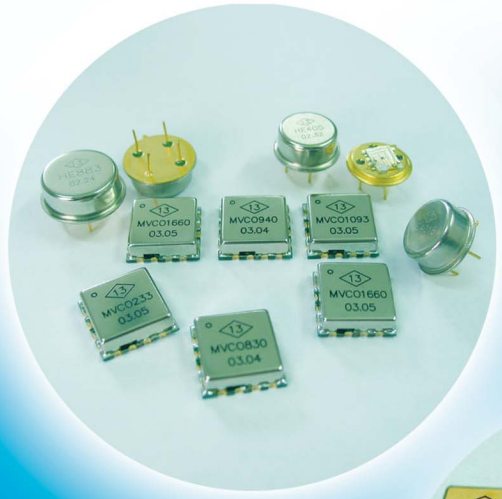
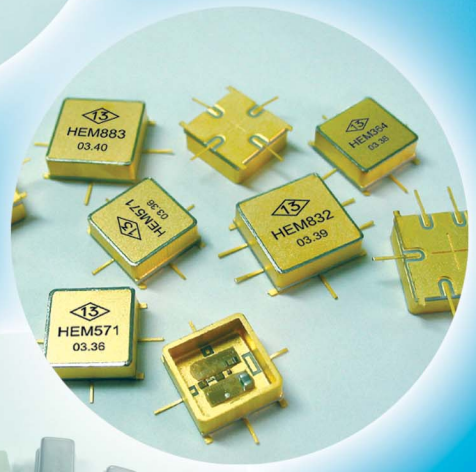
Mini-Packaged Microwave and RF Integrated Circuits

SELECTION GUIDE





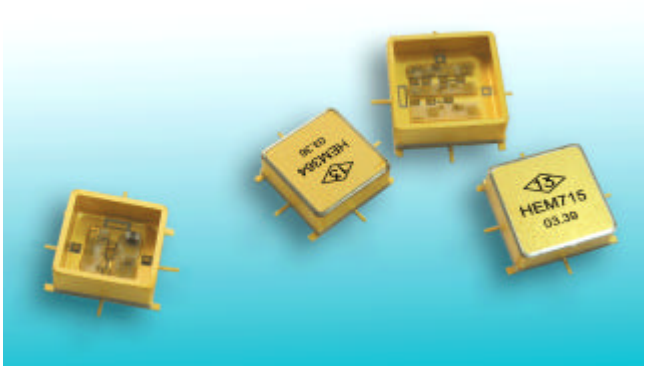
BOWEI INTEGRATED
CIRCUITS CO.,LTD.

Important Information

New SMO-8 Packages

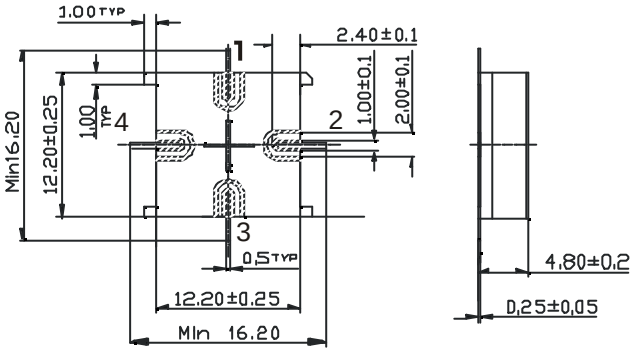
Bowei introduces new packaged style, SMO series, to the customers Adopting international standard, SMO series could be directly used in your systems in stead of the productions of Cougar or W-J company.

All TO-8 package productions have corresponding one in the SMO-8 series. They have completely identical function of the pins.

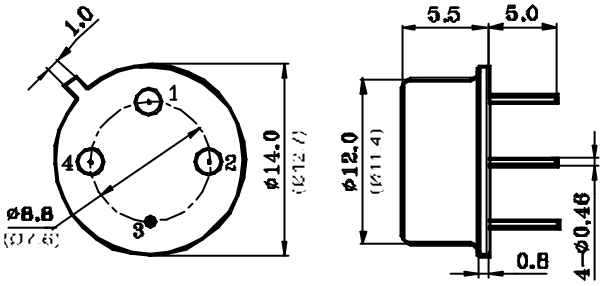


1. Outline drawings

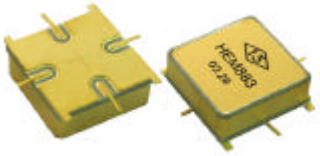
SMO-8C

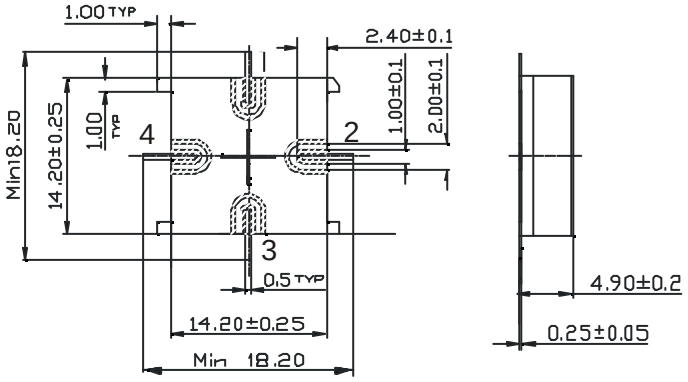


TO-8A、TO-8C

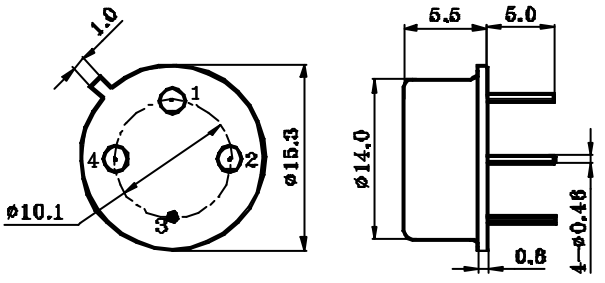


SMO-8D





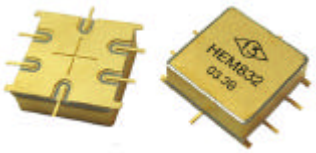
TO-8D

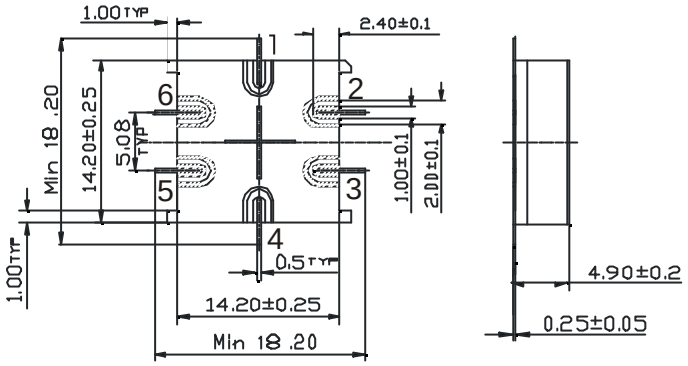


Important Information

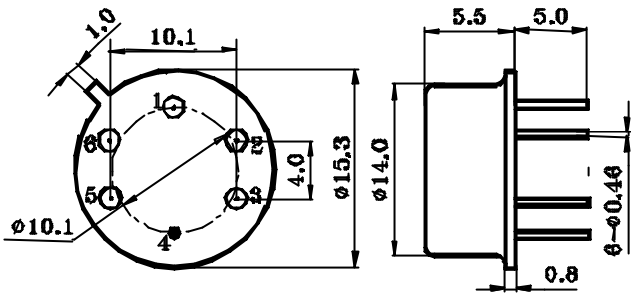
New SMO-8 Packages

SMO-8E





TO-8E



2. To Order

TO-8 series	SMO-8 series
HE⨯⨯⨯	HEM⨯⨯⨯
For example HE372B HE881	 HEM372B HEM881

3. Mounting instructions

3.1 Good RF grounding is necessary.

3.2 For used below 4GHz,four package's ground pin can be soldered only. Full package's ground should be soldered when operating frequency over 4GHz.

3.Testing Device

About Bowei *Integrated Circuits Co. ,LTD*

Bowei Integrated Circuits Co. ,LTD ,founded in 1987, is a professional microwave/RF integrated circuits manufactory. The company offers the worldwide high-performance, cost competitive, quality Mini-packaged RF and Microwave HIC(Hybrid IC) . Almost all devices are sealed by international standard TO-8 packages and SMT packages. They have been widely served in wireless communications, radar receivers, electronic countermeasures, telemetry systems, electronic instruments, aerospace electronics, etc.

High Performance RF / Microwave HIC

Hebei Bowei has more than 15 years' experience in Microwave HIC. By applying microwave thin film processing, micro-assembling and advanced CAD designing, series of RF /microwave HIC and miniature functional modules have been developed. By the end of 2002, 24 series of products which contain more than 360 types had been provided to market, and during the year of 2002, more than 200,000 devices have been used by Chinese customers, including amplifiers, voltage controlled oscillators (VCO), crystal oscillators, filters, attenuators, power splitters / combiners, switches, frequency doublers and comb generators, The operation frequency is covered from DC to 20 GHz .They are small, fully integrated, handy to use, highly reliable and applicable as a variety of Microwave systems. The performance of our products are similar to American companies, such as ***W-J, Merrimac, Cougar, VARI-L*** and ***M/A-COM***. And they can be interchanged directly.

Surface-mount Package RF/ Microwave IC For Wireless Communication

To keep pace with the rapid expansion of wireless communications in recent years, low cost , series surface-mount package RF ICs such as integrated VCOs, Amplifiers, PLLs and filters have been developed for GSM, CDMA, PHS and WLNA.

Excellent Research Conditions and Advanced Designing Measures at Hebei Bowei

More than two million US Dollars has been invested to reform the production lines for HIC in the past few years. Fore processing equipments for magnetic sputtering, laser repairing & laser punching, post processing equipments for micro-assembly, bonding and packaging have been entirely imported from the American companies, Westbond and SSEC. All the equipments and instruments were made in the late 1990s, so the reliability and uniformity of the products can be greatly improved. At present, the workshop occupies 2500m^2, more than 700m^2 are used as local clean rooms. All of the key processes such as etching, electroplating, micro-assembly, bonding, debugging, testing, laser repairing and capping are accomplished in the clean rooms.

Quality Guaranteed Systems at Hebei Bowei

Having passed ISO9001-2002 Quality Verifications in 2002, the company has owned perfect quality management systems. All the materials and devices must be strictly examined before being used. And consummate quality controlling methods can be used for the production process to guarantee the product quality

and to meet various reliability requirements. Each of products are strictly screened before being delivered according to the following requirements.

(1) Production Internal Visual: 10～20 times
(2) Stability Bake:125℃ 168Hrs
(3) Burn-in: Tc 85℃ 168Hrs
(4) Temperature Cycle: -55℃～+125℃ 10cycles
(5) Constant Acceleration: 5000g, Y1 axis
(6) Seal, Gross and Fine: MIL-STD-883 1015.1014

Essential Requirements for Use at Hebei Bowei

The RF and microwave HIC, listed in the Guide are of very high integrity, and with very few external components. So they are very handy to use. But with very high operating frequency, the majority of ICs are electro-static-sensitive. To assure the reliability and the performance of the ICs, more attention should be paid to the following three aspects:

1. Good grounding is necessary for achieving performance shown in catalog..
2. Anti-electrostatic measures should be adopted.
3. DC supply decoupling filtering should be used, especially for cascade applications.

Contact Us

In addition to providing products, We know exactly it is important to have excellent communication with our customers in order to better understand applications. Any need for components and modules, please contact us immediately.

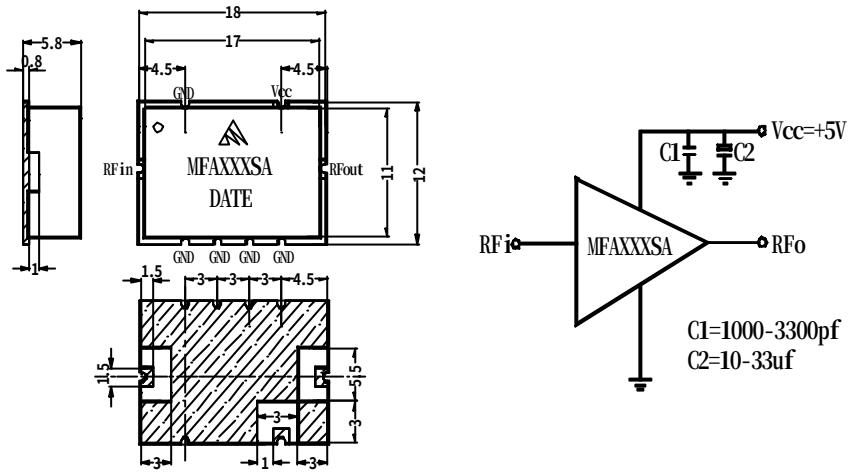
Tel: 86-311-7091427 / 7091412
Fax: 86-311-7081424
Address: P.O.Box 179.Shijiazhuang China
E-mail: mmc-lxh@hbmpc.com
http:// www.cn-bowei.com

Miniature Surface-Mount Package IC For Wireless Communication

· Integrated Surface-Mount Package Low noise High Power Amplifiers

Model	Frequency Range f(GHz)	Gain Gp(dB) Typ Min	Gain Flatness DGp(dB) Max	Input VSWR	Output VSWR	Noise Figure Fn(dB) Typ	Power Output @1dB Compression P_{-1}(dBm)	DC V/mA
MFA825SA	800—850	19.0	±0.3	1.5	1.6	0.7	18	60
MFA825SB	800—850	19.5	±0.3	1.5	1.5	0.7	17	50
MFA825TA	800—850	35.0	±0.3	1.5	1.8	0.6	16	80
MFA825TB	800—850	36.0	±0.3	1.5	1.9	0.6	15	60
MFA900SA	870—925	18.0	±0.3	1.5	1.9	0.7	18	60
MFA900SB	870—925	19.0	±0.3	1.5	1.5	0.6	17	50
MFA900TA	870—925	34.0	±0.3	1.5	1.7	0.6	16	80
MFA900TB	870—925	34.0	±0.3	1.5	1.9	0.6	15	60
MFA940SA	925—960	17.0	±0.3	1.5	2.0	0.6	17	60
MFA940SB	925—960	18.0	±0.3	1.5	1.7	0.6	16	50
MFA940TA	925—960	33.0	±0.3	1.5	1.5	0.6	16	80
MFA940TB	925—960	33.0	±0.3	1.5	2.0	0.6	15	60
MFA1750SA	1715—1785	11.0	±0.3	1.7	1.9	0.8	16	60
MFA1750SB	1715—1785	13.0	±0.3	1.6	1.6	0.8	15	50
MFA1750TA	1715—1785	26.0	±0.3	1.5	1.7	0.8	16	80
MFA1750TB	1715—1785	27.0	±0.3	1.5	1.6	0.8	15	60
MFA1880SA	1850—1910	10.0	±0.3	1.7	1.7	0.8	16	60
MFA1880SB	1850—1910	12.0	±0.3	1.5	1.6	0.8	15	50
MFA1880TA	1850—1910	24.0	±0.3	1.5	1.7	0.8	16	80
MFA1880TB	1850—1910	25.0	±0.3	1.5	1.6	0.8	15	60
MFA1950SA	1920—1980	9.0	±0.3	1.7	1.9	0.8	16	60
MFA1950SB	1920—1980	12.0	±0.3	1.5	1.7	0.8	15	50
MFA1950TA	1920—1980	23.0	±0.3	1.5	1.6	0.8	16	80
MFA1950TB	1920—1980	25.0	±0.3	1.6	1.6	0.8	15	60
MFA2491TC	2450—2500	24.0	±0.3	1.6	1.6	0.8	0	25

Integrated Surface-Mount Package Low noise High Power Amplifiers



Note:

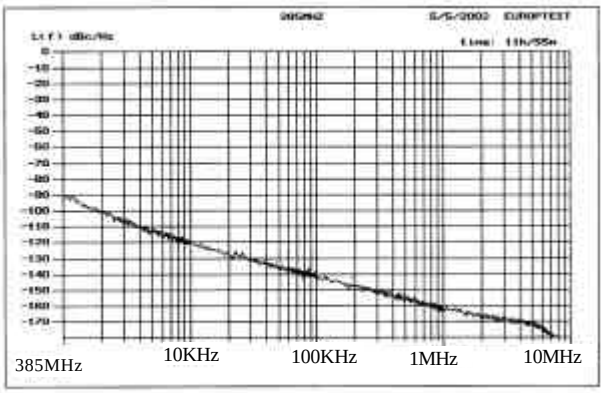
1. Anti-electrostatic measures should be adopted.
2. Operation Temperature:－20～＋70℃, Storage temperature: －45～＋100℃
3. Solder Temperature: ≤230℃±5℃, Solder time: 10s
4. Required Decoupling capacitors at DC supply and grounded tightly.
5. Customer’s products can be offered.

· Integrated Surface-Mount Package Voltage Controlled Oscillators

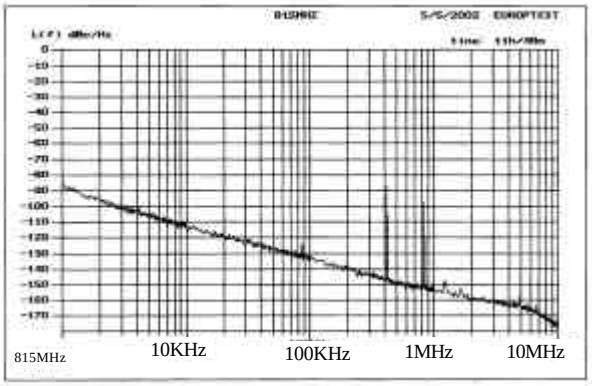
Model	Frequency Range f(MHz)	Power Output Po(dBm)	Tuning Voltage V_T(V)	Harmonic Suppression (dBc) Min	Phase Noise S Φ(dBc/Hz) (fm=10KHz) Typ	Phase Noise S Φ(dBc/Hz) (fm=1MHz) Typ	Input Capacity Cp(pF) Typ	DC Supply Vcc(V)	DC Current Icc(mA) max
MVCO150	140—160	0±2	0.5—4.5	–12	–118	–162	400	5	15
MVCO190	185—195	0±2	1.0—4.0	–17	–118	–162	400	5	15
MVCO233	223—243	0±2	0.5—4.5	–16	–115	–160	250	3	15
MVCO350	340—360	0±2	0.5—4.5	–15	–115	–160	120	3.3	12
MVCO380	370—390	0±2	0.5—4.5	–15	–115	–160	120	5	15
MVCO585	570—590	0±2	1.0—4.0	–13	–115	–160	60	5	15
MVCO699	681—716	0±2	0.5—4.5	–15	–110	–158	50	5	15
MVCO760	740—780	0±2	0.5—4.5	–15	–113	–158	50	5	15
MVCO830	810—850	0±2	0.5—4.5	–15	–110	–155	50	5	15
MVCO900	880—920	0±2	0.5—4.5	–15	–110	–155	50	5	15
MVCO940	920—960	0±2	0.5—4.5	–15	–110	–155	50	5	15
MVCO980	640—980	11±2	0.5—20	–10	–100	–145	150	12	35
MVCO1093	1080—1105	0±2	0.5—4.5	–15	–107	–148	45	5	15
MVCO1138	1125—1150	0±2	0.5—4.5	–15	–106	–146	45	5	15
MVCO1174	1162—1187	0±2	0.5—4.5	–15	–106	–146	45	5	15
MVCO1250	1200—1300	0±2	0.5—4.5	–15	–105	–145	40	5	15
MVCO1500	1450—1550	0±2	0.5—4.5	–25	–102	–142	40	5	15
MVCO1540	1040—1540	7±3	0.5—20	–13	–105	–145	60	12	30
MVCO1550	1500—1600	0±2	0.5—4.5	–25	–100	–140	40	5	15
MVCO1600	1550—1650	0±2	0.5—4.5	–25	–100	–140	40	5	15
MVCO1650	1600—1700	0±2	0.5—4.5	–25	–100	–140	40	5	15
MVCO1660	1630—1690	0±2	0.5—4.5	–25	–100	–140	30	3.3	15
MVCO1760	1730—1790	0±2	0.5—4.5	–25	–100	–140	40	5	15
MVCO1810	1770—1850	0±3	0.5—4.5	–30	–100	–140	30	5	15
MVCO1850	1800—1900	0±2	0.5—4.5	–30	–100	–140	30	5	15
MVCO1870	1450—1870	6±2	0.5—20	–15	–105	–142	60	12	30
MVCO2050	2030—2070	–1.5±1.5	0—3.3	–30	–95	–138	20	3	12
MVCO2100	2050—2150	0±2	0.5—4.5	–30	–95	–138	25	5	15
MVCO2150	2100—2200	0±2	0.5—2.5	–30	–95	–138	25	5	15
MVCO2250	2200—2300	0±3	0.5—4.5	–30	–95	–138	25	5	15
MVCO2350	2300—2400	0±2	0.5—4.5	–30	–95	–136	25	5	15
MVCO2600	2400—2600	6±2	0.5—4.5	–30	–100	–140	20	12	30
Note: International standard package: 12.7x12.7x4.0mm^3									

Integrated Surface-Mount Package Voltage Controlled Oscillators

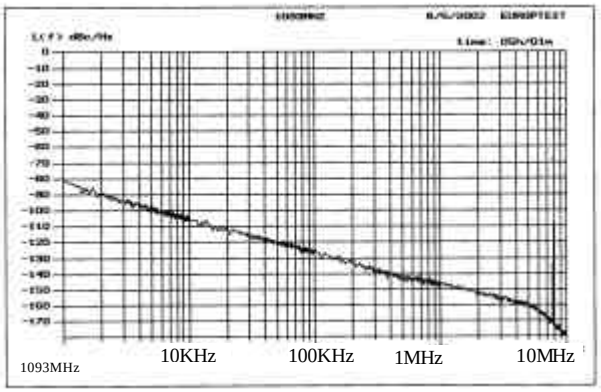
Phase Noise：



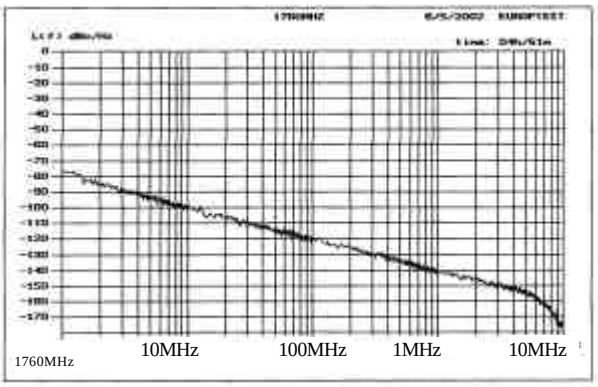
MVCO380



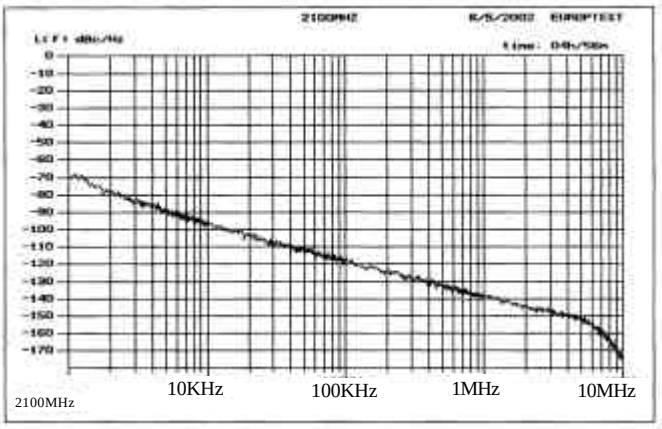
MVCO830



MVCO1093



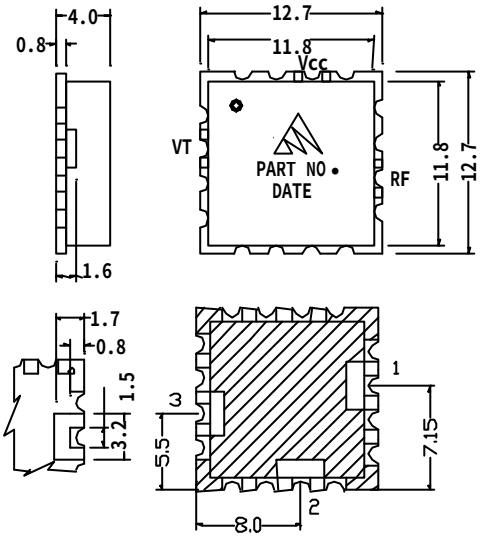
MVCO1760



MVCO2100

Note：

1. Tested by PN9000 phase noise system from France EUROPTEST Company and when offset above 5MHz, the value of phase noise maybe not precision.
2. Customer's VCO can be offered: frequency range: 150～2600MHz, relative bandwidth:5～30%.
3. Operation Temperature:－20～＋70℃, Storage temperature: －45～＋100℃
4. Solder Temperature: ≤230℃±5℃, Solder time: <10s.
5. International Standard Package: 12.7×12.7×4.0mm^3.



1. RF Output
2. DC Supply: Vcc
3. Control Port:V_T

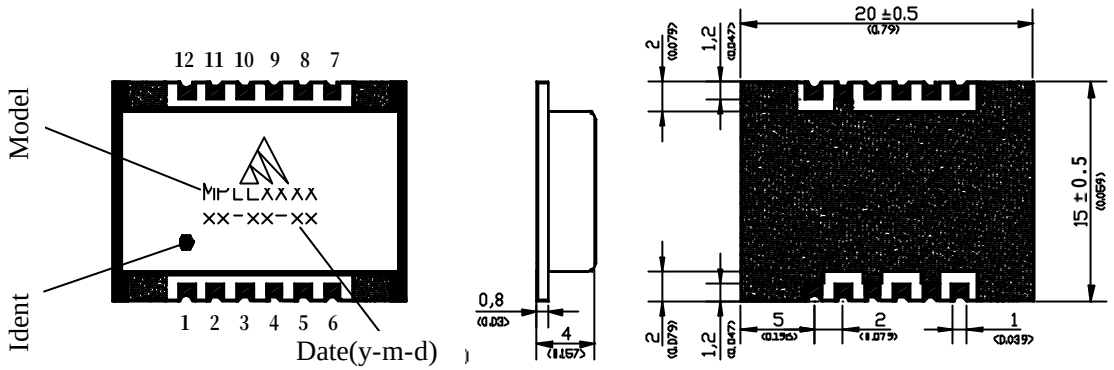
Others:GND

· Integrated Surface-Mount Package PLL Synthesizers

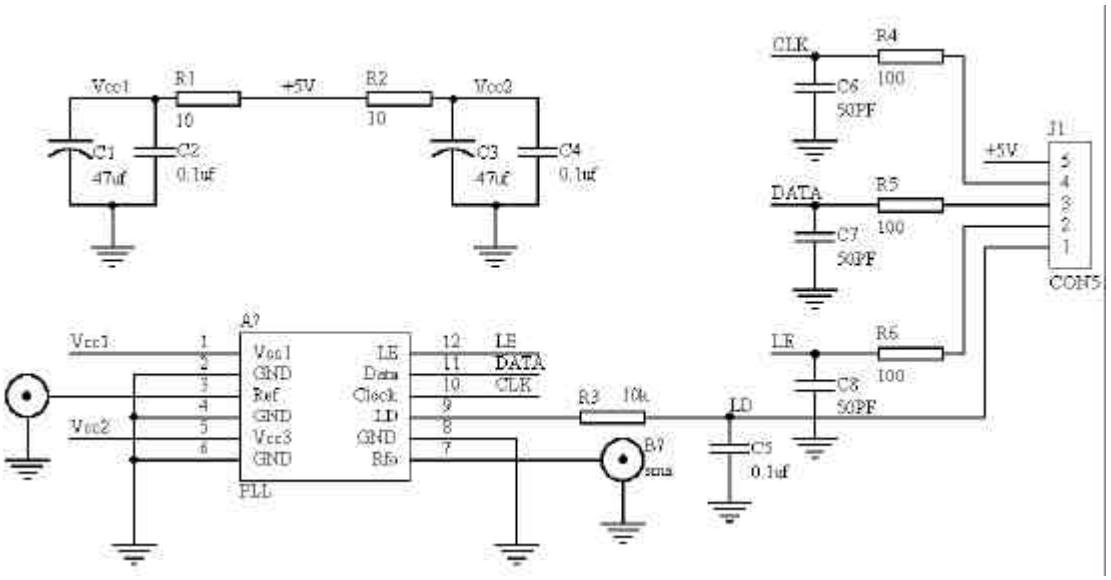
Model	Frequency Range f(MHz)	Step Typ (MHz)	Output Power (dBm)	Frequency Switching Time (mSec)	Phase Noise S_{ϕ}(dBc/Hz) fm= 10KHz/100KHz	Harmonic Suppression (dBc) 2nd 3rd	Spurious Output (dBc)	DC Voltage Vcc1&2 (v)	DC Current (mA)
MPLL110A	102—118	20KHz	0±3	<15	–105/–125	15 15	>65	+5/+5	<40
MPLL300A	290—310	30KHz	0±3	<15	–105/–125	15 15	>65	+5/+5	<40
MPLL402A	390—415	30KHz	0±3	<15	–105/–125	15 15	>65	+5/+5	<40
MPLL766A	754—778	30KHz	0±3	<15	–100/–125	15 15	>65	+5/+5	<40
MPLL836A	824—849	30KHz	0±3	<15	–100/–120	15 15	>65	+5/+5	<40
MPLL881A	869—894	30KHz	0±3	<15	–100/–120	15 15	>65	+5/+5	<40
MPLL1150B	1100—1200	50KHz	0±3	<15	–95/–115	15 15	>65	+5/+5	<40
MPLL1550B	1500—1600	50KHz	0±3	<15	–95/–115	10 15	>60	+5/+5	<40
MPLL1800B	1770—1840	50KHz	0±3	<15	–90/–110	10 15	>60	+5/+5	<40
MPLL2290B	2260—2320	50KHz	0±3	<15	–90/–110	10 15	>60	+5/+5	<40
MPLL2380B	2300—2460	50KHz	0±3	<15	–90/–110	10 15	>60	+5/+5	<40

Integrated Surface-Mount Package PLL Synthesizers

Outline and Block Diagram



Pin No	Function	Pin No	Function	Pin No	Function	Pin No	Function
1	V_{CC1}	2	GND	3	f_{REF}	4	GND
5	V_{CC2}	6	GND	7	RF OUT	8	GND
9	Lock Detect	10	Clock	11	Data	12	Load Enable



Note:

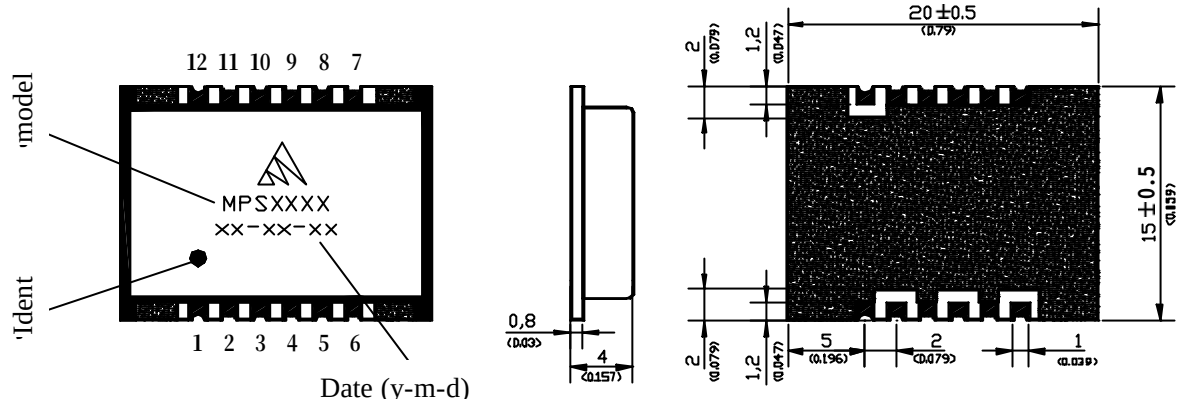
1. Required Decoupling at DC supply and grounded tightly.
2. Solder Temperature: ≤230℃±5℃, Solder time: 10s.
3. Interchanged directly with Series MLS9XXXX－5XXXX or Series 192 from American M/A-COM and SYNERGY Company respectively.
4. Reference frequency: 5～40MHz,Level >0.5V_{p-p}
5. Customer's products can be offered: frequency range: 100～2500MHz, relative bandwidth:2～20%.
6. Operation temperature: -30℃～+70℃
7. Programable control bits see:（National Semiconductor ）LMX2325 or（National Semiconductor ）LMX232

· Integrated Surface-Mount Package Fixed PLL Synthesizers

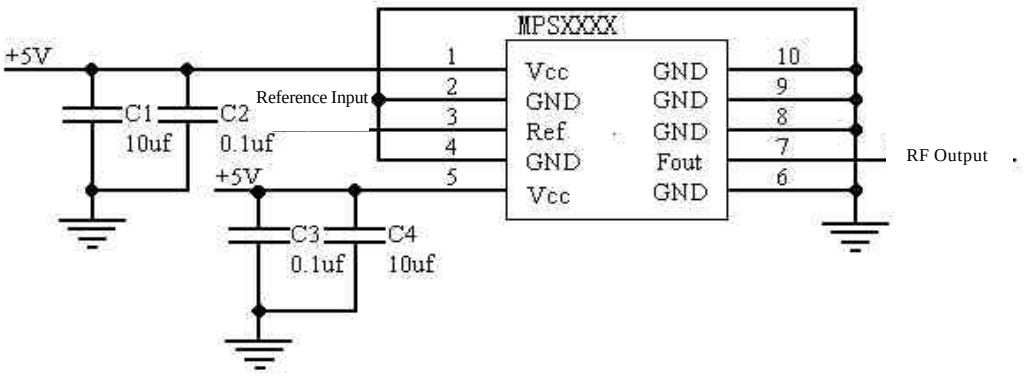
Model	Frequency f(MHz)	Output Power (dBm)	Phase Noise S_φ(dBc/Hz) fm=10KHz/100KHz	Harmonic Suppression (dBc) 2nd	3rd	Spurious Output (dBc)	DC Supply V/mA
MPS110	110.04	0±3	–115/–130	15	15	>65	+5/40
MPS300	300	0±3	–110/–125	15	15	>65	+5/40
MPS402	402	0±3	–105/–125	15	15	>65	+5/40
MPS715	715	0±3	–100/–125	15	15	>65	+5/40
MPS760	760	0±3	–100/–120	15	15	>65	+5/40
MPS830	830	0±3	–100/–120	15	15	>65	+5/40
MPS1132	1132	0±3	–95/–115	15	15	>65	+5/40
MPS1566	1566	0±3	–95/–115	10	15	>60	+5/40
MPS1615	1615	0±3	–90/–110	10	15	>60	+5/40
MPS2356	2356	0±3	–90/–110	10	15	>60	+5/40
MPS2400	2400	0±3	–90/–110	10	15	>60	+5/40

Integrated Surface-Mount Package Fixed PLL Synthesizers

Outline and Block Diagram



PIN No	Function	PIN No	Function	PIN No	Function	PIN No	Function
1	Vcc(+5V)	2	GND	3	f_{REF}	4	GND
5	Vcc(+5V)	6	GND	7	RF_{out}	8	GND
9	GND	10	GND	11	GND	12	GND



Note:

1. Required Decoupling at DC supply and grounded tightly.
2. Solder Temperature: ≤230℃±5℃, Solder time: 10s.

High Performance RF/Microwave HIC

RF / Microwave Cascadable Amplifiers

1, General Amplifiers

Model	Frequency Range f(MHz)	Gain Gp(dB) Typ	Gain Gp(dB) Min	Gain Flatness DGp(dB) Max	Noise Figure Fn(dB) Typ	Power Output @1dB Compression P_{-1}(dBm) Typ	Power Output @1dB Compression P_{-1}(dBm) Min	VSWR In/Out Typ	DC V/mA	Package
HE364B	10—200	33.5	32.0	±0.5	1.3	8.0	6.0	1.3:1	15/38	TO-8A
HE365	20—200	18.0	17.0	±1.0	4.0	/	18.0	1.5:1	12/55	TO-8C
HE321B	10—500	28.0	25.0	±0.5	2.0	6.0	3.0	1.5:1	12/35	TO-8A
HE321D	10—1000	19.5	18.0	±1.0	3.0	1.5	0	1.5:1	12/35	TO-8A
HE360A	10—500	29.0	28.0	±0.5	1.7	7.5	6.0	1.5:1	15/38	TO-8C
HE361B	10—500	29.0	28.0	±0.5	1.7	7.5	6.0	1.3:1	15/38	TO-8A
HE362B	10—1000	19.5	18.0	±0.75	2.7	2.0	0	1.5:1	15/38	TO-8A
HE371B	10—500	17.0	15.0	±0.5	1.8	/	2.0	1.7:1	15/12	TO-8C
HE372B	10—500	20.0	19.0	±0.5	2.2	10.0	9.5	1.5:1	15/25	TO-8C
HE373B	10—1000	14.5	14.0	±0.5	2.7	/	8.0	2.0:1	15/20	TO-8C
HE373C	20—1000	13.0	12.0	±0.5	4.5	17.5	17.0	1.6:1	15/55	TO-8C
HE374B	10—1500	11.0	9.5	±0.75	4.5	9.0	8.5	2.0:1	15/25	TO-8C
HE381B	20—500	11.5	11.0	±0.5	2.0	13.0	12.0	1.5:1	15/32	TO-8C
HE382B	20—1000	10.5	10.0	±0.75	3.0	9.5	8.0	2.0:1	15/25	TO-8C
HE383B	20—500	10.5	10.0	±0.5	4.0	17.0	16.0	1.7:1	15/45	TO-8C
HE391A	20—700	16.0	15.0	±0.5	3.5	17.5	17.0	1.8:1	15/55	TO-8C
HE391B	20—500	16.0	15.0	±0.5	4.0	20.0	19.5	1.5:1	15/63	TO-8C
HE391C	20—400	15.0	14.0	±0.5	4.0	25.0	24.0	1.5:1	15/120	TO-8C
HE461B	10—1000	24.0	23.0	±0.75	3.5	10.0	9.0	1.7:1	15/45	TO-8A
HE462B	10—1500	20.0	19.0	±0.75	4.5	/	8.0	2.0:1	15/45	TO-8A
HE463B	10—2000	17.5	16.0	±1.0	5.5	/	8.0	2.0:1	15/45	TO-8A
HE861	20—500	29.0	27.0	±0.5	4.0	/	18.0	1.8:1	12/85	TO-8D
HE871	20—1000	26.0	24.0	±1.0	4.0	17.0	16.5	2.0:1	12/85	TO-8D
HE390A	10—500	18.0	17.0	±0.5	6.0	27.5	7.0	1.7:1	15/180	SP-1A
Note: Below 20MHz, P_{-1} and Fn may be changed slightly										

2, IF Amplifiers

Model	Frequency Range f(MHz)	Gain Gp(dB) Typ	Gain Gp(dB) Min	Gain Flatness DGp(dB) Max	Noise Figure Fn(dB) Typ	Power Output@1dB Compression P_{-1}(dBm) Typ	Power Output@1dB Compression P_{-1}(dBm) Min	In/Out VSWR Typ	DC V/mA	Package
HE311	1—100	18	17	±0.5	4.0	18	17	1.7:1	12/55	TO-8C
HE312	1—100	16	15	±0.5	3.5	/	19	1.5:1	15/63	TO-8F
HE313	1—100	28	27	±0.5	2.2	17	16	1.5:1	15/32	TO-8F
HE315	1—50	18	17	±0.5	5.0	/	27	1.7:1	15/180	SP-1A
HE316	3—50	11	10	±0.5	1.3	21	20	1.7:1	15/35	TO-8F
Note: DC supply of HE315 can be used at +18V; Power output P_{-1} can reach 30 dBm.										

3, Low Noise & High Dynamic Range Amplifiers

Model	Frequency Range f(MHz)	Gain Gp(dB) Typ	Gain Gp(dB) Min	Gain Flatness DGp(dB) Max	Noise Figure Fn(dB) Typ	Power Output @1dB Compression P_{-1}(dBm) Typ	Power Output @1dB Compression P_{-1}(dBm) Min	In/Out VSWR Typ	DC V/mA	Package
HE380A	10—400	14.0	13.0	±0.5	2.9	17.0	16.0	1.5:1	15/35	TO–8C
HE380B	10—400	14.0	13.0	±0.5	3.2	20.0	19.0	1.5:1	15/45	TO–8C
HE380C	10—400	17.0	16.0	±0.5	2.4	17.0	16.0	1.5:1	15/35	TO–8C
HE380D	10—400	17.0	16.0	±0.5	2.6	20.0	19.0	1.5:1	15/45	TO–8C
HE385A	10—400	/	8.0	±0.5	1.5	11.0	10.0	1.5:1	15/13	TO–8C
HE385B	10—400	/	8.0	±0.5	1.8	18.0	16.0	2.0:1	15/30	TO–8C
HE385C	10—250	7.5	7.0	±0.5	1.8	24.0	23.0	2.0:1	15/50	TO–8C
HE386A	10—200	11.0	10.0	±0.5	1.0	18.0	15.0	1.5:1	15/13	TO–8C
HE386B	10—200	11.0	10.0	±0.5	1.4	21.0	19.0	1.7:1	15/30	TO–8C
HE387A	20—400	26.0	25.0	±0.5	2.3	17.5	16.5	2.0:1	15/30	TO–8C
HE387B	20—400	26.0	25.0	±0.5	2.7	21.0	20.0	2.0:1	15/45	TO–8C
HE387C	100—700	21.0	20.0	±0.5	2.5	16.0	15.0	1.5:1	15/30	TO–8C
HE387D	100—700	22.0	21.0	±0.5	3.8	21.0	20.0	1.5:1	15/55	TO–8C
HE388A	20—400	29.0	28.0	±0.5	3.5	24.0	23.0	2.0:1	15/65	TO–8C
HE389A	20—250	30.0	29.0	±0.5	2.0	21.0	20.0	2.0:1	15/45	TO–8C
HE389B	20—250	30.0	29.0	±0.5	2.5	24.0	23.0	2.0:1	15/65	TO–8C
Note: Below 20MHz, P_{-1} and Fn may be changed slightly										

4, Amplifiers With Lower DC Supply

Model	Frequency Range f(MHz)	Gain Gp(dB) Typ	Gain Gp(dB) Min	Gain Flatness DGp(dB) Max	Noise Figure Fn(dB) Typ	Power Output @1dB Compression P_{-1}(dBm) Typ	Power Output @1dB Compression P_{-1}(dBm) Min	VSWR In/Out Typ	DC V/mA	Package
HE393A	10—500	18.0	17.0	±0.5	2.7	12.0	11.0	1.7:1	5/30	TO–8C
HE393B	10—500	18.0	17.0	±0.5	4.5	18.0	16.5	1.8:1	5/60	TO–8C
HE394A	10—1000	16.0	15.0	±0.5	3.0	11.0	10.0	1.8:1	5/30	TO–8C
HE394B	10—1000	16.0	15.0	±0.5	4.5	16.0	15.0	1.7:1	5/60	TO–8C
HE395A	10—1500	11.5	11.0	±0.5	3.8	10.0	9.0	1.7:1	5/30	TO–8C
HE395B	10—1500	11.5	10.0	±0.5	4.8	14.0	13.0	1.8:1	5/60	TO–8C
Note: Below 20MHz, P_{-1} and Fn may be changed slightly										

5, Low Noise GaAs FET Amplifiers

Model	Frequency Range f(GHz)	Gain Gp(dB) Typ	Gain Gp(dB) Min	Noise Figure Fn(dB) Typ	Noise Figure Fn(dB) Min	Power Output @1dB Compression P_{-1}(dBm) Typ	Power Output @1dB Compression P_{-1}(dBm) Min	DC V/mA	Package
HE550	0.32—0.38	27.0	25.0	0.7	0.8	0	/	5/12	TO–8F
HE550A	0.5—0.7	27.0	25.0	0.8	1.0	6.0	5.0	12/65	TO–8F
HE550B	0.6—1.0	26.0	24.0	0.8	1.0	4.0	3.0	12/65	TO–8F
HE551	0.9—1.3	28.0	25.0	1.2	1.35	12.0	11.0	12/65	TO–8D
HE551A	0.95—1.25	37.0	36.0	0.9	1.0	14.0	13.0	12/65	TO–8D
HE551B	0.95—1.25	38.0	37.0	0.9	1.0	16.0	15.0	12/85	TO–8D
HE552	1.2—1.5	26.0	23.0	1.2	1.4	11.0	10.0	12/65	TO–8D
HE553	1.4—1.7	25.0	23.0	1.3	1.4	11.0	10.0	12/65	TO–8D

HE554	2.0—2.5	24.0	22.0	1.3	1.5	11.0	10.0	12/65	TO–8D
HE554B	2.4—2.8	24.0	22.0	1.3	1.5	11.0	10.0	12/65	TO–8D
HE008	3.1—3.4	23.0	22.0	1.3	1.5	9.0	8.0	12/35	TO–8D

Note: 1. While using, two decoupling capacitances, 33uF and 1000pF respectively, are applied between the supply and ground.
2. Pay attention to electrostatic. Soldering iron must be reliably grounded while bonding.

6, Medium Power GaAs FET Amplifiers

Model	Frequency Range f(GHz)	Gain Gp(dB) Typ	Gain Gp(dB) Min	Gain Flatness DGp(dB) Max	Noise Figure Fn(dB) Typ	Power Output @1dB Compression P_{-1}(dBm) Typ	Power Output @1dB Compression P_{-1}(dBm) Min	DC V/mA	Package
HE571*	1.0—3.5	9.0	8.0	±0.75	4.0	21.0	20.0	12/85	TO–8C
HE572	0.8—3.5	8.0	7.0	±0.75	4.0	14.5	13.0	12/36	TO–8C
HE573*	0.8—2.0	13.5	12.0	±0.75	4.0	20.0	19.0	12/75	TO–8A
HE574*	0.6—2.5	11.5	10.0	±1.0	4.0	19.5	19.0	12/75	TO–8A
HE581	0.8—2.5	20.5	19.0	±0.75	4.0	13.5	13.0	12/75	TO–8D
HE583*	0.8—2.5	25.0	24.0	±0.75	4.0	20.0	19.0	12/100	TO–8D
HE584*	1.5—3.0	24.0	22.0	±1.0	4.0	19.0	18.0	12/100	TO–8D
HE641	1.0—3.5	20.0	17.0	±1.5	4.0	21.0	20.0	12/145	TO–8A
HE641B*	1.0—3.5	26.0	24.0	±1.5	5.0	/	23.0	12/145	SP–3
HE641D*	0.5—2.5	28.0	27.0	±1.0	4.5	22.5	/	12/175	SP–3
HE641E*	1.0—3.5	27.0	26.0	±1.5	5.0	22.5	/	12/175	SP–3
HE061*	4.0—4.5	19.0	18.0	±0.5	3.5	22.5	/	12/185	SP–3
HE024*	3.0—4.0	20.0	18.0	±1.5	3.5	2.0	20.0	12/120	TO–8A
HE033*	3.0—4.2	22.0	18.0	±1.0	5.0	3.0	22.0	12/175	SP–3
HE642	5.2—5.8	18.0	16.0	±0.75	5.0	1.0	20.0	12/150	TO–8D
HE643*	0.5—3.0	30.0	29.0	±1.5	5.5	7.0	/	12/250	SP–3

Notes: 1. Output power of Models with "*" are saturation P_O.
2. While using, two decoupling capacitances, 33uF and 1000pF respectively, are applied between the supply and ground.
3. Pay attention to electrostatic. Soldering iron must be reliably grounded while bonding.

7, IF Limiting Amplifiers

Model	Frequency Range f(MHz)	Small Signal Gain Gp(dB) Typ	Saturated Output Power Po(dBm) Typ	Even order Harmonic Suppression (dB)	Noise Figure Fn(dB) Min	DC V/mA	Package
HE072	10—300	10	0	–20	7.0	15/25	TO–8C
HE072A	2—100	13	0	–25	5.0	15/25	TO–8C
HE073	10—300	20	0	–20	7.5	15/45	TO–8D
HE073A	200—500	20	0	–20	6.0	15/45	TO–8D
HE073B	2—100	26	0	–30	6.0	15/45	TO–8D

Note: 1. HE072 can be interchanged with UTL—503 from HP-Avantek (America).
2. HE072 and HE073 can be cascaded to a gain link, the highest gain can reach up to 70~120dB.

8, High Reverse Isolation Amplifier

Model	Frequency Range f(MHz)	Gain Gp(dB) Min	Gain Flatness DGp(dB) Max	Reverse Isolation ISO(dB) Typ		Power Output @1dB Compression P_{-1}(dBm) Typ	VSWR Typ	DC V/mA	Package
HE771	10—200	12.0	±0.5	<200MHz	<500MHz	13.0	1.5：1	15/35	TO–8A
				50	45				
HE772	10—1000	8.5	±1.0	<500MHz	<1000MHz	10.0	2.0：1	15/35	TO–8A
				45	35				
Note: The real operating frequency of HE771 can reach to 500MHz, but its forward gain will drops 2~3dB.									

9, Voltage Gain-Controlled (VGC)Amplifiers

Model	Frequency Range f(MHz)	Gain Gp(dB) Min	VGC Range（dB）		VGC Voltage / VGC Current V/mA	Power Output @1dB Compression P_{-1}(dBm) Typ	DC V/mA	Package
			<200MHz	<500MHz				
HE761	20—500	17.5	35	30	0—12/0—7	9.0	12/35	TO–8G
HE762	20—200	31.0	50	/	0—12/0—10	8.0	12/50	TO–8H

Crystal Oscillators

1, Temperature Compensated Crystal Oscillators（TCXOs）

Type	Frequency Range f(MHz)	Frequency Stability Vs Temperature ppm	Phase Noise S Φ(dBc/Hz) (fm=100Hz) Typ	Harmonics Distortion dBc	Output※ Po(dBm) Typ	Temperature Range	Package
TX14 Series	10—30	±0.5—5	/	–20	0	Optional	DIP–14D
TX14D-S-HU-R@10M	10	±1	–110	–20	0	–40—85℃	DIP–14D
TX30 Series	10—70	±0.5—5	/	–30	5	Optional	MP3030
TX30D-S-JU-I48M96	48.96	±2	–110	–30	7	–40—85℃	MP3030
TX32 Series	10—70	±0.5—5	/	–30	5	Optional	MP3232
TX32D-S-HU-R@10M	10	±1	–110	–30	7	–40—85℃	MP3232
TX36 Series	10—70	±0.5—5	/	–30	5	Optional	MP3627
TX36D-S-JU-R@70M	70	±2	–110	–30	5	–40—85℃	MP3627
Note: 1. ※Option Output Signal: Sine wave, Clipped Sine wave, TTL. 2. .Option temperature Range : 0~50℃, -20~70℃, -30~70℃, -40~85℃.							

2, Oven Controlled Crystal Oscillators （OCXOs）

Type	Frequency Range f (MHz)	Frequency Stability Vs Temperature ppm	Phase Noise S Φ(dBc/Hz) (fm=100Hz) Typ	Short Term Stability Allenvariance	Output※ Po(dBm) Typ	Temperature Range	Ageing ppm/year	Package
OX30 Series	10—70	±0.05-0.3	/	$5X10^{-12}$/sec	5	Optional	0.5—1	MP3030
OX30D-S-JS-R@16M384	16.384	±0.1	–120	/	7	–30—70℃	1	MP3030
OX32 Series	10—100	±0.005-0.2	/	$5X10^{-12}$/sec	5	Optional	0.5—1	MP3232
OX32D-S-HS-R@10M	10	±0.05	–130	/	7	–40—70℃	1	MP3232
OX32D-S-HS-R@100M	100	±0.1	–115	/	7	–40—70℃	1	MP3232
OX38 Series	10—100	±0.005-0.2	/	$5X10^{-12}$/sec	5	Optional	0.5—1	MP3838
OX38D-S-JT-R@10M	10	±0.05	–130	/	7	–40—70℃	1	MP3838
OX38D-S-HT-R@100M	100	±0.1	–115	/	7	–40—70℃	1	MP3838
OXLN Series	10—100	±0.05-0.3	–150(@1KHz)	$5X10^{-12}$/sec	10	–40—70℃	0.5—1	Optional
Note: 1. ※Option Output Signal: Sine wave, Clipped Sine wave, TTL. 2. Option temperature Range : 0~50,℃, -20~60℃, -30~70℃, -40~70℃.								

3、Voltage controlled Crystal Oscillators（VCXOs）

Type	Frequency Range f(MHz)	Frequency Stability Vs Temperature ppm	Voltage Control Linearity	Votlage Control Pulling Range ppm	Output※ Po(dBm) Typ	Temperature Range	Package
VX14 Series	10—30	±10—25	±5—20%	±30—200	0	Optional	DIP–14D
VX30 Series	10—60	±10—25	±5—20%	±30—200	5	Optional	MP3030

Note： 1. ※Option Output Signal: Sine wave, Clipped Sine wave, TTL.
2. Option temperature Range: 0~~50℃, -10~~60℃, -20~~70℃, -40~~85℃.
3. Above 30MHz, Double-frequency output can be selected for VX30 series。

4、General Crystal Oscillator（PXOs）

Type	Frequency Range f(MHz)	Frequency Stability Vs Temperature ppm	Frequency Accuracy T_C=25℃	Phase Noise S Φ(dBc/Hz) (fm=100Hz) Typ	Output※ Po(dBm) Typ	Temperature Range	Package
PX14 Series	10—160	±10—25	±2ppm	–105	0	Optional	DIP–14D
PX30 Series	10—160	±10—25	±2ppm	–105	5	Optional	MP3030

Note： 1. ※Option Output Signal: Sine wave, Clipped Sine wave, TTL.
2. Option temperature Range: 0~~50℃, -10~~60℃, -20~~70℃, --30~~70℃, 40~~85℃.

Integrated voltage-controlled oscillators

1, Integrated Broadband VCO

Model	Frequency Range f(MHz)	Tuning Voltage V_T(V)	Power Output Po(dBm) Min	Power Output Flatness DPo(dB) Max	Phase Noise S Φ (dBc/Hz) (fm=10KHz) Typ	Harmonics Suppression (dBc) Typ	Spurious Suppression (dBc) Min	DC V/mA	Package
HE880A	25—50	0—15	13.0	±1.5	–112	–10	–70	12/30	TO–8D
HE880B	50—100	0—15	13.0	±1.5	–112	–10	–70	12/30	TO–8D
HE881	70—140	0—15	13.0	±1.5	–110	–10	–70	12/30	TO–8D
HE882	100—200	0—20	13.0	±1.5	–110	–10	–70	12/30	TO–8D
HE883	150—300	0—20	13.0	±1.5	–110	–10	–70	12/30	TO–8D
HE884	200—400	0—20	13.0	±1.5	–110	–10	–70	12/30	TO–8D
HE401B	300—600	0—20	13.0	±1.5	–110	–10	–70	12/30	TO–8C
HE402B	500—1000	0—20	13.0	±1.5	–105	–10	–70	12/30	TO–8C
HE403B	800—1500	0—20	13.0	±1.5	–100	–10	–70	12/30	TO–8C
HE405	1000—2000	0—20	13.0	±1.5	–100	–10	–70	12/30	TO–8C
HE483	700—1400	0—20	13.0	±1.5	–100	–10	–70	12/30	TO–8C
HE484	800—1600	0—20	13.0	±1.5	–100	–10	–70	12/30	TO–8C
HE486B	2000—3000	0—15	13.0	±1.5	–95	–30	–70	12/30	TO–8C
HE488	3700—4200	0—15	10.0	±1.5	–87	–20	–70	12/30	TO–8C

2 ,Integrated Ultra-Broadband VCO (Cover 3 band)

Model	Frequency Range f(MHz)	Tuning Voltage V_T(V)	Power Output Po(dBm) Min	Switch Time(μs) Max	Phase Noise S Φ(dBc/Hz) (fm=10KHz) Typ	Spurious Suppression (dBc) Min	DC V/mA	Package
HE885	30—110	2—10	10	5.0	–112	–70	12/50	DIP–22A

Note: 1. Ultra-Broadband VCO is achieved by using SP3T switch in tuning loop.
2.Customers' products can be offered.

3, Integrated VCO With Built-in Buffer Amplifier

Model	Frequency Range f(MHz)	Tuning Voltage V_T(V)	Power Output Po(dBm) Min	Phase Noise S Φ(dBc/Hz) (fm=10KHz) Typ	Harmonics Suppression (dBc) Typ	Spurious Suppression (dBc) Min	DC V/mA	Package
HE711	535—635	0—12	13.0	–100	–70	–10	12/60	TO–8D
HE713	1500—2100	0—20	10.0	–95	–70	–15	12/70	TO–8D
HE714	1800—2600	0—20	10.0	–95	–70	–35	12/70	TO–8D
HE715	2200—3000	0—15	10.0	–90	–70	–30	12/70	TO–8D
HE716	5000—6000	0—15	10.0	–97*	–60	–20	12/85	TO–8D
HE717	8000—9000	0—15	10.0	–92*	–60	–20	12/85	TO–8D
HE406	2000—4000	0—20	10.0	–105*	–60	–20	12/85	TO–8C
HE102	4000—8000	0—20	10.0	–95*	–60	–20	15/86	TO–8C

Note: 1. Phase noise of models with "*" are tested at fm=100KHz. 2.Built-in buffer amplifier can reduce frequency pulling due to variations in load. 3. Customers' products can be offered, frequency range is from 200MHz to10000MHz.

4, Low Phase Noise VCO With Ceramic Coaxial Resonator

Model	Frequency Range f(MHz)	Power Output Po(dBm) Min	Tuning Voltage V_T(V)	Phase Noise S (dBc/Hz) (fm=10KHz) Typ	Frequency Drift (MHz)Typ -55~+85℃	Spurious Suppression (dBc) Min	DC V/mA	Package
CRO700	680—720	13±0.5	0—15	–115	±1.0	–70	12/60	DIP–22C
CRO1000	970—1040	13±0.5	0—15	–112	±1.5	–70	12/60	DIP–22C
CRO2200	2170—2230	12±0.5	0—15	–107	±2.0	–70	12/60	DIP–22C
CRO3000	2992—3008	10±0.2	0—15	–106	±2.0	–70	12/60	DIP–22C
GRO1030	1030	13	/	–117	±0.5	–70	12/60	DIP–22C
GRO2700	2700	10	/	–110	±1.0	–70	12/60	DIP–22C

Note: 1. Built-in buffer amplifier can reduce frequency pulling due to variations in load.
2. The products can be offered for customers' requirements. Frequency ranges from 500 to 3100MHz, relative bandwidth of 1-8%. Phase noise and frequency stability can be improved fairly at 1-2% bandwidth. GRO are fixed oscillators and customers' products can be offered.

5,Integraed Narrow-Band VCO

Model	Frequency Range f(MHz)	Tuning Voltage V_T(V)	Power Output Po(dBm) Min	Power Flatness DPo(dB) Max	Phase Noise S (dBc/Hz) (fm=10KHz) Typ	Spurious Suppression (dBc) Min	DC V/mA	Package
HE481	1525—1625	0—10	13.0	±1.0	–100	–70	12/30	TO–8A

Note: 1. Customers' products can be offered. Frequency range covers 25~3000MHz, relative bandwidth of 5~30%
2. Centre frequency, Bandwidth, tuning sensitivity, tuning voltage should be provided by customer.
3. Buffer isolation should be designed while using.

6, Integrated Dual Output VCO With Built-in Buffer Amplifier

Model	Frequency Range f(MHz)	Main Output P_{01} (dBm) Min	Aux Output P_{02}(dBm) Typ	Phase Noise S (dBc/Hz) (fm=10KHz) Typ	Spurious Suppression (dBc) Min	DC V/mA	Package
HE831	1800—1950	13	0	–95	–70	12/70	TO–8E
HE832	2200—2600	10	0	–90	–70	12/70	TO–8E

Note: 1. VCOs contain a power divider to feed the buffer amplifier (main output) and PLL(aux output).
2. The products can be offered for customers' requirements within 200-4500MHz.

7, Dual-Tuning , Dual Output VCO With Built-in Buffer Amplifier

Model	Frequency Range f(MHz)	Primary Tuning Voltage V_{T1} (V)	FineTuning Range f(MHz)	Power Output P_o(dBm) Min	Phase Noise S_ϕ (dBc/Hz) (fm=10KHz) Typ	Spurious Suppression (dBc) Min	DC V/mA	Package
HE721	800—1200	0.5—15	15	13	–100	–70	12/70	TO–8E
HE722	1300—1600	0.5—15	15	13	–95	–70	12/70	TO–8E
HE723	1800—2100	0.5—15	20	12	–95	–70	12/70	TO–8E
HE725	2300—2600	0.5—15	25	10	–90	–70	12/70	TO–8E

Note: 1.Two separate tuning loops are designed inside. Fine tuning voltage V_{T2}: 0~10V.
2. The products can be offered for customers' requirements within 250~3500MHz, with primary tuning bandwidth, 20~50%,fine tuning bandwidth,1~5%.

RF/Microwave filter

1, Miniature LC Filters

Model	Frequency Range f_o(MHz)	3dB Relative Bandwidth	Sections	VSWR	Average Power	Impedance	Package
M Series LC filter	2—3000	3—100%	2—8	1.5:1	1W	50Ù	DIP, SMA, Microstrip lead

Note: 1, Typical Shape factor for Lowpass or Highpass is $K_{40dB/3dB}$=2:1.
2, Chebyshev is for standard , Butterworth and Linear Phase designs are also available as required.
3, Number of Sections available depends on the Package style you select.

2, Miniature Ceramic Filters

Model	Frequency Range f_o(MHz)	3dB Relative Bandwidth	Sections	VSWR	Average Power	Impedance	Package
DF Series Ceramic Filters	300—3900	1—5%	2—6	2.0:1	2W	50Ù	SMA, Microstrip Lead

3, Microwave Narrow Band Dielectric Loaded Cavity Filters

Model	Frequency Range f_o(MHz)	3dB Relative Bandwidth	Sections	VSWR (50Ω)	Average Power	Impedance	Package
HD Series	1500—14000	0.1—0.6%	2-8	1.3:1	5W	50Ù	SMA, N Connector

4 ,Miniature Microstrip Filters

Model	f_o(MHz)	$BW_{0.5dB}$ (MHz)	Section	In Band VSWR (Zo=50Ù)	Power	Package
MS3134	3250	300—360	6	1.3:1	1W	SMA In/Out

Series Products Available: Frequency Range: 1~4GHz; 3dB Relative Bandwidth: 5~70%;
I/O format can be SMA、PIN、N、L16(K) or any combination of them.

5, Cavity Filters

Model	Frequency Range f_o(MHz)	3dB Relative Bandwidth	Sections	VSWR (50Ω)	Average Power	Package
FS Series Combline Filters	800—6000	3—30%	2—15	1.5:1	5W	SMA、L16(K) Microstrip Lead、Flange for BJ series
CC Series Coaxial Cavity Filters	800—6000	0.9—3%	2—10	1.3:1	10W	
FD Series Interdigital Filters	600—16000	1—80%	2—11	1.3:1	5W	
BJ Series Rectangular Waveguide Filters	5000—18000	0.35—0.3%	2—10	1.3:1	20W	

Note: High Power Handling up to 300W or higher can be available with special design.

6, Bandstop Filters

Model	Frequency (MHz)	3dB Relative Bandwidth	VSWR	Att@f_o (dB)	Sections	Impedance	Package
BRL Series Lumped Component Band Stop Filters	5—130	5—40%	1.5:1	40min	2—5	50	DIP, Microstrip,or SMA Connect
BRM Series Distributed Parameter Band Stop Filters	1000—10000	5—12%	1.8:1	40min	2—7	50	SMA or Plug-in

7, Diplexers

Model	Frequency (MHz)	BW/F_o ×100%	VSWR	Minimum Distance	Average Power	Impedance	Sections
CB、CL	400—6000	0.6-5%	1.3:1	>2.4:1	10W	50Ù	2-10
RB、RL	5000—18000	0.3-4%	1.3:1	>2.2:1	20W	50Ù	2-10

8, Multichannel Switched Filter Arrays

Model	Frequency Range f_o(MHz)	3dB Relative Bandwidth for Each Channel	Sections for Each Channel	Switch Speed	Input P_{-1} (dBm)	Out of Band Rejection	Dimension (mm)
KMB(4 Channels)	20—2000	5—100%	2—5	150ns	≥22	50dBc	85×57×12
KMB(8 Channels)	20—2000	5—100%	2—5	150ns	≥20	50dBc	99×109×14
KMB(16 Channels)	20—2000	5—100%	2—5	150ns	≥17	50dBc	119×122×18

Note: Filters in these model are designed and realized with LC technique for general.

Voltage-controlled Attenuators & Digital Step Attenuators

1, Voltage-controlled Attenuators

Model	Frequency Range f(MHz)	Insertion Loss IL(dB)	Attenuation Att(dB)	Control Supply V/mA	VSWR Max	DC V/ mA	Package
HE411A	5—500	2.2	31	0—15/0—7	2.0：1	15/14	TO–8B
HE411B	20—500	1.8	33	0—15/0—7	2.0：1	15/14	TO–8B
HE412A	5—1000	2.5	25	0—15/0—7	2.0：1	15/14	TO–8B
HE412B	20—1000	1.8	24	0—15/0—7	2.0：1	15/14	TO–8B
HE413A	5—2000	3.0	19	0—15/0—7	2.0：1	15/14	TO–8B
HE413B	20—2000	2.5	22	0—15/0—7	2.0：1	15/14	TO–8B
HE891A	5—200	3.0	57	0—15/0—20	1.8：1	5/10	TO–8A–1
HE891B	20—200	2.0	57	0—7/0—10	1.8：1	5/10	TO–8A–1
HE892	20—1000	2.5	40	0—7/0—10	1.8：1	5/10	TO–8A–1
HE893	20—3000	3.8	30	0—7/0—10	1.8：1	5/10	TO–8A–1
HE041-1	2000—3000	1.6	50	0—10/0—10	2.0：1	/	SP–1
HE041-2	3000—3800	2.0	45	0—10/0—10	2.0：1	/	SP–1
HE041-3	3800—4500	2.3	40	0—10/0—10	2.0：1	/	SP–1
HE041-4	4500—5500	2.5	35	0—10/0—10	2.0：1	/	SP–1
HE041-5	5000—6000	2.5	35	0—10/0—10	2.0：1	/	SP–1

Note: 1.Most of the package bottom should be grounded tightly while being mounted. As for HE891-HE893, since there are not any pins grounded, the position marks should be soldered with the circuit board to ensure reliable ground. Besides, level A is superior to level B in electric tuning linearity.

2, Integrated Digital Step Attenuators

Model	Frequency Range f(MHz)	Insertion Loss IL(dB)	Total Attenuation Att(dB)	Attenuation Steps (dB)	VSWR IN/OUT	DC V/ mA	Package
HE741	15—1350	1.8	20.0	20	1.5:1	±5/25	TO–8E
HE742	15—1350	2.0	30.0	10,20	1.5:1	±5/30	SP–2
HE751	15—200	4.5	63.0	1,2,4,8,16,32	1.5:1	+5/120	DIP–16
HE751A	50—500	6.0	63.0	1,2,4,8,16,32	1.5:1	+5/120	DIP–16
HE752	15—200	3.0	30.0	2,4,8,16	1.5:1	+5/75	DIP–14A
HE753	15—200	2.5	14.0	2,4,8	1.5:1	+5/60	DIP–14A
Note: All of these devices are controlled by TTL.							

3, Digital Step Attenuators

Model	Frequency Range f(GHz)	Minimum step (dB)	Control TTL (bit)	Insertion Loss I.L (dB)	Attenuation Range (dB)	Attenuation Flatness		VSWR	Package (mm)
						<30dB	<60dB		
SZZ007-1	1.0—2.0	0.5	7	2.0	60	±1	±1.5	1.8:1	70×50×25
SZZ007-2	2.0—3.0	0.5	7	2.5	60	±1	±1.5	1.8:1	70×50×25
SZZ007-3	3.0—4.0	0.5	7	2.8	60	±1	±1.5	1.8:1	70×50×25
SZZ007-4	4.0—5.0	0.5	7	3.0	60	±1	±1.5	2:1	70×50×25
SZZ007-5	5.2—5.8	0.5	7	3.5	60	±0.5	±1.0	2:1	70×50×25
SZZ007-8	8.0—9.0	0.5	7	3.0	60	±0.5	±1.0	2:1	70×50×25
SZZ007-9	9.0—10.0	0.5	7	3.0	60	±0.5	±1.0	2:1	70×50×25
SZZ007-10	10.0—12.0	0.5	7	3.0	60	±1.0	±1.5	2:1	70×50×25
SZZ00930-1	1.0—2.0	0.5	6	1.3	31.5	±0.5	/	1.6:1	50×30×16
SZZ00930-2	2.0—3.0	0.5	6	1.5	31.5	±0.5	/	1.6:1	50×30×16
SZZ00960-3	3.0—4.0	0.5	7	2.8	60	±0.5	±1	1.8:1	50×30×16
SZZ00960-4	4.0—5.0	0.5	7	3.0	60	±0.5	±1	2:1	50×30×16
SZZ00960-5	5.0—6.0	0.5	7	3.5	60	±0.5	±1	2:1	50×30×16
Note: 1.The products can be offered for customers' requirements and 0.25dB step 70dB attenuation can be achieved. 2. If operation frequency range of the model is less than 10%, the performance will be improved obviously.									

0° , 90° , 180° Power Splitters/Combiners

1, Integrated 0° Power Splitters/Combiners

Model	Frequency Range f(MHz)	Number Of Output Ports	Insertion Loss I.L(dB) Typ	Isolation ISO(dB) Typ	Phase Unbalance Δdeg Typ	Amplitude Flatness ΔdB(dB) Typ	VSWR Typ	Package
HE021-2	10—750	2 Way	0.9	23	2°	0.3	1.3:1	TO–8A
HE021-2A	40—1400	2 Way	0.9	23	3°	0.5	1.3:1	TO–8F
HE021-2B	0.5—200	2 Way	0.3	35	0.5°	0.1	1.2:1	TO–8A
HE021-2C	700—2400	2 Way	0.5	23	1.5°	0.3	1.2:1	SP–1
HE022-2A	800—1200	2 Way	0.7	21	2°	0.3	1.4:1	SP–1
HE022-2B	1000—2000	2 Way	0.7	24	2°	0.4	1.4:1	SP–1
HE022-2C	1600—3000	2 Way	0.7	23	6°	0.5	1.5:1	SP–1
HE021-3	20—1000	3 Way	0.9	20	3°	0.3	1.4:1	SP–1
HE021-3A	0.5—200	3 Way	0.4	25	1°	0.1	1.2:1	TO–8H
HE021-3B	5—500	3 Way	0.4	25	1°	0.2	1.3:1	TO–8H
HE021-3C	700—1800	3 Way	0.7	22	2°	0.2	1.3:1	SP–1

HE022-3A	1100—2200	3 Way	0.7	20	6°	0.5	1.5:1	SP–1
HE022-3B	1800—3000	3 Way	0.7	23	10°	0.5	1.4:1	SP–1
HE021-4	10—500	4 Way	0.9	23	3°	0.5	1.4:1	TO–8H
HE021-4A	20—1200	4 Way	1.5	18	4°	0.5	1.4:1	SP–2
HE021-4B	0.5—200	4 Way	0.5	27	1°	0.1	1.15:1	TO–8H
HE021-4C	750—1500	4 Way	0.8	20	3°	0.2	1.2:1	SP–2
HE022-4	1000—2200	4 Way	0.8	20	3°	0.3	1.3:1	SP–2
HE021-6A	10—500	6 Way	0.8	25	2°	0.3	1.3:1	HD–28C
HE022-6A	600—1200	6 Way	0.9	25	2°	0.3	1.3:1	HD–32A
HE021-8A	10—500	8 Way	1.0	23	2°	0.3	1.3:1	HD–28C
Note：Customers’ products can be offered.								

2, Microwave 0° Power Splitters/Combiners

Model	Frequency Range f(MHz)	Number Of Output Ports	Insertion Loss I.L(dB) Typ	Isolation ISO(dB) Typ	Phase Unbalance Δdeg Typ	Amplitude Flatness ΔdB(dB) Typ	VSWR Typ	Package
PSM2-2-4	2.0—4.0	2Way	0.4	20	1.5°	0.2	1.25:1	SMA, Microstrip
PSM2-3-6	3.0—6.0	2Way	0.45	20	3°	0.2	1.35:1	
PSM2-4-8	4.0—8.0	2Way	0.45	22	3°	0.2	1.3:1	
PSM2-4-10	4.0—10.0	2Way	0.7	20	5°	0.3	1.35:1	
PSM2-7-12	7.0—12.5	2Way	0.5	20	5°	0.3	1.5:1	
PSM2-2-8	2.0—8.0	2Way	0.5	18	4°	0.3	1.35:1	
PSM3-2-4	2.0—4.0	3Way	0.4	20	2.5°	0.3	1.3:1	
PSM3-3-6	3.0—6.0	3Way	0.5	20	3°	0.3	1.35:1	
PSM3-4-8	4.0—8.0	3Way	0.5	20	4°	0.4	1.3:1	
PSM4-2-4	2.0—4.0	4Way	0.5	20	4°	0.3	1.3:1	
PSM4-3-6	3.0—6.0	4Way	0.5	20	4°	0.3	1.35:1	
PSM4-4-8	4.0—8.0	4Way	0.8	20	6°	0.4	1.4:1	
PSM4-5-10	5.0—10.0	4Way	0.8	20	6°	0.4	1.4:1	
PSM4-7-12.5	7.0—12.5	4Way	0.8	18	8°	0.4	1.4:1	
PSM4-2-8	2.0—8.0	4Way	1.0	18	6°	0.4	1.5:1	
Note：Customers’ products can be offered.								

3, High power 0° Power Splitters/Combiners

Model	Frequency Range f(MHz)	Number Of Output Ports	Insertion Loss I.L(dB) Typ	Isolation ISO(dB) Typ	Phase Unbalance Δdeg Typ	Input Power Max (W)	VSWR Typ	Package
HE020-2A	0.5—200	2 路	0.4	25	1.0°	20	1.15:1	DIP–22A
HE020-2B	10—500	2 路	0.4	25	0.5°	20	1.2:1	DIP–22A
HE020-3A	0.5—200	3 路	0.5	28	1.0°	20	1.2:1	HD–6
HE020-3B	5—400	3 路	0.5	26	1.0°	20	1.3:1	HD–6
HE020-4A	0.5—200	4 路	0.7	28	2.0°	20	1.2:1	HD–6
HE020-4B	10—500	4 路	0.7	30	2.0°	20	1.3:1	HD–6
Note：Customers’ products can be offered.								

4, Integrated 90° Power Splitters/Combiners

Model	Frequency Range f(MHz)	Insertion Loss I.L(dB) Typ	Isolation ISO(dB) Typ	Phase Unbalance Δdeg Typ	Amplitude Unbalance ΔdB(dB) Typ	VSWR Typ	Package
PD2-30	20—40	0.7	20	2°	0.6	1.5:1	TO–8A–1
PD2-150	100—200	0.7	20	2°	0.6	1.5:1	TO–8A–1

PD2-750	500—1000	0.8	25	1.5°	0.4	1.2:1	DIP–14A
PD2-1500	1000—2000	0.9	23	3°	0.5	1.4:1	DIP–14A
QHP-100	40—250	1.0	16	4°	0.8	1.5:1	TO–8H
PDN-30	30±5%	1.0	22	2°	0.6	1.3:1	TO–8A–1
PDN-60	60±5%	1.0	22	2°	0.6	1.3:1	TO–8A–1
PDN-800	800±5%	1.0	22	2°	0.6	1.4:1	TO–8A–1

5, 180° Power Splitters/Combiners

Model	Frequency Range f(MHz)	Insertion Loss I.L(dB) Typ	Isolation ISO(dB) Typ	Phase Unbalance Δdeg Typ	Amplitude Unbalance ΔdB(dB) Typ	VSWR Typ	Package
PD-180	10—500	1.0	23	2.5°	0.5	1.3:1	TO–8A

RF/Microwave Switches and Switch Drivers

1, Integrated GaAs Switches

Model	Frequency Range f (MHz)	Switch Time T_{on}(ns)Typ	Isolation ISO(dB) Typ	Insertion Loss IL(dB)	Function	DC Supply (V)	Package
XN511(K)	DC—200	15	64	1.3	SPST	/	DS–8
XN521	DC—200	5	64	1.3	SPST	+5 –9	DS–8
HE017A	DC—300	20	67	1.0	SPDT	/ –5	DS–8
HE017	DC—300	15	60	1.0	SPDT	+5 –12	DS–8
HE065	DC—300	15	65	1.2	SPST	+5 –12	DS–8
HE118	DC—3000	7	60	0.9	SPST	–5	CR–9
HE116	DC—3000	7	55	0.8	SPDT	–5	CR–9

Note: 1. XN511（K）,XN521are driven by pulse, Other 6 devices are driven by TTL directly.
2. Anti-electrostatic measures should be adopted.
3. HE118,HE116 can be Interchanged directly with SW-311,SW-313 respectively from M/A-COM Company.

2, Integrated PIN Diode Switches

Model	Frequency Range f (MHz)	Insertion Loss Typ(dB) f (GHz)			Isolation Typ(dB) f (GHz)			VSWR	Type	Package
		≦0.2	≦1.0	≦2.0	≦0.2	≦1.0	≦2.0			
SWST-1	20—2000	0.5	0.8	1.4	66	60	54	1.2	SPST	TO–8E
SWDT-1A	20—2000	0.6	0.9	1.4	75	60	50	1.3	SPDT	DIP–14C
SWDT-1B	20—2000	0.7	0.9	1.5	80	75	65	1.3	SPDT	DIP–14C
SW4T-1	20—1500	0.9	1.2	/	64	55	/	1.3	SP4T	HD–28B

Note: Built-in TTL driver, All of the switches can be controlled by TTL.

3, Miniature PIN Switches

Model	Frequency Range f (MHz)	Switch Time T_{on}(ns)Typ	Isolation ISO(dB)Typ	Insertion Loss IL(dB)	Function	Package
SW101	0.5—2.0	100	60	1.0	SPST	26.6×15.6×8.3
SW102	2.0—4.0	100	60	1.4	SPST	26.6×15.6×8.3
SW103	4.0—8.0	100	60	1.8	SPST	26.6×15.6×8.3
SW201	0.5—2.0	100	60	1.0	SPDT	26.6×15.6×8.3
SW202	2.0—4.0	100	60	1.5	SPDT	26.6×15.6×8.3

Note: Built-in TTL driver, All of the switches can be controlled by TTL.

4, TTL Drivers For PIN Switches

Model	Channel	t_{on}(ns) Typ	t_{off}(ns) Typ	Output Voltage		Output Current I_O(mA)	DC Power (V)	Package
				V_{OH}(v) Typ	V_{OL}(V) Typ			
HE042	4	30	50	+3.5	-29	+80	+5 -30	DH–14
HE051	5	20	20	+4.0	-9.5	+50	+5 -10	DIP–14A
DR-2	4	30	50	+3.5	-3.5	±60	+5 -5	DH–14
HE063	3	50	/	+3.5	-3.5	±60	+5 -5	DH–8
DR-4	1	80	150	+2.5	-95	+80	+5 -100	TO–8G
DR-5	1	30	50	+3.5	-3.5	±60	+5 -5	DH–14
XN441B	2	300	/	+4.5	-4.5	±40	+5 -5	DS–8

Integrated Double-Balanced Mixers

Model	Frequency Range RF &LO f(MHz)	IF Range IF(MHz)	Conversion Loss (dB) Typ	LO-RF IsolationdB) Typ	LO-IF Isolationd (dB) Typ	RF-IF Isolationd (dB) Typ	LO Level (dBm)	Package
MDB-01	1—500	DC—500	7.5	50	40	30	+7	TO–8C
MDB-02	1—500	DC—500	7.5	40	40	30	+17	TO–8C
MDB-03	10—1000	DC—1000	8.0	50	35	30	+7	TO–8C
MDB-04	10—1000	DC—1000	8.5	45	35	30	+17	TO–8C
MDB-05	10—1500	DC—1000	8.0	40	30	25	+7	TO–8C
MDB-06	10—1500	DC—1000	8.5	40	30	35	+17	TO–8C
MDB-07	50—2500	DC—600	6.5	35	20	35	+7	TO–8C
MDB-08	50—2000	DC—600	7.0	30	25	35	+13	TO–8C
MDB-09	500—3000	DC—600	6.5	35	24	32	+7	TO–8C
MDB-10	500—3000	DC—1000	6.5	30	18	25	+13	TO–8C
MDB-11	2000—6000	DC—1000	7.0	25	20	30	+7	Microstrip
MDB-12	3000—8000	DC—1000	7.0	25	25	22	+7	Microstrip

Integrated Phase Shifter

Reflective Voltage-controlled Phase shifter

Model	Centre Frequency fo(MHz)	Relative Bandwidth %fo Min	PhaseShift @fo Min	Insertion Loss IL(dB) Max	Loss Variation ΔIL(dB) Max	VSWR Max	Phase Stability ° /℃ Max	Package
PHA-30	30	±5	0—90°	1.5	0.5	1.5	0.05	TO–8F
PHB-60	60	±5	0—180°	1.5	0.5	1.5	0.1	TO–8F
PHC-240	240	±5	0—360°	3.0	1.0	1.5	0.2	DIP–14
PHB-700	700	±5	0—180°	2.0	0.6	/	0.1	TO–8F

Note: 1.Customers' products can be offered in 10~700MHz 2.Only 0-90°and 0-180° can be offered over 300MHz.

Integrated PLL Synthesizer

Model	Frequency Range f(MHz)	Minimum Step (MHz)	Phase Noise S_φ(dBc/Hz) (fm=10KHz)	Reference Input fr(MHz)	Package (mm)
VPLL2150-100	2100—2200	1	–90	5—100	40×30×15
DPLL2145-30	2130—2160	1	–100	5—100	40×30×15
SPLL2150-100	2100—2200	1	–90	5—100	HD–28B

Note: 1. Customers' products can be offered. The frequency covers 200~2500MHz,relative band, step is about 1~30% and 25KHz respective.

2. LC oscillators ,Dielectric oscillators are used in V Series and D Series (respective band is about 1—5%)

3. VPLL and DPL Series are controlled by 8 bit parallel TTL, SPLL is controlled by series TTL.

Integrated Wide Band Directional Couplers

Model	Frequency Range f(MHz)	Coupling (dB)	Coupling Flatness (dB)	Insertion Loss (dB)	VSWR	Package
TDC-10A	20—500	10.5±0.5	±0.5	2.0	1.5:1	TO–8C
TDC-10B	50—1400	10.5±0.5	±0.5	2.0	1.5:1	TO–8C
TDC-15A	20—500	14.5±0.5	±0.5	1.0	1.5:1	TO–8C
TDC-15B	20—1500	14.5±0.5	±0.5	1.5	1.5:1	TO–8C

Integrated Threshold Detectors

Model	Frequency Range f(MHz)	Threshold Level P_{in}(dBm)		Threshold Level Flatness (dB) Typ	Pulse Width t_W(ns) Min	Clear Time τ_{PD}(ns) Typ	Detection Time (nS) Typ	Holding Time ts(mS) Typ	Output TTL		Package
		Min	Max						Hi(V) Min	Lo(V) Max	
HE043	10—2000	–10	10	0.8	/	/	/	/	3.0	0.3	TO–8G
HE043P	10—2000	–20	0	/	100	/	/	3	3.0	0.3	TO–8E
HE043P-2	10—2000	–20	0	/	100	/	/	3	3.5	0.3	TO–8E
HE111	30—2000	–10	10	1.0	200	/	70	/	3.5	0.3	TO–8E
HE112	100—6000	–10	10	1.5	200	/	70	/	3.5	0.3	SP–1
HE113	100—2000	0	12	1.2	200	/	/	50	3.5	0.3	SP–251
HE057	10—200	120mv*	/	/	100	50	100	/	3.5	0.3	TO8–12
HE060C	2000—6000	–20	0	1.5	/	/	/	/	3.0	0.3	SP–1
HE060P	2000—6000	–20	0	1.5	100	/	/	3	3.5	0.3	SP–1

Note: *The amplitude is V_{p-p}.

1. HE043, HE060C are RF CW detectors, other modules are RF modulation pulse detectors.
2. HE043, HE043P, HE043P-2 can operate upwards 4.0GHz (Relative band less than 20%).
3. HE043P-2 can detect both RF CW and pulse.
4. HE111,HE112 are pulse coding demodulator.
5. Customers' products can be offered.

HE364B

General Amplifier

Features

- **Frequency Range：** **10~200MHz**
- **High Gain：** **33.5dB（Typ）**
- **Low Noise：** **1.3dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8A**
- **Wide Operating Temperature：-55℃~+85℃**

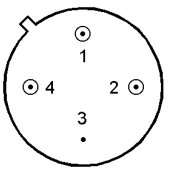
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	10~200	10~300
Small Signal Gain	Gp	dB	32.0	33.5
Gain Flatness	ΔGp	dB	±0.5	±0.2
Noise Figure	Fn	dB	1.5	1.3
Input VSWR	VSWRi	——	1.5:1	1.3:1
Output VSWR	VSWRo	——	1.5:1	1.3:1
Power Output @1dB Compression	P_{-1}	dBm	6.0	8.0
DC Current	I_{CC}	mA	——	38

Note: The Gp and P_{-1} will be reduced 1dB and 3dB respectively under operating at 12VDC (Icc= 32mA TYP).

Absolute Maximum Rating

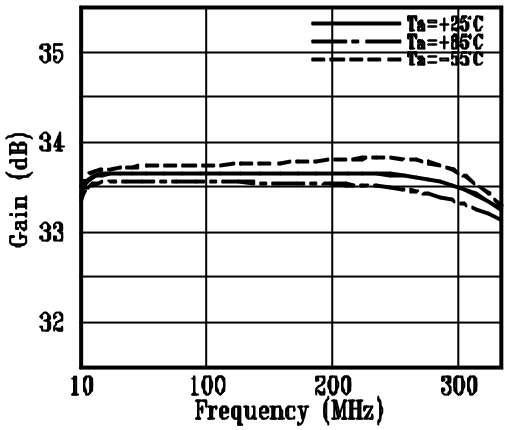
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature -- +125℃



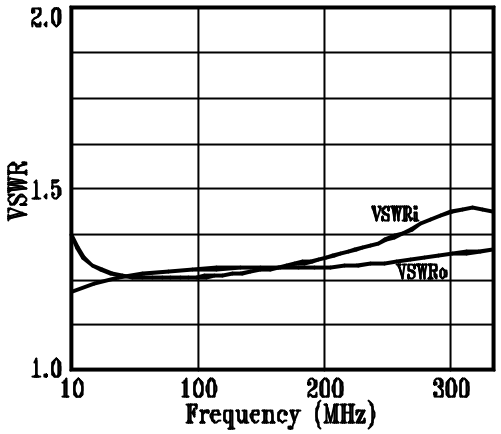
TO-8A

Typical Performance Curves

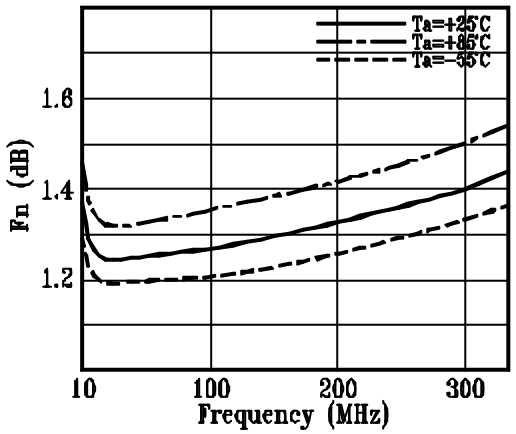
Gain vs. Frequency



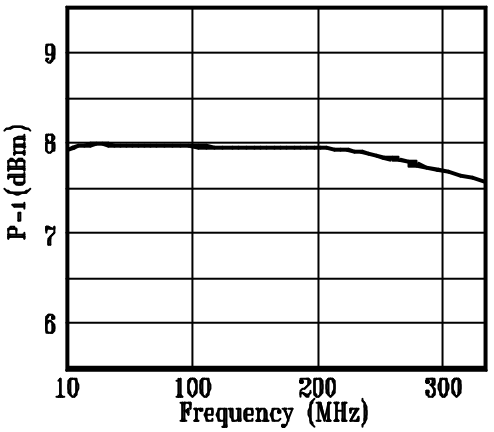
VSWR vs. Frequency



Noise vs. Frequency

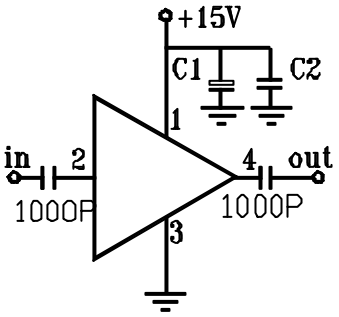


Power Output vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with UTO-250 from American HP Company.



HE365

General Amplifier

Features

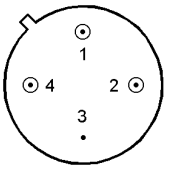
- **Frequency Range：** **20~200MHz**
- **Gain：** **18.0dB（Typ）**
- **High Output Power：** **18dBm（Min）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

Specifications (Test at V_{CC} = +12V，T_A=25℃Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~200	20~250
Small Signal Gain	Gp	dB	17.0	18.0
Gain Flatness	ΔGp	dB	±1.0	±0.5
Noise Figure	Fn	dB	4.5	4.0
Input VSWR	VSWRi	——	2.0:1	1.5:1
Output VSWR	VSWRo	——	2.0:1	1.5:1
Power Output @1dB Compression	P_{-1}	dBm	18.0	——
DC Current	I_{cc}	mA	——	55

Absolute Maximum Rating

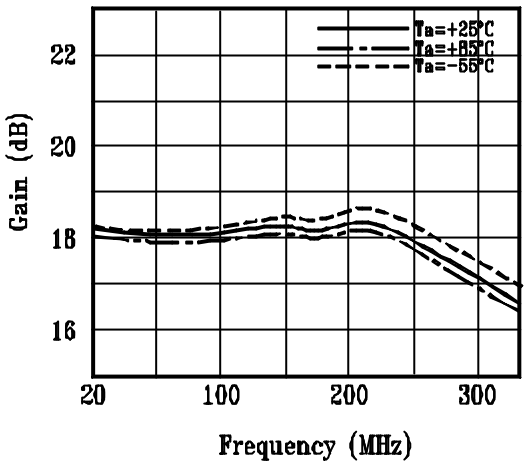
Maximum DC Voltage ----- +15VDC
Maximum Input Power ----- +10dBm
Storage Temperature -- +125℃



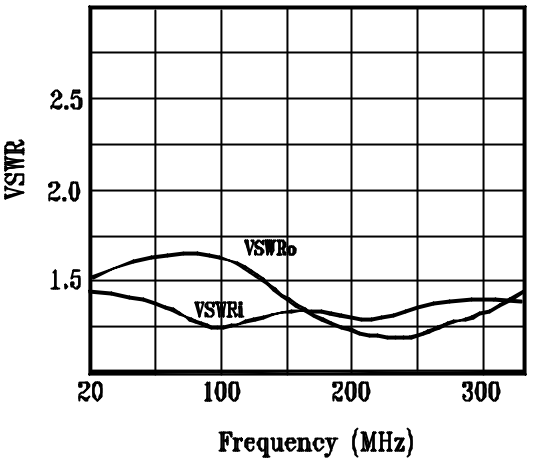
TO-8C

Typical Performance Curves

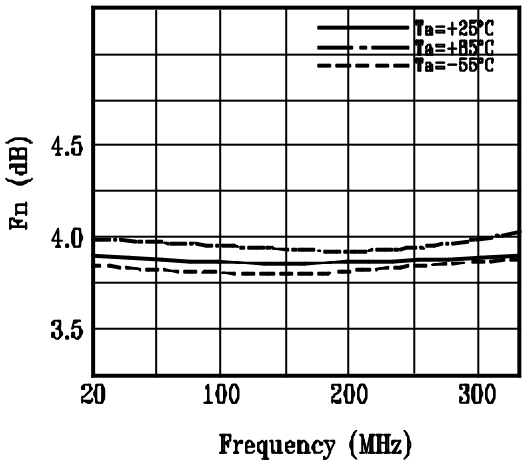
Gain vs. Frequency



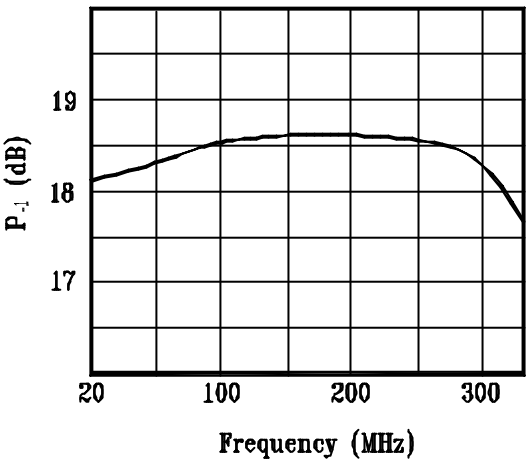
VSWR vs. Frequency



Noise vs. Frequency

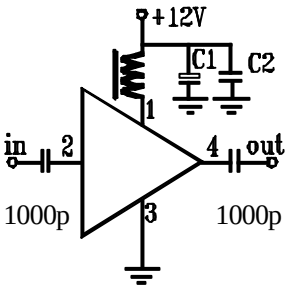


Power Output vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf, L≈20μH;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with A82-1 from American W-J Company.



Features

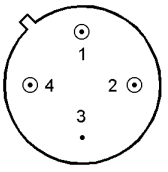
- **Frequency Range：** **10~500MHz**
- **High Gain：** **28.0dB（Typ）**
- **Low Noise：** **2.0dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8A**
- **Wide Operating Temperature：-55℃~+85℃**

Specifications (Test at V_{CC} = +12V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	10~500	10~550
Small Signal Gain	Gp	dB	25.0	28.0
Gain Flatness	ΔGp	dB	±0.5	±0.3
Noise Figure	Fn	dB	2.5	2.0
Input VSWR	VSWRi	——	2.0:1	1.5:1
Output VSWR	VSWRo	——	2.0:1	1.5:1
Power Output @1dB Compression	P_{-1}	dBm	3.0	6.0
DC Current	I_{CC}	mA	——	35

Absolute Maximum Rating

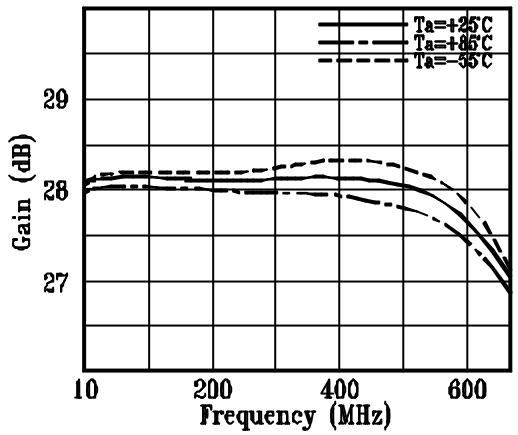
Maximum DC Voltage ----- +15VDC
Maximum Input Power ----- +10dBm
Storage Temperature -- +125℃



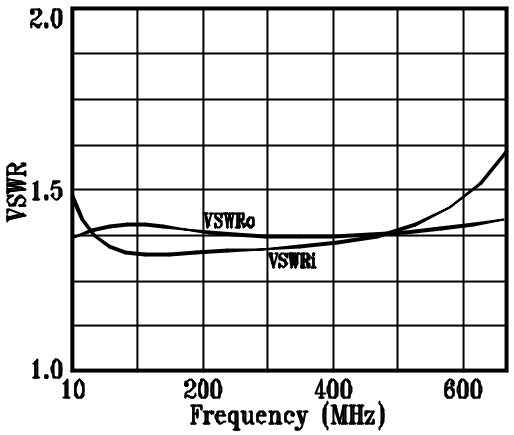
TO-8A

Typical Performance Curves

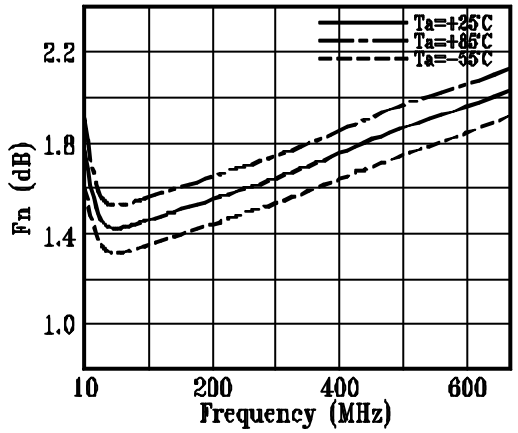
Gain vs. Frequency



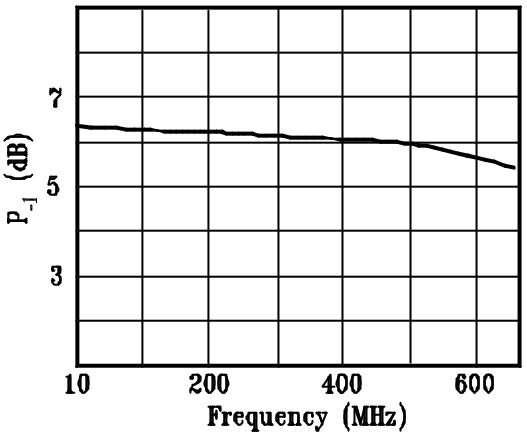
VSWR vs. Frequency



Noise vs. Frequency

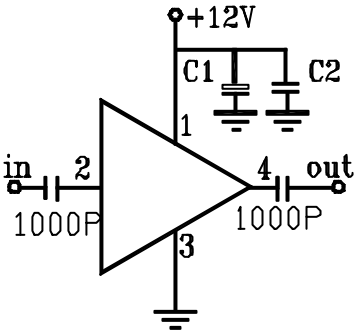


Power Output vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with A76 from American W-J Company.



HE321D

General Amplifier

Features

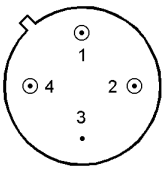
- **Frequency Range：** **10~1000MHz**
- **High Gain：** **19.5dB（Typ）**
- **Low Noise：** **3.0dB（Typ）**
- **Input/Output Impedance:** **50**W
- **Package:** **TO-8A**
- **Wide Operating Temperature：** **-55℃~+85℃**

Specifications (Test at V_{CC} = +12V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	10~1000	——
Small Signal Gain	Gp	dB	18.0	19.5
Gain Flatness	ΔGp	dB	±1.0	±0.5
Noise Figure	Fn	dB	3.5	3.0
Input VSWR	VSWRi	——	2.0:1	1.5:1
Output VSWR	VSWRo	——	2.0:1	1.5:1
Power Output @1dB Compression	P_{-1}	dBm	0	1.5
DC Current	I_{cc}	mA	——	35

Absolute Maximum Rating

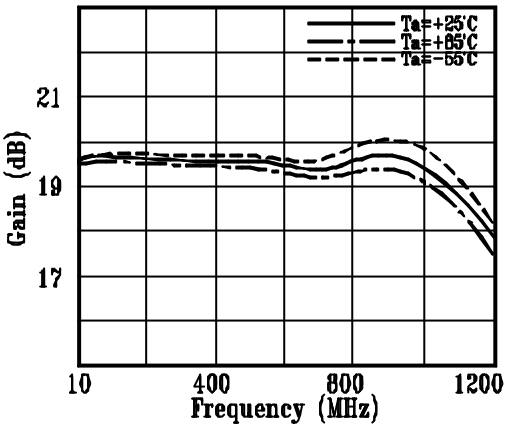
Maximum DC Voltage ----- +15VDC
Maximum Input Power ----- +10dBm
Storage Temperature -- +125℃



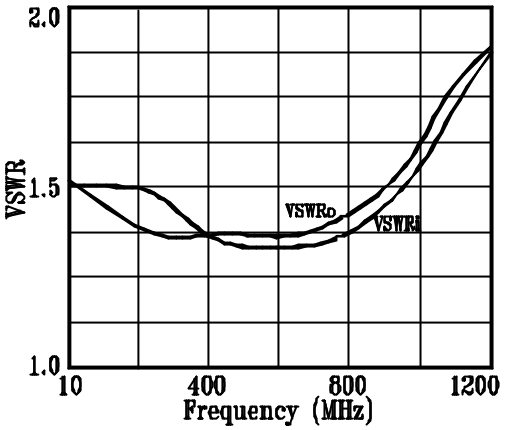
TO-8A

Typical Performance Curves

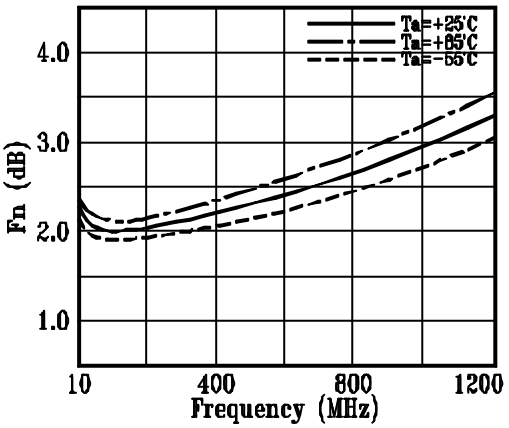
Gain vs. Frequency



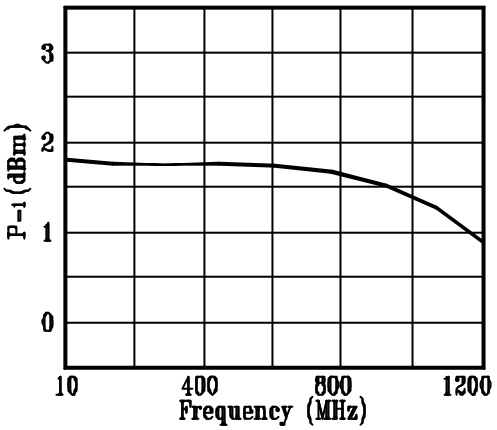
VSWR vs. Frequency



Noise vs. Frequency

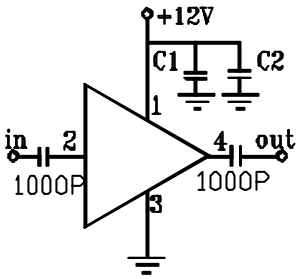


Power Output vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Interchanged directly with A64 from American W-J Company.



Features

- **Frequency Range：** **10~500MHz**
- **High Gain：** **29.0dB（Typ）**
- **Low Noise：** **1.7dB（Typ）**
- **Input/Output Impedance:** **50**Ω
- **Package:** **TO-8C**
- **Wide Operating Temperature：** **-55℃~+85℃**

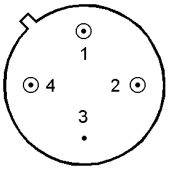
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	10~500	10~550
Small Signal Gain	Gp	dB	28.0	29.0
Gain Flatness	ΔGp	dB	±0.5	±0.2
Noise Figure	Fn	dB	2.0	1.7
Input VSWR	VSWRi	——	1.5:1	1.3:1
Output VSWR	VSWRo	——	1.5:1	1.3:1
Power Output @1dB Compression	P_{-1}	dBm	6.0	7.5
DC Current	I_{cc}	mA	——	38

Note：The Gp and P_{-1} will be reduced 1dBand 3dBm respectively under operating at 12VDC (Icc= 32mA TYP).

Absolute Maximum Rating

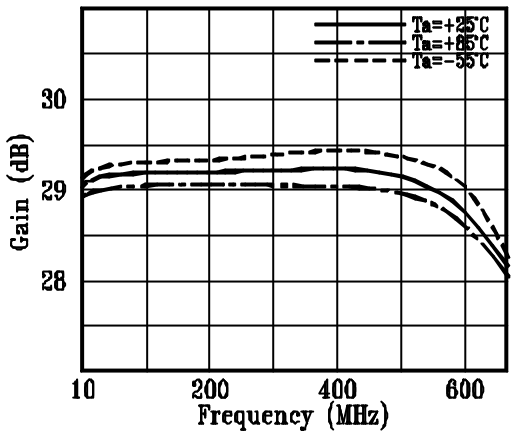
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature -- +125℃



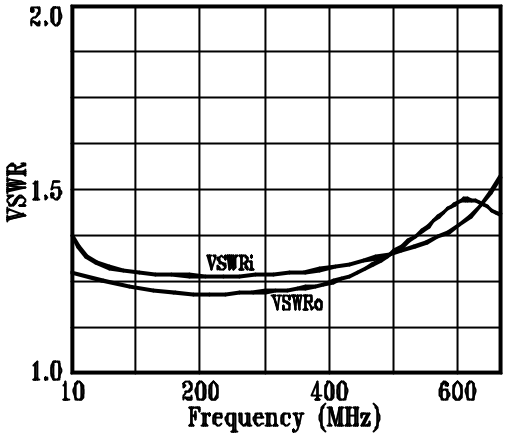
TO-8C

Typical Performance Curves

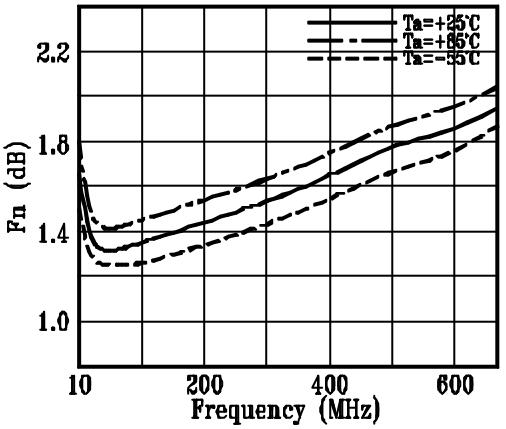
Gain vs. Frequency



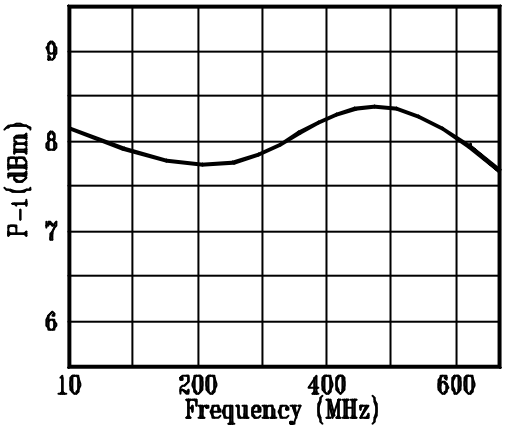
VSWR vs. Frequency



Noise vs. Frequency

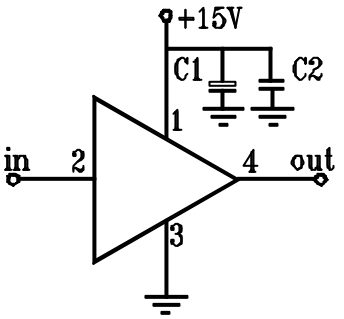


Power Output vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with UTO-521 from American HP Company.



HE361B

General Amplifier

Feature

- **Frequency Range：** **10~500MHz**
- **High Gain：** **29.0dB（Typ）**
- **Low Noise：** **1.7dB（Typ）**
- **Input/Output Impedance:** **50**W
- **Package:** **TO-8A**
- **Wide Operating Temperature：** **-55℃~+85℃**

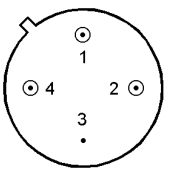
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	10~500	10~550
Small Signal Gain	Gp	dB	28.0	29.0
Gain Flatness	ΔGp	dB	±0.5	±0.2
Noise Figure	Fn	dB	2.0	1.7
Input VSWR	VSWRi	——	1.5:1	1.3:1
Output VSWR	VSWRo	——	1.5:1	1.3:1
Power Output @1dB Compression	P_{-1}	dBm	6.0	7.5
DC Current	I_{cc}	mA	——	38

Note：The Gp and P_{-1} will be reduced 1dBand 3dBm respectively under operating at 12VDC (Icc= 32mA TYP)

Absolute Maximum Rating

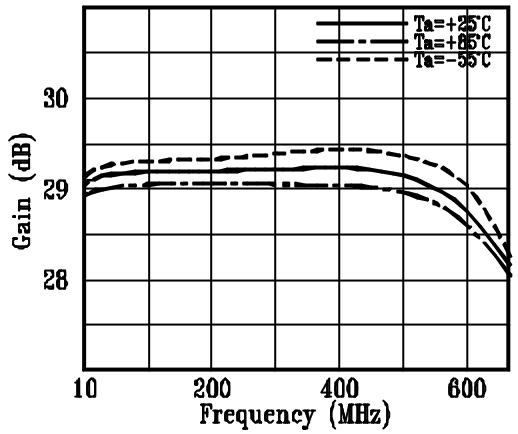
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature ----- +125℃



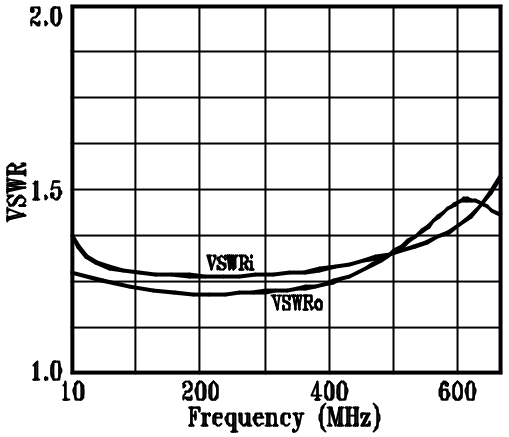
TO-8A

Typical Performance Curves

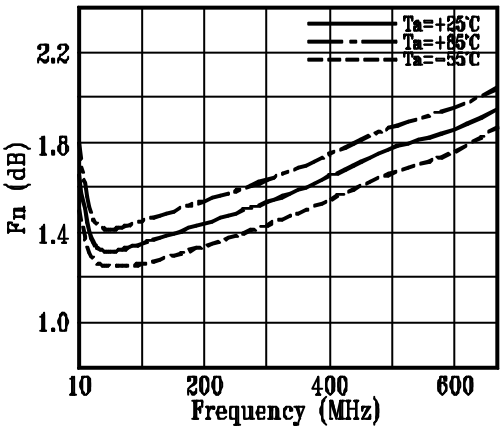
Gain vs. Frequency



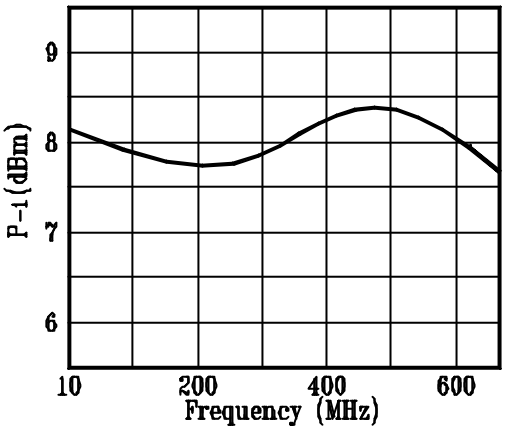
VSWR vs. Frequency



Noise vs. Frequency

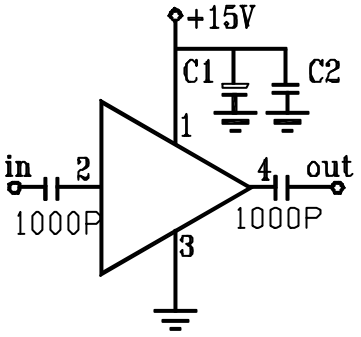


Power Output vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).



HE362B

General Amplifier

Features

- **Frequency Range：** **10~1000MHz**
- **High Gain：** **19.0dB（Typ）**
- **Low Noise：** **2.7dB（Typ）**
- **Input/Output Impedance: 50W**
- **Package:** **TO-8A**
- **Wide Operating Temperature：-55℃~+85℃**

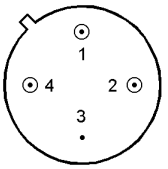
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	10~1000	——
Small Signal Gain	Gp	dB	18.0	19.0
Gain Flatness	ΔGp	dB	±0.75	±0.5
Noise Figure	Fn	dB	3.0	2.7
Input VSWR	VSWRi	——	2.0:1	1.5:1
Output VSWR	VSWRo	——	2.0:1	1.5:1
Power Output @1dB Compression	P_{-1}	dBm	0	2.0
DC Current	I_{cc}	mA	——	38

Note: The Gp and P_{-1} will be reduced 1dBand 2dBm respectively under operating at 12VDC (Icc= 32mA TYP).

Absolute Maximum Rating

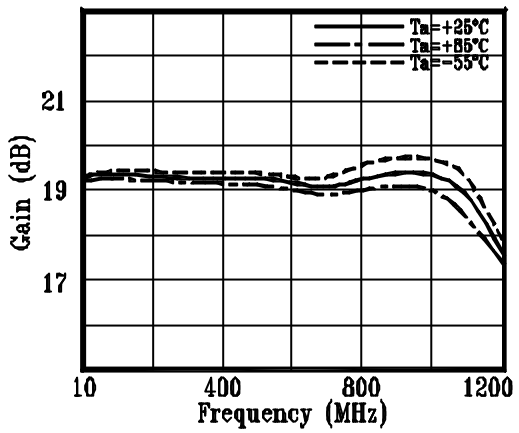
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature -- +125℃



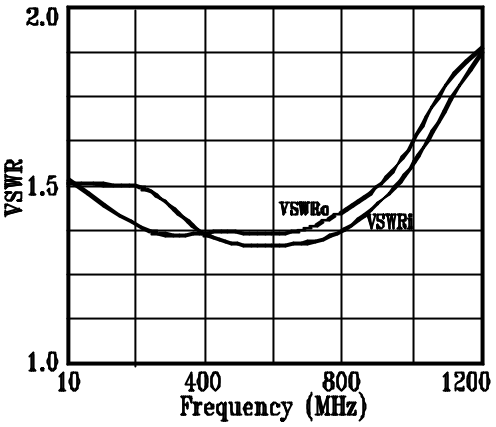
TO-8A

Typical Performance Curves

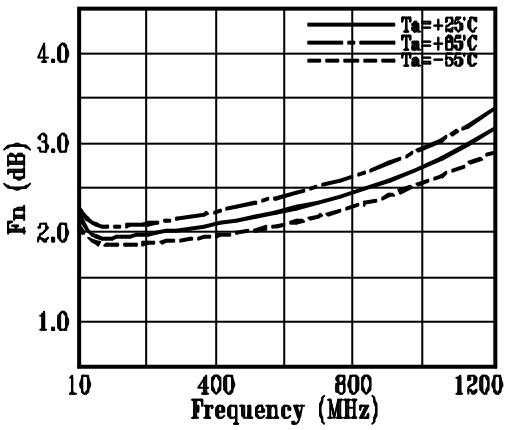
Gain vs. Frequency



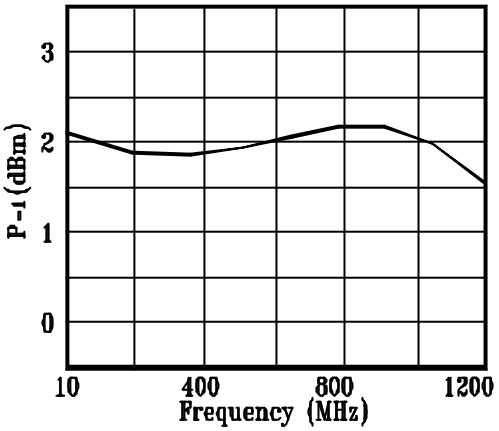
VSWR vs. Frequency



Noise vs. Frequency

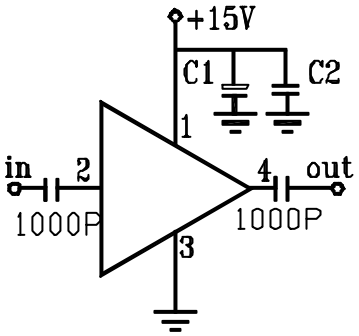


Power Output vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with A12 from American W-J Company.



HE371B

General Amplifier

Features

- **Frequency Range：** **10~500MHz**
- **High Gain：** **17dB （Typ）**
- **Low Noise：** **1.8dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

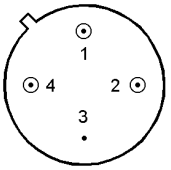
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~500	10~600
Small Signal Gain	Gp	dB	15.0	17.0
Gain Flatness	ΔGp	dB	±0.5	——
Noise Figure	Fn	dB	2.0	1.8
Input VSWR	VSWRi	——	2:1	1.7:1
Output VSWR	VSWRo	——	2:1	1.7:1
Power Output @1dB Compression	P_{-1}	dBm	2.0	——
DC Current	I_{cc}	mA	——	12

Note: The Gp and P_{-1} will be reduced 0.7dBand 1.3dBm respectively under operating at 12VDC (Icc= 9mA TYP).

Absolute Maximum Rating

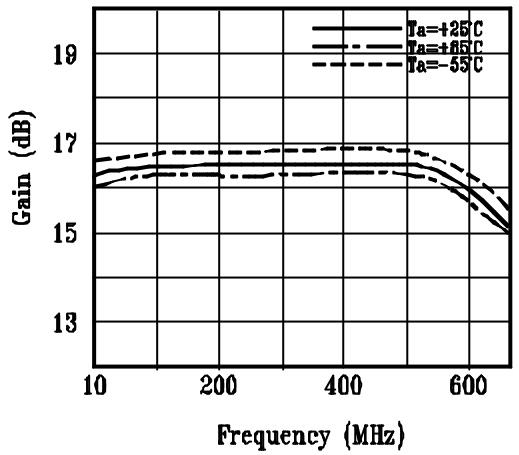
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature -- +125℃



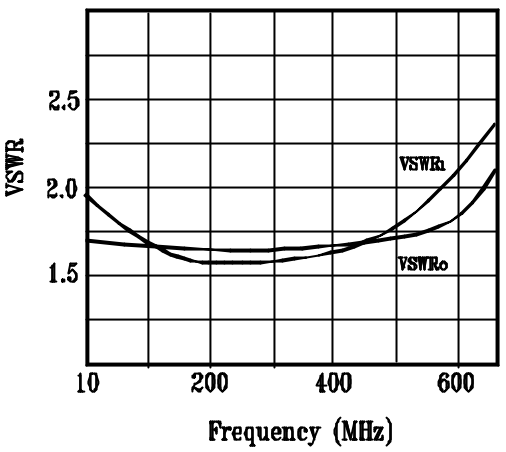
TO-8C

Typical Performance Curves

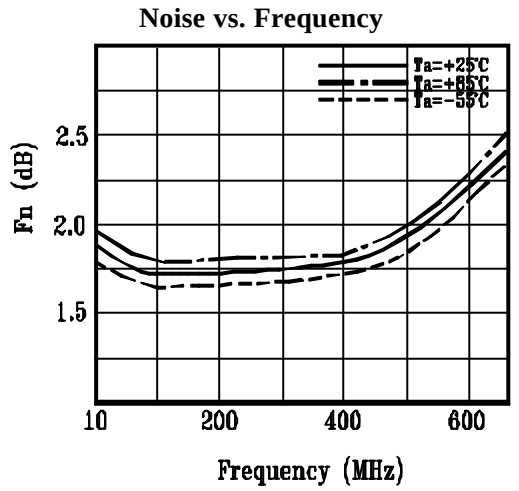
Gain vs. Frequency



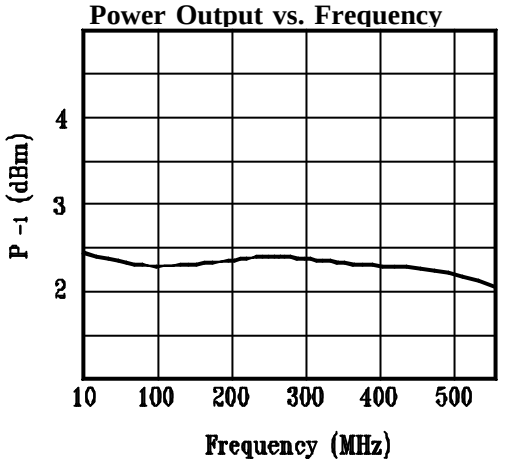
VSWR vs. Frequency



Noise vs. Frequency

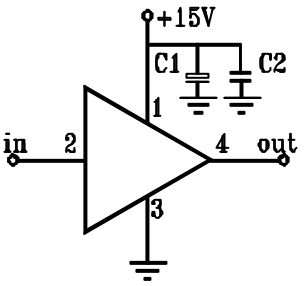


Power Output vs. Frequency



Note:

1. Typical application as shown right C_1=22~47μf;C_2=1000~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with UTO-510 from American HP Company or A51 from American W-J Company.



HE372B

General Amplifier

Features

- **Frequency Range：** **10~500MHz**
- **High Gain：** **20dB（Typ）**
- **Low Noise：** **2.2dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

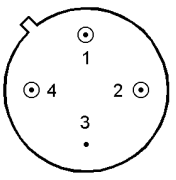
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~500	10~500
Small Signal Gain	Gp	dB	19.0	20.0
Gain Flatness	ΔGp	dB	±0.5	±0.2
Noise Figure	Fn	dB	2.5	2.2
Input VSWR	VSWRi	——	2:1	1.5:1
Output VSWR	VSWRo	——	2:1	1.5:1
Power Output @1dB Compression	P_{-1}	dBm	9.5	10.0
DC Current	I_{cc}	mA	——	25

Note: The Gp and P_{-1} will be reduced 0.4dBand 1.8dBm respectively under operating at 12VDC (Icc= 12mA TYP).

Absolute Maximum Rating

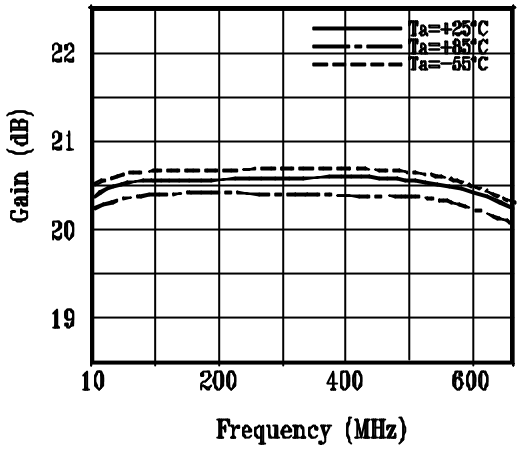
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



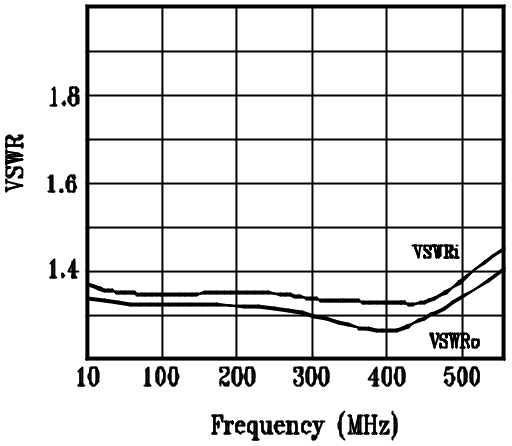
TO-8C

Typical Performance Curves

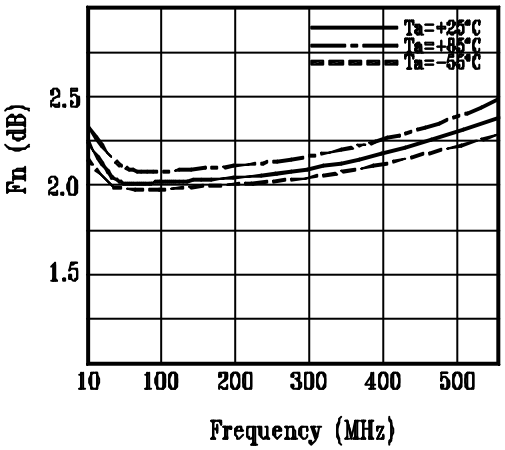
Gain vs. Frequency



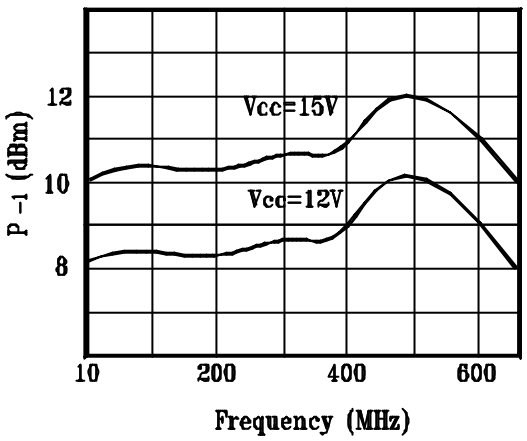
VSWR vs. Frequency



Noise vs. Frequency

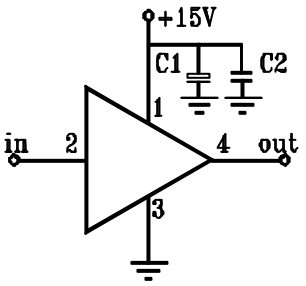


Output Power vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with UTO-512 from American HP Company or A75-3 from American W-J Company.



HE373B

General Amplifier

Features

- **Frequency Range：** **10~1000MHz**
- **Gain：** **14.5dB（Typ）**
- **Low Noise：** **2.7dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

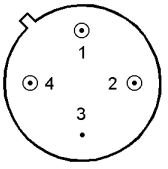
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~1000	10~1000
Small Signal Gain	Gp	dB	14.0	14.5
Gain Flatness	ΔGp	dB	±0.5	——
Noise Figure	Fn	dB	3.0	2.7
Input VSWR	VSWRi	——	2:1	——
Output VSWR	VSWRo	——	2:1	——
Power Output @1dB Compression	P_{-1}	dBm	8.0	——
DC Current	I_{cc}	mA	——	20

Note: The Gp and P_{-1} will be reduced 0.3dBand 1.5dBm respectively under operating at 12VDC (Icc= 16mA TYP).

Absolute Maximum Rating

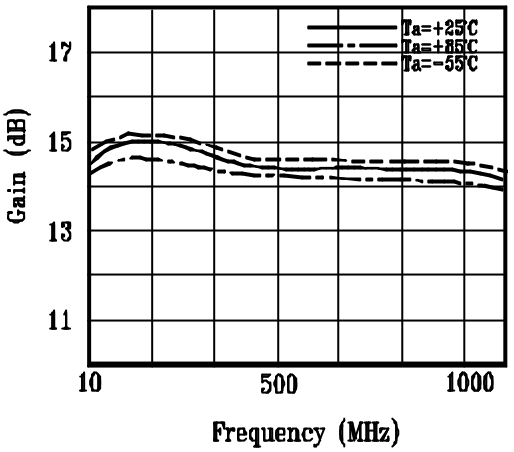
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



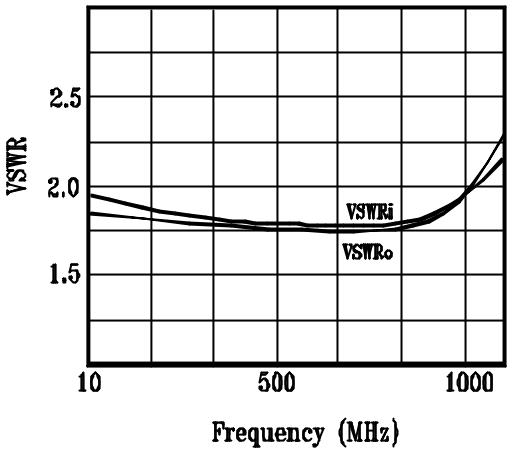
TO-8C

Typical Performance Curves

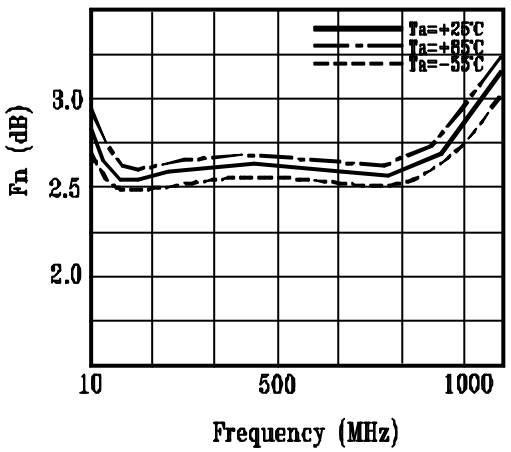
Gain vs. Frequency



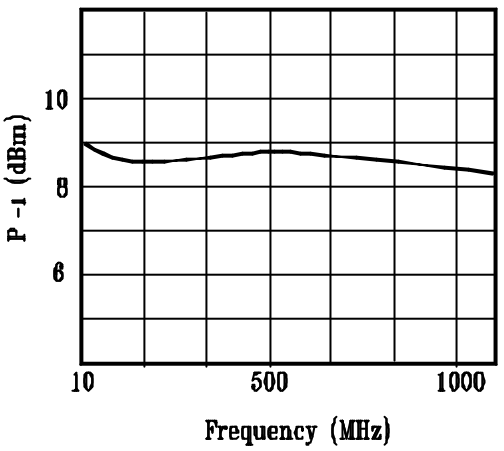
VSWR vs. Frequency



Noise vs. Frequency

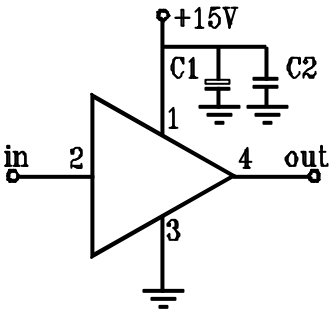


Output Power vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with UTO-1012 from American HP Company or A11 from American W-J Company.



HE373C

General Amplifier

Features

- **Frequency Range：** **10~1000MHz**
- **Gain：** **13.0dB（Typ）**
- **High Output Power：** **17.5dBm（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

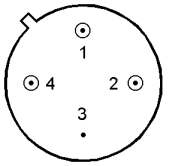
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~1000	10~1000
Small Signal Gain	Gp	dB	12.0	13.0
Gain Flatness	ΔGp	dB	±0.5	±0.3
Noise Figure	Fn	dB	5.0	4.5
Input VSWR	VSWRi	——	2:1	1.6:1
Output VSWR	VSWRo	——	2:1	1.6:1
Power Output @1dB Compression	P_{-1}	dBm	17.0	17.5
DC Current	I_{CC}	mA	——	60

Note: The P_{-1} will be reduced 2dBm under operating at 12VDC (Icc= 16mA TYP)

Absolute Maximum Rating

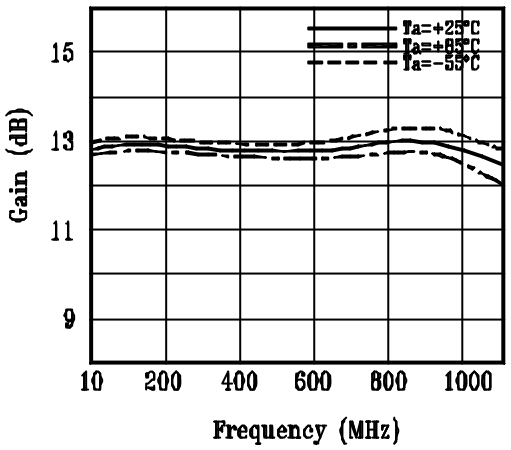
Maximum DC Voltage ----- +17VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



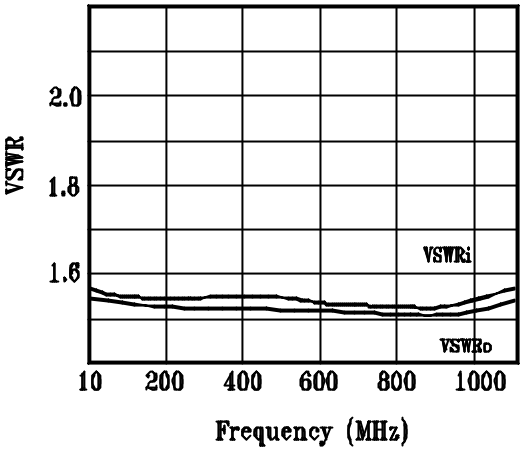
TO-8C

Typical Performance Curves

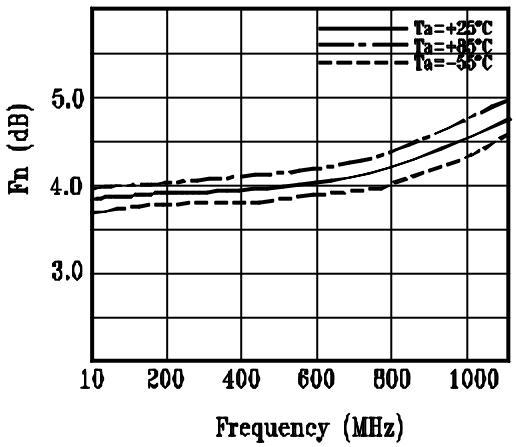
Gain vs. Frequency



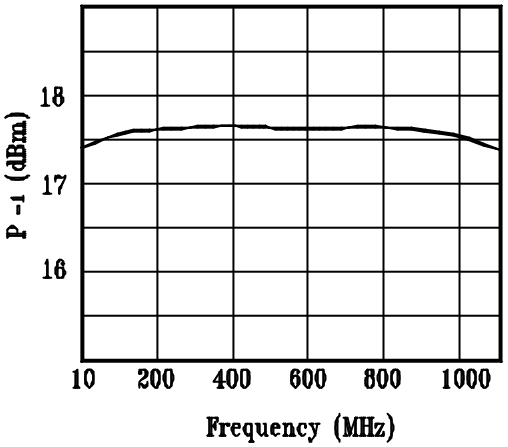
VSWR vs. Frequency



Noise vs. Frequency

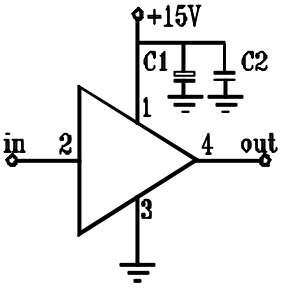


Output Power vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Scattering heat because power dissipation is higher.



HE374B

General Amplifier

Features

- **Frequency Range：** **10~1500MHz**
- **Gain：** **11.0dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

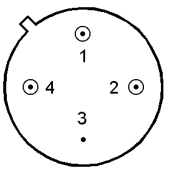
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~1500	10~1500
Small Signal Gain	Gp	dB	9.5	11.0
Gain Flatness	ΔGp	dB	±0.75	±0.5
Noise Figure	Fn	dB	4.5	——
Input VSWR	VSWRi	——	2:1	——
Output VSWR	VSWRo	——	2:1	——
Power Output @1dB Compression	P_{-1}	dBm	8.5	9.0
DC Current	I_{cc}	mA	——	25

Note: The Gp and P_{-1} will be reduced 0.1dBand 1.6dBm respectively under operating at 12VDC (Icc= 20mA TYP).

Absolute Maximum Rating

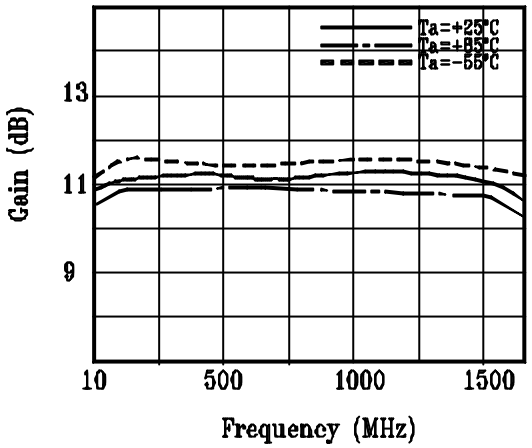
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



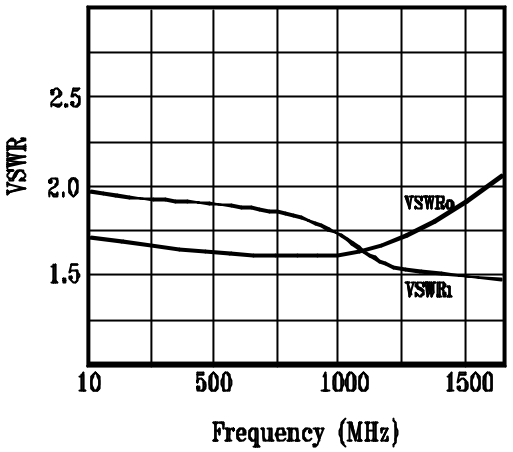
TO-8C

Typical Performance Curves

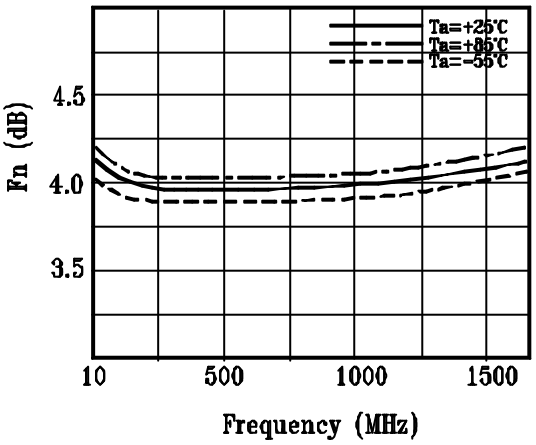
Gain vs. Frequency



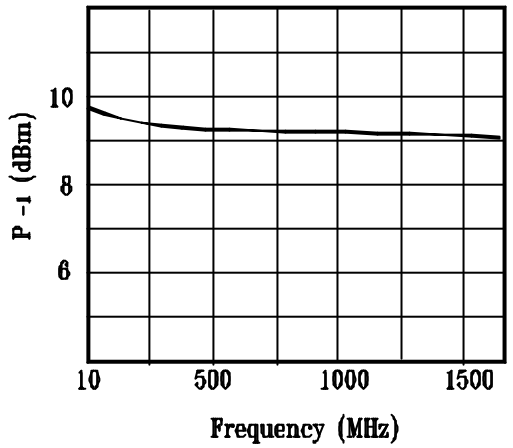
VSWR vs. Frequency



Noise vs. Frequency

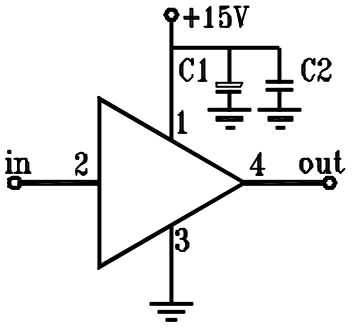


Output Power vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with UTO-1502 from American HP Company or A25 from American W-J Company.



HE381B

General Amplifier

Features

- **Frequency Range：** **20~500MHz**
- **Gain：** **11.5dB（Typ）**
- **Low Noise：** **2.2dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

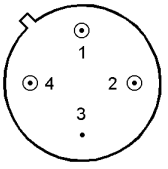
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~500	20~600
Small Signal Gain	Gp	dB	11.0	11.5
Gain Flatness	ΔGp	dB	±0.5	±0.3
Noise Figure	Fn	dB	2.5	2.2
Input VSWR	VSWRi	——	2.0:1	1.5:1
Output VSWR	VSWRo	——	2.0:1	1.5:1
Power Output @1dB Compression	P_{-1}	dBm	12	13
DC Current	I_{cc}	mA	——	32

Note: The Gp and P_{-1} will be reduced 0.2dBand 3.5dBm respectively under operating at 12VDC (Icc= 27mA TYP).

Absolute Maximum Rating

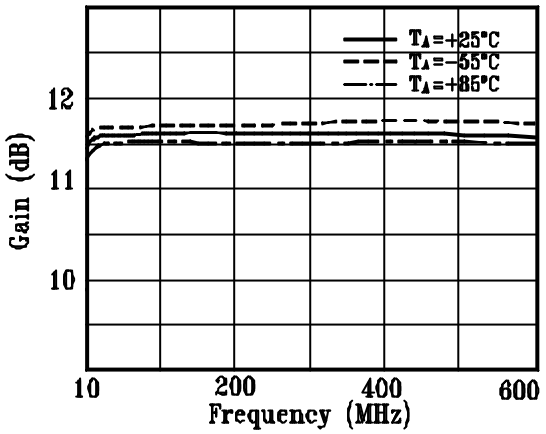
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature -- +125℃



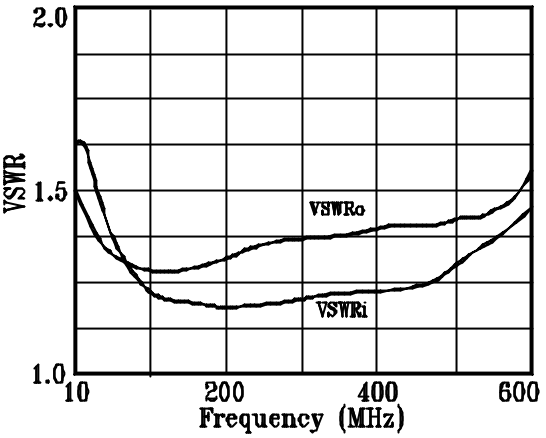
TO-8C

Typical Performance Curves

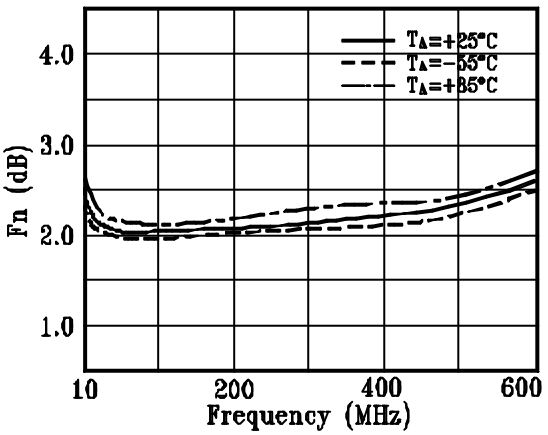
Gain vs. Frequency



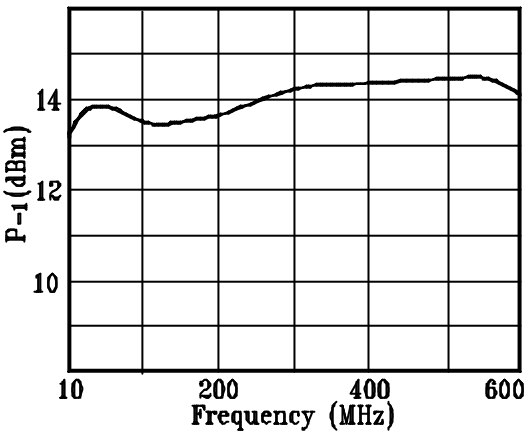
VSWR vs. Frequency



Noise vs. Frequency

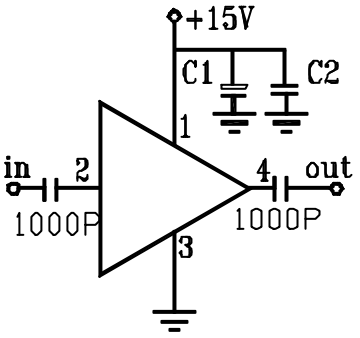


Power Output vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with UTO-554 from American HP Company.



HE382B

General Amplifier

Features

- **Frequency Range：** **20~1000MHz**
- **Gain：** **10.5dB（Typ）**
- **Low Noise：** **3.0dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

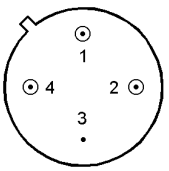
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~1000	20~1100
Small Signal Gain	Gp	dB	10.0	10.5
Gain Flatness	ΔGp	dB	±0.75	±0.5
Noise Figure	Fn	dB	3.5	3.0
Input VSWR	VSWRi	——	2.5:1	2.0:1
Output VSWR	VSWRo	——	2.5:1	2.0:1
Power Output @1dB Compression	P_{-1}	dBm	8	9.5
DC Current	I_{cc}	mA	——	25

Note: The Gp and P_{-1} will be reduced 0.3dBand 3.2dBm respectively under operating at 12VDC (Icc= 20mA TYP).

Absolute Maximum Rating

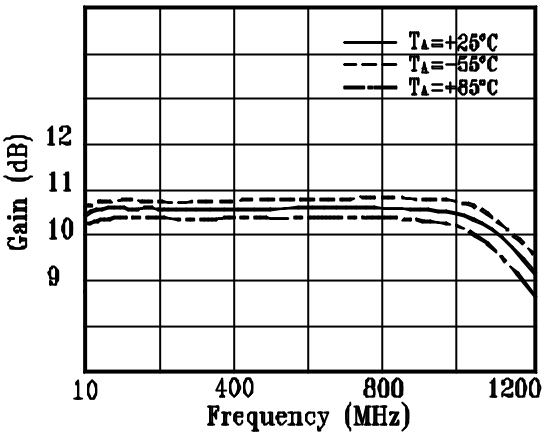
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



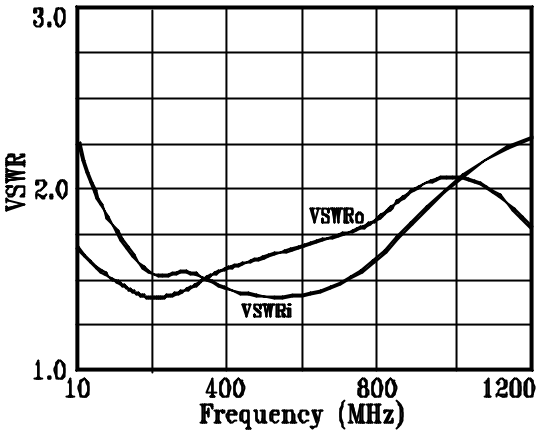
TO-8C

Typical Performance Curves

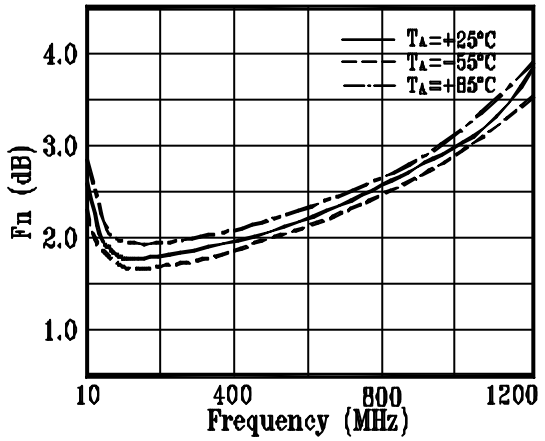
Gain vs. Frequency



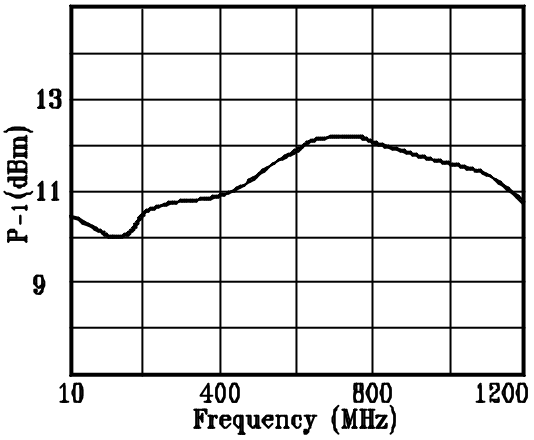
VSWR vs. Frequency



Noise vs. Frequency

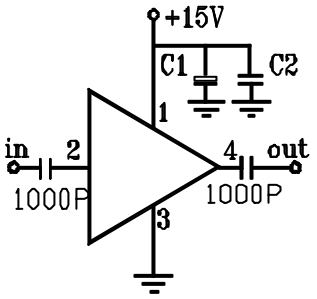


Power Output vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with UTO-1043 from American HP Company.



HE383B

General Amplifier

Features

- **Frequency Range：** **20~500MHz**
- **Gain：** **10.5dB (Typ)**
- **High Output Power** **17dBm (Typ)**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

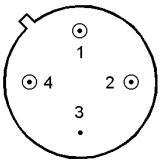
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~500	20~600
Small Signal Gain	Gp	dB	10.0	10.5
Gain Flatness	ΔGp	dB	±0.5	±0.3
Noise Figure	Fn	dB	4.5	4.0
Input VSWR	VSWRi	——	2.0:1	1.7:1
Output VSWR	VSWRo	——	2.0:1	1.7:1
Power Output @1dB Compression	P_{-1}	dBm	16.0	17.0
DC Current	I_{cc}	mA	——	45

Note: The Gp and P_{-1} will be reduced 0.1dBand 2.3dBm respectively under operating at 12VDC (Icc= 36mA TYP).

Absolute Maximum Rating

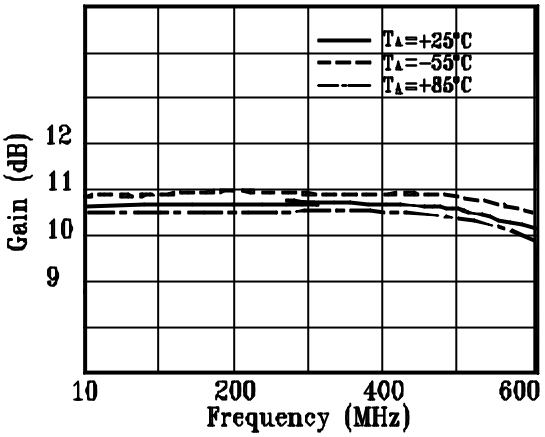
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



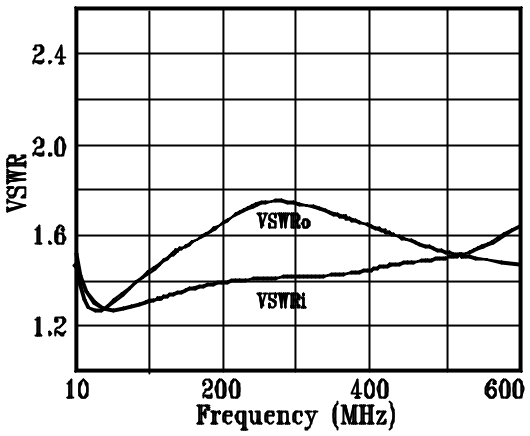
TO-8C

Typical Performance Curves

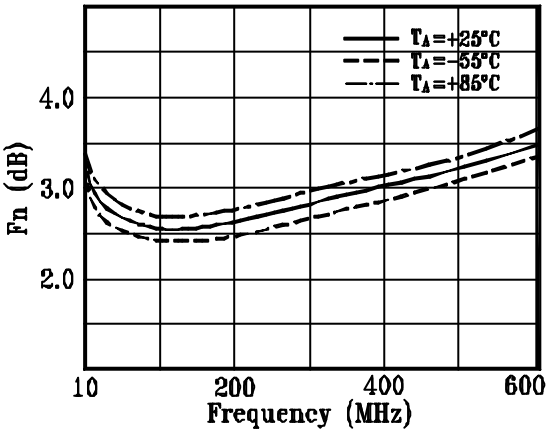
Gain vs. Frequency



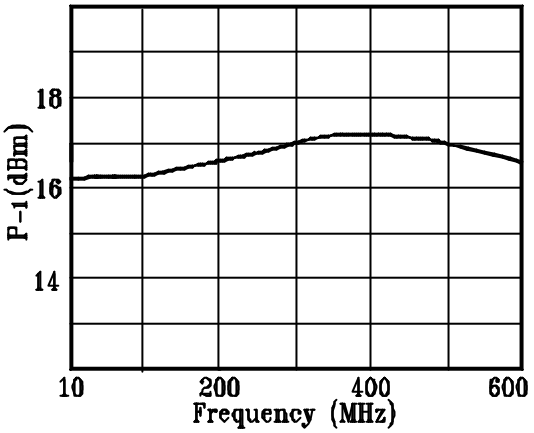
VSWR vs. Frequency



Noise vs. Frequency

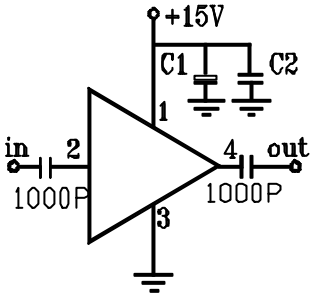


Power Output vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with UTO-545 from American HP Company.



HE391A

General Amplifier

Features

- **Frequency Range：** **20~700MHz**
- **Gain：** **16.0dB (Typ)**
- **High Output Power: 17.5dBm@700MHz(Typ)**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

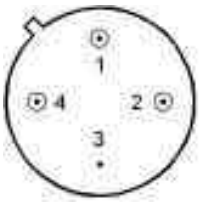
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~700	10~700
Small Signal Gain	Gp	dB	15.0	16.0
Gain Flatness	ΔGp	dB	±0.5	±0.2
Noise Figure	Fn	dB	4.0	3.5
Input VSWR	VSWRi	——	2:1	1.8:1
Output VSWR	VSWRo	——	2:1	1.8:1
Power Output @1dB Compression	P_{-1}	dBm	17.0	17.5
DC Current	I_{cc}	mA	——	55

Note: The P_{-1} will be reduced 2dBm under operating at 12VDC (Icc= 44mA TYP)

Absolute Maximum Rating

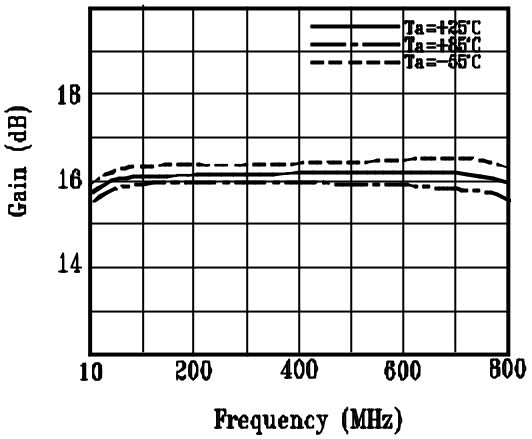
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



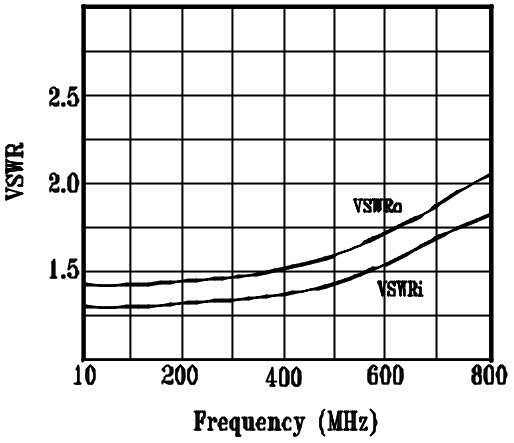
TO-8C

Typical Performance Curves

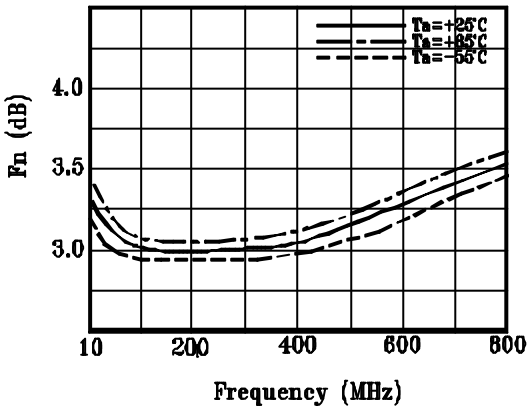
Gain vs. Frequency



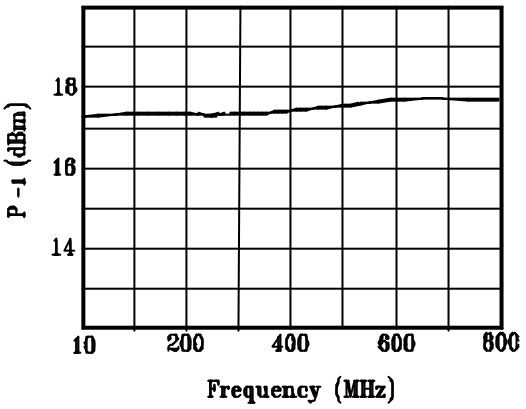
VSWR vs. Frequency



Noise vs. Frequency

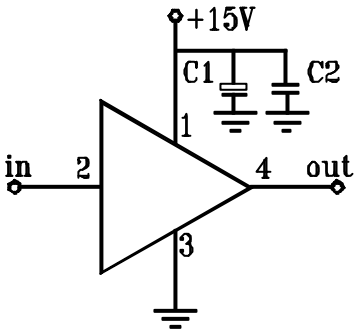


Output Power vs. Frequency



Note:

1. Typical application as shown right C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Pay attention to heat dispersion.
4. Interchanged directly with UTO-533 from American former **AVANTEK** Company or A67-1 from American W-J Company.

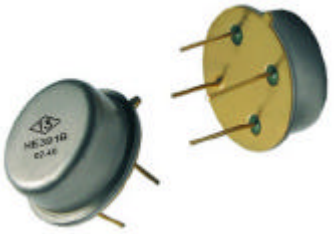


HE391B

General Amplifier

Features

- **Frequency Range：** **20~500MHz**
- **Gain：** **16.0dB（Typ）**
- **High Output Power：** **20.0dBm （Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**



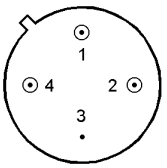
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~500	20~550
Small Signal Gain	Gp	dB	15.0	16.0
Gain Flatness	ΔGp	dB	±0.5	±0.3
Noise Figure	Fn	dB	4.5	4.0
Input VSWR	VSWRi	——	2:1	1.5:1
Output VSWR	VSWRo	——	2:1	1.5:1
Power Output @1dB Compression	P_{-1}	dBm	19.5	20.0
DC Current	I_{cc}	mA	——	65

Note: The P_{-1} will be reduced 2dBm under operating at 12VDC (Icc= 52mA TYP).

Absolute Maximum Rating

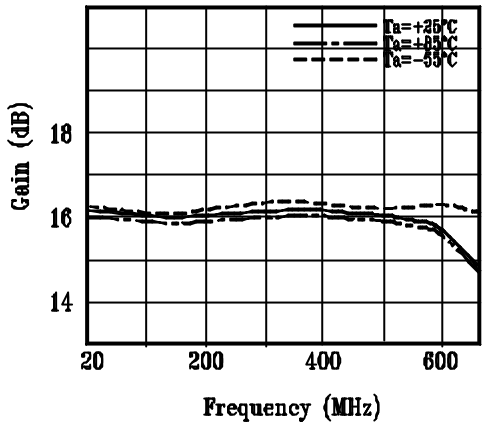
Maximum DC Voltage ----- +16VDC
Maximum Input Power ----- +12dBm
Storage Temperature ---- +125℃



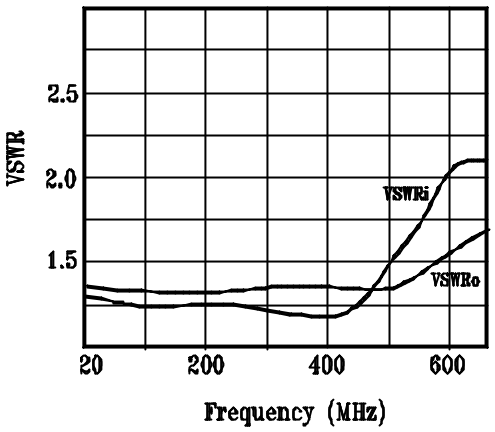
TO-8C

Typical Performance Curves

Gain vs. Frequency

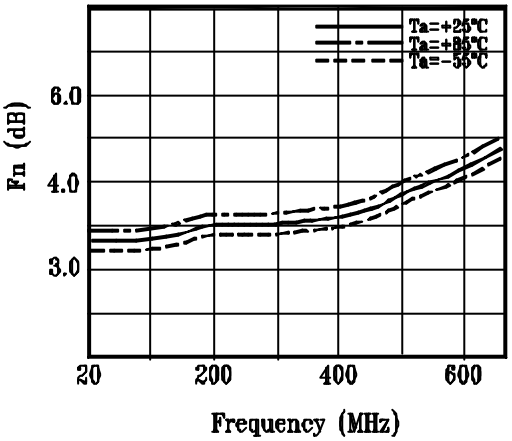


VSWR vs. Frequency

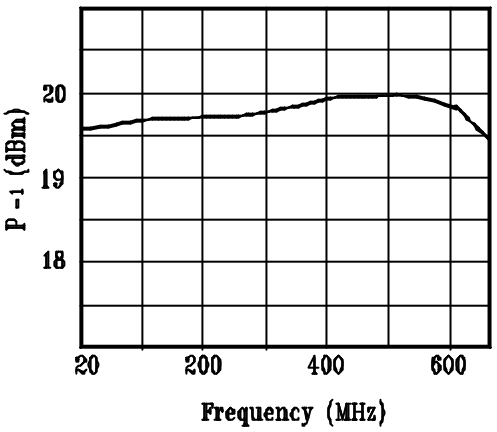


噪

Noise vs. Frequency

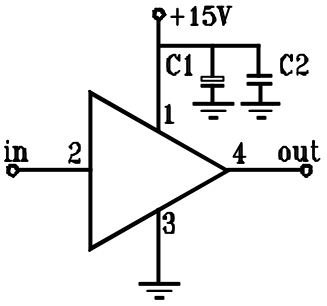


Output Power vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Pay attention to heat dispersion.
4. Interchanged directly with UTO-509R from American HP Company or A79 from American W-J Company.



HE391C

General Amplifier

Features

- **Frequency Range：** **20~400MHz**
- **Gain：** **16.0dB（Typ）**
- **High Output Power：** **25.0dBm（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

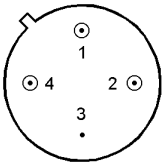
Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~400	20~450
Small Signal Gain	Gp	dB	15.0	16.0
Gain Flatness	ΔGp	dB	±0.5	±0.3
Noise Figure	Fn	dB	4.5	4.0
Input VSWR	VSWRi	——	2:1	1.5:1
Output VSWR	VSWRo	——	2:1	1.5:1
Power Output @1dB Compression	P_{-1}	dBm	23.0*	——
			24.0**	25.0
Frequency Range	I_{cc}	mA	——	120

Note: * f >300MHz ** f≤300MHz;

The Gp and P_{-1} will be reduced 0.3dBand 2.0dBm respectively under operating at 12VDC (Icc= 92mA TYP).

Absolute Maximum Rating

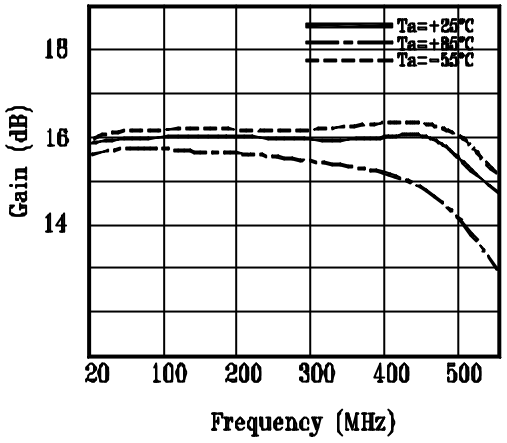
Maximum DC Voltage ----- +16VDC
Maximum Input Power ----- +13dBm
Storage Temperature ---- +125℃



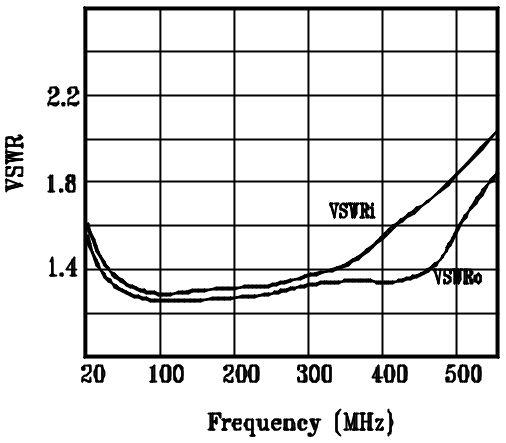
TO-8C

Typical Performance Curves

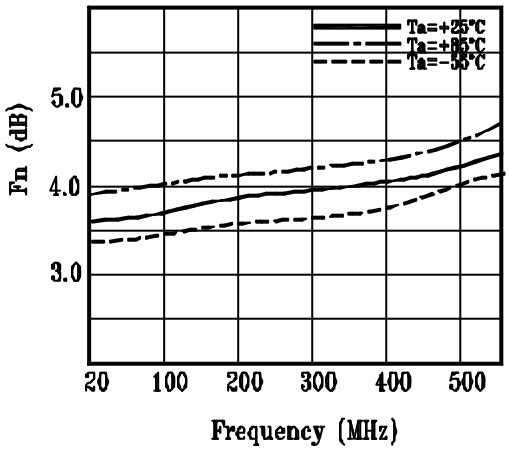
Gain vs. Frequency



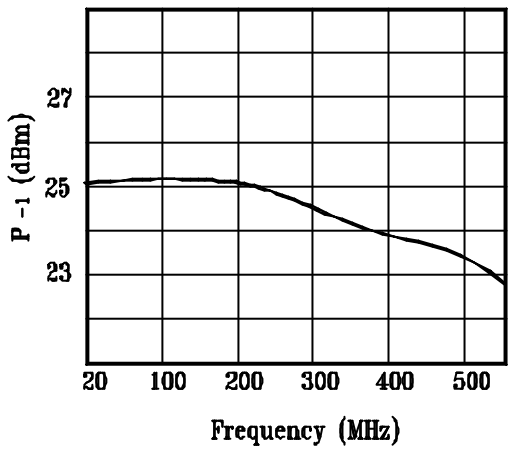
VSWR vs. Frequency



Noise vs. Frequency

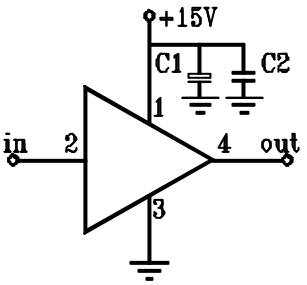


Output Power vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. **Pay attention to heat dispersion.**



HE461B

General Amplifier

Features

- **Frequency Range：** **10~1000MHz**
- **High Gain：** **24.0dB（Typ）**
- **Noise Figure：** **3.5dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8A**
- **Wide Operating Temperature：-55℃~+85℃**

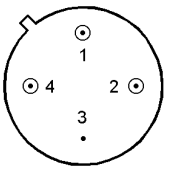
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~1000	10~1000
Small Signal Gain	Gp	dB	23.0	24.0
Gain Flatness	ΔGp	dB	±0.75	±0.5
Noise Figure	Fn	dB	4.0	3.5
Input VSWR	VSWRi	——	2.0:1	1.7:1
Output VSWR	VSWRo	——	2.0:1	1.7:1
Power Output @1dB Compression	P_{-1}	dBm	9.0	——
DC Current	I_{cc}	mA	——	45

Note：The Gp and P_{-1} will be reduced 0.5dBand 1.6dBm respectively under operating at 12VDC (Icc= 35mA TYP).

Absolute Maximum Rating

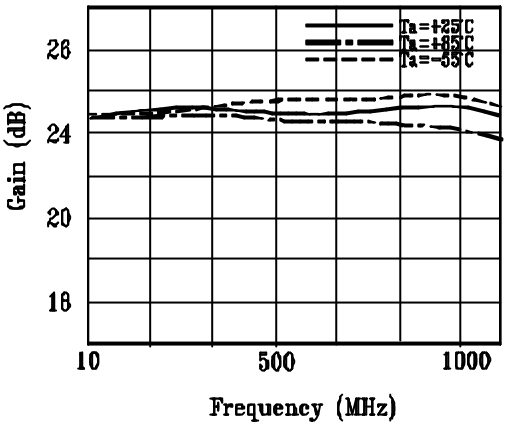
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature -- +125℃



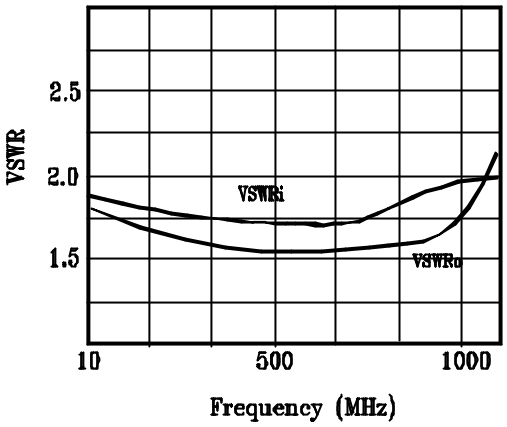
TO-8A

Typical Performance Curves

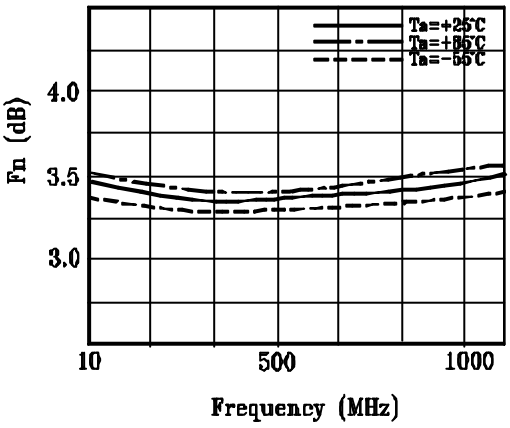
Gain vs. Frequency



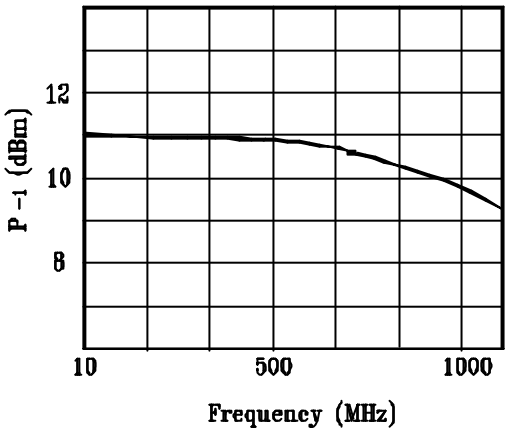
VSWR vs. Frequency



VSWR vs. Frequency

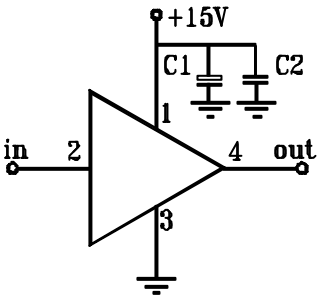


Power Output vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with UTO-1054 from American HP Company or A64 from American W-J Company.



HE462B

General Amplifier

Features

- **Frequency Range：** **10~1500MHz**
- **High Gain：** **20.0dB（Typ）**
- **Noise Figure：** **4.5dB**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8A**
- **Wide Operating Temperature：-55℃~+85℃**

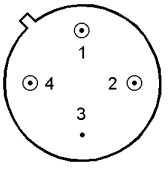
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~1500	10~1500
Small Signal Gain	Gp	dB	19.0	20.0
Gain Flatness	ΔGp	dB	±0.75	±0.5
Noise Figure	Fn	dB	4.5	——
Input VSWR	VSWRi	——	2.0:1	——
Output VSWR	VSWRo	——	2.0:1	——
Power Output @1dB Compression	P_{-1}	dBm	8.0	——
DC Current	I_{cc}	mA	——	45

Note：The Gp and P_{-1} will be reduced 0.4dBand 1.6dBm respectively under operating at 12VDC (Icc= 35mA TYP).

Absolute Maximum Rating

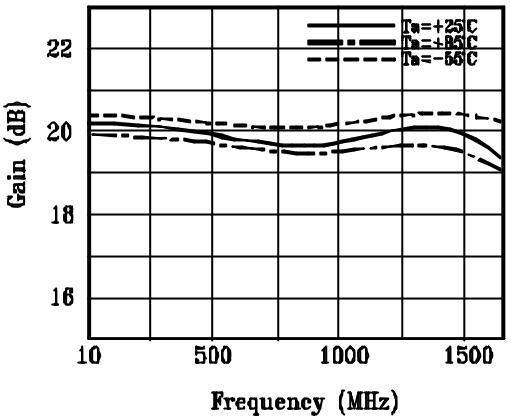
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature -- +125℃



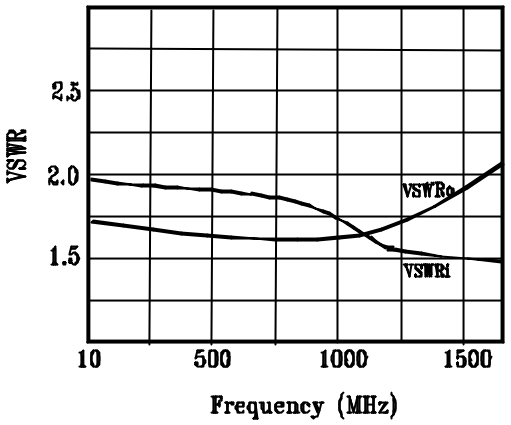
To-8A

Typical Performance Curves

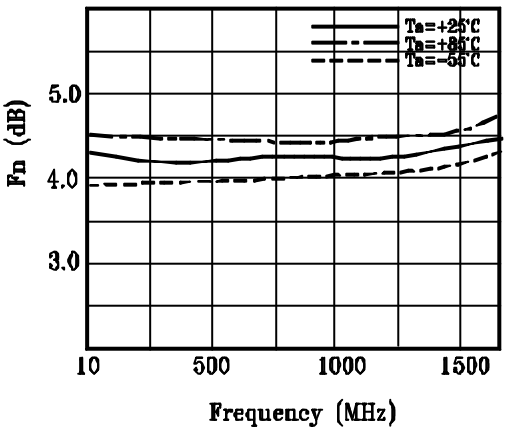
Gain vs. Frequency



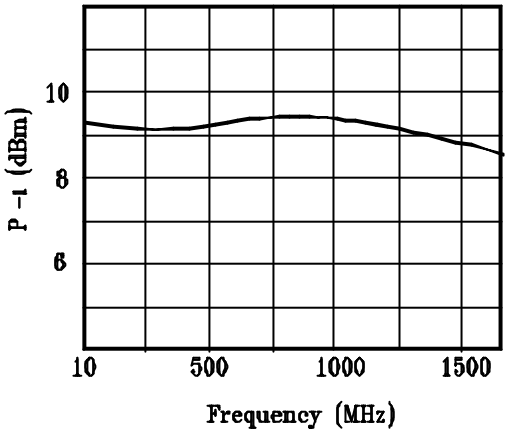
VSWR vs. Frequency



VSWR vs. Frequency

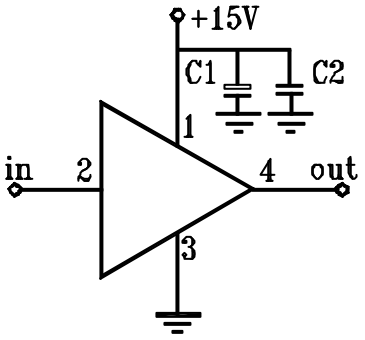


Power Output vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with UTO-1524 from American HP Company or A24 from American W-J Company.



HE463B

General Amplifier

Features

- **Frequency Range：** **10~2000MHz**
- **High Gain：** **17.0dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8A**
- **Wide Operating Temperature：-55℃~+85℃**

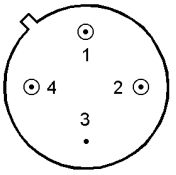
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~2000	10~2000
Small Signal Gain	Gp	dB	16.0	17.0
Gain Flatness	ΔGp	dB	±1.0	±0.75
Noise Figure	Fn	dB	5.5	——
Input VSWR	VSWRi	——	2.0:1	——
Output VSWR	VSWRo	——	2.0:1	——
Power Output @1dB Compression	P_{-1}	dBm	8.0	——
DC Current	I_{cc}	mA	——	45

Note：The Gp and P_{-1} will be reduced 0.5dBand 2dBm respectively under operating at 12VDC (Icc= 35mA TYP).

Absolute Maximum Rating

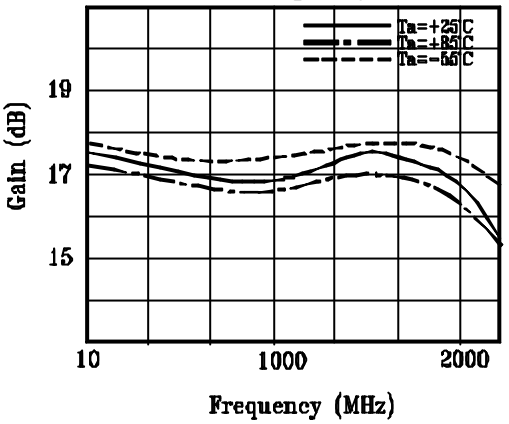
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature -- +125℃



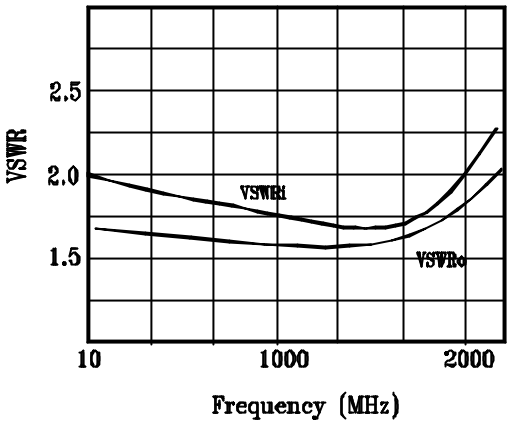
TO-8A

Typical Performance Curves

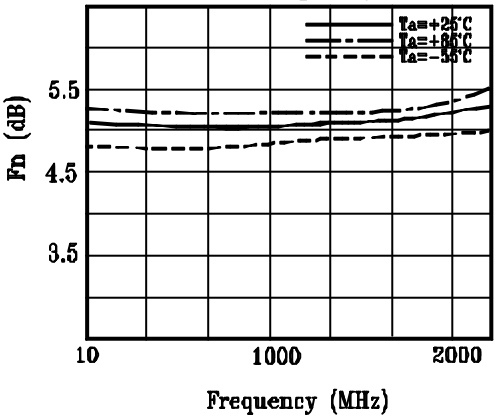
Gain vs. Frequency



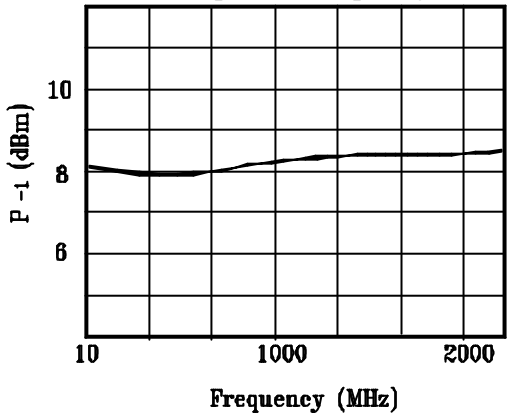
VSWR vs. Frequency



VSWR vs. Frequency

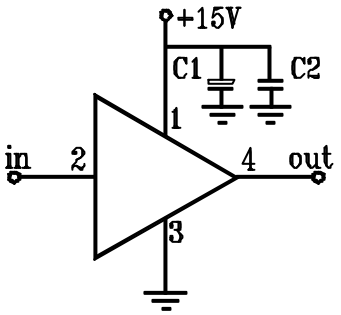


Power Output vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with UTO-2024 from American HP Company or A34 from American W-J Company.



HE861

General Amplifier

Features

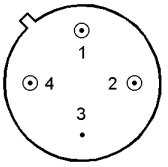
- **Frequency Range：** **20~500MHz**
- **High Gain：** **29dB（Typ）**
- **High Output Power：** **18dBm(Min)**
- **Input/Output Impedance: 50Ω**
- **Package:** **TO-8D**
- **Wide Operating Temperature：-55℃~+85℃**

Specifications (Test at V_{CC} = +12V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~500	——
Small Signal Gain	Gp	dB	27.0	29.0
Gain Flatness	ΔGp	dB	±0.5	——
Noise Figure	Fn	dB	4.5	4.0
Input VSWR	VSWRi	——	2.0:1	1.8:1
Output VSWR	VSWRo	——	2.0:1	1.8:1
Power Output @1dB Compression	P_{-1}	dBm	18.0	——
DC Current	I_{cc}	mA	——	85

Absolute Maximum Rating

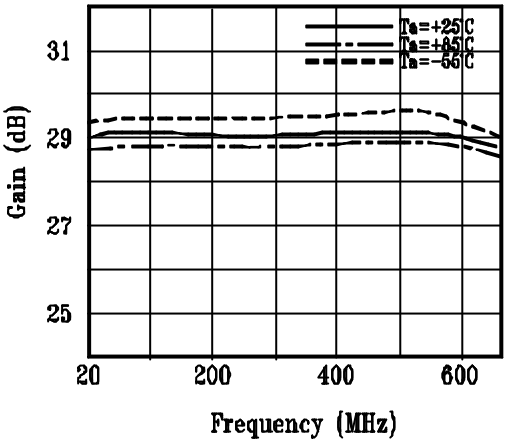
Maximum DC Voltage ----- +13VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



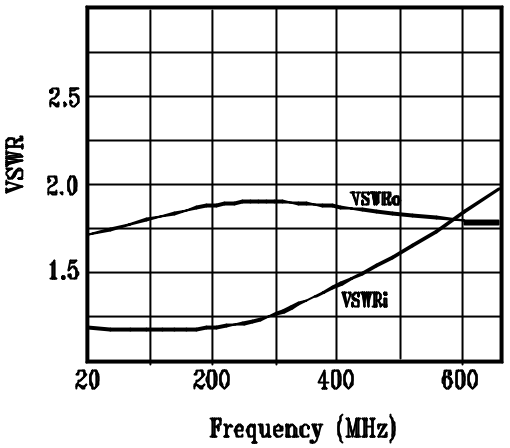
TO-8D

Typical Performance Curves

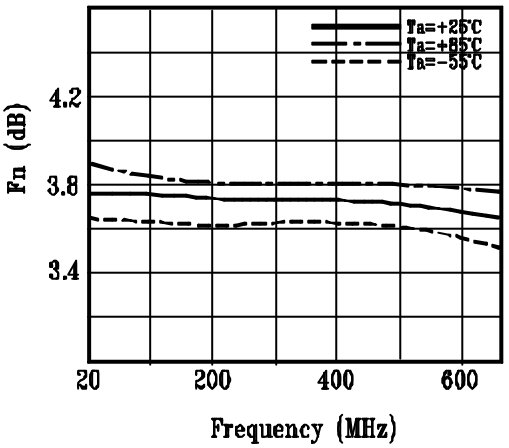
Gain vs. Frequency



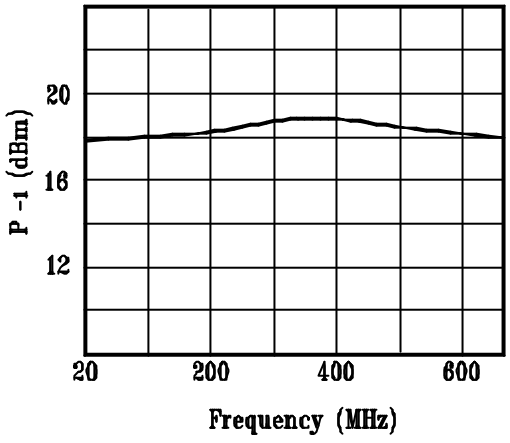
VSWR vs. Frequency



Noise vs. Frequency

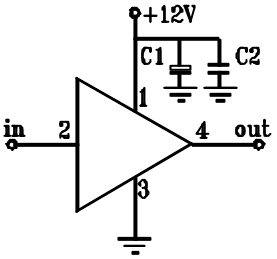


Output Power vs. Frequency



Note:

1. Typical application as shown right C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Pay attention to heat dispersion.



HE871

General Amplifier

Features

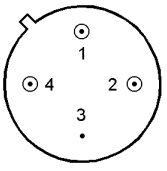
- **Frequency Range：** **20～1000MHz**
- **High Gain：** **26dB（Typ）**
- **High Output Power：** **17dBm(Typ)**
- **Input/Output Impedance: 50Ω**
- **Package:** **TO-8D**
- **Wide Operating Temperature：-55℃～+85℃**

Specifications (Test at V_{CC} = +12V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L～f_H	MHz	20～1000	20～1000
Small Signal Gain	Gp	dB	24.0	26.0
Gain Flatness	ΔGp	dB	±1	——
Noise Figure	Fn	dB	4.5	4.0
Input VSWR	VSWRi		2.0:1	1.8:1
Output VSWR	VSWRo	——	2.0:1	——
Power Output @1dB Compression	P_{-1}	dBm	16.5	17.0
DC Current	I_{cc}	mA	——	85

Absolute Maximum Rating

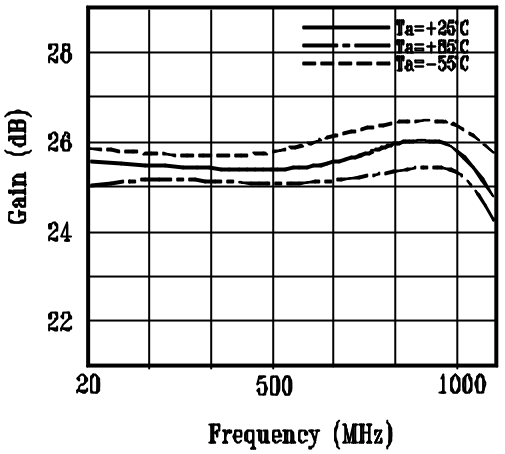
Maximum DC Voltage ----- +13VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



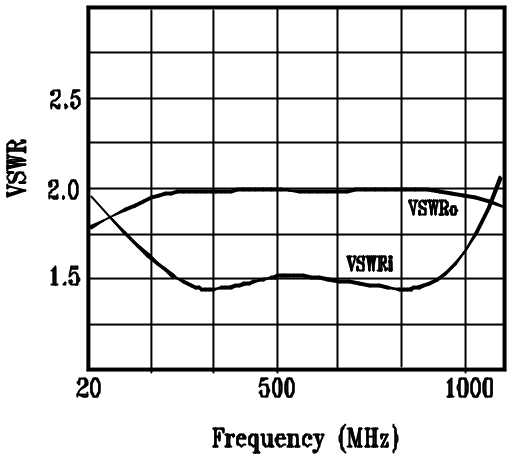
TO-8D

Typical Performance Curves

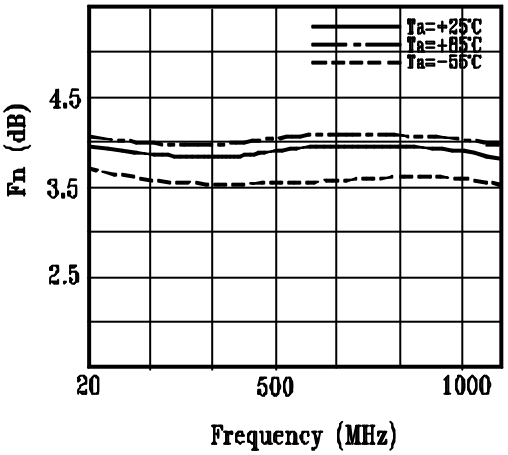
Gain vs. Frequency



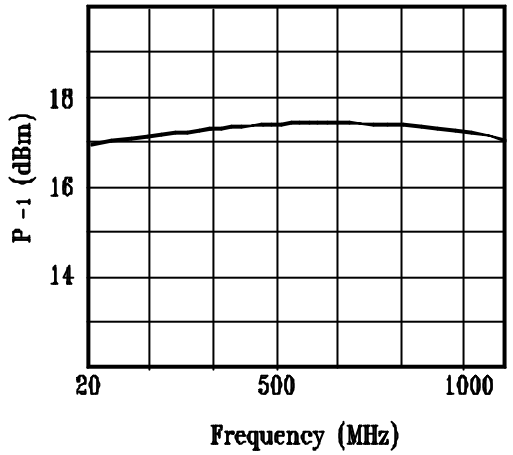
VSWR vs. Frequency



Noise vs. Frequency

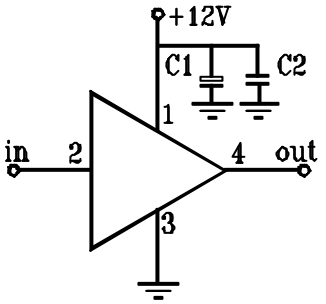


Output Power vs. Frequency



Note:

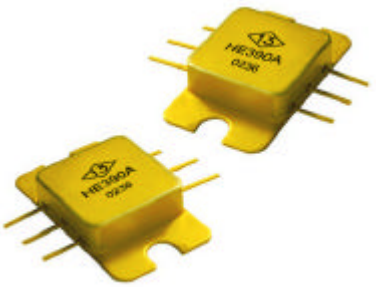
1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Pay attention to heat dispersion.



HE390A

General Amplifier

Features



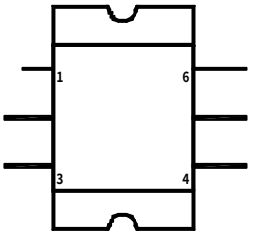
- **Frequency Range：** **10~500MHz**
- **Gain：** **18dB(Typ)**
- **High Output Power** **27dBm (Typ)**
- **Input/Output Impedance: 50W**
- **Package:** **SP**
- **Wide Operating Temperature：** **-55℃~+85℃**

Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~500	10~500
Small Signal Gain	Gp	dB	17.0	18.0
Gain Flatness	ΔGp	dB	±0.5	——
Noise Figure	Fn	dB	6.5	6.0
Input VSWR	VSWRi	——	2.0:1	1.7:1
Output VSWR	VSWRo	——	2.0:1	1.7:1
Power Output @1dB Compression	P_{-1}	dBm	27.0	27.5
DC Current	I_{cc}	mA	——	180

Absolute Maximum Rating

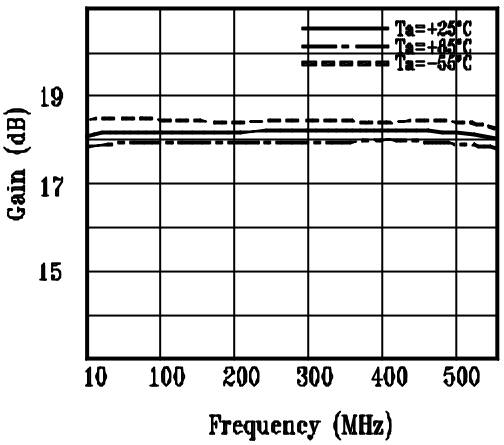
Maximum DC Voltage ----- +20VDC
Maximum Input Power ----- +15dBm
Storage Temperature ---- +125℃



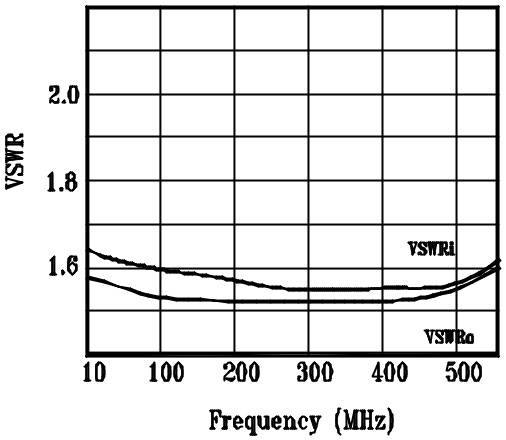
SP-1A

Typical Performance Curves

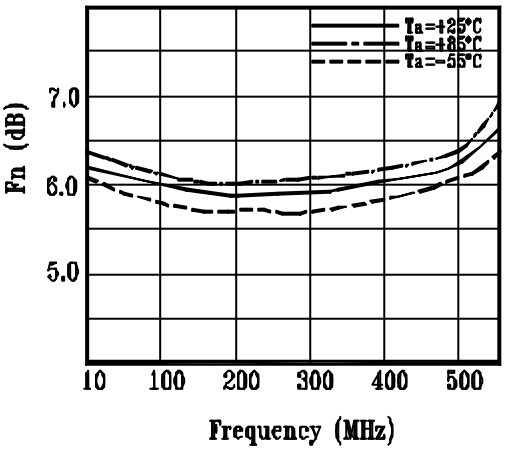
Gain vs. Frequency



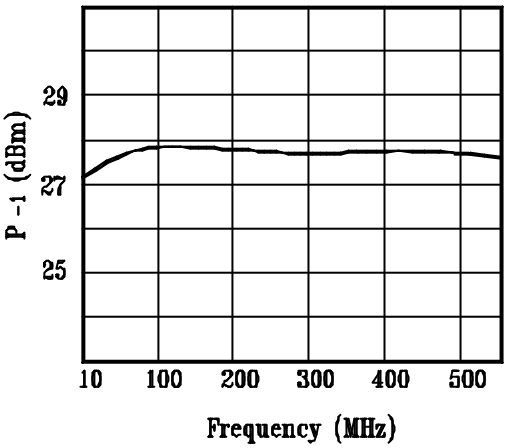
VSWR vs. Frequency



Noise vs. Frequency

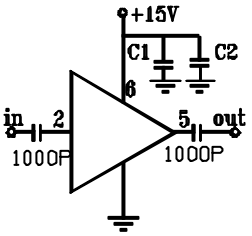


Power Output vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Addtional heatsink required.
3. **30dBm output power can be offered (more than 18VDC).**



Features

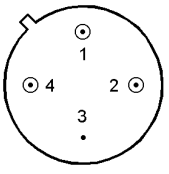
- **Frequency Range：** **1~100MHz**
- **High Dynamic Range：** **18dBm(Typ)**
- **High IP3 (Output)：** **30dBm（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

Specifications (Test at V_{CC} = +12V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	1~100	——
Small Signal Gain	Gp	dB	17.0	18.0
Gain Flatness	ΔGp	dB	±0.5	±0.3
Noise Figure	Fn	dB	4.5	4.0
Input VSWR	VSWRi	——	2.0:1	1.7:1
Output VSWR	VSWRo	——	2.0:1	1.7:1
Power Output @1dB Compression	P_{-1}	dBm	17.0	18.0
DC Current	I_{CC}	mA	——	55

Absolute Maximum Rating

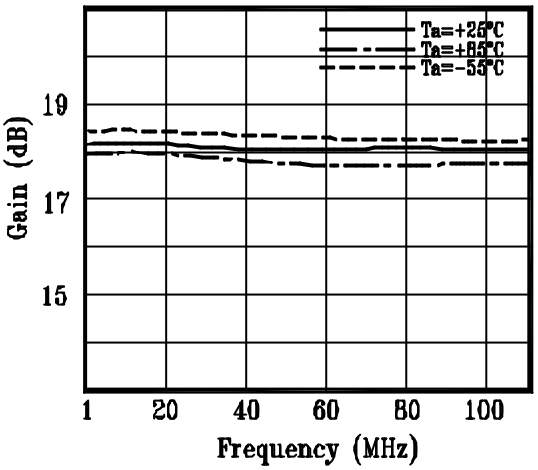
Maximum DC Voltage ----- +15VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



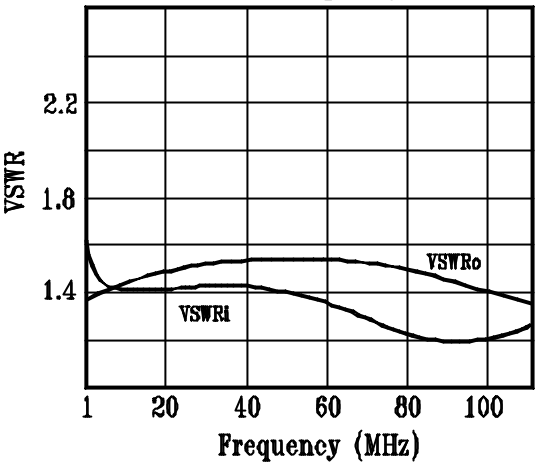
TO-8C

Typical Performance Curves

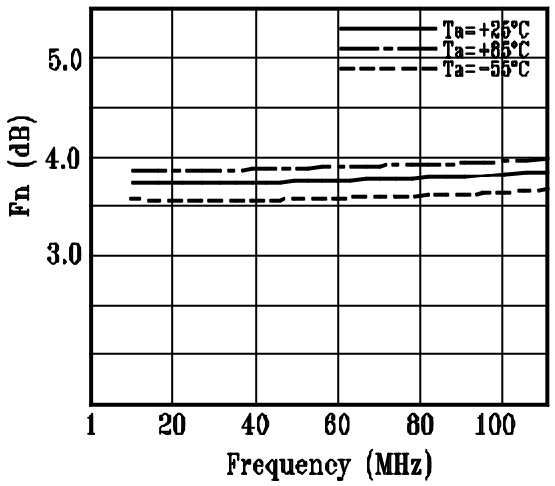
Gain vs. Frequency



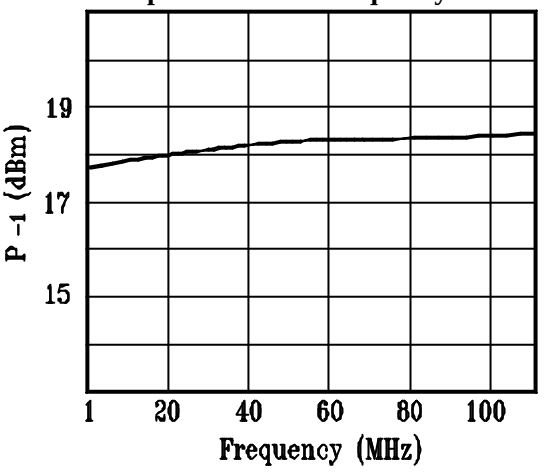
VSWR vs. Frequency



Noise vs. Frequency

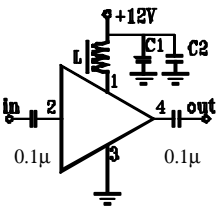


Output Power vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~3300pf, L≥130μH
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).



HE312

IF Amplifier

Features

- **Frequency Range：** **1~100MHz**
- **High Dynamic Range：** **19dBm**
- **High IP3(Output)：** **29dBm（Typ）**
- **Input/Output Impedance: 50W**
- **Package:** **TO-8F**
- **Wide Operating Temperature：-55℃~+85℃**

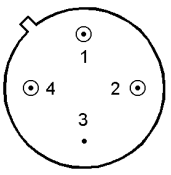
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	1~100	——
Small Signal Gain	Gp	dB	15.0	16.0
Gain Flatness	ΔGp	dB	±0.5	±0.3
Noise Figure	Fn	dB	4.0	3.5
Input VSWR	VSWRi	——	2:1	1.5:1
Output VSWR	VSWRo	——	2:1	1.5:1
Power Output @1dB Compression	P_{-1}	dBm	19.0	——
DC Current	I_{CC}	mA	——	65

Note :The P_{-1} will be reduced 2dBm under operating at 12VDC(I_{cc}=52mA Typ).

Absolute Maximum Rating

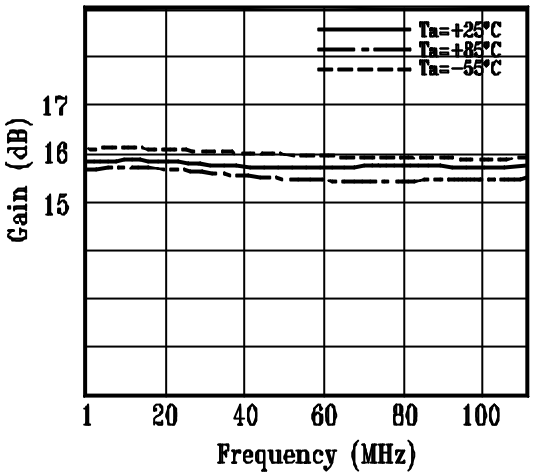
Maximum DC Voltage ----- +17VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



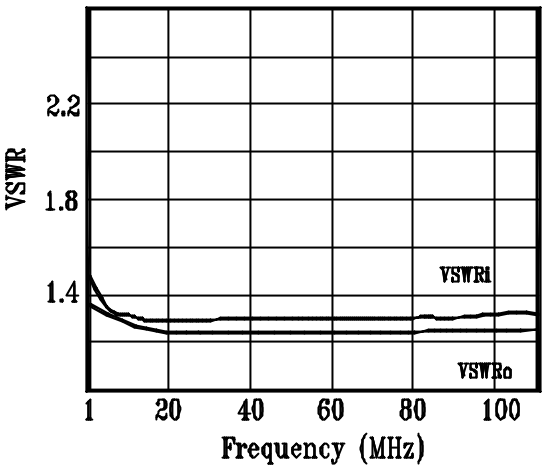
TO-8F

Typical Performance Curves

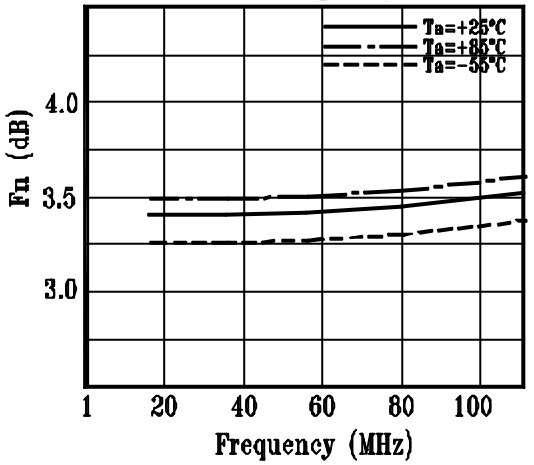
Gain vs. Frequency



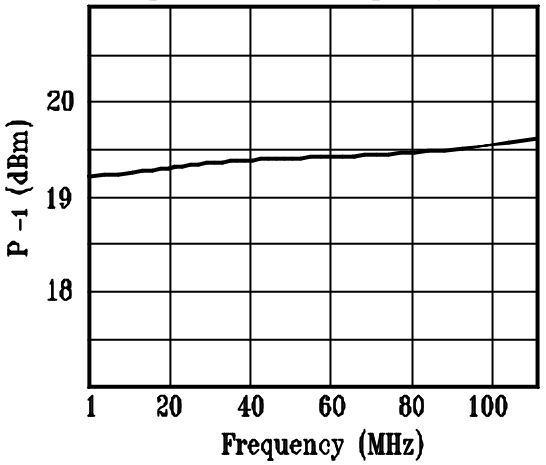
VSWR vs. Frequency



Noise vs. Frequency

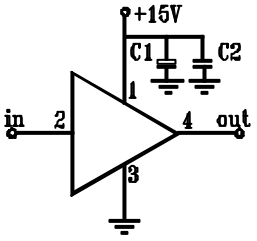


Output Power vs. Frequency

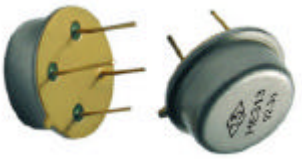


Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Pay attention to heat dispersion.



Features



- **Frequency Range：** **1~100MHz**
- **High Gain:** **28dB(Typ)**
- **High Dynamic Range：** **17dBm**
- **IP3 (Output) ：** **30dBm（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8F**
- **Wide Operating Temperature：-55℃~+85℃**

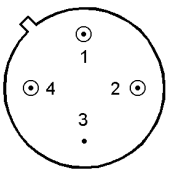
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	1~100	——
Small Signal Gain	Gp	dB	27.0	28.0
Gain Flatness	ΔGp	dB	±0.5	±0.2
Noise Figure	Fn	dB	2.5	2.2
Input VSWR	VSWRi	——	2:1	1.5:1
Output VSWR	VSWRo	——	2:1	1.5:1
Power Output @1dB Compression	P_{-1}	dBm	16.0	17.0
DC Current	I_{CC}	mA	——	32

Note :The Gp and P_{-1} will be reduced 0.4dB and 2.8dBm respectively under operating at 12VDC(I_{cc}=26mA Typ).

Absolute Maximum Rating

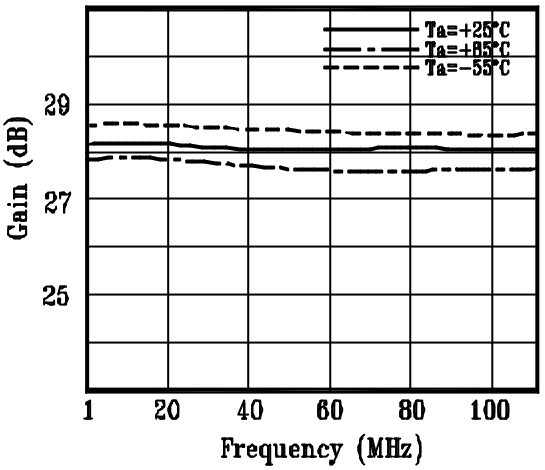
Maximum DC Voltage ----- +17VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



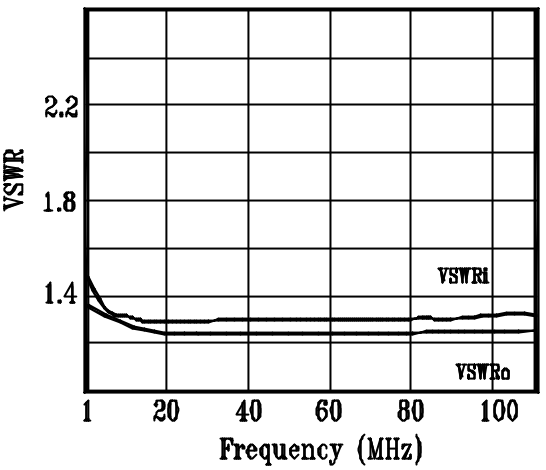
TO-8F

Typical Performance Curves

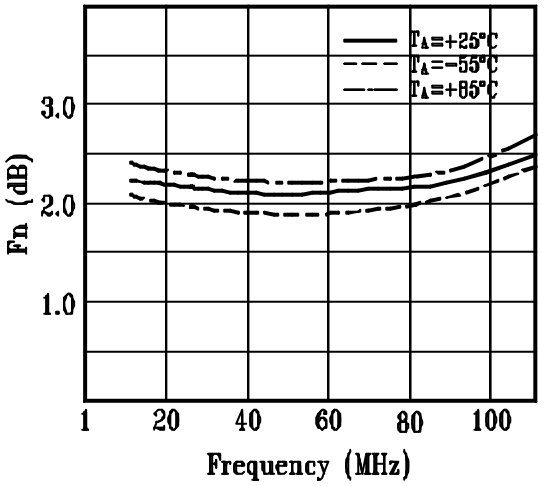
Gain vs. Frequency



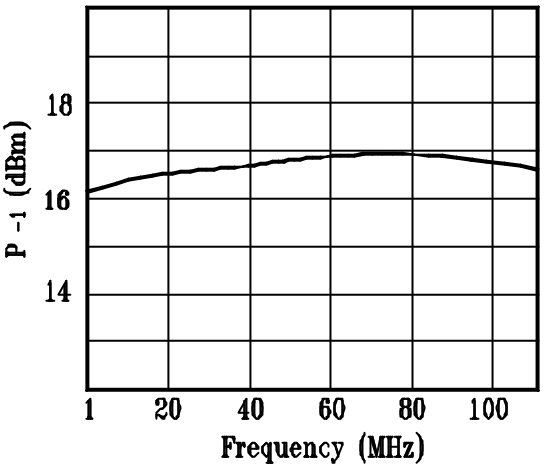
VSWR vs. Frequency



Noise vs. Frequency

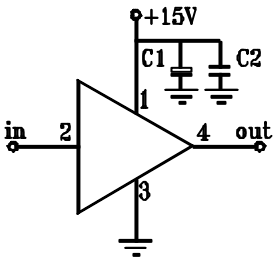


Output Power vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).



Features

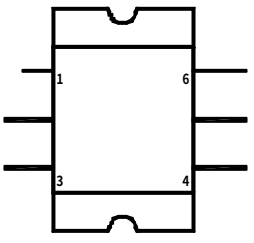
- **Frequency Range：** **3~50MHz**
- **High Gain:** **20dB(Typ)**
- **High Dynamic Range：** **27dBm/15VDC**
  30dBm/18VDC
- **High IP3 (Output)：** **35dBm（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **SP-1A**

Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	3~50	1~50
Small Signal Gain	Gp	dB	17.0	20.0
Gain Flatness	ΔGp	dB	±0.5	±0.2
Noise Figure	Fn	dB	6.0	4.5
Input VSWR	VSWRi	——	2:1	1.5:1
Output VSWR	VSWRo	——	2:1	1.5:1
Power Output @1dB Compression	P_{-1}	dBm	27.0	——
DC Current	I_{cc}	mA	——	180

Absolute Maximum Rating

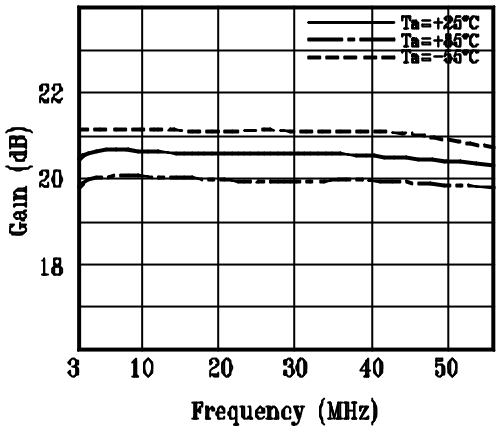
Maximum DC Voltage ----- +20VDC
Maximum Input Power ----- +15dBm
Storage Temperature ---- +125℃



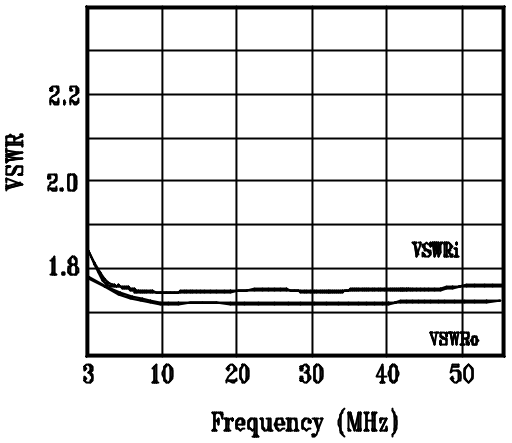
SP-1A

Typical Performance Curves

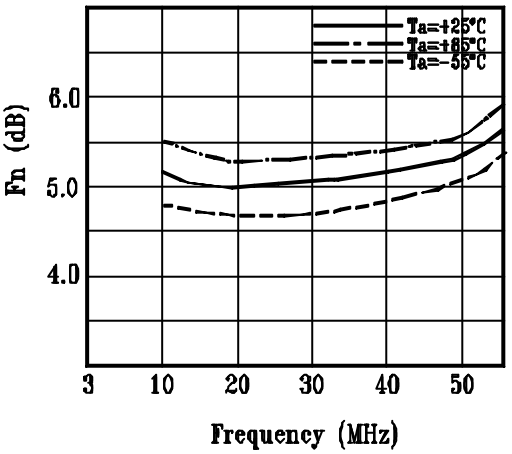
Gain vs. Frequency



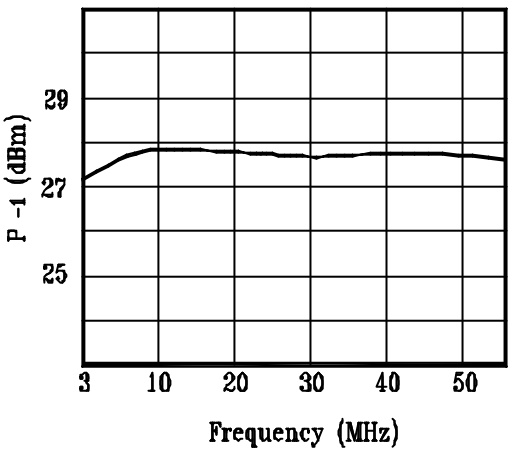
VSWR vs. Frequency



Noise vs. Frequency

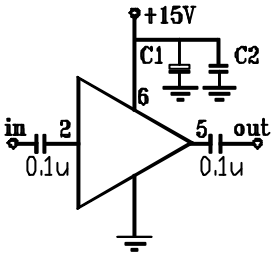


Output Power vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf.
2. Additional heatsink required.
3. The output power can reach 30dBm at 18VDC.



HE316

IF Amplifier

Features

- **Frequency Range：** **3~50MHz**
- **Gain:** **11dB(Typ)**
- **High Dynamic Range：** **21dBm**
- **IP3 (Output) ：** **32dBm（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8F**
- **Wide Operating Temperature：-55℃~+85℃**

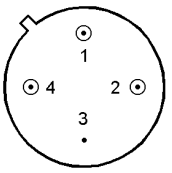
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	3~50	——
Small Signal Gain	Gp	dB	10.0	11.0
Gain Flatness	ΔGp	dB	±0.5	±0.3
Noise Figure	Fn	dB	2.0	1.3
Input VSWR	VSWRi	——	2:1	1.7:1
Output VSWR	VSWRo	——	2:1	1.7:1
Power Output @1dB Compression	P_{-1}	dBm	20.0	21.0
DC Current	I_{CC}	mA	——	35

Note: The Gp and P_{-1} will be reduced 0.1dB and 2.0dBm respectively under operating at 12VDC(Icc=28mA Typ).

Absolute Maximum Rating

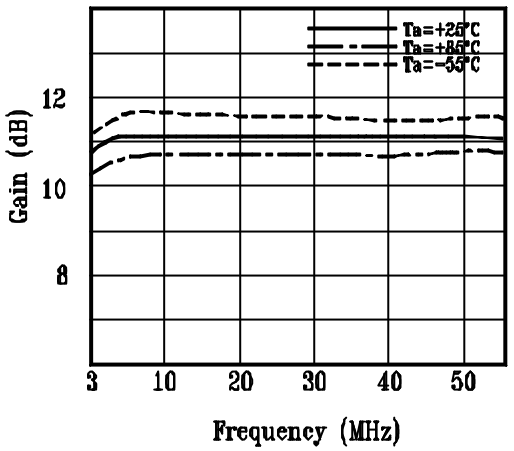
Maximum DC Voltage ----- +17VDC
Maximum Input Power ----- +13dBm
Storage Temperature ---- +125℃



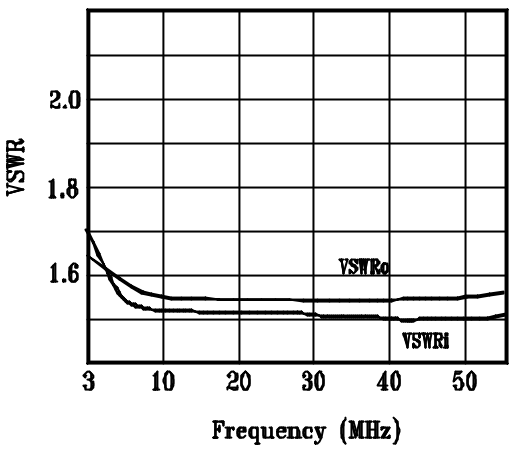
TO-8F

Typical Performance Curves

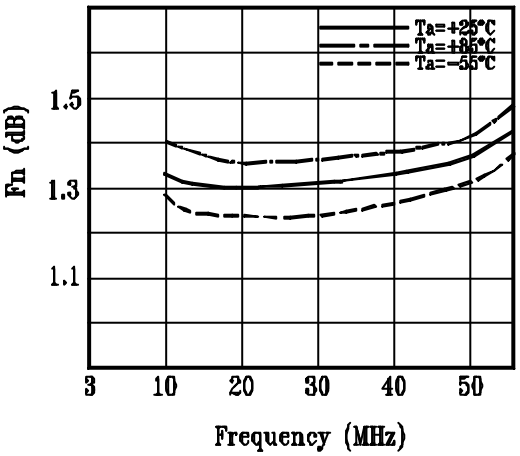
Gain vs. Frequency



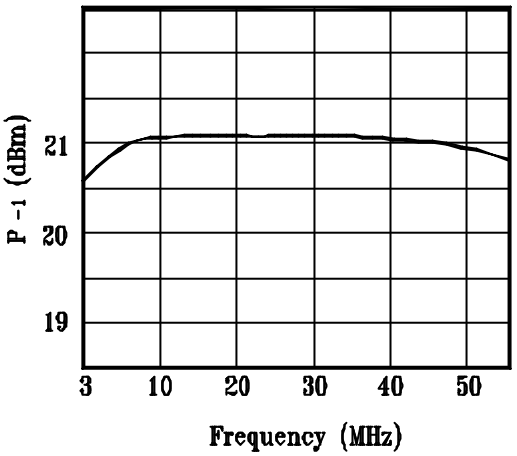
VSWR vs. Frequency



Noise vs. Frequency

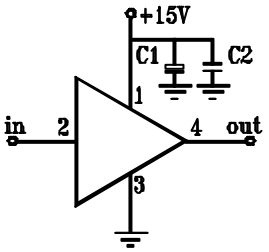


Output Power vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~3300pf.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).



HE380A

Low Noise High Dynamic Range Amplifier

Features

- **Frequency Range：** **10~400MHz**
- **High Efficiency：** **17dBm/35mA （Typ）**
- **Low Noise：** **2.9dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

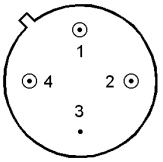
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	10~400	——
Small Signal Gain	Gp	dB	13.0	14.0
Gain Flatness	ΔGp	dB	±0.5	±0.3
Noise Figure	Fn	dB	4.0	2.9
Input VSWR	VSWRi	——	2:1	1.5:1
Output VSWR	VSWRo	——	2:1	1.5:1
Power Output @1dB Compression	P_{-1}	dBm	16.0	17.0
DC Current	I_{cc}	mA	——	35

Note: The Gp and P_{-1} will be reduced 0.2dB and 2dBm respectively under operating at 12VDC (Icc= 28mA TYP).

Absolute Maximum Rating

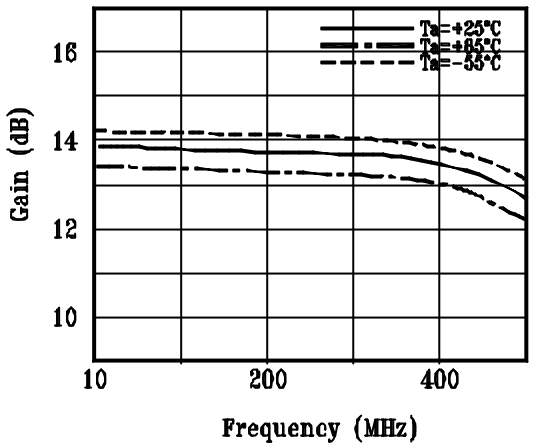
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



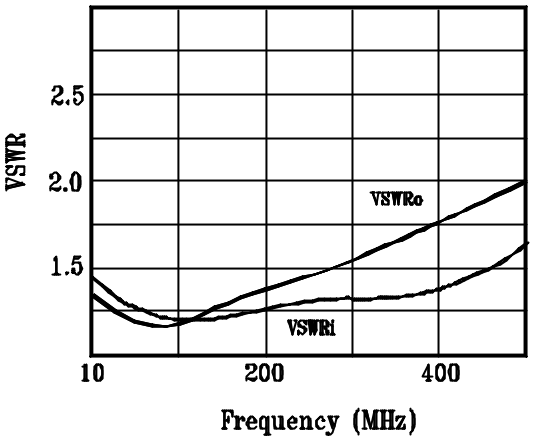
TO-8C

Typical Performance Curves

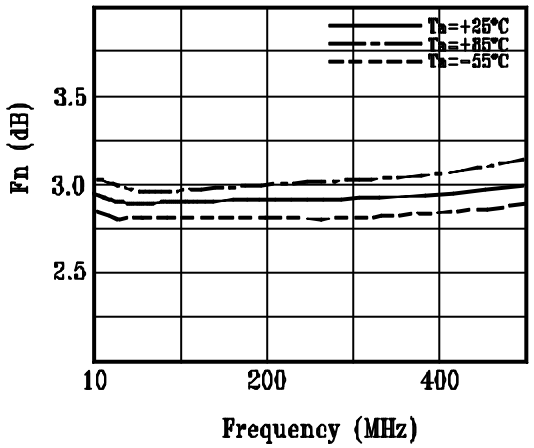
Gain vs. Frequency



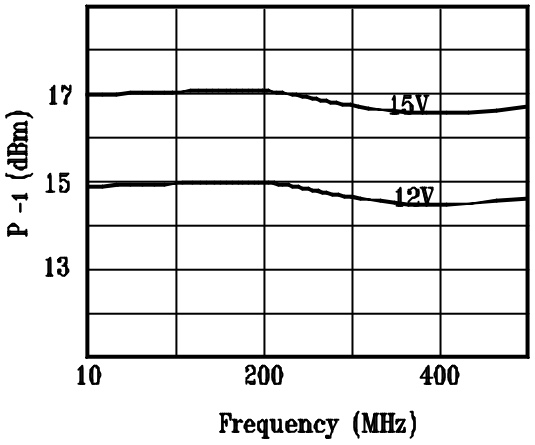
VSWR vs. Frequency



Noise vs. Frequency

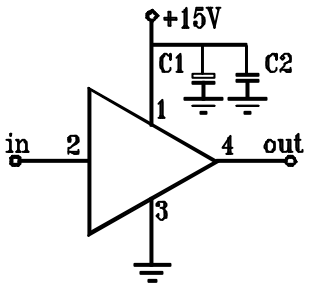


Output Power vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).



HE380B

Low Noise High Dynamic Range Amplifier

Features

- **Frequency Range：** **10~400MHz**
- **High Efficiency：** **20dBm/45mA （Typ）**
- **Low Noise：** **3.2dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

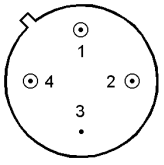
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	10~400	——
Small Signal Gain	Gp	dB	13.0	14.0
Gain Flatness	ΔGp	dB	±0.5	±0.3
Noise Figure	Fn	dB	4.2	3.2
Input VSWR	VSWRi	——	2:1	1.5:1
Output VSWR	VSWRo	——	2:1	1.5:1
Power Output @1dB Compression	P_{-1}	dBm	19.0	20.0
DC Current	I_{cc}	mA	——	45

Note: The Gp and P_{-1} will be reduced 0.2dB and 2dBm respectively under operating at 12VDC (Icc= 35mA TYP).

Absolute Maximum Rating

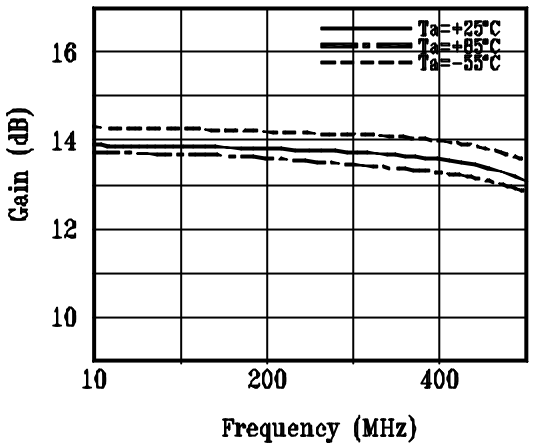
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



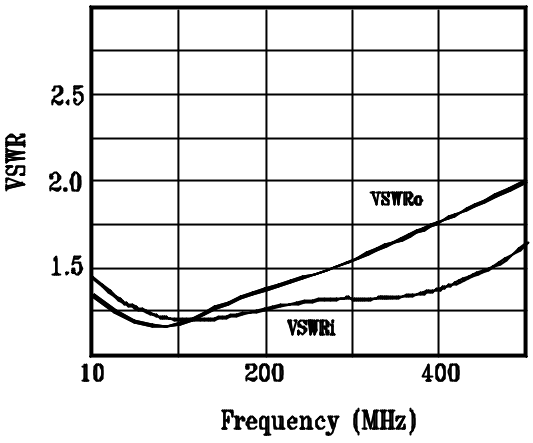
TO-8C

Typical Performance Curves

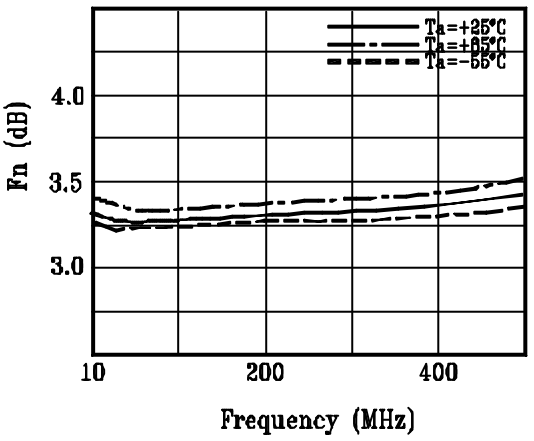
Gain vs. Frequency



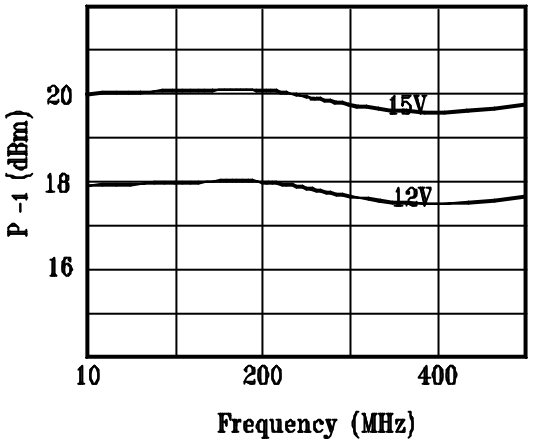
VSWR vs. Frequency



Noise vs. Frequency

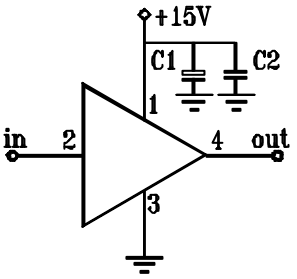


Output Power vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with AM151 from Americ M/ACOM Company or A78 from American W-J Company.



HE380C

Low Noise High Dynamic Range Amplifier

Features

- **Frequency Range：** **10~400MHz**
- **High Efficiency：** **17dBm/35mA （Typ）**
- **Low Noise：** **2.4dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

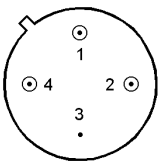
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	10~400	——
Small Signal Gain	Gp	dB	16.0	17.0
Gain Flatness	ΔGp	dB	±0.5	±0.3
Noise Figure	Fn	dB	3.5	2.4
Input VSWR	VSWRi	——	2:1	1.5:1
Output VSWR	VSWRo	——	2:1	1.5:1
Power Output @1dB Compression	P_{-1}	dBm	16.0	17.0
DC Current	I_{cc}	mA	——	35

Note: The Gp and P_{-1} will be reduced 0.2dB and 2dBm respectively under operating at 12VDC (Icc= 28mA TYP).

Absolute Maximum Rating

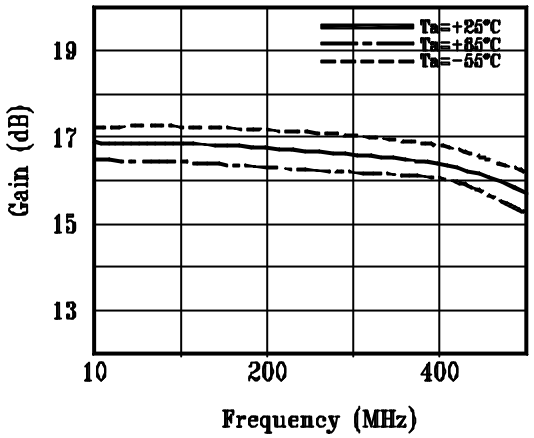
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



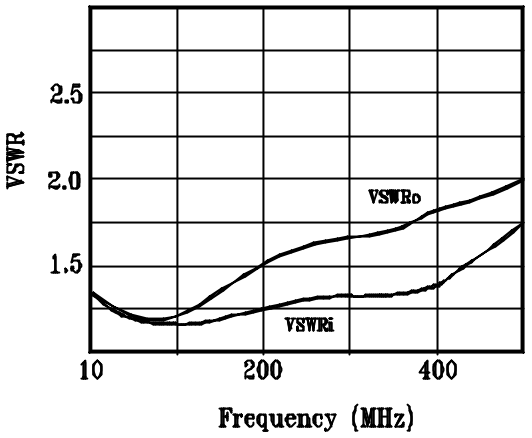
TO-8C

Typical Performance Curves

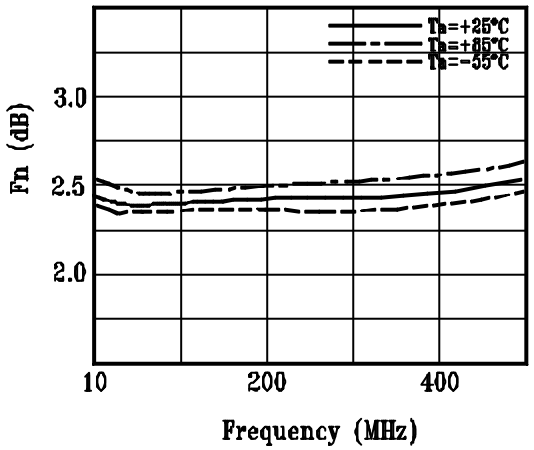
Gain vs. Frequency



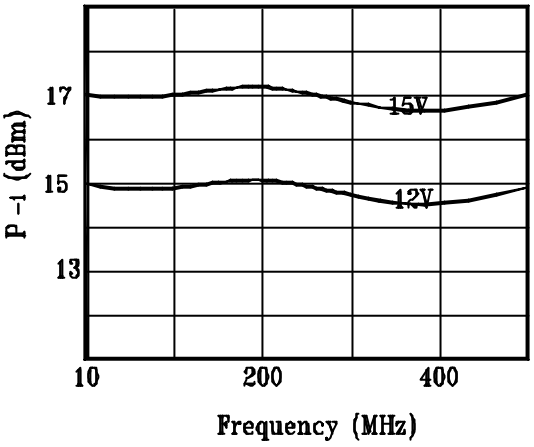
VSWR vs. Frequency



Noise vs. Frequency

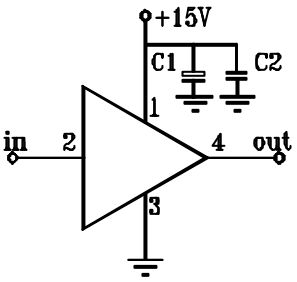


Output Power vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with A87-2 from American W-J Company.



HE380D

Low Noise High Dynamic Range Amplifier

Features

- **Frequency Range：** **10~400MHz**
- **High Efficiency：** **20dBm/45mA （Typ）**
- **Low Noise：** **2.6dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

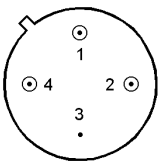
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	10~400	——
Small Signal Gain	Gp	dB	16.0	17.0
Gain Flatness	ΔGp	dB	±0.5	±0.3
Noise Figure	Fn	dB	3.5	2.6
Input VSWR	VSWRi	——	2:1	1.5:1
Output VSWR	VSWRo	——	2:1	1.5:1
Power Output @1dB Compression	P_{-1}	dBm	19.0	20.0
DC Current	I_{cc}	mA	——	45

Note: The Gp and P_{-1} will be reduced 0.2dB and 2dBm respectively under operating at 12VDC (Icc= 35mA TYP).

Absolute Maximum Rating

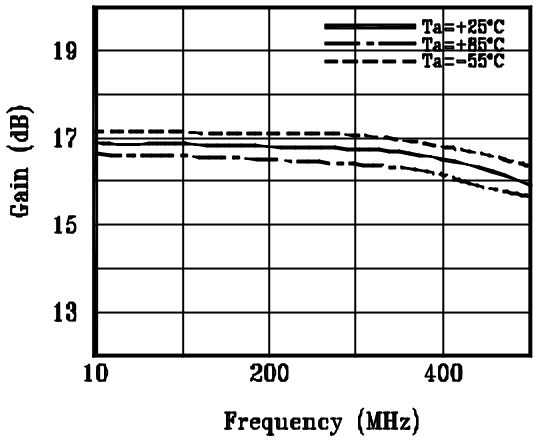
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



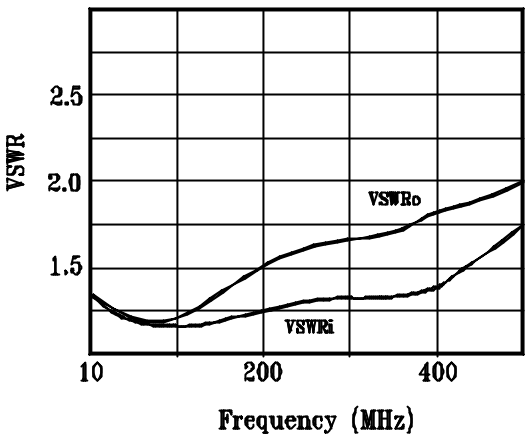
TO-8C

Typical Performance Curves

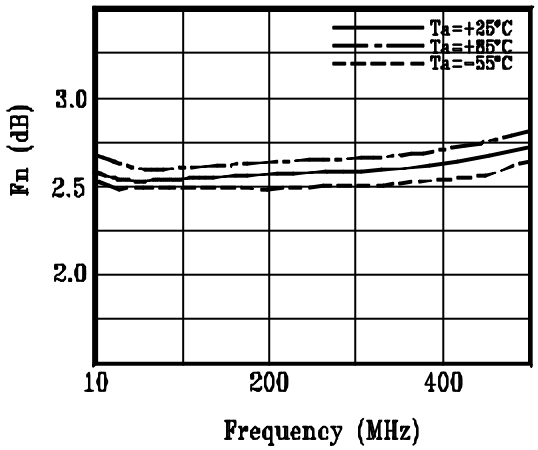
Gain vs. Frequency



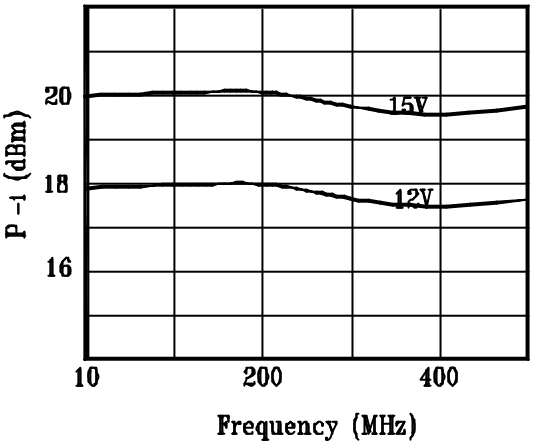
VSWR vs. Frequency



Noise vs. Frequency

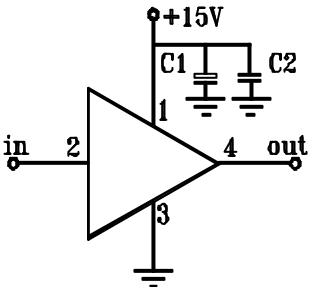


Output Power vs. Frequency

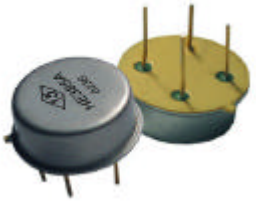


Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with AM147 from Americ M/ACOM Company or A180 from American W-J Company.



Features



- **Frequency Range：** **10~400MHz**
- **High Efficiency：** **11dBm/13mA （Typ）**
- **Low Noise：** **1.5dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

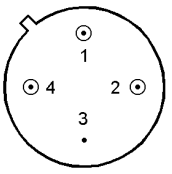
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~400	10~400
Small Signal Gain	Gp	dB	8.0	——
Gain Flatness	ΔGp	dB	±0.5	——
Noise Figure	Fn	dB	1.6	1.5
Input VSWR	VSWRi	——	2:1	1.5:1
Output VSWR	VSWRo	——	2:1	1.5:1
Power Output @1dB Compression	P_{-1}	dBm	10.0	11.0
DC Current	I_{cc}	mA	——	13

Note: The Gp and P_{-1} will be reduced 0.1dB and 2dBm respectively under operating at 12VDC (Icc= 10mA TYP).

Absolute Maximum Rating

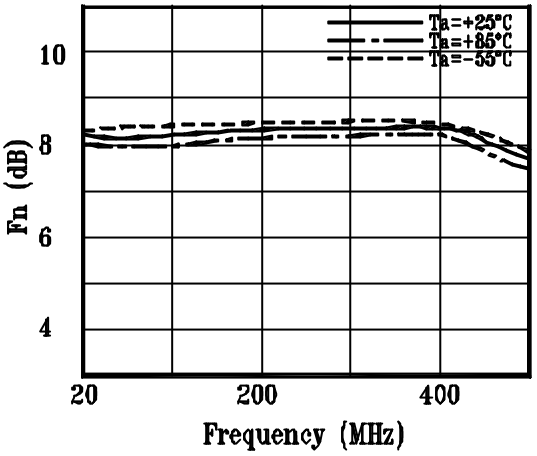
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



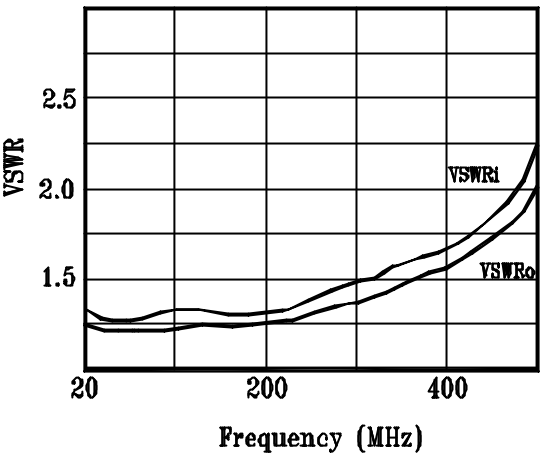
TO-8C

Typical Performance Curves

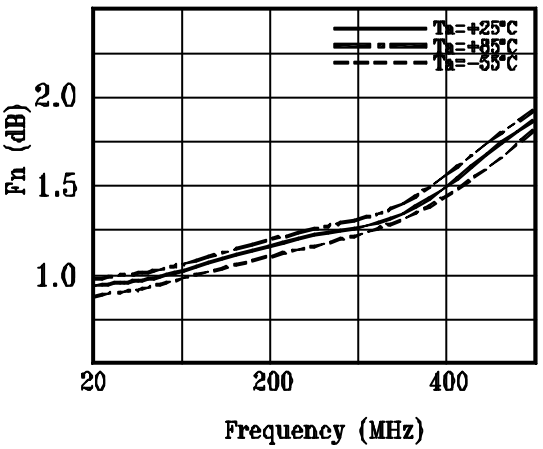
Gain vs. Frequency



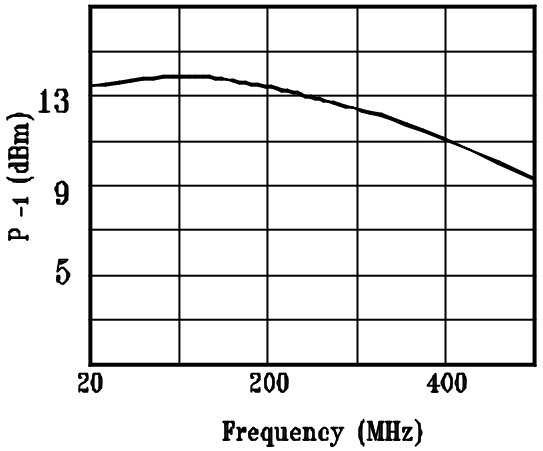
VSWR vs. Frequency



Noise vs. Frequency

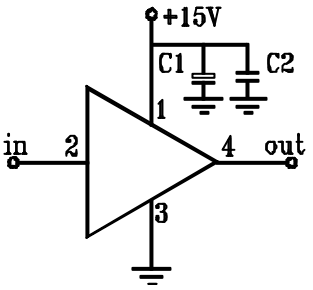


Output Power vs. Frequency



Note:

1. Typical application as shown right C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with AM181 from Americ M/ACOM Company.



Features

- **Frequency Range：** **10~400MHz**
- **High Efficiency：** **18dBm/30mA （Typ）**
- **Low Noise：** **1.8dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

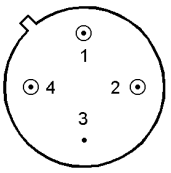
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~400	10~400
Small Signal Gain	Gp	dB	8.0	——
Gain Flatness	ΔGp	dB	±0.5	——
Noise Figure	Fn	dB	2.0	1.8
Input VSWR	VSWRi	——	2:1	——
Output VSWR	VSWRo	——	2:1	——
Power Output @1dB Compression	P_{-1}	dBm	16.0	18.0
DC Current	I_{cc}	mA	——	30

Note: The Gp and P_{-1} will be reduced 0.1dB and 3dBm respectively under operating at 12VDC (Icc= 24mA TYP).

Absolute Maximum Rating

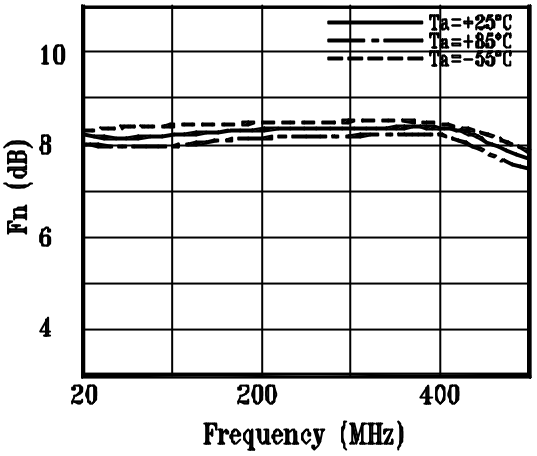
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +13dBm
Storage Temperature ---- +125℃



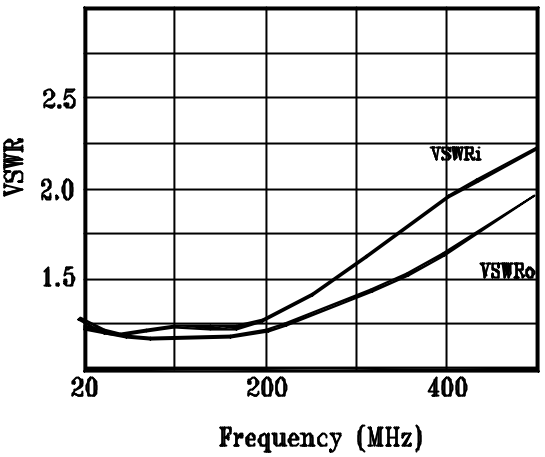
TO-8C

Typical Performance Curves

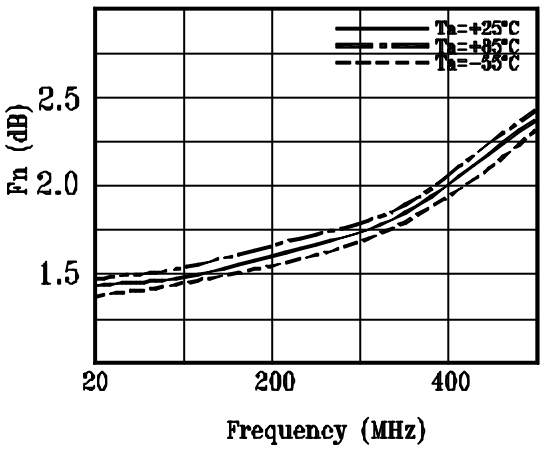
Gain vs. Frequency



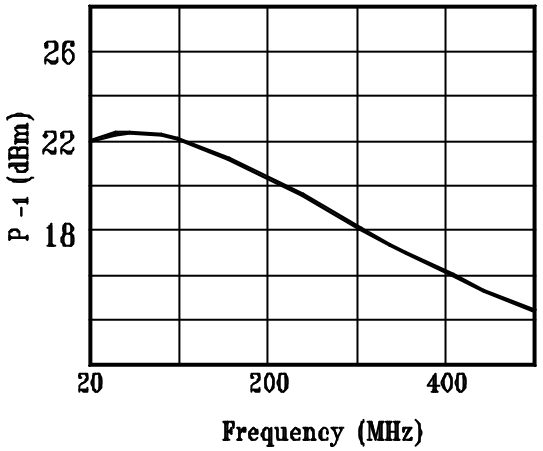
VSWR vs. Frequency



Noise vs. Frequency

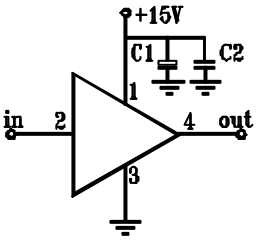


Output Power vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with AM119 from Americ M/ACOM Company.



HE385C

Low Noise High Dynamic Range Amplifier

Features

- **Frequency Range：** **10~250MHz**
- **High Efficiency：** **24dBm/50mA （Typ）**
- **Low Noise：** **1.8dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

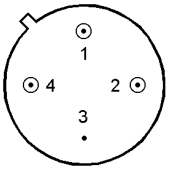
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~250	10~250
Small Signal Gain	Gp	dB	7.0	7.5
Gain Flatness	ΔGp	dB	±0.5	——
Noise Figure	Fn	dB	2.0	1.8
Input VSWR	VSWRi	——	2.0:1	——
Output VSWR	VSWRo	——	2.0:1	——
Power Output @1dB Compression	P_{-1}	dBm	23.0	24.0
DC Current	I_{cc}	mA	——	50

Note: The Gp and P_{-1} will be reduced 0.1dB and 2dBm respectively under operating at 12VDC (Icc= 40mA TYP).

Absolute Maximum Rating

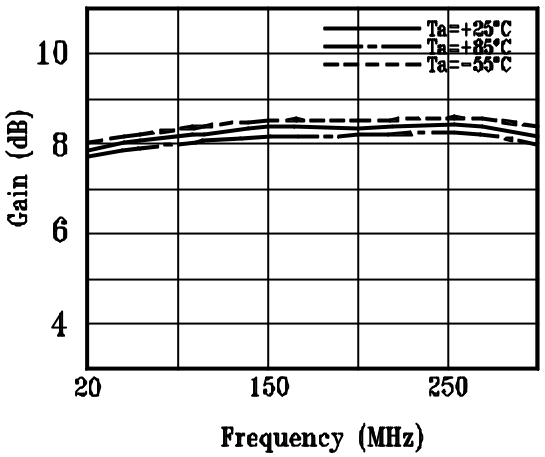
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +18dBm
Storage Temperature ---- +125℃



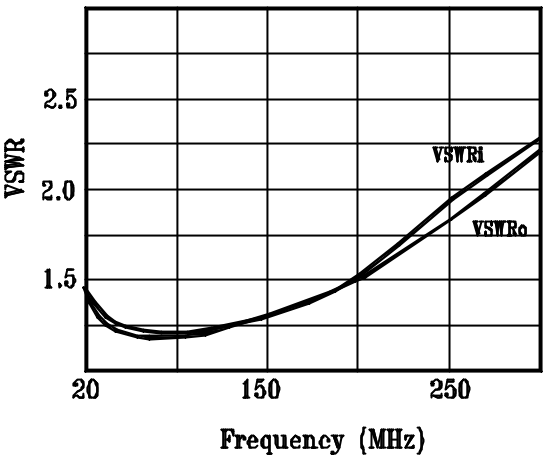
TO-8C

Typical Performance Curves

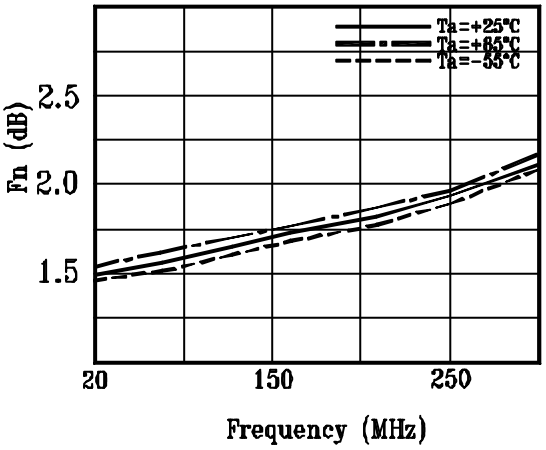
Gain vs. Frequency



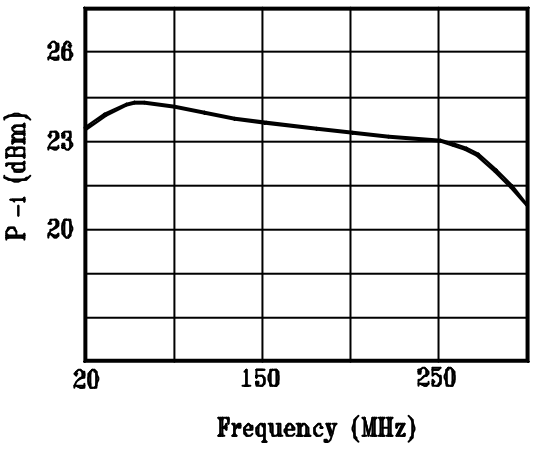
VSWR vs. Frequency



Noise vs. Frequency

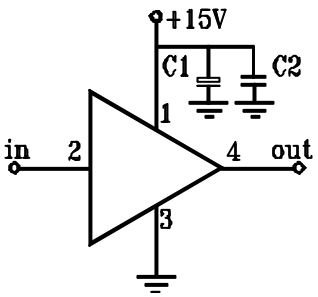


Output Power vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).



Features

- **Frequency Range：** **10~200MHz**
- **High Efficiency：** **18dBm/13mA**
- **Low Noise：** **1.0dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

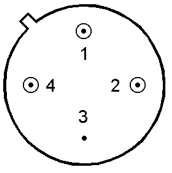
Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~200	10~200
Small Signal Gain	Gp	dB	10.0	11.0
Gain Flatness	ΔGp	dB	±0.5	——
Noise Figure	Fn	dB	1.2	1.0
Input VSWR	VSWRi	——	2.0:1	1.5:1
Output VSWR	VSWRo	——	2.0:1	1.5:1
Power Output @1dB Compression	P_{-1}	dBm	15.0[1)]	——
			18.0[2)]	——
DC Current	I_{cc}	mA	——	13

Note: 1)f>100MHz 2)f<100MHz

The Gp and P_{-1} will be reduced 0.1dB and 2.5dBm respectively under operating at 12VDC (Icc= 10mA TYP).

Absolute Maximum Rating

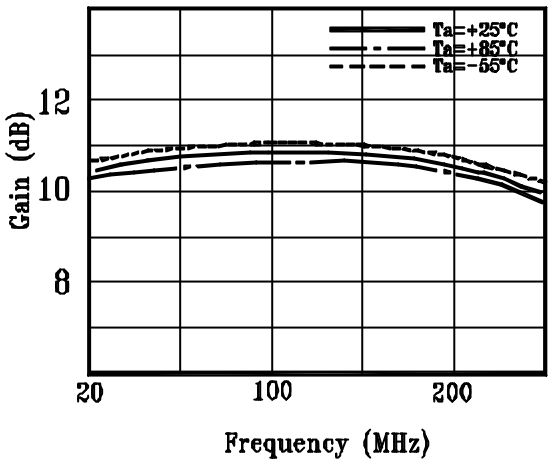
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +13dBm
Storage Temperature ---- +125℃



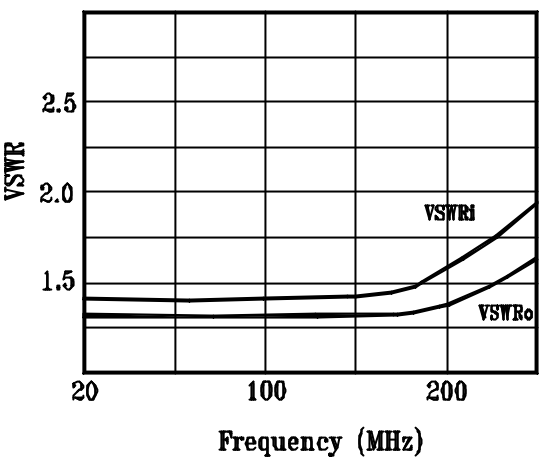
TO-8C

Typical Performance Curves

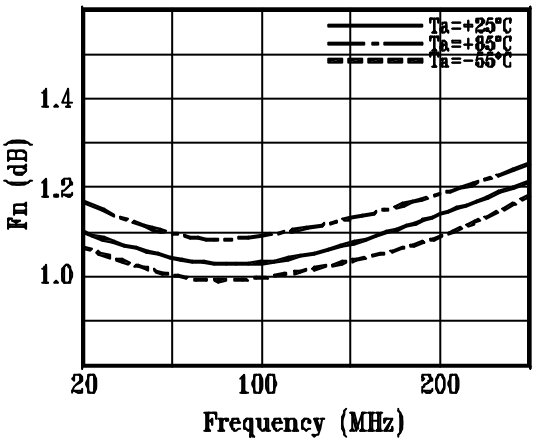
Gain vs. Frequency



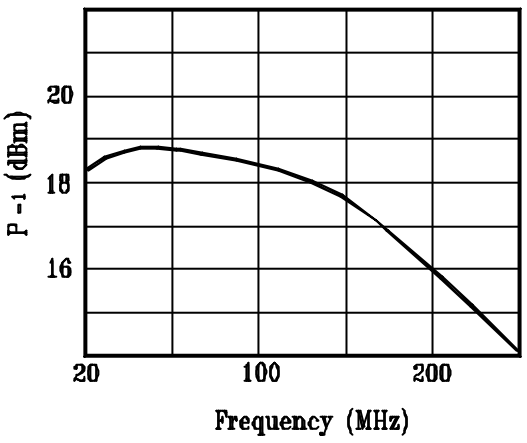
VSWR vs. Frequency



Noise vs. Frequency

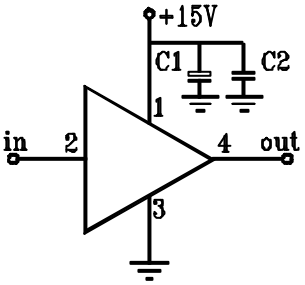


Output Power vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).



HE386B

Low Noise High Dynamic Range Amplifier

Features

- **Frequency Range：** **10~200MHz**
- **High Efficiency：** **21dBm/30mA**
- **Low Noise：** **1.4dB**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

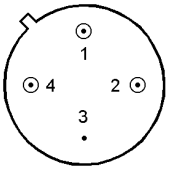
Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~200	10~200
Small Signal Gain	Gp	dB	10.0	11.0
Gain Flatness	ΔGp	dB	±0.5	——
Noise Figure	Fn	dB	1.4	——
Input VSWR	VSWRi	——	2.0:1	1.7:1
Output VSWR	VSWRo	——	2.0:1	1.7:1
Power Output @1dB Compression	P_{-1}	dBm	19.0[1)]	——
			21.0[2)]	——
DC Current	I_{cc}	mA	——	30

Note: 1)f>100MHz 2)f<100MHz;

The Gp and P_{-1} will be reduced 0.1dB and 2.0dBm respectively under operating at 12VDC (Icc= 24mA TYP).

Absolute Maximum Rating

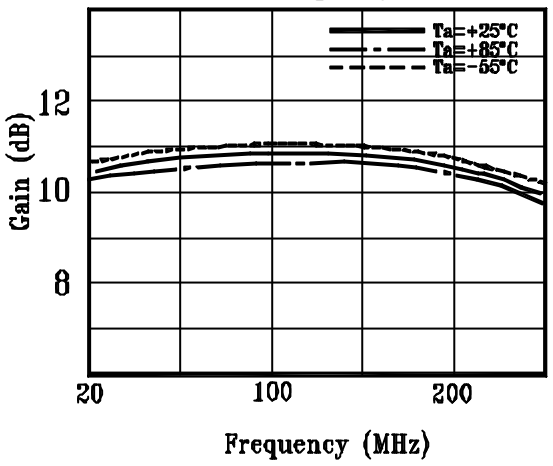
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +13dBm
Storage Temperature ---- +125℃



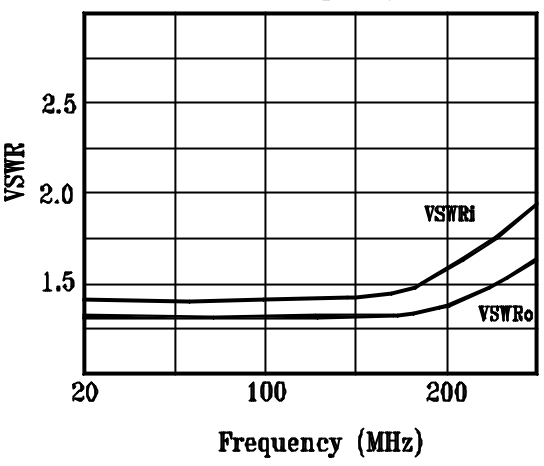
TO-8C

Typical Performance Curves

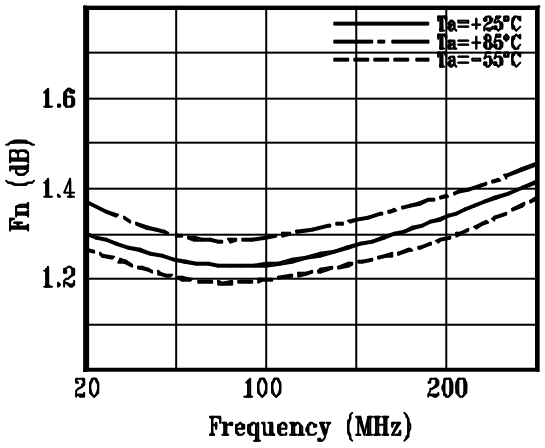
Gain vs. Frequency



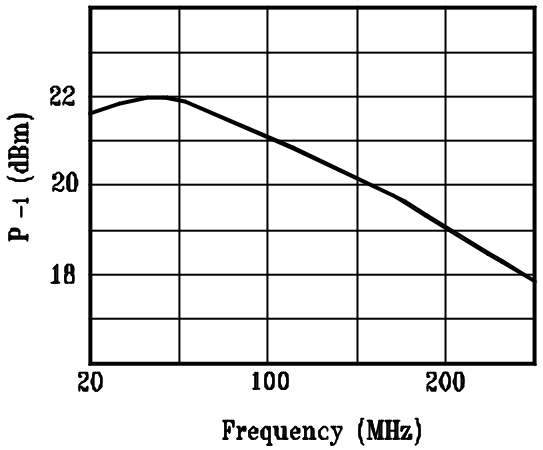
VSWR vs. Frequency



Noise vs. Frequency

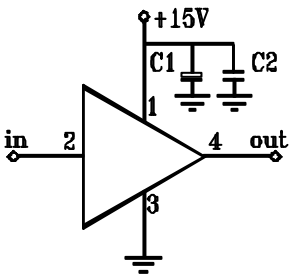


Output Power vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).



HE387A

Low Noise High Dynamic Range Amplifier

Features

- **Frequency Range：** **20~400MHz**
- **High Efficiency：** **17dBm/30mA**
- **Low Noise：** **2.3dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

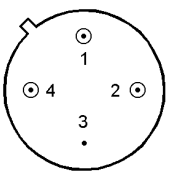
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~400	——
Small Signal Gain	Gp	dB	25.0	26.0
Gain Flatness	ΔGp	dB	±0.5	——
Noise Figure	Fn	dB	3.0	2.3
Input VSWR	VSWRi	——	2.0:1	——
Output VSWR	VSWRo	——	2.0:1	——
Power Output @1dB Compression	P_{-1}	dBm	16.5	17.0
DC Current	I_{CC}	mA	——	30

Note: The Gp and P_{-1} will be reduced 0.4dB and 2.8dBm respectively under operating at 12VDC (Icc=25mA TYP).

Absolute Maximum Rating

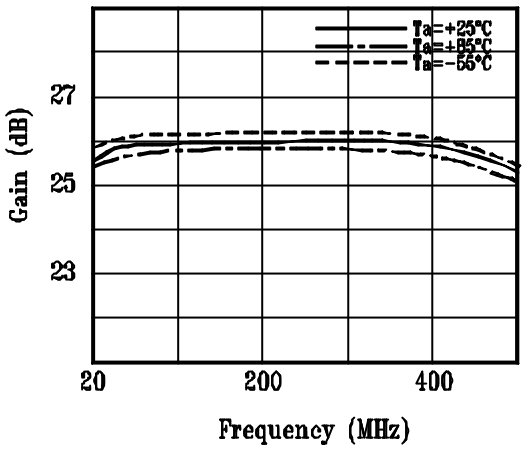
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



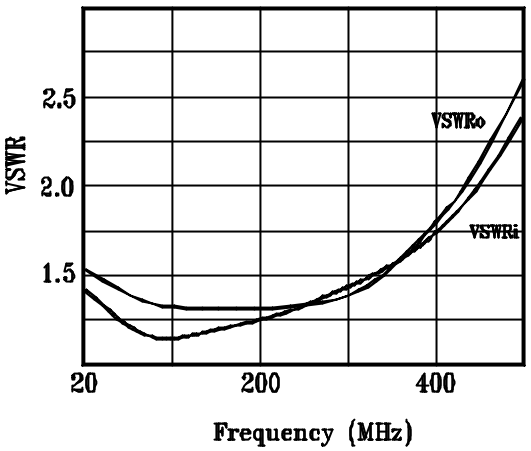
TO-8C

Typical Performance Curves

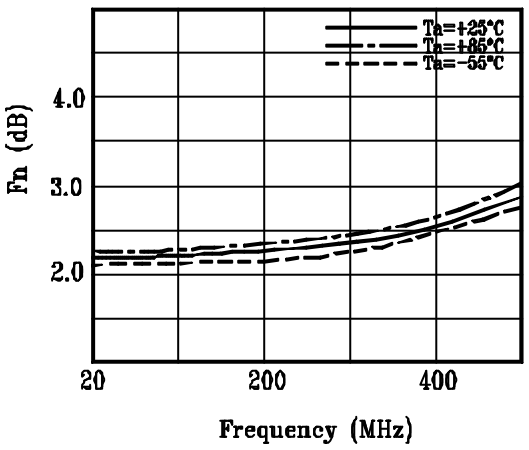
Gain vs. Frequency



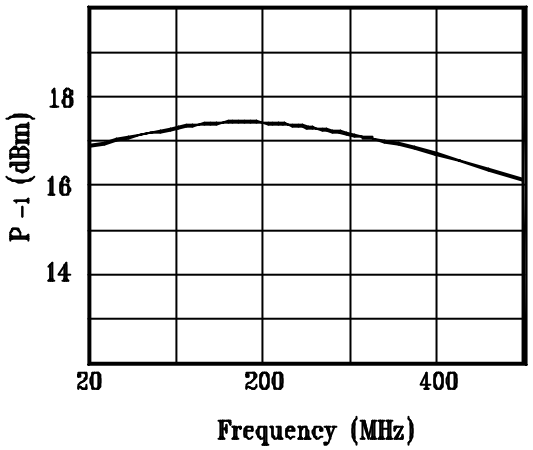
VSWR vs. Frequency



Noise vs. Frequency

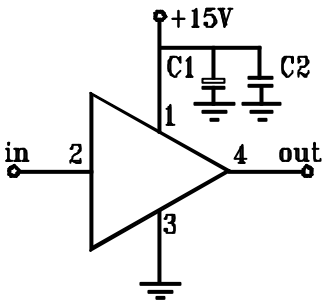


Output Power vs. Frequency



Note:

1. Typical application as shown right C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with A80,A81 from American W-J company.



HE387B

Low Noise High Dynamic Range Amplifier

Features

- **Frequency Range：** **20~400MHz**
- **High Gain:** **26dB(Typ)**
- **High Efficiency：** **21dBm/45mA(Typ)**
- **Low Noise：** **2.7dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

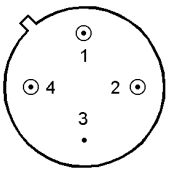
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~400	——
Small Signal Gain	Gp	dB	25.0	26.0
Gain Flatness	ΔGp	dB	±0.5	——
Noise Figure	Fn	dB	3.2	2.7
Input VSWR	VSWRi	——	2.0:1	——
Output VSWR	VSWRo	——	2.0:1	——
Power Output @1dB Compression	P_{-1}	dBm	20.0	21.0
DC Current	I_{cc}	mA	——	45

Note: The Gp and P_{-1} will be reduced 0.4dB and 2.8dBm respectively under operating at 12VDC (Icc=35mA TYP).

Absolute Maximum Rating

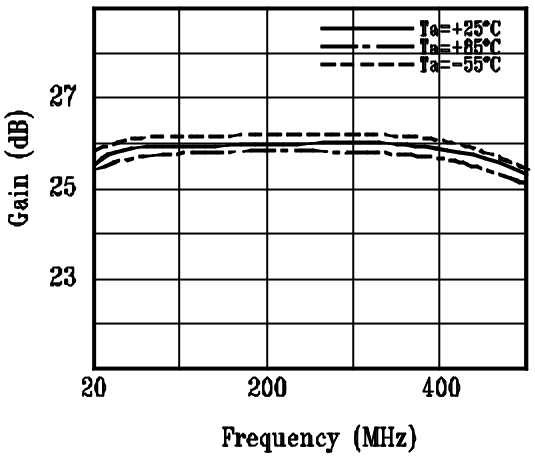
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



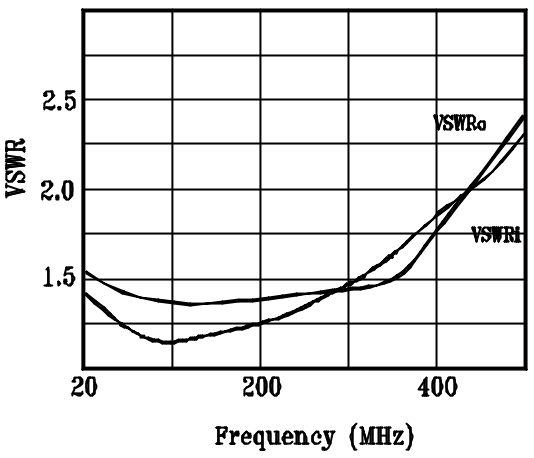
TO-8C

Typical Performance Curves

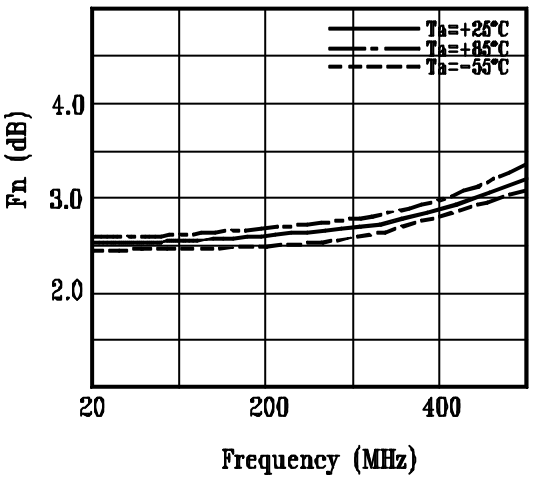
Gain vs. Frequency



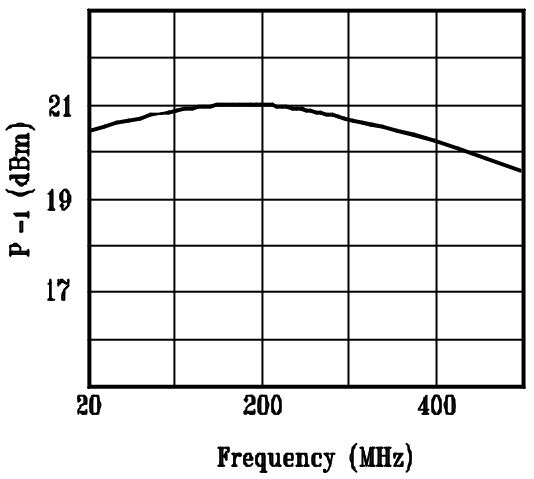
VSWR vs. Frequency



Noise vs. Frequency

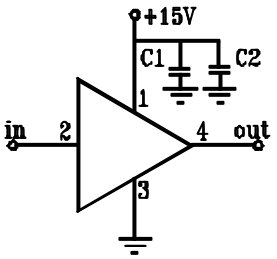


Output Power vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with A54 from American W-J company.



HE387C

Low Noise High Dynamic Range Amplifier

Features

- **Frequency Range：** **100~700MHz**
- **High Gain:** **21dB(Typ)**
- **High Efficiency：** **16dBm/30mA(Typ)**
- **Low Noise：** **2.5dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

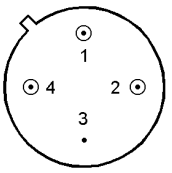
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	100~700	——
Small Signal Gain	Gp	dB	20.0	21.0
Gain Flatness	ΔGp	dB	±0.5	±0.3
Noise Figure	Fn	dB	4.0	2.5
Input VSWR	VSWRi	——	2:1	1.5:1
Output VSWR	VSWRo	——	2:1	1.5:1
Power Output @1dB Compression	P_{-1}	dBm	15.0	16.0
DC Current	I_{cc}	mA	——	30

Note: The Gp and P_{-1} will be reduced 0.2dB and 2.5dBm respectively under operating at 12VDC (Icc=25mA TYP).

Absolute Maximum Rating

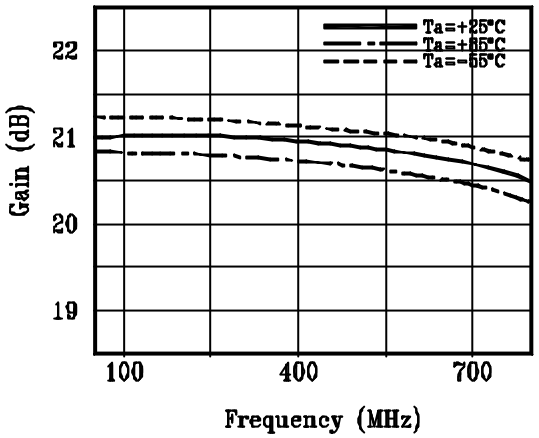
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



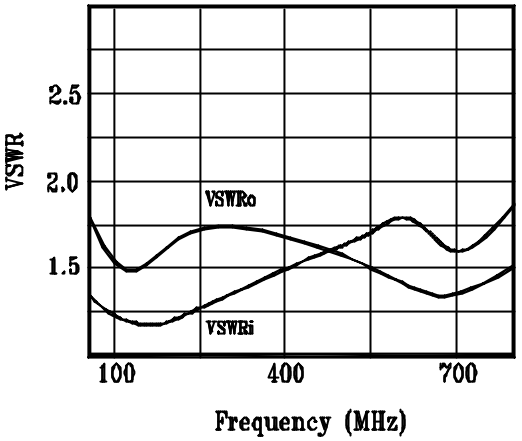
TO-8C

Typical Performance Curves

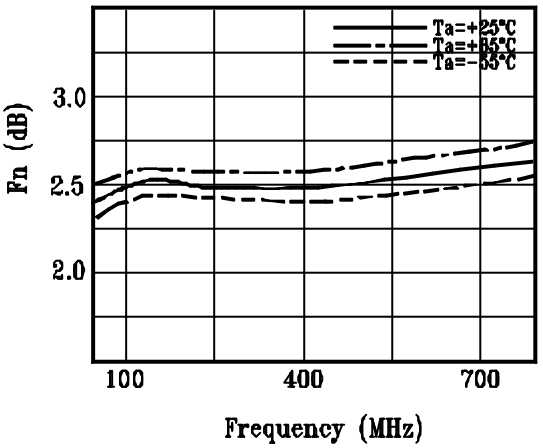
Gain vs. Frequency



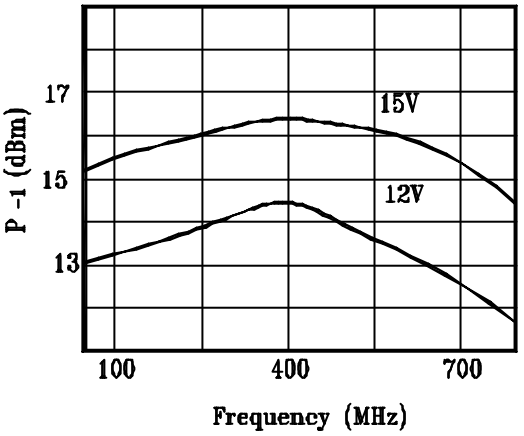
VSWR vs. Frequency



Noise vs. Frequency

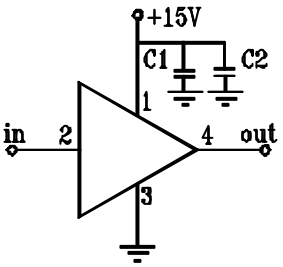


Output Power vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).



HE387D

Low Noise High Dynamic Range Amplifier

Features

- **Frequency Range：** **100～700MHz**
- **High Gain:** **22dB(Typ)**
- **High Efficiency：** **21dBm/55mA(Typ)**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：** **-55℃～+85℃**

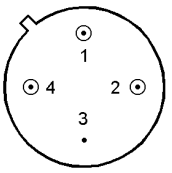
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L～f_H	MHz	100～700	——
Small Signal Gain	Gp	dB	21.0	22.0
Gain Flatness	ΔGp	dB	±0.5	±0.3
Noise Figure	Fn	dB	4.5	3.8
Input VSWR	VSWRi	——	2:1	1.5:1
Output VSWR	VSWRo	——	2:1	1.5:1
Power Output @1dB Compression	P_{-1}	dBm	20	21.0
DC Current	I_{cc}	mA	——	55

Note: The Gp and P_{-1} will be reduced 0.2dB and 2.5dBm respectively under operating at 12VDC (Icc=45mA TYP).

bsolute Maximum Rating

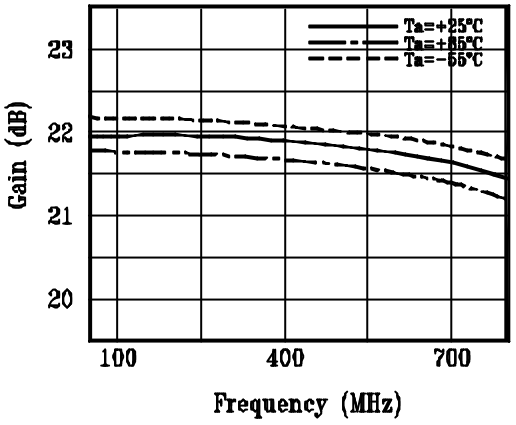
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



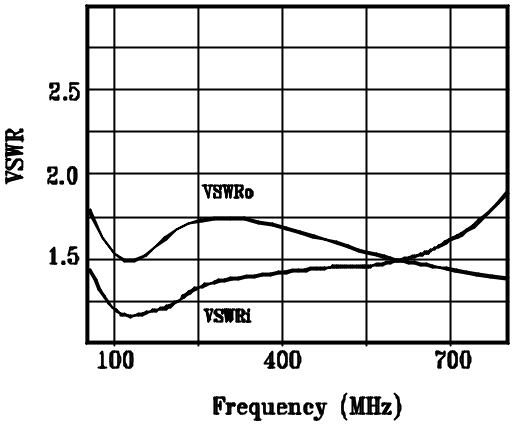
TO-8C

Typical Performance Curves

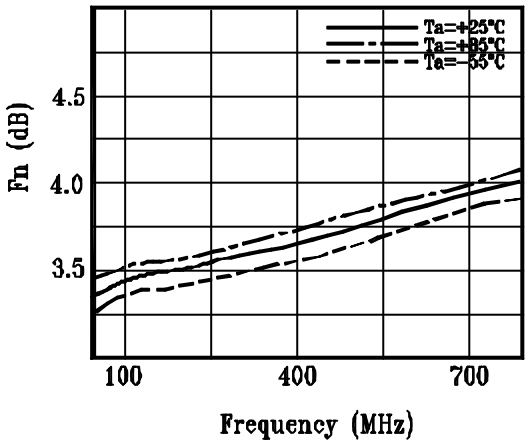
Gain vs. Frequency



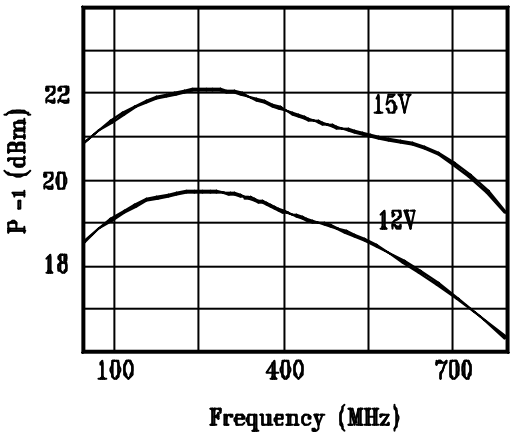
VSWR vs. Frequency



Noise vs. Frequency

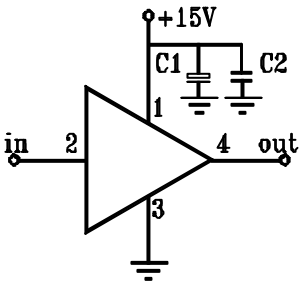


Output Power vs. Frequency



Note:

1. Typical application as shown right C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with A89 from American W-J company.



Features

- **Frequency Range：** **20~400MHz**
- **High Gain:** **26dB(Typ)**
- **High Efficiency：** **23dBm/65mA(Typ)**
- **Low Noise：** **3.5dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

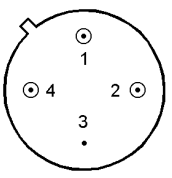
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~400	——
Small Signal Gain	Gp	dB	25.0	26.0
Gain Flatness	ΔGp	dB	±0.5	——
Noise Figure	Fn	dB	4.0	3.5
Input VSWR	VSWRi	——	2.0:1	——
Output VSWR	VSWRo	——	2.0:1	——
Power Output @1dB Compression	P_{-1}	dBm	23.0	24.0
DC Current	I_{cc}	mA	——	65

Note: The Gp and P_{-1} will be reduced 0.4dB and 2.8dBm respectively under operating at 12VDC (Icc=52mA TYP).

Absolute Maximum Rating

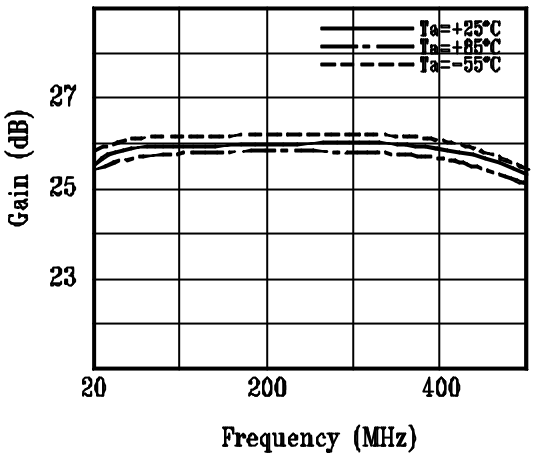
Maximum DC Voltage ----- +17VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



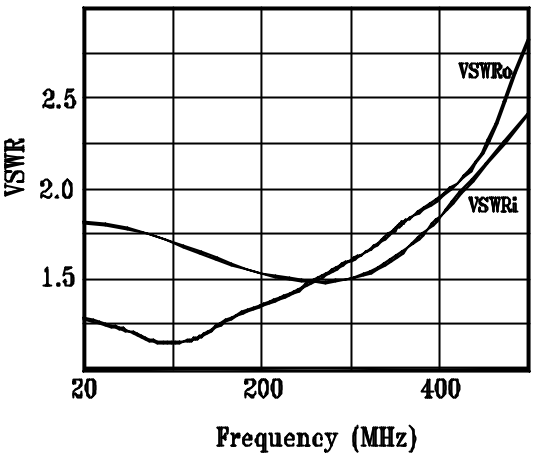
TO-8C

Typical Performance Curves

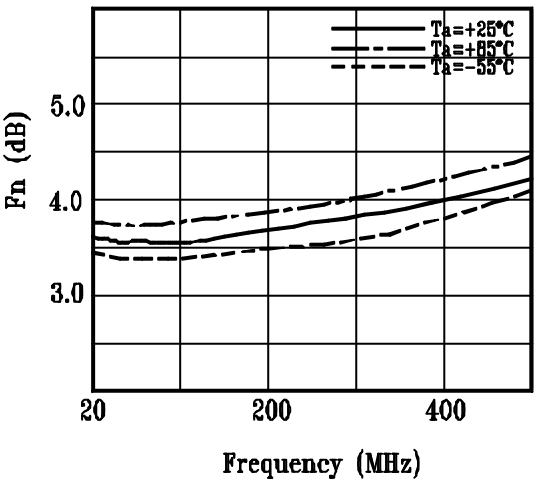
Gain vs. Frequency



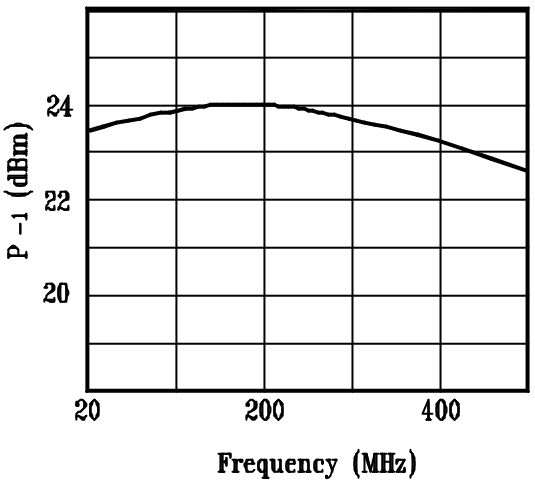
VSWR vs. Frequency



Noise vs. Frequency

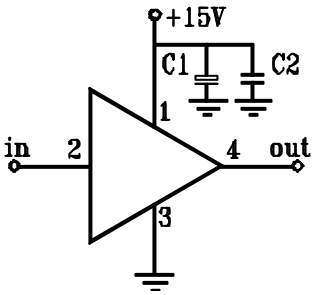


Output Power vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).



HE389A

Low Noise High Dynamic Range Amplifier

Features

- **Frequency Range：** **20~250MHz**
- **High Gain:** **30dB(Typ)**
- **High Efficiency：** **21dBm/45mA(Typ)**
- **Low Noise：** **2.0dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

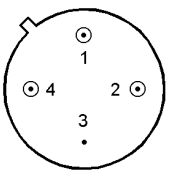
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~250	——
Small Signal Gain	Gp	dB	29.0	30.0
Gain Flatness	ΔGp	dB	±0.5	——
Noise Figure	Fn	dB	2.5	2.0
Input VSWR	VSWRi	——	2.0:1	——
Output VSWR	VSWRo	——	2.0:1	——
Power Output @1dB Compression	P_{-1}	dBm	20.0	21.0
DC Current	I_{cc}	mA	——	45

Note: The Gp and P_{-1} will be reduced 0.4dB and 2.8dBm respectively under operating at 12VDC (Icc=35mA TYP).

Absolute Maximum Rating

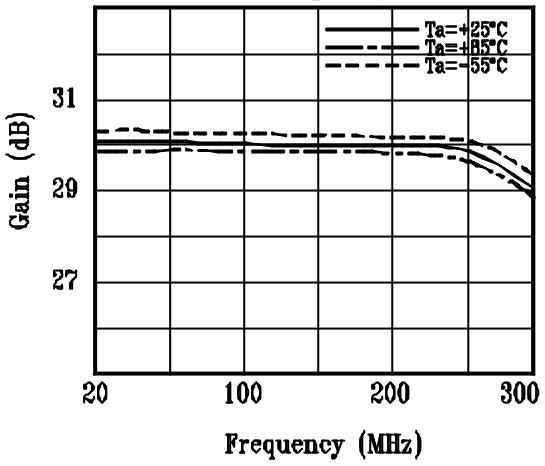
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



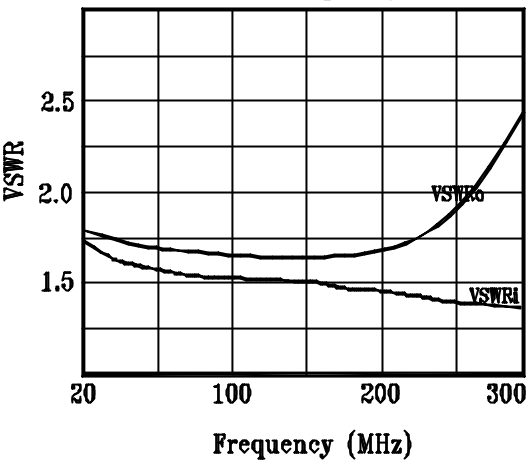
TO-8C

Typical Performance Curves

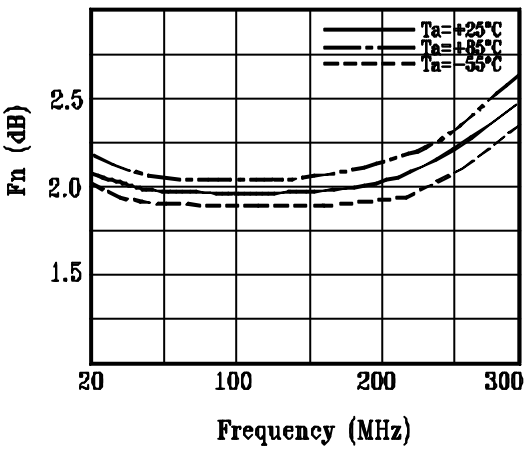
Gain vs. Frequency



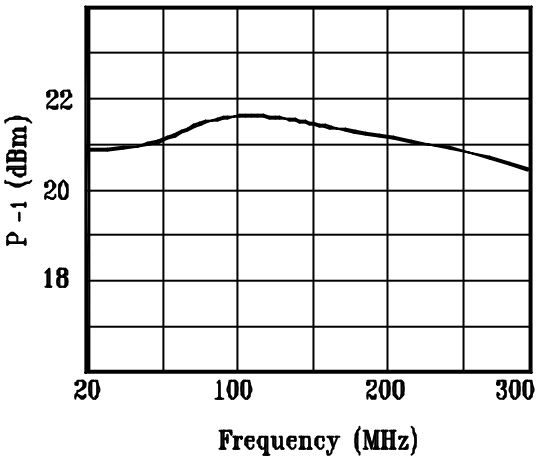
VSWR vs. Frequency



Noise vs. Frequency

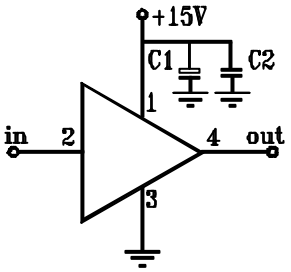


Output Power vs. Frequency



Note:

1. Typical application as shown right C_1=22~47μf;C_2=1000~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with A81,A86-1from American W-J company.



HE389B

Low Noise High Dynamic Range Amplifier

Features

- **Frequency Range：** **20~250MHz**
- **High Gain:** **30dB(Typ)**
- **High Efficiency：** **24dBm/65mA(Typ)**
- **Low Noise：** **2.5dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

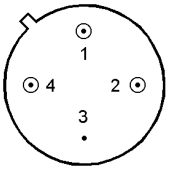
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~250	——
Small Signal Gain	Gp	dB	29.0	30.0
Gain Flatness	ΔGp	dB	±0.5	——
Noise Figure	Fn	dB	3.0	2.5
Input VSWR	VSWRi	——	2.0:1	——
Output VSWR	VSWRo	——	2.0:1	——
Power Output @1dB Compression	P_{-1}	dBm	23.0	24.0
DC Current	I_{cc}	mA	——	65

Note: The Gp and P_{-1} will be reduced 0.4dB and 2.8dBm respectively under operating at 12VDC (Icc=52mA TYP).

Absolute Maximum Rating

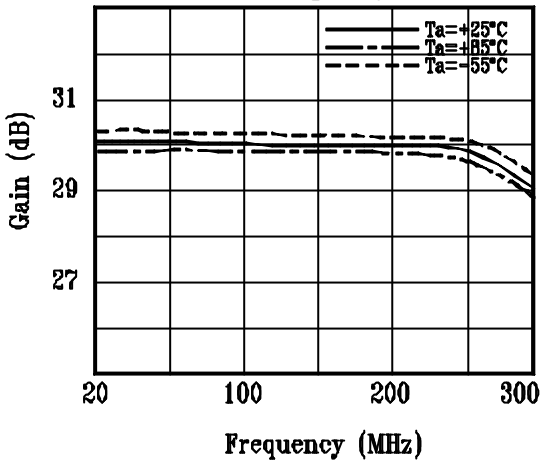
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



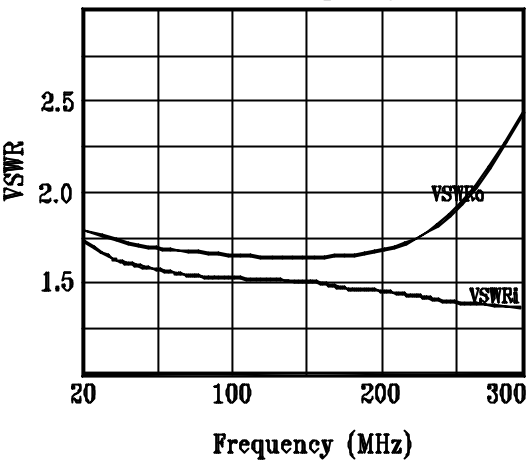
TO-8C

Typical Performance Curves

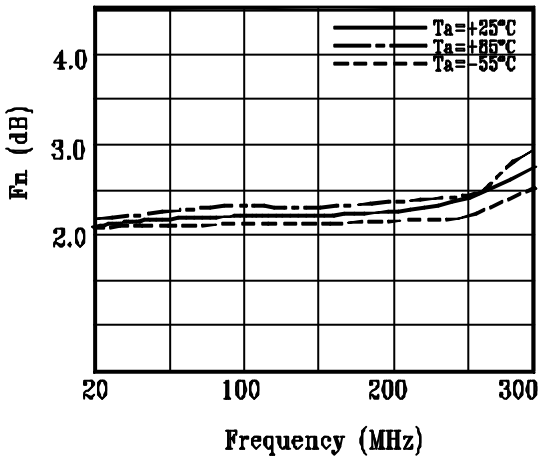
Gain vs. Frequency



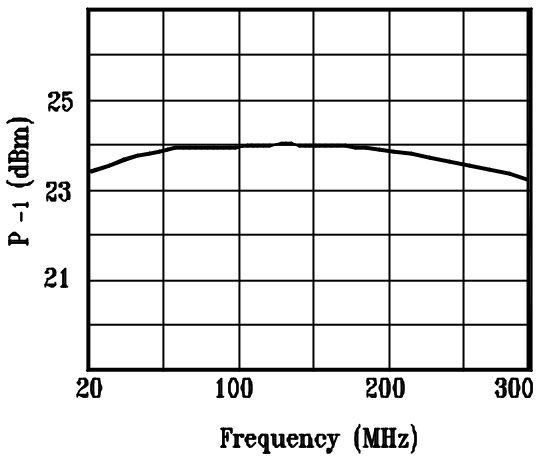
VSWR vs. Frequency



Noise vs. Frequency

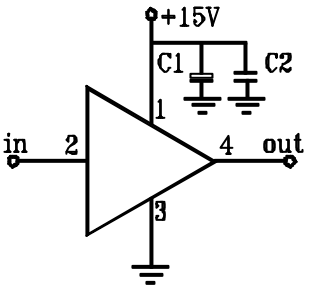


Output Power vs. Frequency



Note:

1. Typical application as shown right C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with A74-1from American W-J company.



HE393A

Amplifier With Lower DC Supply

Features

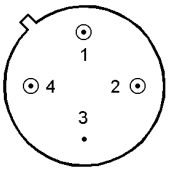
- **Frequency Range：** **10~500MHz**
- **High Gain:** **18dB(Typ)**
- **Lower DC Supply:** **5V**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：** **-55℃~+85℃**

Specifications (Test at V_{CC} = +5V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~500	10~500
Small Signal Gain	Gp	dB	17.0	18.0
Gain Flatness	ΔGp	dB	±0.5	±0.2
Noise Figure	Fn	dB	3.0	2.7
Input VSWR	VSWRi	——	2:1	1.7:1
Output VSWR	VSWRo	——	2:1	1.8:1
Power Output @1dB Compression	P_{-1}	dBm	11.0	12.0
DC Current	I_{cc}	mA	——	30

Absolute Maximum Rating

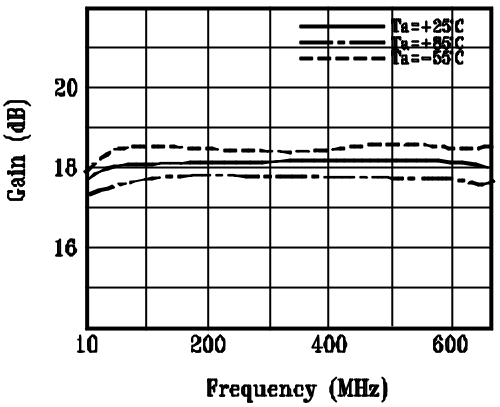
Maximum DC Voltage ----- +6VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



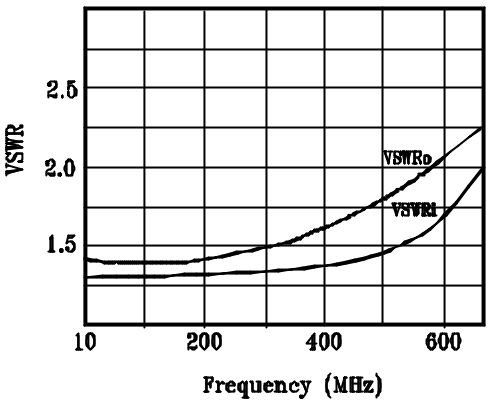
TO-8 C

Typical Performance Curves

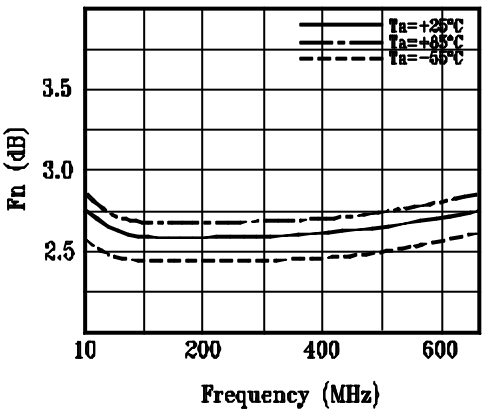
Gain vs. Frequency



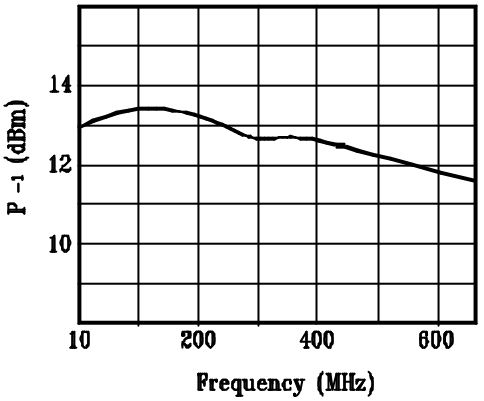
VSWR vs. Frequency



Noise vs. Frequency

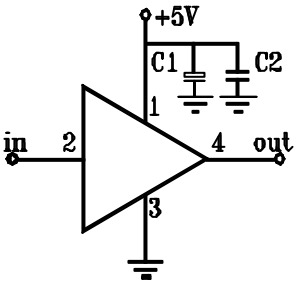


Output Power vs. Frequency



Note:

1. Typical application as shown right C_1=22~47μf;C_2=1000~~3300pf.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with A87-2 from American W-J company or UTO552 from American former AVANTEK company.



Features

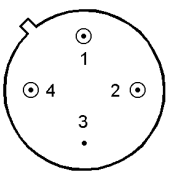
- **Frequency Range：** **10~500MHz**
- **Gain:** **18dB(Typ)**
- **High Dynamic Range:** **18.5dBm@100MHz**
- **Lower DC Supply:** **5V**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：** **-55℃~+85℃**

Specifications (Test at V_{CC} = +5V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~500	10~500
Small Signal Gain	Gp	dB	17.0	18.0
Gain Flatness	ΔGp	dB	±0.5	±0.2
Noise Figure	Fn	dB	4.5	——
Input VSWR	VSWRi	——	2:1	1.5:1
Output VSWR	VSWRo	——	2:1	1.8:1
Power Output @1dB Compression	P_{-1}	dBm	16.5	18.0
DC Current	I_{cc}	mA	——	60

Absolute Maximum Rating

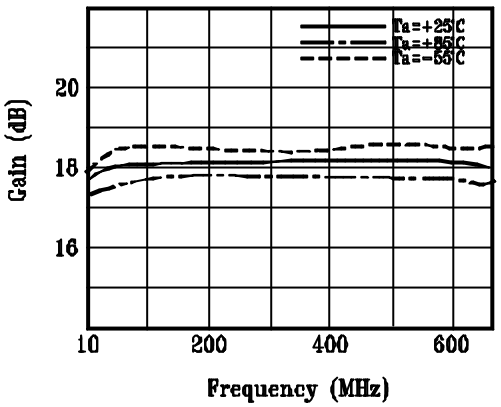
Maximum DC Voltage ----- +6VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



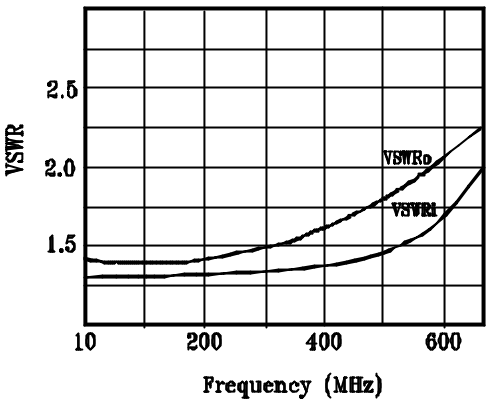
TO-8C

Typical Performance Curves

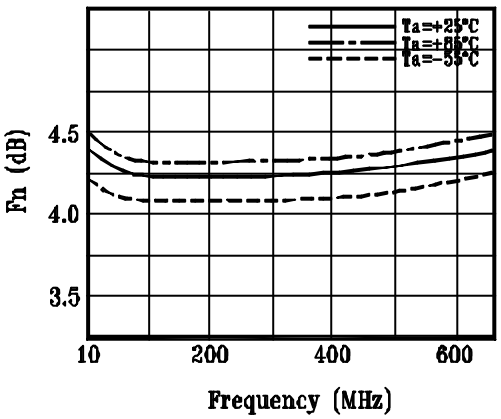
Gain vs. Frequency



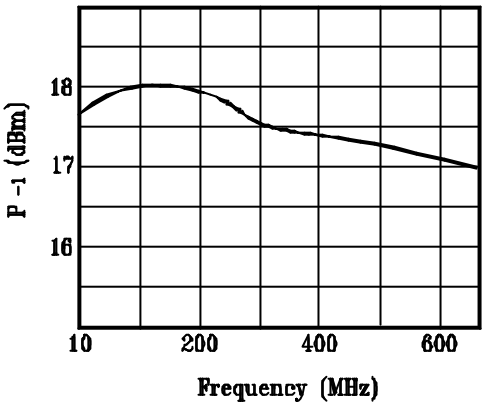
VSWR vs. Frequency



Noise vs. Frequency

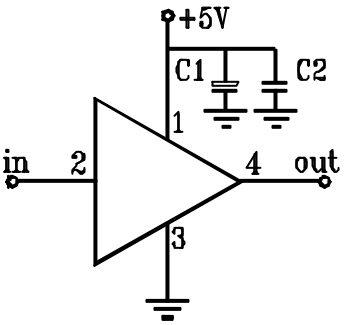


Output Power vs. Frequency



Note:

1. Typical application as shown right C_1=22~47μf;C_2=1000~~3300pf.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with A72 from American W-J company or UTO520 from American former AVANTEK company.



Features

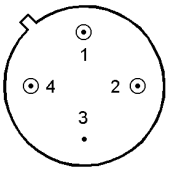
- **Frequency Range：** **10~1000MHz**
- **Gain:** **16dB(Typ)**
- **Lower DC Supply:** **5V**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：** **-55℃~+85℃**

Specifications (Test at V_{CC} = +5V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~1000	10~1000
Small Signal Gain	Gp	dB	15.0	16.0
Gain Flatness	ΔGp	dB	±0.5	±0.3
Noise Figure	Fn	dB	3	——
Input VSWR	VSWRi	——	2:1	1.8:1
Output VSWR	VSWRo	——	2:1	1.5:1
Power Output @1dB Compression	P_{-1}	dBm	10.0	11.0
DC Current	I_{cc}	mA	——	30

Absolute Maximum Rating

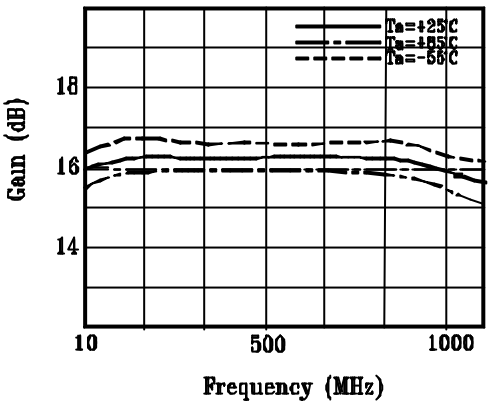
Maximum DC Voltage ----- +6VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



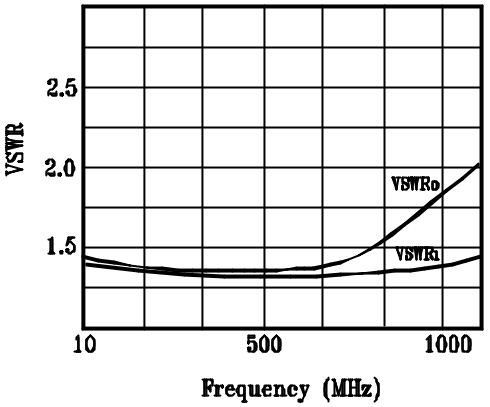
TO-8C

Typical Performance Curves

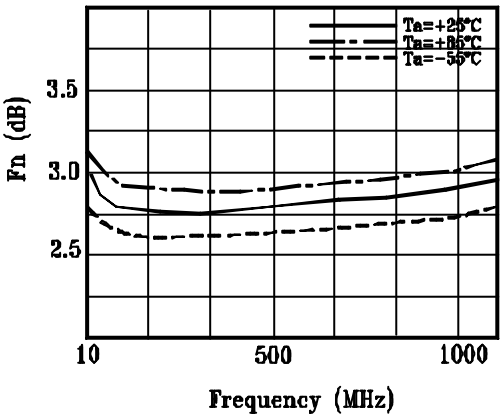
Gain vs. Frequency



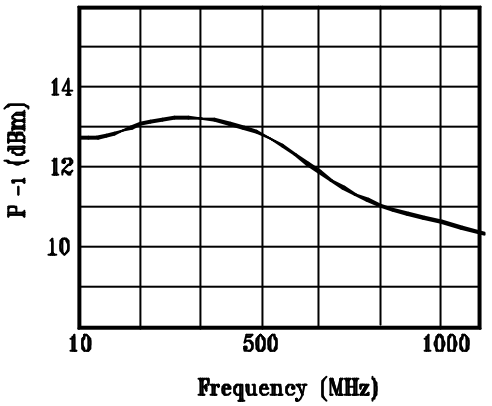
VSWR vs. Frequency



Noise vs. Frequency

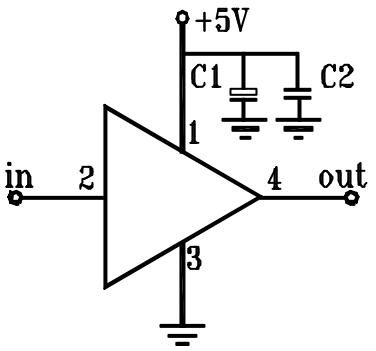


Output Power vs. Frequency



Note:

1. Typical application as shown right C_1=22~47μf;C_2=1000~~3300pf.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with A28 from American W-J company or UTO-1007 from American former AVANTEK company.



Features

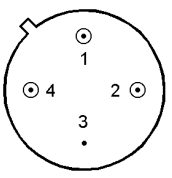
- **Frequency Range：** **10~1000MHz**
- **High Dynamic Range:** **18dBm@100MHz**
- **Lower DC Supply:** **5V**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：** **-55℃~+85℃**

Specifications (Test at V_{CC} = +5V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~1000	10~1000
Small Signal Gain	Gp	dB	15.0	16.0
Gain Flatness	ΔGp	dB	±0.5	±0.3
Noise Figure	Fn	dB	4.5	——
Input VSWR	VSWRi	——	2:1	1.7:1
Output VSWR	VSWRo	——	2:1	1.5:1
Power Output @1dB Compression	P_{-1}	dBm	15.0	16.0
DC Current	I_{cc}	mA	——	60

Absolute Maximum Rating

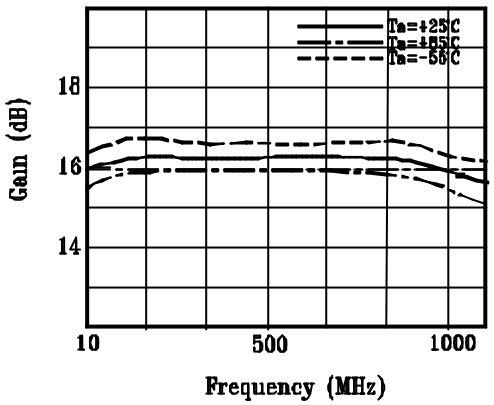
Maximum DC Voltage ----- +6VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



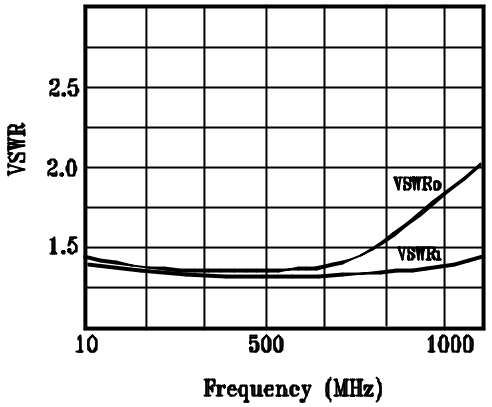
TO-8C

Typical Performance Curves

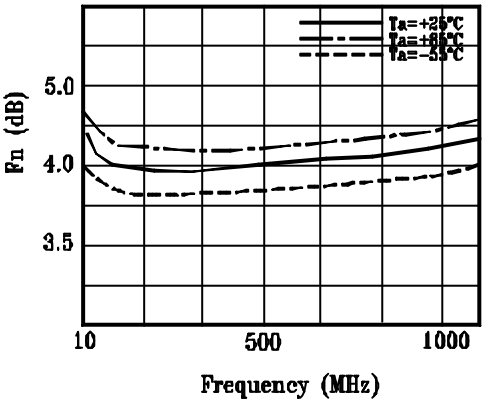
Gain vs. Frequency



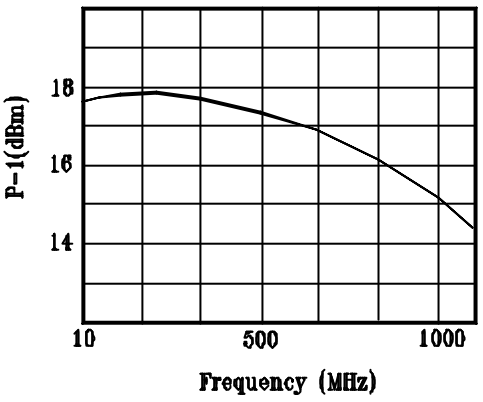
VSWR vs. Frequency



VSWR vs. Frequency

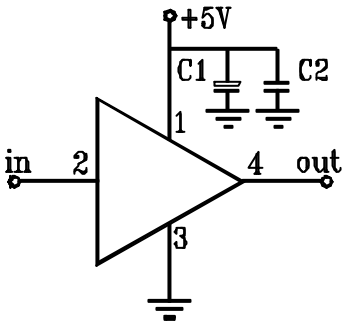


Output Power vs. Frequency



Note:

1. Typical application as shown right C_1=22~47μf;C_2=1000~~3300pf.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with A28-2 from American W-J company or UTO-1007 from American former AVANTEK company.



HE395A

Amplifier With Lower DC Supply

Features

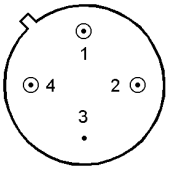
- **Frequency Range：** **10~1500MHz**
- **Lower DC Supply:** **5V**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：** **-55℃~+85℃**

Specifications (Test at V_{CC} = +5V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~1500	10~1500
Small Signal Gain	Gp	dB	11.0	11.5
Gain Flatness	ΔGp	dB	±0.5	±0.3
Noise Figure	Fn	dB	4.0	3.8
Input VSWR	VSWRi	——	2:1	1.7:1
Output VSWR	VSWRo	——	2:1	1.6:1
Power Output @1dB Compression	Po(1dB)	dBm	9.0	10.0
DC Current	I_{cc}	mA	——	30

Absolute Maximum Rating

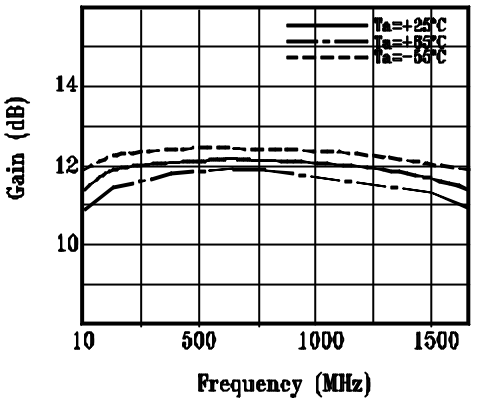
Maximum DC Voltage ----- +6VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



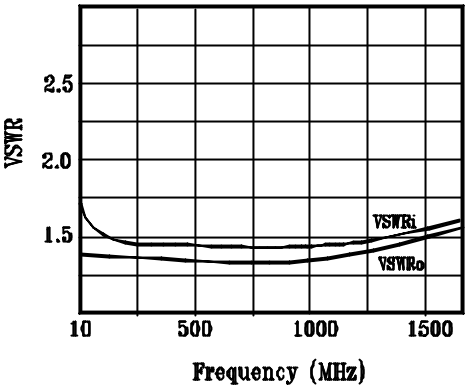
TO-8C

Typical Performance Curves

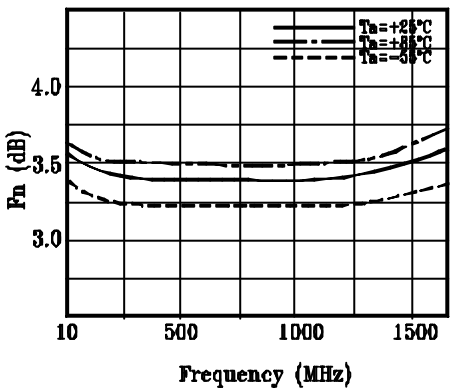
Gain vs. Frequency



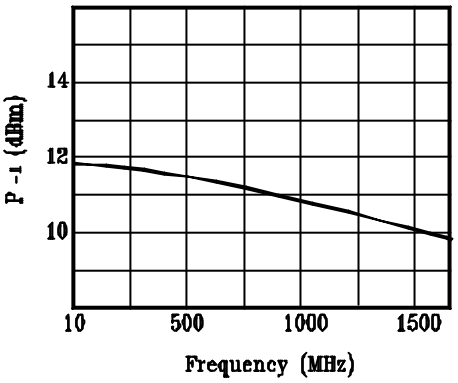
VSWR vs. Frequency



VSWR vs. Frequency

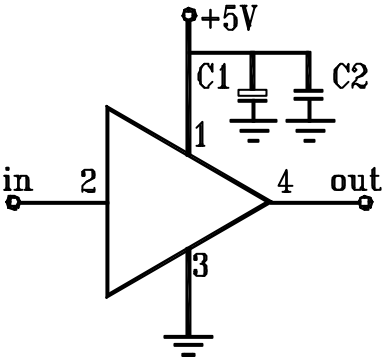


Output Power vs. Frequency



Note:

1. Typical application as shown right C_1=22~47μf;C_2=1000~3300pf.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with A16-2 from American W-J company.



HE395B

Amplifier With Lower DC Supply

Features

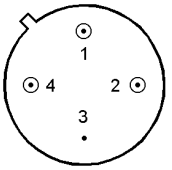
- **Frequency Range：** **10~1500MHz**
- **High Dynamic Range:** **17dBm@400MHz**
- **Lower DC Supply:** **5V**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：** **-55℃~+85℃**

Specifications (Test at V_{CC} = +5V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~1500	10~1500
Small Signal Gain	Gp	dB	10.0	11.5
Gain Flatness	ΔGp	dB	±0.5	±0.3
Noise Figure	Fn	dB	5.0	4.8
Input VSWR	VSWRi	——	2:1	1.8:1
Output VSWR	VSWRo	——	2:1	1.4:1
Power Output @1dB Compression	P_{-1}	dBm	13.0	14.0
DC Current	I_{cc}	mA	——	60

Absolute Maximum Rating

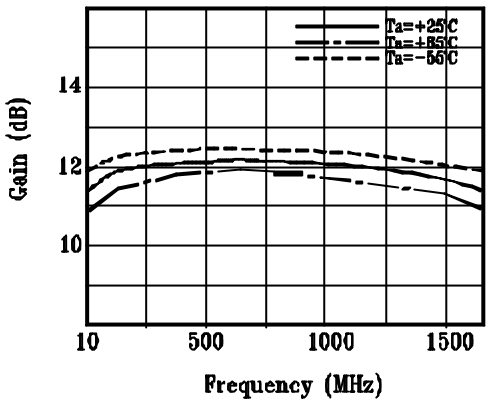
Maximum DC Voltage ----- +6VDC
Maximum Input Power ----- +10dBm
Storage Temperature ---- +125℃



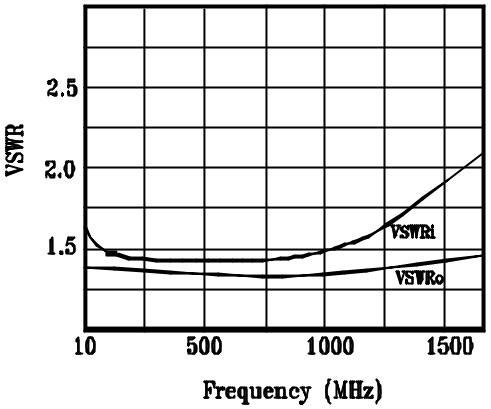
TO - 8C

Typical Performance Curves

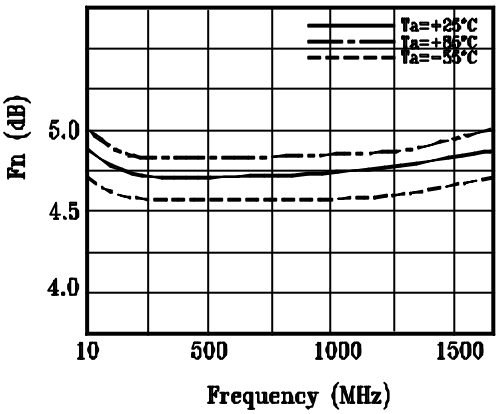
Gain vs. Frequency



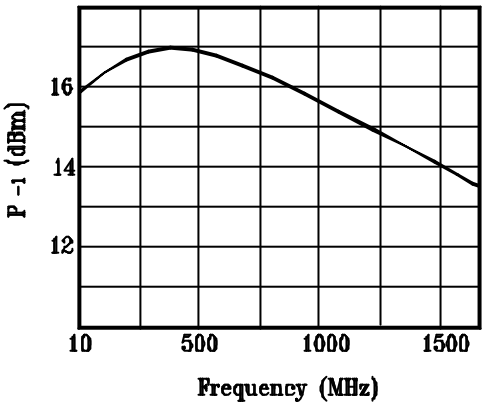
VSWR vs. Frequency



VSWR vs. Frequency

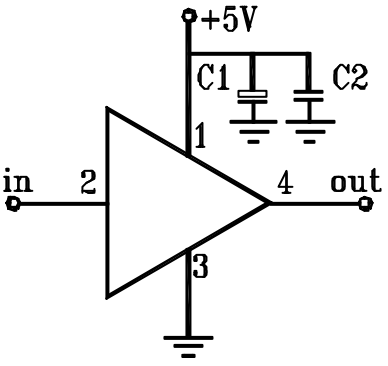


Output Power vs. Frequency



Note:

1. Typical application as shown right C_1=22~47μf;C_2=1000~3300pf.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).



HE550

Low Noise GaAs FET Amplifier

Features

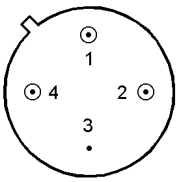
- **High Gain：** **27.0dB（Typ）**
- **Low Noise：** **0.7dB（Typ）**
- **Input/Output Impedance:** **50**W
- **Package:** **TO-8F**
- **Wide Operating Temperature：** **-55℃~+85℃**

Specifications (Test at V_{CC} = +5V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_{L-H}	MHz	320~380	——
Small Signal Gain	GssG	dB	**25.0**	27.0
Gain Flatness	△Gp	dB	**±0.3**	±0.2
Noise Figure	Fn	dB	0.8	0.7
VSWR（In/out）	VSWR	——	2.0:1	1.5:1
DC Current	Icc	mA	——	12

Absolute Maximum Rating

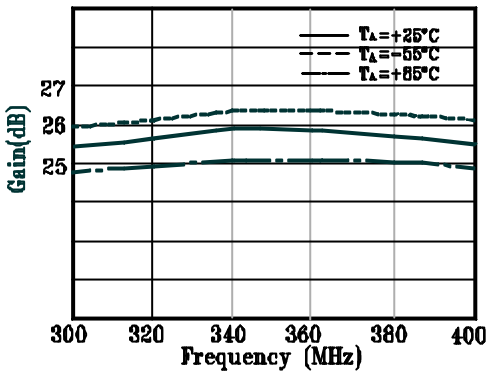
Maximum DC Voltage ----- +6VDC
Maximum Input Power -----0dBm
Storage Temperature -- +125℃



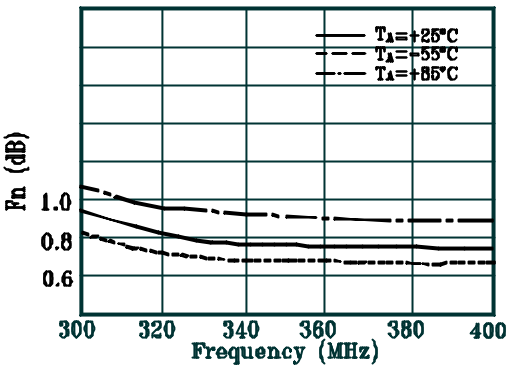
TO-8F

Typical Performance Curves

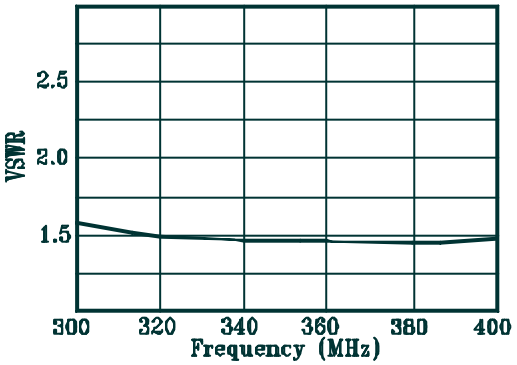
Gain vs. Frequency



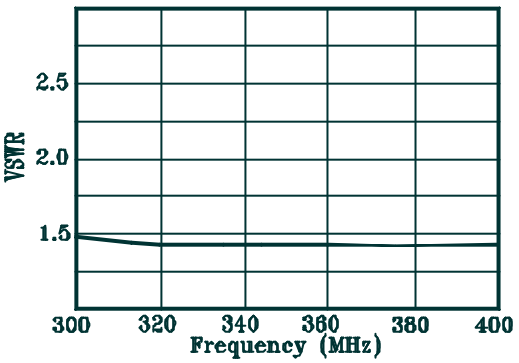
Noise vs. Frequency



Input VSWR vs. Frequency

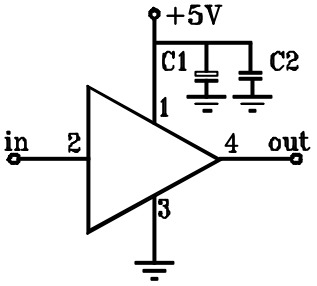


Output VSWR vs. Frequency



Note:

1. Typical application as shown right C_1=10~33μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Microstrip packaged Amplifiers can be offered.



HE550A

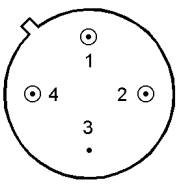
Low Noise GaAs FET Amplifier

Features

- **High Gain:** 27.0dB (Typ)
- **Low Noise:** 0.8dB (Typ)
- **Input/Output Impedance:** 50W
- **Package:** TO-8F
- **Wide Operating Temperature:** -55℃~+85℃

Specifications (Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	GHz	0.5~0.7	——
Small Signal Gain	GSSG	dB	25.0	27.0
Gain Flatness	ΔGp	dB	±1.0	±0.75
Noise Figure	Fn	dB	1.0	0.8
Input VSWR	VSWRi	——	2.5:1	2.0:1
Output VSWR	VSWRo	——	2.0:1	1.8:1
Power Output @1dB Compression	Po(1dB)	dBm	+5	+6
DC Current	I_{cc}	mA	——	65



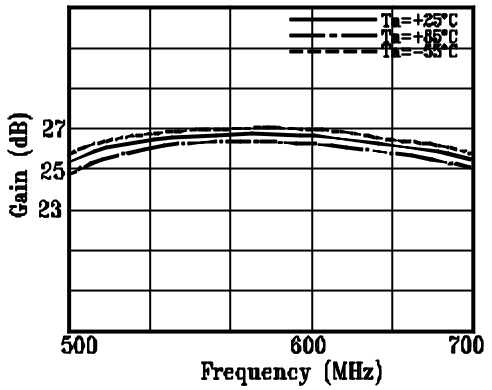
TO-8F

Absolute Maximum Rating

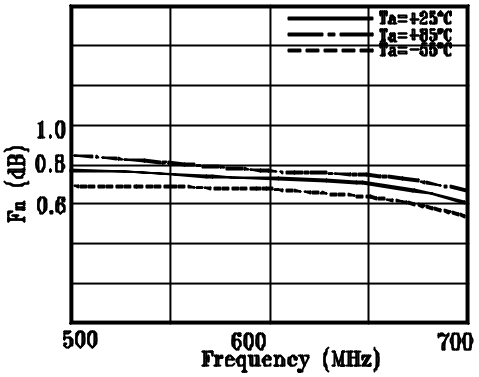
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power -----0dBm
Storage Temperature -- +125℃

Typical Performance Curves

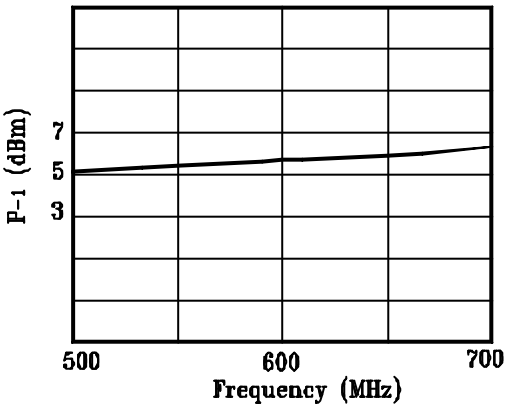
Gain vs. Frequency



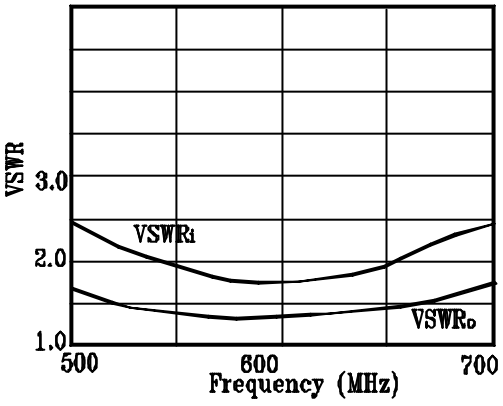
Noise vs. Frequency



Power Output vs. Frequency

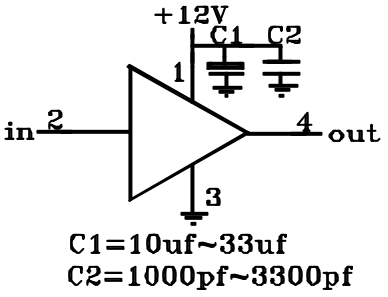


VSWR vs. Frequency



Note:

1. Typical application as shown right.
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Microstrip packaged Amplifiers can be offered.



HE550B

Low Noise GaAs FET Amplifier

Features

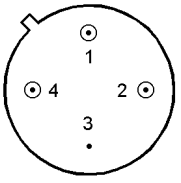
- **High Gain:** 26.0dB (Typ)
- **Low Noise:** 0.8dB (Typ)
- **Input/Output Impedance:** 50W
- **Package:** TO-8F
- **Wide Operating Temperature:** -55℃~+85℃

Specifications (Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	GHz	0.6~1.0	——
Small Signal Gain	GSSG	dB	24	26
Gain Flatness	ΔGp	dB	±1.25	±1
Noise Figure	Fn	dB	1.0	0.8
Input VSWR	VSWRi	——	2.5:1	2.0:1
Output VSWR	VSWRo	——	2.5:1	2.0:1
Power Output @1dB Compression	Po(1dB)	dBm	+3	+4
DC Current	I_{cc}	mA	——	65

Absolute Maximum Rating

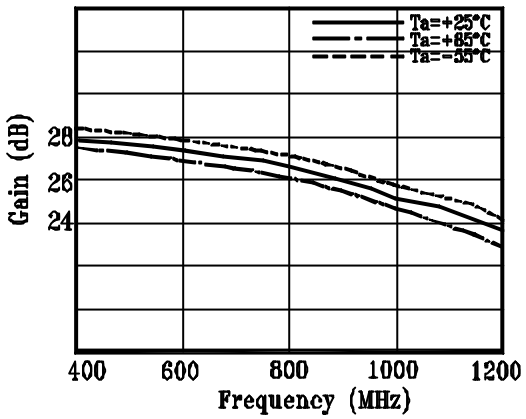
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power -----0dBm
Storage Temperature -- +125℃



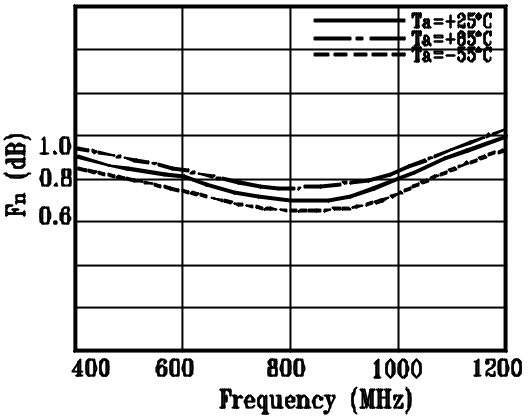
TO-8F

Typical Performance Curves

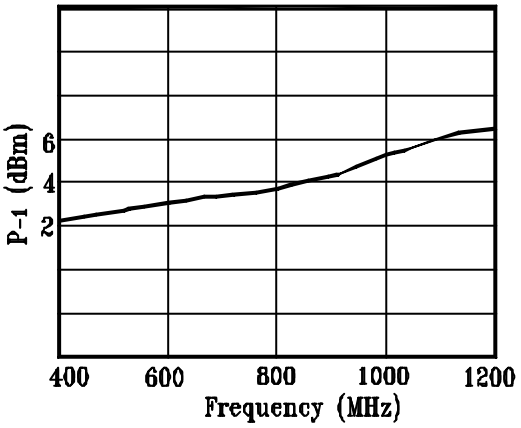
Gain vs. Frequency



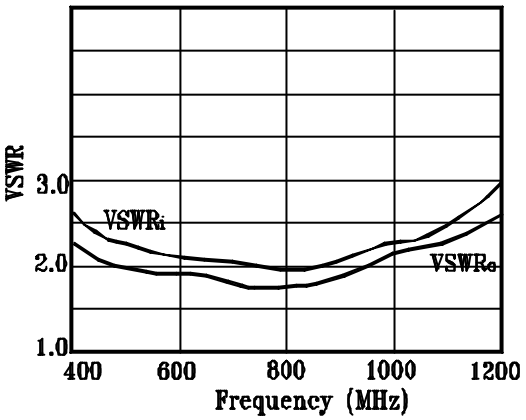
Noise vs. Frequency



Power Output vs. Frequency

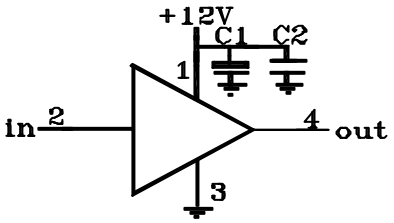


VSWR vs. Frequency



Note:

1. Typical application as shown right.
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Microstrip packaged Amplifiers can be offered.



HE551

Low Noise GaAs FET Amplifier

Features

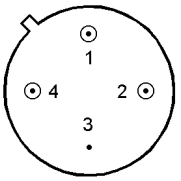
- **High Gain：** **28.0dB（Typ）**
- **Low Noise：** **1.0dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8D**
- **Wide Operating Temperature：-55℃~+85℃**

Specifications (Test at V_{CC} = +12V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	900~1300	——
Small Signal Gain	GSSG	dB	25.0	28.0
Noise Figure	Fn	dB	1.35	1.0
Input VSWR	VSWRi	——	2.5:1	2:1
Output VSWR	VSWRo	——	2.5:1	2:1
Power Output @1dB Compression	Po(1dB)	dBm	11.0	12.0
DC Current	I_{CC}	mA	——	65

Absolute Maximum Rating

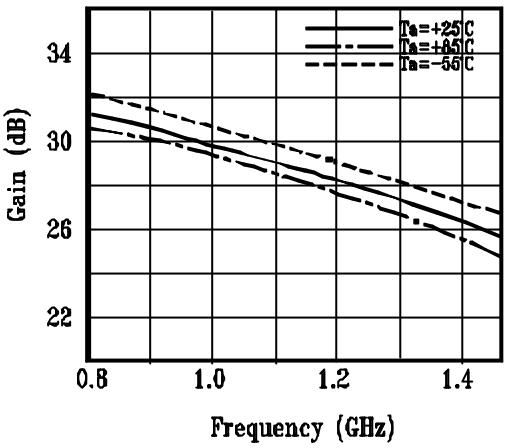
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power ----- +13dBm
Storage Temperature -- +125℃



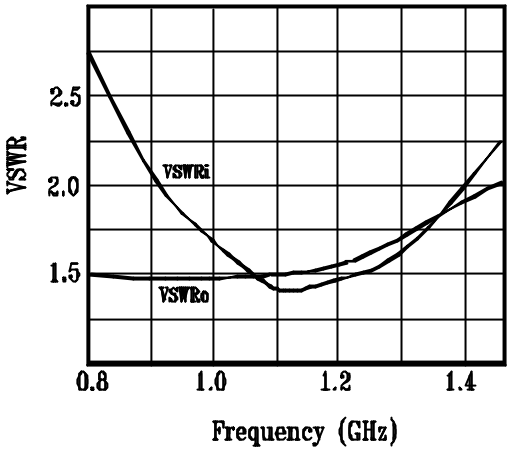
TO-8F

Typical Performance Curves

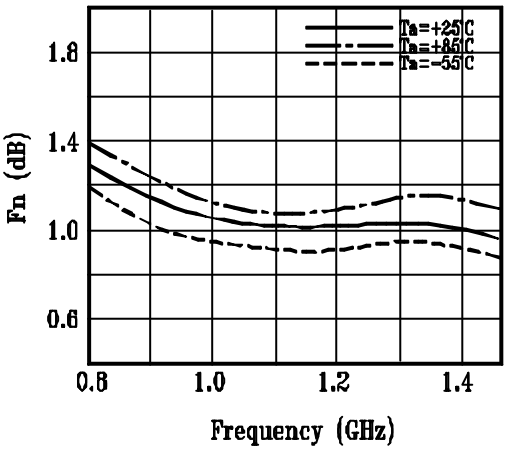
Gain vs. Frequency



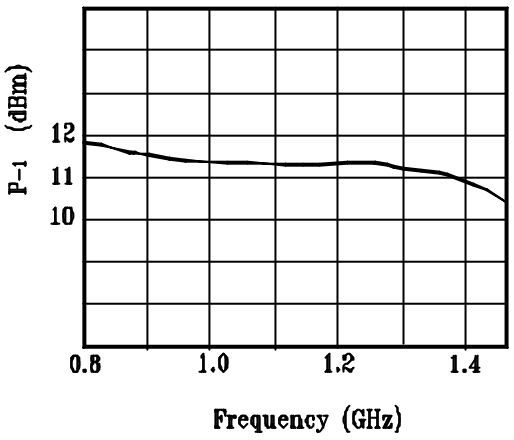
VSWR vs. Frequency



Noise vs. Frequency

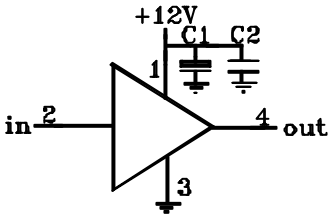


Power Output vs. Frequency



Note:

1. Typical application as shown right.
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Microstrip packaged Amplifiers can be offered.



C1=10uf~33uf
C2=1000pf~3300pf

HE551A

Low Noise GaAs FET Amplifier

Features

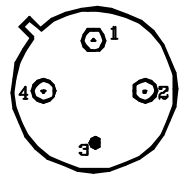
- **High Gain：** **37.0dB（Typ）**
- **Low Noise：** **0.9dB（Typ）**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8D**
- **Wide Operating Temperature：-55℃~+85℃**

Specifications (Test at V_{CC} = +12V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_{L-H}	MHz	950~1250	——
Small Signal Gain	GSSG	dB	**36.0**	37.0
Gain Flatness	△Gp	dB	**±0.5**	±0.4
Noise Figure	Fn	dB	1.0	0.9
VSWR (In/out)	VSWR	——	2.0:1	1.8:1
Power Output @1dB Compression	P_{-1}	dBm	**13.0**	**14.0**
DC Current	Icc	mA	——	65

Absolute Maximum Rating

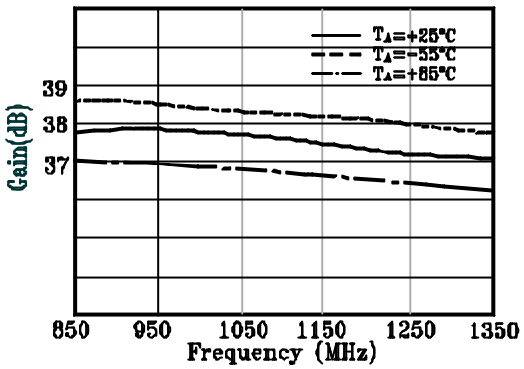
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power ----- +13dBm
Storage Temperature -- +125℃



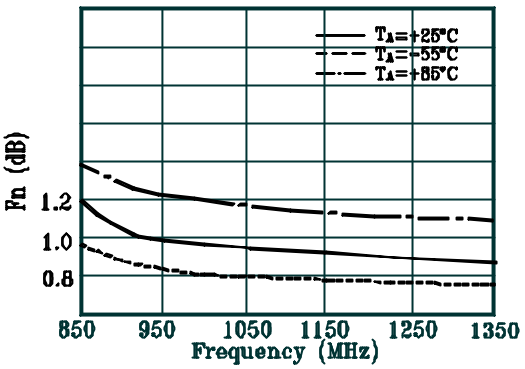
TO-8D

Typical Performance Curves

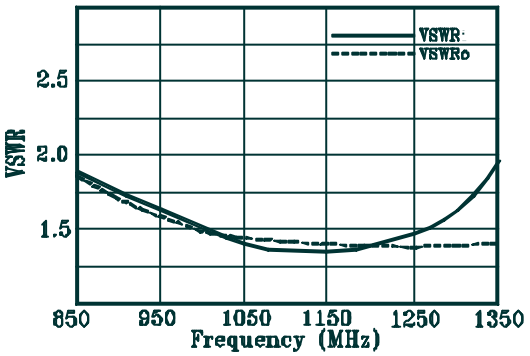
Gain vs. Frequency



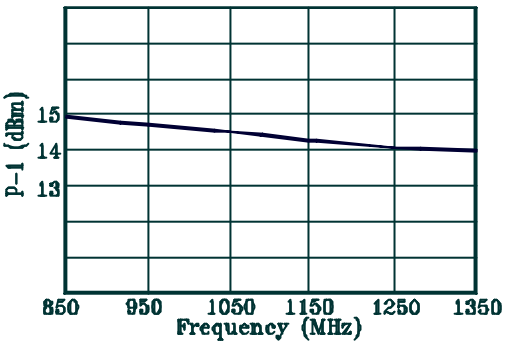
Noise vs. Frequency



VSWR vs. Frequency

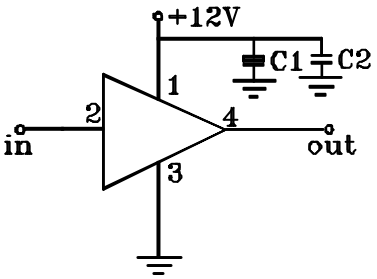


Output Power vs. Frequency



Note:

1. Typical application as shown right.
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Microstrip packaged Amplifiers can be offered.



C1=10μf~33μf C2=1000~3300pf

HE551B

Low Noise GaAs FET Amplifier

Features

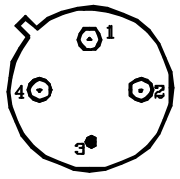
- **High Gain:** **38.0dB (Typ)**
- **Low Noise:** **0.9dB (Typ)**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8D**
- **Wide Operating Temperature: -55℃~+85℃**

Specifications (Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_{L-H}	MHz	950~1250	——
Small Signal Gain	Gp	dB	**37.0**	38.0
Gain Flatness	△GSSG	dB	**±0.5**	±0.4
Noise Figure	Fn	dB	1.0	0.9
VSWR(In/out)	VSWR	——	2.0:1	1.8:1
Power Output @1dB Compression	P_{-1}	dBm	**15.0**	**16.0**
DC Current	Icc	mA	——	85

Absolute Maximum Rating

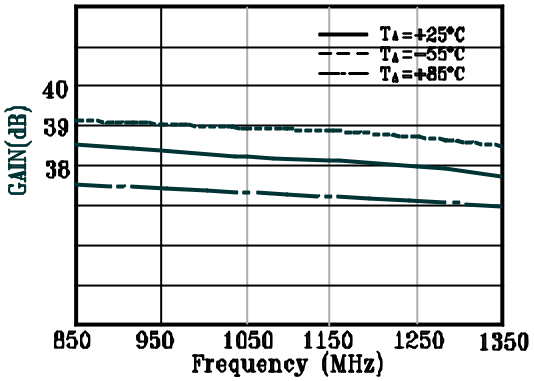
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power ----- +13dBm
Storage Temperature -- +125℃



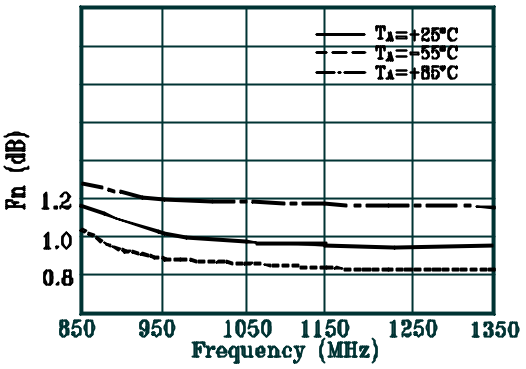
TO-8D

Typical Performance Curves

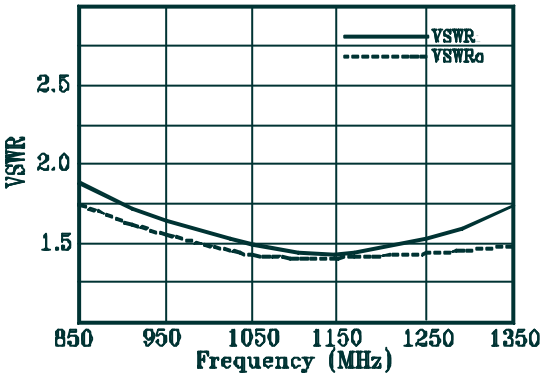
Gain vs. Frequency



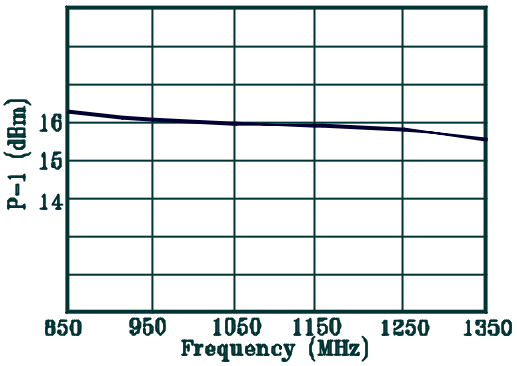
Noise vs. Frequency



VSWR vs. Frequency

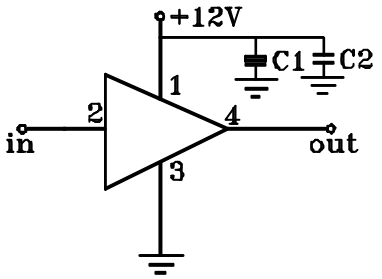


Power Output vs. Frequency



Note:

1. Typical application as shown right.
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Microstrip packaged Amplifiers can be offered.



C1=10μf~33μf C2=1000~3300pf

HE552

Low Noise GaAs FET Amplifier

Features

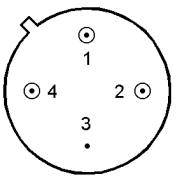
- **High Gain:** 26.0dB (Typ)
- **Low Noise:** 1.2dB (Typ)
- **Input/Output Impedance:** 50W
- **Package:** TO-8D
- **Wide Operating Temperature:** -55℃~+85℃

Specifications (Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	1200~1500	——
Small Signal Gain	GSSG	dB	23.0	26.0
Noise Figure	Fn	dB	1.4	1.2
Input VSWR	VSWRi	——	2.0:1	——
Output VSWR	VSWRo	——	2.0:1	——
Power Output @1dB Compression	Po(1dB)	dBm	10.0	11.0
DC Current	I_{cc}	mA	——	65

Absolute Maximum Rating

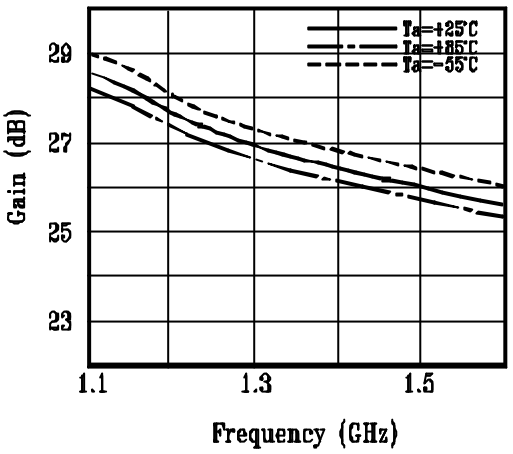
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power ----- +13dBm
Storage Temperature -- +125℃



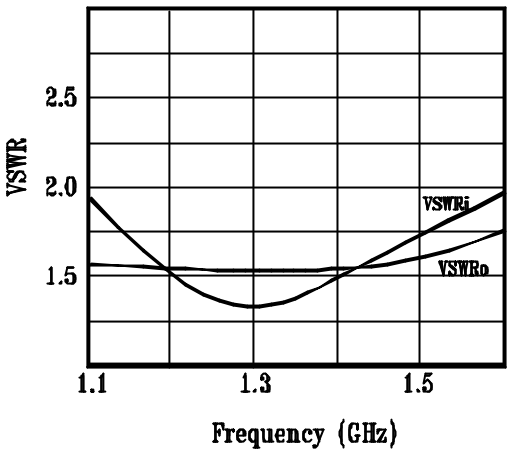
TO-8D

Typical Performance Curves

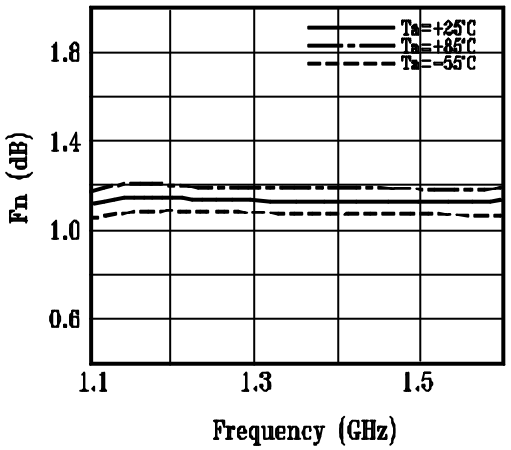
Gain vs. Frequency



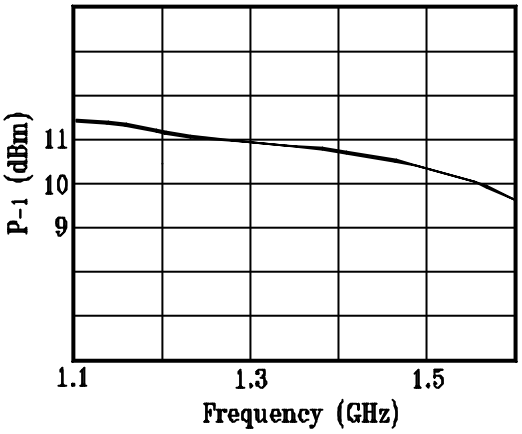
VSWR vs. Frequency



Noise vs. Frequency

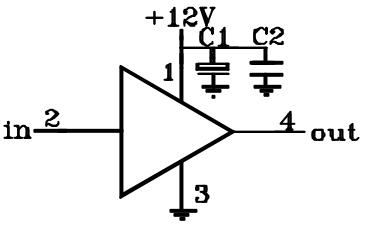


Power Output vs. Frequency



Note:

1. Typical application as shown right.
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Microstrip packaged Amplifiers can be offered.



C1=10uf~33uf
C2=1000pf~3300pf

HE553

Low Noise GaAs FET Amplifier

Features

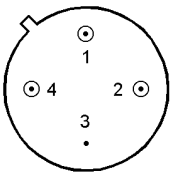
- **High Gain:** 25.0dB (Typ)
- **Low Noise:** 1.3dB (Typ)
- **Input/Output Impedance:** 50W
- **Package:** TO-8D
- **Wide Operating Temperature:** -55℃~+85℃

Specifications (Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	1400~1700	——
Small Signal Gain	GSSG	dB	23.0	25.0
Noise Figure	Fn	dB	1.4	1.3
Input VSWR	VSWRi	——	2.0:1	——
Output VSWR	VSWRo	——	2.0:1	——
Power Output @1dB Compression	Po(1dB)	dBm	10.0	11.0
DC Current	I_{cc}	mA	——	65

Absolute Maximum Rating

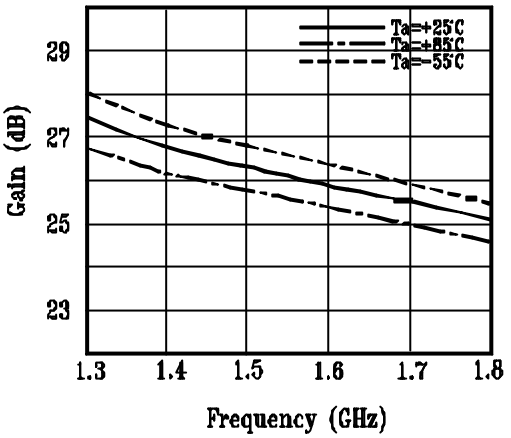
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power ----- +13dBm
Storage Temperature -- +125℃



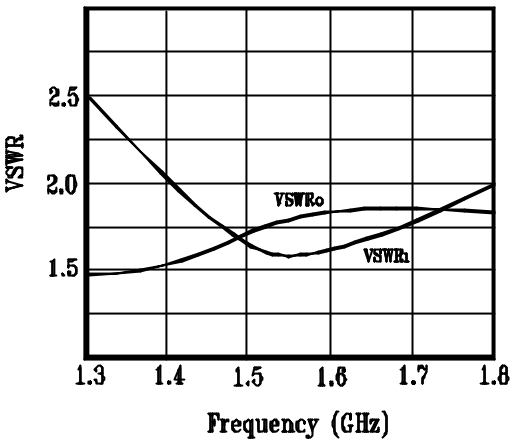
TO-8D

Typical Performance Curves

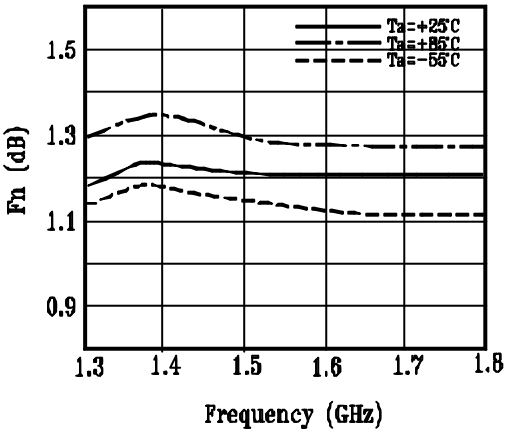
Gain vs. Frequency



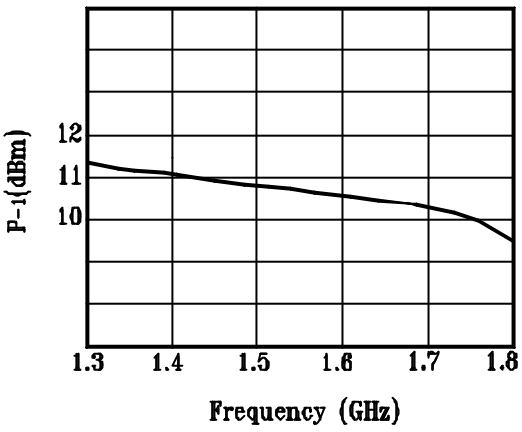
VSWR vs. Frequency



Noise vs. Frequency

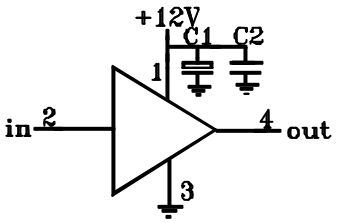


Power Output vs. Frequency



Note:

1. Typical application as shown right.
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Microstrip packaged Amplifiers can be offered.



C1=10uf~33uf
C2=1000pf~3300pf

HE554

Low Noise GaAs FET Amplifier

Features

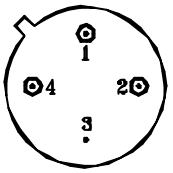
- **High Gain:** **24.0dB (Typ)**
- **Low Noise:** **1.3dB (Typ)**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8D**
- **Wide Operating Temperature: -55℃~+85℃**

Specifications (Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	GHz	2.0~2.5	——
Small Signal Gain	GSSG	dB	22.0	24.0
Gain Flatness	ΔGp	dB	±1.0	±0.5
Noise Figure	Fn	dB	1.5	1.3
Input VSWR	VSWRi	——	2.5:1	2.0:1
Output VSWR	VSWRo	——	2.5:1	2.2:1
Power Output @1dB Compression	Po(1dB)	dBm	+10	+11
DC Current	I_{cc}	mA	——	65

Absolute Maximum Rating

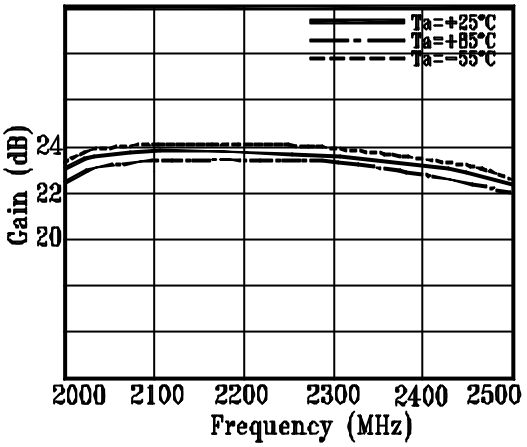
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power ----- +13dBm
Storage Temperature -- +125℃



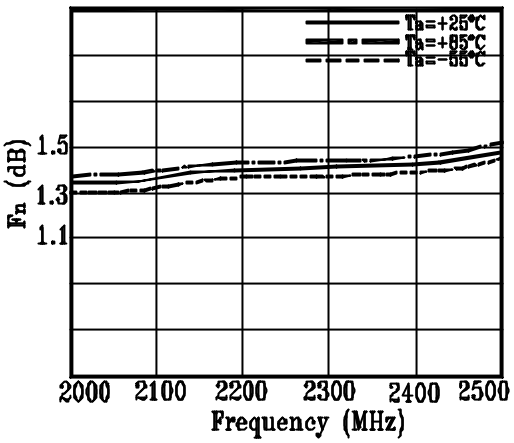
TO-8D

Typical Performance Curves

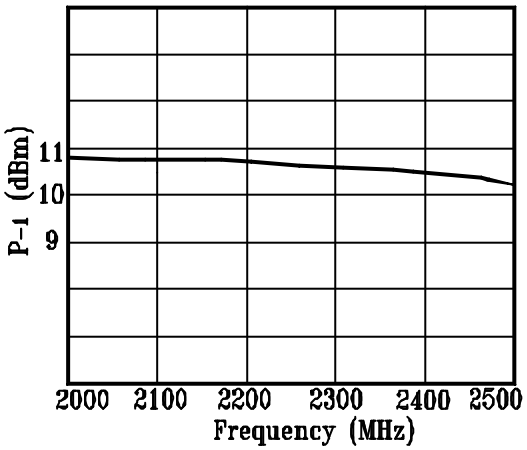
Gain vs. Frequency



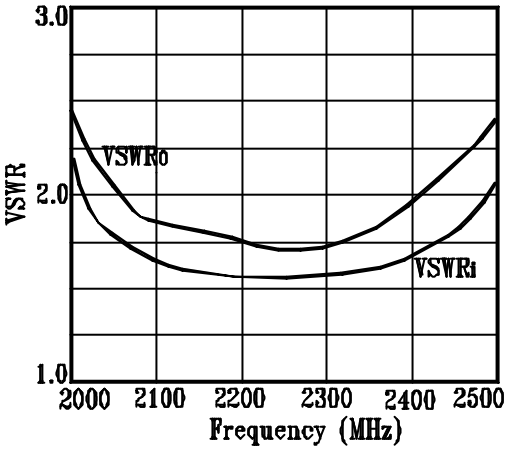
Noise vs. Frequency



Output power vs. Frequency

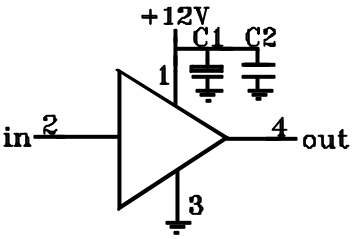


VSWR vs. Frequency



Note:

1. Typical application as shown right.
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Microstrip packaged Amplifiers can be offered.



C1=10uf~33uf
C2=1000pf~3300pf

HE554B

Low Noise GaAs FET Amplifier

Features

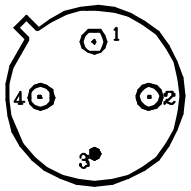
- **High Gain:** 24.0dB (Typ)
- **Low Noise:** 1.3dB (Typ)
- **Input/Output Impedance:** 50W
- **Package:** TO-8D
- **Wide Operating Temperature:** -55℃~+85℃

Specifications (Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_{L-H}	MHz	2400~2800	——
Small Signal Gain	GSSG	dB	22.0	24.0
Gain Flatness	△Gp	dB	1.0	0.5
Noise Figure	Fn	dB	1.5	1.3
VSWR	VSWR	——	2.5:1	2.0:1
Power Output @1dB Compression	P_{-1}	dBm	10.0	11.0
DC Current	Icc	mA	——	65

Absolute Maximum Rating

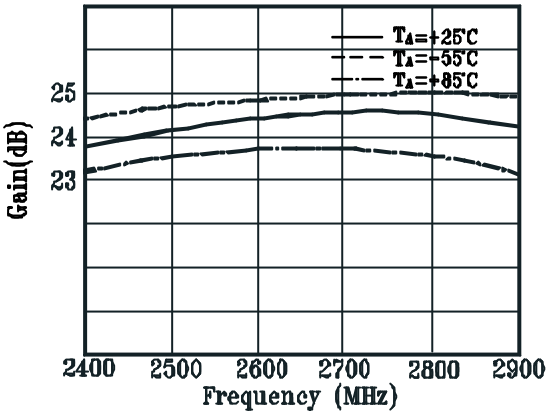
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power ----- +13dBm
Storage Temperature -- +125℃



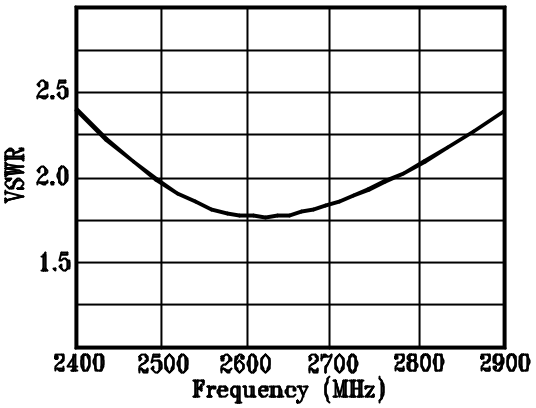
TO-8D

Typical Performance Curves

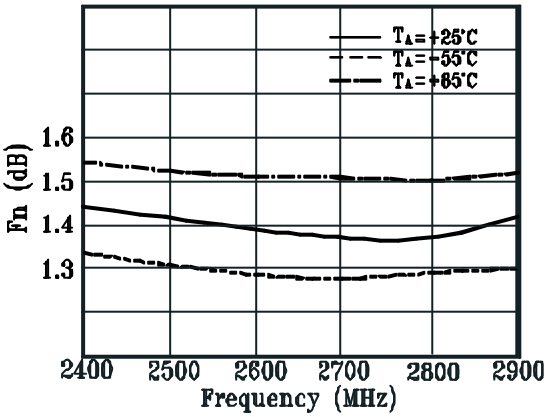
Gain vs. Frequency



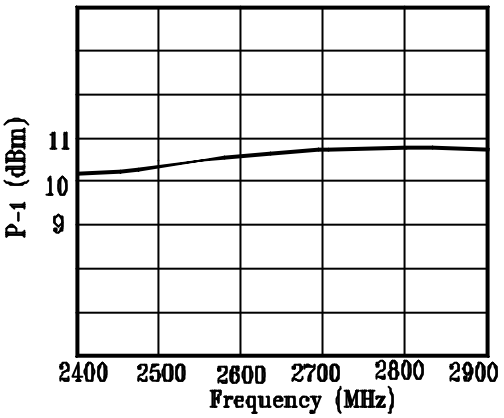
VSWR vs. Frequency



Noise vs. Frequency

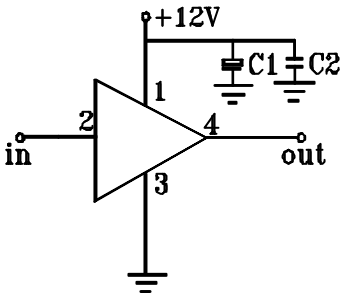


Power Output vs. Frequency



Note:

1. Typical application as shown right.
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Microstrip packaged Amplifiers can be offered.



C1=10μf~~33μf C2=1000~~3300pf

HE008

Low NoiseGaAs FET Amplifier

Features

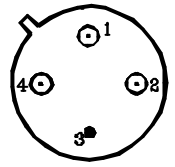
- **High Gain：** **23.0dB（Typ）**
- **Low Noise：** **1.3dB（Typ）**
- **Input/Output Impedance:** **50**W
- **Package:** **TO-8D**
- **Wide Operating Temperature：** **-55℃~+85℃**

Specifications (Test at V_{CC} = +12V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_{L-H}	MHz	3100~3400	——
Power Gain	Gp	dB	22.0	23.0
Gain Flatness	△Gp	dB	1.0	0.5
Noise Figure	Fn	dB	1.5	1.3
VSWR	VSWR	——	2.0:1	1.8:1
Power Output @1dB Compression	P_{-1}	dBm	8.0	9.0
DC Current	Icc	mA	——	35

Absolute Maximum Rating

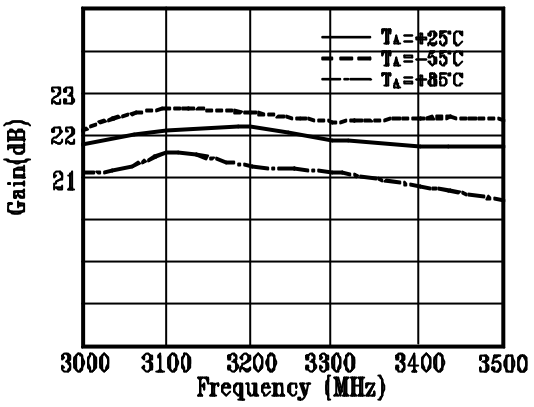
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power ----- +13dBm
Storage Temperature -- +125℃



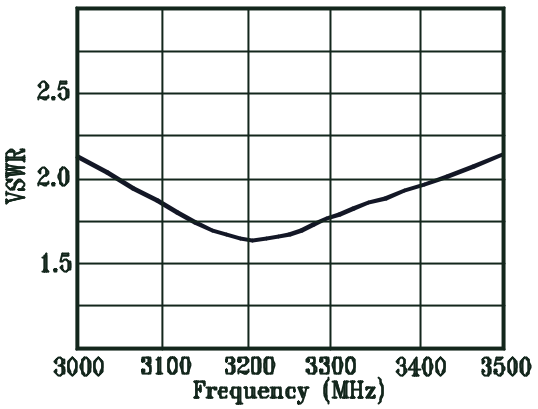
TO-8D

Typical Performance Curves

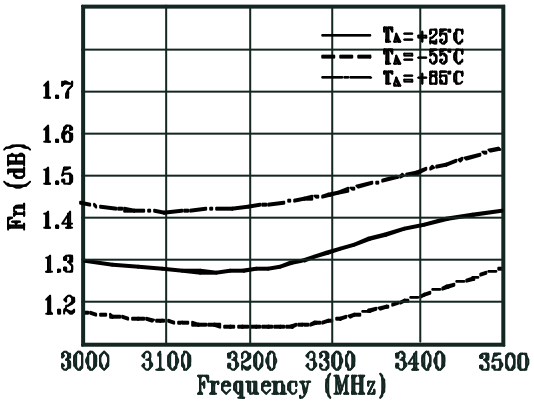
Gain vs. Frequency



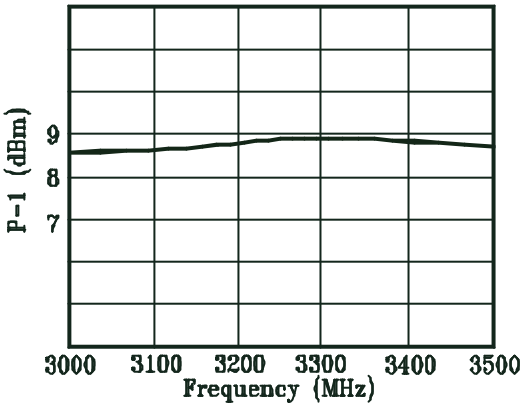
VSWR vs. Frequency

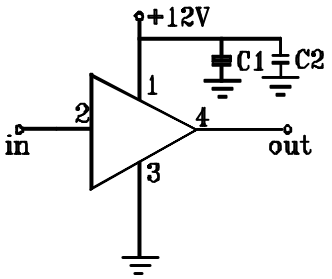


Noise vs. Frequency



Power Output vs. Frequency





Note:

1. Typical application as shown right C_1=10~33μf;C_2=1000~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Microstrip packaged Amplifiers can be offered.

Features

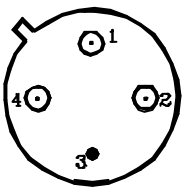
- **Broad Band:** **1.0~3.5GHz**
- **High Output Power:** **21.0dBm (Typ)**
- **Input/Output Impedance:** **50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature ：** **-55℃~+85℃**

Specifications (Test at V_{CC} = +5V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	GHz	1.0~3.5	—
Power Gain	Gp	dB	8.0	9.0
Gain Flatness	ΔGp	dB	±0.75	±0.5
Noise Figure	Fn	dB	5.5	4.0
Input VSWR	VSWRi	—	2.0:1	1.8:1
Output VSWR	VSWRo	—	2.5:1	2.2:1
Saturation Output Power	Po	dBm	+20.0	+21.0
DC Current	I_{cc}	mA	—	85

Absolute Maximum Rating

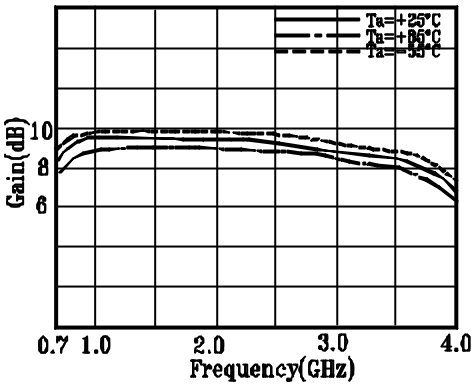
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power ----- +13dBm
Storage Temperature -- +125℃



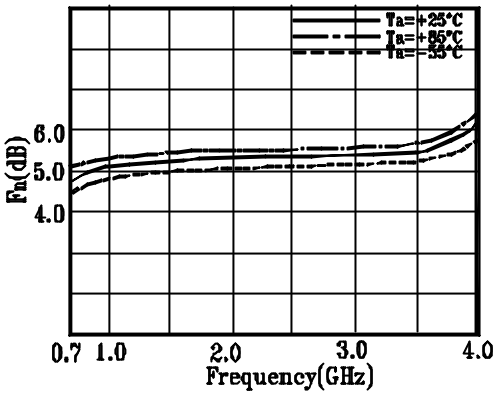
TO-8C

Typical Performance Curves

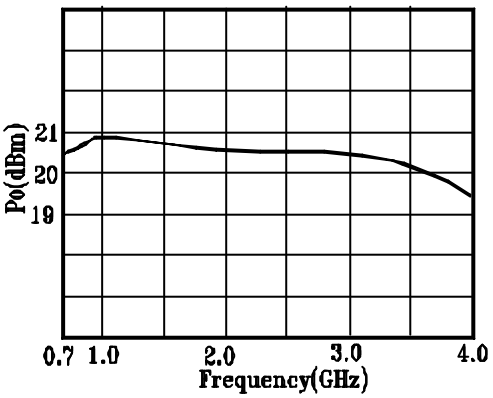
Gain vs. Frequency



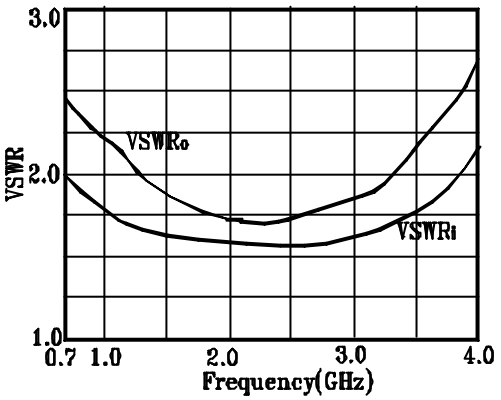
Noise vs. Frequency



Output Power vs. Frequency

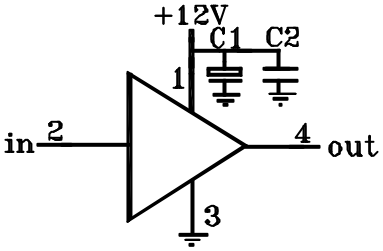


VSWR vs. Frequency



Note:

1. Typical application as shown right ;
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Microstrip packaged Amplifiers can be offered.



C1=10uf~33uf
C2=1000pf~3300pf

Features

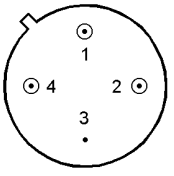
- **Broad Band:** 0.8~3.5GHz
- **Output Power:** 14.5dBm (Typ)
- **Input/Output Impedance:** 50W
- **Package:** TO-8C
- **Wide Operating Temperature :** -55℃~+85℃

Specifications (Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	GHz	0.8~3.5	—
Small Signal Gain	Gp	dB	7.0	8.0
Gain Flatness	ΔGp	dB	±0.75	±0.5
Noise Figure	Fn	dB	5.0	4.0
Input VSWR	VSWRi	—	2.0:1	1.8:1
Output VSWR	VSWRo	—	2.5:1	2.0:1
Power Output @1dB Compression	P_{-1}	dBm	+13.0	+14.5
DC Current	I_{cc}	mA	—	36

Absolute Maximum Rating

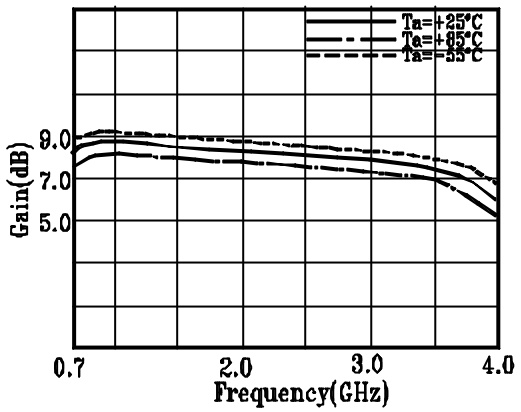
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power ----- +13dBm
Storage Temperature -- +125℃



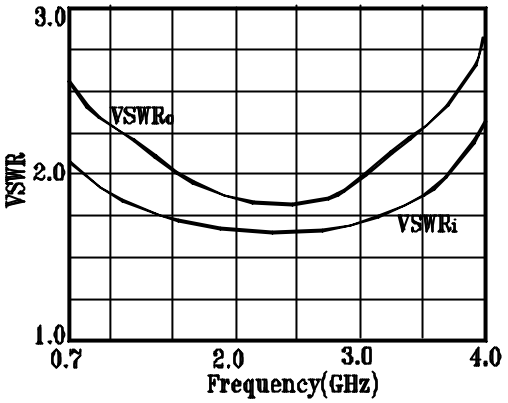
TO-8C

Typical Performance Curves

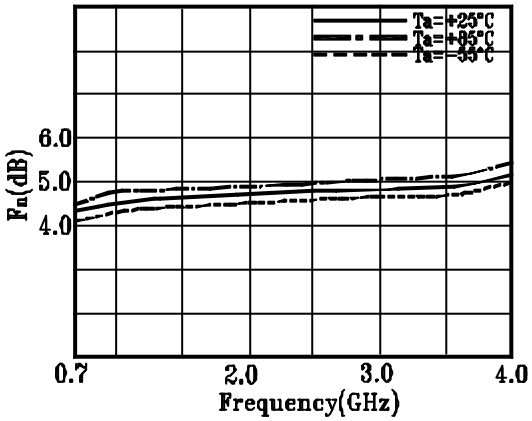
Gain vs. Frequency



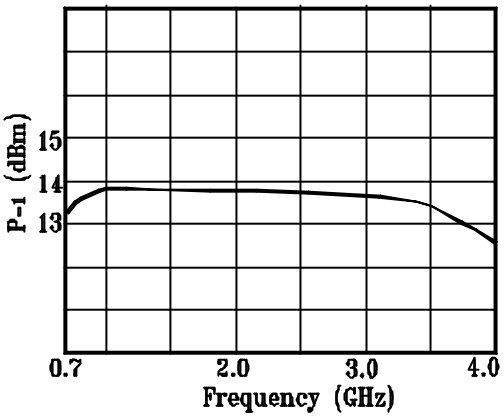
VSWR vs. Frequency



Noise vs. Frequency

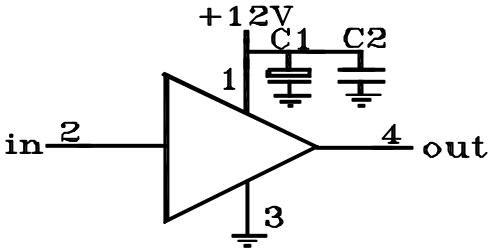


Output Power vs. Frequency



Note:

1. Typical application as shown right;
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Microstrip packaged Amplifiers can be offered.



C1=10uf~33uf
C2=1000pf~3300pf

Features

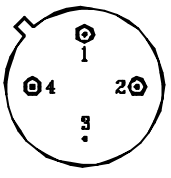
- **Broad Band:** **0.8~2.0GHz**
- **High Output Power:** **20dBm (Typ)**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8A**
- **Wide Operating Temperature ：-55℃~+85℃**

Specifications (Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	GHz	0.8~2.0	——
Small Signal Gain	Gp	dB	12.0	13.5
Gain Flatness	ΔGp	dB	±0.75	±0.5
Noise Figure	Fn	dB	5.5	4.0
Input VSWR	VSWRi	——	2.0:1	1.8:1
Output VSWR	VSWRo	——	2.5:1	2.2:1
Saturation Output Power	Po	dBm	+19.0	+20.0
DC Current	I_{cc}	mA	——	75

Absolute Maximum Rating

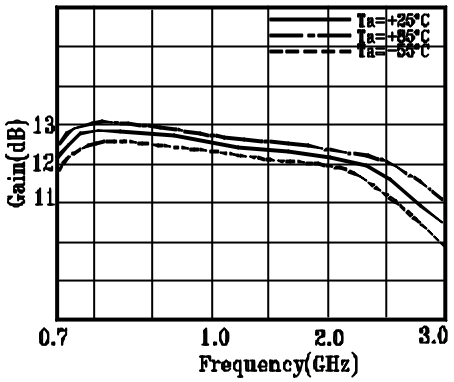
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power ----- +13dBm
Storage Temperature -- +125℃



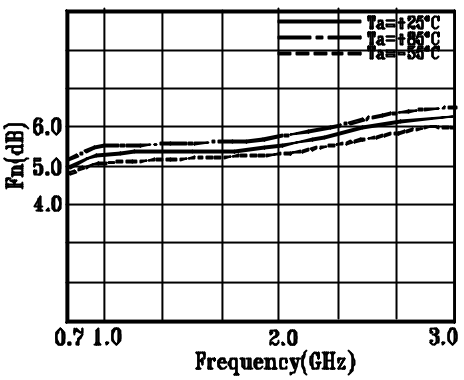
TO-8A

Typical Performance Curves

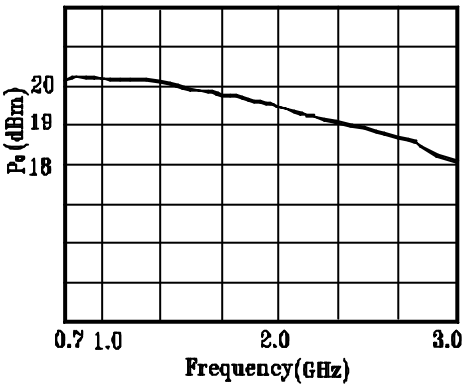
Gain vs. Frequency



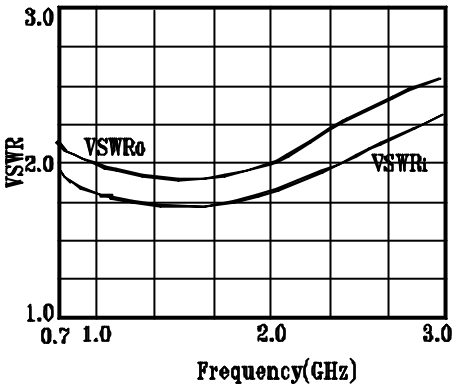
Noise vs. Frequency



Output Power vs. Frequency

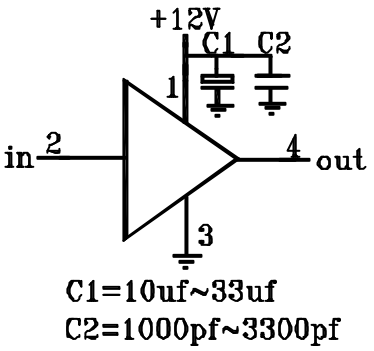


VSWR vs. Frequency



Note:

1. Typical application as shown right
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Microstrip packaged Amplifiers can be offered.
5. Pay attention to heat dispersion.



Features

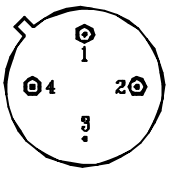
- **Broad Band:** 0.6~2.5GHz
- **High Output Power:** 19.5dBm (Typ)
- **Input/Output Impedance:** 50W
- **Package:** TO-8A
- **Wide Operating Temperature:** -55℃~+85℃

Specifications (Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	GHz	0.6~2.5	——
Small Signal Gain	Gp	dB	10.0	11.5
Gain Flatness	ΔGp	dB	±1.0	±0.7
Noise Figure	Fn	dB	5.5	4.0
Input VSWR	VSWRi	——	2.5:1	2.0:1
Output VSWR	VSWRo	——	2.5:1	2.2:1
Saturation Output power	Po	dBm	+19.0	19.5
DC Current	I_{cc}	mA	——	75

Absolute Maximum Rating

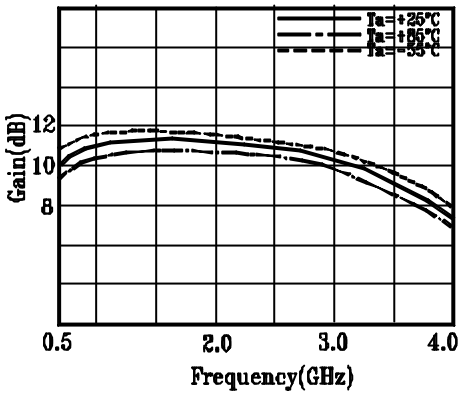
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power ----- +13dBm
Storage Temperature -- +125℃



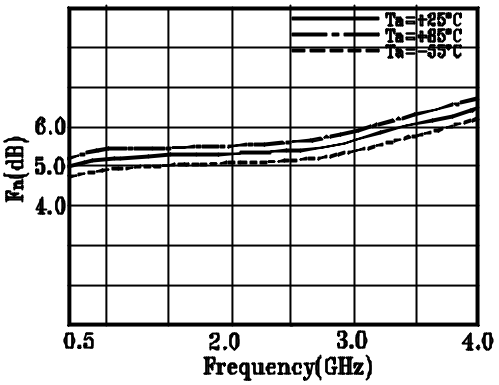
TO-8A

Typical Performance Curves

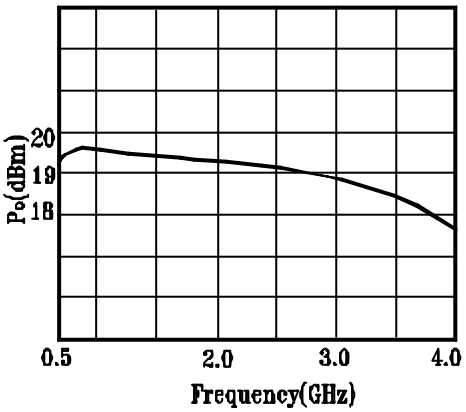
Gain vs. Frequency



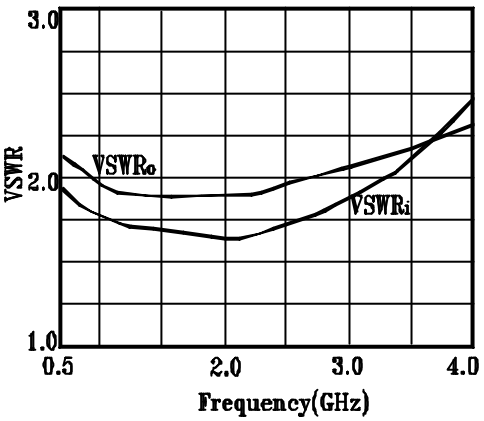
Noise vs. Frequency



Output Power vs. Frequency

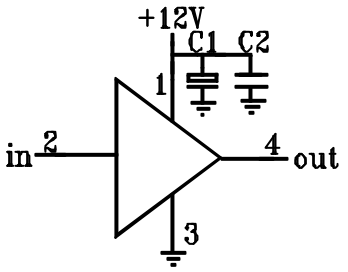


VSWR vs. Frequency



Note:

1. Typical application as shown right
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Microstrip packaged Amplifiers can be offered.
5. Pay attention to heat dispersion.



C1=10uf~33uf
C2=1000pf~3300pf

Features

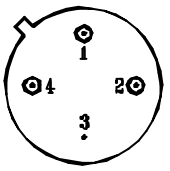
- **Broad Band:** **0.8~2.5GHz**
- **High Gain:** **20.5dB(Typ)**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8D**
- **Wide Operating Temperature：-55℃~+85℃**

Specifications (Test at V_{CC} = +12V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	GHz	0.8~2.5	——
Small Signal Gain	Gp	dB	19.0	20.5
Gain Flatness	ΔGp	dB	±0.75	±0.5
Noise Figure	Fn	dB	5.5	4.0
Input VSWR	VSWRi	——	2.5:1	2.0:1
Output VSWR	VSWRo	——	2.5:1	2.2:1
Power Output @ 1dB Compression	Po(1dB)	dBm	+13.0	+13.5
DC Current	I_{cc}	mA	——	75

Absolute Maximum Rating

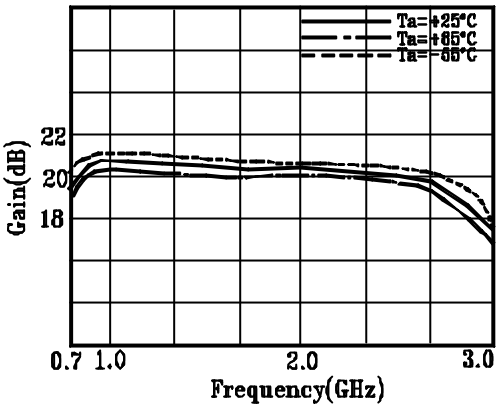
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power ----- +13dBm
Storage Temperature -- +125℃



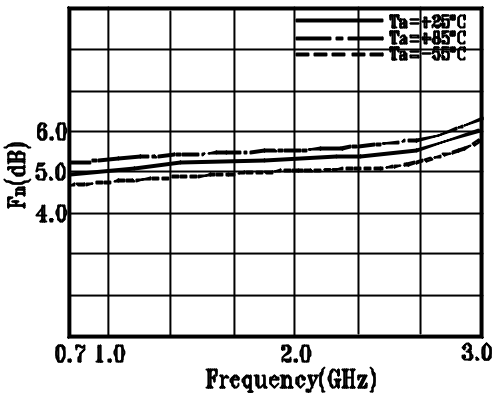
TO-8D

Typical Performance Curves

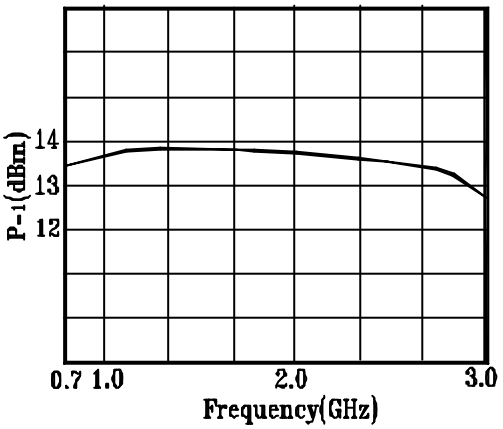
Gain vs. Frequency



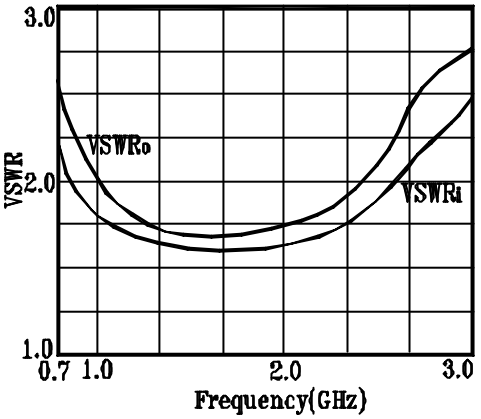
Noise vs. Frequency



Output Power vs. Frequency

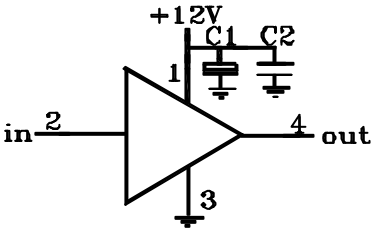


VSWR vs. Frequency



Note:

1. Typical application as shown right
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Microstrip packaged Amplifiers can be offered.
5. Pay attention to heat dispersion.



C1=10uf~33uf
C2=1000pf~3300pf

Features

- **Broad Band:** **0.8~2.5GHz**
- **High Gain:** **25.0dB(Typ)**
- **Input/Output Impedance: 50**Ω
- **Package:** **TO-8D**
- **Wide Operating Temperature：-55℃~+85℃**

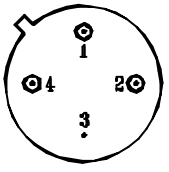
Specifications (Test at V_{CC} = +12V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	GHz	0.8~2.5	0.7~2.5
Small Signal Gain	Gp	dB	24.0	25.0
Gain Flatness	ΔGp	dB	±0.75	±0.5
Noise Figure	Fn	dB	5.5	4.0
Input VSWR	VSWRi	——	2.0:1*	——
Output VSWR	VSWRo	——	2.0:1*	——
Power Output @ 1dB Compression	Po	dBm	+19	+20
DC Current	I_{cc}	mA	——	100

Note: VSWR of some amplifiers may be over 2:1 at f<1.0GHz and f>2.0GHz

Absolute Maximum Rating

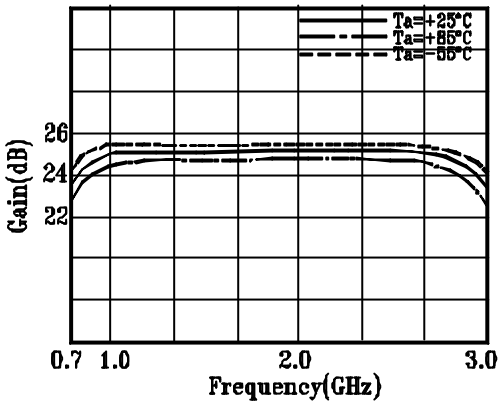
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power ----- +13dBm
Storage Temperature -- +125℃



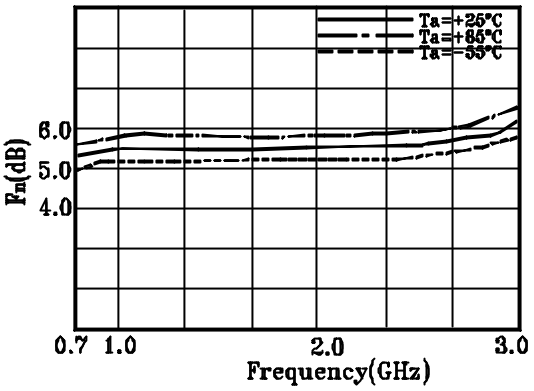
TO-8D

Typical Performance Curves

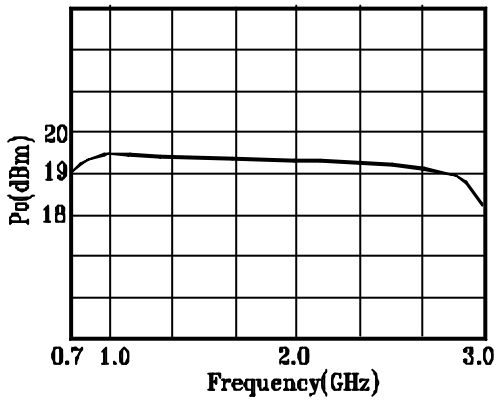
Gain vs. Frequency



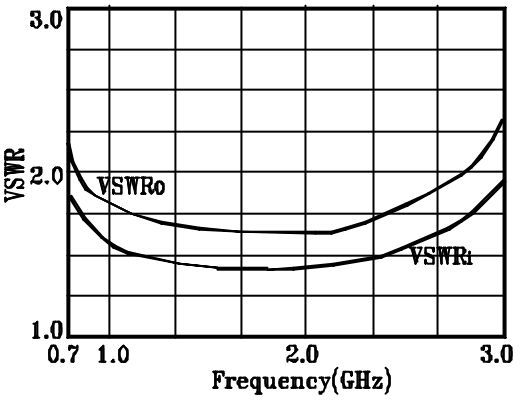
Noise vs. Frequency



Output Power vs. Frequency

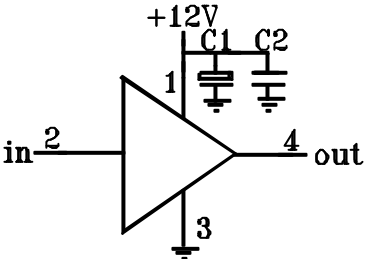


VSWR vs. Frequency



Note:

1. Typical application as shown right
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Microstrip packaged Amplifiers can be offered.
5. Pay attention to heat dispersion.



C1=10uf~33uf
C2=1000pf~3300pf

Features

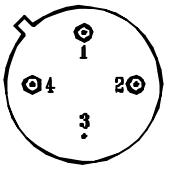
- **Broad Band:** 1.5~3.0GHz
- **High Gain:** 24.0dB(Typ)
- **Input/Output Impedance:** 50W
- **Package:** TO-8D
- **Wide Operating Temperature：** -55℃~+85℃

Specifications (Test at V_{CC} = +12V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	GHz	1.5~3.0	——
Small Signal Gain	Gp	dB	22.0	24.0
Gain Flatness	ΔGp	dB	±1.0	±0.75
Noise Figure	Fn	dB	5.5	4.0
Input VSWR	VSWRi	——	2.5:1	2.0:1
Output VSWR	VSWRo	——	2.5:1	1.8:1
Saturation Output Power	Po	dBm	+18	19
DC Current	I_{cc}	mA	——	100

Absolute Maximum Rating

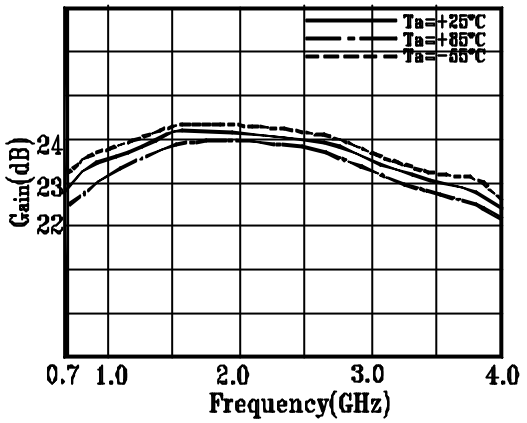
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power ----- +13dBm
Storage Temperature -- +125℃



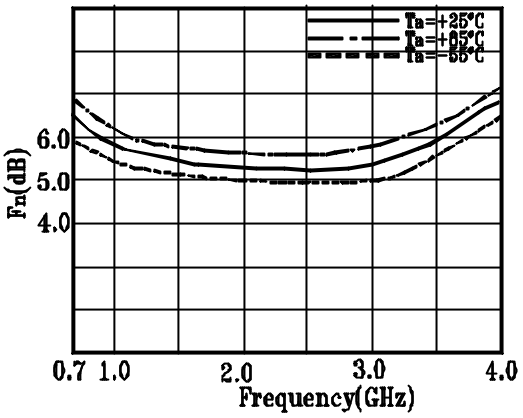
TO-8D

Typical Performance Curves

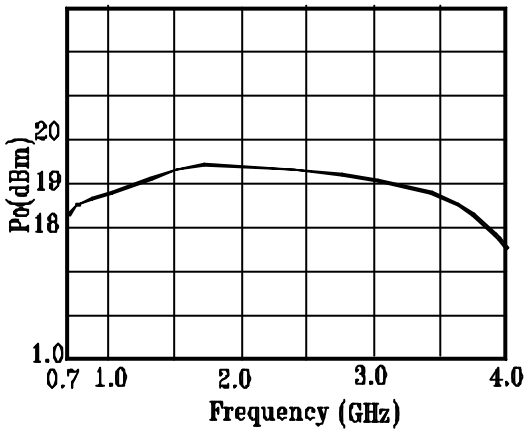
Gain vs. Frequency



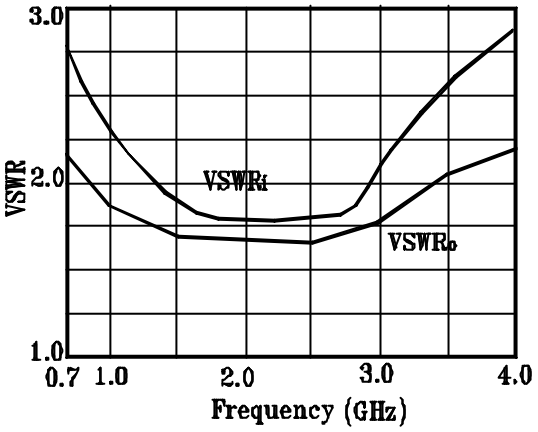
Noise vs. Frequency



Output Power vs. Frequency

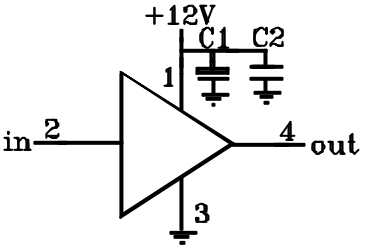


VSWR vs. Frequency



Note:

1. Typical application as shown right
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Microstrip packaged Amplifiers can be offered.
5. Pay attention to heat dispersion.



C1=10uf~33uf
C2=1000pf~3300pf

Features

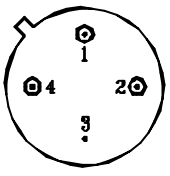
- **Broad Band:** 1.0~3.5GHz
- **Gain:** 20.0dB(Typ)
- **High Output Power:** 21.0dBm(Typ)
- **Input/Output Impedance:** 50W
- **Package:** TO-8A
- **Wide Operating Temperature：** -55℃~+85℃

Specifications (Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	GHz	1.0~3.5	0.8~3.5
Small Signal Gain	Gp	dB	17.0	20.0
Gain Flatness	ΔGp	dB	±1.5	±1.0
Noise Figure	Fn	dB	5.5	4.0
VSWR	VSWRi	——	2.0:1	1.8:1
Power Output @1dB compression	Po(1dB)	dBm	+20.0	+21.0
DC Current	I_{CC}	mA	——	145

Absolute Maximum Rating

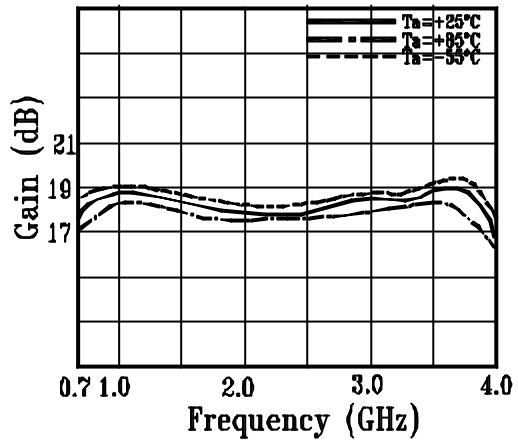
Maximum DC Voltage ----- +13VDC
Maximum Input Power ----- +13dBm
Storage Temperature -- +125℃



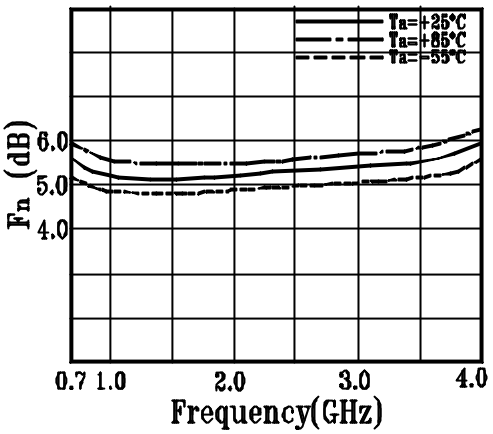
TO-8A

Typical Performance Curves

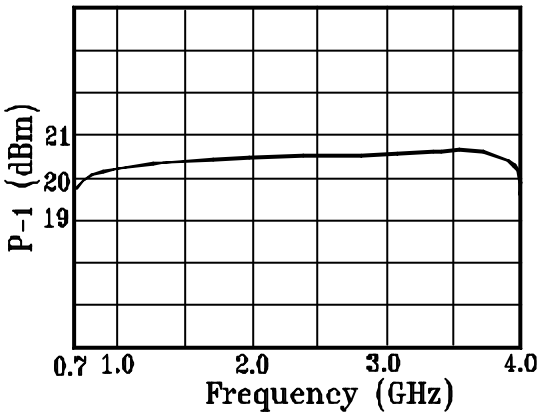
Gain vs. Frequency



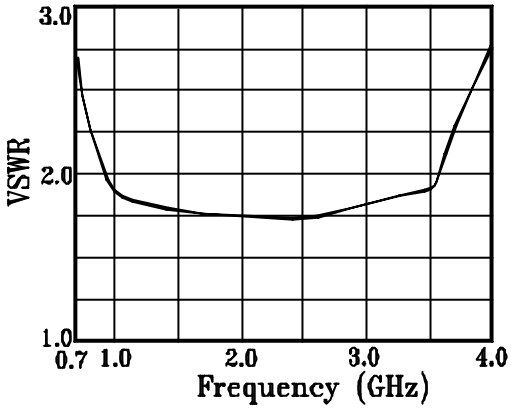
Noise vs. Frequency



Output Power vs. Frequency

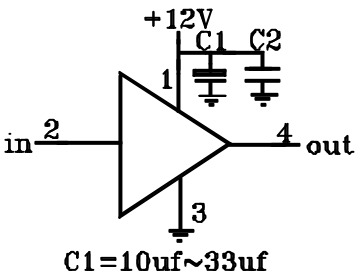


VSWR vs. Frequency



Note:

1. Typical application as shown right
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Pay attention to heat dispersion.



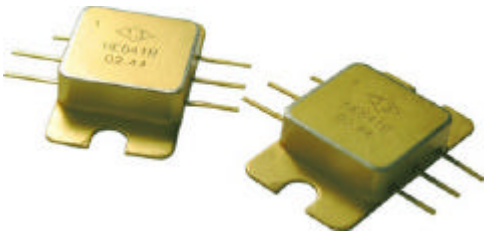
C1=10uf~33uf
C2=1000pf~3300pf

HE641B

Medium Power GaAs FET Amplifier

Features

- **Broad Band:** 1.0~3.5GHz
- **High Gain:** 26.0dB(Typ)
- **High Output Power:** 23.0dBm(Typ)
- **Input/Output Impedance:** 50W
- **Package:** Microstrip
- **Wide Operating Temperature：**
  -55℃~+85℃

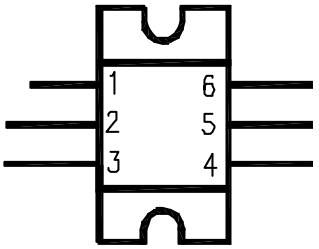


Specifications (Test at V_{CC} = +12V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_{L-H}	MHz	1000~3500	——
Small Signal Gain	Gp	dB	24.0	26.0
Gain Flatness	△Gp	dB	3.0	2.0
Saturation Power Output	P_o	dBm	23.0	——
Input VSWR	VSWR	——	2.0:1	1.8:1
Noise Figure	Fn	dB	6.0	5.0
DC Current	Icc	mA	——	145

Absolute Maximum Rating

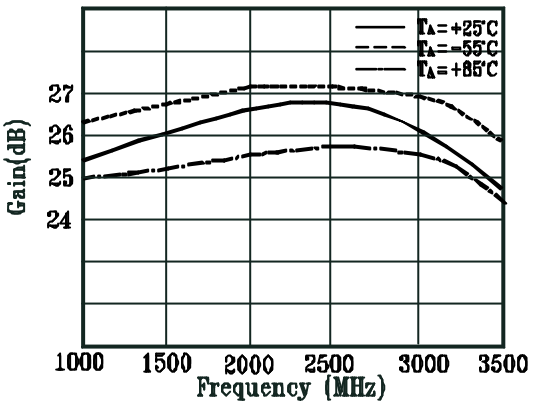
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power ----- +6dBm
Storage Temperature -- +125℃



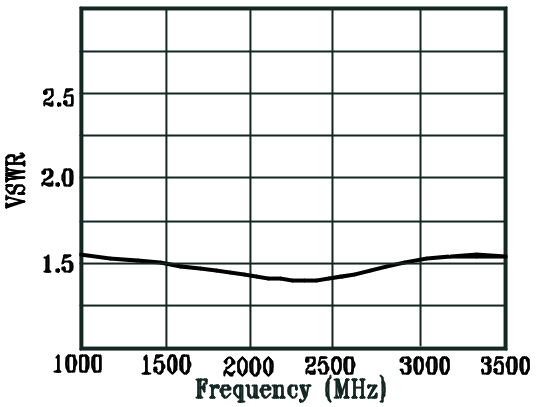
SP-3

Typical Performance Curves

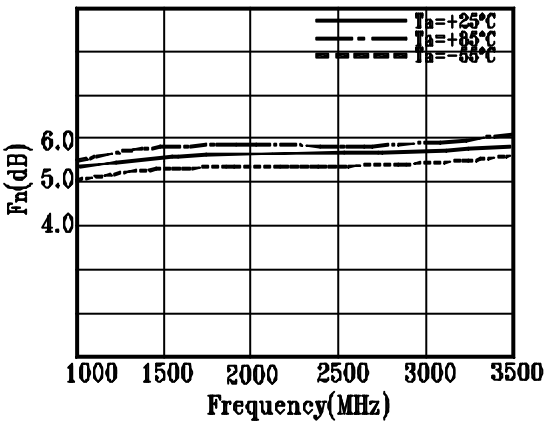
Gain vs. Frequency



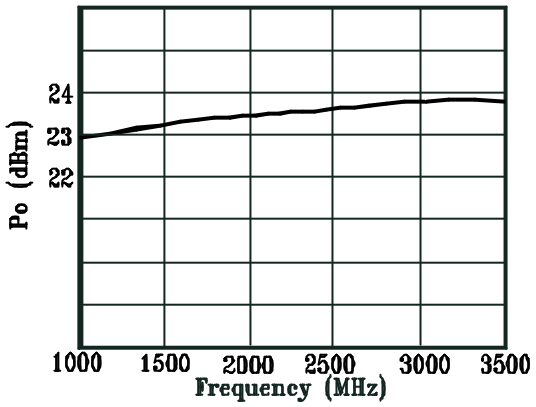
VSWR vs. Frequency



Noise vs. Frequency

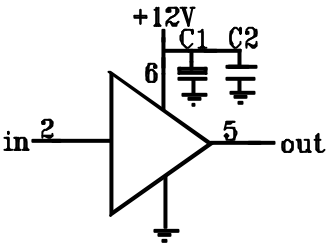


Output Power vs. Frequency



Note:

1. Typical application as shown right
2. Required the package bottom grounded tightly.
3. Anti-electrostatic measures should be adopted.
4. Pay attention to heat dispersion.



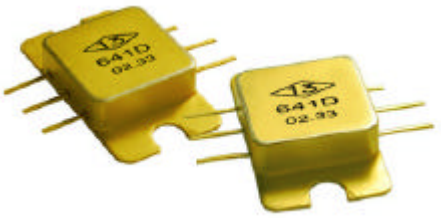
C1=10uf~33uf
C2=1000pf~3300pf

HE641D

Medium Power GaAs FET Amplifier

Features

- **Broad Band:** 0.5~2.5GHz
- **High Gain:** 28.0dB(Typ)
- **High Output Power:** 350mW(Typ)
- **Input/Output Impedance:** 50W
- **Package:** Microstrip
- **Wide Operating Temperature：**
  -55℃~+85℃

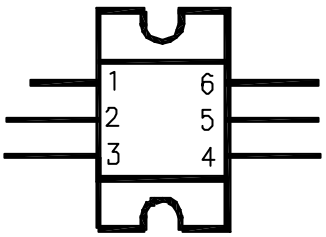


Specifications (Test at V_{CC} = +12V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_{L-H}	GHz	0.5 ~2.5	——
Small Signal Gain	Gp	dB	**27.0**	28.0
Gain Flatness	ΔGp	dB	**±1.0**	**±0.75**
Saturation Power Output	P_o	mW	300	350
VSWR (In/out)	VSWR	——	2.0:1	1.8:1
Noise Figure	Fn	dB	5.0	4.5
DC Current	Icc	mA	——	175

Absolute Maximum Rating

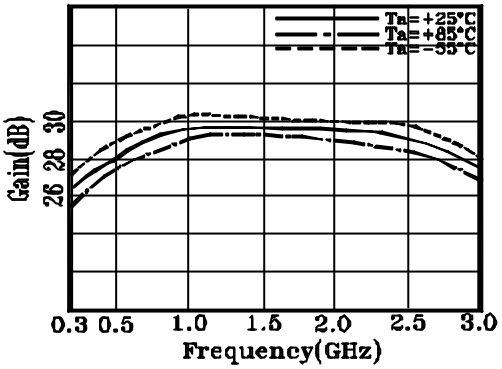
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power ----- +6dBm
Storage Temperature -- +125℃



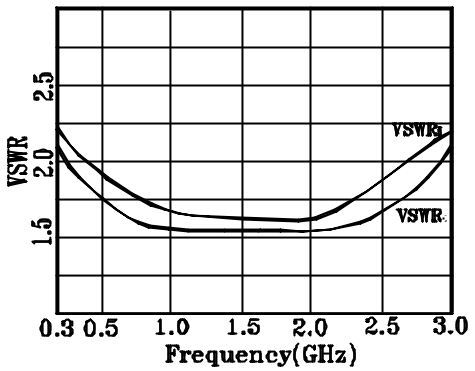
SP-3

Typical Performance Curves

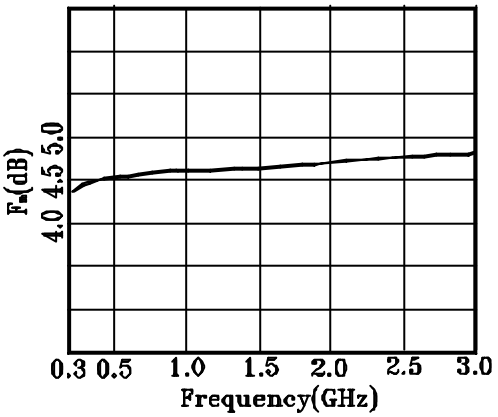
Gain vs. Frequency



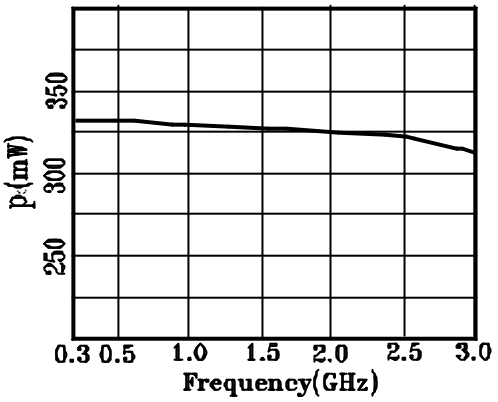
VSWR vs. Frequency



Noise vs. Frequency

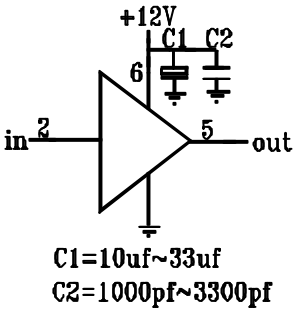


Output Power vs. Frequency



Note:

1. Typical application as shown right
2. Required the package bottom grounded tightly.
3. Anti-electrostatic measures should be adopted.
4. Pay attention to heat dispersion.



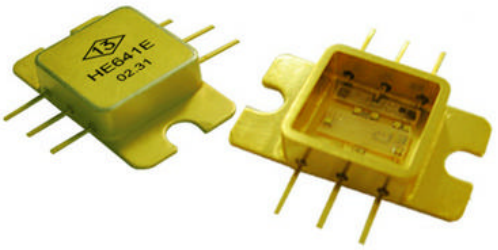
C1=10uf~33uf
C2=1000pf~3300pf

HE641E

Medium Power GaAs FET Amplifier

Features

- **Broad Band:** 1.0~3.5GHz
- **High Gain:** 27.0dB(Typ)
- **High Output Power:** 330mW(Typ)
- **Input/Output Impedance:** 50W
- **Package:** Microstrip
- **Wide Operating Temperature：**
  -55℃~+85℃

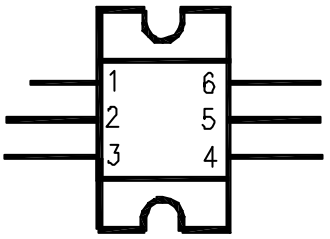


Specifications (Test at V_{CC} = +12V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_{L-H}	MHz	1000~3500	
Small Signal Gain	Gp	dB	**26.0**	27.0
Gain Flatness	ΔGp	dB	**±1.5**	**±1.0**
Saturation Power Output	P_o	mW	300	330
VSWR(In/out)	VSWR		2.5:1	2.0:1
Noise Figure	Fn	dB	5.5	5.0
DC Current	Icc	mA		175

Absolute Maximum Rating

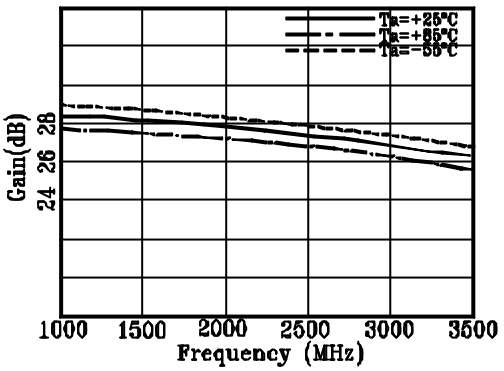
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power ----- +6dBm
Storage Temperature -- +125℃



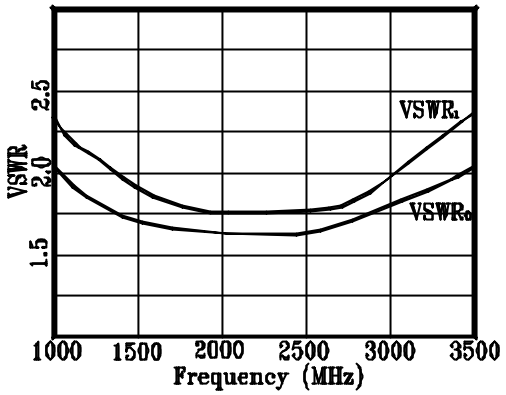
SP-3

Typical Performance Curves

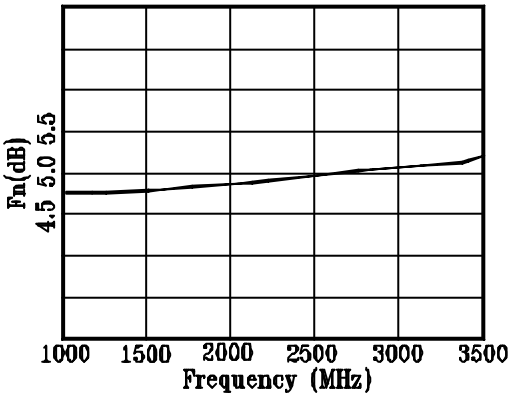
Gain vs. Frequency



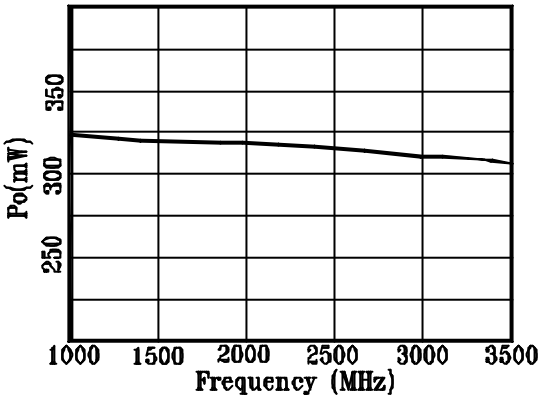
VSWR vs. Frequency



Noise vs. Frequency

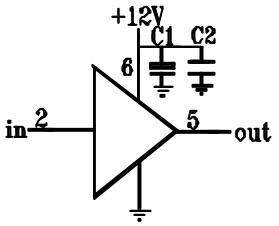


Output Power vs. Frequency



Note:

1. Typical application as shown right
2. Required the package bottom grounded tightly.
3. Anti-electrostatic measures should be adopted.
4. Pay attention to heat dispersion.



C1=10uf~33uf
C2=1000pf~3300pf

HE061

Medium Power GaAs FET Amplifier

Features

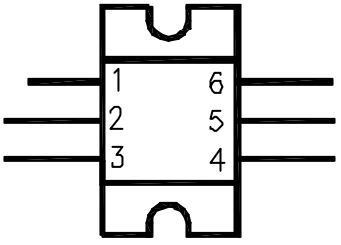
- **Frequency Band: 4.0~4.5GHz**
- **High Output Power: 350mW (Typ)**
- **Input/Output Impedance: 50**Ω
- **Package: Microstrip**
- **Wide Operating Temperature:**
  -55℃~+85℃

Specifications (Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_{L-H}	GHz	4.1~4.4	4.0~4.5
Power Gain	Gp	dB	**18.0**	19.0
Gain Flatness	ΔGp	dB	**±0.5**	——
Saturation Output Power	P_o	mW	300	350
Input VSWR	VSWR	——	2.0:1	——
Noise Figure	Fn	dB	4.0	3.5
DC Current	Icc	mA	——	185

Absolute Maximum Rating

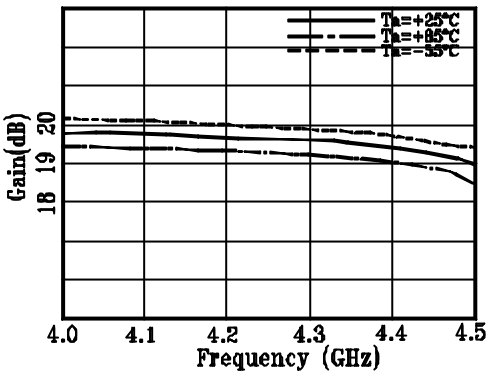
Maximum DC Voltage ----- +13.5V
Maximum Input Power ----- +13dBm
Storage Temperature ----- +125℃



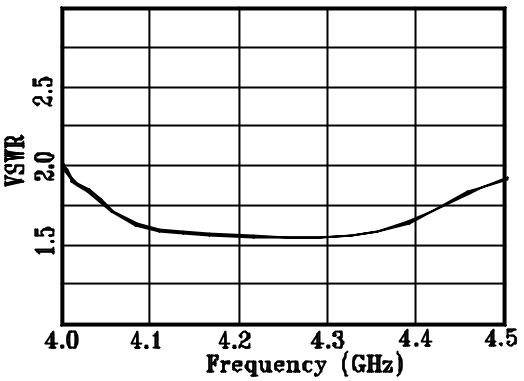
SP-3

Typical Performance Curves

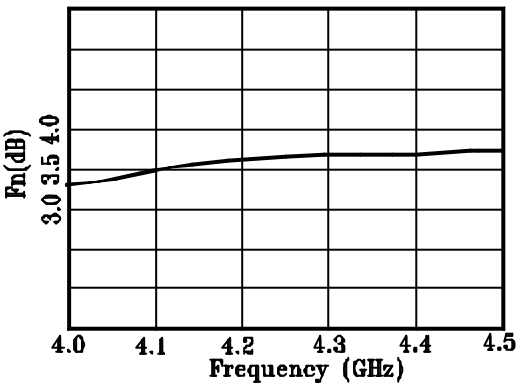
Gain vs. Frequency



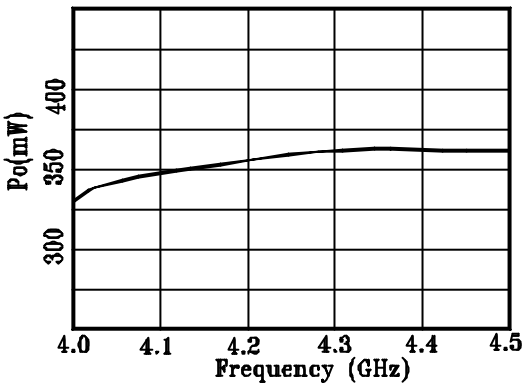
VSWR vs. Frequency



Noise vs. Frequency

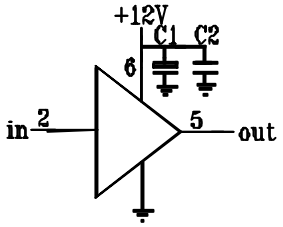


Output Power vs. Frequency



Note:

1. Typical application as shown right C_1=10~33μf;C_2=1000~~3300pf;
2. Required the package bottom grounded tightly.
3. Anti-electrostatic measures should be adopted.
4. Pay attention to heat dispersion.



Features

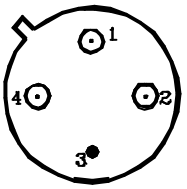
- **Broad Band:** **3~4GHz**
- **High Output Power:** **22.0dBm (Typ)**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8A**
- **Wide Operating Temperature：-55℃~+85℃**

Specifications (Test at V_{CC} = +5V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_{L-H}	MHz	3000~4000	——
Power Gain	Gp	dB	**18.0**	20.0
Gain Flatness	△Gp	dB	**3.0**	2.0
Saturation Output Power	P_o	dBm	20	22
VSWR	VSWR	——	2.0:1	——
Noise Figure	Fn	dB	4.0	3.5
DC Current	Icc	mA	——	120

Absolute Maximum Rating

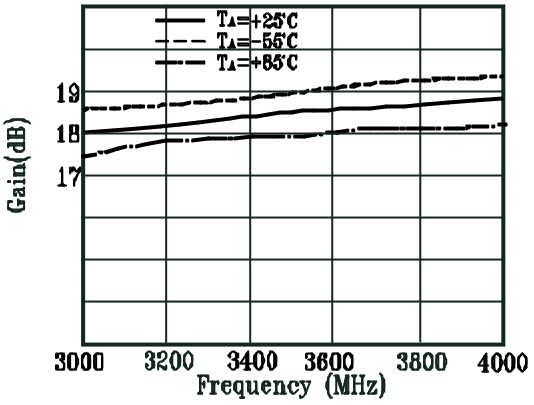
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power ----- +13dBm
Storage Temperature -- +125℃



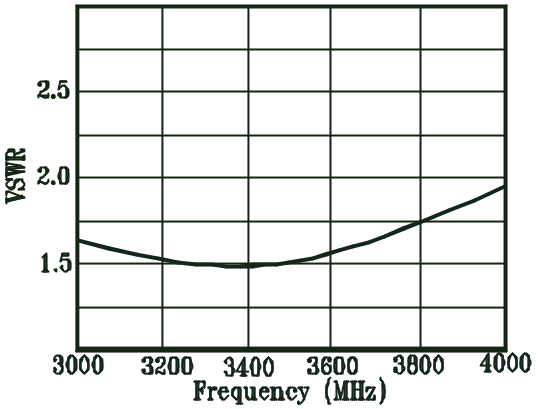
TO-8A

Typical Performance Curves

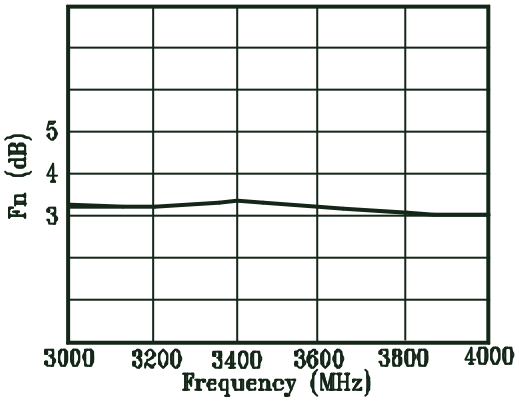
Gain vs. Frequency



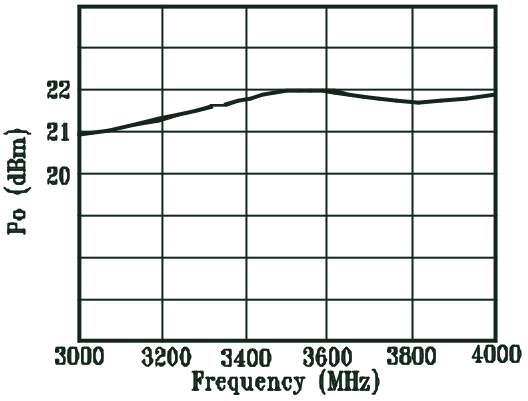
VSWR vs. Frequency



Noise vs. Frequency

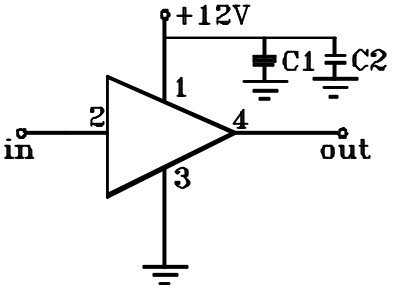


Output Power vs. Frequency



Note:

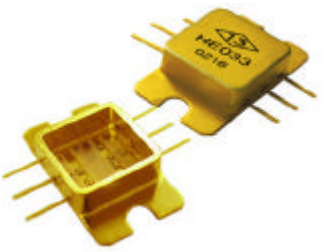
1. Typical application as shown right
   C_1=10~33μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Microstrip packaged Amplifiers can be offered.



C1=10μf~~33μf C2=1000~~3300pf

Features

- **Broad Band:** **3.0~4.2GHz**
- **High Output Power:** **23.0dBm (Typ)**
- **Input/Output Impedance: 50**W
- **Package:** **Microstrip**
- **Wide Operating Temperature：-55℃~+85℃**

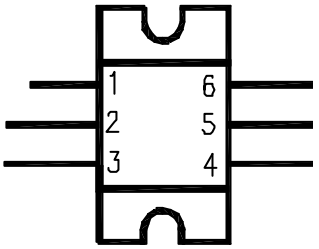


Specifications (Test at V_{CC} = +12V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_{L-H}	MHz	3000~4200	——
Power Gain	Gp	dB	18.0	22.0
Gain Flatness	△Gp	dB	2.0	1.6
Saturation Output Power	P_o	dBm	22	23
VSWR	VSWR	——	2.0:1	1.8:1
Noise Figure	Fn	dB	7.0	5.0
DC Current	Icc	mA	——	175

Absolute Maximum Rating

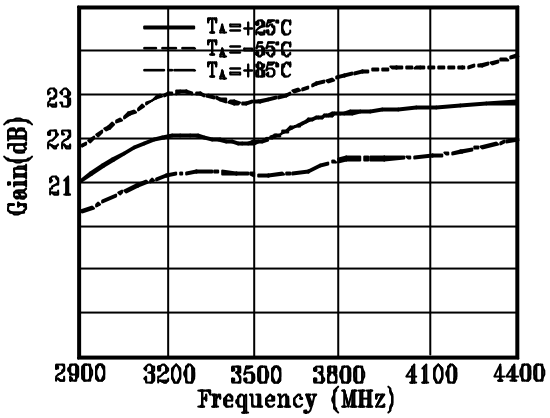
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power ----- +13dBm
Storage Temperature -- +125℃



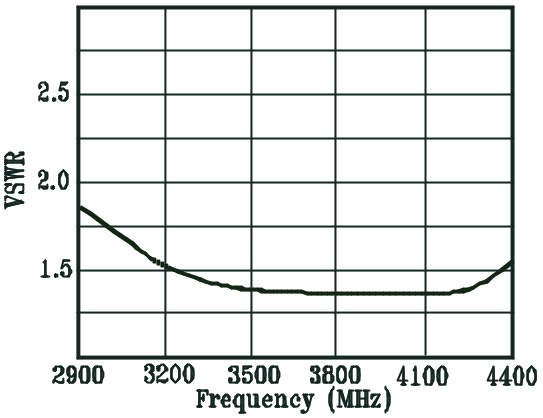
SP-3

Typical Performance Curves

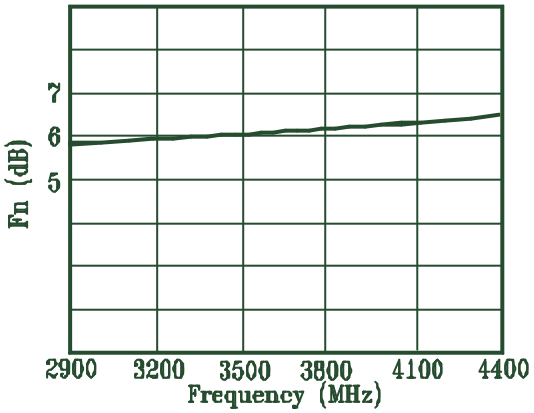
Gain vs. Frequency



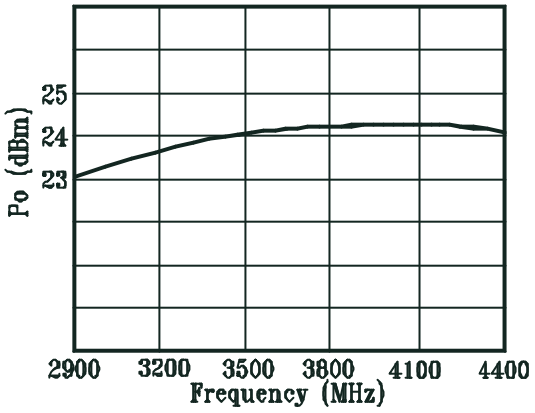
VSWR vs. Frequency



Noise vs. Frequency

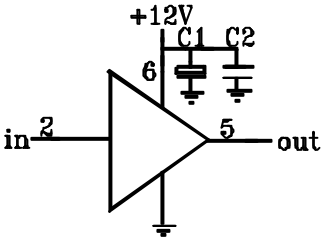


Output Power vs. Frequency



Note:

1. Typical application as shown right C_1=10~33μf;C_2=1000~~3300pf;
2. Required the package bottom grounded tightly.
3. Anti-electrostatic measures should be adopted.
4. Pay attention to heat dispersion.



C1=10uf~33uf
C2=1000pf~3300pf

Features

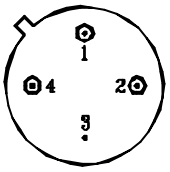
- **Broad Band:** 5.2~5.8GHz
- **High Gain:** 18.0dB(Typ)
- **High Output Power:** 21.0dBm(Typ)
- **Input/Output Impedance:** 50W
- **Package:** TO-8D
- **Wide Operating Temperature：** -55℃~+85℃

Specifications (Test at V_{CC} = +12V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	GHz	5.2~5.8	——
Small Signal Gain	Gp	dB	16.0	18.0
Gain Flatness	ΔGp	dB	±0.75	±0.5
Noise Figure	Fn	dB	6.0	5.0
Input VSWR	VSWRi	——	2.0:1	1.8:1
Output VSWR	VSWRo	——	2.0:1	1.5:1
Saturation Power Output	Po	dBm	20.0	21.0
DC Current	I_{CC}	mA	——	150

Absolute Maximum Rating

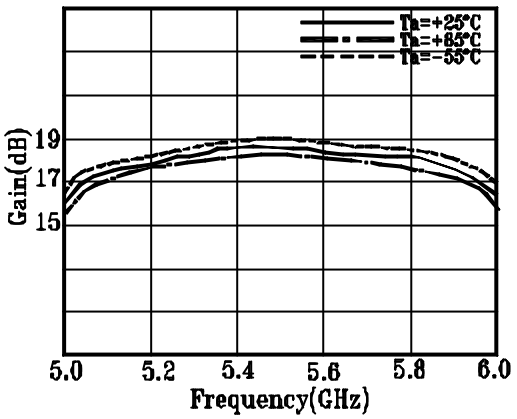
Maximum DC Voltage ----- +13.5VDC
Maximum Input Power ----- +13dBm
Storage Temperature -- +125℃



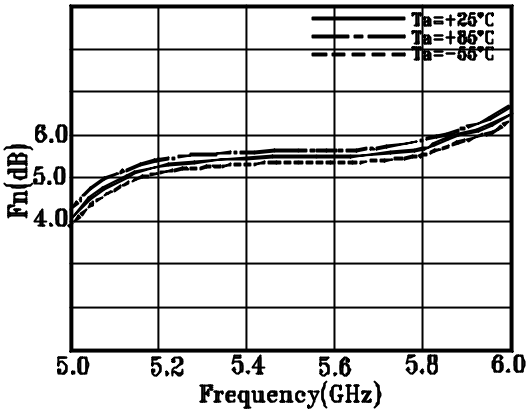
TO-8D

Typical Performance Curves

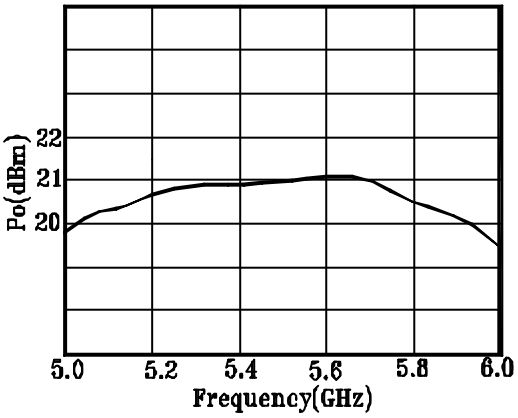
Gain vs. Frequency



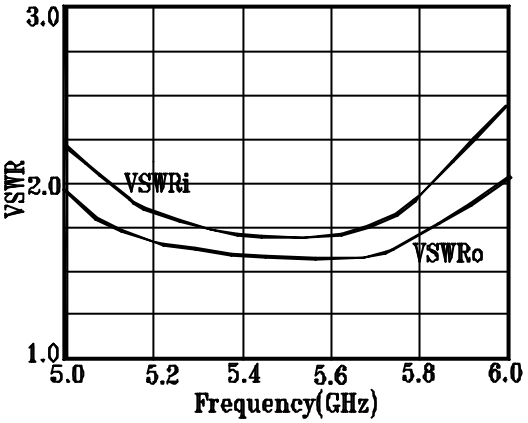
Noise vs. Frequency



Output Power vs. Frequency

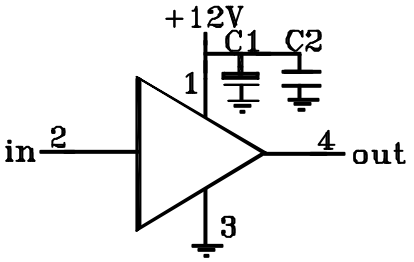


VSWR vs. Frequency



Note:

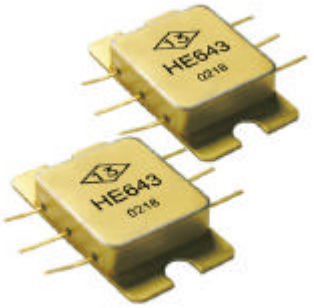
1. Typical application as shown right
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Pay attention to heat dispersion.



C1=10uf~33uf
C2=1000pf~3300pf

Features

- **Broad Band:** 0.5~3.0GHz
- **High Gain:** 30.0dB(Typ)
- **High Output Power:** 550mW(Typ)
- **Input/Output Impedance:** 50W
- **Package:** Microstrip
- **Wide Operating Temperature：**
  -55℃~+85℃

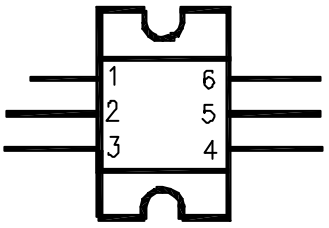


Specifications (Test at V_{CC} = +12V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_{L-H}	GHz	0.5~3.0	——
Small Signal Gain	Gp	dB	29.0	30.0
Gain Flatness	△Gp	dB	±1.5	——
Saturation Power Output	P_o	mW	500	550
VSWR	VSWR	——	2.5:1	2.0:1
Noise Figure	Fn	dB	5.5	——
DC Current	Icc	mA	——	250

Absolute Maximum Range

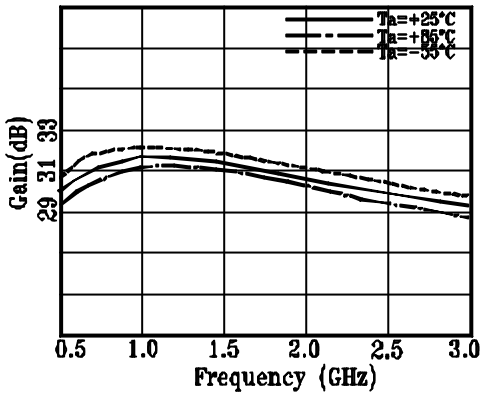
Maximum DC Voltage ----- 13.5VDC
Maximum Input Power ----- +13dBm
Storage Temperature ----- +125℃



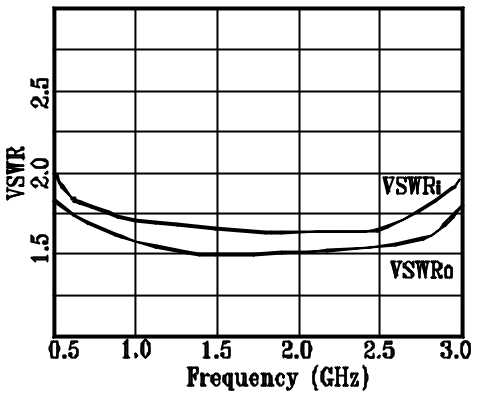
SP-3

Typical Performance Curves

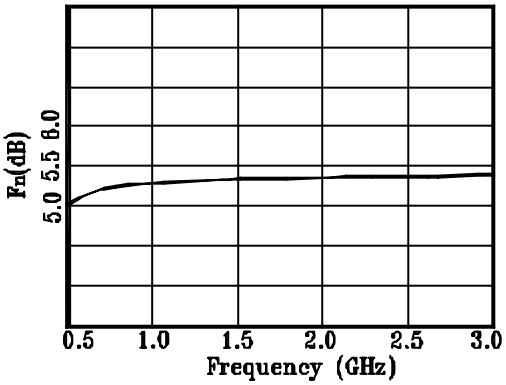
Gain vs. Frequency



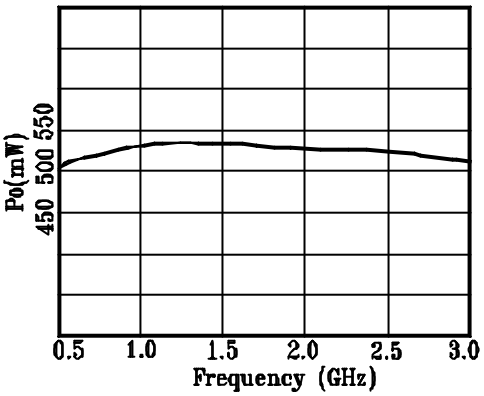
VSWR vs. Frequency



Noise vs. Frequency

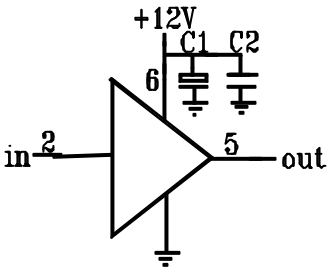


Output Power vs. Frequency



Note:

1. Typical application as shown right
2. Required the package bottom grounded tightly.
3. Anti-electrostatic measures should be adopted.
4. Pay attention to heat dispersion.



C1=10uf~33uf
C2=1000pf~3300pf

HE072

IF limiting Amplifier

Features

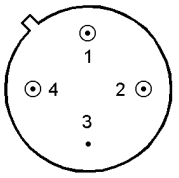
- **Frequency Range：** **10~300MHz**
- **Gain：** **10.0dB（Typ）**
- **Output Limiting Level: 0dBm(Typ)**
- **Input/Output Impedance:50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	10~300	10~300
Small Signal Gain	Gp	dB	9.0	11
Noise Figure	Fn	dB	7.5	6
Input VSWR	VSWRi	——	2.0:1	1.4
Output VSWR	VSWRo	——	2.0:1	1.3
Output Limiting Level	Po	dBm	-2	0
Even Order Harmonic Suppression		dBc	20	25
DC Current	I_{cc}	mA	25	20

Absolute Maximum Rating

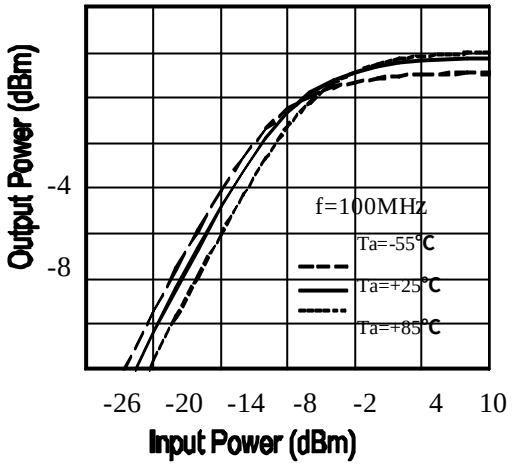
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +13dBm
Storage Temperature -- +125℃



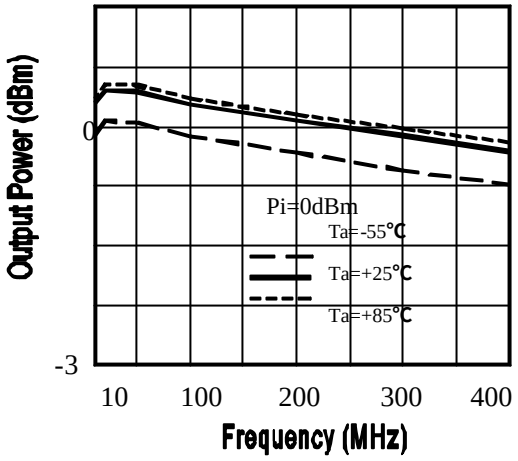
TO-8C

Typical Performance Curves

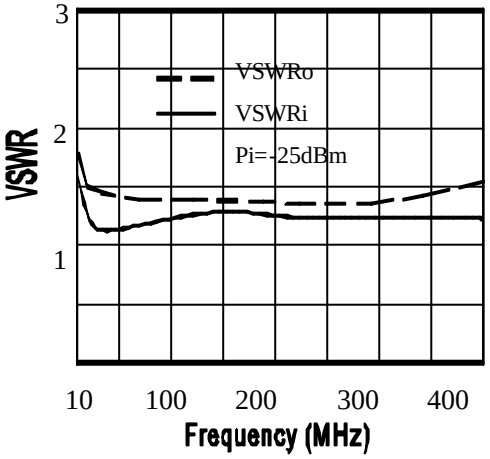
Power Output vs. Input Power



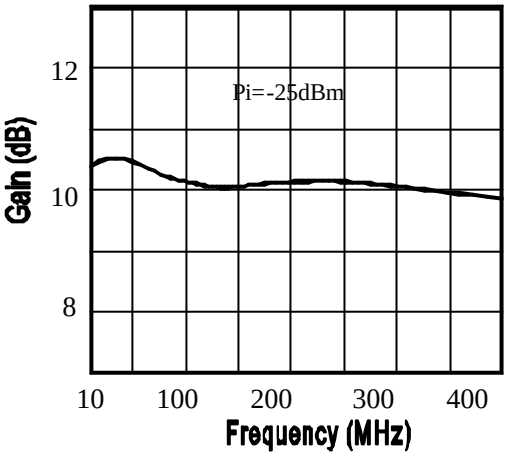
Power Output vs.Frequency



VSWR vs. Frequency

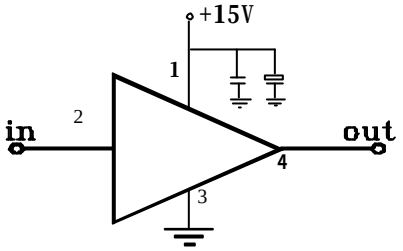


Gain vs. Frequency



Note:

1. Typical application as shown right, DC supply decoupling filtering should be used, C_1=10μf;C_2=10000pf；
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Interchanged directly with UTL-503 from American HP Company.



Features

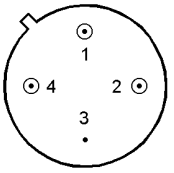
- **Frequency Range：** **2~100MHz**
- **Gain：** **13.0dB（Typ）**
- **Output Limiting Level: 0dBm(Typ)**
- **Input/Output Impedance:50**W
- **Package:** **TO-8C**
- **Wide Operating Temperature：-55℃~+85℃**

Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	2~100	2~100
Small Signal Gain	Gp	dB	12	13
Noise Figure	Fn	dB	6	5
Input VSWR	VSWRi	——	2.0:1	1.5（≥3MHz）
Output VSWR	VSWRo	——	2.0:1	1.5（≥3MHz）
Output Limiting Level	Po	dBm	-1	0
Even Order Harmonic Suppression		dBc	25	30
DC Current	I_{CC}	mA	28	25

Absolute Maximum Rating

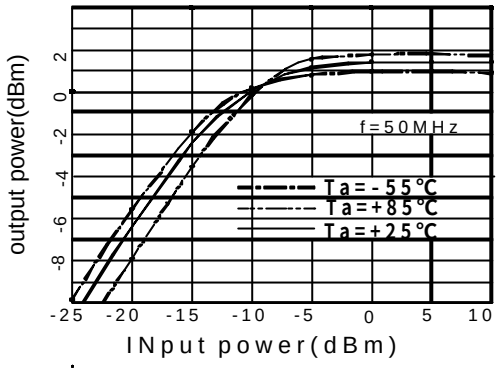
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +15dBm
Storage Temperature -- +125℃



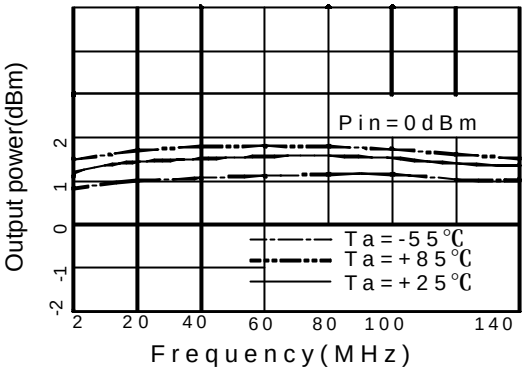
To-8C

Typical Performance Curves

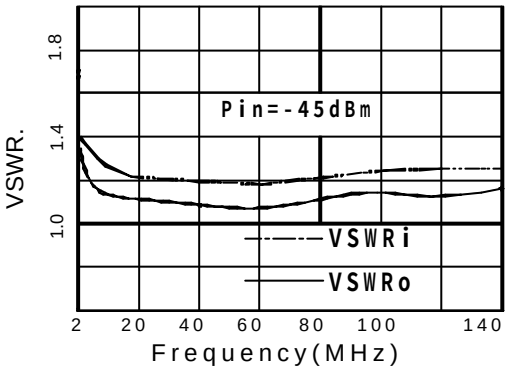
Power Output vs. Input Power



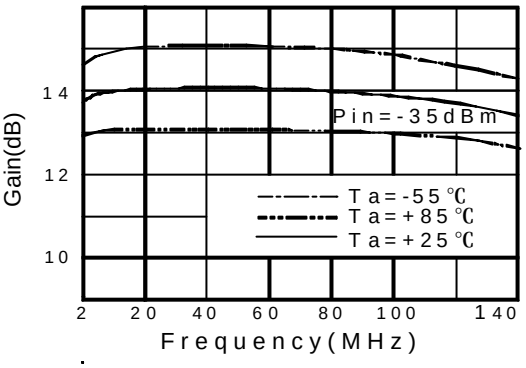
Power Output vs. Frequency



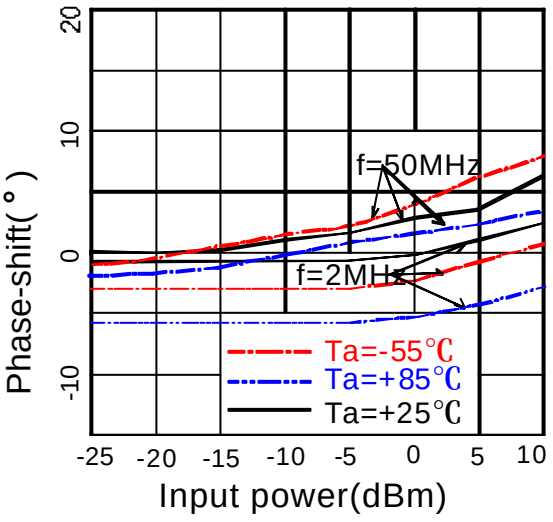
VSWR vs. Frequency



Gain vs. Frequency

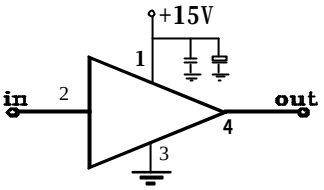


Phase-shift vs. Input Power



Note:

1. Typical application as shown underside, DC supply decoupling filtering should be used, C_1=10μf;C_2=10000pf；
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Interchanged directly with UTL-503 from American HP Company.



HE073

IF limiting Amplifier

Features

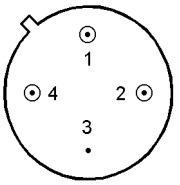
- **Frequency Range：** **10~100MHz**
- **Gain：** **21.0dB（Typ）**
- **Output Limiting Level: 0dBm(Typ)**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8D**
- **Wide Operating Temperature：-55℃~+85℃**

Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	10~300	10~300
Small Signal Gain	Gp	dB	20	21
Noise Figure	Fn	dB	8.0	6.5
Input VSWR	VSWRi	——	2.0:1	1.4
Output VSWR	VSWRo	——	2.0:1	1.3
Output Limiting Level	Po	dBm	-2	
Even Order Harmonic Suppression		dBc	25	30
DC Current	I_{CC}	mA	50	45

Absolute Maximum Rating

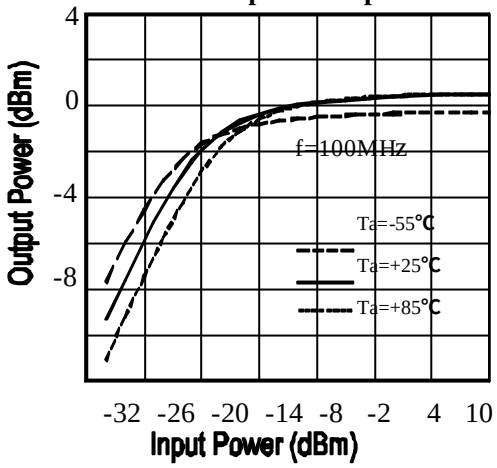
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +15dBm
Storage Temperature -- +125℃



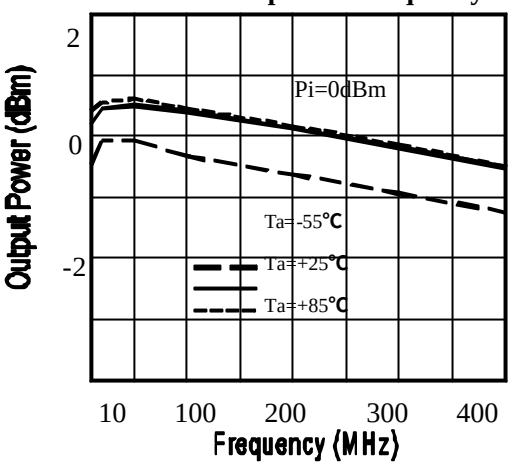
TO-8D

Typical Performance Curves

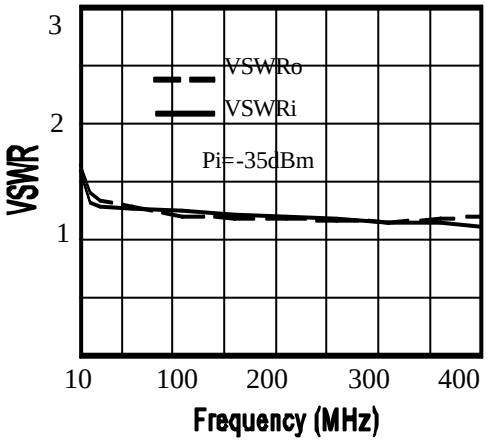
Power Output vs. Input Power



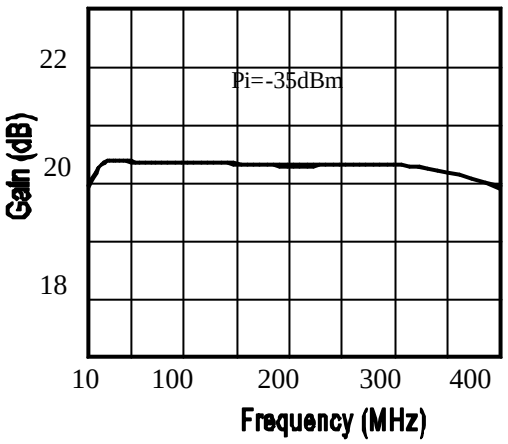
Power Output vs. Frequency



VSWR vs. Frequency

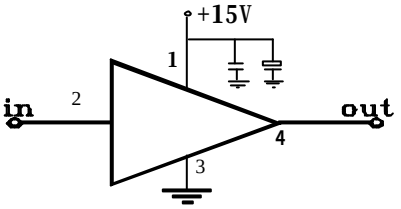


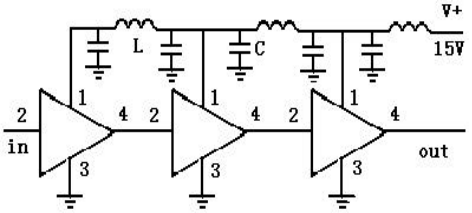
Gain vs. Frequency



Note:

1. Typical application as DC supply decoupling filtering should be used, C_1=10μf;C_2=10000pf ;
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. HE073 can be cascaded as shown right, gain is above 60dB. L:10uH C:10000PF





HE073A

IF limiting Amplifier

Features

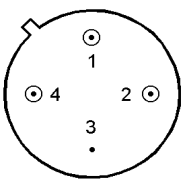
- **Frequency Range：** **200~500MHz**
- **Gain：** **20.0dB（Typ）**
- **Output Limiting Level: 0dBm(Typ)**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8D**
- **Wide Operating Temperature：-55℃~+85℃**

Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	200~500	200~500
Small Signal Gain	Gp	dB	18(Min)	20
Noise Figure	Fn	dB	7.0	6.0
Input VSWR	VSWRi	——	2.0:1(Max)	1.5
Output VSWR	VSWRo	——	2.0:1(Max)	1.5
Output Limiting Level	Po	dBm	-2(Min)	0
Even Order Harmonic Suppression		dBc	15	20
DC Current	I_{CC}	mA	45	40

Absolute Maximum Rating

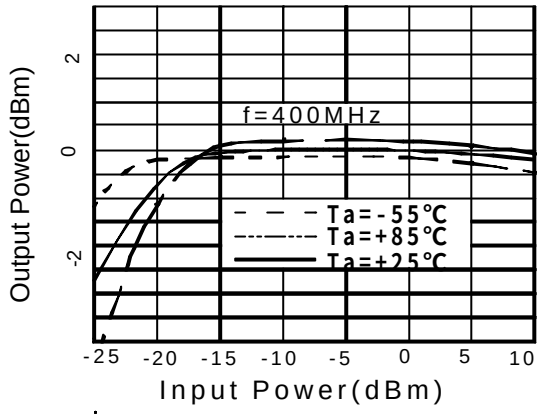
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +13dBm
Storage Temperature -- +125℃



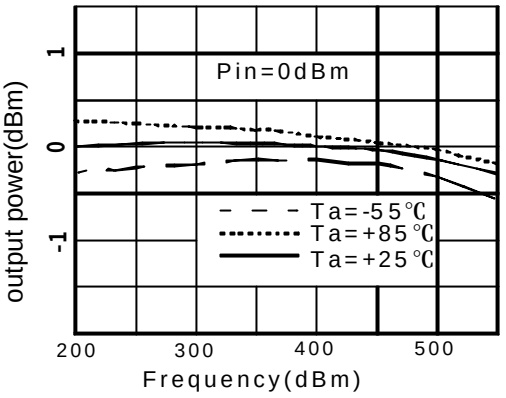
To-8D

Typical Performance Curves

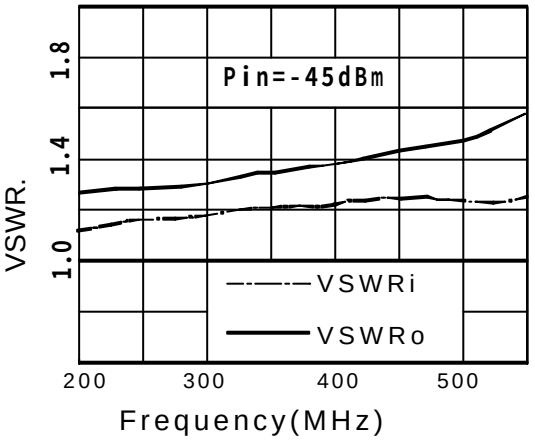
Power Output vs. Input Power



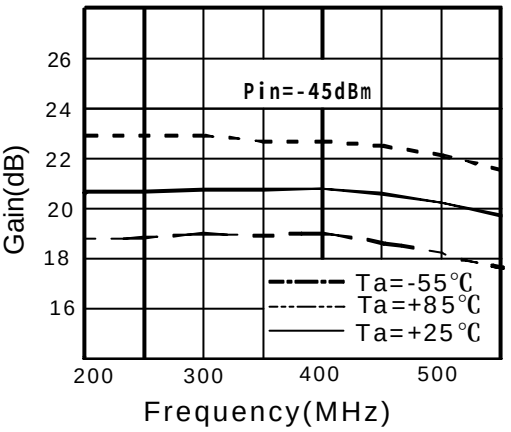
Power Output vs. Frequency



VSWR vs. Frequency

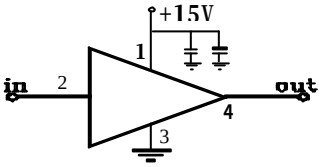


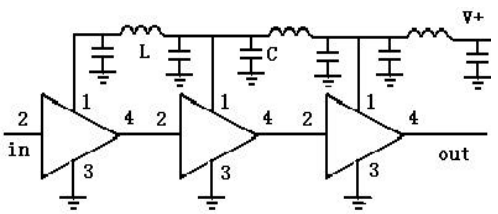
Gain vs. Frequency



Note:

1. Typical application as shown right, DC supply decoupling filtering should be used, C_1=10μf;C_2=10000pf；
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. HE073A can be cascaded as shown right, gain is above 60dB. L:10uH C:10000PF





HE073B

IF limiting Amplifier

Features

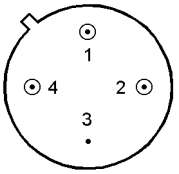
- **Frequency Range：** **2~100MHz**
- **Gain：** **26.0dB（Typ）**
- **Output Limiting Level:** **0dBm(Typ)**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8D**
- **Wide Operating Temperature ：-55℃~+85℃**

Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	2~100	2~100
Small Signal Gain	Gp	dB	25	26
Noise Figure	Fn	dB	7.0	6.0
Input VSWR	VSWRi	——	2.0:1(Max)	1.3（≥3MHz）
Output VSWR	VSWRo	——	2.0:1(Max)	1.3（≥3MHz）
Output Limiting Level	Po	dBm	-1(Min)	0
Even Order Harmonic Suppression		dBc	25(Min)	30
DC Current	I_{CC}	mA	50	45

Absolute Maximum Rating

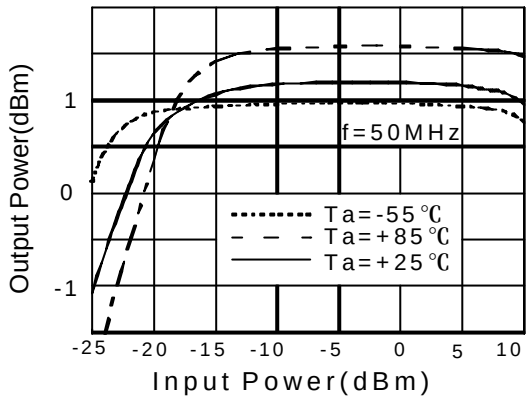
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +13dBm
Storage Temperature -- +125℃



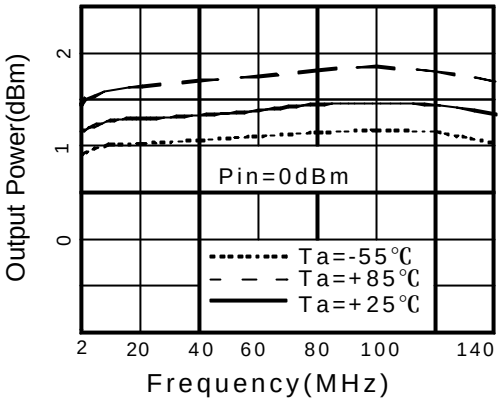
To-8D

Typical Performance Curves

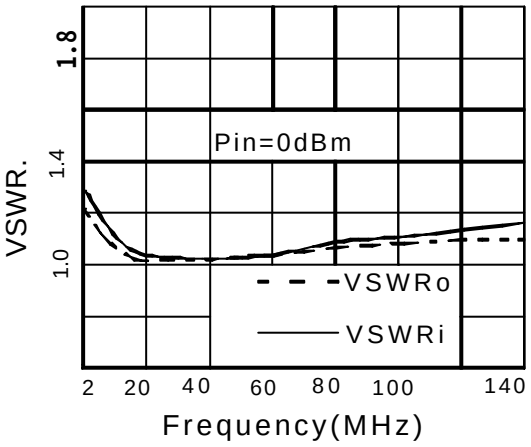
Power Output vs. Input Power



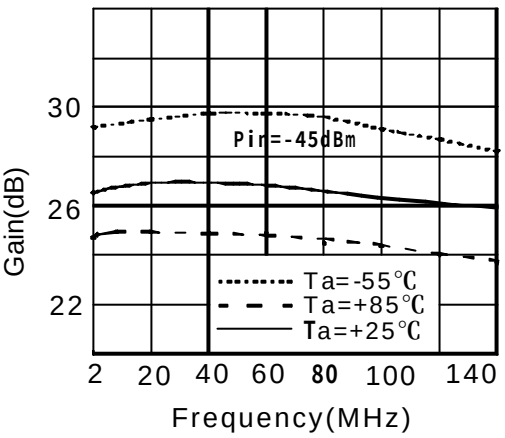
Power Output vs. Frequency



VSWR vs. Frequency

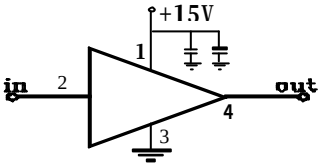


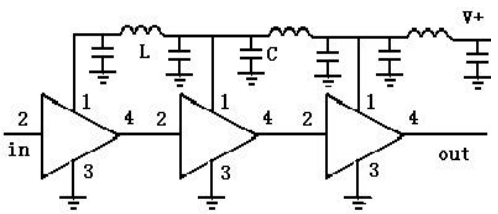
Gain vs. Frequency



Note:

1. Typical application as shown right, DC supply decoupling filtering should be used, C_1=10μf;C_2=10000pf；
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. HE073B can be cascaded as shown right, gain is above 60dB. L:10uH C:10000PF





Features

- **Frequency Range：** **10~500MHz**
- **Lower Gain：** **12dB（Typ）**
- **High Reverse Isolation：60dB（Typ）**
- **Input/Output Impedance: 50**Ω
- **Package:** **TO-8A**
- **Wide Operating Temperature：-55℃~+85℃**

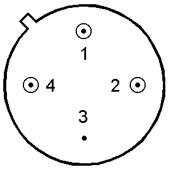
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	
Frequency Range	f_L~f_H	MHz	10~200	10~200	10~500
Small Signal Gain	Gp	dB	10.0	12.0	11.0
Gain Flatness	ΔGp	dB	±0.5	±0.3	±0.75
Reverse Isolation	Iso	dB	50	60*	40
Noise Figure	Fn	dB	5.0	4.5	5.0
Input VSWR	VSWRi	——	2.0:1	1.5:1	
Output VSWR	VSWRo	——	2.0:1	1.5:1	
Power Output @1dB Compression	P_{-1}	dBm	13.0	13.0	11.0
DC Current	I_{cc}	mA	——	35	

Note: The Gp and P_{-1} will be reduced 0.3dB and 2dBm respectively under operating at 12VDC (Icc= 28mA TYP). *f =100MHz

Absolute Maximum Rating

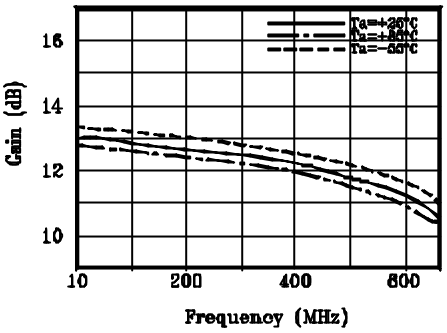
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature -- +125℃



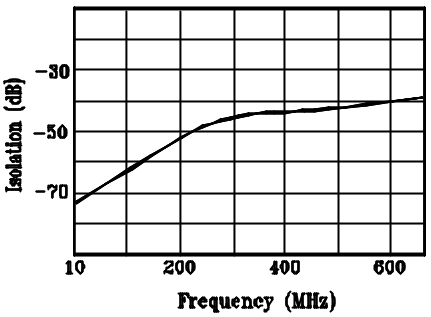
TO-8A

Typical Performance Curves

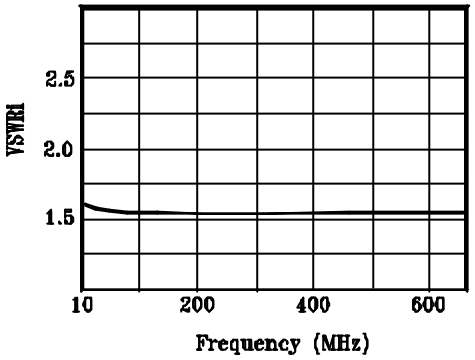
Gain vs. Frequency



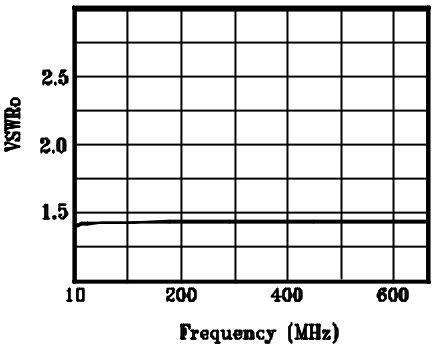
Isolation vs. Frequency



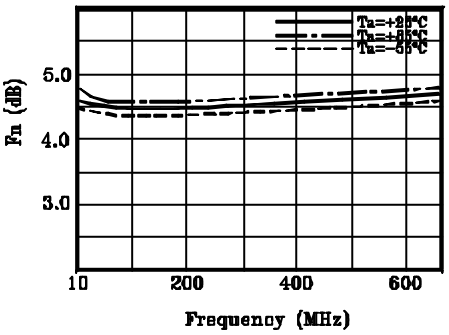
Input VSWR vs. Frequency



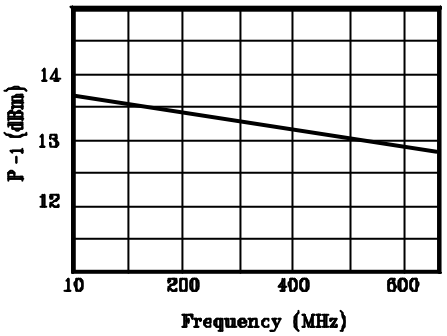
Output VSWR vs. Frequency



Noise vs. Frequency

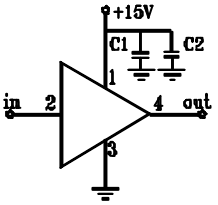


Output Power vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with UTO-573 from American HP.



Features

- **Frequency Range：** **10~1000MHz**
- **Lower Gain：** **8.5dB**
- **High Reverse Isolation：35dB（Typ）**
- **Input/Output Impedance: 50**Ω
- **Package:** **TO-8A**
- **Wide Operating Temperature：-55℃~+85℃**

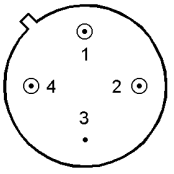
Specifications (Test at V_{CC} = +15V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	10~1000	——
Small Signal Gain	Gp	dB	8.5	9.0
Gain Flatness	ΔGp	dB	±1.0	±0.5
Reverse Isolation	Iso	dB	30	35
Noise Figure	Fn	dB	6.0	5.5
Input VSWR	VSWRi	——	2.5:1	2.0:1
Output VSWR	VSWRo	——	2.0:1	——
Power Output @1dB Compression	P_{-1}	dBm	10.0	——
DC Current	I_{cc}	mA	——	35

Note: The Gp and P_{-1} will be reduced 0.3dBand 2dBm respectively under operating at 12VDC (Icc= 28mA TYP).

Absolute Maximum Rating

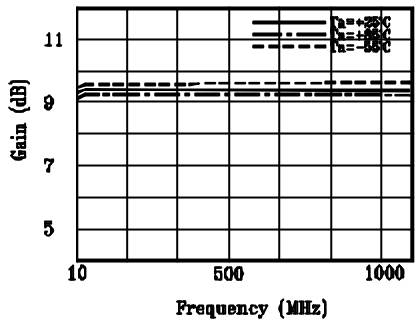
Maximum DC Voltage ----- +18VDC
Maximum Input Power ----- +10dBm
Storage Temperature -- +125℃



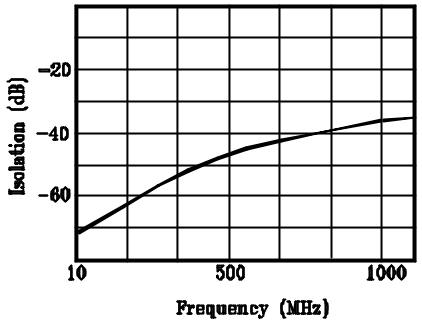
TO-8A

Typical Performance Curves

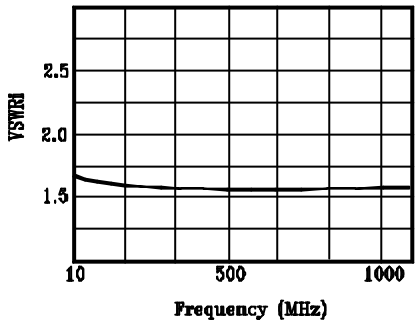
Gain vs. Frequency



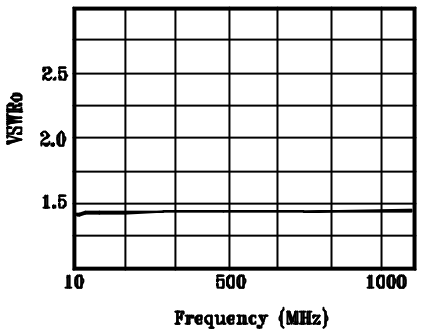
Isolation vs. Frequency



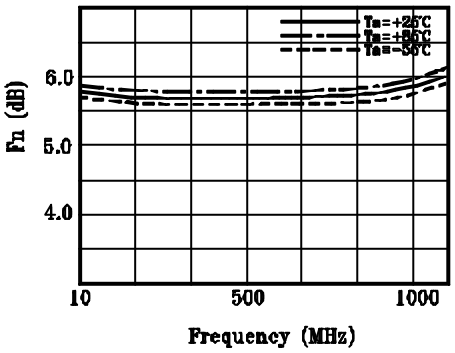
Input VSWR vs. Frequency



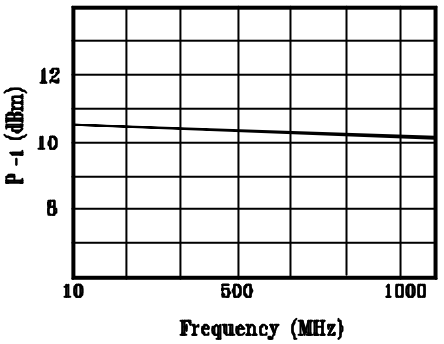
Output VSWR vs. Frequency



Noise vs. Frequency

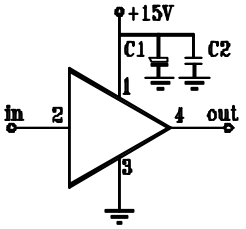


Output Power vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~3300pf;
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
3. Interchanged directly with UTO1076 from American HP.



Features

- **Frequency Range：** **20~500MHz**
- **Max Input Linear Power: +5dBm**
- **VGC Range:** **35dB(f<200MHz)**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8G**
- **Wide Operating Temperature：-55℃~+85℃**

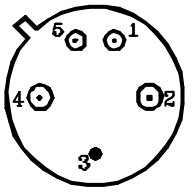
Specifications (Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~500	——
Small Signal Gain	Gp※	dB	17.0	17.5
Gain Flatness	ΔGp	dB	±1.0	±0.5
Noise Figure	Fn※	dB	5.0	4.0
VSWR	VSWR	——	2.5:1	2:1
VGC Range	Att	dB	30	——
Power Output @1dB Compression	Po(1dB)	dBm	7.0	9.0
DC Current	I_{cc}	mA	——	35
VGC Tuning Voltage	V_T	V	——	0-12

Note:※Gp、Fn tested at V_T=12V

Absolute Maximum Rating

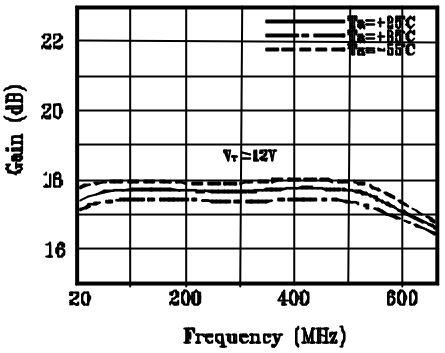
Maximum DC Voltage ----- +15VDC
Maximum Input Power ----- +10dBm
Storage Temperature -- +125℃



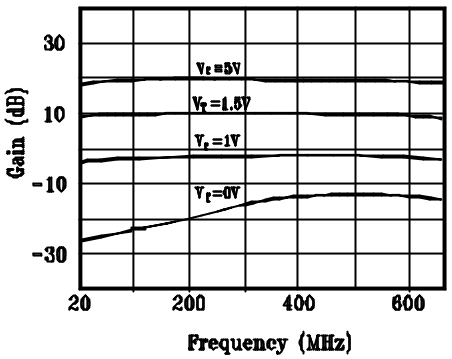
TO-8G

Typical Performance Curves

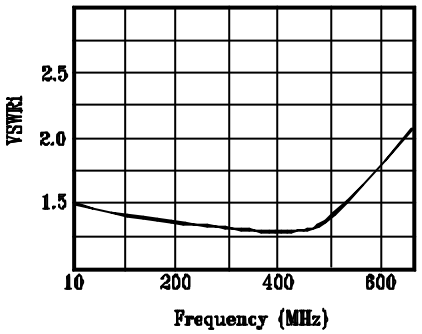
Gain vs. Frequency



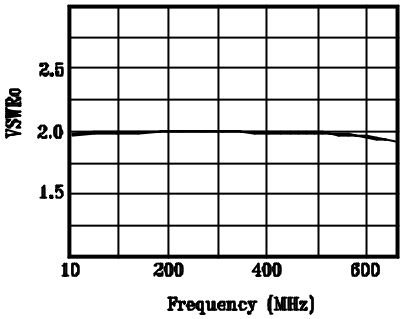
Gain vs. V_T



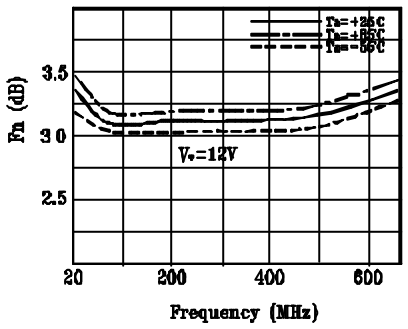
Input VSWR vs. Frequency



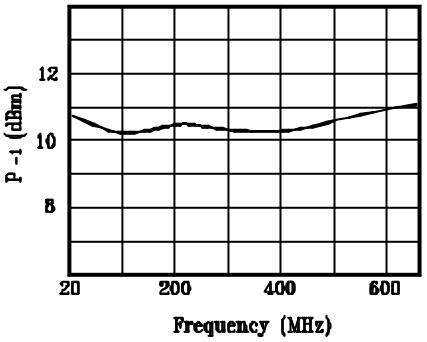
Output VSWR vs. Frequency



Noise vs. Frequency

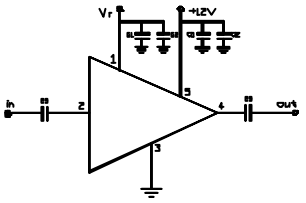


Power Output vs. Frequency



Note:

1. Typical application as shown right
   C_1=22~47μf;C_2=1000~3300pf,C_3=1000pf;
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).



Features

- **Frequency Range：** **20~200MHz**
- **High Gain:** **31dB(Typ)**
- **VGC Range:** **50dB(f<200MHz)**
- **Input/Output Impedance: 50**W
- **Package:** **TO-8H**
- **Wide Operating Temperature：-55℃~+85℃**

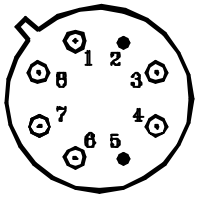
Specifications (Test at V_{CC} = +12V，T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	f_L~f_H	MHz	20~200	——
Small Signal Gain	Gp※	dB	30.0	31.0
Gain Flatness	ΔGp	dB	±0.5	±0.3
Noise Figure	Fn※	dB	5.0	4.5
Input VSWR	VSWRi	——	2:1	1.4:1
Output VSWR	VSWRo	——	2:1	1.6:1
Power Output @1dB Compression	P_{-1}	dBm	6.0	8
VGC Range	Att	dB	50	——
DC Current	V_T	V	——	0-12
VGC Tuning Voltage	I_{cc}	mA	——	50

Note:※Gp、Fn tested at V_T=12V

Absolute Maximum Rating

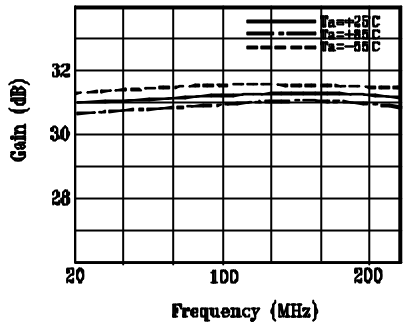
Maximum DC Voltage ----- +15VDC
Maximum Input Power ----- +10dBm
Storage Temperature -- +125℃



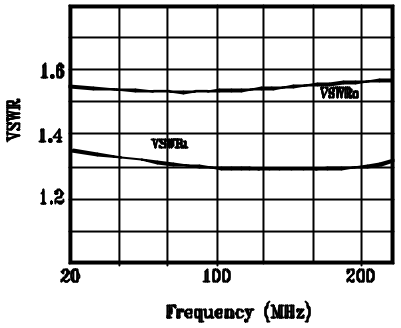
TO-8H

Typical Performance Curves

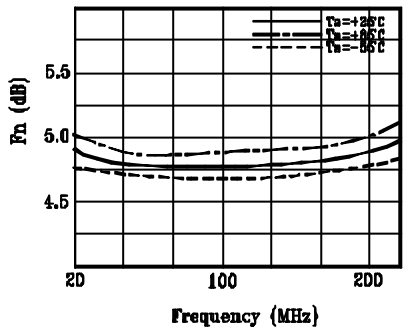
Gain vs. Frequency



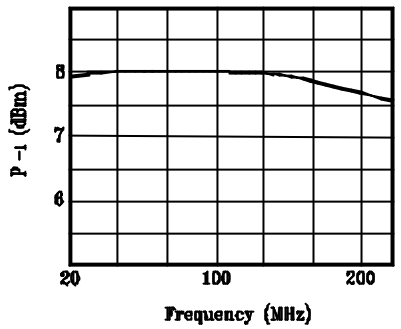
VSWR vs. Frequency



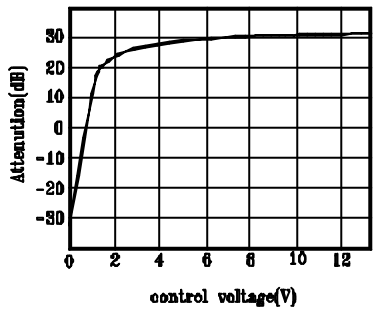
Noise vs. Frequency



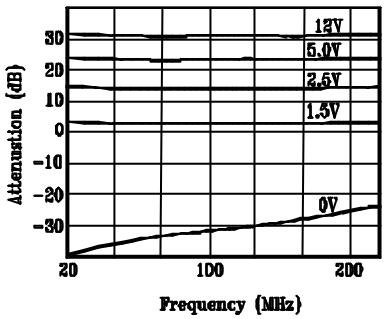
Power Output vs. Frequency



Attenuation vs. V_T

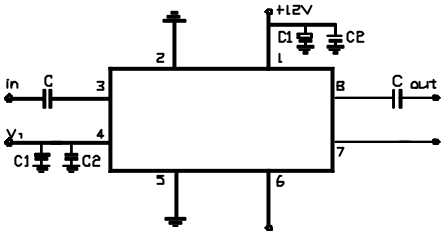


Attenuation vs. Frequency



Note:

1. Typical application as shown right C=1000pf ,C_1=22~47μf;C_2=1000~~3300pf.
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. PIN Function:1 Vcc 2,5 GND 3 RF_{IN} 4 V_T 6,7 NC 8RF_{OUT}



Feature

- **High stable output ,wide temperature range**
- **Small size、low power dissipation**
- **External frequency adjustment**
- **Standard DIP package**
- **Costomer' s Products can be offered**

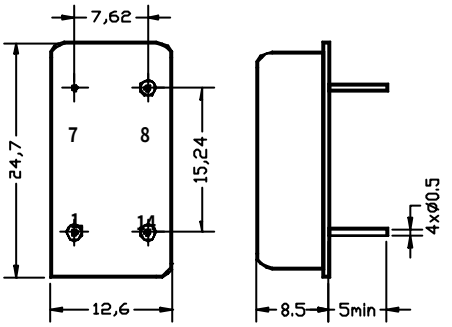
DIP14D

ELECTRICAL SPECFICATION

PARAMETER		CHARACTERISTIC		
Frequency range		10～30MHz		
Frequency stability	**Vs temperature**	±0.5～±5ppm		
	Vs supply changes	±0.3ppm（Max）/Vdc±5%		
	Ageing	±1ppm/year		
RF output	**Sinewave**	Output level	0dBm/50Ω， option＋5dBm/50Ω	
		Harmonic distortion	≤－20dB	
		Non-Harmonic suppression	≤－70dB	
	Clipped Sinewave	1Vp-p（min）/10kΩ//10PF		
	TTL	Risetime	≤6ns	Load :15PF
		Falltime	≤6ns	
		Duty cycle	45%～55%	
Phase noise		10Hz	-80dBc	
		100Hz	-110 dBc	
		1KHz	-135 dBc	
		10KHz	-140 dBc	
Supply voltage		＋12V±5%、＋5V±5%		
Current consumption		5～15mA		
Operation temperature range		Different range（refer to the table below）		
Storage temperature range		－55～＋100℃		
Frequency adjustment		±3ppm（Min）		
Dimension		24.7mm*12.6mm*8.7mm		

Frequency temperature stability（ppm）					
	±0.5	±1	±2	±3	±5
0~50℃	GP	HP	JP	KP	LP
-10~60℃		HR	JR	KR	LR
-20~70℃		HS	JS	KS	LS
-30~70℃		HT	JT	KT	LT
-40~85℃		HU	JU	KU	LU

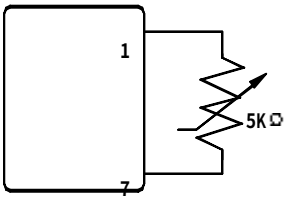
Outline dimensions



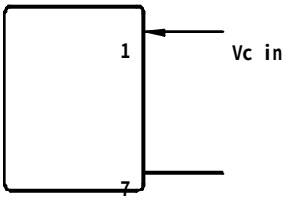
Pin function

1：Control voltage（Vc）;
7： Ground （GND）;
8： RF output（RF）;
14：Power supply（Vcc）;

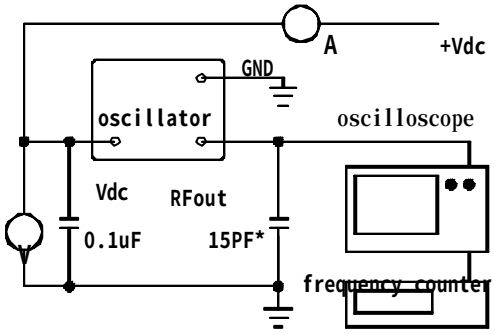
Outside frequency adjustment



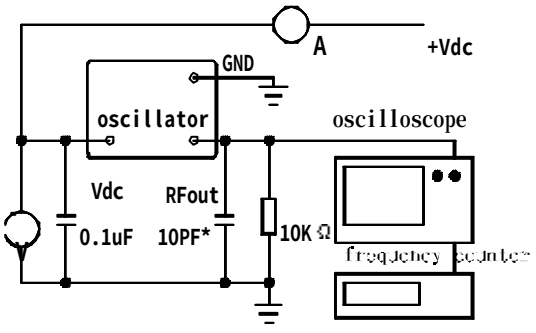
Connect with variable-resistance



Connect with reference voltage



HCMOS test circuit



Clipped Sine test circuit

*include of jigging & equipment capacitance

FEATURES

- **High stability**
- **External frequency adjustment**
- **Small size、low power dissipation**
- **Standard DIP package**
- **Wide temperature range: -40℃~+85℃**

DIP14D

ELECTRICAL SPECIFICATION

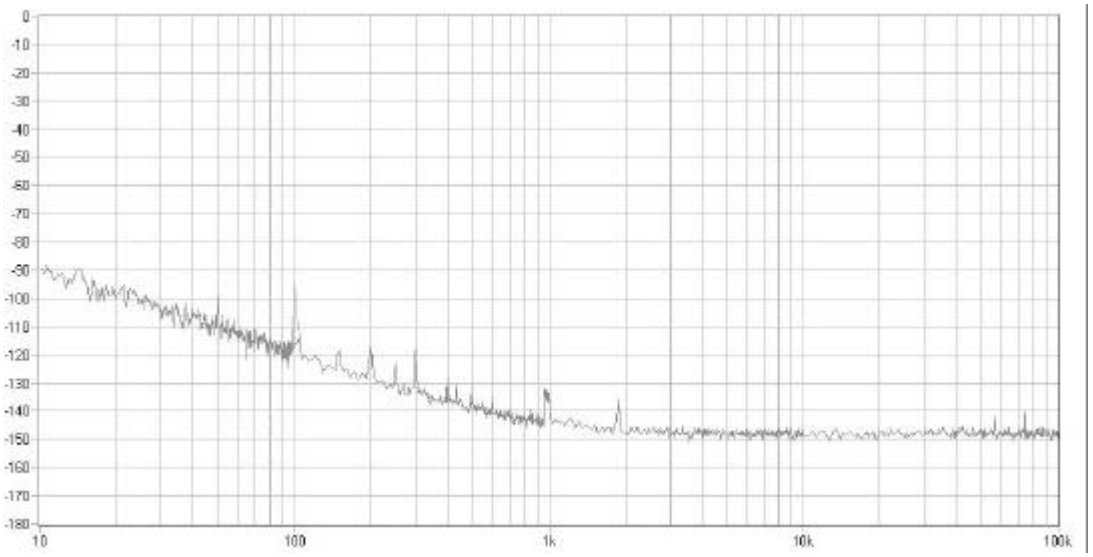
PARAMETER		CHARACTERISTIC	
Nominal frequency		10MHz	
Frequency accuracy		±1ppm @ 25℃	
Frequency stability	vs temperature	±1ppm	
	vs supply changes	±0.1ppm（Max）/+12V±5%	
	Ageing	±1ppm/year	
RF output		Sinewave、0dBm/50Ω， option+5dBm/50Ω	
Phase noise		10Hz 100Hz 1KHz 10KHz	-80dBc -110 dBc -135 dBc -140 dBc
Supply Voltage		+12V±5%、	
Current consumption		15mA（Max）	
Frequency adjustment	range	±3ppm（Min）	
	method	external	
Harmonic distortion		-20dB（Min）	
Non-Harmonic suppression		-70 dB（Min）	
Operation temperature range		−40~+85℃	
Storage temperature range		−55~+100℃	
Dimension		24.7mm*12.6mm*8.7mm	

Absolute Maximum Ratings

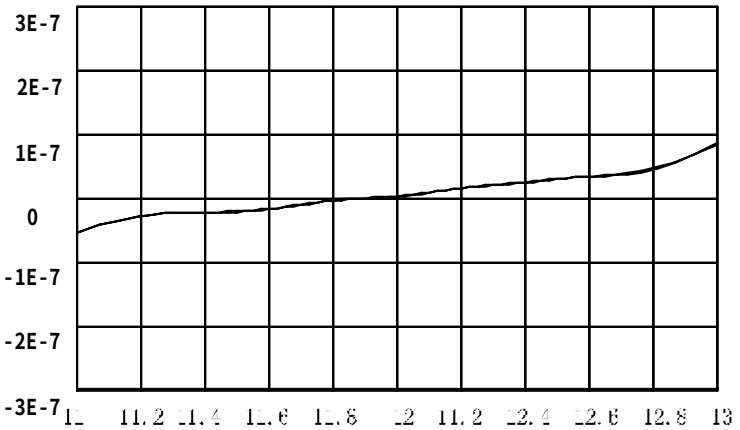
Supply voltage ----- +13V

Storage temperature ----- +105℃

Typical curve



Phase noise £(f)(dBC/Hz) vs Offset frequency (Hz) curve



Supply(V) vs frequency stability (Hz) curve

Features

- **High stable output**
- **Wide temperature range**
- **Low phase noise**
- **Internal frequency adjustment**
- **DIP package**
- **Customer' s Products can be offered**

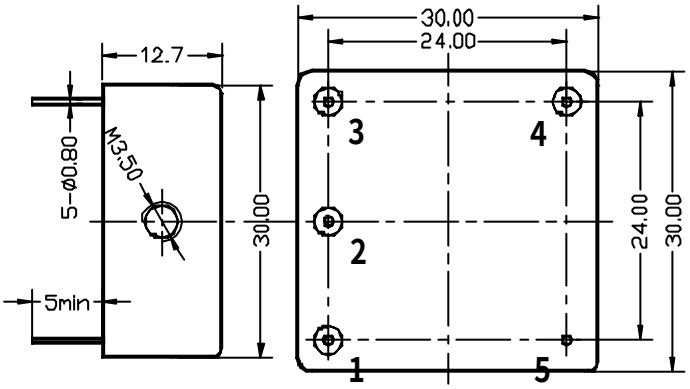
MP3030

ELECTRICAL SPECFICATION

PARAMETER		CHARACTERISTIC		
Frequency range		10～70MHz		
Frequency stability	**Vs temperature**	±0.5～±5ppm		
	Vs supply change	±0.3ppm（Max）/Vdc±5%		
	Ageing	±1ppm/year		
RF output	Sinewave	Output level	+5dBm/50Ω， option+10dBm/50Ω	
		Harmonic distortion	≤−30dB	
		Non-Harmonic suppression	≤−70dB	
	Clipped Sinewave	1Vp-p（min）/10kΩ//10PF		
	TTL(~50MHz)	Risetime	≤6ns	Load :15PF
		Falltime	≤6ns	
		Duty cycle	45%～55%	
Phase noise		10Hz 100Hz 1KHz 10KHz	-80dBc -110 dBc -135 dBc -140 dBc	
Supply voltage		+12V±5%、+5V±5%		
Current consumption		5～25mA		
Operation temperature range		Different range（refer to the table below）		
Storage temperature range		−55～+100℃		
Frequency adjustment		±3ppm（Min）		
Dimension		30mm*30mm*12.7mm		

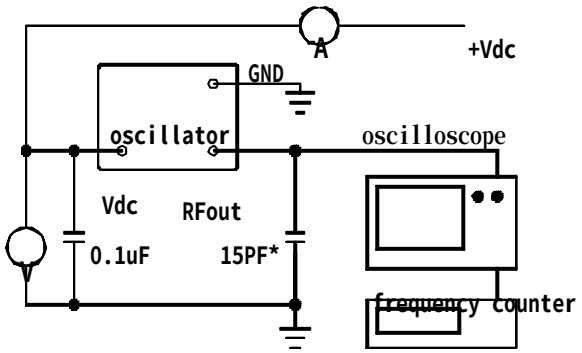
Frequency vs temperature stability (ppm)					
	±0.5	±1	±2	±3	±5
0~50℃	GP	HP	JP	KP	LP
-10~60℃		HR	JR	KR	LR
-20~70℃		HS	JS	KS	LS
-30~70℃		HT	JT	KT	LT
-40~85℃		HU	JU	KU	LU

Outline dimensions

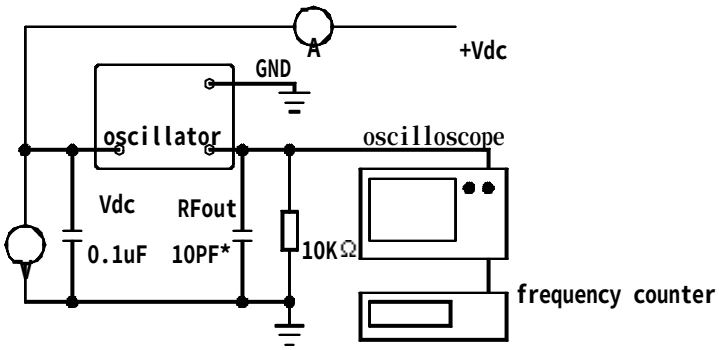


Pin function

1：control voltage（V_T）;
2：reference voltage（Vref）;
3: Supply voltage（Vcc）;
4：RF output（RF）;
5：Ground（GND）;



HCMOS test circuit



Clipped Sine test circuit

*include of jigging & equipment capacitance

FEATURES

- **High output power**
- **High stability**
- **Internal frequency adjustment**
- **Wide operation temperature range: -40℃~+85℃**

MP3030

ELECTRICAL SPECIFICATION

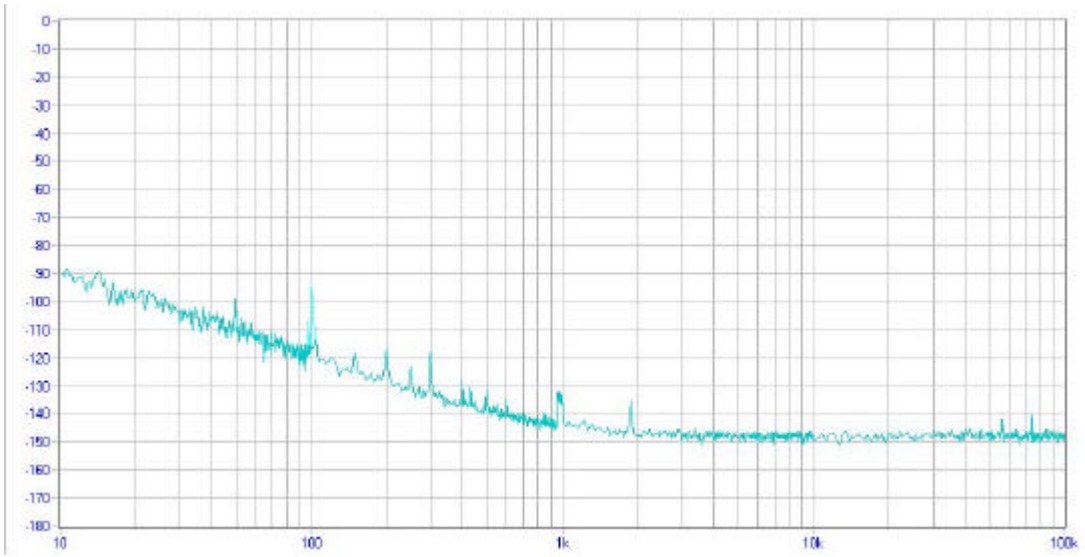
PARAMETER		CHARACTERISTIC	
Nominal frequency		48.96MHz	
Frequency stability	vs temperature	±2ppm	
	vs supply change	±0.1ppm/+12V±5%	
	Ageing	±1ppm/year	
RF output		Sinewave、+7dBm/50Ω， option+10dBm/50Ω	
Phase noise		10Hz 100Hz 1KHz 10KHz	-80dBc -110 dBc -135 dBc -140 dBc
Supply voltage		+12V±5%、	
Current consumption		25mA（Max）	
Frequency adjustment	range	±3ppm（Min）	
	method	Inside	
Harmonic distortion		-30dB（Min）（可选—50dB以上）	
Non-Harmonic suppression		-70 dB（Min）	
Operation temperature range		—40~+85℃	
Storage temperature range		—55~+100℃	
Dimension		30mm*30mm*12.7mm	

Absolute Maximum Ratings

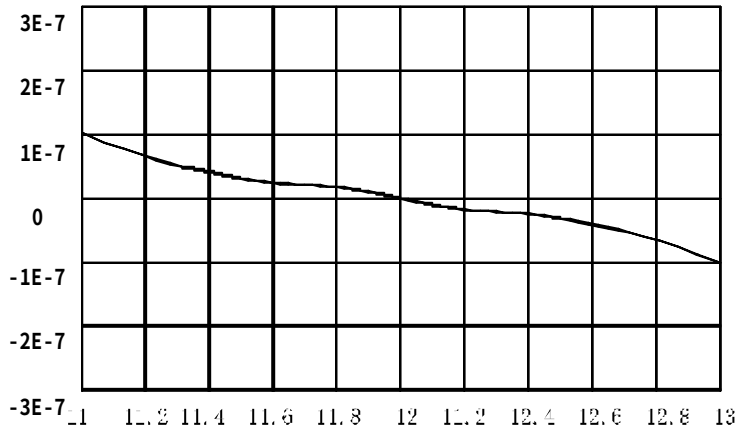
Supply voltage ----- +13V

Storage temperature ----- +105℃

Typical curve



Phase noise £(f)(dBC/Hz) vs Offset frequency (Hz) curve



Supply voltage(V) vs frequency stability (Hz) curve

FEATURES

- High stablity output
- Low phase noise
- Outside frequency adjustment
- DIP package
- Customer's Products can be offered
- Wide temperature range

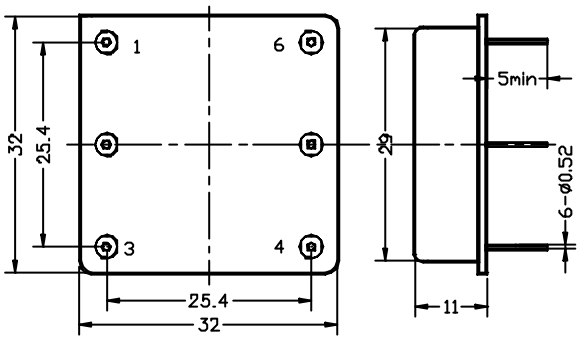
MP3232

ELECTRICAL SPECIFICATION

PARAMETER		CHARACTERISTIC		
Frequency range		10~70MHz		
Frequency stability	vs temperature	±0.5~±5ppm		
	vs supply change	±0.3ppm（Max）/Vdc±5%		
	Ageing	±1ppm/year		
RF output	Sinewave	Output level	+5dBm/50Ω， option+10dBm/50Ω	
		Harmonic distortion	≤−30dB	
		Non-Harmonic suppression	≤−70dB	
	Clipped Sinewave	1Vp-p（min）/10kΩ//10PF		
	TTL(~50MHz)	Risetime	≤6ns	Load :15PF
		Falltime	≤6ns	
		Duty cycle	45%~55%	
Phase noise		10Hz	-80dBc	
		100Hz	-110 dBc	
		1KHz	-135 dBc	
		10KHz	-140 dBc	
Supply voltage		+12V±5%、+5V±5%		
Current consumption		5~25mA		
Operation temperature range		Different temperature range（refer to the table below）		
Storage temperature range		−55~+100℃		
Frequency adjustment		±3ppm（Min）		
Dimension		32mm*32mm*11mm		

Frequency temperature stability (ppm)					
	±0.5	±1	±2	±3	±5
0~50℃	GP	HP	JP	KP	LP
-10~60℃		HR	JR	KR	LR
-20~70℃		HS	JS	KS	LS
-30~70℃		HT	JT	KT	LT
-40~85℃		HU	JU	KU	LU

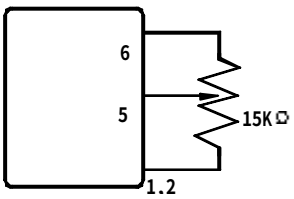
Outline Dimensions



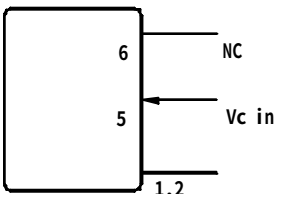
Pin function

1: Gound (GND);
2: Gound (GND);
3: Power supply (Vcc);
4: RF output (RF);
5: Control voltage (Vc);
6: Reference voltage output (Vref);

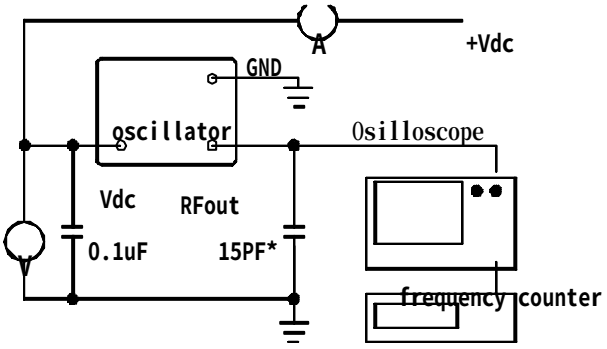
Outside frequency adjustment



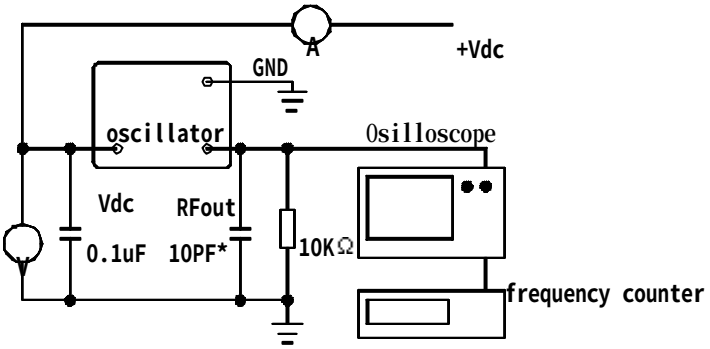
Connect with variable-resistance



Connect with reference voltage



HCMOS test circuit



Clipped Sine test circuit

*include of jigging & equipment capacitance

FEATURES

- **High output power**
- **High frequency stability**
- **Internal frequency adjustment**
- **DIP package**
- **Wide temperature range: -40℃~+85℃**

MP3232

ELECTRICAL SPECIFICATION

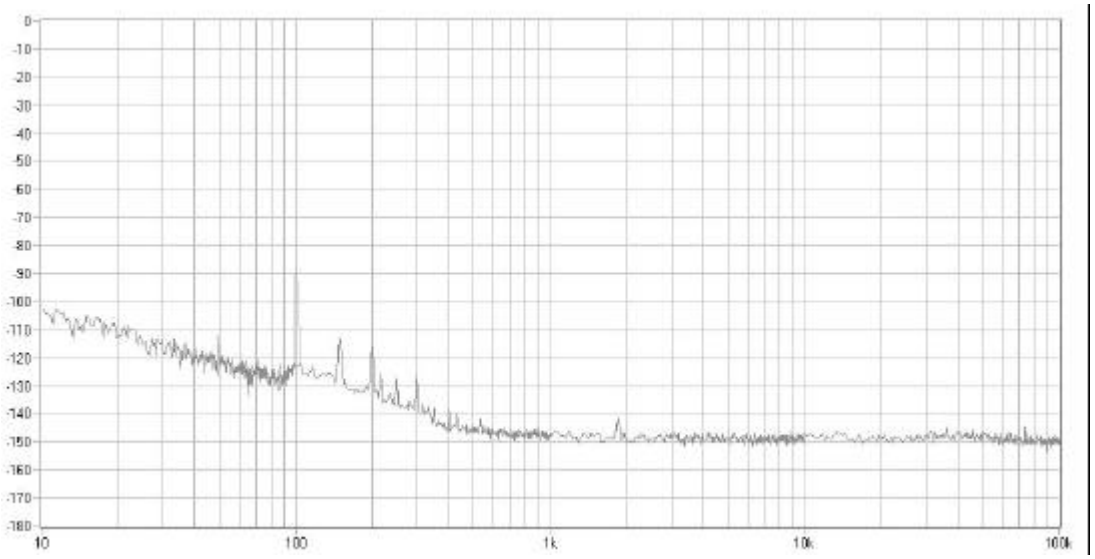
PARAMETER		CHARACTERISTIC	
Nominal frequency		10MHz	
Frequency stability	vs temperature	±1ppm	
	vs supply change	±0.1ppm/+12V±5%	
	Ageing	±1ppm/year	
RF output		Sinewave、+7dBm/50Ω， option+10dBm/50Ω	
Phase noise		10Hz 100Hz 1KHz 10KHz	-80dBc -110 dBc -135 dBc -140 dBc
Supply voltage		+12V±5%、	
Current consumption		25mA（Max）	
Frequency adjustment	Range	±3ppm（Min）	
	method	outside	
Harmonic distortion		-30dB（Min）（About—50Db Can b e offered）	
Non-Harmonic suppression		-70 dB（Min）	
Operation temperature range		—40~+85℃	
Storage temperature range		—55~+100℃	
Dimension		32mm*32mm*12.7mm	

Absolute Maximum Ratings

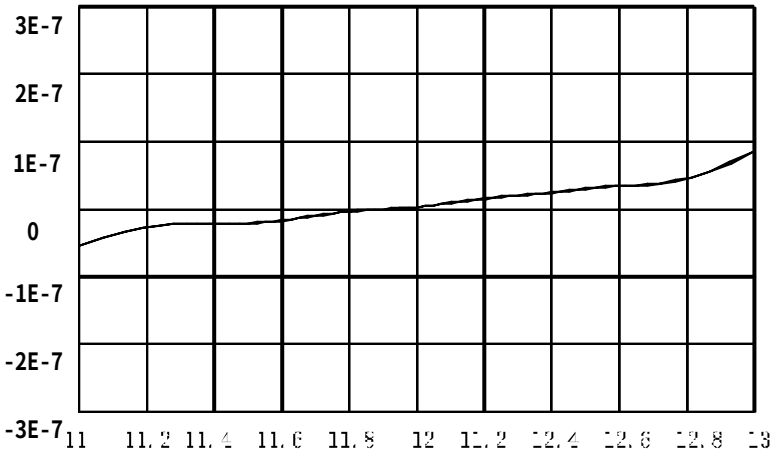
Supply voltage ----- +13V

Storage temperature ----- +105℃

Typical curve



Phase noise £(f)(dBC/Hz) vs Offset frequency (Hz) curve



Supply voltage(V) vs frequency stability (Hz) curve

FEATURES

- **High stablility output**
- **Low phase noise**
- **Wide temperature range**
- **Outside frequency adjustment**
- **DIP package**
- **Customer's Products can be offered**

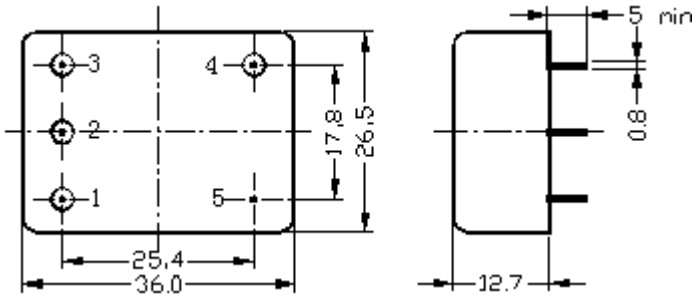
MP3627

ELECTRICAL SPECIFICATION

PARAMETER		CHARACTERISTIC		
Frequency range		10~70MHz		
Frequency stability	**vs temperature**	±0.5~±5ppm		
	vs supply voltage	±0.3ppm（Max）/Vdc±5%		
	Ageing	±1ppm/year（Max）		
RF output	Sinewave	Output level	+5dBm/50Ω， option+10dBm/50Ω	
		Harmonic distortion	≤−30dB	
		Non-Harmonic suppression	≤−70dB	
	Clipped Sinewave	1Vp-p（min）/10kΩ//10PF		
	TTL(~50MHz)	Risetime	≤6ns	Load :15PF
		Falltime	≤6ns	
		Duty cycle	45%~55%	
Phase noise		10Hz	-80dBc	
		100Hz	-110 dBc	
		1KHz	-135 dBc	
		10KHz	-140 dBc	
Supply voltage		+12V±5%、+5V±5%		
Current consumption		5~25mA		
Operation temperature range		Different temperature range （refer to the table below）		
Storage temperature range		−55~+100℃		
Frequency adjustment		±3ppm（Min）		
Dimension		32mm*32mm*11mm		

Frequency temperature stability (ppm)					
	±0.5	±1	±2	±3	±5
0~50℃	GP	HP	JP	KP	LP
-10~60℃		HR	JR	KR	LR
-20~70℃		HS	JS	KS	LS
-30~70℃		HT	JT	KT	LT
-40~85℃		HU	JU	KU	LU

MP3627 Outline dimensions

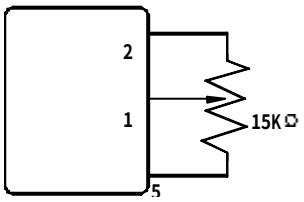


Pin function

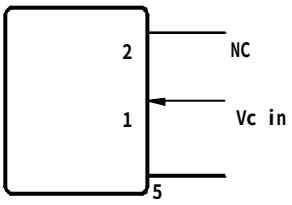
1: control voltage input (Vc)
2: reference voltage output (Vref);
3: supply voltage (Vcc);
4: RF output (RF);
5: ground (GND);

Outside frequency adjustment

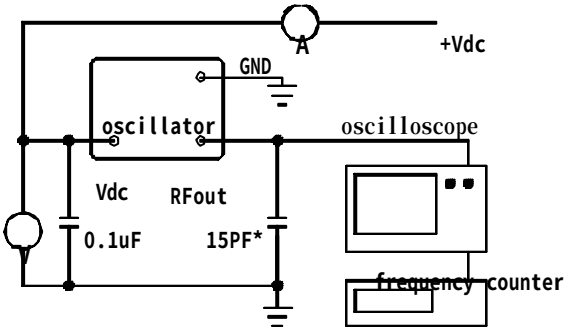
Connect with variable-resistance



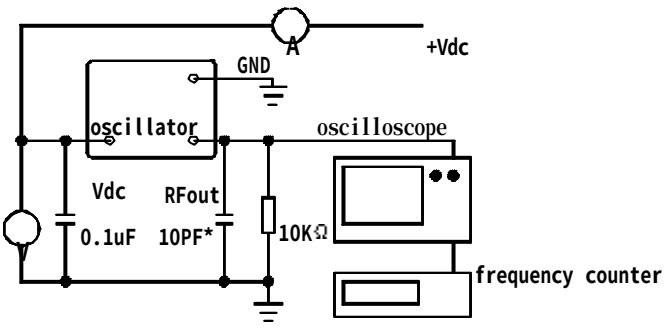
Connect with reference voltage



Select one from them



HCMOS test circuit



Clipped Sine test circuit

*include of jigging & equipment capacitance

FEATURES

- **High output power**
- **High frequency stability**
- **Internal frequency adjustment**
- **DIP package**
- **Wide temperature range: -40℃--+85℃**

MP3627

ELECTRICAL SPECIFICATION

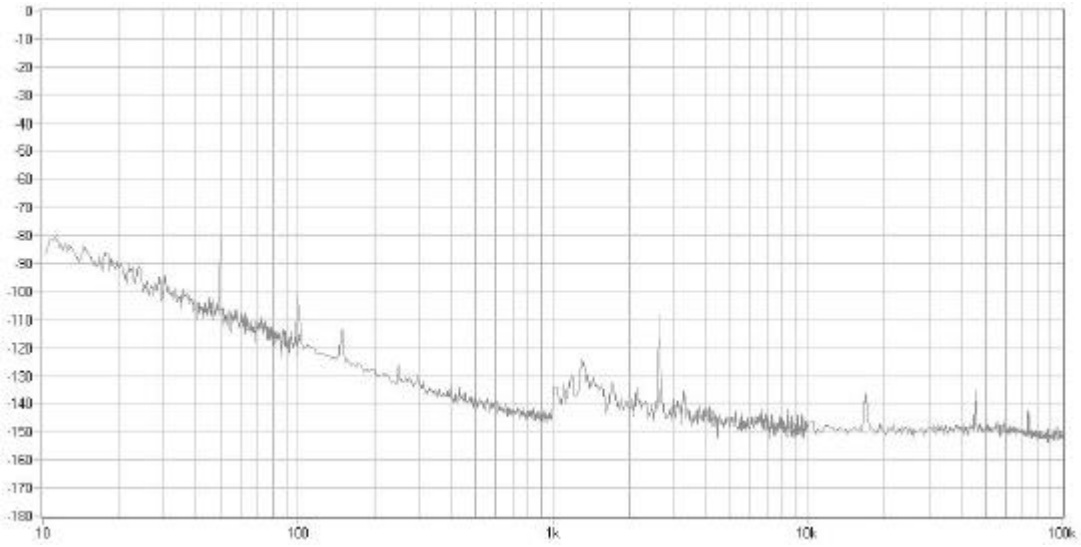
PARAMETER		CHARACTERISTIC	
Nominal frequency		70MHz	
Frequency stability	vs temperature	±2ppm	
	vs supply change	±0.2ppm/+12V±5%	
	Ageing	±1ppm/year	
RF output		Sinewave、+5dBm/50Ω， option+10dBm/50Ω	
Phase noise		10Hz 100Hz 1KHz 10KHz	-80dBc -110 dBc -135 dBc -140 dBc
Supply voltage		+12V±5%、	
Current consumption		25mA（Max）	
Frequency adjusting	range	±3ppm（Min）	
	method	outside	
Harmonic distortion		-30dB（Min）（About−50dB Can be offered）	
Non-Harmonic suppression		-70 dB（Min）	
Temperature range		−40~+85℃	
Storage temperature range		−55~+100℃	
Dimension		36mm*27mm*12.7mm	

Absolute Maximum Ratings

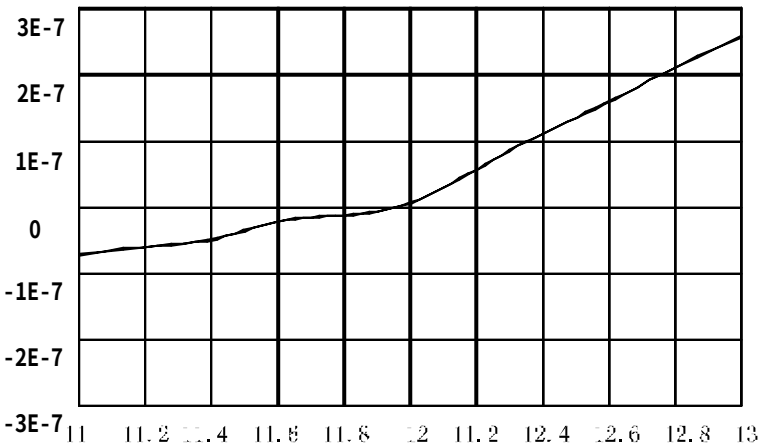
Supply voltage ----- +13V

Storage temperature ----- +105℃

Typical curve



Phase noise £(f)(dBC/Hz) vs Offset frequency (Hz) curve



Supply voltage(V) vs frequency stability (Hz) curve

FEATURES:

- High Temperature Stability
- Low Phase Noise
- External Frequency Tuning
- DIP Package
- Frequency Range 10MHz to 70 MHz

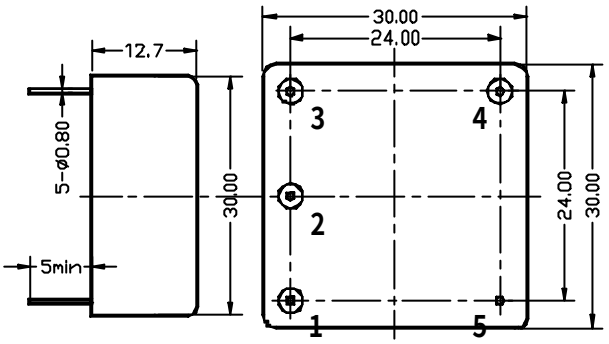
MP3030

ELECTRICAL SPECIFICATIONS

Parameters		CHARACTERISTICS
Frequency		10 to 70MHz
Frequency Stability	Temperature	±0.3~±0.05ppm
	Supply	±0.01ppm（Max）/+12V±5%
Output		Sinewave、+5dBm/50Ω， Option +10dBm/50Ω Clipped Sinewave 1Vp-p（min）/10kΩ//10PF TTL/15PF
Short Term (Allan Variance)		$3X10^{-12}$/sec~$2X10^{-11}$/sec
Supply		+12V±5%
Input Power		<4Watts at turn on; <2Watts stabilized (25℃)
Aging		1ppm~0.5ppm/year（Max）
Warm-up* (Restablization)		1X10-6: 7min 1X10-7: 10min 5X10-8: 15min 1X10-8: 30min
Harmonics		−20dBc（Sinewave output）
Operation temperature		See next page
Storage temperature		−55~+100℃
Frequency Adjustment		3ppm（Min）
Mechanical dimension		30mmX30mmX12.7mm
*frequency relative to that two hours after turn-on following 24 hour off-time at 25℃		

FREQUENCY vs TEMPERATURE (ppm)					
	±0.3	±0.2	±0.1	±0.05	±0.02
0~50℃	GP	HP	JP	KP	LP
-20~60℃	GQ	HQ	JQ	KQ	
-20~70℃	GR	HR	JR		
-30~70℃	GS	HS	JS		
-40~70℃	Please contract us				

MP3030 Mechanical Dimensions

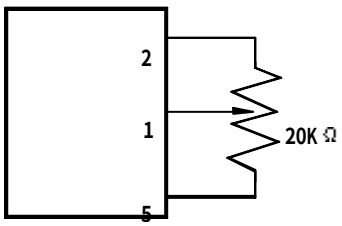


Pin Function

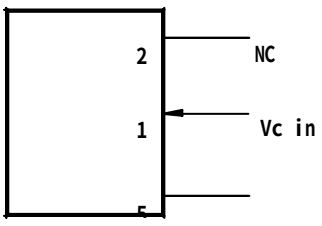
1: Elect. Freq. Adj.(V_T);
2: Reference Voltage (Vref);
3: Supply (Vcc);
4: RF Output (RF);
5: 0Volts. Case (GND);

EXTERNAL FREQUENCY ADJUSTMENT

External Resistance



External Voltage



FEATURES

- Low Phase Noise
- High Temperature Stability
- External Frequency Tuning
- Temp Range: -30℃~+70℃

MP3030

ELECTRICAL SPECIFICATIONS

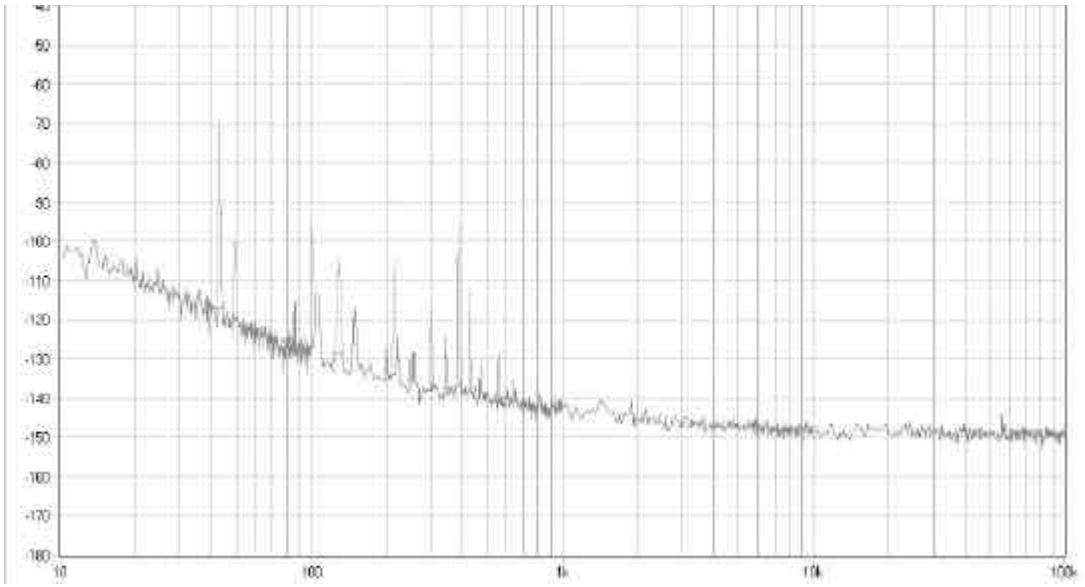
Parameters		CHARACTERISTICS	
Frequency		16.384MHz	
Frequency Stability	Temperature	±0.1ppm	
	Supply	±0.05ppm（Max）/+12V±5%	
Output		Sinewave、+5dBm/50Ω， Option +10dBm/50Ω	
Phase Noise		10Hz	-100dBc
		100Hz	-120 dBc
		1KHz	-140 dBc
		10KHz	-145 dBc
Aging Rate		1ppm/year(Max)	
Supply		+12V±5%、	
Input Power		<4Watts at turn on; <2Watts stabilized (25℃)	
Frequency Adjustment		3ppm minimum range for 0 to 5V control via external 20kΩ potentiometer	
Harmonics		-20dB（Min）	
Non-Harmonic suppression		-70 dB（Min）	
Operation temperature		−30~+70℃	
Storage temperature		−55~+100℃	
Mechanical dimension		30mmX30mmX12.7mm	

Absolute Maximum Rating

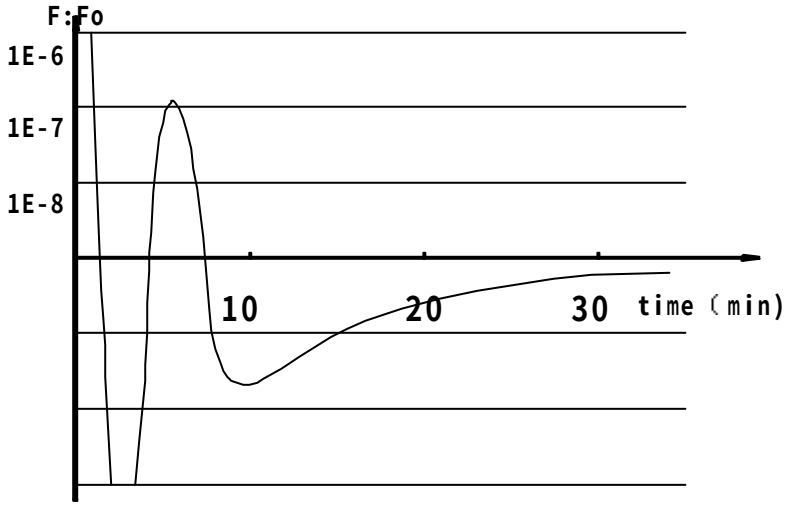
Maximum DC Voltage ----- +13V

Storage Temperature ----- -55℃~+105℃

Typical Curves



Phase noise(dBc/Hz) vs frequency deviation(Hz)



TURN-ON F:Fo vs TIME

FEASTURES

- High Temperature Stability
- Low Phase Noise
- External Frequency Tuning
- DIP Package
- Frequency range 10MHz to 100 MHz

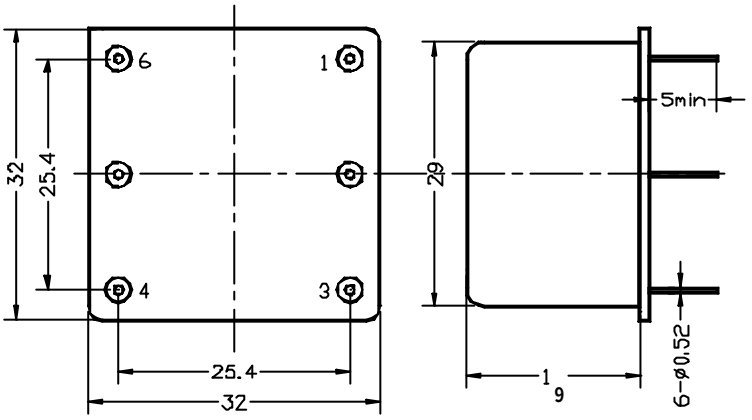
MP3232

ELECTRICAL SPECIFICATIONS

Parameters		CHARACTERISTICS
Frequency		10~100MHz
Frequency Stability	Temperature	±0.2~±0.005ppm
	Supply	±0.01ppm（Max）/+12V±5%
Output		Sinewave：+5dBm/50Ω， Option+10dBm/50Ω Clipped Sinewave： 1Vp-p（min）/10kΩ//10PF TTL： TTL/15PF
Short Term (Allan Variance)		$3X10^{-12}$/sec~$2X10^{-11}$/sec
Supply		+12V±5%
Input Power		<4.5Watts at turn on; <2Watts stabilized (25℃)
Aging		1ppm~0.5ppm/year（Max）
Warm-up (Restablization)		$1X10^{-6}$: 7min $1X10^{-7}$: 10min $5X10^{-8}$: 15min $1X10^{-8}$: 30min
Harmonics		−20dBc（Sinewave 输出）
Operation temperature		See next page
Storage temperature		−55~+100℃
Frequency Adjustment		3ppm（Min）
Mechanical dimension		32mmX32mmX19mm

FREQUENCY vs TEMPERATURE (ppm)					
	±0.2	±0.1	±0.05	±0.02	±0.01
0~50℃	GP	HP	JP	KP	LP
-20~60℃	GQ	HQ	JQ	KQ	
-30~70℃	GR	HR	JR		
-40~70℃	GS	HS			
-55~85℃	Please contract us				

MP3232 Mechanical dimension

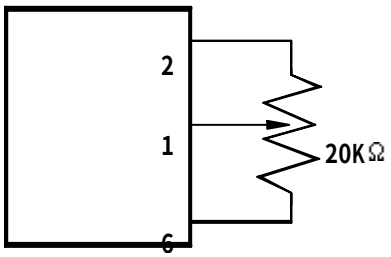


Pin Function

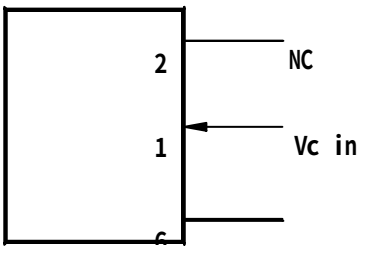
1: Elect. Freq. Adj.(V_T);
2: Reference Voltage (Vref);
3: Supply (Vcc);
4: RF Output (RF)
5: NULL;
6: 0Volts. Case (GND);

EXTERNAL FREQUENCY ADJUSTMENT

External Resistance



External Voltage



FEATURES

- Low Phase Noise
- High Temperature Stability
- External Frequency Tuning
- DIP Package
- Temp Range: -40℃~+70℃

MP3232

ELECTRICAL SPECIFICATIONS

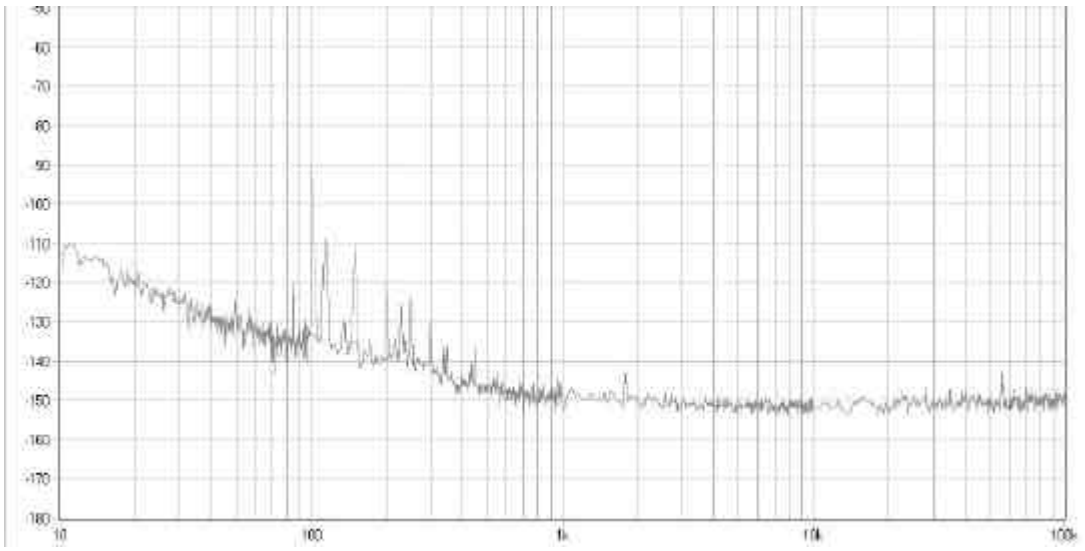
Parameters		CHARACTERISTICS	
Frequency		10MHz	
Frequency Stability	Temperature	±0.05ppm	
	Supply	±0.05ppm（Max）/+12V±5%	
Output		Sinewave、+5dBm/50Ω， Optics+10dBm/50Ω	
Phase Noise		10Hz	-105dBc
		100Hz	-130 dBc
		1KHz	-145 dBc
		10KHz	-145 dBc
Aging Rate		1ppm/year	
Supply		+12V±5%、	
Input Power		<4.5Watts at turn on; <2Watts stabilized (25℃)	
Frequency Adjustment		3ppm minimum range for 0 to 5V control via external 20kΩ potentiometer	
Harmonics		-20dB（Min）	
Non-Harmonic suppression		-70 dB（Min）	
Operation temperature		−40~+70℃	
Storage temperature		−55~+100℃	
Mechanical dimension		32mmX32mmX19mm	

Absolute Maximum Rating

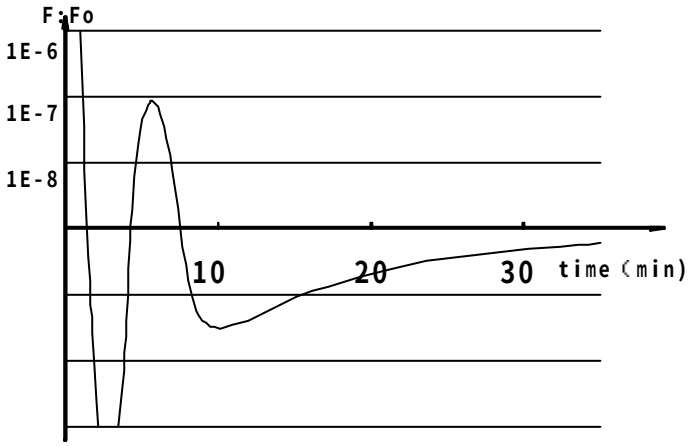
Maximum DC Voltage ----- +13V

Storage Temperature ----- -55℃~+105℃

Typical Curves



Phase noise(dBc/Hz) vs frequency deviation(Hz)



TURN-ON F:Fo vs TIME

FEATURES

- Low Phase Noise
- High Temperature Stability
- External Frequency Tuning
- DIP Package
- Temp Range: -40℃~+70℃

MP3232

ELECTRICAL SPECIFICATIONS

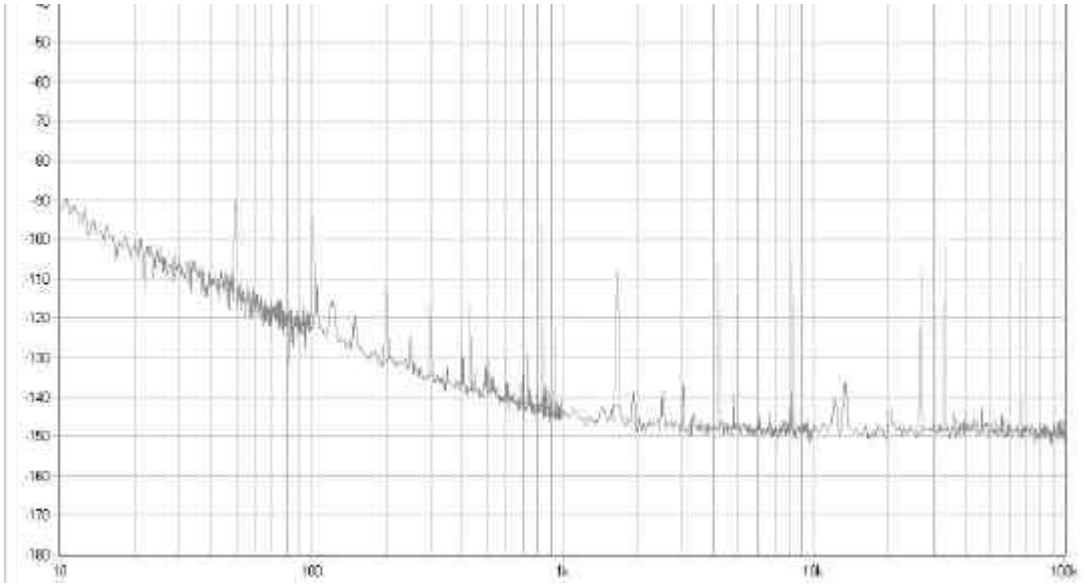
Parameters		CHARACTERISTICS	
Frequency		100MHz	
Frequency Stability	Temperature	±0.1ppm	
	Supply	±0.05ppm（Max）/+12V±5%	
Output		Sinewave、+5dBm/50Ω， Opton+10dBm/50Ω	
Phase Noise		10Hz	-85dBc
		100Hz	-115 dBc
		1KHz	-140 dBc
		10KHz	-140 dBc
Aging Rate		1ppm//year	
Supply		+12V±5%、	
Input Power		<4.5Watts at turn on; <2Watts stabilized (25℃)	
Frequency Adjustment		3ppm minimum range for 0 to 5V control via external 20kΩ potentiometer	
Harmonics		-20dB（Min）	
Non-Harmonic suppression		-70 dB（Min）	
Operation temperature		−40~+70℃	
Storage temperature		−55~+100℃	
Mechanical dimension		32mmX32mmX19mm	

Absolute Maximum Rating

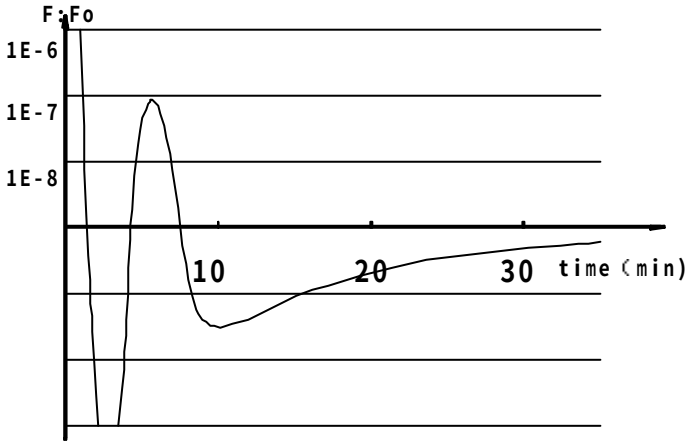
Maximum DC Voltage ----- +13V

Storage Temperature ----- -55℃~+105℃

Typical Curves



Phase noise(dBc/Hz) vs frequency deviation(Hz)



TURN-ON F:Fo vs TIME

FEASTURES

- High Temperature Stability
- Low Phase Noise
- External Frequency Tunning
- Frequency Range 10MHz to 100 MHz

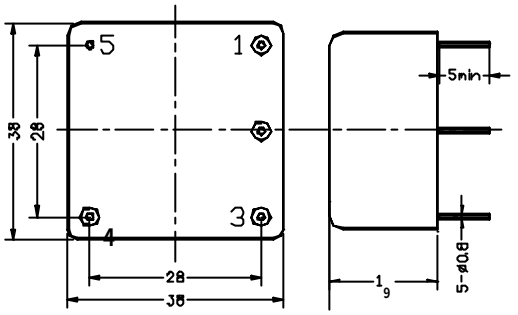
MP3838

ELECTRICAL SPECIFICATIONS

Parameters		CHARACTERISTICS
Frequency		10~100MHz
Frequency Stability	Temperature	±0.2~±0.005ppm
	Supply	±0.01ppm（Max）/+12V±5%
Output		Sinewave：+5dBm/50Ω， Optics+10dBm/50Ω Clipped Sinewave： 1Vp-p（min）/10kΩ//10PF TTL：TTL/15PF
Short Term (Allan Variance)		$2X10^{-12}$/sec~$1X10^{-11}$/sec
Supply		+12V±5%
Input Power		<5Watts at turn on; <2.5Watts stabilized (25℃)
Aging		1ppm~0.5ppm/year（Max）
Warm-up* (Restablization)		$1X10^{-6}$: 8min $1X10^{-7}$: 10min $5X10^{-8}$: 17min $1X10^{-8}$: 30min
Harmonics		−20dBc（Sinewave）
Operation temperature		See next page
Storage temperature		−55~+100℃
Frequency Adjustment		3ppm（Min）
Mechanical dimension		38mmX38mmX19mm

FREQUENCY vs TEMPERATURE (ppm)						
	±0.2	±0.1	±0.05	±0.02	±0.01	±0.005
0~50℃	GP	HP	JP	KP	LP	MP
-20~60℃	GR	HR	JR	KR	LR	
-30~70℃	GS	HS	JS	KS		
-40~70℃	GT	HT	JT			
-55~85℃	Please contract us					

MP3838 Mechanical Dimensions

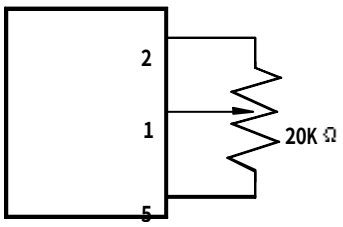


Pin Function

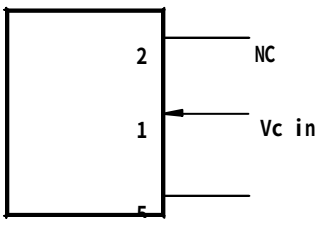
1: Elect. Freq. Adj.(V_T);
2: Reference Voltage (Vref);
3: Supply (Vcc);
4: RF Output (RF)
5: 0Volts. Case (GND);

EXTERNAL FREQUENCY ADJUSTMENT

External Resistance



External Voltage



FEATURES

- Low Phase Noise
- High Temperature Stability
- External Frequency Tuning
- Temp Range: -40℃~+70℃
- Frequency Range 10MHz to 100MHz

MP3838

ELECTRICAL SPECIFICATIONS

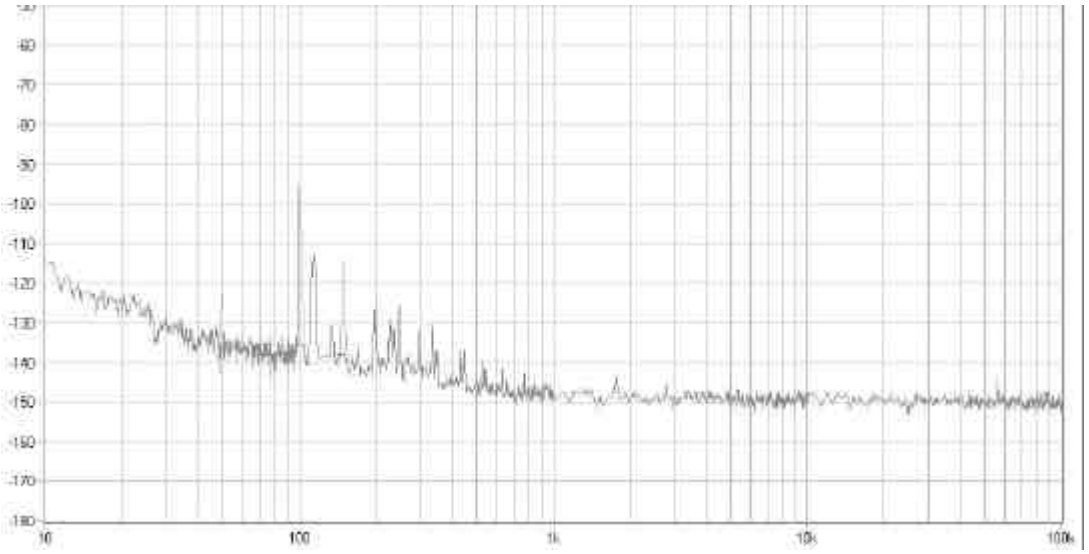
Parameters		CHARACTERISTICS	
Frequency		10MHz	
Frequency Stability	Temperature	±0.05ppm	
	Supply	±0.02ppm（Max）/+12V±5%	
Output		Sinewave、+7dBm/50Ω，Option+10dBm/50Ω	
Phase Noise		10Hz 100Hz 1KHz 10KHz	-105dBc -130 dBc -145 dBc -145 dBc
Aging Rate		±1ppm/年（Max）	
Supply		+12V±5%、	
Input Power		<5Watts at turn on; <2.5Watts stabilized (25℃)	
Frequency Adjustment		3ppm minimum range for 0 to 5V control via external 20kΩ potentiometer	
Harmonics		-20dB（Min）（Option -50dB）	
Non-Harmonic suppression		-70 dB（Min）	
Operation temperature		−40~+70℃	
Storage temperature		−55~+100℃	
Mechanical dimension		38mmX38mmX19mm	

Absolute Maximum Rating

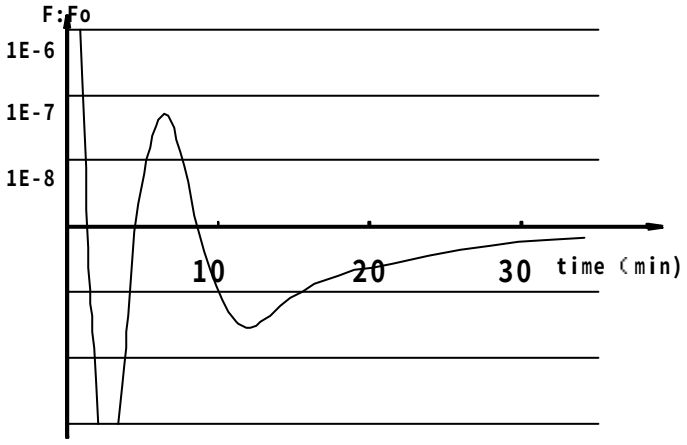
Maximum DC Voltage ----- +13V

Storage Temperature ----- -55℃~+105℃

Typical Curves



Phase Noise(dBC/Hz) vs frequency deviation(Hz)



TURN-ON F:Fo vs TIME

FEATURES

- Low Phase Noise
- High Temperature Stability
- External Frequency Tuning
- Temp Range: -40℃~+70℃
- Frequency vary 10MHz to 100MHz

MP3838

ELECTRICAL SPECIFICATIONS

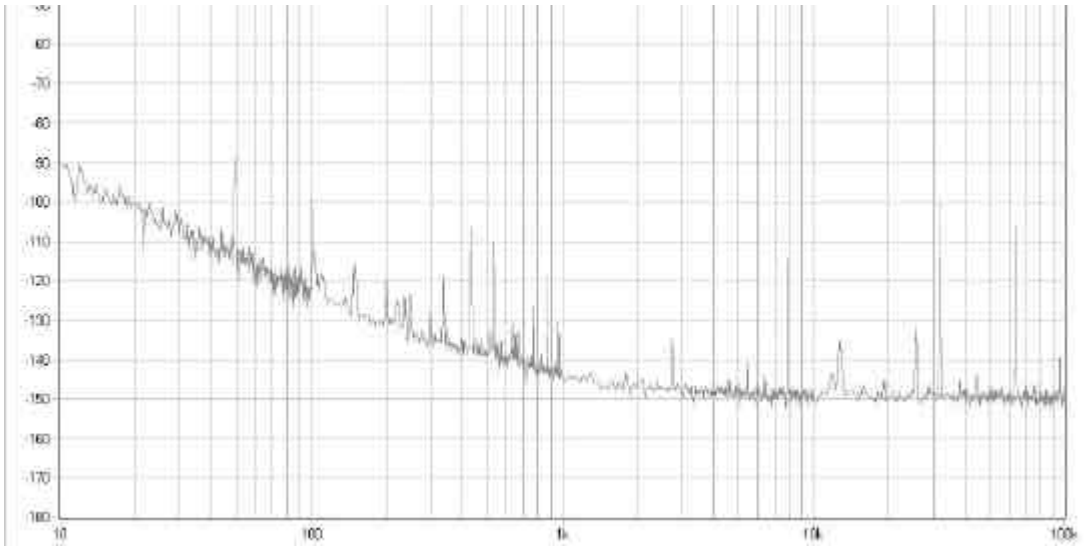
Parameters		CHARACTERISTICS	
Frequency		100MHz	
Frequency Stability	Temperature	±0.1ppm	
	Supply	±0.02ppm（Max）/+12V±5%	
Output		Sinewave、+5dBm/50Ω， Option+10dBm/50Ω	
Phase Noise		10Hz 100Hz 1KHz 10KHz	-85dBc -110 dBc -140 dBc -140 dBc
Aging Rate		1ppm/year	
Supply		+12V±5%、	
Input Power		<5Watts at turn on; <2.5Watts stabilized (25℃)	
Frequency Adjustment		3ppm minimum range for 0 to 5V control via external 20kΩ potentiometer	
Harmonics		-20dB（Min）（Option -50dB）	
Non-Harmonic suppression		-70 dB（Min）	
Operation temperature		−40~+70℃	
Storage temperature		−55~+100℃	
Mechanical dimension		38mmX38mmX19mm	

Absolute Maximum Rating

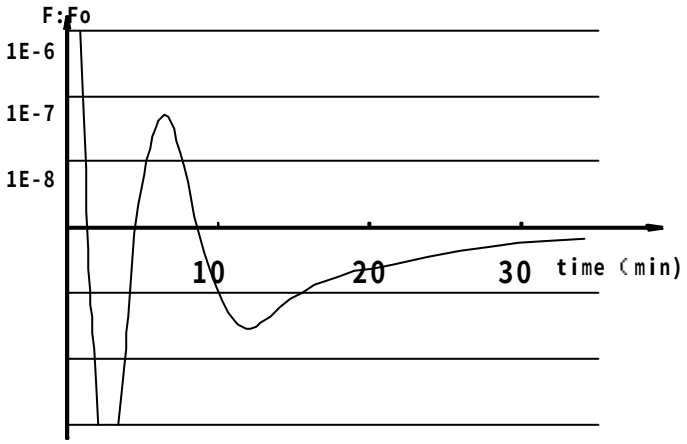
Maximum DC Voltage ----- +13V

Storage Temperature ----- -55℃~+105℃

Typical Curves



Phase noise(dBc/Hz) vs frequency deviation(Hz)



TURN-ON F:Fo vs TIME

FEASTURES

- Small package size
- Very Low Phase Noise
- External Frequency Tunning
- Frequency Range 10MHz to 120 M

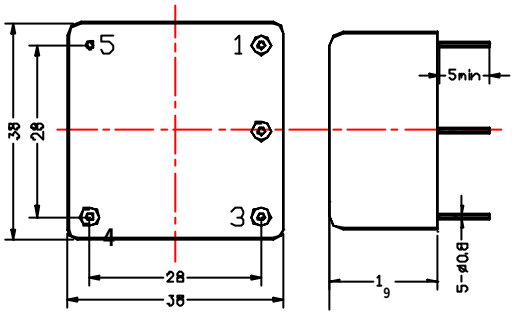
MP3838

ELECTRICAL SPECIFICATION

Parameters		CHARACTERISTIC
Frequency		10~120MHz
Frequency Stability	Temperature	±0.3~±0.05ppm
	Supply	±0.02ppm（Max）/+12V±5%
Output		Sinewave: +10dBm/50Ω
Phase Noise(100MHZ typical)		
@10Hz		-90 dBc/Hz
@100Hz		-120dBc/Hz
@1KHz		-150dBc/Hz
@10KHz		-158dBc/Hz
Floor		-162dBc/Hz
Short Term (Allan Variance)		$2X10^{-12}$/sec~$1X10^{-11}$/sec
Supply		+12V±5%, (+15V available)
Input Power		<5Watts at turn on; <2.5Watts stabilized (25℃)
Aging		1ppm~0.5ppm/year（Max）
Warm-up* (Restablization)		$2X10^{-6}$: 3min $2X10^{-7}$: 5min $1X10^{-7}$: 7min $5X10^{-8}$: 20min
Harmonics		-25dBc（Sinewave min）
Operation temperature		See next page
Storage temperature		-55~+100℃
Frequency Adjustment		±3ppm（Min）
Mechanical size		38mmX38mmX19mm（optics height 12.7mm）

FREQUENCY vs TEMPERATURE (ppm)					
	±0.3	±0.2	±0.1	±0.05	±0.01
0~50℃	GP	HP	JP	KP	LP
-20~60℃	GR	HR	JR	KR	
-30~70℃	GS	HS	JS		
-40~70℃	GT	HT			
-55~85℃	Please contract us				

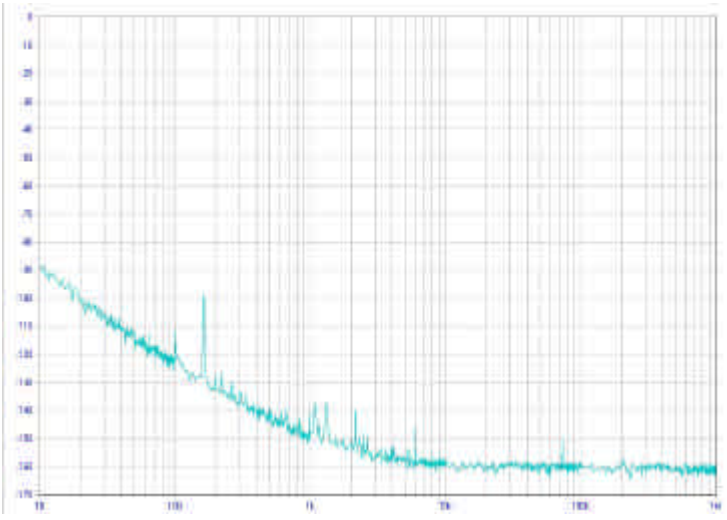
MP3838 Mechanical Size



Pin Function

1：Elect. Freq. Adj.(V_T)；
2：Null ；
3：Supply (Vcc)；
4：RF Output（RF）
5：0Volts. Case（GND）；

Phase Noise (100Mhz,typical)



FEATURES

- Wide Operating Temperature
- Wide Pulling Range
- Different output wave
- Standard DIP Package
- Customer's Products can be offered

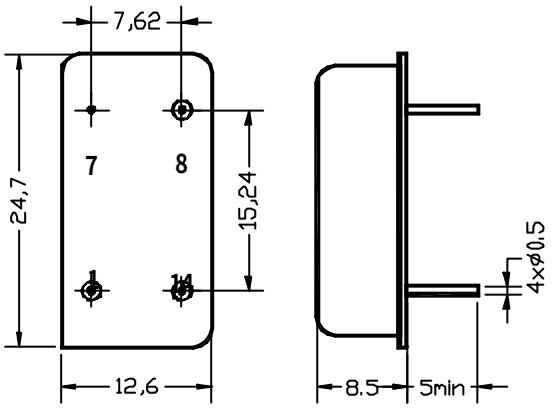
DIP14D

ELECTRICAL SPECIFICATION

PARAMETER		CHARACTERISTIC		
Frequency range		10~30MHz		
Frequency tolerance		±2ppm @ 4.5V or 2.5V 25℃		
Frequency stability	**vs temperature**	±10~±25ppm		
	vs supply changes	±0.5ppm（Max）/Vdc±5%		
	Ageing	±3ppm/1st year		
RF output	Sinewave	Output level	0dBm/50Ω， option +5dBm/50Ω	
		Harmonic distortion	≤−20dB	
		Non-Harmonic suppression	≤−70dB	
	Clipped Sinewave	1Vp-p（min）/10kΩ//10PF		
	TTL	Risetime	≤6nS	Load: 15PF
		Falltime	≤6nS	
		Duty cycle	45~55%	
Supply Voltage		+12V±5%、+5V±5%		
Current consumption		5~15mA		
Control voltage range		4.5±4V、2.5±2V		
Pulling range		±30ppm~±100ppm		
Slope		Positive		
Linearity		±5~20%		
Operation temperature range		up to –40 ~ +85℃		
Storage temperature range		−55~+100℃		
Dimension		24.7mm*12.6mm*8.7mm		

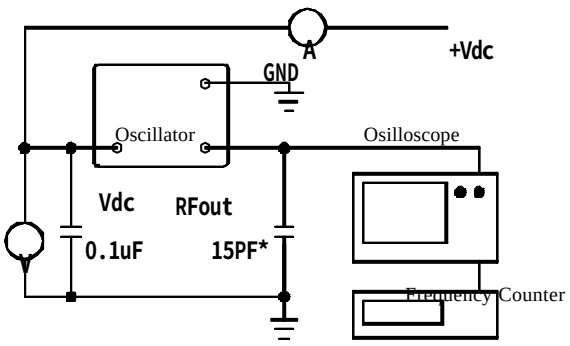
Frequency Temperature stability (ppm)					
	±10	±15	±20	±25	±30
0~50℃	GP	HP	JP	KP	LP
-10~60℃		HR	JR	KR	LR
-20~70℃			JS	KS	LS
-40~85℃			JU	KU	LU

Outline dimensions

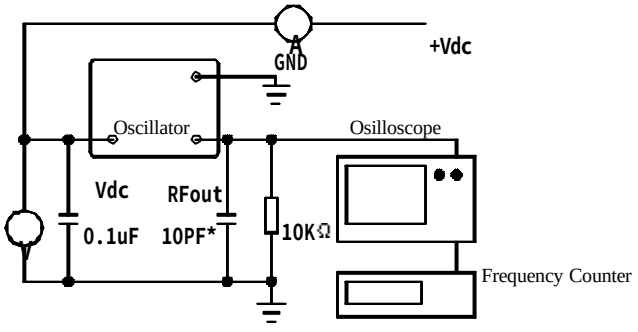


Pin function

1: Control Voltage (Vc);
7: Ground;
8: RF Output;
14: Power supply (Vcc);



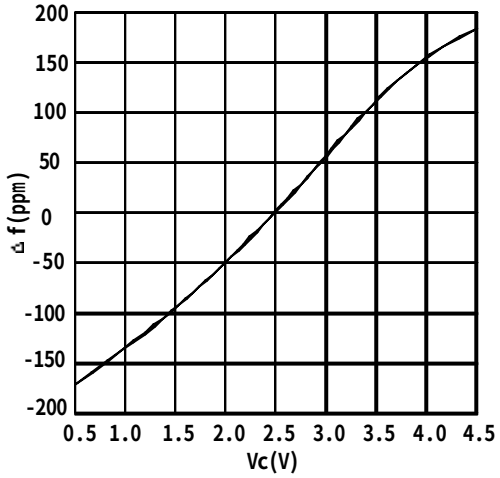
HCMOS Test Circuit



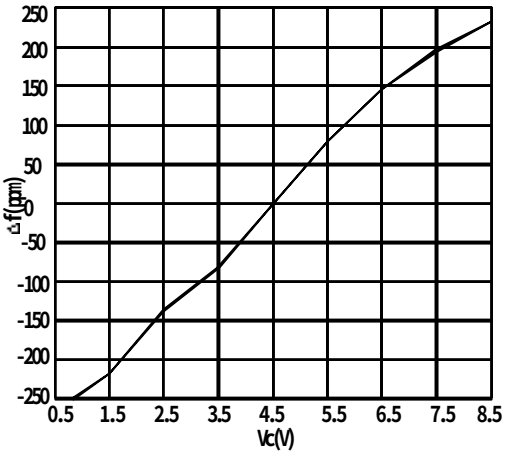
Clipped Sine Test Circuit

*include of jigging & equipment capacitance

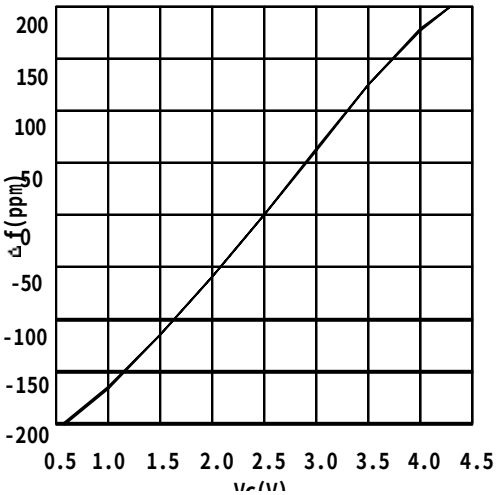
Typical Curve



VX14D-S-JU-D@10M pulling curve



VX14D-S-JU-E@20M pulling curve



VX14D-S-JU-D@12M8 pulling curve

FEATURES

- Wide Operating Temperature
- Wide Pulling Range
- Different output waveform
- DIP Package
- Customers' products can be offered

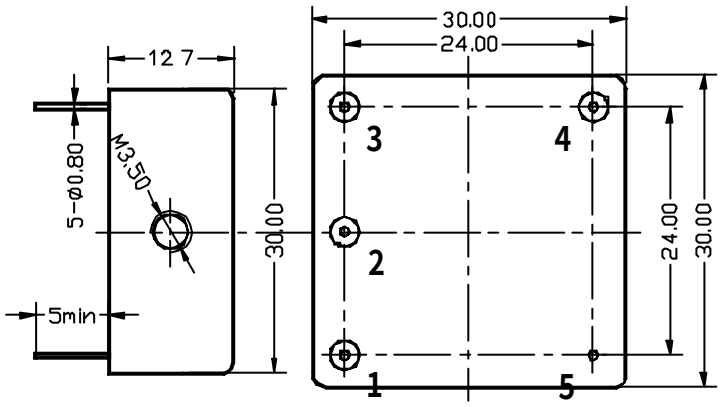
MP3030

ELECTRICAL SPECIFICATION

PARAMETER		CHARACTERISTIC		
Frequency range		10~30MHz		
Frequency tolerance		±2ppm @ 4.5V or 2.5V 25℃		
Frequency stability	vs temperature	±10~±25ppm		
	vs supply	±0.5ppm（Max）/Vdc±5%		
	Ageing	±3ppm/1st year		
RF output	Sinewave	Output level	0dBm/50Ω， option +5dBm/50Ω	
		Harmonic distortion	≤−30dB	
		Non-Harmonic suppression	≤−70dB	
	Clipped Sinewave	1Vp-p（min）/10kΩ//10PF		
	TTL	Rise time	≤6nS	Load: 15PF
		Fall time	≤6nS	
		Duty cycle	45~55%	
DC Supply		+12V±5%、+5V±5%		
DC Current		5~25mA		
Control voltage range		4.5±4V、2.5±2V		
Pulling range		±30ppm~±200ppm		
Slope		Positive		
Linearity		±5~20%		
Operation temperature range		up to –40 ~ +85℃		
Storage temperature range		−55~+100℃		
Dimension		30mm*30mm*12.7mm		

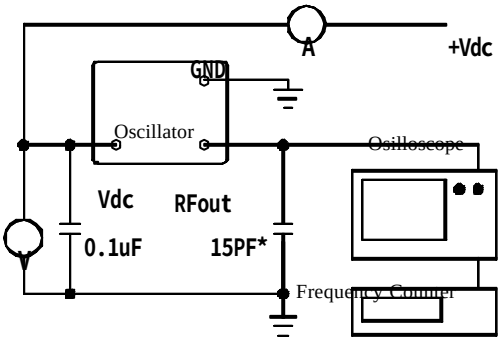
Frequency Temperature stability (ppm)					
	±10	±15	±20	±25	±30
0~50℃	GP	HP	JP	KP	LP
-10~60℃		HR	JR	KR	LR
-20~70℃			JS	KS	LS
-40~85℃			JU	KU	LU

Outline dimension

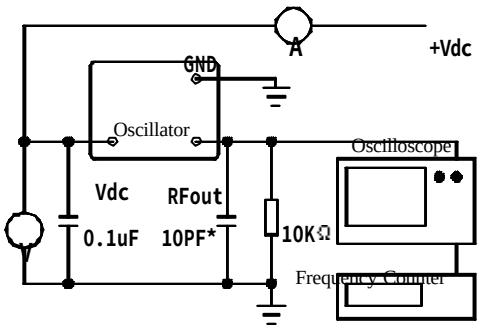


Pin function

1: Control Voltage (Vc);
2: NC
3: DC supply (Vcc);
4: RF Output;
5: Ground;



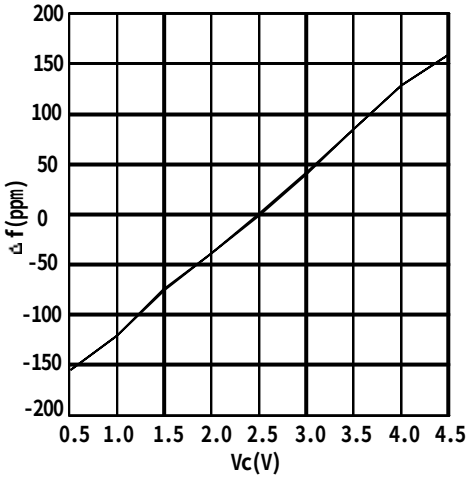
HCMOS Test Circuit



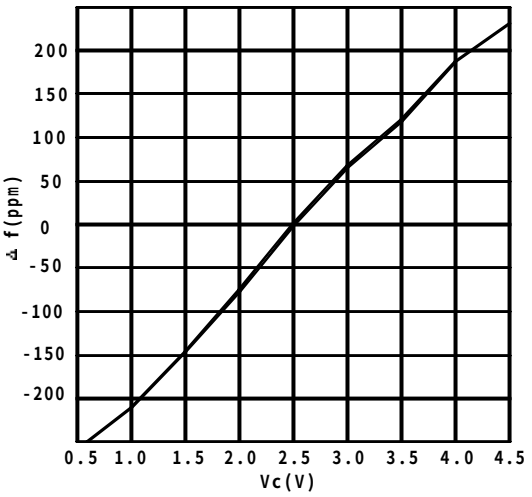
Clipped Sine Test Circuit

*include of jigging & equipment capacitance

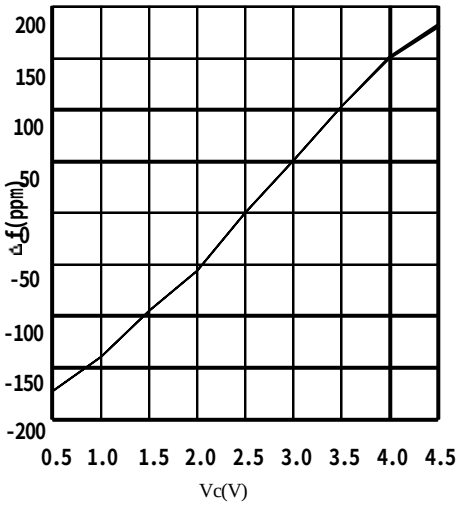
Typical Curve



VX30D-S-JU-D@10M pulling curve



VX30D-S-JU-E@20M pulling curve



VX30D-S-JU-D@12M8 pulling curve

FEATURES

- Wide operation temperature range
- Small size、low power dissipation
- Different output waveform
- Standard DIP package
- Custormer' s Products can be offered

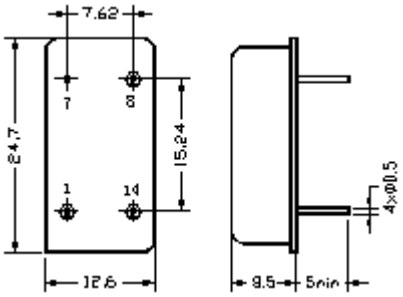
DIP14D

ELECTRICAL PARAMETER

PARAMETER		CHARACTERISTIC		
Frequency range		10~160MHz		
Frequency tolerance		±2ppm @ 25℃		
Frequency stability	vs temperature	±10~±25ppm		
	vs supply voltage	±0.3ppm（Max）/V_D±5%		
	Ageing	±3ppm/1st year		
RF Output	Sinewave	Output level	0dBm/50Ω， option+5dBm/50Ω	
		Harmonic distortion	≤-20dB	
		Non-Harmonic suppression	≤-70dB	
	Clipped Sinewave	1Vp-p（min）/10kΩ//10PF		
	TTL（~50MHz）	tr ≤6ns	Load :15PF	
		tf≤6ns		
		Duty circle 45%~55%		
Phase noise		10Hz	-70dBc	
		100Hz	-105 dBc	
		1KHz	-130 dBc	
		10KHz	-135 dBc	
Supply voltage		+12V±5%、+5V±5%		
Current consumption		5~15mA		
Operation Temperature range		Different temperature range（refer to the table below）		
Storage temperature range		-55~+100℃		
Frequency adjusting		±3ppm（Min）		
Dimension		24.7mm*12.6mm*8.7mm		

Frequency temperature stability (ppm)				
	±10	±15	±20	±25
0～50℃	GP	HP	JP	KP
-10～60℃	/	HR	JR	KR
-20～70℃	/	HS	JS	KS
-30～70℃	/	HT	JT	KT
-40～85℃	/	/	JU	KU

Outline dimensions

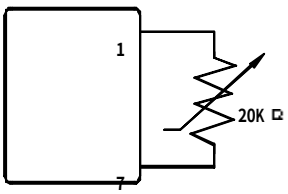


Pin function

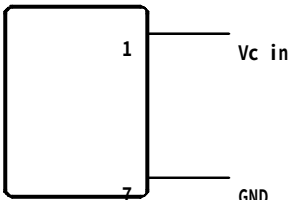
1：outside frequency adjusting（Vc）
or nothing connected (NC)
7： GND
8： RF output（RF）;
14：Supply voltage（Vcc）;

Outside frequency adjustment（you should note when ordering）

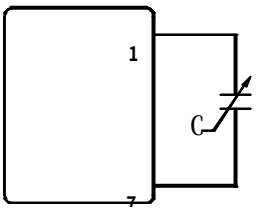
Connect with variable-resistance

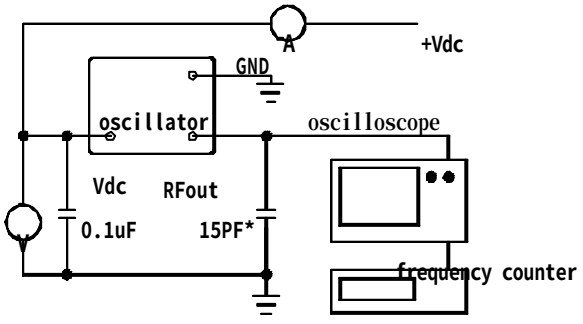


Connect with reference voltage

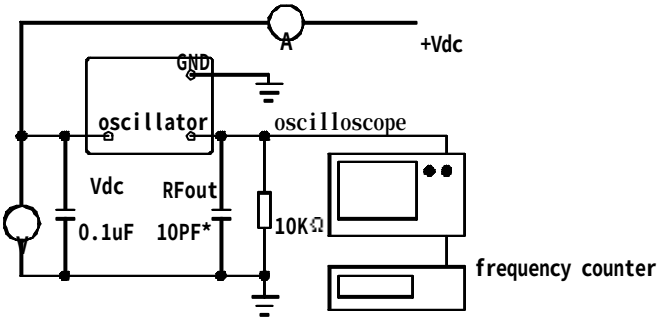


Connect with varicap





HCMOS test circuit



Clipped Sine test circuit

*include of jigging & equipment capacitance

Features

- Wide operation temperature range
- Small size、low power dissipation
- Different output waveform
- Standard DIL package
- Custormer's Products can be offered

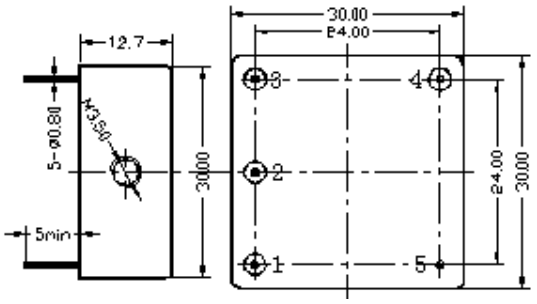
MP3030

ELECTRICAL SPECIFICATION

PARAMETER		CHARACTERISTIC		
Frequency range		10~160MHz		
Frequency tolerance		±2ppm @ 25℃		
Frequency stability	vs temperature	±10~±25ppm		
	vs suppluy voltage	±0.5ppm（Max）/V_D±5%		
	Ageing	±3ppm/1st year		
RF output	Sinewave	Output level	5dBm/50Ω， option+10dBm/50Ω	
		Harmonic distortion	≤−30dB	
		Non-Harmonic suppression	≤−70dB	
	Clipped Sinewave	1Vp-p（min）/10kΩ//10PF		
	TTL（~50MHz）	Risetime	≤6ns	Load :15PF
		Falltime	≤6ns	
		Duty cycle	45%~55%	
Phase noise		10Hz	-70dBc	
		100Hz	-105 dBc	
		1KHz	-130 dBc	
		10KHz	-135 dBc	
Supply voltage		+12V±5%、+5V±5%		
Current consumption		5~25mA		
Frequency adjusting		±3ppm（Min）		
Operation temperature range		Different temperature range（refer to the table below）		
Storage temperature range		−55~+100℃		
Dimension		30mm*30mm*12.7mm		

Frequency temperature stability（ppm）				
	±10	±15	±20	±25
0~50℃	GP	HP	JP	KP
-10~60℃	/	HR	JR	KR
-20~70℃	/	HS	JS	KS
-30~70℃	/	HT	JT	KT
-40~85℃	/		JU	KU

Outline dimension

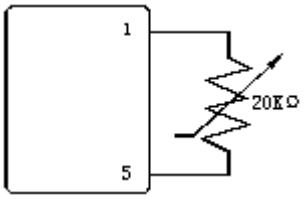


Pin function

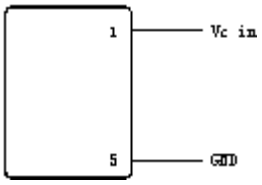
1： frequency adjustment（Vc）or nothing connected（NC）;
2：nothing connected（NC）;
3：power supply（Vcc）;
4：RF output（RF）;
5：Ground（GND）;

Outside frequency adjustment（you should note when ordering）

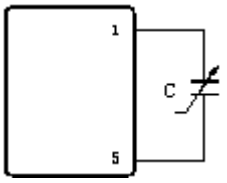
Connect with variable-resistance

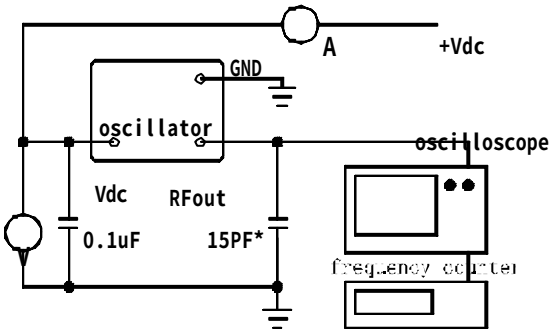


Connect to reference voltage

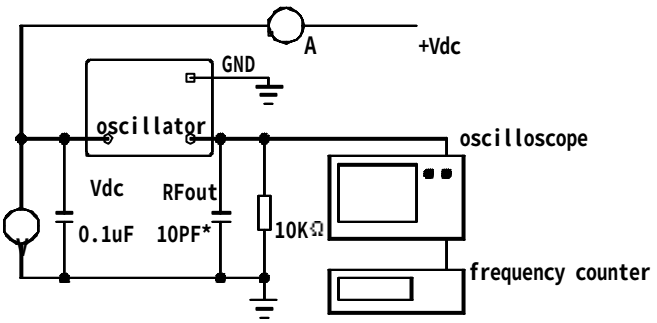


Connect with varicap





HCMOS test circuit



Clipped Sine test circuit

*include of jigging & equipment capacitance

HE880A

Broadband VCO

Features

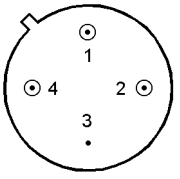
- Octave bandwidth range
- Low phase noise
- Linear tuning
- Standard package TO-8D
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	25~50	——	V_T: 0~15V
Output Power	Po	dBm	≥13	15	V_T =10V
Output Power Flatness	ΔPo	dB	≤±1.5	±1.0	V_T: 0~15V
Tuning Voltage	V_T	V	0~15	——	——
Pushing	——	MHz/V	——	0.5	Vcc:11~13V,V_T =10V
Spurious Suppression	——	dBc	-70	——	V_T =10V
Harmonic Suppression	——	dBc	——	-10	V_T =10V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-112	V_T =10V, fm=10kHz
Frequency Drift	Δf	MHz	——	3	V_T=10V T_A : -55~+85℃
DC Current	Icc	mA	——	30	——
Tuning Port Capacitance	C_T	pF	——	1000	——

Absolute Maximum Rating

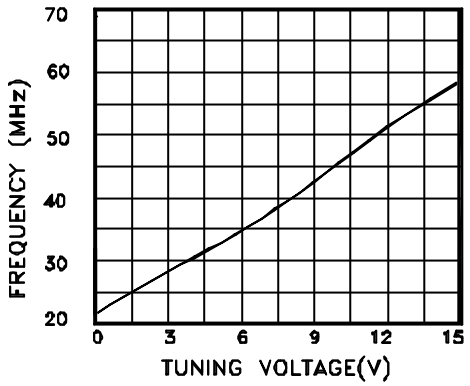
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125



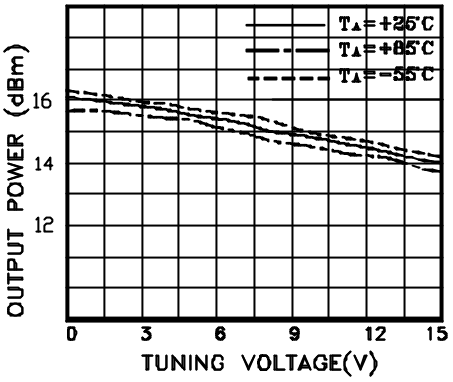
TO-8D

Typical Performance Curves

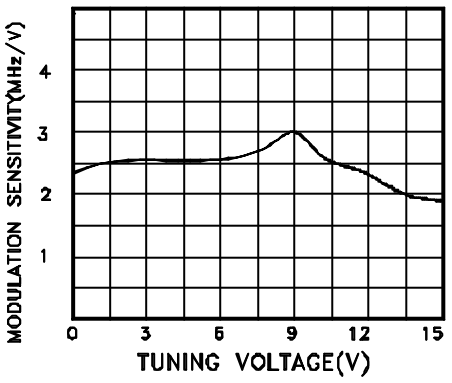
Frequency vs. Tuning Voltage



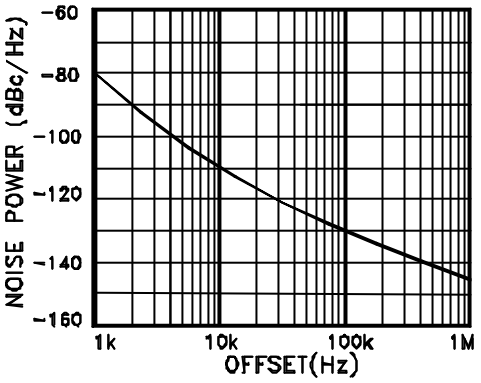
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

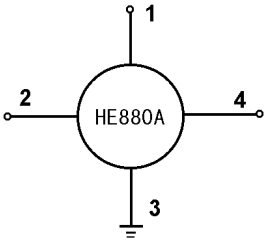


Phase Noise vs. Offset Frequency



Note:

1. Buffer isolation measures should be designed in order to reduce frequency pulling due to load variation.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Interchanged directly with VCO-102 from American VARIL company.



1. Vcc
2. V_T
3. GND
4. Output Po

HE880B

Broadband VCO

Features

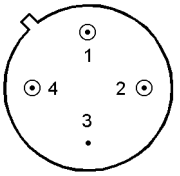
- Octave bandwidth range
- Low phase noise
- Linear tuning
- Standard package TO-8D
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	50~100	——	V_T: 0~15V
Output Power	Po	dBm	≥13	15	V_T =10V
Output Power Flatness	ΔPo	dB	≤±1.5	±1.0	V_T: 0~15V
Tuning Voltage	V_T	V	0~15	——	——
Pushing	——	MHz/V	——	0.5	Vcc:11~13V,V_T =10V
Spurious Suppression	——	dBc	-70	——	V_T =10V
Harmonic Suppression	——	dBc	——	-10	V_T =10V
SSB Phase Noise	S_ϕ	dBc/Hz	—	-112	V_T =10V, fm=10kHz
Frequency Drift	Δf	MHz	——	4	V_T=10V T_A : -55~+85℃
DC Current	Icc	mA	——	30	——
Tuning Port Capacitance	C_T	pF	——	1000	——

Absolute Maximum Rating

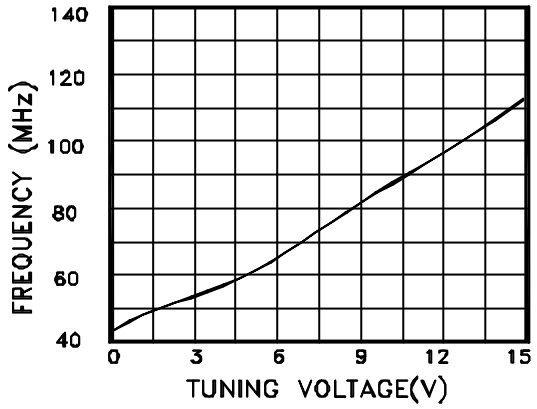
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125



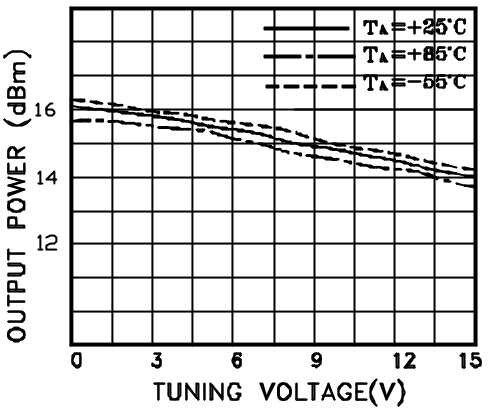
TO-8D

Typical Performance Curves

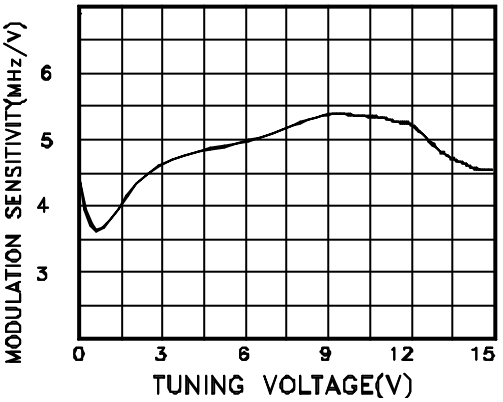
Frequency vs. Tuning Voltage



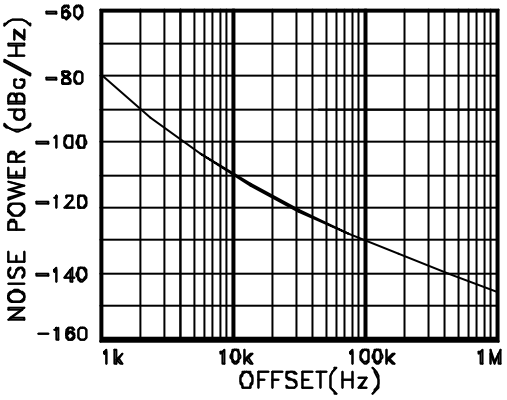
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

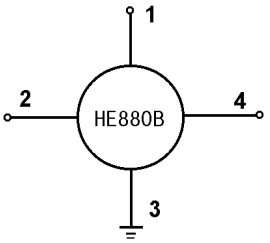


Phase Noise vs. Offset Frequency



Note:

1. Buffer isolation measures should be designed in order to reduce frequency pulling due to load variation.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Interchanged directly with VCO-103, HV17T-1from American company VARIL and Magnum respectively.



1. Vcc
2. V_T
3. GND
4. Output Po

HE881

Broadband VCO

Features

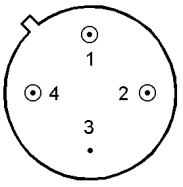
- Octave bandwidth range
- Low phase noise
- Linear tuning
- Standard package TO-8D
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	70~140	——	V_T: 0~15V
Output Power	Po	dBm	≥13	15	V_T =10V
Output Power Flatness	ΔPo	dB	≤±1.5	±1.0	V_T: 0~15V
Tuning Voltage	V_T	V	0~15	——	——
Pushing	——	MHz/V	——	0.5	Vcc:11~13V,V_T =10V
Spurious Suppression	——	dBc	-70	——	V_T =10V
Harmonic Suppression	——	dBc	——	-10	V_T =10V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-110	V_T =10V, fm=10kHz
Frequency Drift	Δf	MHz	——	6	V_T=10V T_A : -55~+85℃
DC Current	Icc	mA	——	30	——
Tuning Port Capacitance	C_T	pF	——	400	——

Absolute Maximum Rating

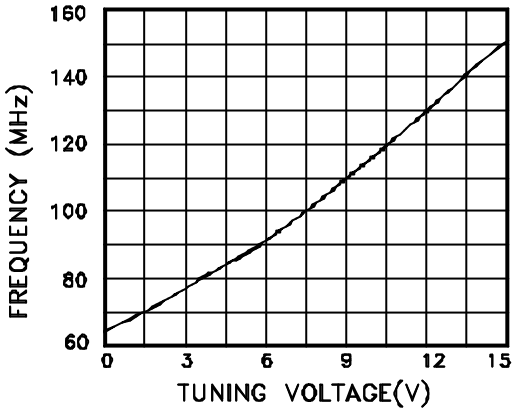
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125



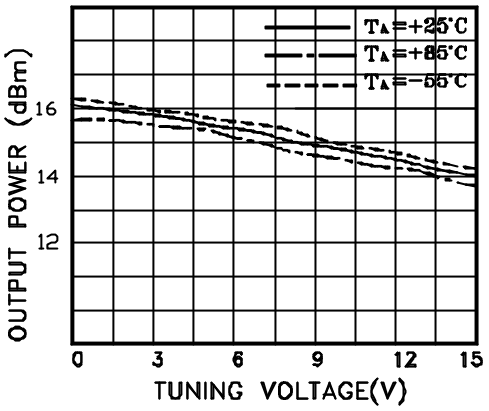
TO-8D

Typical Performance Curves

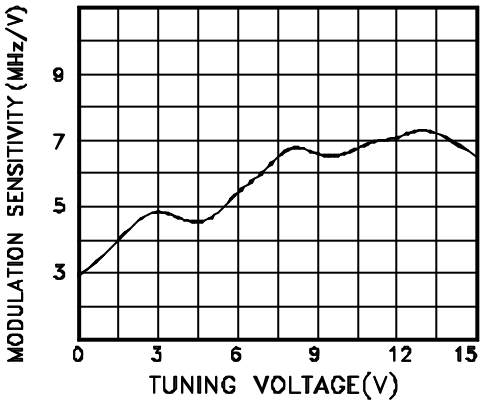
Frequency vs. Tuning Voltage



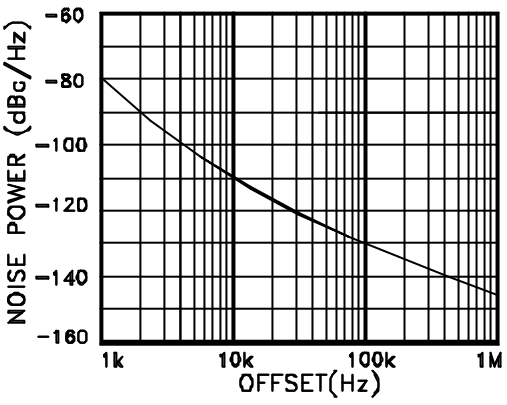
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

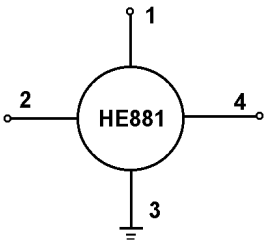


Phase Noise vs. Offset Frequency



Note:

1. Buffer isolation measures should be designed in order to reduce frequency pulling due to load variation.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Interchanged directly with VCO-114from American VARIL company.



1. Vcc
2. V_T
3. GND
4. Output Po

HE882

Broadband VCO

Features

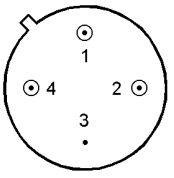
- Octave bandwidth range
- Low phase noise
- Linear tuning
- Standard package TO-8D
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	100~200	——	V_T: 0~20V
Output Power	Po	dBm	≥13	15	V_T =10V
Output Power Flatness	ΔPo	dB	≤±1.5	±1.0	V_T: 0~20V
Tuning Voltage	V_T	V	0~20	——	——
Pushing	——	MHz/V	——	0.5	Vcc:11~13V,V_T =10V
Spurious Suppression	——	dBc	-70	——	V_T =10V
Harmonic Suppression	——	dBc	——	-10	V_T =10V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-110	V_T =10V, fm=10kHz
Frequency Drift	Δf	MHz	——	6	V_T=10V T_A : -55~+85℃
DC Current	Icc	mA	——	30	——
Tuning Port Capacitance	C_T	pF	——	400	——

Absolute Maximum Rating

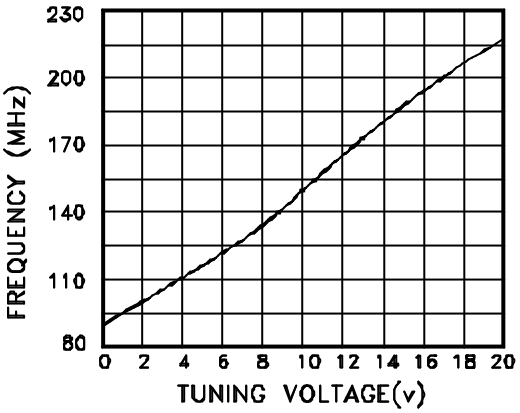
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125



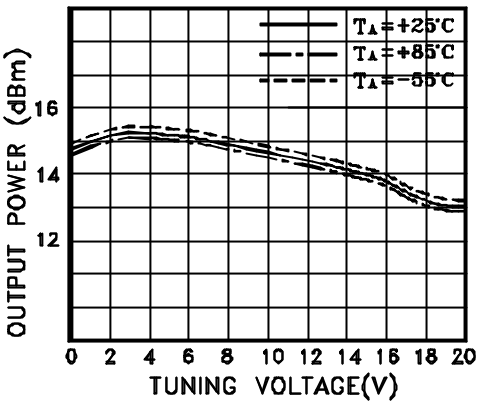
TO-8D

Typical Performance Curves

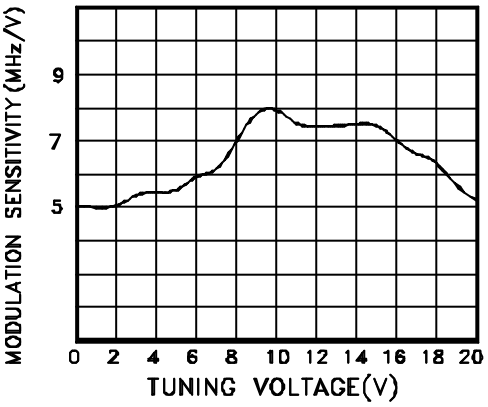
Frequency vs. Tuning Voltage



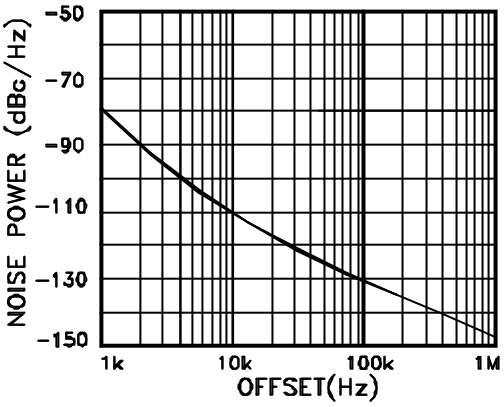
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

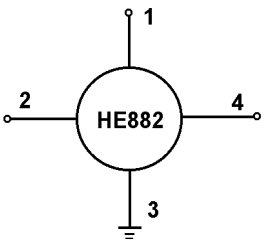


Phase Noise vs. Offset Frequency



Note:

1. Buffer isolation measures should be designed in order to reduce frequency pulling due to load variation.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Interchanged directly with VCO-104, HV27T-11from American company VARIL and Magnum respectively.



1. Vcc
2. V_T
3. GND
4. Output Po

HE883

Broadband VCO

Features

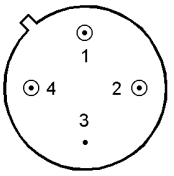
- Octave bandwidth range
- Low phase noise
- Linear tuning
- Standard package TO-8D
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	150~300	——	V_T: 0~20V
Output Power	Po	dBm	≥13	15	V_T =10V
Output Power Flatness	ΔPo	dB	≤±1.5	±1.0	V_T: 0~20V
Tuning Voltage	V_T	V	0~20	——	——
Pushing	——	MHz/V	——	0.5	Vcc:11~13V,V_T =10V
Spurious Suppression	——	dBc	-70	——	V_T =10V
Harmonic Suppression	——	dBc	——	-10	V_T =10V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-110	V_T =10V, fm=10kHz
Frequency Drift	Δf	MHz	——	6	V_T=10V T_A : -55~+85℃
DC Current	Icc	mA	——	30	——
Tuning Port Capacitance	C_T	pF	——	400	——

Absolute Maximum Rating

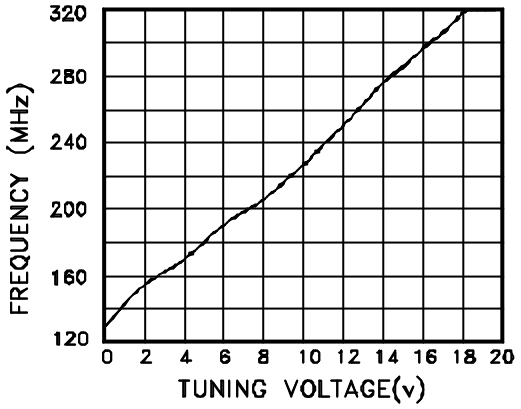
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125



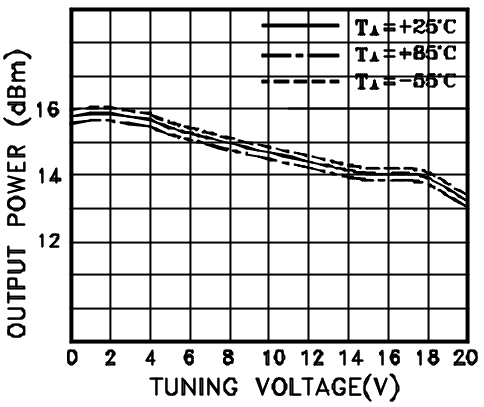
TO-8D

Typical Performance Curves

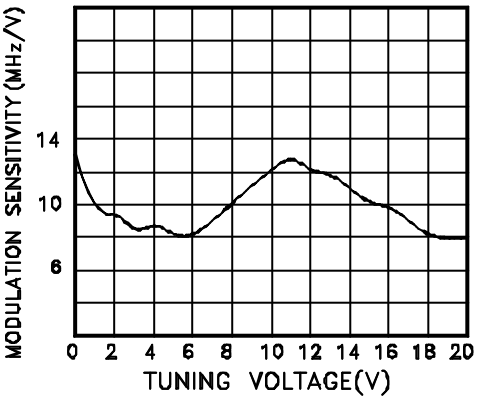
Frequency vs. Tuning Voltage



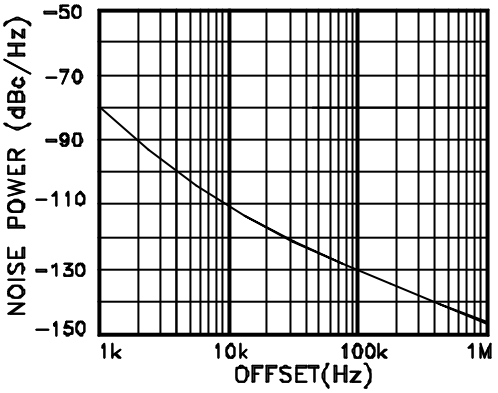
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

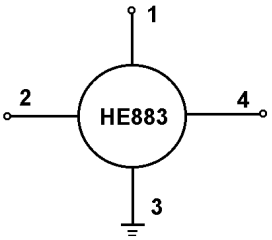


Phase Noise vs. Offset Frequency



Note:

1. Buffer isolation measures should be designed in order to reduce frequency pulling due to load variation.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Interchanged directly with VCO-116 from American VARIL company.



1. Vcc
2. V_T
3. GND
4. Output Po

HE884

Broadband VCO

Features

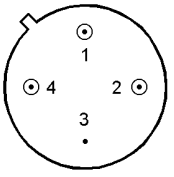
- Octave bandwidth range
- Low phase noise
- Linear tuning
- Standard package TO-8D
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	200~400	——	V_T: 0~20V
Output Power	Po	dBm	≥13	15	V_T =10V
Output Power Flatness	ΔPo	dB	≤±1.5	±1.0	V_T: 0~20V
Tuning Voltage	V_T	V	0~20	——	——
Pushing	——	MHz/V	——	0.5	Vcc:11~13V,V_T =10V
Spurious Suppression	——	dBc	-70	——	V_T =10V
Harmonic Suppression	——	dBc	——	-10	V_T =10V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-110	V_T =10V, fm=10kHz
Frequency Drift	Δf	MHz	——	10	V_T=10V T_A : -55~+85℃
DC Current	Icc	mA	——	30	——
Tuning Port Capacitance	C_T	pF	——	400	——

Absolute Maximum Rating

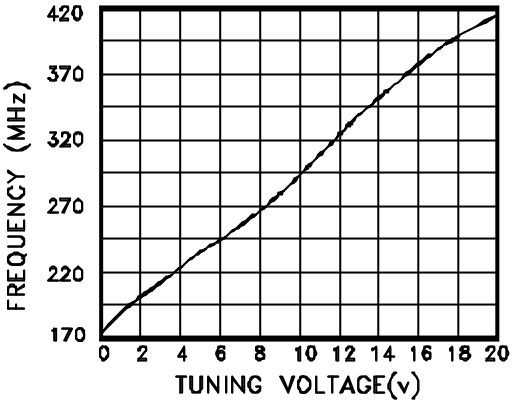
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125



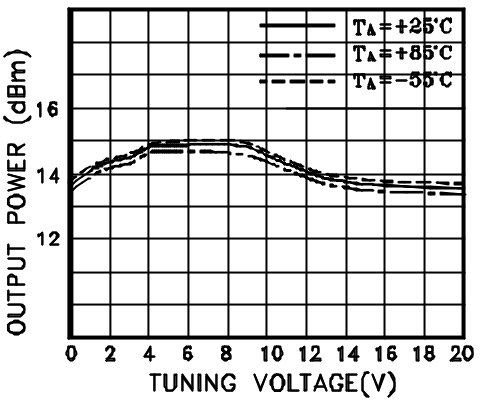
TO-8D

Typical Performance Curves

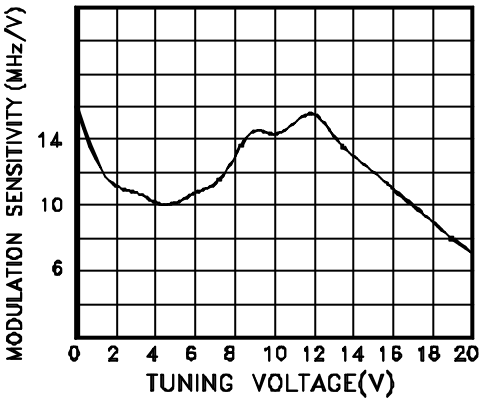
Frequency vs. Tuning Voltage



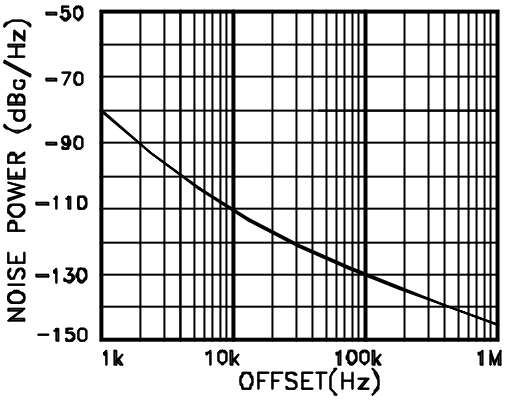
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

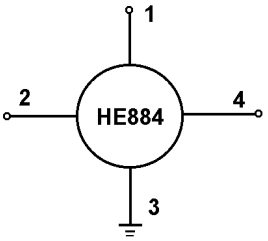


Phase Noise vs. Offset Frequency



Note:

1. Buffer isolation measures should be designed in order to reduce frequency pulling due to load variation.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Interchanged directly with VCO-105, HV37T-8from American company VARIL and Magnum respectively.



1. Vcc
2. V_T
3. GND
4. Output Po

HE401B

Broadband VCO

Features

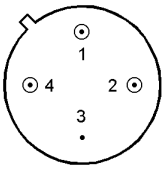
- Octave bandwidth range
- Low phase noise
- Linear tuning
- Standard package TO-8C
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	300~600	——	V_T: 0~20V
Output Power	Po	dBm	≥13	15	V_T =10V
Output Power Flatness	ΔPo	dB	≤±1.5	±1.0	V_T: 0~20V
Tuning Voltage	V_T	V	0~20	——	——
Pushing	——	MHz/V	——	1.0	Vcc:11~13V,V_T =10V
Spurious Suppression	——	dBc	-70	——	V_T =10V
Harmonic Suppression	——	dBc	——	-10	V_T =10V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-110	V_T =10V, fm=10kHz
Frequency Drift	Δf	MHz	——	16	V_T=10V T_A : -55~+85℃
DC Current	Icc	mA	——	30	——
Tuning Port Capacitance	C_T	pF	——	180	——

Absolute Maximum Rating

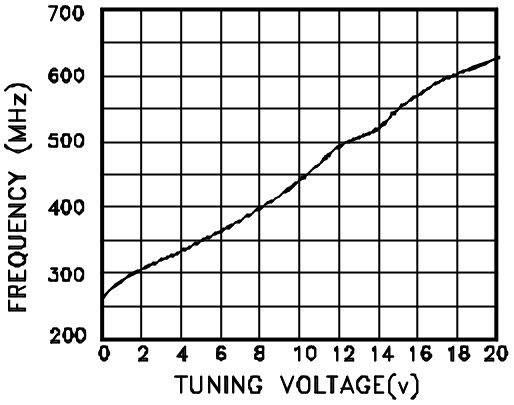
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~ +125℃



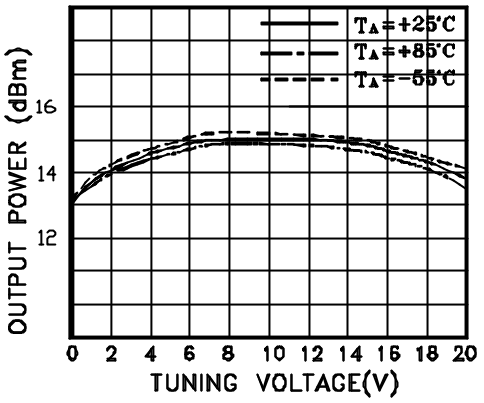
TO-8C

Typical Performance Curves

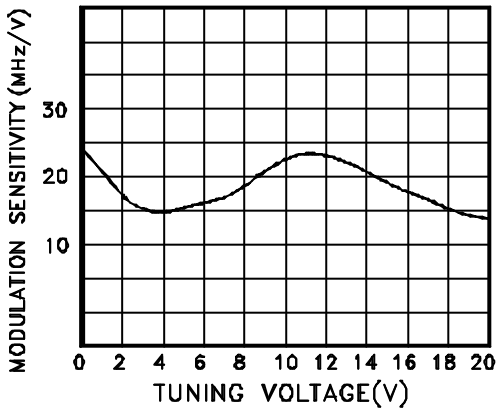
Frequency vs. Tuning Voltage



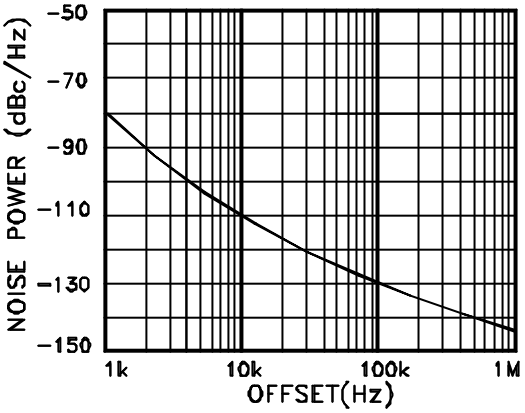
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

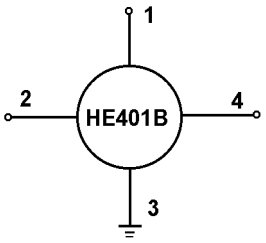


Phase Noise vs. Offset Frequency



Note:

1. Buffer isolation measures should be designed in order to reduce frequency pulling due to load variation.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10 f).
3. Anti-electrostatic measures should be adopted.
4. Interchanged directly with VCO- 117, MTO-8040, HV37T-7 from American company VARIL, AVANTEK and Magnum respectively.



1. Vcc
2. V_T
3. GND
4. Output Po

HE402B

Broadband VCO

Features

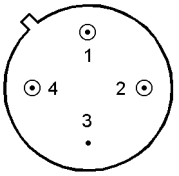
- Octave bandwidth range
- Low phase noise
- Linear tuning
- Standard package TO-8C
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	500~1000	——	V_T: 0~20V
Output Power	Po	dBm	≥13	14	V_T =10V
Output Power Flatness	ΔPo	dB	≤±1.5	——	V_T: 0~20V
Tuning Voltage	V_T	V	0~20	——	——
Pushing	——	MHz/V	——	2.0	Vcc:11~13V,V_T =10V
Spurious Suppression	——	dBc	-70	——	V_T =10V
Harmonic Suppression	——	dBc	——	-10	V_T =10V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-105	V_T =10V, fm=10kHz
Frequency Drift	Δf	MHz	——	18	V_T=10V T_A : -55~+85℃
DC Current	Icc	mA	——	30	——
Tuning Port Capacitance	C_T	pF	——	90	——

Absolute Maximum Rating

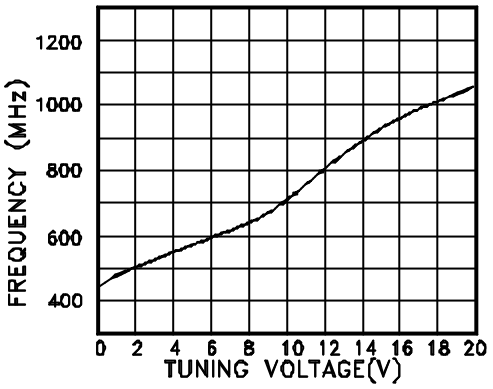
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage ---+30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~ +125℃



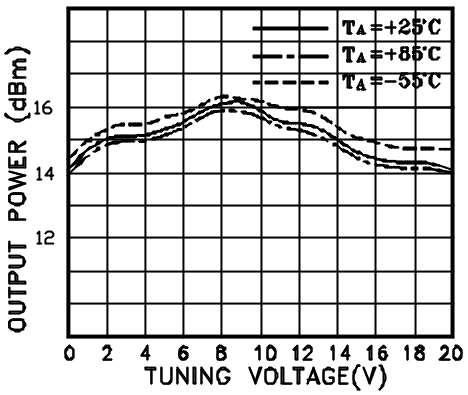
TO-8C

Typical Performance Curves

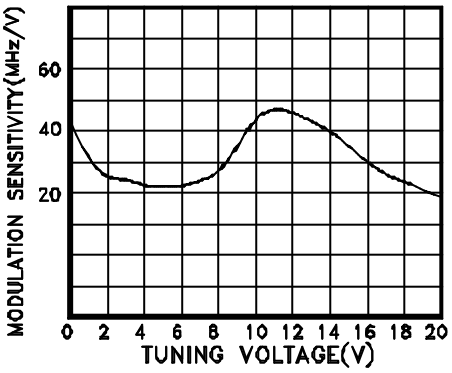
Frequency vs. Tuning Voltage



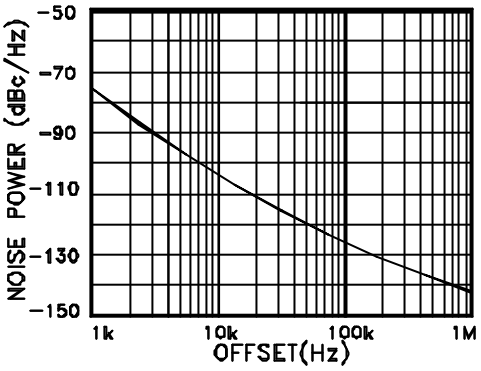
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

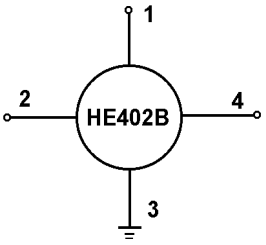


Phase Noise vs. Offset Frequency



Note:

1. Buffer isolation measures should be designed in order to reduce frequency pulling due to load variation.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10 f).
3. Anti-electrostatic measures should be adopted.
4. Interchanged directly with VCO-107, MTO-8060, from American company VARIL and AVANTEK respectively.



1. Vcc
2. V_T
3. GND
4. Output Po

HE403B

Broadband VCO

Features

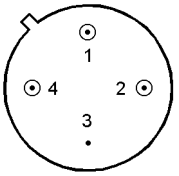
- Wide operating bandwidth
- Low phase noise
- Linear tuning
- Standard package TO-8C
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	800~1500	——	V_T: 0~20V
Output Power	Po	dBm	≥13	14	V_T =10V
Output Power Flatness	ΔPo	dB	≤±1.5	±1.0	V_T: 0~20V
Tuning Voltage	V_T	V	0~20	——	——
Pushing	——	MHz/V	——	2.0	Vcc:11~13V,V_T =10V
Spurious Suppression	——	dBc	-70	——	V_T =10V
Harmonic Suppression	——	dBc	——	-10	V_T =10V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-100	V_T =10V, fm=10kHz
Frequency Drift	Δf	MHz	——	20	V_T=10V T_A : -55~+85℃
DC Current	Icc	mA	——	30	——
Tuning Port Capacitance	C_T	pF	——	90	——

Absolute Maximum Rating

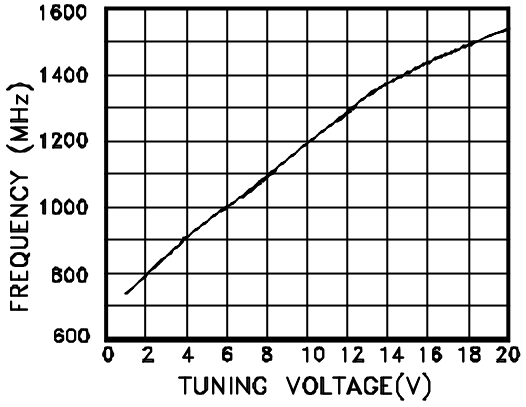
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125



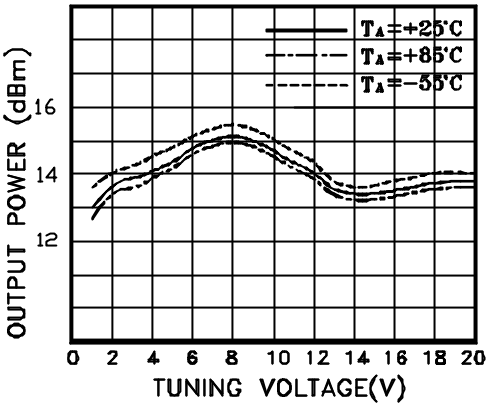
TO-8C

Typical Performance Curves

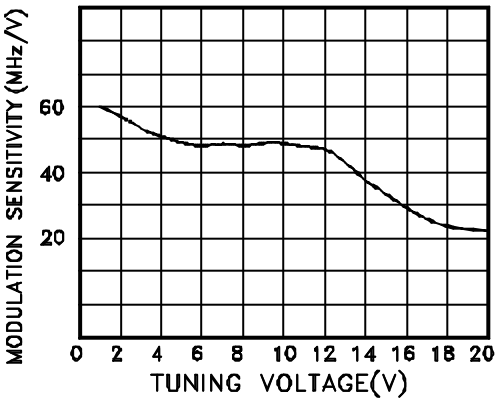
Frequency vs. Tuning Voltage



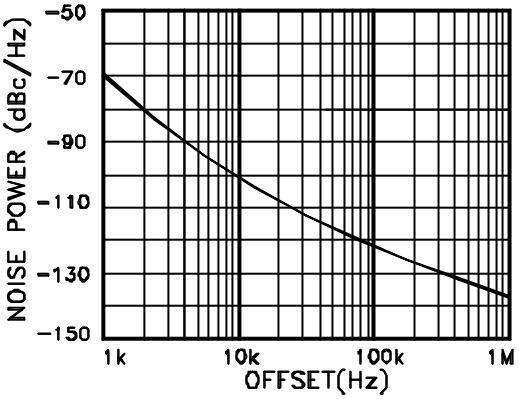
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

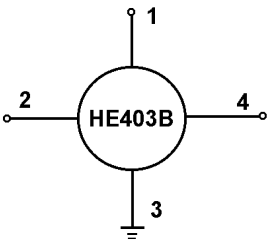


Phase Noise vs. Offset Frequency



Note:

1. Buffer isolation measures should be designed in order to reduce frequency pulling due to load variation.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Interchanged directly with MTO-8090 from American AVANTEK company.
5. Microstrip packaged VCO can be offered.



1. Vcc
2. V_T
3. GND
4. Output Po

HE405

Broadband VCO

Features

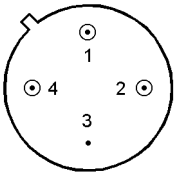
- Octave bandwidth range
- Low phase noise
- Linear tuning
- Standard package TO-8C
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	1000~2000	——	V_T: 0~20V
Output Power	Po	dBm	≥13	14	V_T =10V
Output Power Flatness	ΔPo	dB	≤±1.5	——	V_T: 0~20V
Tuning Voltage	V_T	V	0~20	——	——
Pushing	——	MHz/V	——	2.0	Vcc:11~13V,V_T =10V
Spurious Suppression	——	dBc	-70	——	V_T =10V
Harmonic Suppression	——	dBc	——	-10	V_T =10V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-100	V_T =10V, fm=10kHz
Frequency Drift	Δf	MHz	——	30	V_T=10V T_A : -55~+85℃
DC Current	Icc	mA	——	30	——
Tuning Port Capacitance	C_T	pF	——	90	——

Absolute Maximum Rating

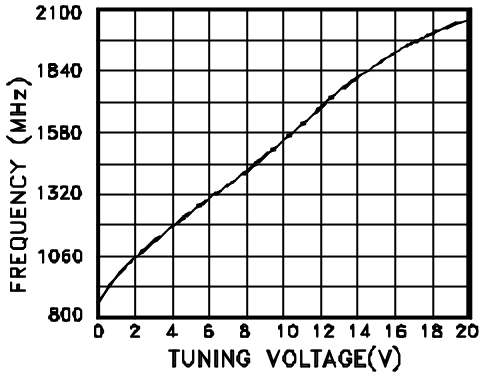
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125℃



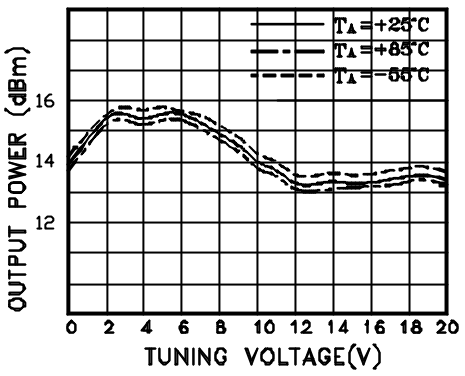
TO-8C

Typical Performance Curves

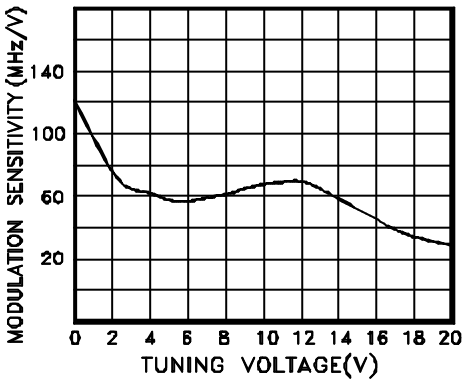
Frequency vs. Tuning Voltage



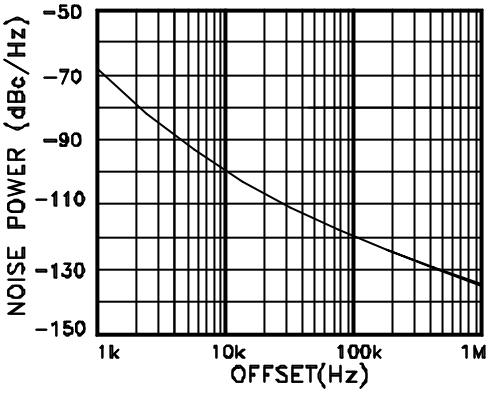
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

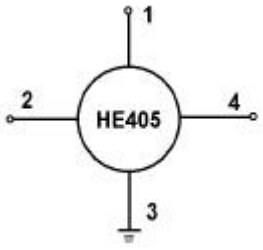


Phase Noise vs. Offset Frequency



Note:

1. Buffer isolation measures should be designed in order to reduce frequency pulling due to load variation.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Interchanged directly with VCO-1107, HTO-2000 from American company VARIL, AVANTEK respectively.
5. Microstrip packaged VCO can be offered.



1. Vcc
2. V_T
3. GND
4. OutputPo

HE483
Broadband VCO

Features

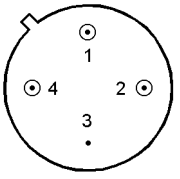
- Octave bandwidth range
- Low phase noise
- Linear tuning
- Standard package TO-8C
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	700~1400	——	V_T: 0~20V
Output Power	Po	dBm	≥13	14	V_T =10V
Output Power Flatness	ΔPo	dB	≤±1.5	——	V_T: 0~20V
Tuning Voltage	V_T	V	0~20	——	——
Pushing	——	MHz/V	——	2.0	Vcc:11~13V,V_T =10V
Spurious Suppression	——	dBc	-70	——	V_T =10V
Harmonic Suppression	——	dBc	——	-10	V_T =10V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-100	V_T =10V, fm=10kHz
Frequency Drift	Δf	MHz	——	20	V_T=10V T_A : -55~+85℃
DC Current	Icc	mA	——	30	——
Tuning Port Capacitance	C_T	pF	——	150	——

Absolute Maximum Rating

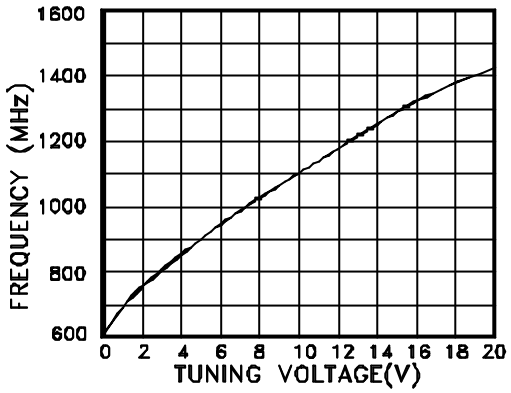
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage--- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125



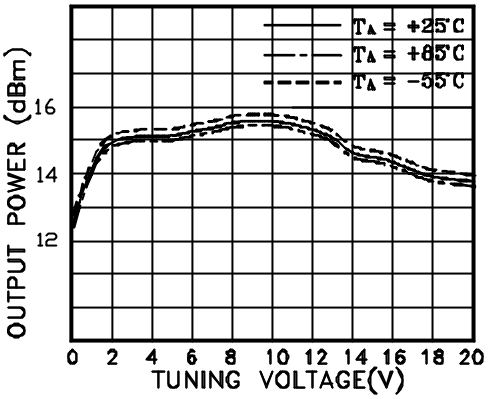
TO-8C

Typical Performance Curves

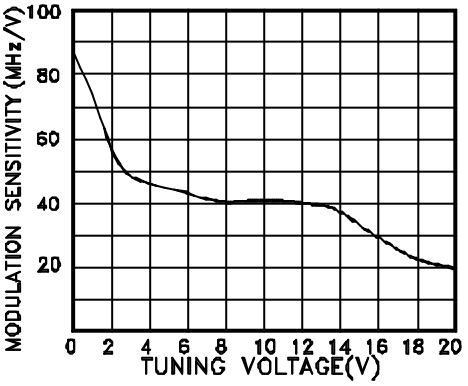
Frequency vs. Tuning Voltage



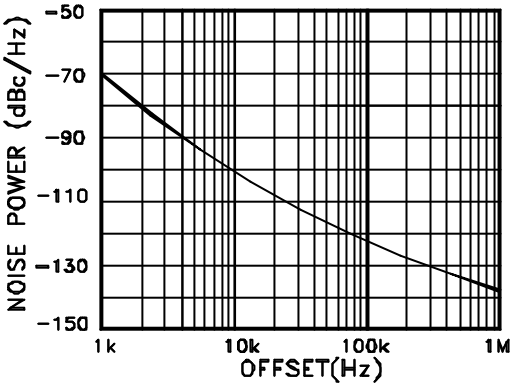
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

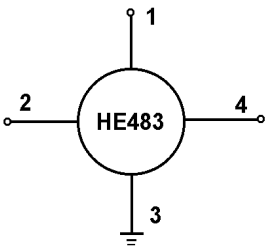


Phase Noise vs. Offset Frequency



Note:

1. Buffer isolation measures should be designed in order to reduce frequency pulling due to load variation.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10 f).
3. Anti-electrostatic measures should be adopted.
4. Interchanged directly with VCO-121, VTO-8080from American company VARIL, AVANTEK respectively.
5. Microstrip packaged VCO can be offered.



1. Vcc
2. V_T
3. GND
4. Output Po

HE484

Broadband VCO

Features

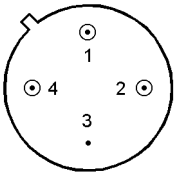
- Octave bandwidth range
- Low phase noise
- Linear tuning
- Standard package TO-8C
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	800~1600	——	V_T: 0~20V
Output Power	Po	dBm	≥13	14	V_T =10V
Output Power Flatness	ΔPo	dB	≤±1.5	——	V_T: 0~20V
Tuning Voltage	V_T	V	0~20	——	——
Pushing	——	MHz/V	——	2.0	Vcc:11~13V,V_T =10V
Spurious Suppression	——	dBc	-70	——	V_T =10V
Harmonic Suppression	——	dBc	——	-10	V_T =10V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-100	V_T =10V, fm=10kHz
Frequency Drift	Δf	MHz	——	22	V_T=10V T_A : -55~+85℃
DC Current	Icc	mA	——	30	——
Tuning Port Capacitance	C_T	pF	——	90	——

Absolute Maximum Rating

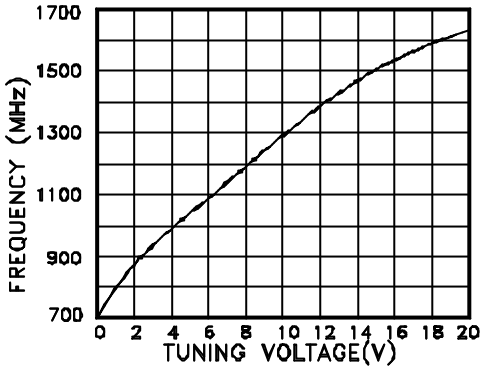
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125



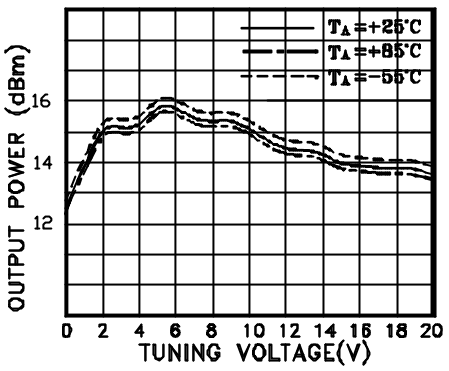
TO-8C

Typical Performance Curves

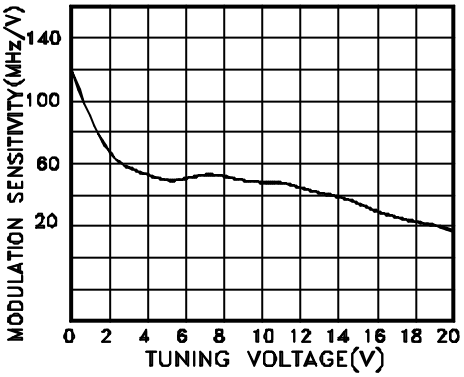
Frequency vs. Tuning Voltage



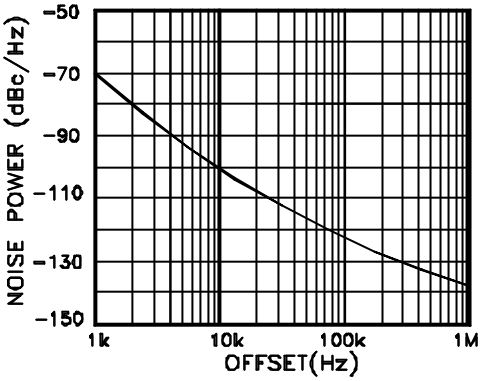
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

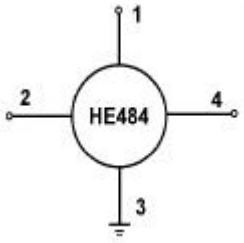


Phase Noise vs. Offset Frequency



Note:

1. Buffer isolation measures should be designed in order to reduce frequency pulling due to load variation.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Interchanged directly with VCO-108, VTO-8090 from American company VARIL, AVANTEK respectively.
5. Microstrip packaged VCO can be offered.



1. Vcc
2. V_T
3. GND
4. Output Po

HE486B

Broadband VCO

Features

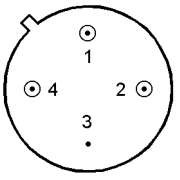
- Wide operating bandwidth
- Low phase noise
- Linear tuning
- Standard package TO-8C
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	2000~3000	——	V_T: 0~15V
Output Power	Po	dBm	≥13	14	V_T =5V
Output Power Flatness	ΔPo	dB	≤±1.5	±1.0	V_T: 0~15V
Tuning Voltage	V_T	V	0~15	——	——
Pushing	——	MHz/V	——	3.0	Vcc:11~13V,V_T =5V
Spurious Suppression	——	dBc	-70	——	V_T =5V
Harmonic Suppression	——	dBc	——	-30	V_T =5V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-95	V_T =5V, fm=10kHz
Frequency Drift	Δf	MHz	——	50	V_T=5V T_A : -55~+85℃
DC Current	Icc	mA	——	30	——
Tuning Port Capacitance	C_T	pF	——	45	——

Absolute Maximum Rating

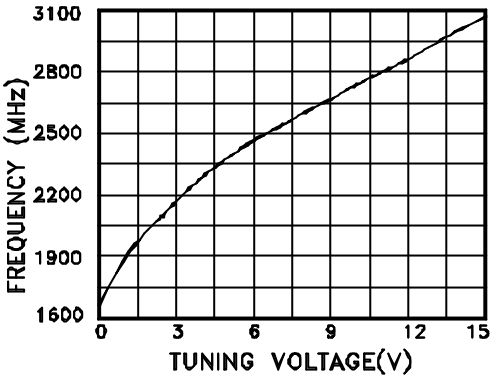
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage --- -0.7V
Storage Temperature --- -55~+125



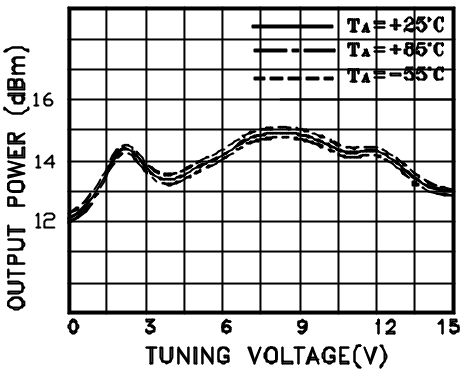
TO-8C

Typical Performance Curves

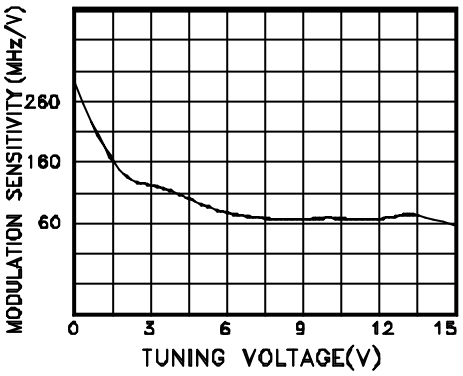
Frequency vs. Tuning Voltage



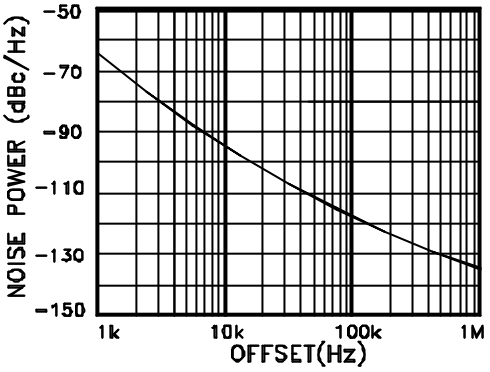
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

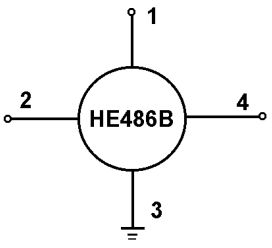


Phase Noise vs. Offset Frequency



Note:

1. Buffer isolation measures should be designed in order to reduce frequency pulling due to load variation.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Interchanged directly with VCO-112, VTO-8200 from American company VARIL, AVANTEK respectively.
5. Microstrip packaged VCO can be offered.



1. Vcc
2. V_T
3. GND
4. Output Po

HE488

Broadband VCO

Features

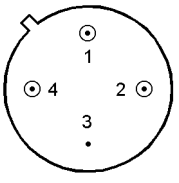
- Wide operating bandwidth
- Low phase noise
- Linear tuning
- Standard package TO-8C
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	3700~4200	——	V_T: 0~15V
Output Power	Po	dBm	≥10	12	V_T =5V
Output Power Flatness	ΔPo	dB	≤±1.5	±1.0	V_T: 0~15V
Tuning Voltage	V_T	V	0~15	——	——
Pushing	——	MHz/V	——	3.0	Vcc:11~13V,V_T =5V
Spurious Suppression	——	dBc	-70	——	V_T =5V
Harmonic Suppression	——	dBc	——	-20	V_T =5V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-87	V_T =5V, fm=10kHz
Frequency Drift	Δf	MHz	——	50	V_T=5V T_A : -55~+85℃
DC Current	Icc	mA	——	30	——
Tuning Port Capacitance	C_T	pF	——	45	——

Absolute Maximum Rating

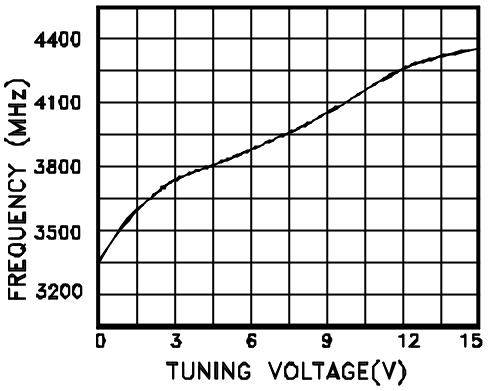
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125



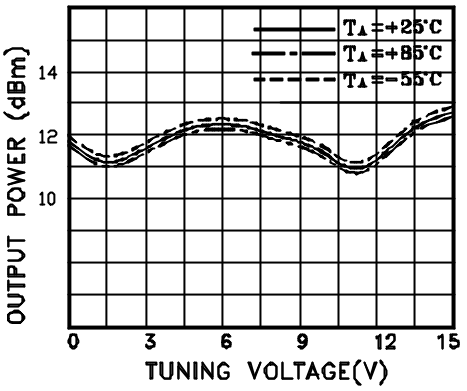
TO-8C

Typical Performance Curves

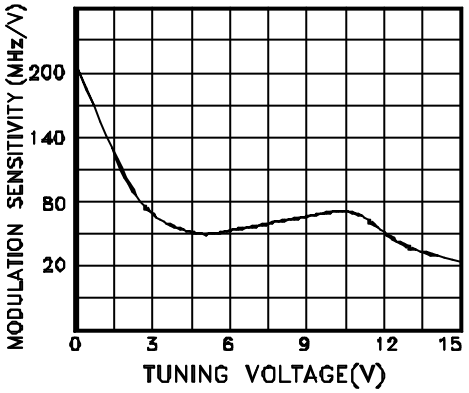
Frequency vs. Tuning Voltage



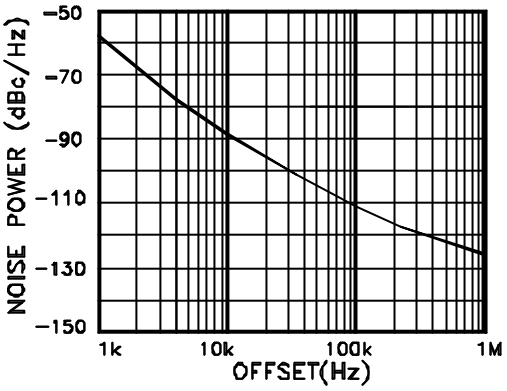
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

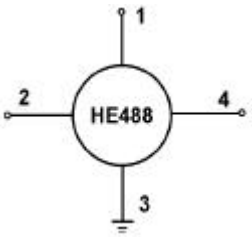


Phase Noise vs. Offset Frequency



Note:

1. Buffer isolation measures should be designed in order to reduce frequency pulling due to load variation.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Interchanged directly with VTO-8360 from American AVANTEK company.
5. Microstrip packaged VCO can be offered.



1. Vcc
2. V_T
3. GND
4. Output Po

HE885

Ultra-Broadband VCO

Features

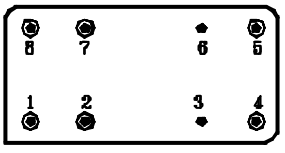
- Approximately 2 octave bandwidth range
- Low phase noise
- Linear tuning
- Built-in buffer isolation amplifier
- Package DIP-22A
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	Ⅰ Band: 30~45 Ⅱ Band: 44~75 ⅢBand: 70~110	——	V_T: 2~10V
Output Power	Po	dBm	≥10	10	V_T =5V
Output Power Flatness	ΔPo	dB	≤±1.0	±1.0	V_T:2~10V
Tuning Voltage	V_T	V	2~10	——	——
Control Port Voltage and Current	V_+, V_- I_+	V mA	≥+3.6, ≤−3.6 ≥8	——	——
Switch Time	——	μS	——	5.0(Ton) 2.0(Toff)	V_T =5V
Pushing	——	MHz/V	——	0.5	Vcc:11~13V,V_T =5V
Spurious Suppression	——	dBc	-70	——	V_T =5V
Harmonic Suppression	——	dBc	——	-10	V_T =5V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-112	V_T =5V, fm=10kHz
Frequency Drift	Δf	MHz	——	2	V_T=5V T_A : -55~+85℃
DC Current	Icc	mA	——	50	——
Tuning Port Capacity	C_T	pF	——	390	——

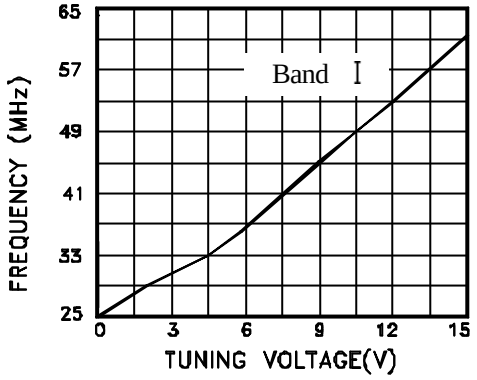
Absolute Maximum Rating

Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage ---+30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125℃

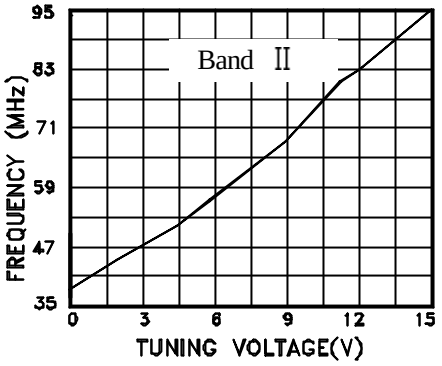


DIP-22A

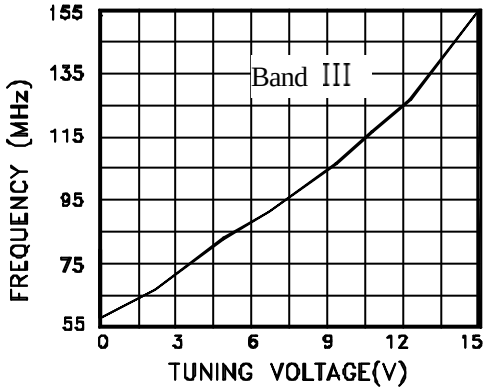
Typical Performance Curves



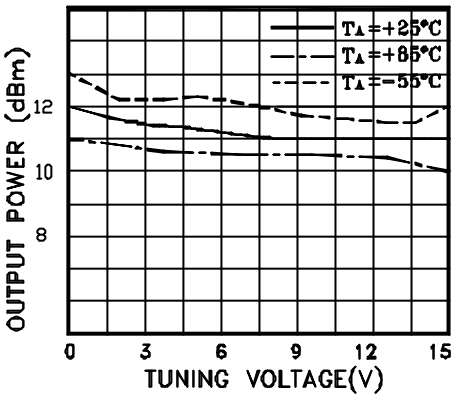
Frequency vs. Tuning Voltage



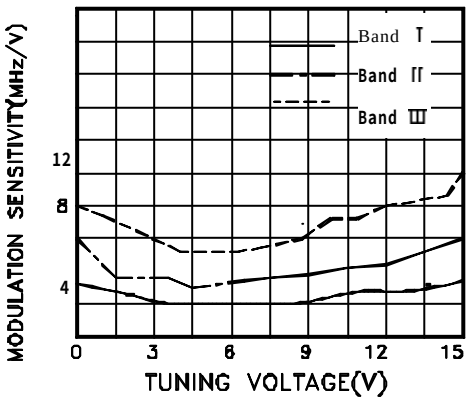
Frequency vs. Tuning Voltage



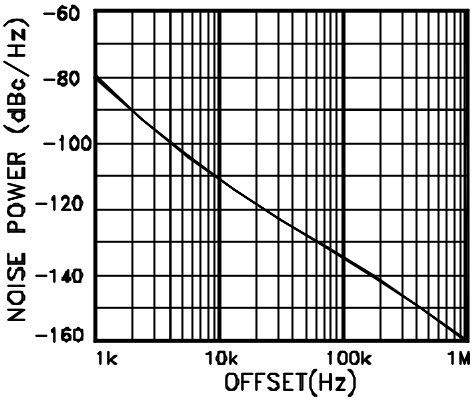
Frequency vs. Tuning Voltage



Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

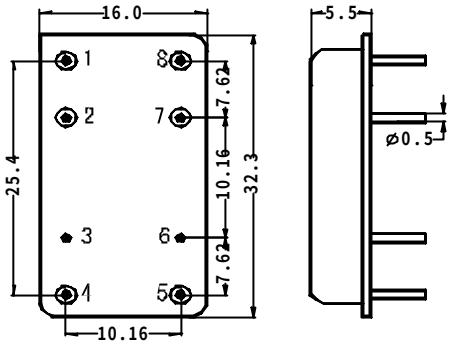


Phase Noise vs. Offset Frequency

Note:

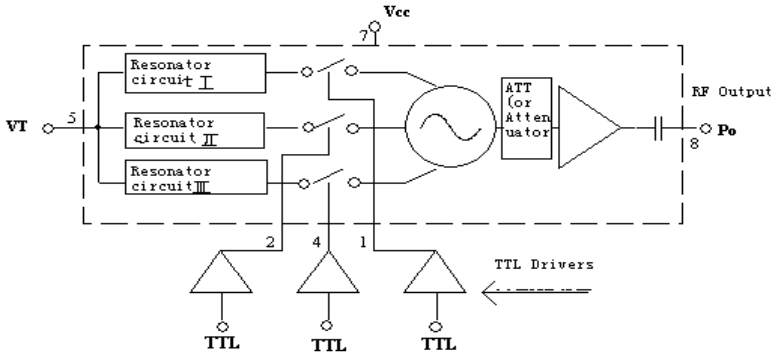
1. PIN Function:

PIN 1 Ⅰband control port:
(30~~45MHz)
PIN 2 Ⅱband control port:
(44~~75MHz)
PIN 3 Ⅲ band control port:
(44~~75MHz)
PIN 5 Tuning Port V_T
PIN 6 GND
PIN 7 DC Voltage Vcc
PIN 8 Output Po

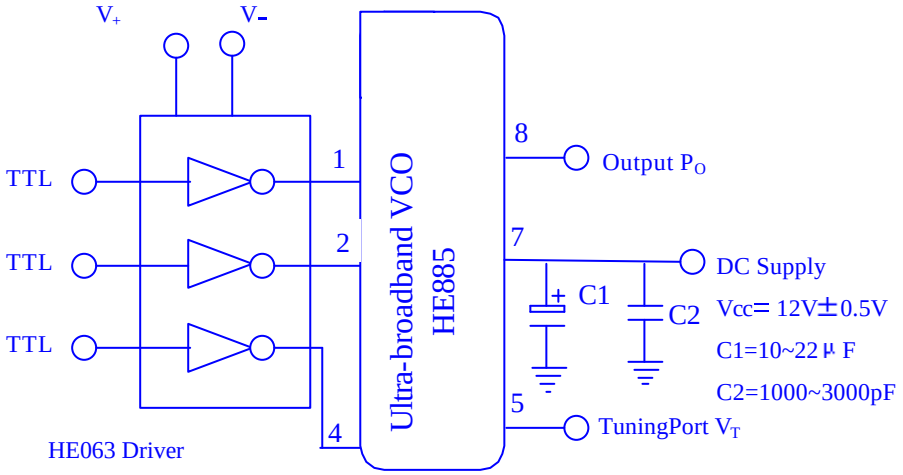


Package Drawing
(Unit: mm, PIN Length: ≥3.0mm,Tolerance: ±0.25mm)

2. Schematic:



3. Typical Application:



* HE063---- TTL driver, see this catalog for detail performances.

4.

4.1 Built-in buffer isolation amplifier.

4.2 Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacity at Vcc is necessary(about 10μf).

4.3 Anti-electrostatic measures should be adopted.

4.4 TTL diver HE063 are recommended.

4.5 Customers' products can be offered.

Features

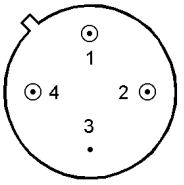
- Low phase noise
- Built-in buffer isolation amplifier
- Standard package TO-8D
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	535~635	——	V_T: 0~12V
Output Power	Po	dBm	≥13	14	V_T =5V
Output Power Flatness	ΔPo	dB	≤±1.0	——	V_T: 0~12V
Tuning Voltage	V_T	V	0~12	——	——
Pushing	——	MHz/V	——	1.0	Vcc:11~13V,V_T =5V
Spurious Suppression	——	dBc	-70	——	V_T =5V
Harmonic Suppression	——	dBc	——	-10	V_T =5V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-100	V_T =5V, fm=10kHz
Frequency Drift	Δf	MHz	——	13	V_T=5V T_A : -55~+85℃
DC Current	Icc	mA	——	60	——
Tuning Port Capacitance	C_T	pF	——	90	——

Absolute Maximum Rating

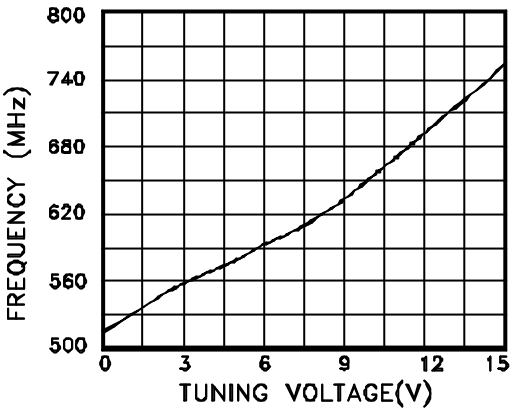
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125℃



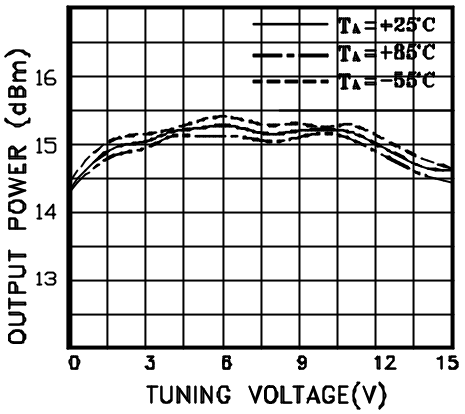
TO-8D

Typical Performance Curves

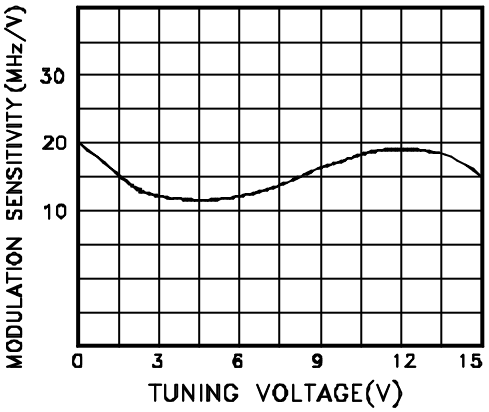
Frequency vs. Tuning Voltage



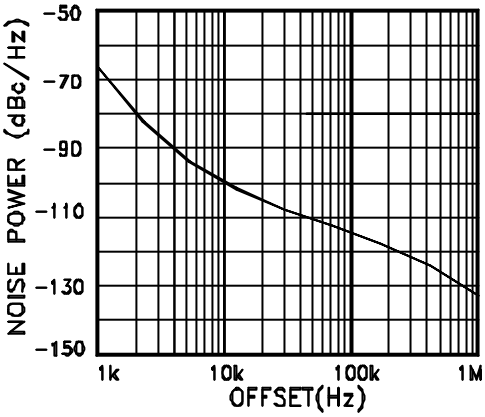
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

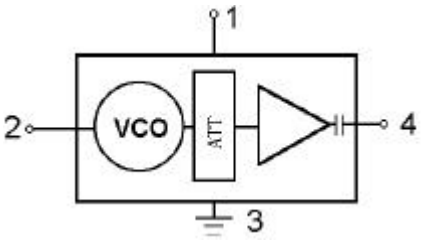


Phase Noise vs. Offset Frequency



Note:

1. Built-in buffer isolation amplifier.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Microstrip package VCO can be offered.



1. Vcc 3.GND
2. V_T 4.Output Po

Features

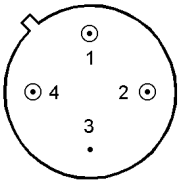
- Wide operation bandwidth
- Low phase noise
- Built-in buffer isolation amplifier
- Standard package TO-8D
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	1500~2100	——	V_T: 0~20V
Output Power	Po	dBm	≥10	12	V_T =10V
Output Power Flatness	ΔPo	dB	≤±1.5	±1.0	V_T: 0~20V
Tuning Voltage	V_T	V	0~20	——	——
Pushing	——	MHz/V	——	2.0	Vcc:11~13V,V_T =10V
Spurious Suppression	——	dBc	-70	——	V_T =10V
Harmonic Suppression	——	dBc	——	-15	V_T =10V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-95	V_T =10V, fm=10kHz
Frequency Drift	Δf	MHz	——	35	V_T=10V T_A : -55~+85℃
DC Current	Icc	mA	——	70	——
Tuning Port Capacitance	C_T	pF	——	90	——

Absolute Maximum Rating

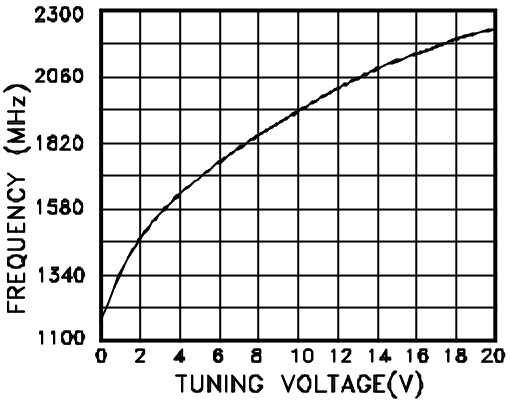
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125℃



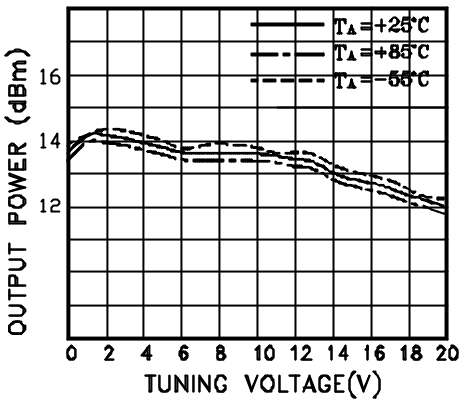
TO-8D

Typical Performance Curves

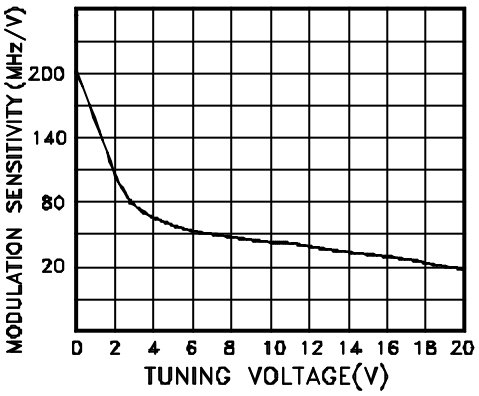
Frequency vs. Tuning Voltage



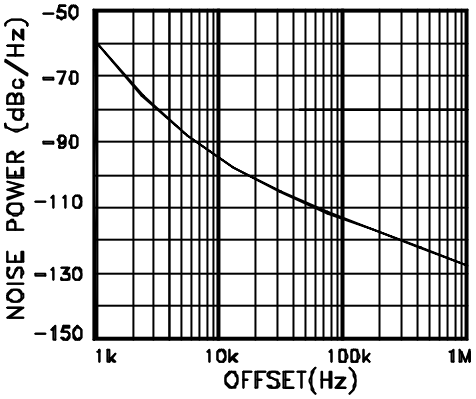
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

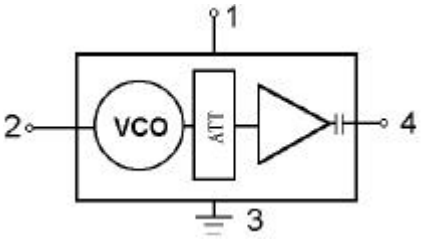


Phase Noise vs. Offset Frequency



Note:

1. Built-in buffer isolation amplifier.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Microstrip package VCO can be offered.



1. Vcc 3.GND
2. V_T 4.Output Po

Features

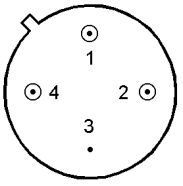
- Wide operation bandwidth
- Low phase noise
- Built-in buffer isolation amplifier
- Standard package TO-8D
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	1800~2600	——	V_T: 0~20V
Output Power	Po	dBm	≥10	12	V_T =10V
Output Power Flatness	ΔPo	dB	≤±1.5	±1.0	V_T: 0~20V
Tuning Voltage	V_T	V	0~20	——	——
Pushing	——	MHz/V	——	3.0	Vcc:11~13V,V_T =10V
Spurious Suppression	——	dBc	-70	——	V_T =10V
Harmonic Suppression	——	dBc	——	-35	V_T =10V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-95	V_T =10V, fm=10kHz
Frequency Drift	Δf	MHz	——	40	V_T=10V T_A : -55~+85℃
DC Current	Icc	mA	——	70	——
Tuning Port Capacitance	C_T	pF	——	90	——

Absolute Maximum Rating

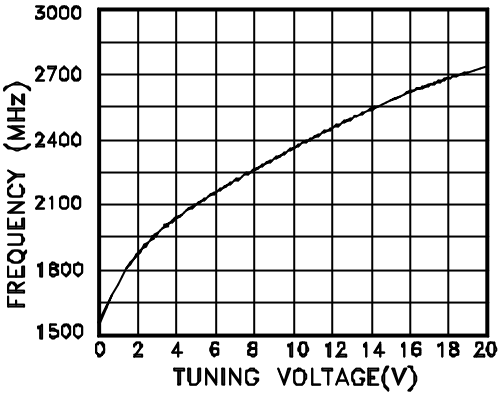
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125℃



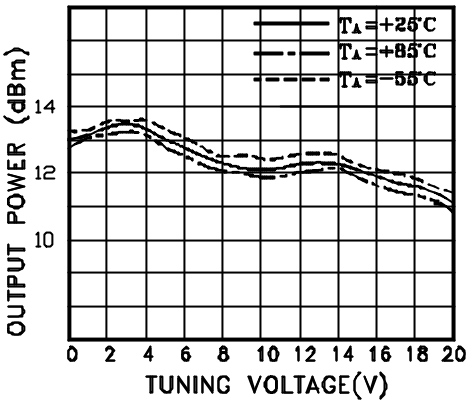
TO-8D

Typical Performance Curves

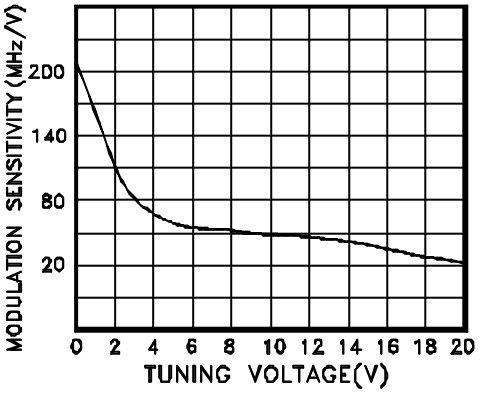
Frequency vs. Tuning Voltage



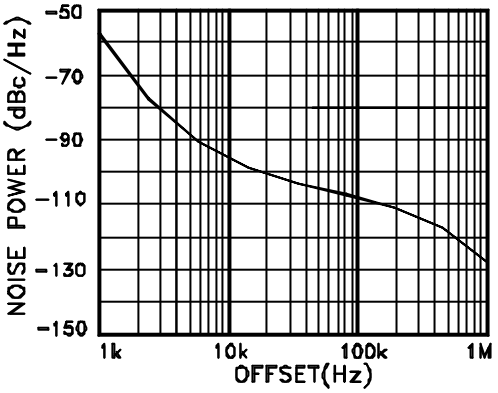
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

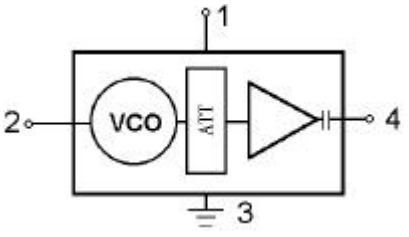


Phase Noise vs. Offset Frequency



Note:

1. Built-in buffer isolation amplifier.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Microstrip package VCO can be offered.



1. Vcc 3.GND
2. V_T 4.Output Po

Features

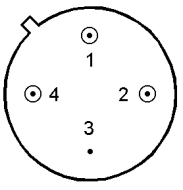
- Wide operation bandwidth
- Low phase noise
- Built-in buffer isolation amplifier
- Standard package TO-8D
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	2200~3000	——	V_T: 0~15V
Output Power	Po	dBm	≥10	12	V_T =10V
Output Power Flatness	ΔPo	dB	≤±1.5	±1.0	V_T: 0~15V
Tuning Voltage	V_T	V	0~15	——	——
Pushing	——	MHz/V	——	3.0	Vcc:11~13V,V_T =10V
Spurious Suppression	——	dBc	-70	——	V_T =10V
Harmonic Suppression	——	dBc	——	-30	V_T =10V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-90	V_T =10V, fm=10kHz
Frequency Drift	Δf	MHz	——	50	V_T=10V T_A : -55~+85℃
DC Current	Icc	mA	——	70	——
Tuning Port Capacitance	C_T	pF	——	90	——

Absolute Maximum Rating

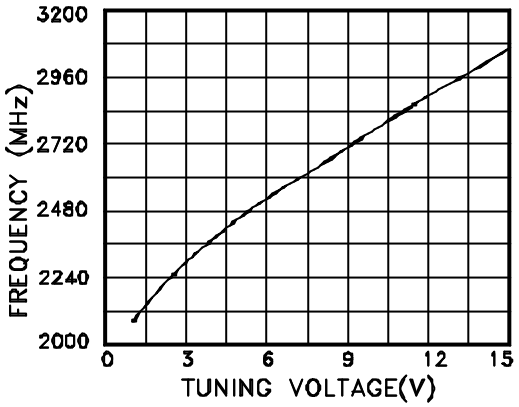
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125℃



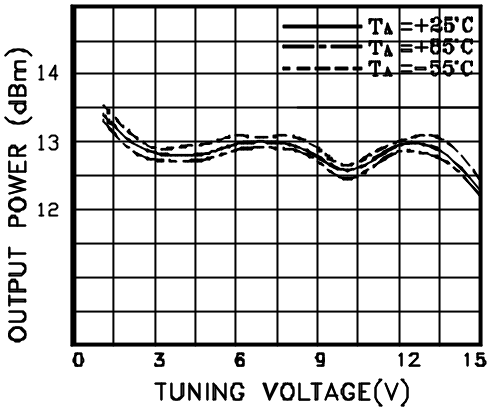
TO-8D

Typical Performance Curves

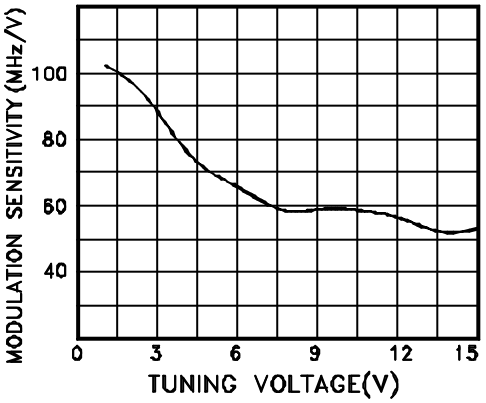
Frequency vs. Tuning Voltage



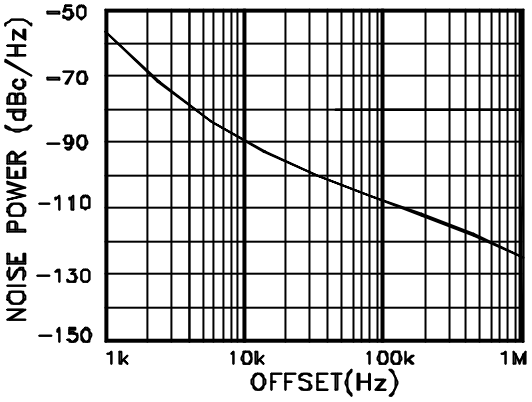
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

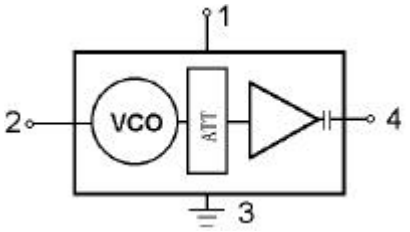


Phase Noise vs. Offset Frequency



Note:

1. Built-in buffer isolation amplifier.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Microstrip package VCO can be offered.



1. Vcc 3.GND
2. V_T 4.Output Po

HE716

VCO With Built-in Buffer Amplifier

Features

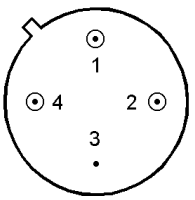
- Wide operation bandwidth
- Low phase noise
- Linear tuning
- Built-in buffer isolation amplifier
- Standard package TO-8D
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	5000~6000	——	V_T: 0~15V
Output Power	Po	dBm	≥10	11	V_T=5V
Output Power Flatness	ΔPo	dB	≤±1.5	——	V_T: 0~15V
Tuning Voltage	V_T	V	0~15	——	——
Pushing	——	MHz/V	——	10	Vcc:11~13V,V_T=5V
Spurious Suppression	——	dBc	-60	——	V_T=5V
Harmonic Suppression	——	dBc	——	-20	V_T=5V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-97	V_T=5V, fm=100kHz
Frequency Drift	Δf	MHz	——	150	V_T=5V T_A : -55~+85℃
DC Current	Icc	mA	——	85	——
Tuning Port Capacitance	C_T	pF	——	45	——

Absolute Maximum Rating

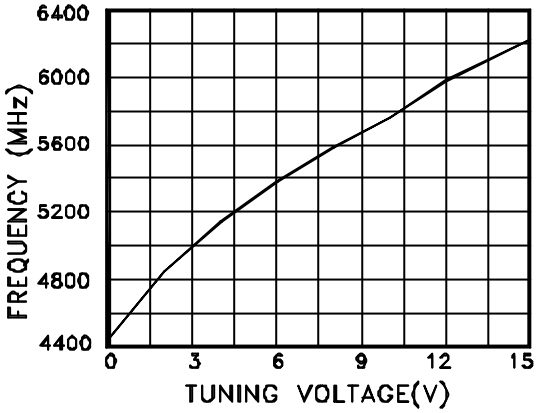
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125℃



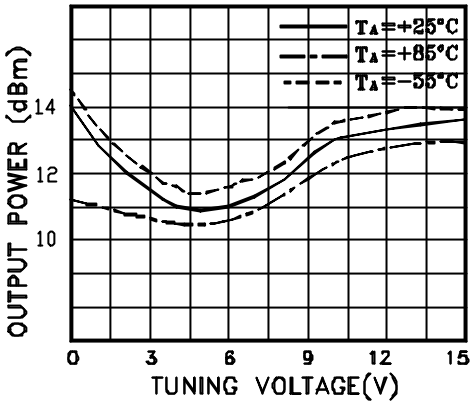
TO-8D

Typical Performance Curves

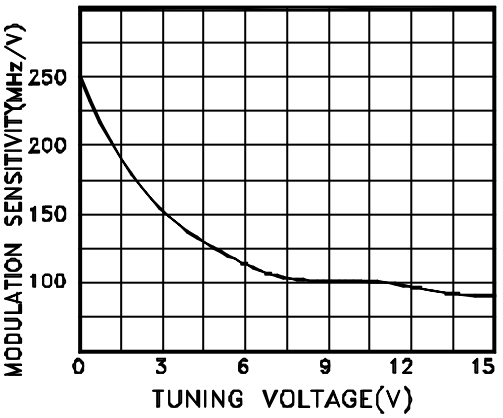
Frequency vs. Tuning Voltage



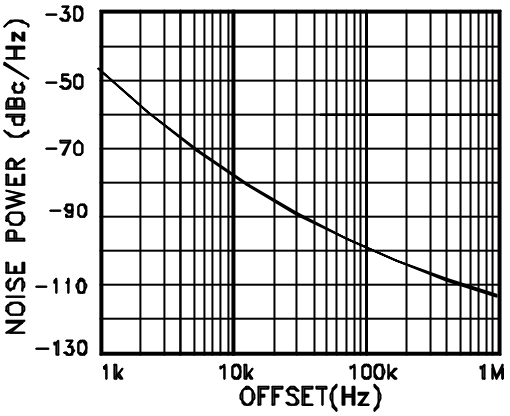
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

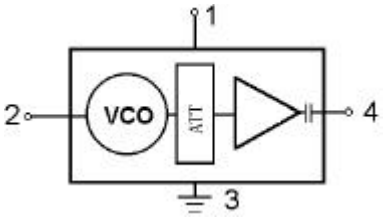


Phase Noise vs. Offset Frequency



Note:

1. Built-in buffer isolation amplifier.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Microstrip package VCO can be offered.



1. Vcc 3.GND
2. V_T 4.Output Po

HE717

VCO With Built-in Buffer Amplifier

Features

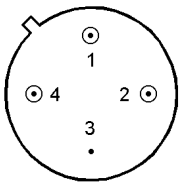
- Wide operation bandwidth
- Low phase noise
- Built-in buffer isolation amplifier
- Standard package TO-8D
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	8000~9000	——	V_T: 0~15V
Output Power	Po	dBm	≥10	11	V_T=5V
Output Power Flatness	ΔPo	dB	≤±1.5	——	V_T: 0~15V
Tuning Voltage	V_T	V	0~15	——	——
Pushing	——	MHz/V	——	15	Vcc:11~13V,V_T=5V
Spurious Suppression	——	dBc	-60	——	V_T=5V
Harmonic Suppression	——	dBc	——	-20	V_T=5V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-92	V_T=5V, fm=100kHz
Frequency Drift	Δf	MHz	——	180	V_T=5V T_A : -55~+85℃
DC Current	Icc	mA	——	85	——
Tuning Port Capacitance	C_T	pF	——	45	——

Absolute Maximum Rating

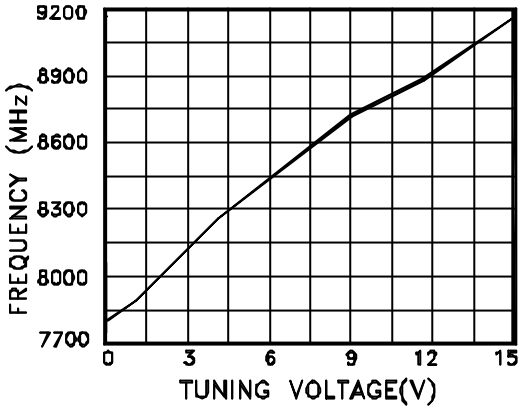
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125℃



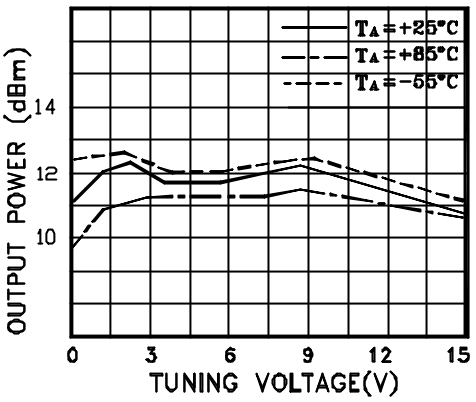
TO-8D

Typical Performance Curves

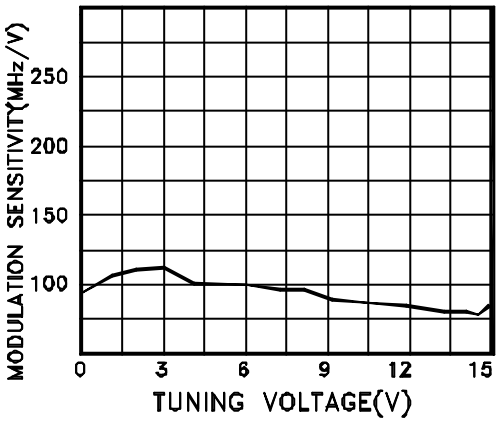
Frequency vs. Tuning Voltage



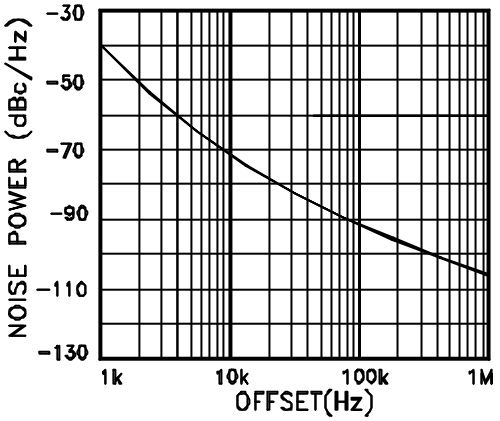
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

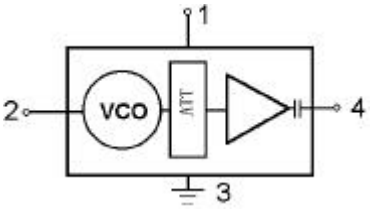


Phase Noise vs. Offset Frequency



Note:

1. Built-in buffer isolation amplifier.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Microstrip package VCO can be offered.



1. Vcc 3.GND
2. V_T 4.Output Po

HE406 *Ultra-Broadband VCO With Built-in Buffer Amplifier*

Features

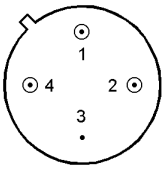
- Octave bandwidth range
- Low phase noise
- Built-in buffer isolation amplifier
- Standard package TO-8C
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	2000~4000	——	V_T: 0~20V
Output Power	Po	dBm	≥10	11	V_T=6V
Output Power Flatness	ΔPo	dB	≤±2.5	±1.5	V_T: 0~20V
Tuning Voltage	V_T	V	0~20	——	——
Pushing	——	MHz/V	——	15	Vcc:11~13V, V_T=6V
Spurious Suppression	——	dBc	≤-60	——	V_T=6V
Harmonic Suppression	——	dBc	——	-20	V_T=6V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-105	V_T=6V, fm=100kHz
Frequency Drift	Δf	MHz	——	100	V_T=6V T_A : -55~+85℃
DC Current	Icc	mA	——	85	——
Tuning Port Capacitance	C_T	pF	——	45	——

Absolute Maximum Rating

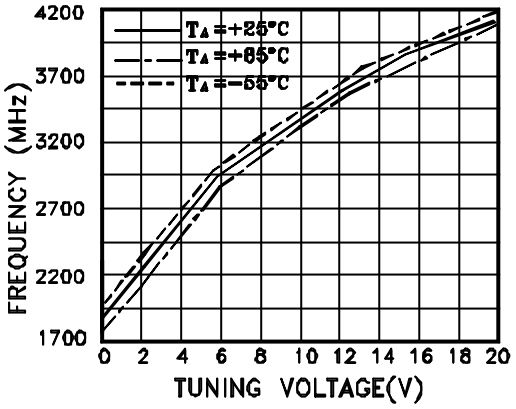
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +25V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125℃



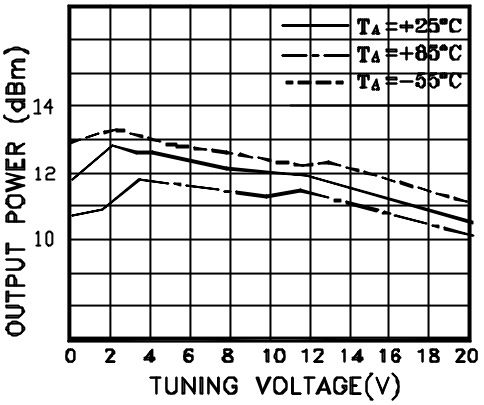
TO-8C

Typical Performance Curves

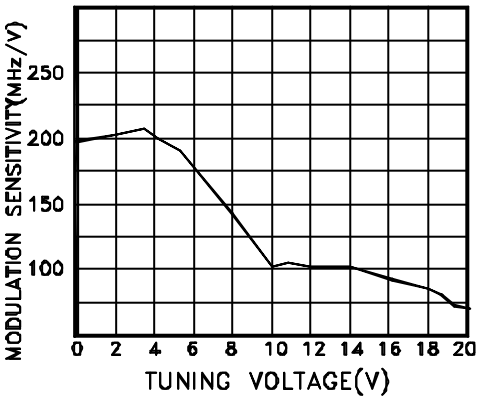
Frequency vs. Tuning Voltage



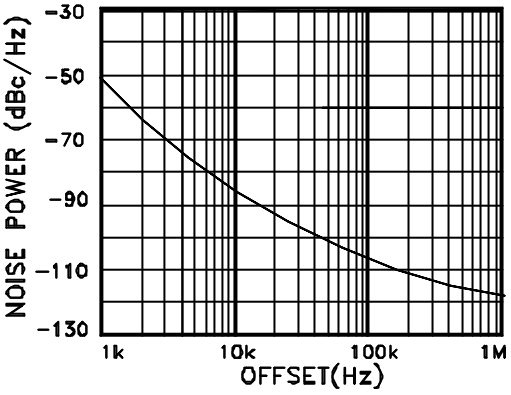
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

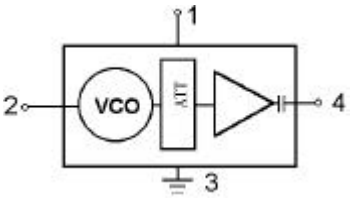


Phase Noise vs. Offset Frequency



Note:

1. Built-in buffer isolation amplifier.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Microstrip package VCO can be offered.



1. Vcc 3.GND
2. V_T 4.Output Po

HE102 Ultra-Broadband VCO With Built-in Buffer Amplifier

Features

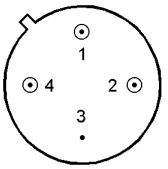
- Octave bandwidth range
- Low phase noise
- Linear tuning
- Built-in buffer isolation amplifier
- Standard package TO-8C
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +15V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	4000~8000	——	V_T: 0~20V
Output Power	Po	dBm	≥10	11	V_T=6V
Output Power Flatness	ΔPo	dB	≤±2.5	±1.5	V_T: 0~20V
Tuning Voltage	V_T	V	0~20	——	——
Pushing	——	MHz/V	——	20	Vcc:14~16V,V_T=6V
Spurious Suppression	——	dBc	-60	——	V_T=6V
Harmonic Suppression	——	dBc	——	-20	V_T=6V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-95	V_T=6V, fm=100kHz
Frequency Drift	Δf	MHz	——	120	V_T=6V T_A : -55~+85℃
DC Current	Icc	mA	——	85	——
Tuning Port Capacitance	C_T	pF	——	45	——

Absolute Maximum Rating

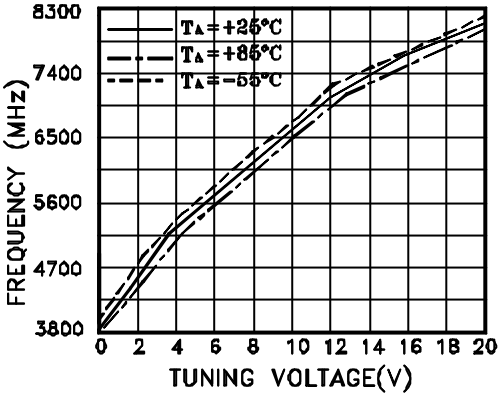
Maximum DC Voltage ----- +18VDC
Maximum Tuning Voltage --- +25V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125℃



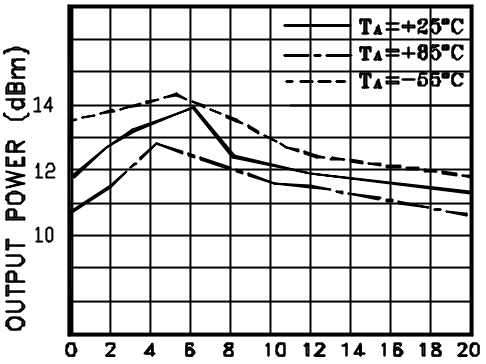
TO-8C

Typical Performance Curves

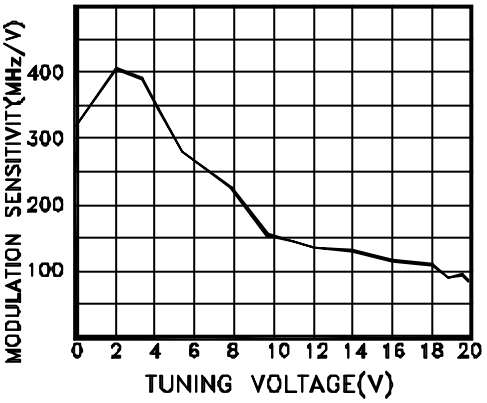
Frequency vs. Tuning Voltage



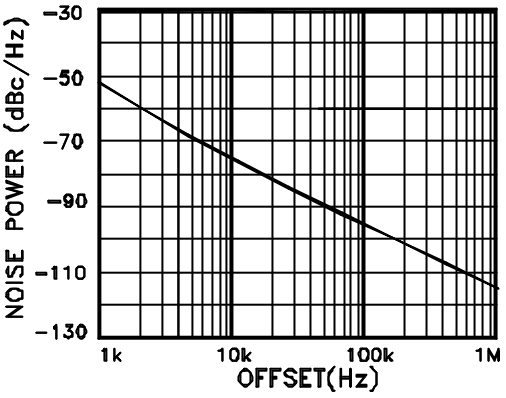
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

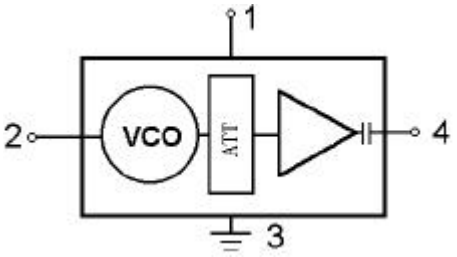


Phase Noise vs. Offset Frequency



Note:

1. Built-in buffer isolation amplifier.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Microstrip package VCO can be offered.



1. Vcc 3.GND
2. V_T 4.Output Po

Features

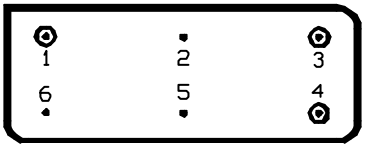
- Ceramic Coaxial Resonator Design
- Low phase noise
- Built-in buffer isolation amplifier
- Package DIP-22C
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	680~720	——	V_T: 0~15V
Output Power	Po	dBm	≥13	15	V_T=6V
Output Power Flatness	△Po	dB	≤±0.5	——	V_T: 0~15V
Tuning Voltage	V_T	V	0~15	——	——
Pushing	——	MHz/V	——	0.3	Vcc: 11~13V, V_T=6V
Harmonic Suppression	——	dBc	——	-15	——
Spurious Suppression	——	dBc	-70	——	V_T=6V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-115	V_T=6V, fm=10kHz
Frequency Drift vs. Temperature	——	ppm/℃	——	±10	V_T=6V,T_A:-55~+85℃
DC Current	Icc	mA	——	60	——
Tuning Port Capacitance	C_T	pF	——	90	——

Absolute Maximum Rating

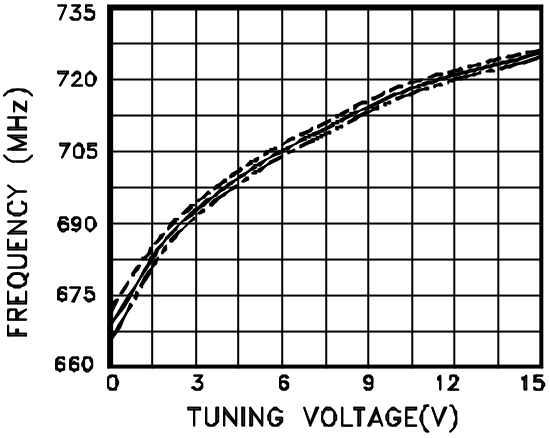
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125℃



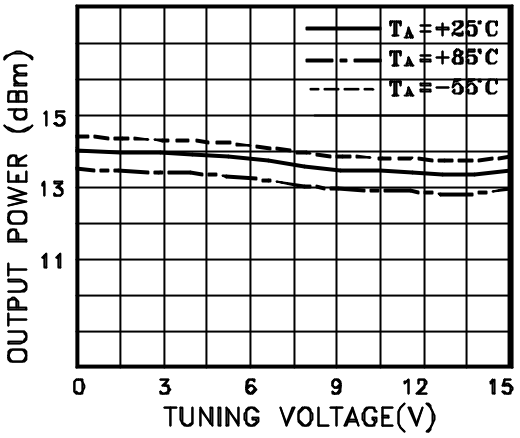
DIP-22C

Typical Performance Curves

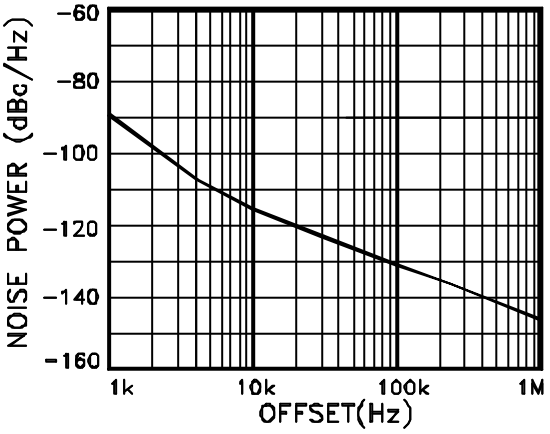
Frequency vs. Tuning Voltage



Output Power vs. Tuning Voltage



Phase Noise vs. Offset Frequency

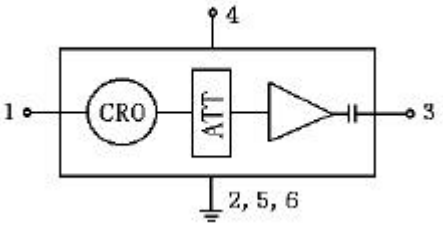


Pin Connections

PIN No	Function
1	V_T
3	P_O
4	DC Supply Vcc
2,5,6	GND

Note:

1. Built-in buffer isolation amplifier.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Customers' VCO can be offered, frequency range 500~3100MHz , relative bandwidth1~8%.



Features

- Ceramic Coaxial Resonator
- Low phase noise
- Built-in buffer isolation amplifier
- Package DIP-22C
- Wide operating temperature: -55℃~+85℃

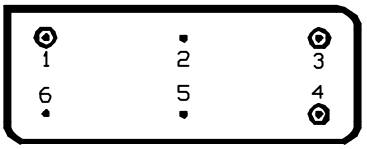
\

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	970~1040	——	V_T: 0~15V
Output Power	Po	dBm	≥13	14	V_T=6V
Output Power Flatness	△Po	dB	≤±0.5	——	V_T: 0~15V
Tuning Voltage	V_T	V	0~15	——	——
Pushing	——	MHz/V	——	0.5	Vcc: 11~13V, V_T=6V
Harmonic Suppression	——	dBc	——	-15	——
Spurious Suppression	——	dBc	-70	——	V_T=6V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-112	V_T=6V, fm=10kHz
Frequency Drift vs. Temperature	——	ppm/℃	——	±10	V_T=6V,T_A:-55~+85℃
DC Current	Icc	mA	——	60	——
Tuning Port Capacitance	C_T	pF	——	90	——

Absolute Maximum Rating

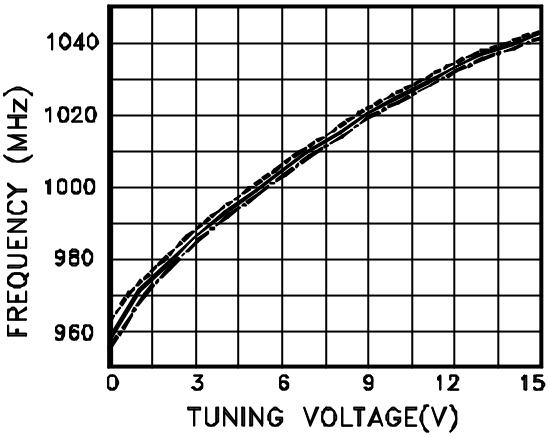
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125℃



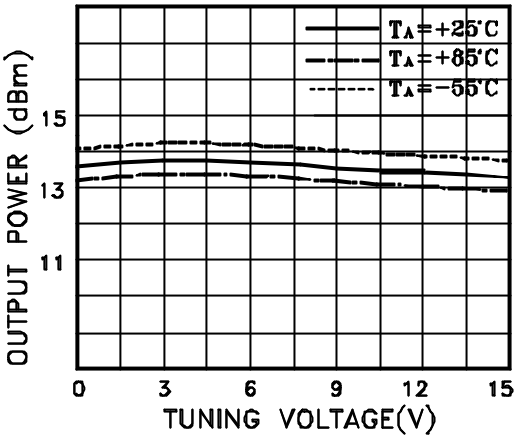
DIP-22C

Typical Performance Curves

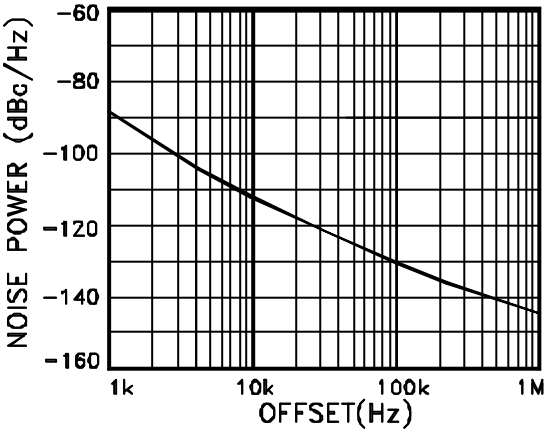
Frequency vs. Tuning Voltage



Output Power vs. Tuning Voltage



Phase Noise vs. Offset Frequency

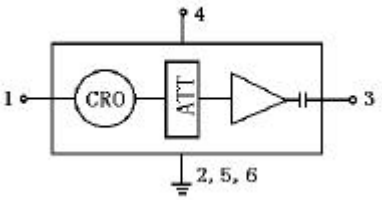


Pin Connections

PIN No	Function
1	V_T
3	P_O
4	DC Supply Vcc
2,5,6	GND

Note:

1. Built-in buffer isolation amplifier.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Customers' VCO can be offered, frequency range 500~3100MHz , relative bandwidth 1~8%.



Features

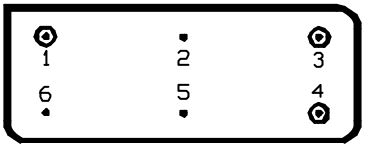
- Ceramic Coaxial Resonator Design
- Low phase noise
- Built-in buffer isolation amplifier
- Package DIP-22C
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	2170~2230	——	V_T: 0~15V
Output Power	Po	dBm	≥12	13	V_T=6V
Output Power Flatness	△Po	dB	≤±0.5	——	V_T: 0~15V
Tuning Voltage	V_T	V	0~15	——	——
Pushing	——	MHz/V	——	0.5	Vcc: 11~13V, V_T=6V
Harmonic Suppression	——	dBc	——	-25	——
Spurious Suppression	——	dBc	-70	——	V_T=6V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-107	V_T=6V, fm=10kHz
Frequency Drift vs. Temperature	——	ppm/℃	——	±10	V_T=6V,T_A:-55~+85℃
DC Current	Icc	mA	——	60	——
Tuning Port Capacitance	C_T	pF	——	45	——

Absolute Maximum Rating

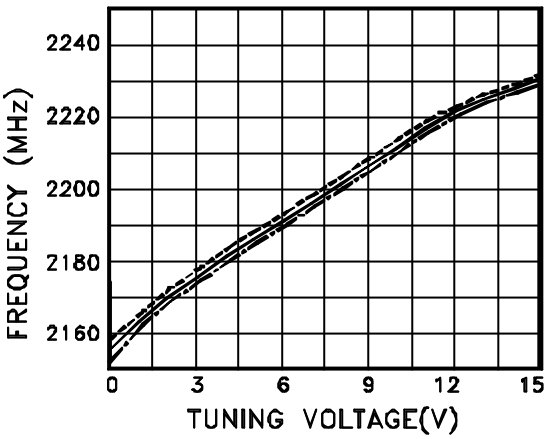
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125℃



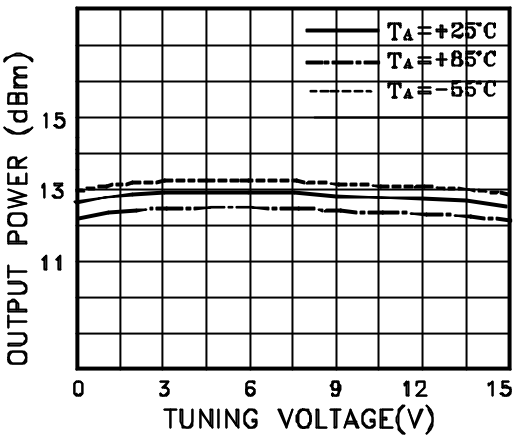
DIP-22C

Typical Performance Curves

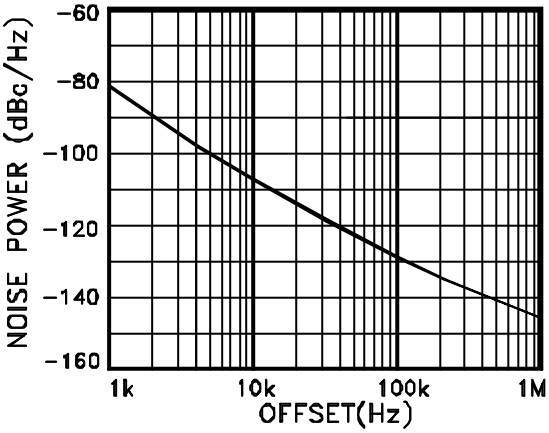
Frequency vs. Tuning Voltage



Output Power vs. Tuning Voltage



Phase Noise vs. Offset Frequency

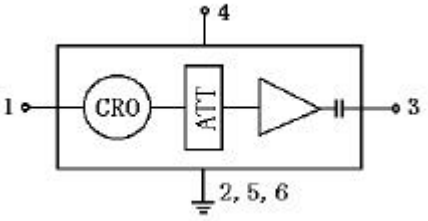


Pin Connections

PIN No	Function
1	V_T
3	P_O
4	DC Supply Vcc
2,5,6	GND

Note:

1. Built-in buffer isolation amplifier.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Customers' VCO can be offered, frequency range 500~3100MHz , relative bandwidth1~8%.



Features

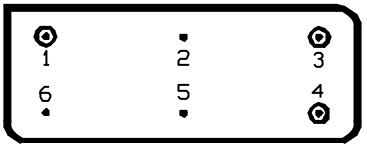
- Ceramic Coaxial Resonator Design
- Low phase noise
- Built-in buffer isolation amplifier
- Package DIP-22C
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	2992~3008	——	V_T: 0~15V
Output Power	Po	dBm	≥10	11	V_T=6V
Output Power Flatness	△Po	dB	≤±0.2	——	V_T: 0~15V
Tuning Voltage	V_T	V	0~15	——	——
Pushing	——	MHz/V	——	0.8	Vcc: 11~13V, V_T=6V
Harmonic Suppression	——	dBc	——	-30	——
Spurious Suppression	——	dBc	-70	——	V_T=6V
SSB Phase Noise	S	dBc/Hz	——	-106	V_T=6V, fm=10kHz
Frequency Drift vs. Temperature	——	ppm/℃	——	±6	V_T=6V,T_A:-55~+85℃
DC Current	Icc	mA	——	60	——
Tuning Port Capacitance	C_T	pF	——	45	——

Absolute Maximum Rating

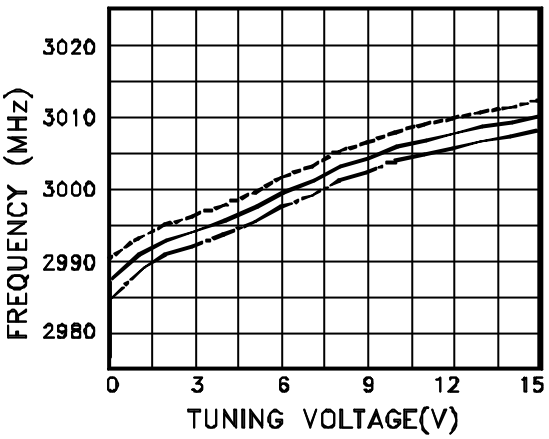
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125℃



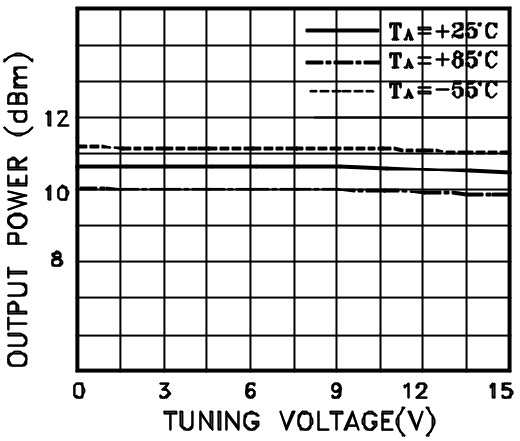
DIP-22C

Typical Performance Curves

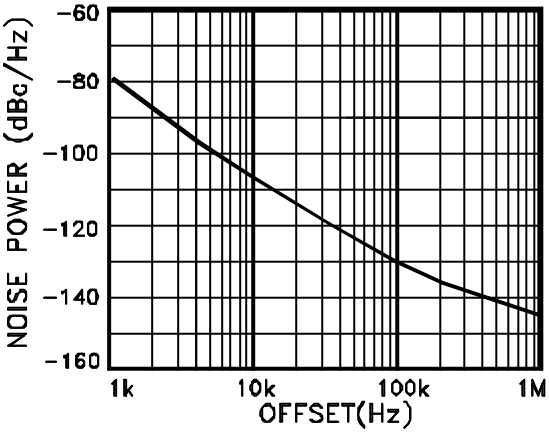
Frequency vs. Tuning Voltage



Output Power vs. Tuning Voltage



Phase Noise vs. Offset Frequency

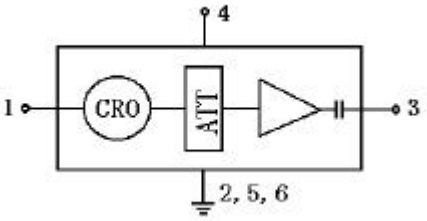


Pin Connections

PIN No	Function
1	V_T
3	P_O
4	DC Supply Vcc
2,5,6	GND

Note:

1. Built-in buffer isolation amplifier.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Customers' VCO can be offered, frequency range 500~3100MHz , relative bandwidth1~8%.



Features

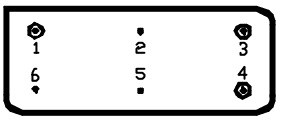
- Ceramic Coaxial Resonator Design
- Low phase noise
- Built-in buffer isolation amplifier
- Package DIP-22C
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

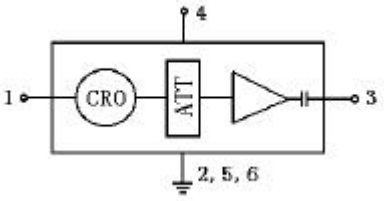
Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	——	1030MHz	——
Output Power	Po	dBm	≥13	14	——
Pushing	——	MHz/V	——	0.3	Vcc: 11~13V
Harmonic Suppression	——	dBc	——	-15	——
Spurious Suppression	——	dBc	-70	——	——
SSB Phase Noise	S_ϕ	dBc/Hz	——	-117	fm=10kHz
Frequency Drift	——	MHz	——	±0.5	T_A:-55~+85℃
Output Power Flatness	△Po	dB	——	±1.0	T_A:-55~+85℃
DC Current	Icc	mA	——	60	——
Tuning Port Capacitance	C_T	pF	——	90	——

Note:

1. Built-in buffer isolation amplifier.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Customers' VCO can be offered, frequency range 500~3100MHz .



DIP-22C



Features

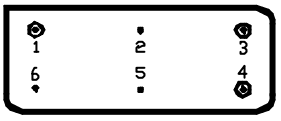
- Ceramic Coaxial Resonator Design
- Low phase noise
- Built-in buffer isolation amplifier
- Package DIP-22C
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

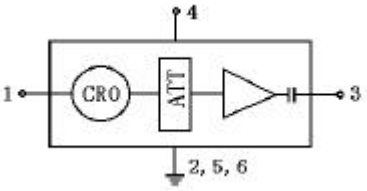
Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	——	2700	——
Output Power	Po	dBm	≥10	11	——
Pushing	——	MHz/V	——	0.5	Vcc: 11~13V
Harmonic Suppression	——	dBc	——	-30	——
Spurious Suppression	——	dBc	-70	——	——
SSB Phase Noise	S	dBc/Hz	——	-110	fm=10kHz
Frequency Drift	——	MHz	——	±1	T_A:-55~+85℃
Output Power Flatness	△Po	dB	——	±1.0	T_A:-55~+85℃
DC Current	Icc	mA	——	60	——
Tuning Port Capacitance	C_T	pF	——	45	——

Note:

1. Built-in buffer isolation amplifier.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Customers' VCO can be offered, frequency range 500~3100MHz .



DIP-22C



HE481

Narrow bandwidth VCO

Features

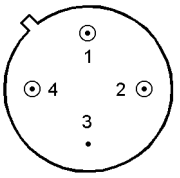
- Narrow bandwidth
- Low phase noise
- Linear tuning
- Standard package TO-8A
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	1525~1625	——	V_T: 0~12V
Output Power	Po	dBm	≥13	14	V_T =5V
Output Power Flatness	ΔPo	dB	≤±1.0	±1.0	V_T: 0~12V
Tuning Voltage	V_T	V	0~12	——	——
Pushing	——	MHz/V	——	2.0	Vcc:11~13V,V_T =5V
Spurious Suppression	——	dBc	-70	——	V_T =5V
Harmonic Suppression	——	dBc	——	-10	V_T =5V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-100	V_T =5V, fm=10kHz
Frequency Drift	Δf	MHz	——	15	V_T=5V T_A :-55~+85℃
DC Current	Icc	mA	——	30	——
Tuning Port Capacitance	C_T	pF	——	90	——

Absolute Maximum Rating

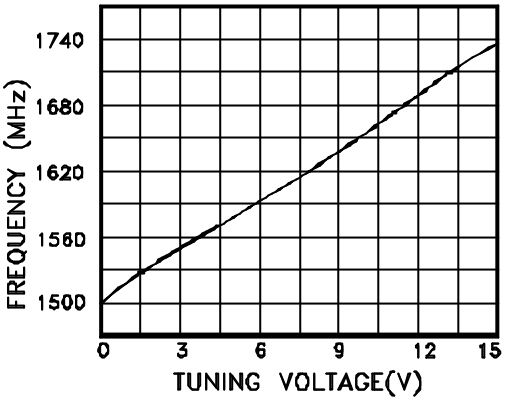
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125℃



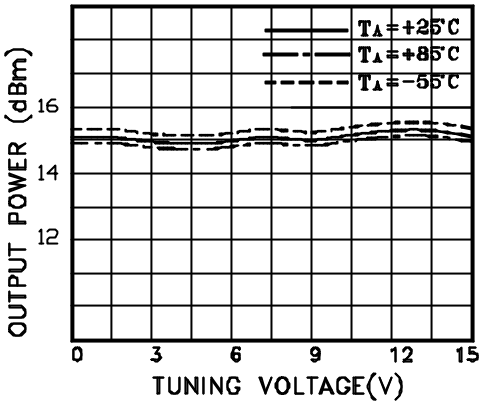
TO-8A

Typical Performance Curves

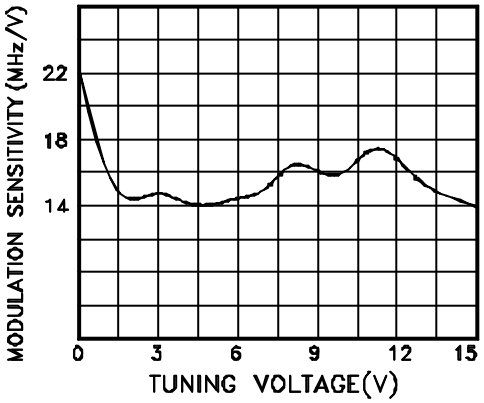
Frequency vs. Tuning Voltage



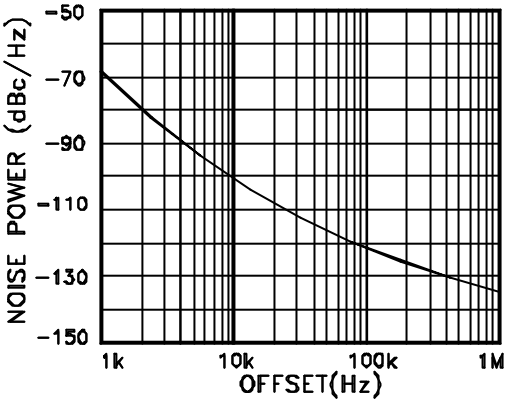
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

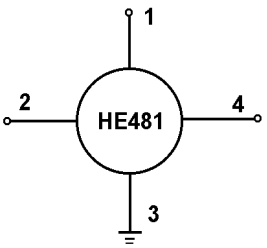


Phase Noise vs. Offset Frequency



Note:

1. Buffer isolation measures should be designed in order to reduce frequency pulling due to load variation.
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. **Microstrip package VCO can be offered .**
5. Customers' narrow VCO between 250～4000MHz can be offered.



1. Vcc
2. V_T
3. GND
4. Output Po

HE831

Dual Output VCO With Built-in Buffer Amplifier

Features

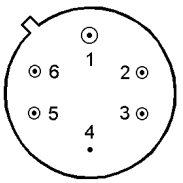
- Built-in buffer isolation Amplifier
- Low phase noise
- Aux output for PLL
- Linear tuning
- Package TO-8E
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	1800~1950	——	V_T: 0~15V
Main output Power	P_{O1}	dBm	≥13	——	——
Aux output Power	P_{O2}	dBm	——	0	V_T =5V
Output Power Flatness	ΔPo	dB	≤±1.5	±1.0	V_T: 0~15V
Tuning Voltage	V_T	V	0~15	——	——
Pushing	——	MHz/V	——	3.0	Vcc:11~13V,V_T =5V
Spurious Suppression	——	dBc	-70	——	V_T =5V
Harmonic Suppression	——	dBc	-20	-25	V_T =5V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-95	V_T =5V, fm=10kHz
Frequency Drift	Δf	MHz	——	35	V_T=5V T_A : -55~+85℃
DC Current	Icc	mA	——	70	——
Tuning Port Capacitance	C_T	pF	——	90	——

Absolute Maximum Rating

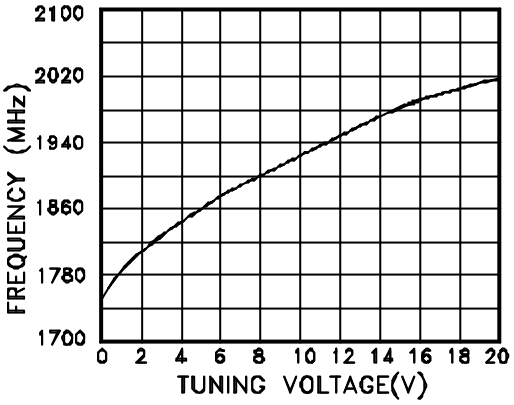
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125℃



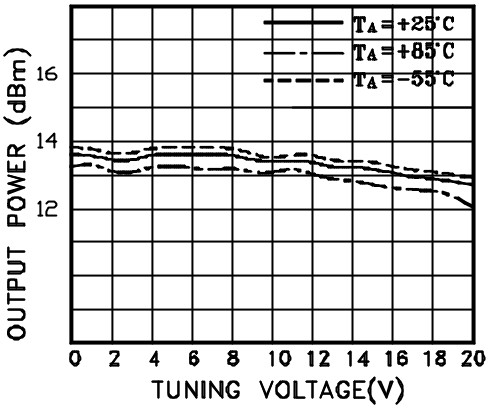
TO-8E

Typical Performance Curves

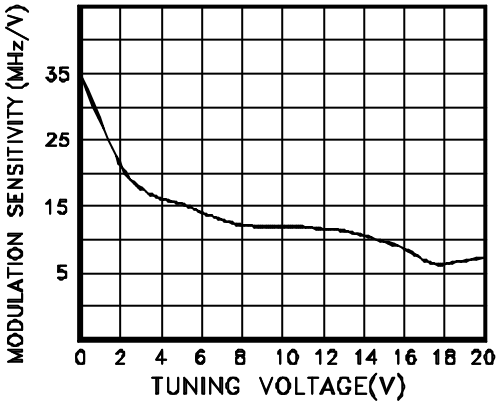
Frequency vs. Tuning Voltage



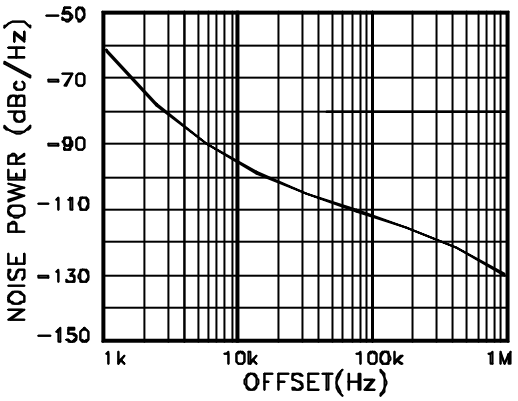
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

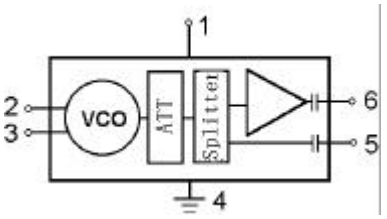


Phase Noise vs. Offset Frequency



Note:

1. Pin 5 should not be no connected (50Ω load required)
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Pin 2 can be treated as GND or other tuning port (usually $V_{T2} \leqslant 0v$)
5. Microstrip package VCO can be offered.



1.Vcc **4.GND**

2.V_{T2} or GND **5. Aux output P_{02}**

3. Tuning port V_T **6. Main outputP_{01}**

HE832

Dual Output VCO With Built-in Buffer Amplifier

Features

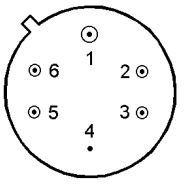
- Built-in buffer isolation Amplifier
- Low phase noise
- Aux output for PLL
- Linear tuning
- Package TO-8E
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Frequency Range	f_{L-H}	MHz	2200~2600	——	V_T: 0~18V
Main output Power	P_{O1}	dBm	≥10	12	——
Aux output Power	P_{O2}	dBm	——	0	V_T =10V
Output Power Flatness	ΔPo	dB	≤±1.5	±1.0	V_T: 0~18V
Tuning Voltage	V_T	V	0~18	——	——
Pushing	——	MHz/V	——	3.0	Vcc:11~13V,V_T =10V
Spurious Suppression	——	dBc	-70	——	V_T =10V
Harmonic Suppression	——	dBc	——	-25	V_T =10V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-90	V_T =10V, fm=10kHz
Frequency Drift	Δf	MHz	——	40	V_T=10V T_A : -55~+85℃
DC Current	Icc	mA	——	70	——
Tuning Port Capacitance	C_T	pF	——	90	——

Absolute Maximum Rating

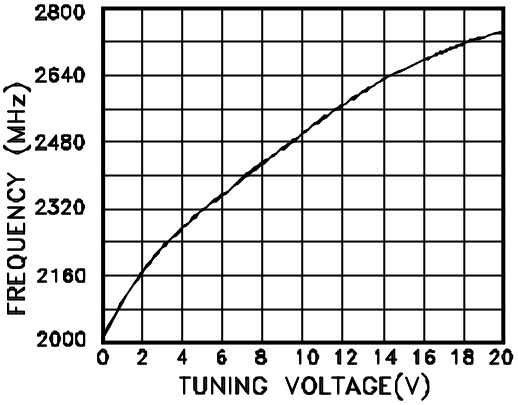
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125℃



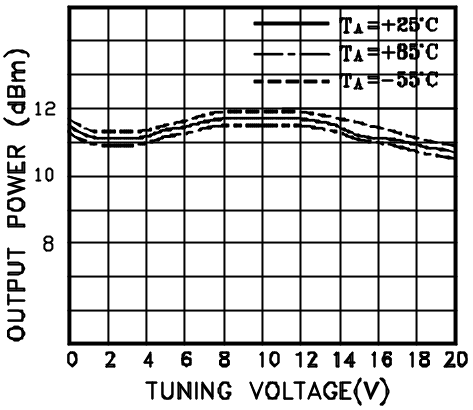
TO-8E

Typical Performance Curves

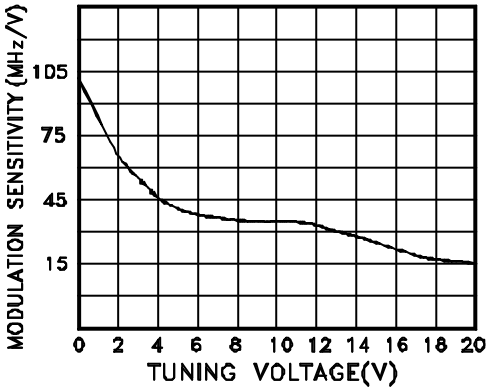
Frequency vs. Tuning Voltage



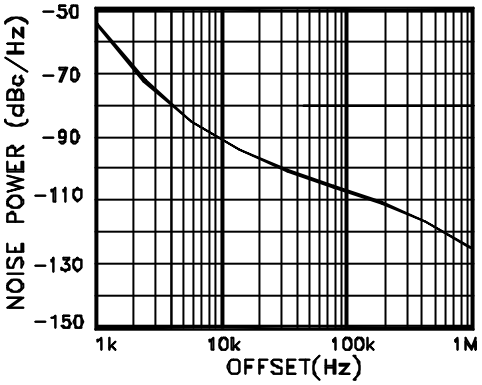
Output Power vs. Tuning Voltage



Sensitivity vs. Tuning Voltage

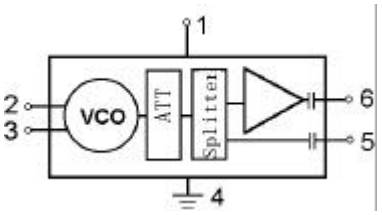


Phase Noise vs. Offset Frequency



Note:

1. Pin 5 should not be no connected (50Ω load required)
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Pin 2 can be treated as GND or other tuning port (usually V_{T2}≤0v)
5. Microstrip package VCO can be offered.



1.Vcc **4.GND**

2.V_{T2} or GND **5. Aux output P_{02}**

3. Tuning port V_T **6. Main output P_{01}**

HE721

Dual-Tuning , Dual Output VCO With Built-in Buffer Amplifier

Features

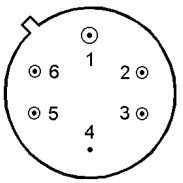
- Tow varactors for primary and fine tuning
- Built-in buffer isolation Amplifier
- Low phase noise
- Aux output for PLL
- Linear tuning
- Package TO-8E
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Primary frequency	f_{L-H}	MHz	800~1200	——	V_{T1}: 0~15V
Fine frequency	——	MHz	——	15	V_{T2}: 0~10V
Main output power	P_{O1}	dBm	≥13	——	V_{T1} =10V, V_{T2}=5V
Aux output power	P_{O2}	dBm	——	0	——
Output power flatness	ΔPo	dB	≤±1.5	——	V_{T1}: 0~15V
Primary tuning Voltage	V_{T1}	V	0~15	——	——
Fine tuning Voltage	V_{T2}	V	0~10	——	——
Pushing	——	MHz/V	——	2.0	Vcc:11~13V,V_{T1} =10V, V_{T2}=5V
Spurious Suppression	——	dBc	-70	——	V_{T1}=10V, V_{T2}=5V
Harmonic Suppression	——	dBc	——	-15	V_{T1} =10V, V_{T2}=5V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-100	V_{T1} =10V, fm=10kHz V_{T2}=5V
Frequency Drift	Δf	MHz	——	20	V_{T1}=10V, V_{T2}=5V T_A : -55~+85℃
DC Current	Icc	mA	——	70	——
Tuning Port Capacitance	C_T	pF	——	90	——

Absolute Maximum Rating

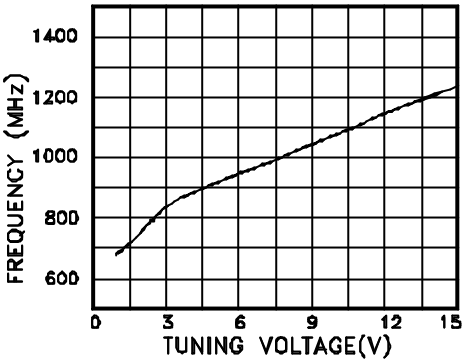
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125℃



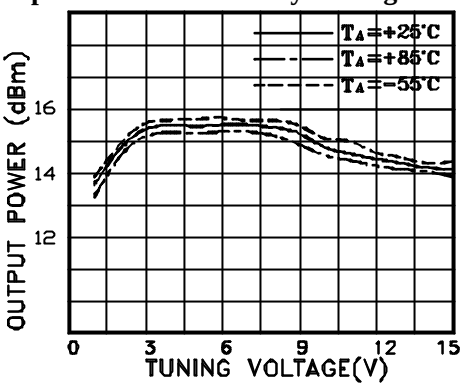
TO-8E

Typical Performance Curves

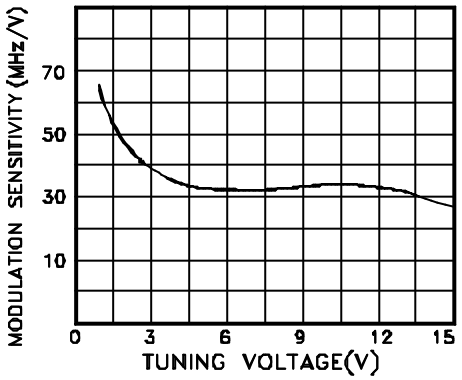
Frequency vs. Primary Tuning Voltage



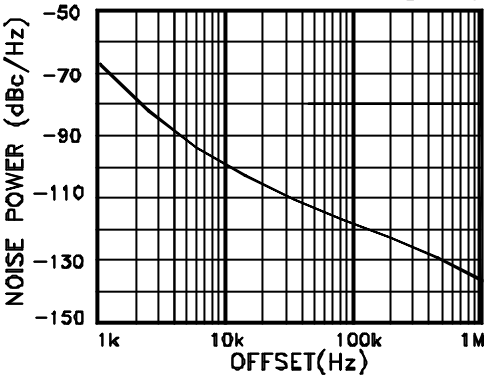
Output Power vs. Primary Tuning Voltage



Sensitivity vs. Primary Tuning Voltage

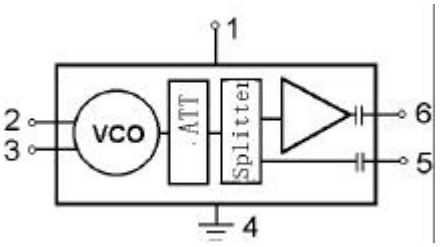


Phase Noise vs. Offset Frequency



Note:

1. Pin 5 should not be no connected (50Ω load required).
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Microstrip package VCO can be offered.
5. Customers' VCO can be offered between 250~5000MHz.



1. Vcc
2. Fine tuning V_{T2}
3. Primary V_{T1}
4. GND
5. Aux output P_{O2}
6. Main output P_{O1}

HE722

Dual-Tuning , Dual Output VCO With Built-in Buffer Amplifier

Features

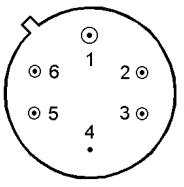
- Tow varactors for primary and fine tuning
- Built-in buffer isolation Amplifier
- Low phase noise
- Aux output for PLL
- Linear tuning
- Package TO-8E
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Primary frequency	f_{L-H}	MHz	1300~1600	——	V_{T1}: 0~15V
Fine frequency	——	MHz	——	15	V_{T2}: 0~10V
Main output power	P_{O1}	dBm	≥13	——	V_{T1} =10V, V_{T2}=5V
Aux output power	P_{O2}	dBm	——	0	——
Output power flatness	ΔPo	dB	——	3.0	V_{T1}: 0~15V
Primary tuning Voltage	V_{T1}	V	0~15	——	——
Fine tuning Voltage	V_{T2}	V	0~10	——	——
Pushing	——	MHz/V	——	2.0	Vcc:11~13V,V_{T1} =10V, V_{T2}=5V
Spurious Suppression	——	dBc	-70	——	V_{T1}=10V, V_{T2}=5V
Harmonic Suppression	——	dBc	——	-20	V_{T1} =10V, V_{T2}=5V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-95	V_{T1} =10V, fm=10kHz V_{T2}=5V
Frequency Drift	Δf	MHz	——	30	V_{T1}=10V, V_{T2}=5V T_A : -55~+85℃
DC Current	Icc	mA	——	70	——
Tuning Port Capacitance	C_T	pF	——	90	——

Absolute Maximum Rating

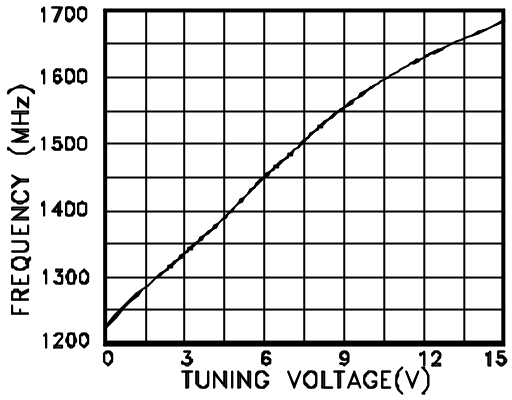
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125℃



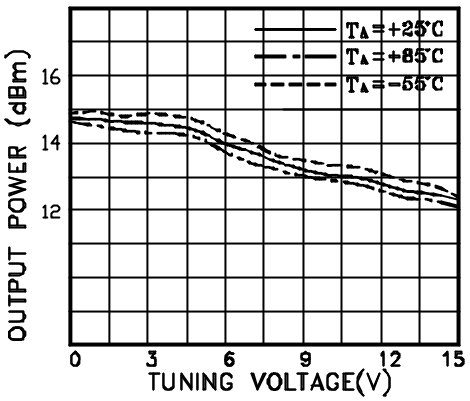
TO-8E

Typical Performance Curves

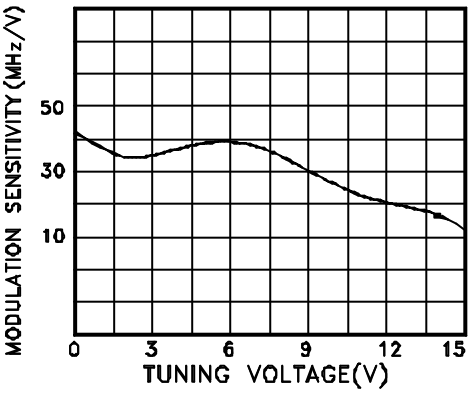
Frequency vs. Primary Tuning Voltage



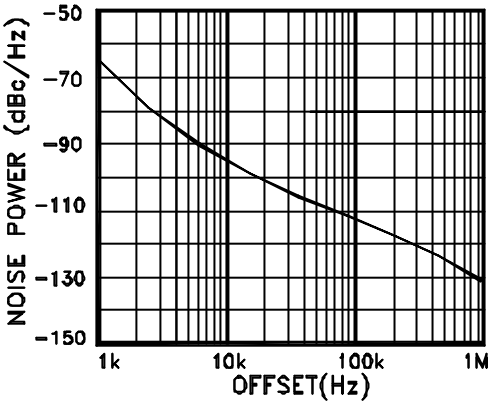
Output Power vs. Primary Tuning Voltage



Sensitivity vs. Primary Tuning Voltage

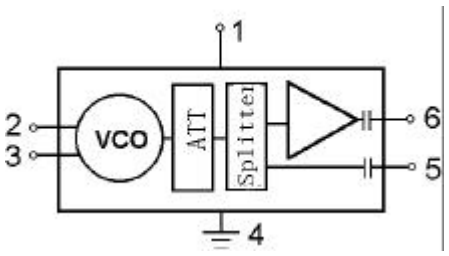


Phase Noise vs. Offset Frequency



Note:

1. Pin 5 should not be no connected (50Ω load required).
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Microstrip package VCO can be offered.
5. Customers' VCO can be offered between 250~5000MHz.



1. Vcc
2. Fine tuning V_{T2}
3. Primary V_{T1}
4. GND
5. Aux output P_{O2}
6. Main output P_{O1}

HE723

Dual-Tuning , Dual Output VCO With Built-in Buffer Amplifier

HEBEI BOWEI

Features

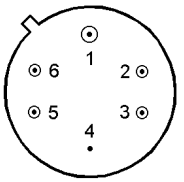
- Tow varactors for primary and fine tuning
- Built-in buffer isolation Amplifier
- Low phase noise
- Aux output for PLL
- Linear tuning
- Package TO-8E
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Primary frequency	f_{L-H}	MHz	1800~2100	——	V_{T1}: 0~15V
Fine frequency	——	MHz	——	20	V_{T2}: 0~10V
Main output power	P_{O1}	dBm	≥12	——	V_{T1} =10V, V_{T2}=5V
Aux output power	P_{O2}	dBm	——	0	——
Output power flatness	ΔPo	dB	——	3.0	V_{T1}: 0~15V
Primary tuning Voltage	V_{T1}	V	0~15	——	——
Fine tuning Voltage	V_{T2}	V	0~10	——	——
Pushing	——	MHz/V	——	3.0	Vcc:11~13V,V_{T1} =10V, V_{T2}=5V
Spurious Suppression	——	dBc	-70	——	V_{T1}=10V, V_{T2}=5V
Harmonic Suppression	——	dBc	——	-25	V_{T1} =10V, V_{T2}=5V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-95	V_{T1} =10V, fm=10kHz V_{T2}=5V
Frequency Drift	Δf	MHz	——	40	V_{T1}=10V, V_{T2}=5V T_A : -55~+85℃
DC Current	Icc	mA	——	70	——
Tuning Port Capacitance	C_T	pF	——	90	——

Absolute Maximum Rating

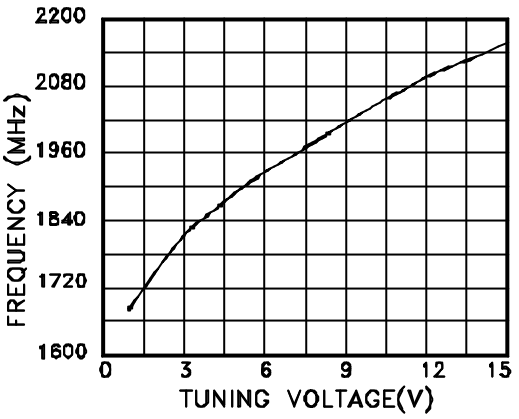
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125℃



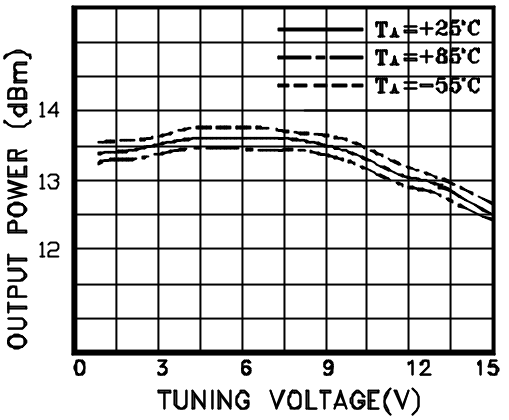
TO-8E

Typical Performance Curves

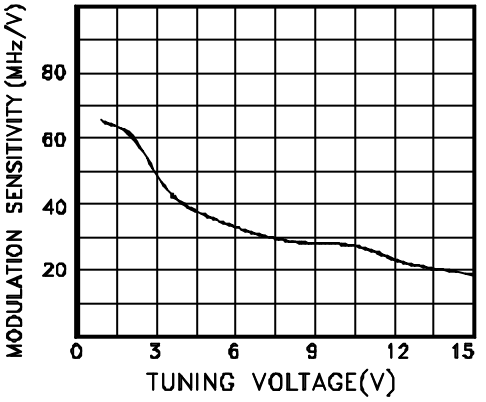
Frequency vs. Primary Tuning Voltage



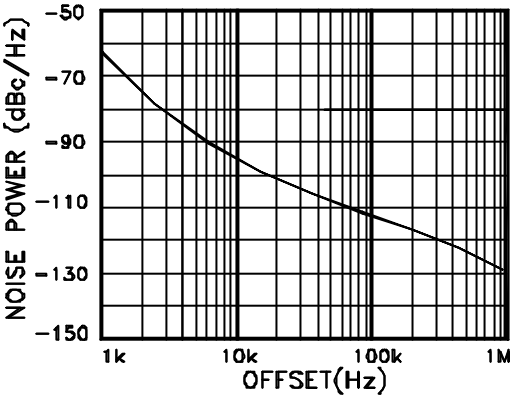
Output Power vs. Primary Tuning Voltage



Sensitivity vs. Primary Tuning Voltage

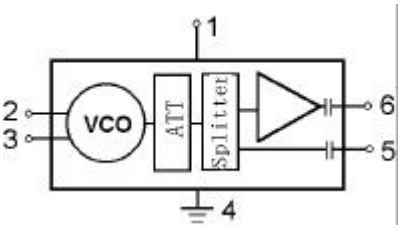


Phase Noise vs. Offset Frequency



Note:

1. Pin 5 should not be no connected (50Ω load required).
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Microstrip package VCO can be offered.
5. Customers' VCO can be offered between 250~5000MHz.



1. Vcc 4. GND
2. Fine tuning V_{T2} 5. Aux output P_{O2}
3. Primary V_{T1} 6. Main output P_{O1}

HE725

Dual-Tuning , Dual Output VCO With Built-in Buffer Amplifier

Features

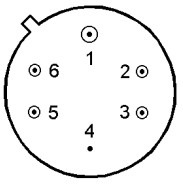
- Tow varactors for primary and fine tuning
- Built-in buffer isolation Amplifier
- Low phase noise
- Aux output for PLL
- Linear tuning
- Package TO-8E
- Wide operating temperature: -55℃~+85℃

Specifications(Test at V_{CC} = +12V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical	Test Conditions
Primary frequency	f_{L-H}	MHz	2300~2600	——	V_{T1}: 0~15V
Fine frequency	——	MHz	——	25	V_{T2}: 0~10V
Main output power	P_{O1}	dBm	≥10	12	V_{T1} =10V, V_{T2}=5V
Aux output power	P_{O2}	dBm	——	0	——
Output power flatness	ΔPo	dB	——	3.0	V_{T1}: 0~15V
Primary tuning Voltage	V_{T1}	V	0~15	——	——
Fine tuning Voltage	V_{T2}	V	0~10	——	——
Pushing	——	MHz/V	——	3.0	Vcc:11~13V,V_{T1} =10V, V_{T2}=5V
Spurious Suppression	——	dBc	-70	——	V_{T1}=10V, V_{T2}=5V
Harmonic Suppression	——	dBc	——	-30	V_{T1} =10V, V_{T2}=5V
SSB Phase Noise	S_ϕ	dBc/Hz	——	-90	V_{T1} =10V, fm=10kHz ,V_{T2}=5V
Frequency Drift	Δf	MHz	——	50	V_{T1}=10V, V_{T2}=5V T_A : -55~+85℃
DC Current	Icc	mA	——	70	——
Tuning Port Capacitance	C_T	pF	——	90	——

Absolute Maximum Rating

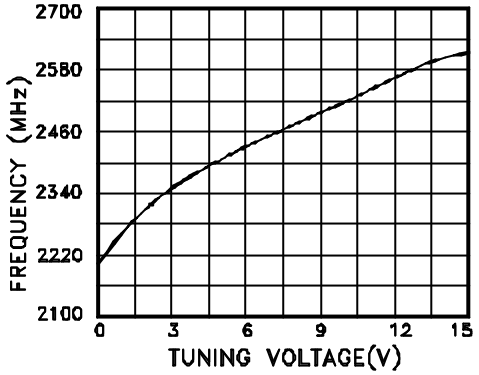
Maximum DC Voltage ----- +15VDC
Maximum Tuning Voltage --- +30V
Minimum Tuning Voltage--- -0.7V
Storage Temperature --- -55~+125℃



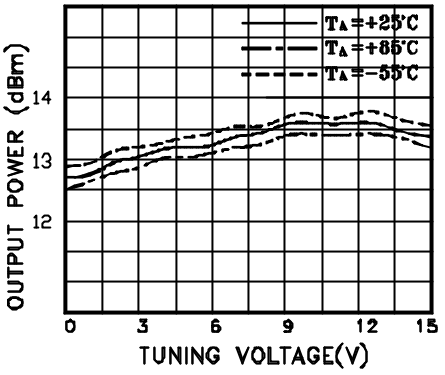
TO-8E

Typical Performance Curves

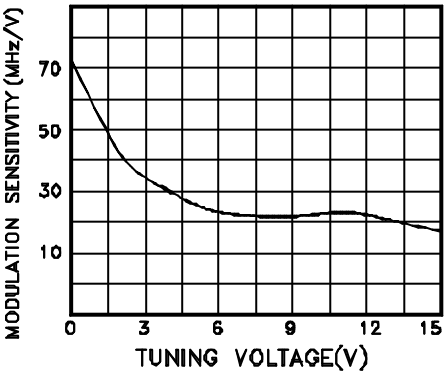
Frequency vs. Primary Tuning Voltage



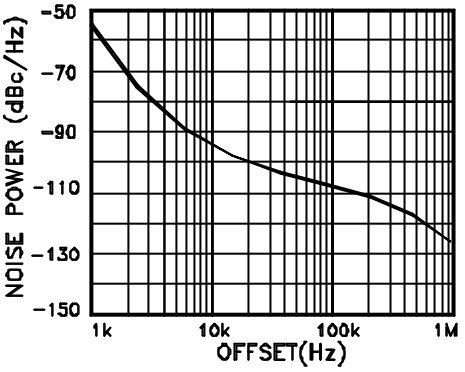
Output Power vs. Primary Tuning Voltage



Sensitivity vs. Primary Tuning Voltage

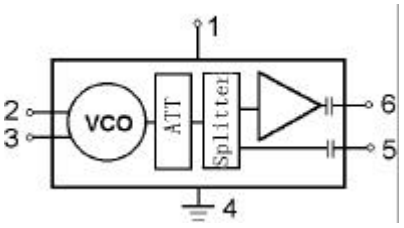


Phase Noise vs. Offset Frequency



Note:

1. Pin 5 should not be no connected (50Ω load required).
2. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).Decouple capacitor at Vcc is necessary(about 10μf).
3. Anti-electrostatic measures should be adopted.
4. Microstrip package VCO can be offered.
5. Customers' VCO can be offered between 250~5000MHz.



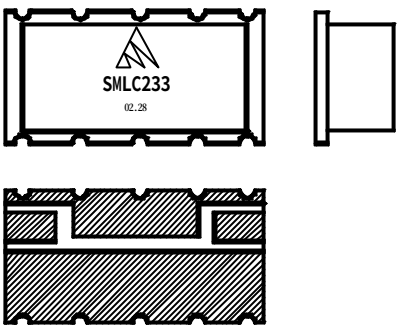
1. Vcc
2. Fine tuning V_{T2}
3. Primary V_{T1}
4. GND
5. Aux output P_{O2}
6. Main output P_{O1}

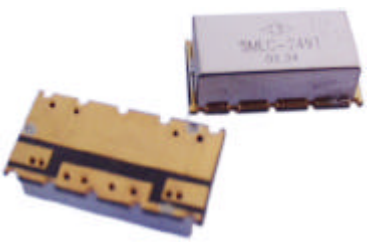
Surface Mount LC Filters

Mini-Packaged Circuit
Surface Mount LC Filter
10~2500MHz
SMLC Series

Feature

- Frequency Range: 10~2500MHz(1dB Relative Bandwidth should be no less than 10%)
- Response: 0.05dB Chebyshev function for standard, Butterworth, Bessel and Gaussian also availabe as required
- Light、Miniature design (19.7×10×6mm)
- Leadless Surface Mount structure
- Good temperature stability
- Specialized for PCS, GSM, CDMA, WLAN





Specifications

Zo=50Ω, T_A=25℃

Model	F_c (MHz)	Insertion Loss@F_c TYP(dB)	BW_{1dB} (MHz)	Degression for 2nd Harmonic of Inband Frequency (dBc)	VSWR TYP
SMLC233	233	1.38	≥24	50	≤1.5
SMLC380	380	0.83	≥38	50	≤1.5
SMLC760	760	0.56	≥76	50	≤1.5
SMLC925	925	1.17	≥90	50	≤1.5
SMLC1795	1795	1.01	≥180	50	≤1.5
SMLC2045	2045	0.76	≥280	50	≤1.5

Note: Other products can be customized for the special specifications different than the standard ones listed above.

Environmental

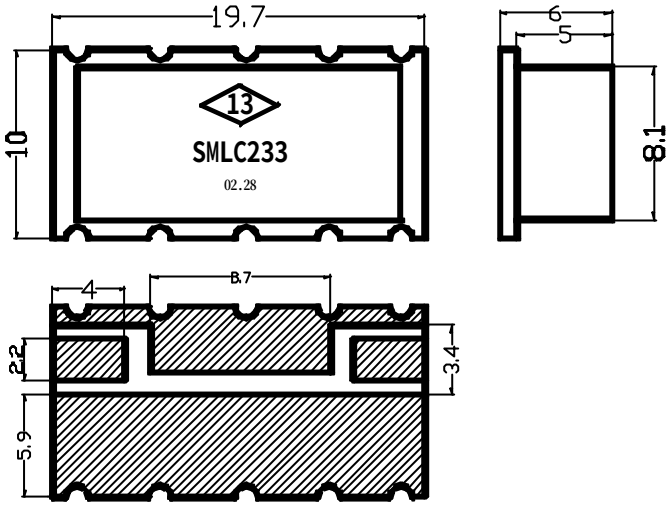
Vibration(5~2000Hz) ---------- 5G

Shock(11 mSec) ---------- 20G

Operating temperature ---------- -20~+71℃

Storage temperature---------- -40~+100℃

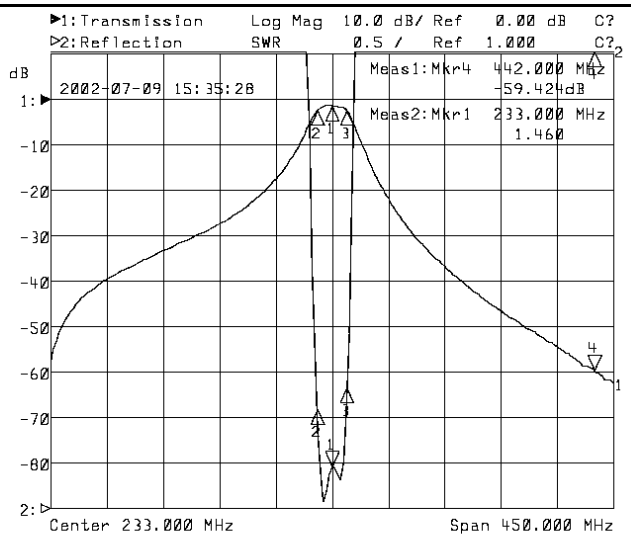
Outline Drawings



Unit： mm

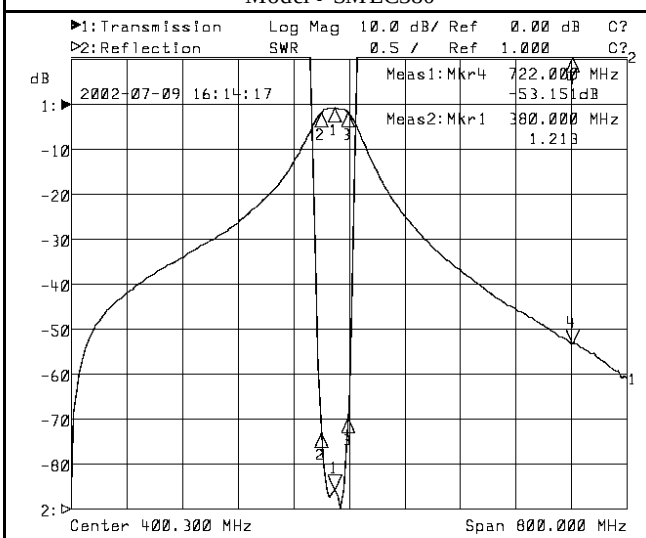
Typical Curves

Model： SMLC233



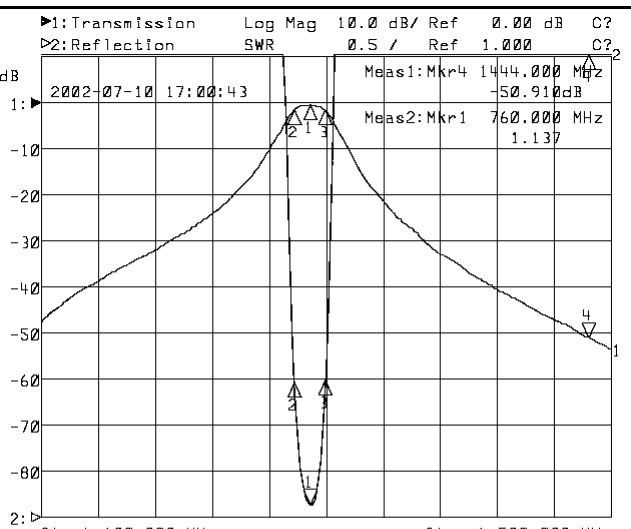
1:Mkr (MHz)	dB	2:Mkr (MHz)	
1: 233.0000	-1.382	1› 233.0000	1.460
2: 221.0000	-2.464	2: 221.0000	2.085
3: 245.0000	-2.444	3: 245.0000	2.324
4› 442.0000	-59.424	4: 442.0000	35.478

Model： SMLC380



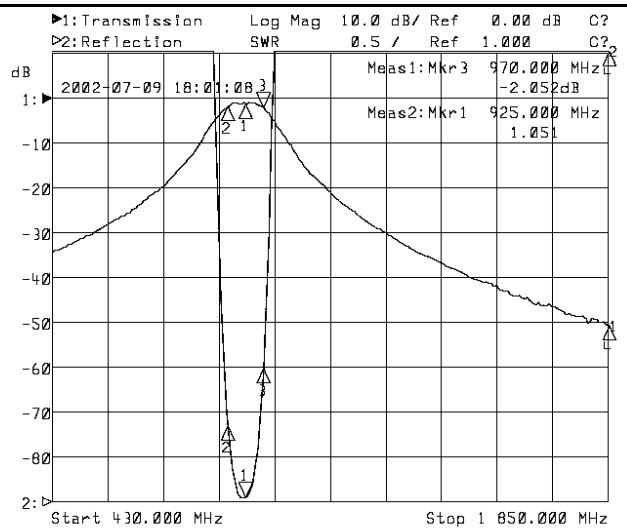
1:Mkr (MHz)	dB	2:Mkr (MHz)	
1: 380.0000	-0.833	1› 380.0000	1.213
2: 361.0000	-1.728	2: 361.0000	1.853
3: 399.0000	-1.703	3: 399.0000	2.019
4› 722.0000	-53.151	4: 722.0000	100.45

Model： SMLC760



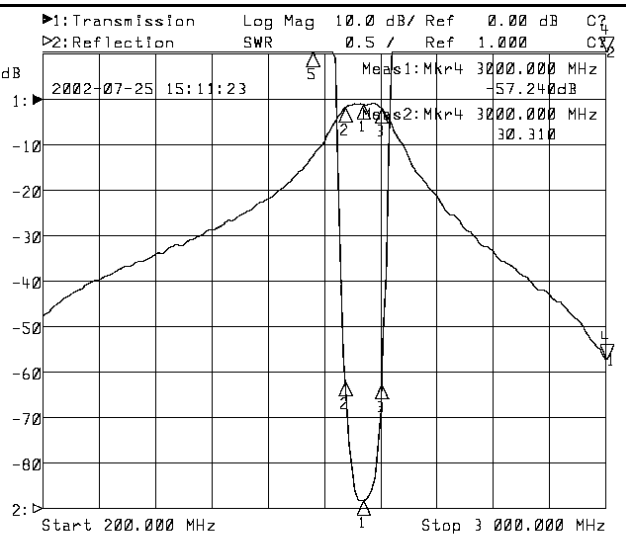
1:Mkr (MHz)	dB	2:Mkr (MHz)	
1: 760.0000	-0.569	1› 760.0000	1.137
2: 722.0000	-1.428	2: 722.0000	2.461
3: 798.0000	-1.559	3: 798.0000	2.486
4› 1444.0000	-50.910	4: 1444.0000	378.51

Model：SMLC925



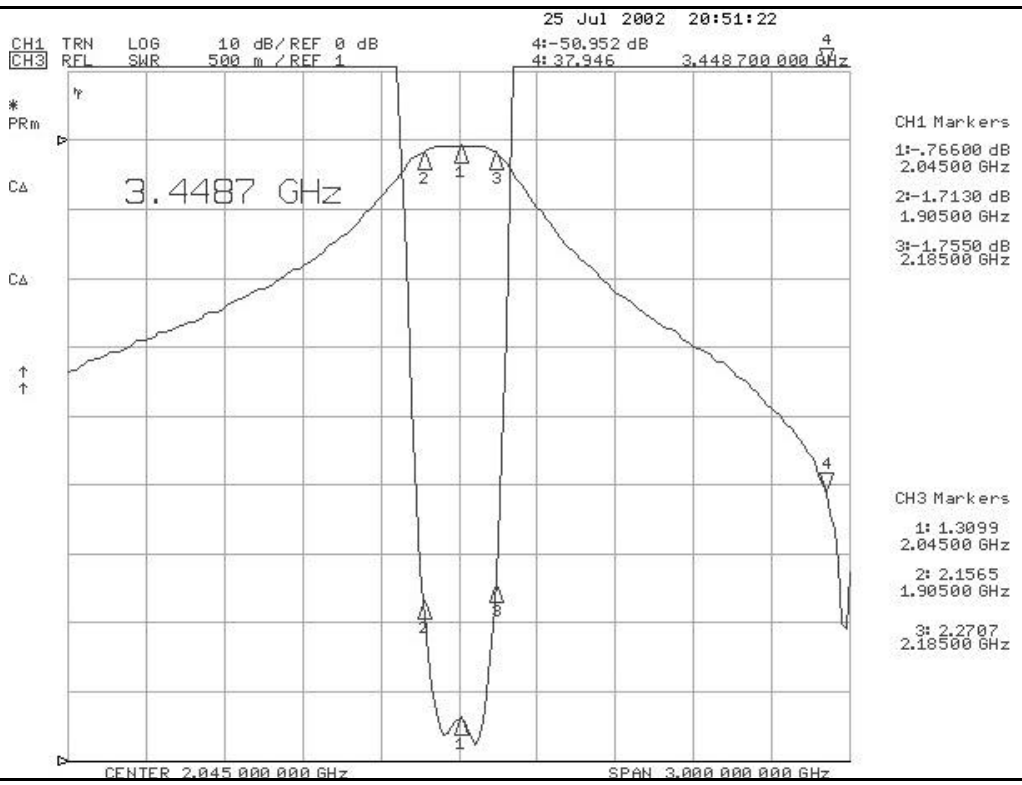
1:Mkr (MHz)	dB	2:Mkr (MHz)	
1: 925.0000	-1.170	1> 925.0000	1.051
2: 880.0000	-1.834	2: 880.0000	1.853
3> 970.0000	-2.052	3: 970.0000	2.489
4: 1850.0000	-50.710	4: 1850.0000	124.23

Model：SMLC1795



1:Mkr (MHz)	dB	2:Mkr (MHz)	
1: 1795.0000	-1.019	1: 1795.0000	1.086
2: 1705.0000	-1.775	2: 1705.0000	2.399
3: 1885.0000	-1.915	3: 1885.0000	2.364
4> 3000.0000	-57.240	4> 3000.0000	30.310
		5: 1545.0000	16.806

Model：SMLC2045



Ceramic Filters

Mini-Packaged Circuit
Miniature Ceramic Filters
300~~3900MHz

Feature

- Frequency Range：300~~3900MHz
- Response：Chebyshev for standard，
  Butterworth, Bessel and Gaussian also available as required
- Small volum、high performance narrow band filter
- Two types of I/O format：Microstrip Pin, SMA
- Perfect Temperature Stability

SMA

How to Order

5DF3/C-960/T10-N

1 2 3 4 5 6 7 8

1. Number of section
2. Series(DF)
3. Dielectric Code [1)]
4. Response
5. Center Frequency(MHz)
6. Bandwidth designator
7. Bandwidth(MHz) [2)]
8. I/O format [3)]

Note: 1) NO.1、2 or 3 dielectric material ;

2)The actual bandwidth may be 10% wider than required;

3) N—microstrip ; K—SMA(K Type).

Response	Bandwidth designator
/C Chebyshev	**/T** BW_{3dB}
/W Butterworth	**/U** BW_{1dB}
/B Bessel , /G Gaussian	**/H** $BW_{0.5dB}$

Specifications

Electrical

	Standard	Special
Center frequency(F_c)	400~~2500MHz	300~~3900MHz
3dB Relative Bandwidth (% of F_c)	1~~5	0.5~~7
Number of Sections	2~~4	2~~6
Impedance	50Ω	75Ω
Maximum VSWR	2.0:1	1.5:1
Maximum Insertion Loss@Fc	See formula below	See formula below
Temperature Coefficient	2~10ppm/℃	Contact the factory
Average Power(CW)	2W	5W
Operation Temperature	-20~~+71℃	-55~~+85℃

Microstrip Pin

Insersion Loss

Calculating the Insertion Loss @F_c for a N section Cermic filter：

$$IL(dB) = 20NLog_{10}(1+\frac{f_{c(MHz)}}{BW_{3dB(MHz)}\times K\times Qu})$$

$Q_u = CR\sqrt{f_{c(MHz)}}$, **CR**(See the chart) ； K=1.17

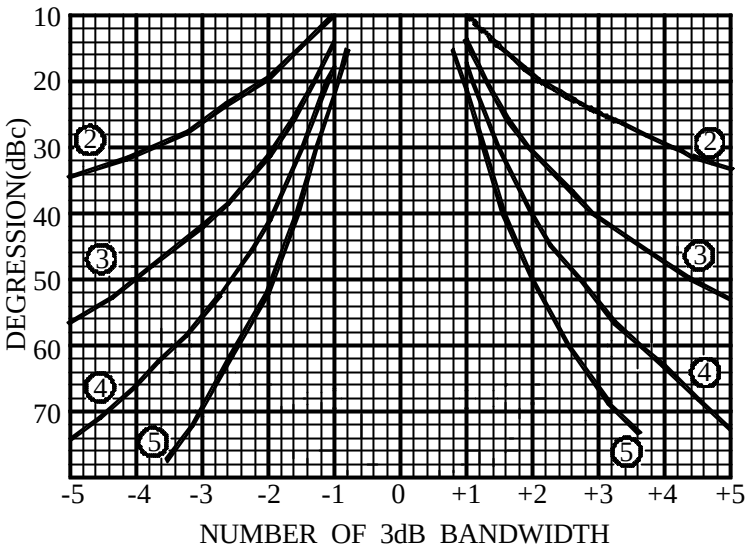
EXAMPLE：For 4DF3/C-835.2/T10.8-P, to get the Insertion Loss @835.2MHz ： Qu=$16.2\sqrt{835.2}$ =468,

F_c(MHz)	400~700	701~1500	1501~2500	2501~3900
CR	16	16.2	16.8	11

so, $IL = 80Log_{10}(1+\frac{835.2}{10.8\times 1.17\times 468}) = 4.59dB$

Note：The actual Insertion Loss may be **10% higher than the calculation.**

Environmental	STANDARD	SPECIAL
Vibration(5~2000Hz)	10G	20G
Shock(11 mSec)	30G	30G
Humidity	0~90%	95%
Operating Temperature	-20~+71℃	-55~+85℃
Storage Temperature	-40~+100℃	-55~+125℃



Degression

To determine the stopband degression, use the degression graph at the right. The curves show the degression as multiples of the 3dB BW for filters with 2 to 5sections.The following formula is used to determine the stopband degression:

3dB BW's from Fc= $\frac{F_r - F_c}{BW_{3dB}}$

EXAMPLE:

Center Freq.(F_c): 1000MHz

BW_{3dB} : 12MHz(F_c±6MHz)

No. of sections=3

Finding the degression at 976MHz and 1024MHz.

Using the formula:

3dB BW's from Fc = $\frac{976-1000}{12} = -2$

3dB BW's from Fc = $\frac{1024-1000}{12} = +2$

Then using the graph we can find at -2BW's from F_c a 3 section gives 31.6dBc minimum degression, and at +2BW's from F_c gives 30.7dBc minimum degression. If more degression is desired,select a higher number of sections.

Note:

1) The curves are for standard response with a relative 3dB bandwidth of 1%. It can be referenced for filters with other bandwidth. A wider bandwidth will result in a better degression.

2) Contact the factory to get the wider span degression of the filter

3) A maximum degression of only –60dBc is guaranteed.

4) The general parasitic passband will be 2.5 to 3 multiples of the Center Freq. The lowest parasitic passband may be at 2.2×F_c sometimes however.

Note

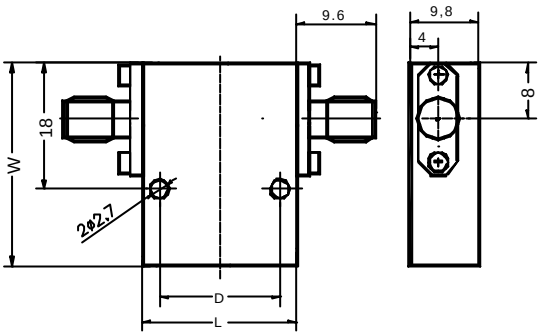
1. The Input and Ouput port can be interchanged.

2. **Over heating the filter to a temperature obove 150℃ may damage the component .**

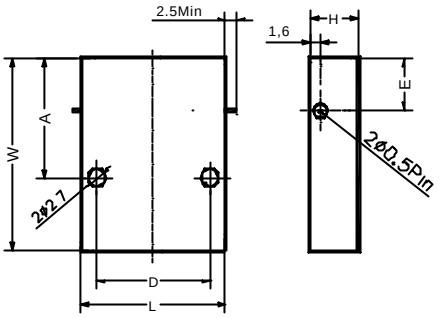
3. A cascaded low pass filter can effectively cancel the parasitic passband.

4. Please contact the factory to get the smaller size of products if the size of the standard package could not meet your requirement..

Outline Drawings (mm)



SMA(K Type) (W=29 or 32)



Microstrip Pin H=8mm(f_o<2500MHz)
H=6mm(fo≥2500MHz)

Section No.	2	3	4	5
L(mm)	22	28.2	34.5	40.7
D(mm)	17.2	23.4	29.7	35.9

Note:1) The dimensions shown above are for filters having a f_o below 2500MHz. To get the L(D) values for filter with f_o above 2500MHz, you should substract 2*N from these values .
2) The L(D) value for filters with f_o<2500MHz can be shortened by using some other type of dielectric resonators at the expense of insersion loss and the stopband degression.

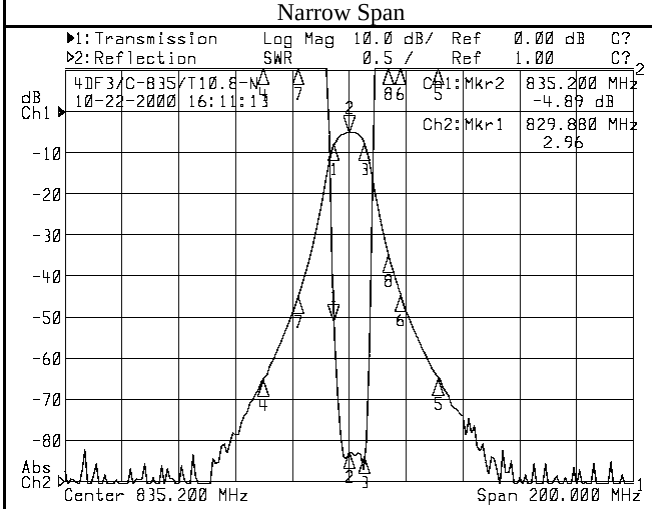
Fc (MHz)	450~3900	300~450	550~700, 850~2100 2200~2500
W(mm)	29	32	23
A	18		9
E	8		4

1) Without special desire of W=23 from the customer, the W will always have the corresponding default value of 29 and 32.
2) The additional SMA connector will be impossible for the package with W =23. There will be totally four fixing holes for the package with W=23. The A value of another two fixing holes which are not shown on the drawing will be 20.6, which is 11.6mm part away from the two already shown.

Typical Curves

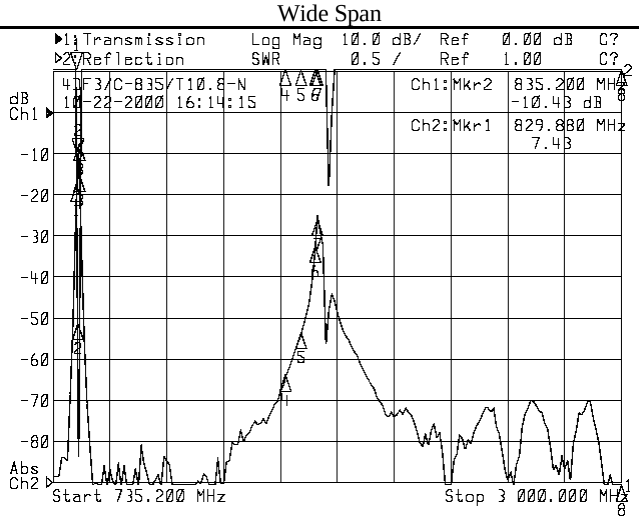
Model：**4DF3/C-835/U10.8-N**

Narrow Span



1:Mkr (MHz)	dB	2:Mkr (MHz)	
1: 829.88	-7.92	1> 829.88	2.96
2> 835.20	-4.89	2: 835.20	1.35
3: 840.66	-7.83	3: 840.66	1.29
4: 805.04	-65.18	4: 805.04	105.74
5: 866.58	-64.89	5: 866.58	107.51
6: 853.38	-44.73	6: 853.38	43.86
7: 817.20	-44.88	7: 817.20	41.22
8: 849.10	-34.89	8: 849.10	25.77

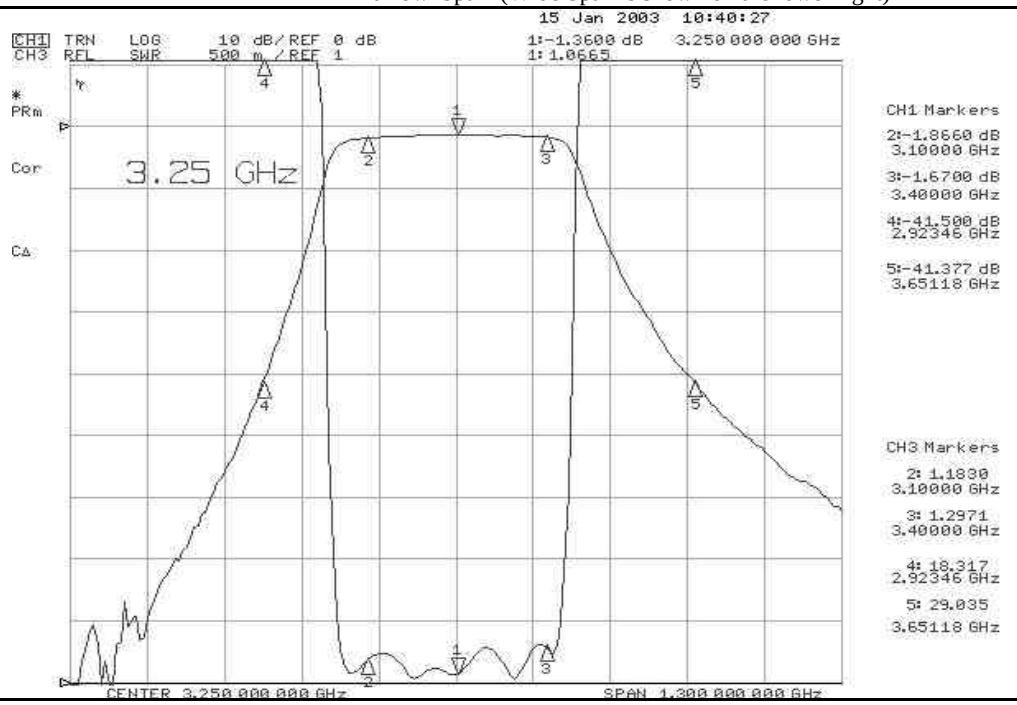
Wide Span



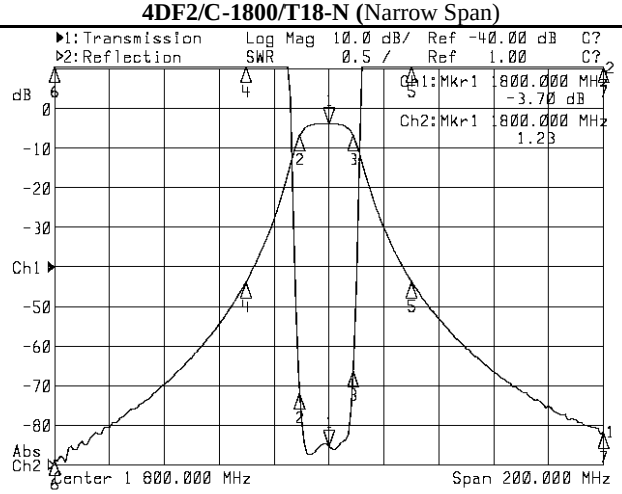
1:Mkr (MHz)	dB	2:Mkr (MHz)	
1: 829.88	-17.57	1> 829.88	7.43
2> 835.20	-10.43	2: 835.20	2.93
3: 840.66	-15.00	3: 840.66	5.12
4: 1663.63	-63.80	4: 1663.63	62.12
5: 1724.94	-53.38	5: 1724.94	27.78
6: 1779.91	-32.42	6: 1779.91	12.14
7: 1790.84	-25.79	7: 1790.84	7.46
8: 3000.00	-92.54	8: 3000.00	11.40

Model：**6DF2/C-3250/H300-N**

Narrow Span (Wide Span is shown on the lower right)

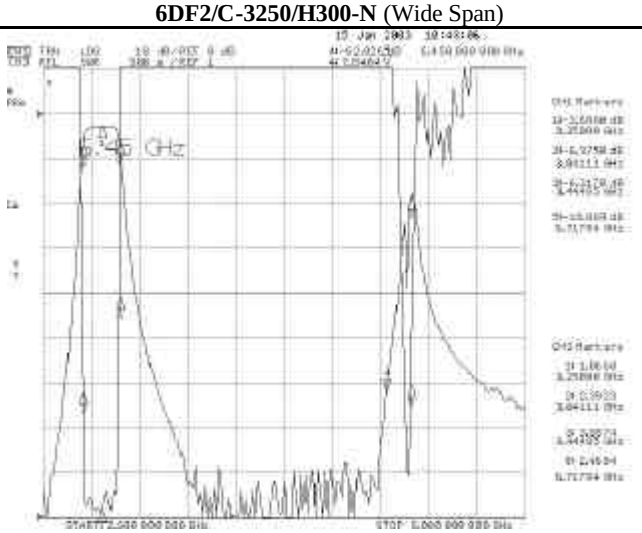


4DF2/C-1800/T18-N (Narrow Span)



1:Mkr (MHz)	dB	2:Mkr (MHz)	
1> 1800.00	-3.70	1> 1800.00	1.23
2: 1789.40	-6.60	2: 1789.40	1.91
3: 1808.76	-6.67	3: 1808.76	2.19
4: 1769.76	-43.68	4: 1769.76	38.09
5: 1830.12	-43.68	5: 1830.12	62.71
6: 1700.00	-88.75	6: 1700.00	109.36
7: 1900.00	-81.85	7: 1900.00	104.97

6DF2/C-3250/H300-N (Wide Span)



Note: The size for this model can be 29×**20**×**6 mm as required.**

The I/O format is microstrip Pins.

Microwave
Dielectric Cavity Filters

HD Series Narrow Band
Dielectric Cavity Filter
1500~14000MHz

♦ Features

- **Center Frequency(F_c): 1500MHz~14000MHz.**
- Response: Typical 0.05dB Chebyshev. Standard ellipse function and linear phase filters can be offered.
- **Section Number: 2 to 8 or more**
- **3 dB Relative Bandwidth: 1‰~6‰ or more**
- **Maximum VSWR: 1.2:1(1.3:1 for specification)**
- **Temperature compensation design for wide operation temperature range.**
- **The general dimensions can only be referenced for standard specifications. The dimensions may be changed for special requirements.**
- **The nearest parasitic passband is usually located around 1.12×F_c.**

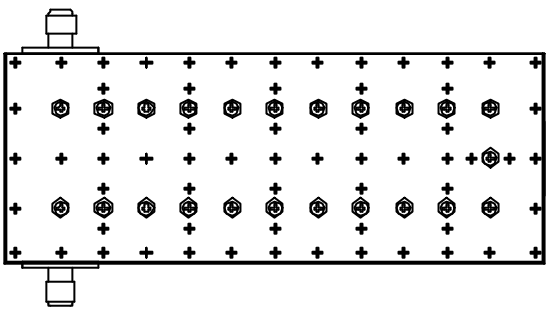
To Order

5 HD 10 – 8200 / H50 –O / O
1 2 3 4 5 6 7 8

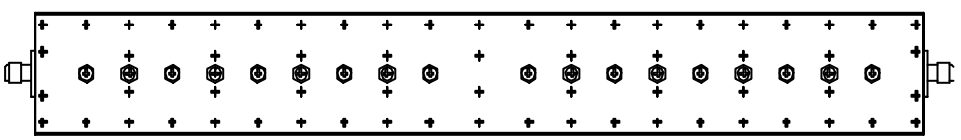
1.Section Number
2.Series (HD—— "Dielectric Cavity")
3.Package code——Type "10" Paralell or "20" In Line
4.Center Frequency (8200MHz)
5.Bandwidth designator (The same meaning as LC Filters)
6.Bandwidth(50MHz)
7.Input Connector
8.Output Connector

♦ **Environmental**

	Standard	Special
Vibration (5~2000Hz)	10G	20G
Shock(11 mSec)	10G	25G
Humidity	0~90%	95%
Storage Temperature	-40~+100℃	-55~+125℃



HD10 Outline Drawings



HD20 Outline Drawings

♦ Specifications

Series	Freq.MHz	BW/F_0× 100%	VSWR	Average Power	Impedance	Section Number	Operating Temperature[1)]
HD	1500-14000	1‰-6‰	1.3:1	*	50Ù	2-8	-40~+60℃

Note: * The Average Power is 5W for general, 10W or more can also be satisfied.
1) The Operating Temperature of -55~+85℃ **can also be available as requirement.**

Stopband Attenuation

To determine the stopband attenuation, use the attenuation graph at the right. The curves show the attenuation as multiples of the 3dB BW.The following formula is used to determine the stopband attenuation:

3dB BW's from F_c, R= $\frac{F_r - F_c}{BW_{3dB}}$

EXAMPLE:

Center Freq.:F_c=4300MHz

BW_{3dB}=20MHz

No. of sections: **N=6**

Finding the attenuation at **4250MHz,** Using the formula:

$$R=\frac{4250-4300}{20}=-2.5$$

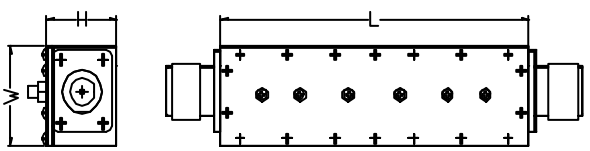
Then using the graph about 64dB attenuation can be obtained.

♦ Mechanical

- Drills for fixing are set on the bottom whose location will be provided by the factory. The drills can be either smooth or with screw thread.
- The mechanical dimensions of **H is shown in the table of** General Dimension.
- **Approximate size L:**

HD10: L=(K+3.5)×0.5N+(0~4.5)(mm)
HD20: L=(K+3.5)×N+(0~4.5)(mm)
W:
HD10: W =K×2+(9~11.5)(mm)
HD20: W =K+(6~8)(mm)
K=10~39(See General Dimensions)

Example:(HD10)
F_0=8.15GHz, N=6, BW_{3dB}=5‰,
K=11
L=(11+3.5)×3+2.5=46(mm)
W=11×2+10=32(mm)
H=12(mm)



HD20 Outline Dimension

♦ Insertion Loss

"Dielectric Cavity" **filters have higher Q. Very narrow bandwidth can be obtained.**

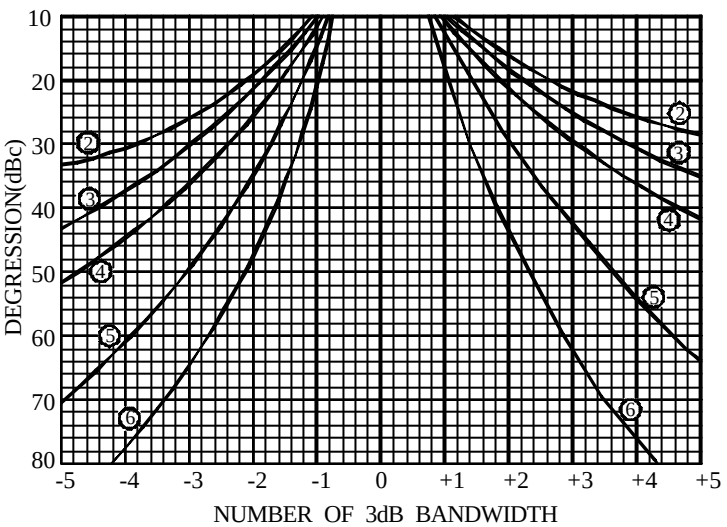
Center frequency insertion loss IL **is determined by :**

$$IL_0 = \frac{K(N+0.5)}{BW(\%)} + 0.3$$

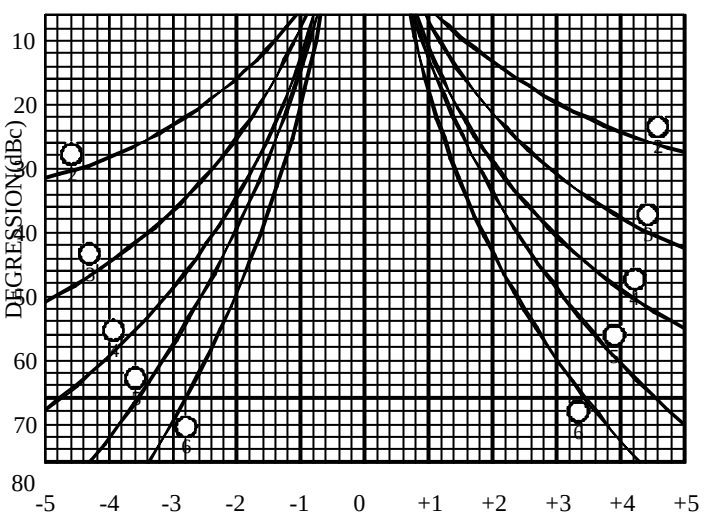
$BW(\%)=BW_{3dB}/F_0\times 100$

K = 0.1 ~ 0.2

3dB Relative Bandwidth **1‰~3‰**



3dB Relative Bandwidth **3‰~6‰**



♦ General Dimensions

Freq.GHz	1.5-3	3-5	5-7	8-11	11-14
H mm	32	18	13	**12**	12

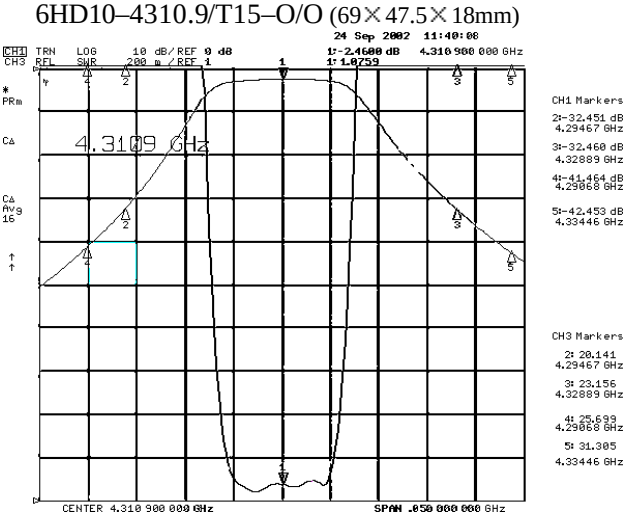
Note：H don’ t include the screws.

★I/O Connector Code

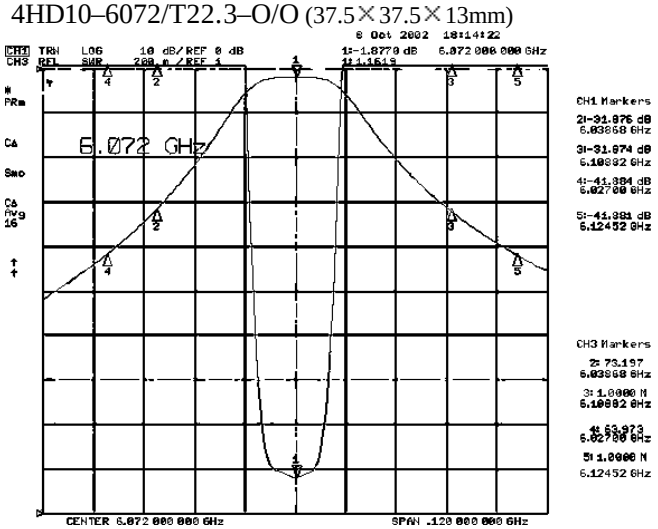
Code	O	OP	P	L	N
Type	SMA(K)	SMA(J)	Microstrip Pin	L16(K)	N(K)

♦ Typical Performance Curves

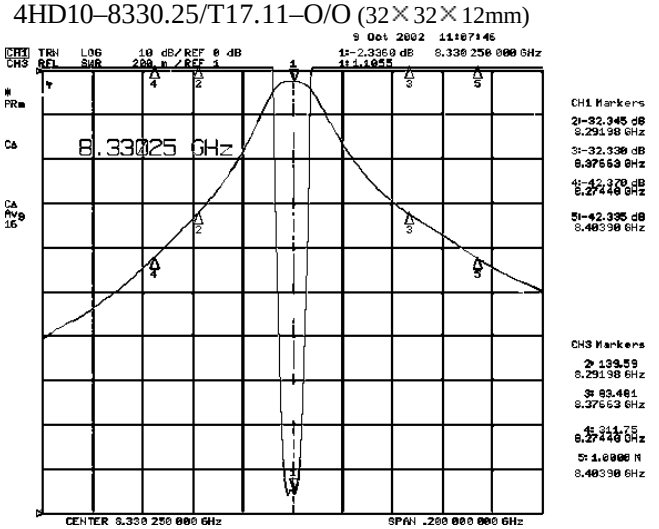
6HD10–4310.9/T15–O/O (69×47.5×18mm)

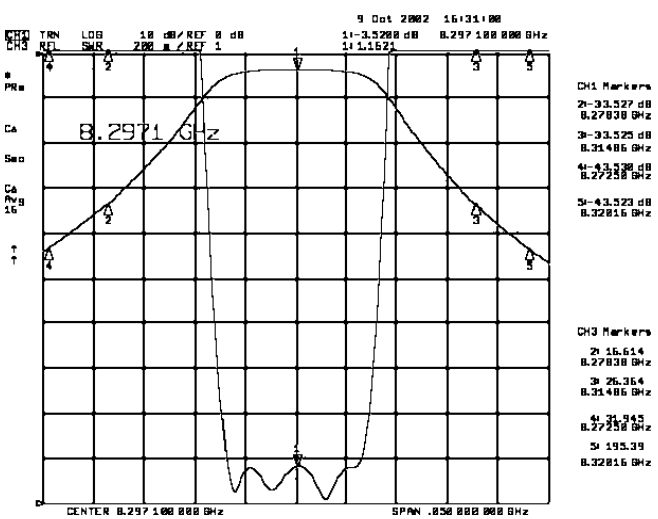


4HD10–6072/T22.3–O/O (37.5×37.5×13mm)

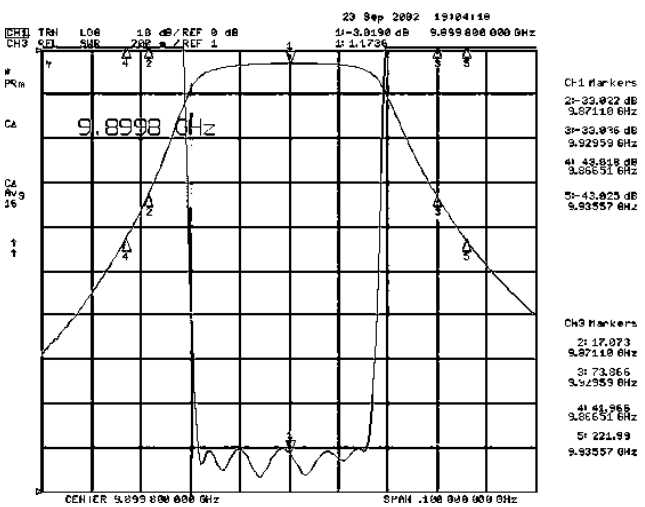


4HD10–8330.25/T17.11–O/O (32×32×12mm)





6HD10–8297.1/T15.6–O/O (46×32×12mm)



6HD10–9899.8/T35.6–O/O (45×31×12mm)

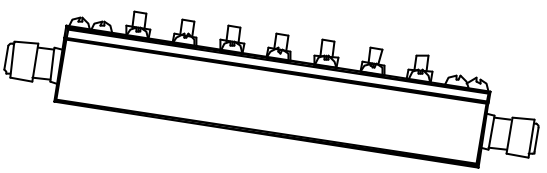
Features

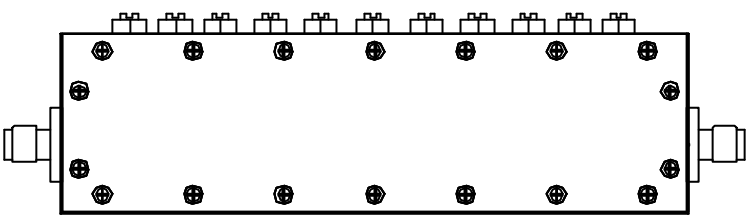
- **Center Frequency: 400MHz~10000MHz.**
- Response: Typical 0.05dB Chebyshev
- **Section Number: 2 to 11 or more**
- **3 dB Relative Bandwidth: 1%~30% or more**
- **Maximum VSWR: 1.3:1(1.5:1 for specification).**
- **The given curves、charts and formulas in this manual are for standard specifications designed with general structure. Customers' requirements such as lower insertion Loss、higher power handling、smaller size can be satisfied.**
- **The general dimensions only be referenced for standard specifications which may be optimized sometimes to meet special requirements.**
- **The nearest parasitic passband for combline filters are usually located around 3×F_c (4×F_c or further can also be available as requirement).**

To Order:

5 FS 10 – 6575 / T 750 –O / O
1 2 3 4 5 6 7 8

1. Section Number
2. Series (FS—— "Combline")
3. Package code——Type "10"
4. Center Frequency (6575MHz)
5. Bandwidth designator (The same meaning as LC Filters)
6. Bandwidth(750MHz)
7. Input Connector
8. Output Connector





♦ **Environmental**

	Standard	Special
Vibration (5~~2000Hz)	10G	20G
Shock(11 mSec)	10G	25G
Humidity	0~~90%	95%
Storage Temperature	-40~~+100℃	-55~~+125

♦ **Specifications**

Series	Freq.(MHz)	BW/F_0×100%	VSWR	Average Power	Impedance	Section Number	Operating Temperature[1)]
FS	400-10000	1-30%	1.5:1	*	50Ù	2-15	-40~+60℃

Note: * The Average Power is 5W for general, 300W or higher can also be available with special design.

1) The Operating Temperature of -55~+85℃ **can also be available as requirement.**

Stopband Attenuation

● **Graph** To determine the stopband attenuation, use the attenuation graph at the right. The curves show the attenuation as multiples of the 3dB BW.The following formula is used to determine the stopband attenuation:

3dB BW's from F_c, R= $\frac{F_r - F_c}{BW_{3dB}}$

EXAMPLE:

Center Freq.:F_c=2600 MHz

BW_{3dB}=200 MHz

No. of sections: **N=5**

Finding the attenuation at **2400MHz,** Using the formula:

$$R=\frac{2400-2600}{200}=-1$$

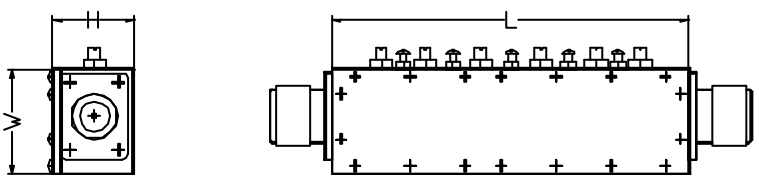
Then using the graph about 30dB attenuation can be obtained.

● **Calculation**

The following formula **can also give the approximate stopband attenuation:**

$L^{dB} = 20 \times N \times \log_{10}(2 \times |R|)$

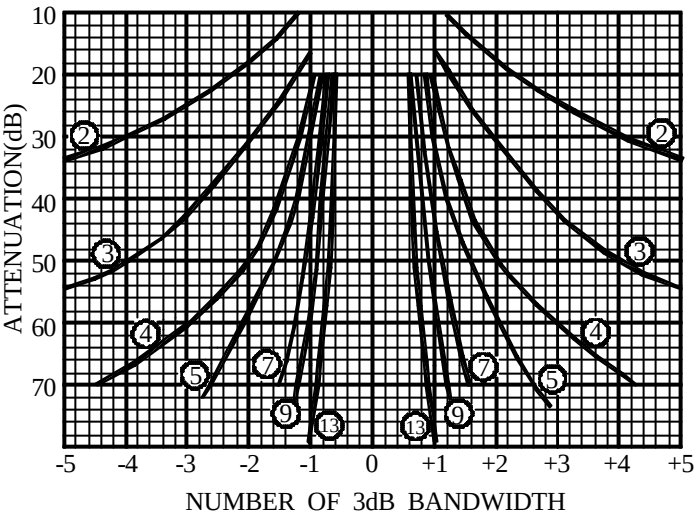
The calculated result is generally 5 to 10dB less than actual one. The calculated result for the above example is 30.1dB.



♦ Insertion Loss

"Combline" filters are suited for both narrow and broad band design, as well as lower insertion loss(inverse ratio the volume).

- **The tyical Insertion Loss <1dB**
- **Wider band lead to less Insertion Loss.**
- **More sections, more Insertion Loss.**



♦ Mechanical

- Drills for fixing are set on the bottom whose location will be provided by the factory. The drills can be either smooth or with screw thread.
- The mechanical dimensions of **W and H are shown in the table of** General Dimension.
- **Approximate size**

L=(K)(N)+10(mm).

K=6~16, being inverse proportional with the bandwidth(to be confirmed by the factory).

EXAMPLE:

2.5GHz,6 sections, relative BW_{3dB} 1%,

K=12

L=12×6+10 = 82 (mm)

W=40

H=18

♦ General Dimension

Freq.GHz	0.4-1	1-2	2-3	3-4	4-5	5-6	6-8	8-10
W mm	125	70	40	30	25	22	20	17
H mm	25	20	18	17	16	15	14	13

★I/O Connector Code

Code	O	OP	P	L	N
Type	SMA(K)	SMA(J)	Microstrip Pin	L16(K)	N(K)

Cavity Filters

Coaxial Resonator Cavity Filter
400~6000MHz

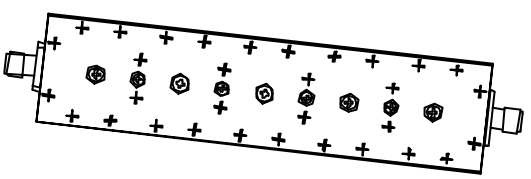
Features

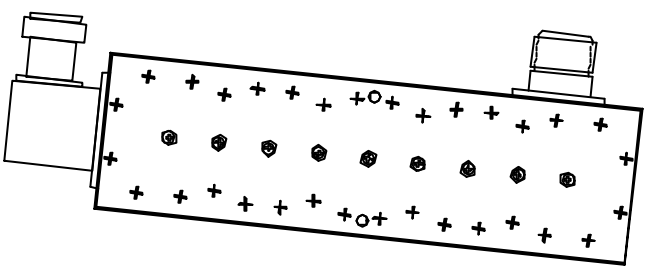
- **Center Frequency: 400MHz~6000MHz.**
- Response: Typical 0.05dB Chebyshev
- **Section Number: 2 to 10 or more**
- **3 dB Relative Bandwidth: 0.6%~5% or more**
- **Maximum VSWR: 1.2:1(1.3:1 for specifications)**
- **The given curves、charts and formulas in this manual are for standard specifications designed with general structure. Customers' requirement such as lower insertion Loss、higher power handling can be satisfied .**
- **The general dimensions can only be referenced for standard specifications. The dimensions may be changed for special requirements.**
- **The nearest parasitic passband are usually located around 2×F_c (4×F_c can also be available as requirement).**

To order

5 CC 20 – 4575 / T 760 –O / O
1 2 3 4 5 6 7 8

1.Section Number
2.Series (CC—— "Coaxial")
3.Package code——Type "10"
4.Center Frequency (4575MHz)
5.Bandwidth designator（The same meaning as LC Filters）
6.Bandwidth(760MHz)
7.Input Connector
8.Output Connector





♦ Environmental

	Standard	Special
Vibration (5~2000Hz)	10G	20G
Shock(11 mSec)	10G	25G
Humidity	0~90%	95%
Storage Temperature	-40~+100℃	-55~+125℃

♦Specifications

Series	Freq.(MHz)	BW/F_0× 100%	VSWR	Average Power	Impedance	Section Number	Operating Temperature[1)]
CC	400-6000	0.6-5%	1.3:1	*	50Ù	2-10	-40~+60℃

Note: * The Average Power is 10W for general, 300W or higher can also be available with special design.

1) The Operating Temperature of -55~+85℃ **can also be available as requirement.**

Stopband Attenuation

●**Graph** To determine the stopband attenuation, use the attenuation graph at the right. The curves show the attenuation as multiples of the 3dB BW.The following formula is used to determine the stopband attenuation:

3dB BW's from F_c, R= $\frac{F_r - F_c}{BW_{3dB}}$

EXAMPLE:

Center Freq.:F_c=1832 MHz

BW_{3dB}=18MHz

No. of sections: **N=5**

Finding the attenuation at **1796MHz,** Using the formula:

$$R=\frac{1796-1832}{18}=-2$$

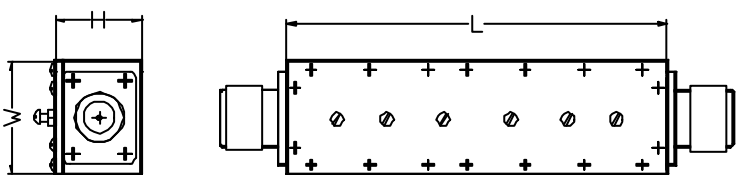
Then using the graph about 62dB attenuation can be obtained.

● **Calculation**

The following formula **can also give the approximate stopband attenuation:**

$L^{dB} = 20 \times N \times \log_{10}(2 \times |R|)$

The calculated result is generally 4 to 9dB worse than the actual one. The calculated result for the above example is 60.2dB.



♦Insertion Loss

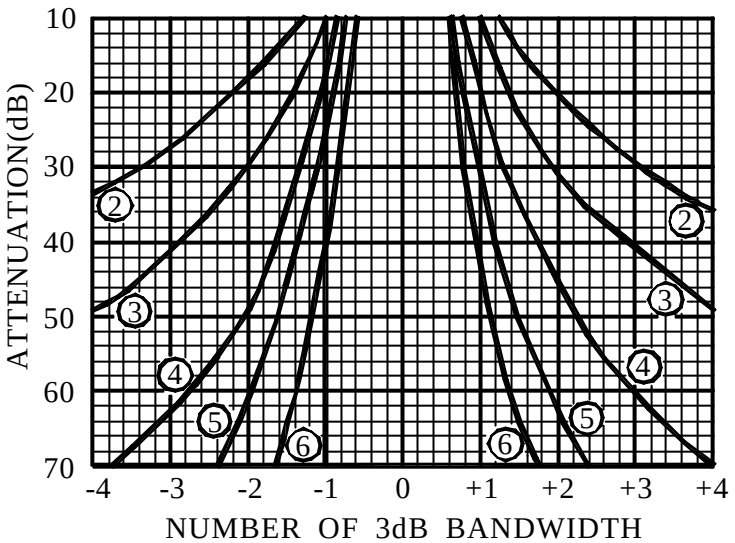
"Coaxial" filters have high Q. Compare with combline filters, narrower bandwidth can be obtained at same insertion loss.

Center frequency insertion loss IL **is determined by :**

$$IL = \frac{K(N+0.5)}{BW(\%)} + 0.3$$

$BW(\%)=BW/F_0 \times 100$

$K = 0.2 \sim 0.35$



♦Mechanical

- Drills for fixing are set on the bottom whose location will be provided by the factory. The drills can be either smooth or with screw thread.
- The mechanical dimensions of **H is shown in the table of** General Dimensions.
- **Approximate size**

L=(K+4)(N)+4(mm)
W=K+8.
K=12~30(To be confirmed)

EXAMPLE:
F_o=900MHz,N=6 BW_{3dB} =2.8%,
K=21
L=25×6+4 =154(mm)
H=70
W=29

♦General Dimensions

Freq.GHz	0.6-1	1-2	2-3	3-4	4-5	5-6
H mm	70	40	30	25	21	19

★I/O Connector Code

Code	O	OP	P	L	N
Type	SMA(K)	SMA(J)	Microstrip Pin	L16(K)	N(K)

Cavity Filters

Interdigital
Cavity Filter
600~16000MHz

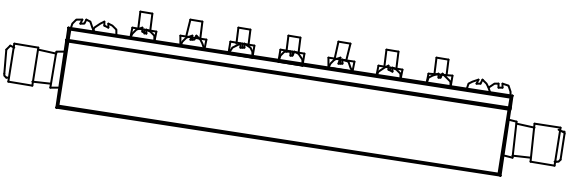
Features

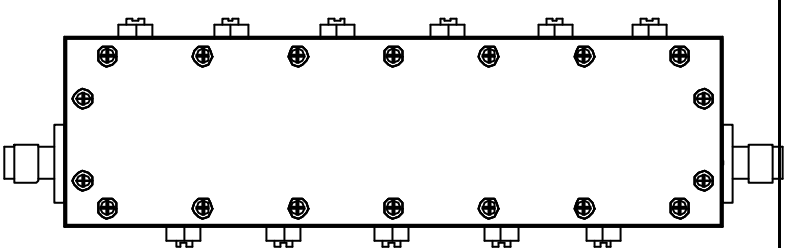
- **Center Frequency: 600MHz~16000MHz.**
- Response: Typical 0.05dB Chebyshev
- **Section Number: 2 to 11 or more**
- **3 dB Relative Bandwidth: 1%~80%**
- **Maximum VSWR: 1.3:1(1.5:1 for specification).**
- **The given curves、charts and formulas in this manual are for standard specications designed with general structure. Consult the factory for special requirements such as lower Insertion Loss、higher power handling、smaller size.**
- **The general dimensions can only be referenced for standard specifications which may be optimized sometimes to meet special requirements.**
- **The nearest parasitic passband for interdigital filters are usually located around $2\times F_c$ ($2.5\times F_c$ or further can also be available as requirement).**

To Order:

5 FD 10 – 8240 / T1200 –O / O
1 2 3 4 5 6 7 8

9. Section Number
10. Series (FD—— "Interdigital")
11. Package code——Type "10"
12. Center Frequency (8240MHz)
13. Bandwidth designator (The same meaning as LC Filters)
14. Bandwidth(1200MHz)
15. Input Connector
16. Output Connector





◆ Environmental

	Standard	Special
Vibration (5~2000Hz)	10G	20G
Shock(11 mSec)	10G	25G
Humidity	0~90%	95%
Storage Temperature	-40~+100℃	-55~+125℃

◆Specification

Series	Freq.(MHz)	BW/$F_0\times$100%	VSWR	Average Power	Impedance	Section Number	Operating Temperature[1)]
FD	600-16000	1-80%	1.5:1	*	50Ù	2-11	-40~+60℃

Note: * The Average Power is 5W for general, 300W or higher can also be available with special design. Please contact the factory for consultant.

1) The Operating Temperature of -55~+85℃ **can also be available as requirement.**

♦ Stopband Attenuation

● **Graph** To determine the stopband attenuation, use the attenuation graph at the right. The curves show the attenuation as multiples of the 3dB BW for filters with 2 to 5sections.The following formula is used to determine the stopband attenuation:

3dB BW's from F_c, R= $\frac{F_r - F_c}{BW_{3dB}}$

EXAMPLE:

Center Freq.:F_c=5600 MHz

BW_{3dB}=500 MHz

No. of sections: **N=5**

Finding the attenuation at **6100MHz,** Using the formula:

$$R=\frac{6100-5600}{500}=+1$$

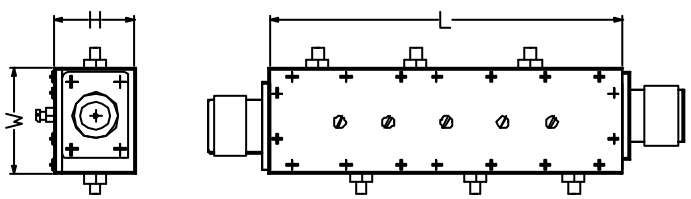
Then using the graph we can find at +1BW's from F_c a 5 section gives 30dB minimum attenuation.

● **Calculation**

The following formula **can also give the approximate stopband attenuation:**

$$L^{dB} = 20\times N\times \log_{10}(2\times|R|)$$

The calculated result is generally 5 to 10dB worse than the actual one.The calculated result for the above example is 30.1dB.



♦General Dimension

Freq.GHz	0.6-1	1-2	2-3	3-4	4-6	6-8	8-10	10-16
W mm	130	80	45	35	28	22	19	16
H mm	24	16	15	14	13	12	11	11

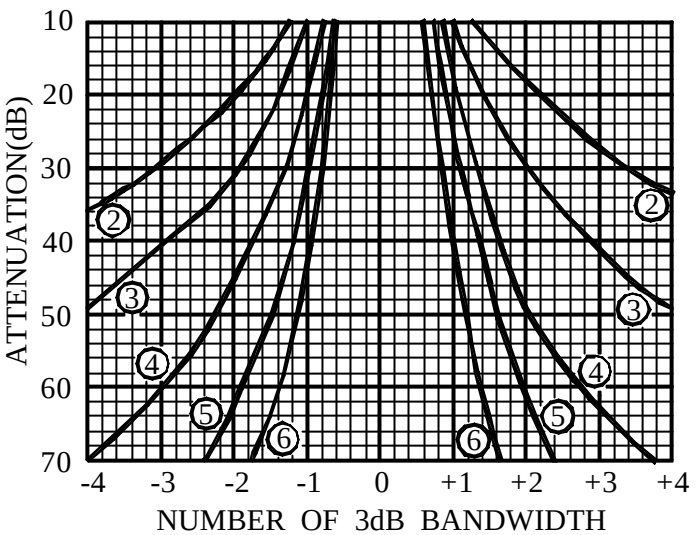
♦Insertion Loss

"Interdigital" filters are very suited for wideband applications.

●The tyical inband Insertion Loss is less than 0.6dB.

●Wider band lead to less Insertion Loss.

●More sections, more insertion loss.



♦Mechanical

- Drills for fixing are set on the bottom whose location will be provided by the factory. The drills can be either smooth or with screw thread.
- The mechanical dimensions of **W and H are shown in the table of** General Dimension.
- **Approximate size**

L=(K)(N)+10(mm).

K=6~14, being inverse proportional with the bandwidth, to be confirmed by the factory.

EXAMPLE:

2.5GHz,6 sections, relative BW_{3dB} 3%,

K=10

L=10×6+10 = 70 (mm)

W=45

H=15

★I/O Connector Code

Code	O	OP	P	L	N
Type	SMA(K)	SMA(J)	Microstrip Pin	L16 (K)	N(K)

Features

- **Center Frequency: 5000MHz~18000MHz.**
- Response: Typical TE101 mode design.
- **Section Number: 2 to 10 or more**
- **3 dB Relative Bandwidth: 0.3%~4% or more**
- **Maximum VSWR: 1.2:1(1.3:1 for specification)**
- **The given curves、charts and formulas in this manual are for standard specifications designed with general structure. Customers' requirement such as lower insertion Loss、higher power handling can be satisfied .**
- **The general dimensions can only be referenced for standard specifications. The dimensions may be changed for special requirements.**
- **The nearest parasitic passband will be close to the passband when the bandwidth become wider.**

To Order

5 BJ 20 – 6000 / T 50 –O / O
1 2 3 4 5 6 7 8

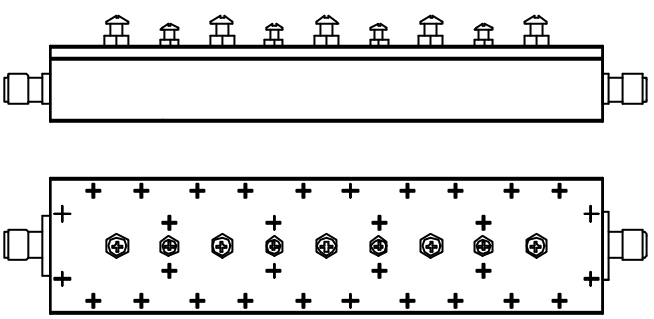
1.Section Number
2.Series (BJ—— "Rectangular Waveguide")
3.Package code——Type "20"
4.Center Frequency (6000MHz)
5.Bandwidth designator (The same meaning as LC Filters)
6.Bandwidth(50MHz)
7.Input Connector
8.Output Connector

★I/O Connector Code

Code	O	OP	P	B	N
Type	SMA(K)	SMA(J)	Microstrip Pin	Flange	N(K)

♦ **Environmental**

	Standard	Special
Vibration (5~2000Hz)	10G	20G
Shock(11 mSec)	10G	25G
Humidity	0~90%	95%
Storage Temperature	-40~+100℃	-55~+125℃



♦ **Specifications**

Series	Freq.GHz	BW/F_0×100%	VSWR	Average Power	Impedance	Section Number	Operating Temperature[1)]
BJ	5-18	0.3-4%	1.3:1	*	50Ù	2-10	-40~+60℃

Note: * The Average Power is 20W for general. Customers' requirements can be satisfied.

1) The Operating Temperature of -55~+85℃ **can also be available as requirement.**

Stopband Attenuation

● **Graph** To determine the stopband attenuation, use the attenuation graph at the right. The curves show the attenuation as multiples of the 3dB BW.The following formula is used to determine the stopband attenuation:

3dB BW's from F_c, R= $\frac{F_r - F_c}{BW_{3dB}}$

EXAMPLE:

Center Freq.:F_c=8000 MHz

BW_{3dB}=30MHz

No. of sections: **N=5**

Finding the attenuation at **8045MHz,** Using the formula:

$$R=\frac{8045-8000}{30}=1.5$$

Then using the graph about 46dB attenuation can be obtained.

● **Calculation**

The following formula **can also give the approximate stopband attenuation:**

$L^{dB} = 20\times N\times \log_{10}(2\times|R|)$

The calculated result is generally 4 to 9dB worse than actual one. The calculated result for the above example is 47.7dB.

♦ Insertion Loss

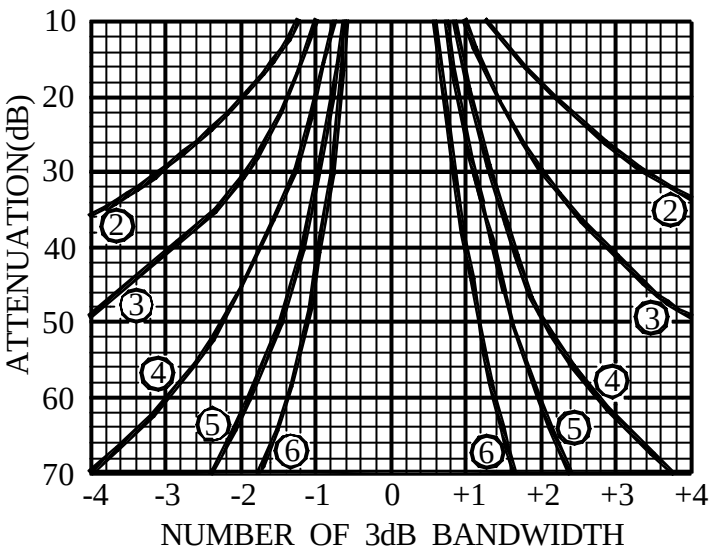
"Rectangular Waveguide" filters have higher Q. Compared with coaxial filters, narrower bandwidth can be obtained at same insertion loss.

Center frequency insertion loss IL **is determined by :**

$$IL = \frac{K(N+0.5)}{BW(\%)} + 0.3$$

$BW(\%)=BW/F_0\times 100$

K = 0.1



♦ Mechanical

● Drills for fixing are set on the bottom whose location will be provided by the factory. The drills can be either smooth or with screw thread.

● The mechanical dimensions of **H is shown in the table of** General Dimensions.

● **Approximate size**

L=(W-4)×N+4 (mm)

H= W/2 + 1 (mm)

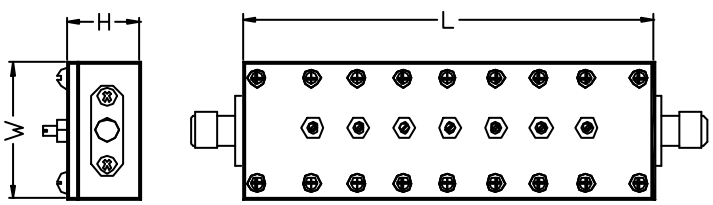
Example:

F_0=8000MHz,N=5, BW=0.35%, 则

W = 33.9 (mm)

L=(33.9-4)×5+4 = 153.9(mm)

H = 17.9 (mm)



♦ General Dimensions

Freq.GHz	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-18
W mm	49.5	42.5	37.6	33.9	31	28.7	26.9	25.3	24.0	22.8	20

Cavity Duplexers

Features

- Coaxial cavity design, Operating Frequency: 400MHz~6000MHz.
- Section Number of each channel: 2 to 10 or more
- 3 dB Relative Bandwidth of each channel :0.6%~6% or more
- Maximum VSWR of each ports: 1.2:1(1.3:1 for specifications)
- The specifications provided by curves, tables and formulas are general performance. Customers' requirements such as insertion loss, power handling can be satisfied.
- The general dimensions can only be referenced for standard specifications. The dimensions may be changed for special customers' requirements.
- Two channel's center frequency should be separated with some space and channel f_{02} should not drop into the parasitic passband($2.5f_{01}$)of another channel

To Order

5 CB 20 – 1.7&1.82 / T 30 –O&O / O

1 2 3 4 5 6 7 8

1.Section Number

2.Series (CB——Parallel, CL——Straightness)

3.Package code——Type "20"

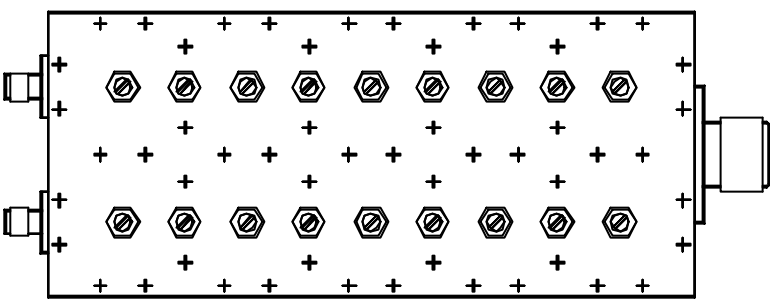
4.Center Frequency: (1.7 and 1.8GHz)

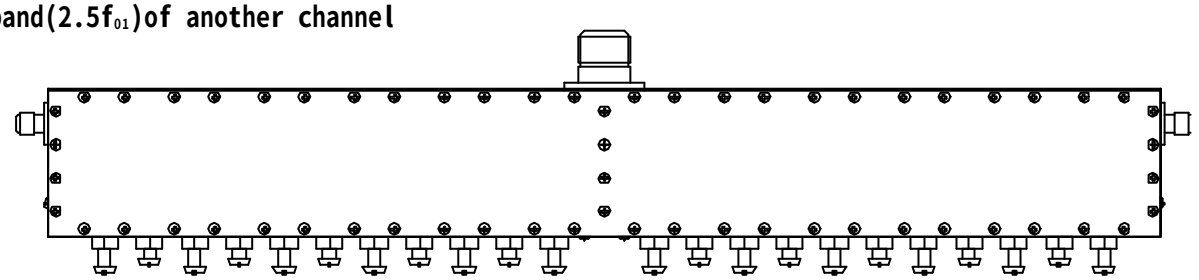
5.Bandwidth designator（The same meaning as LC Filters）

6.Bandwidth(30MHz)

7.Input Connector (Co-Port)

8.Output Connector





♦ Specifications

Series	f^{MHz}	BW/F_0× 100%	VSWR	Min Space[1)]	Average Power	Impedance	Section Number	Operating Temperature[2)]
CB、CL	400-6000	0.6-5%	1.3:1	>2.4:1	*	50Ù	2-10	-40~+60℃

Note: * The Average Power is 10W for general.300W or more power can be satisfied.

1)Minimum channel Space defined as: $(F_{02}-F_{01})/BW_{3dB}$,BW_{3dB} is wider one of the two.

2)The Operating Temperature of -55~+85℃ can also be available as requirement.

♦ Co-Channel Isolation

●**Graph** To determine the Co-channel isolation, use the attenuation graph at the right. The curves show the attenuation as multiples of the 3dB BW.The following formula is used to determine the isolation:

3dB BW's from F_c, R= $\frac{F_r - F_c}{BW_{3dB}}$

EXAMPLE:

Center Freq.:F_c=1832 MHz

BW_{3dB}=18MHz

Section number: **N=5**

Finding the attenuation at **1796MHz,** Using the formula:

$$R=\frac{4675-5000}{210}=-1.55$$

Then using the graph about 64dB attenuation can be obtained.

● **Calculation**

The following formula **can also give the approximate** Co-channel isolation:

$L^{dB} = 20\times N\times \log_{10}(2\times|R|)$

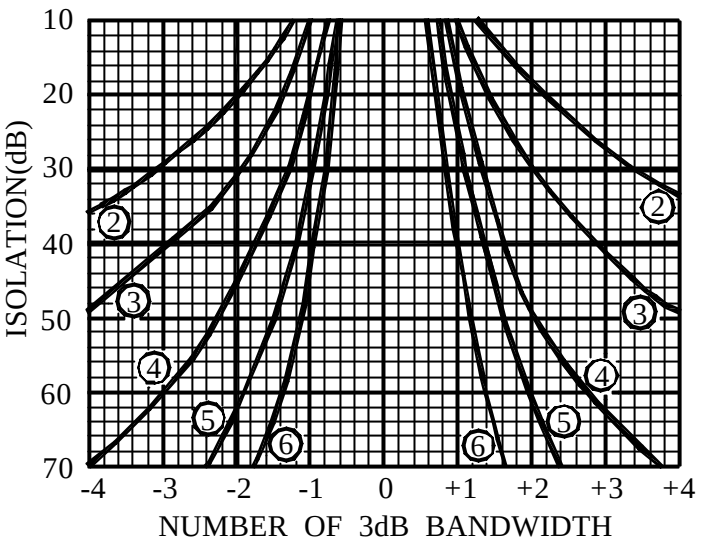
The calculated result is generally 4 to 9dB less than actual one. The calculated result for the above example is 59dB.

♦ Environmental

Refering to the coaxial resonator cavity filters.

♦ Insertion Loss

Refering to the coaxial resonator cavity filters.



♦ Mechanical

Drills for fixing are set on the bottom whose location will be provided by the factory.

● **Mechanical dimensions**

Reference the coaxial resonator cavity filters.

Additional informations:

About L:

CB: $L=L_c$;

CL: $L\approx 2L_c$;

About W and H:

CB:

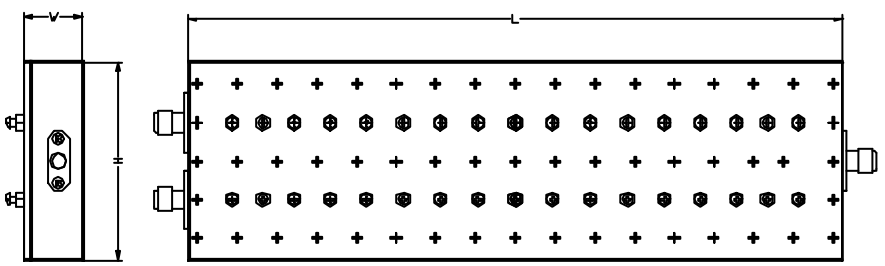
Type F-F $W=W_c$, $H=2H_c$

Type E-E $W=2W_c$, $H=H_c$

CL:$W=W_c$, $H=H_c$

Note: L_c, W_c and H_c are dimension of coaxial filters.

Left diagram **shows** the outline of **type F-F of Series CB.**



♦ Mechanical Type

Series	CB	CL
Type	Parallel	Straightness

★ I/O Connector

Code	O	OP	P	L
Type	SMA(K)	SMA(J)	Microstrip Pin	L16(K)

Cavity Duplexers

Features

- Rectangular waveguide design,Operating Frequency: 5000MHz~18000MHz.
- Section Number: 2 to 10 or more
- 3 dB Relative Bandwidth: 0.3%~4% or more
- Maximum VSWR: 1.2:1(1.3:1 for specification)
- The given curves、charts and formulas in this manual are for standard specifications designed with general structure. Customers' requirement such as lower insertion Loss、higher power handling can be satisfied .
- The general dimensions can only be referenced for standard specifications. The dimensions may be changed for special requirements.
- Two channel' s center frequency should be separated with some space and channel f_{02} should not drop into the parasitic passband($2.5f_{01}$)of another channel.

To Order

5RB 20 – 8.5&8.65 / T 30 –O&O / O

1 2 3 4 5 6 7 8

1.Section Number

2.Series (RB——Parallel, RL——Straightness)

3.Package code——Type "20"

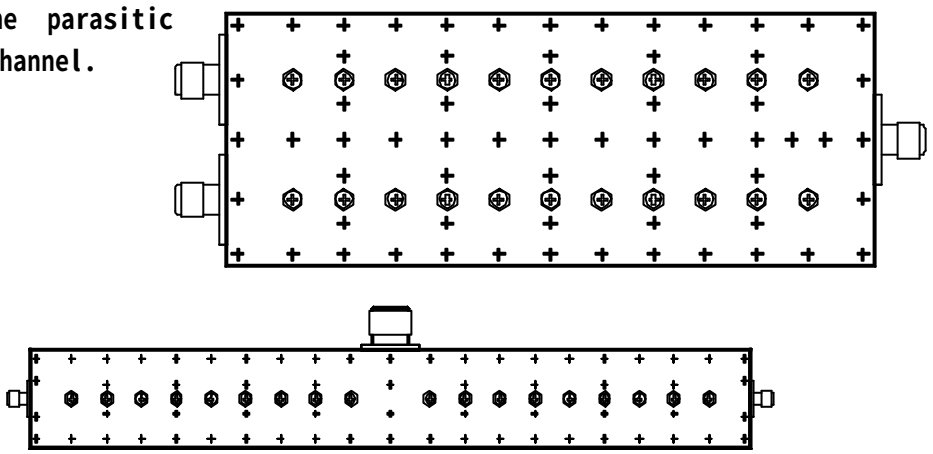
4.Center Frequency: (8.5and 8.65GHz)

5.Bandwidth designator（The same meaning as LC Filters）

6.Bandwidth(30MHz)

7.Input Connector (Co-Port)

8.Output Connector



♦ Specifications

Series	f^{GHz}	BW/F_0× 100%	VSWR	Min Space[1)]	Average Power	Impedance	Section Number	Operating Temperature[2)]
RB、RL	5-18	0.3-4%	1.3:1	>2.2:1	*	50Ù	2-10	-40~+60℃

Note: * The Average Power is 20W for general. Special requirements can be satisfied.

1)Minimum space defined as: $(F_{02}-F_{01})/BW_{3dB}$,BW_{3dB} is wider one.

2)The Operating Temperature of -55~+85℃ can also be available as requirement.

♦ Co-Channel Isolation

● **Graph** To determine the Co-channel isolation, use the attenuation graph at the right. The curves show the attenuation as multiples of the 3dB BW.The following formula is used to determine the isolation:

3dB BW's from F_c, R= $\frac{F_r - F_c}{BW_{3dB}}$

EXAMPLE:

Center Freq.:F_c=8000 MHz

BW_{3dB}=30MHz

Section number: **N=6**

Finding the attenuation at **8060MHz,** Using the formula:

$$R=\frac{8060-8000}{30}=-2$$

Then using the graph about 61dB attenuation can be obtained.

● **Calculation**

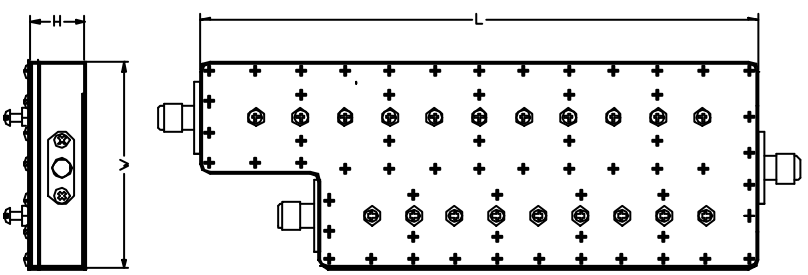
The following formula **can also give the approximate** Co-channel isolation:

$L^{dB} = 20\times N\times \log_{10}(2\times|R|)$

The calculated result is generally less 4 to 9dB than actual one. The calculated result for the above example is 60.2dB.

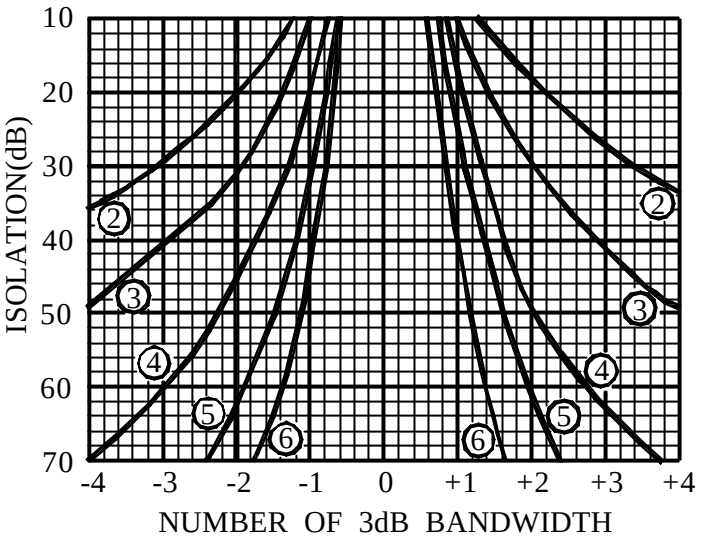
♦ Environmental

Refering to the rectangular waveguide filters.



♦ Insertion Loss

Reference the rectangular waveguide filters.



♦ Mechanical

Drills for fixing are set on the bottom whose location will be provided by the factory.

● **Mechanical dimensions**

Reference the rectangular waveguide filters. Additional informations:

About L:

RB: $L=L_R$;

RL: $L\approx 2L_R$;

About W and H:

RB:

Model F-F $W=W_R$, $H=2H_R$

Model E-E $W=2W_R$, $H=H_R$

RL:$W=W_R$, $H=H_R$

Note: L_R, W_R and H_R are dimension of waveguide filters.

Left diagram **shows** the outline of Model **E-E (Series RB).**

♦ Mechanical Type

Series	RB	RL
Type	Parallel	Straightness

★I/O Connector Code

Code	O	OP	P	B	N
Type	SMA(K)	SMA(J)	Microstrip Pin	Flange	N(K)

HE411A

Integrated Voltage-controlled Attenuator

Features

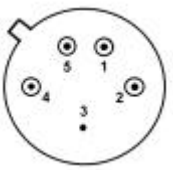
- High attenuation: 45dBm/100MHz
- Low insertion loss
- Standard package: TO-8B
- Wide Operation Temperature:-55℃~+85℃

Specifications (Test at V_C =+15V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency	f_L~f_H	MHz	5~500	5~500
Attenuation (Max)	Att	dB	31	33
Insertion loss	IL	dB	2.2	1.8
Input/Output VSWR	VSWR	——	2.0:1	1.4:1
DC Supply	Vcc	V	+15	——
DC Current	Icc	mA	14	——
Control Voltage	Vco	V	0~15	——
Control Current	Ico	mA	0~7	——

Absolute Maximum Rating

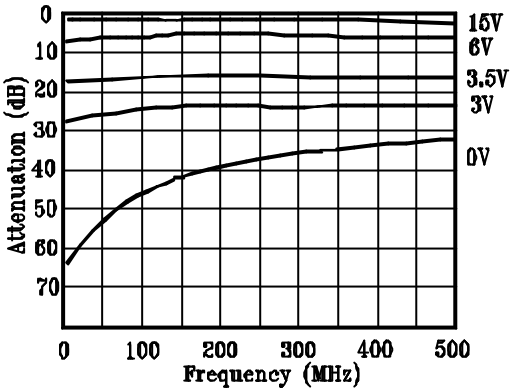
Maximum DC Supply: 18V
Maximum Input Power : +20dBm
Storage Temperature : +125℃



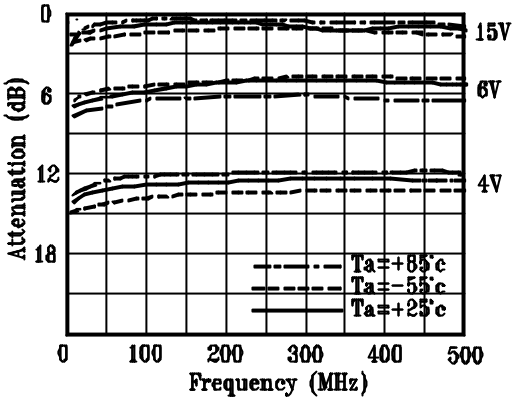
TO-8B

Typical Performance Curves

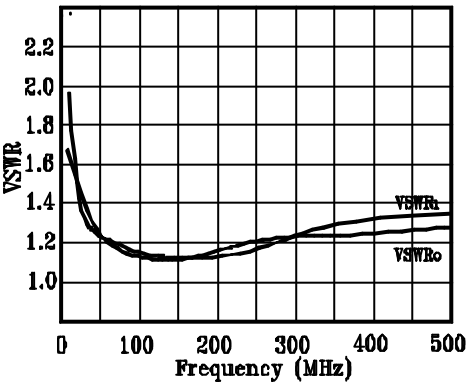
Attenuation vs. Frequency



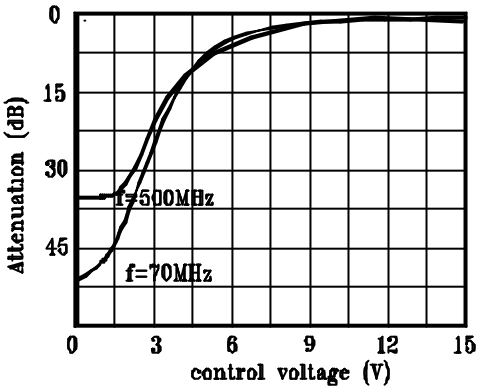
Attenuation vs. Temperature



VSWR vs. Frequency

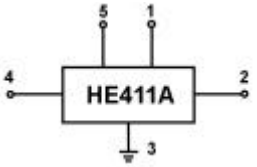


Attenuation vs. Vco



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Input and output port can interchange directly.



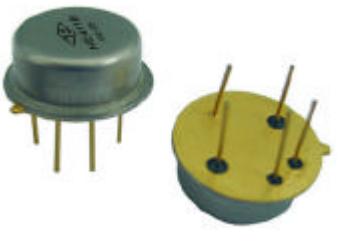
1. Vcc 2.RF Output 3.GND
4.RFInput 5. Vco

HE411B

Integrated Voltage-controlled Attenuator

Features

- High attenuation: 45dB/100MHz
- Low insertion loss
- Standard package: TO-8B
- Wide Operation Temperature:-55℃~+85℃



Specifications (Test at V_C =+15V, T_A=25℃ Measured in a 50Ω system)

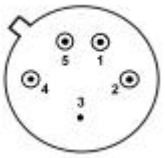
Parameter	Symbol	Unit	Guaranteed	Typical
Frequency	f_L~f_H	MHz	20~500	20~500
Attenuation (Max)	Att	dB	33	35
Insertion loss	IL	dB	1.8	1.2
Input/Output VSWR	VSWR	——	2.0:1	1.4:1
DC Supply	Vcc	V	+15	——
DC Current	Icc	mA	14	——
Control Voltage	Vco	V	0~15	——
Control Current	Ico	mA	0~7	——

Absolute Maximum Rating

Maximum DC Supply: 18V

Maximum Input Power: +10dBm

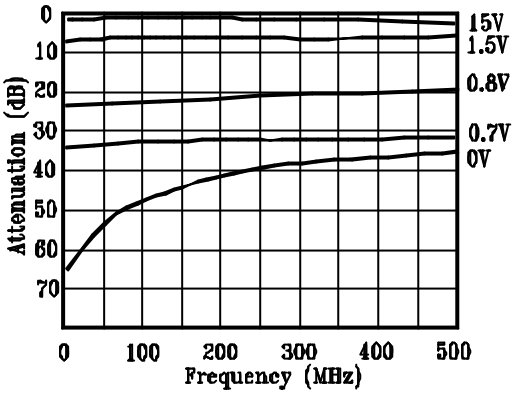
Storage Temperature : +125℃



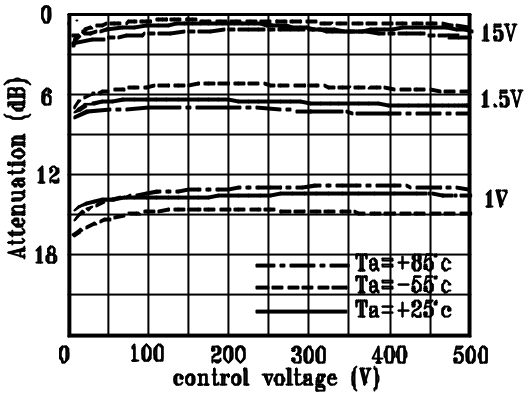
TO-8B

Typical Performance Curves

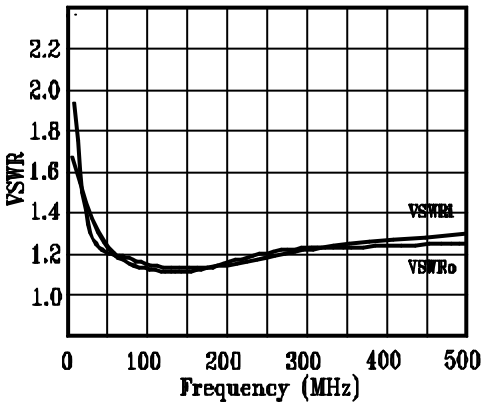
Attenuation vs. Frequency



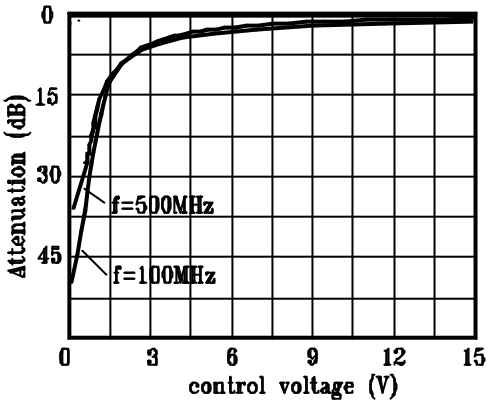
Attenuation vs. Temperature



VSWR vs. Frequency

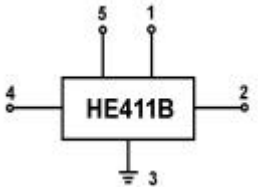


Attenuation vs. Vco



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Input and output port can interchange directly.



1. Vcc 2.RF Output 3.GND
4.RFInput 5. Vco

HE412A

Integrated Voltage-controlled Attenuator

Features

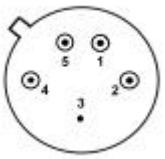
- High attenuation: 27dB(TYP)
- Standard package: TO-8B
- Wide Operation Temperature:-55℃~+85℃

Specifications (Test at V_C =+15V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency	f_L~f_H	MHz	5~1000	5~1000
Attenuation (Max)	Att	dB	25	27
Insertion loss	IL	dB	2.5	2.0
Input/Output VSWR	VSWR	——	2.0:1	1.5:1
DC Supply	Vcc	V	+15	+15
DC Current	Icc	mA	14	——
Control Voltage	Vco	V	0~15	——
Control Current	Ico	mA	0~14	——

Absolute Maximum Rating

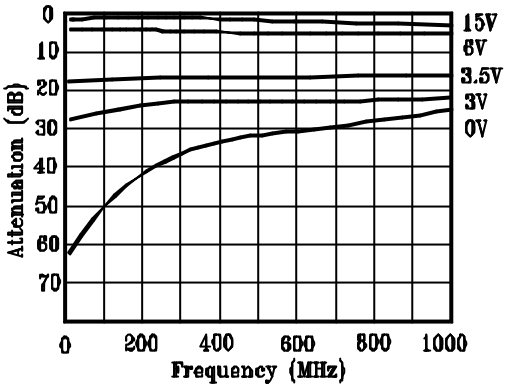
Maximum DC Supply: 18V
Maximum Input Power: +20dBm
Storage Temperature : +125℃



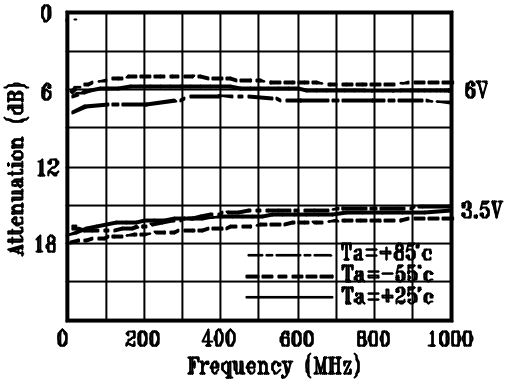
TO-8B

Typical Performance Curves

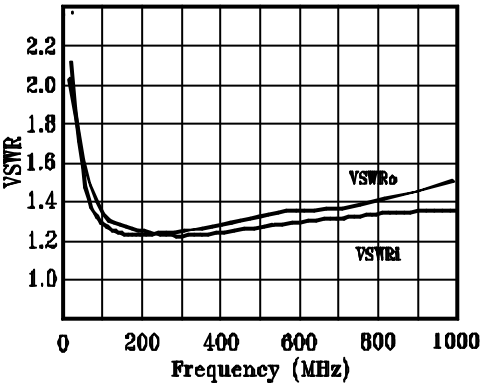
Attenuation vs. Frequency



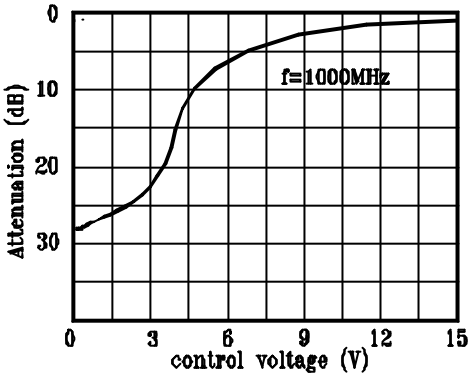
Attenuation vs. Temperature



VSWR vs. Frequency

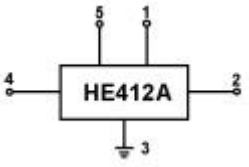


Attenuation vs. Vco



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Input and output port can interchange directly.



1. Vcc 2.RF Output 3.GND
4.RFInput 5. Vco

HE412B

Integrated Voltage-controlled Attenuator

Features

- High attenuation: 26dB(TYP)
- Standard package: TO-8B
- Wide Operation Temperature:-55℃~+85℃

Specifications (Test at V_C =+15V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency	f_L~f_H	MHz	20~1000	20~1000
Attenuation (Max)	Att	dB	24	26
Insertion loss	IL	dB	1.8	1.2
Input/Output VSWR	VSWR	——	2.0:1	1.5:1
DC Supply	Vcc	V	+15	——
DC Current	I_{cc}	mA	14	——
Control Voltage	Vco	V	0~15	——
Control Current	Ico	mA	0~7	——

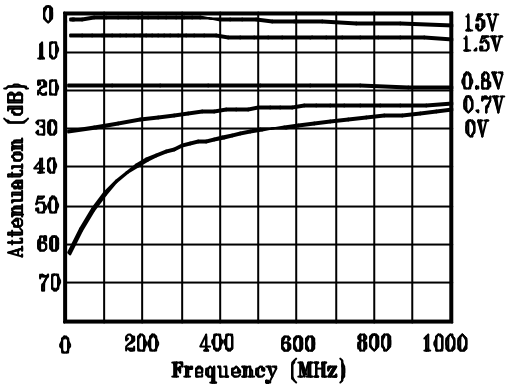
Absolute Maximum Rating

Maximum DC Supply: 18V
Maximum Input Power: +10dBm
Storage Temperature : +125℃

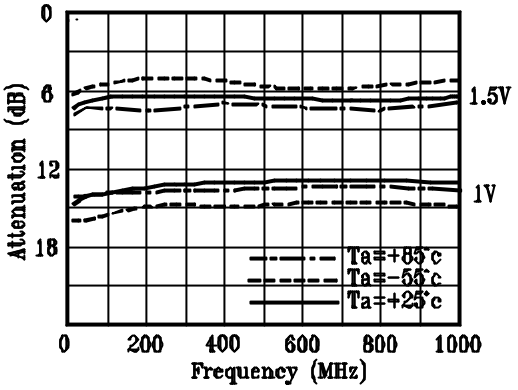
TO-8B

Typical Performance Curves

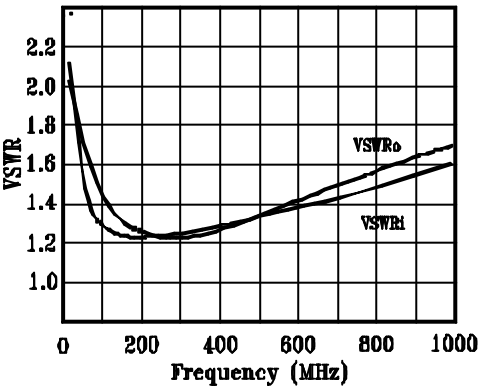
Attenuation vs. Frequency



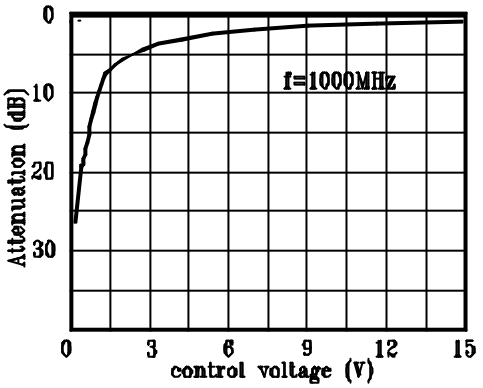
Attenuation vs. Temperature



VSWR vs. Frequency

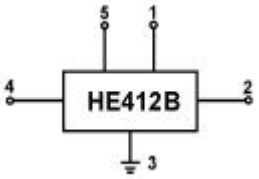


Attenuation vs. Vco



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Input and output port can interchange directly.



1. Vcc 2.RF Output 3.GND
4.RFInput 5. Vco

HE413A

Integrated Voltage-controlled Attenuator

Features

- Broadband: 5~2000MHz
- High attenuation: 21dB(TYP)
- Standard package: TO-8B
- Wide Operation Temperature:-55℃~+85℃

Specifications (Test at V_C =+15V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency	f_L~f_H	MHz	5~2000	5~2000
Attenuation (Max)	Att	dB	19	21
Insertion loss	IL	dB	3.0	2.0
Input/Output VSWR	VSWR	——	2.0:1	1.5:1
DC Supply	Vc	V	+15	——
DC Current	Icc	mA	14	——
Control Voltage	Vco	V	0~15	——
Control Current	Ico	mA	0~14	——

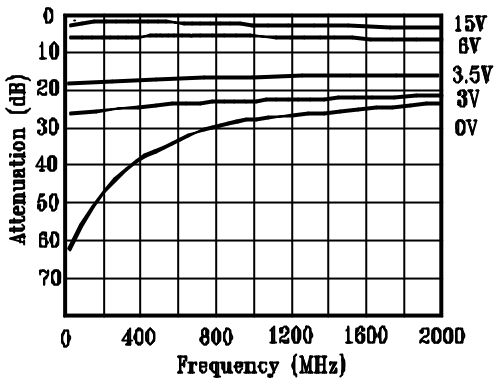
Absolute Maximum Rating

Maximum DC Supply: 18V
Maximum Input Power: +20dBm
Storage Temperature : +125℃

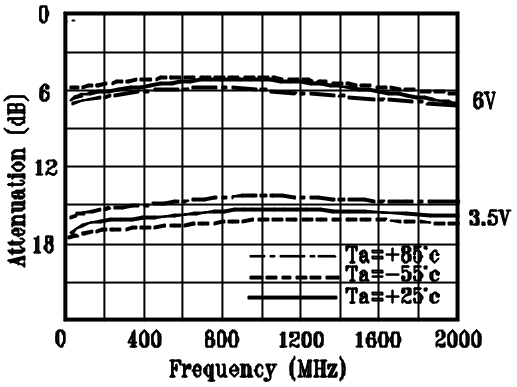
TO-8B

Typical Performance Curves

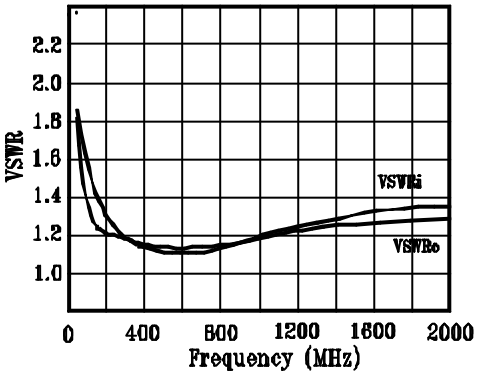
Attenuation vs. Frequency



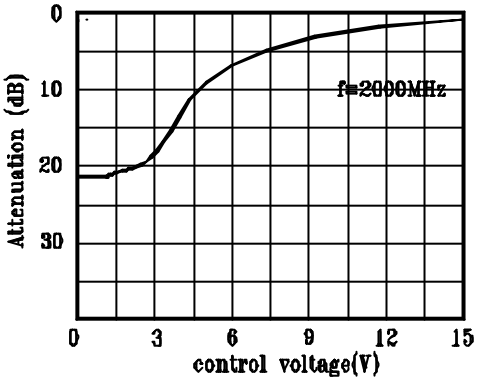
Attenuation vs. Temperature



VSWR vs. Frequency

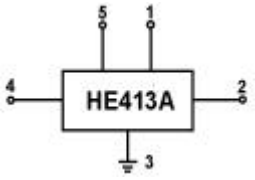


Attenuation vs. Vco



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Input and output port can interchange directly.



1. Vcc 2.RF Output 3.GND
4.RFInput 5. Vco

HE413B

Integrated Voltage-controlled Attenuator

Features

- Broadband: 5~2000MHz
- High attenuation: 24dB(TYP)
- Standard package: TO-8B
- Wide Operation Temperature:-55℃~+85℃

Specifications (Test at V_C =+15V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency	f_L~f_H	MHz	20~2000	20~2000
Attenuation (Max)	Att	dB	22	24
Insertion loss	IL	dB	2.5	2.0
Input/Output VSWR	VSWR	——	2.0:1	1.5:1
DC Supply	Vcc	V	+15	——
DC Current	Icc	mA	14	——
Control Voltage	Vco	V	0~15	——
Control Current	Ico	mA	0~7	——

Absolute Maximum Rating

Maximum DC Supply: 18V

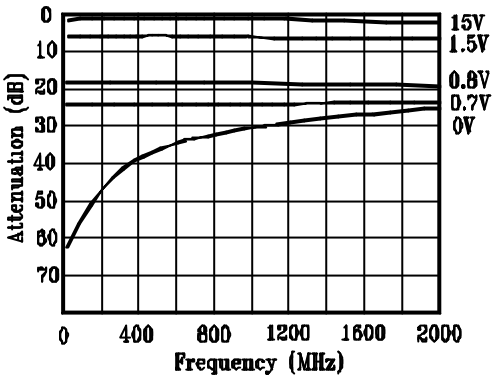
Maximum Input Power: +10dBm

Storage Temperature : +125℃

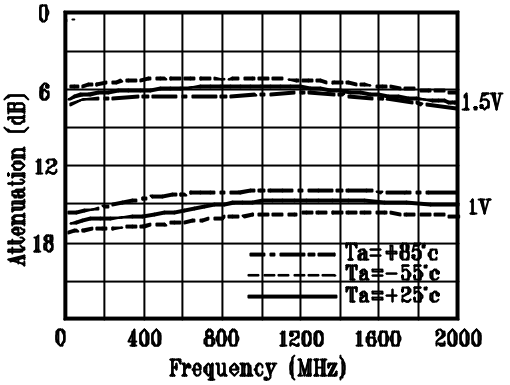
TO-8B

Typical Performance Curves

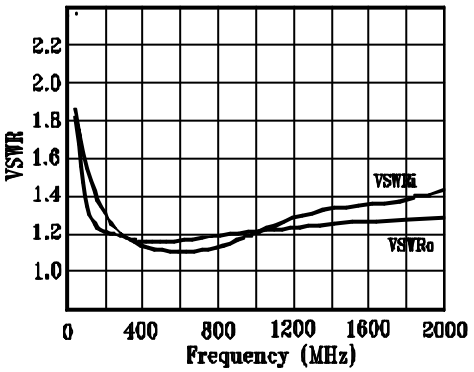
Attenuation vs. Frequency



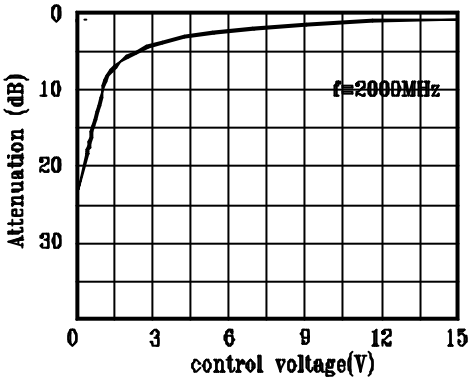
Attenuation vs. Temperature



VSWR vs. Frequency

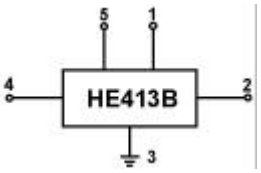


Attenuation vs. Vco



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Input and output port can interchange directly.



1. Vcc 2.RF Output 3.GND
4.RFInput 5. Vco

HE891A

Integrated Voltage-controlled Attenuator

Features

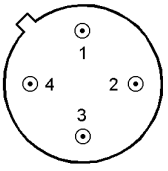
- High attenuation: 70dB(f=70MHz)
- Standard package: TO-8A-1
- Wide Operation Temperature:-55℃~+85℃

Specifications (Test at V_C =+5V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency	f_L~f_H	MHz	5~200	5~300
Insertion loss	IL	dB	3.0	2.8
Attenuation (Max)	Att	dB	57.0	——
Input VSWR	VSWRi	——	1.8:1	1.3:1
Output VSWR	VSWRo	——	1.8:1	1.3:1
DC Current	Icc	mA	10	——
Control Voltage/Current	Vco/Ico	V/mA	0~15/0~20	——

Absolute Maximum Rating

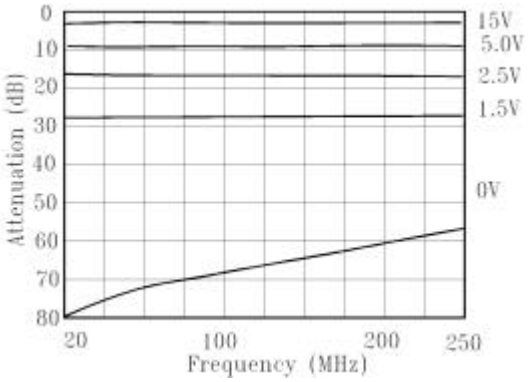
Maximum DC Supply: 7V
Maximum Input Power: +23dBm
Storage Temperature : +125℃



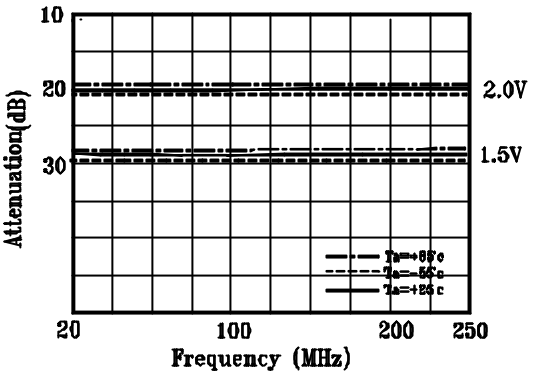
To-8A-1

Typical Performance Curves

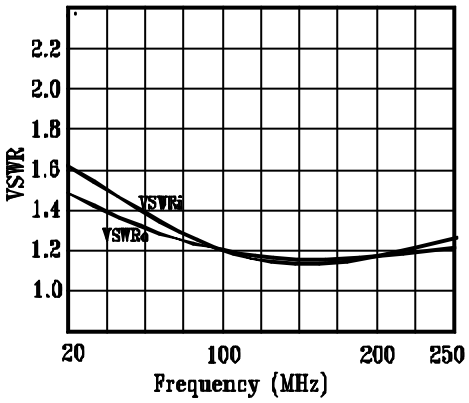
Attenuation vs. Frequency



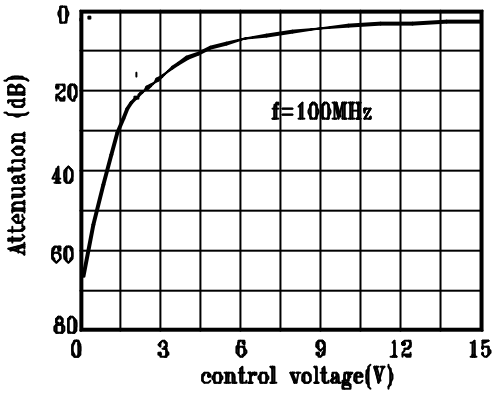
Attenuation vs. Temperature



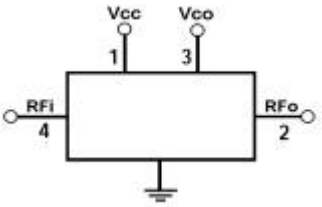
VSWR vs. Frequency



Attenuation vs. Vco



Note: Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).



HE891B

Integrated Voltage-controlled Attenuator

Features

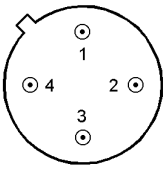
- High attenuation: 70dB(f=70MHz)
- Standard package: TO-8A-1
- Wide Operation Temperature:-55℃~+85℃

Specifications (Test at V_C =+5V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency	f_L~f_H	MHz	20~200	——
Insertion loss	IL	dB	2.0	1.8
Attenuation (Max)	Att	dB	57.0	——
Input VSWR	VSWRi	——	1.8:1	1.3:1
Output VSWR	VSWRo	——	1.8:1	1.3:1
DC Current	Icc	mA	10	——
Control Voltage/Current	Vco/Ico	V/mA	0~7/0~10	——

Absolute Maximum Rating

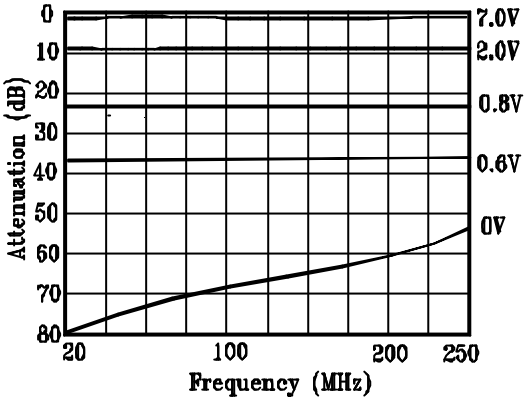
Maximum DC Supply: 7V
Maximum Input Power: +10dBm
Storage Temperature : +125℃



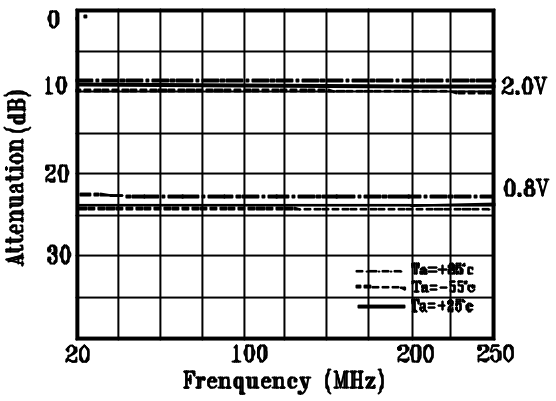
To-8A-1

Typical Performance Curves

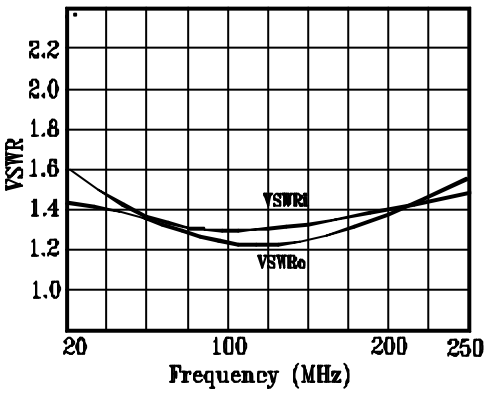
Attenuation vs. Frequency



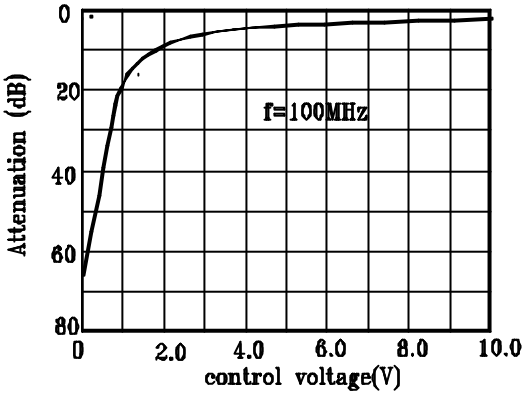
Attenuation vs. Temperature



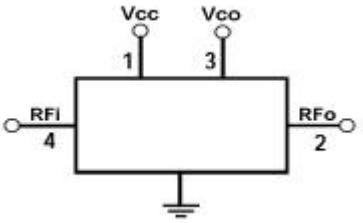
VSWR vs. Frequency



Attenuation vs. Vco



Note: Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).



HE892

Integrated Voltage-controlled Attenuator

Features

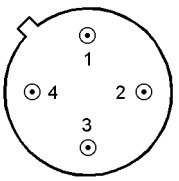
- **Broadband:** 20~1000MHz
- High attenuation: 40dB
- Standard package: TO-8A-1
- Wide Operation Temperature:-55℃~+85℃

Specifications (Test at V_C =+5V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency	f_L~f_H	MHz	20~1000	——
Insertion loss	IL	dB	2.5	2.2
Attenuation (Max)	Att	dB	40.0	——
Input VSWR	VSWRi	——	1.8:1	1.3:1
Output VSWR	VSWRo	——	1.8:1	1.3:1
DC Current	Icc	mA	10	——
Control Voltage/Current	Vco/Ico	V/mA	0~7/0~10	——

Absolute Maximum Rating

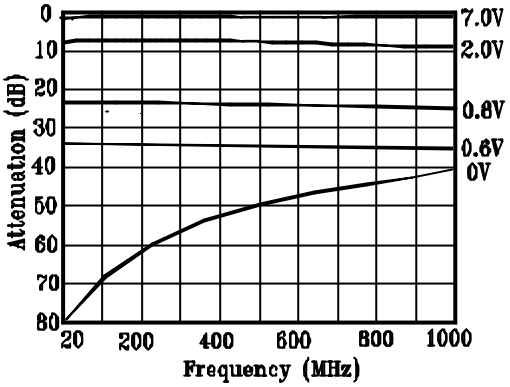
Maximum DC Supply: 7V
Maximum Input Power: +23dBm
Storage Temperature : +125℃



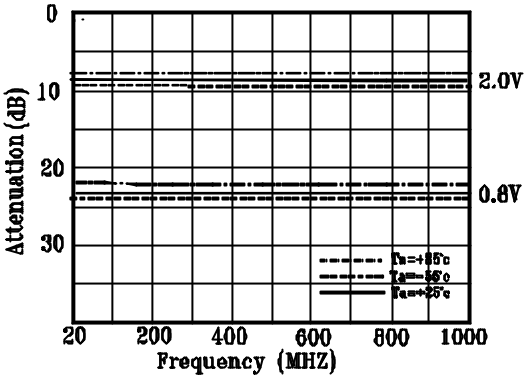
To-8A-1

Typical Performance Curves

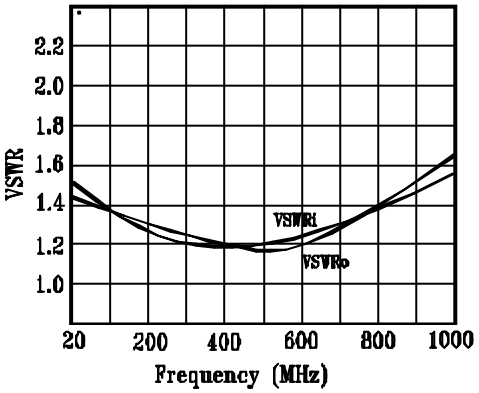
Attenuation vs. Frequency



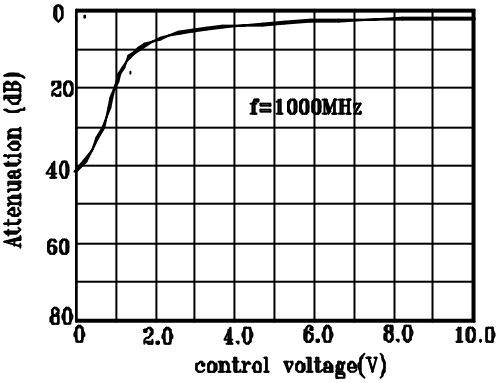
Attenuation vs. Temperature



VSWR vs. Frequency

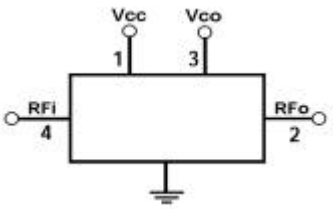


Attenuation vs. Vco



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Input and output port can interchange directly.



HE893

Integrated Voltage-controlled Attenuator

Features

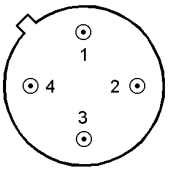
- **Broadband:** 20~3000MHz
- High attenuation: 30dB
- Standard package: TO-8A-1
- Wide Operation Temperature:-55℃~+85℃

Specifications (Test at V_C =+5V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency	f_L~f_H	MHz	20~3000	——
Insertion loss	IL	dB	3.8	3.3
Attenuation (Max)	Att	dB	30.0	——
Input VSWR	VSWRi	——	1.8:1	1.3:1
Output VSWR	VSWRo	——	1.8:1	1.3:1
DC Current	Icc	mA	10	——
Control Voltage/Current	Vco/Ico	V/mA	0~7/0~10	——

Absolute Maximum Rating

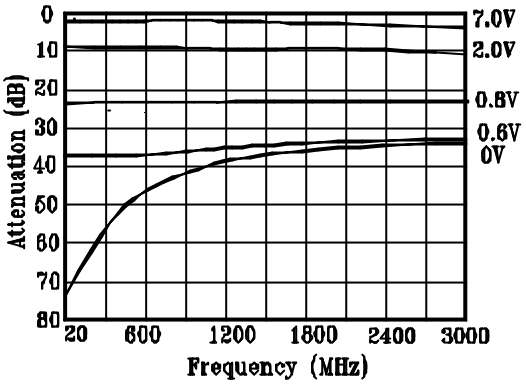
Maximum DC Supply: 7V
Maximum Input Power: +23dBm
Storage Temperature : +125℃



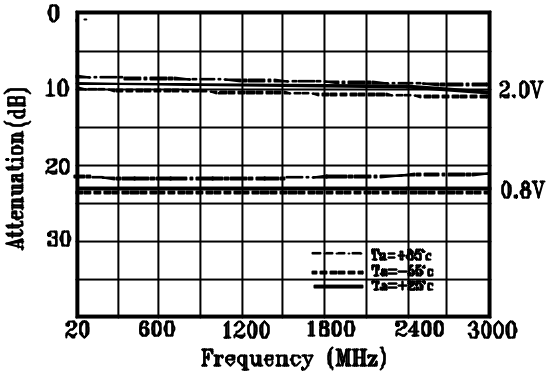
To-8A-1

Typical Performance Curves

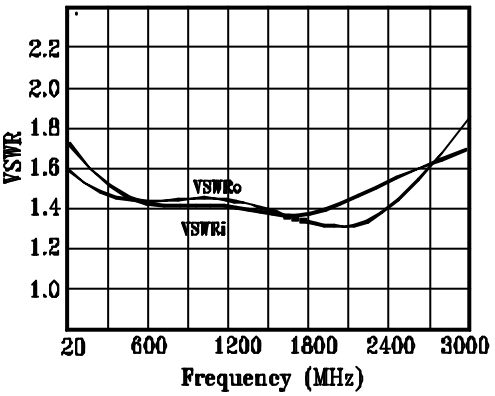
Attenuation vs. Frequency



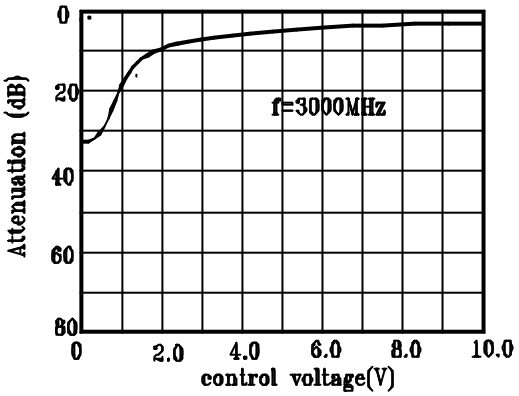
Attenuation vs. Temperature



VSWR vs. Frequency

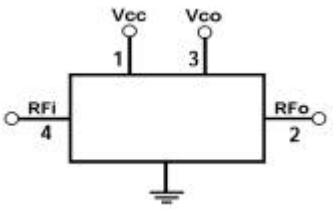


Attenuation vs. Vco



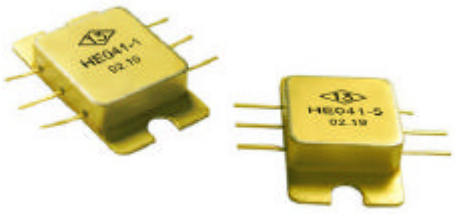
Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Input and output port can interchange directly.



Features

- Single voltage controlled
- High attenuation
- Low insertion loss
- Excellent Linear
- Microstrip package or SMA
- Wide Operation Temperature:-55℃~+85℃



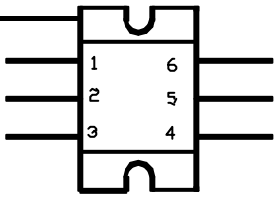
Specifications (Test at V_C = 0~+10V, T_A=25℃ Measured in a 50Ω system)

Model	Frequency (GHz)	Insertion loss (dB)	Attenuation (dB)	VSWR	Control Current (mA)
HE041-1	2.0~3.0	1.6	50	≤1.8:1	0~10
HE041-2	3.0~3.8	2.0	45	≤1.8:1	0~10
HE041-3	3.7~4.5	2.3	40	≤1.8:1	0~10
HE041-4	4.5~5.5	2.5	35	≤2:1	0~10
HE041-5	5.0~6.0	3.0	35	≤2:1	0~10

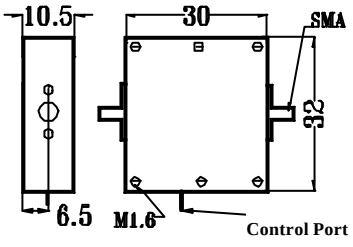
Absolute Maximum Rating

Maximum Input Power : +10dBm

Storage Temperature : +125℃



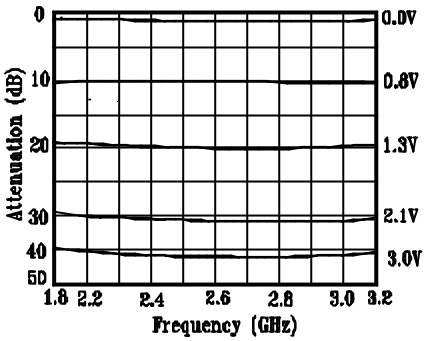
SP-1



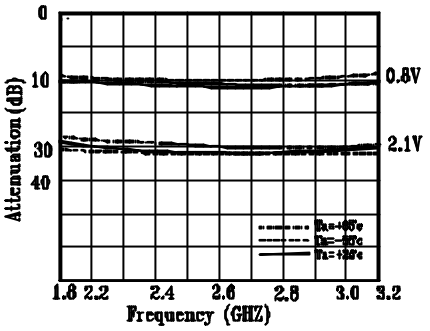
SMA

Typical Performance Curves（HE041-1/R=510W， Other models are similar to HE041-1）

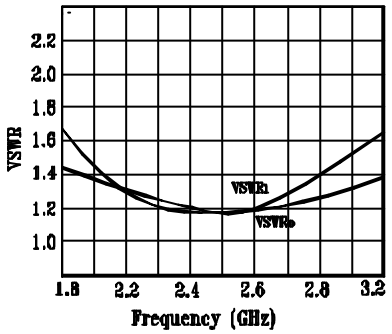
Attenuation vs. Frequency



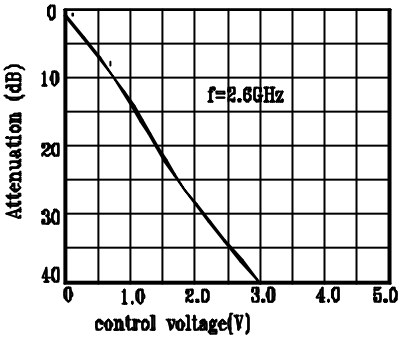
Attenuation vs. Temperature



VSWR vs. Frequency

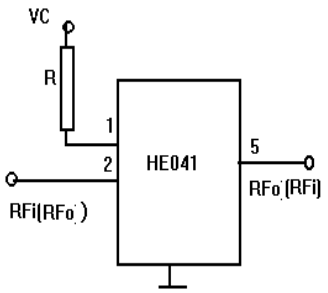


Attenuation vs. Vc



Note:

1. Additional R should be used between 100~ 2000Ω.
2. Pin 3,4,6 NC



HE741

Integrated Digital Attenuator

Features

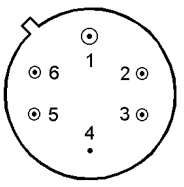
- Broadband: 15~1500MHz(Typ)
- Attenuation: 20dB
- Low insertion loss: 1.3dB
- Standard package: TO-8E
- Wide Operation Temperature:-55℃~+85℃

Specifications (Test at V_C =±5V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency	f_L~f_H	MHz	15~1350	15~1500
Insertion loss	IL	dB	1.8	1.3
Attenuation	Att	dB	20.0	20.0
Attenuation Accuracy	——	dB	±0.5	±0.3
Input/Output VSWR	VSWR	——	1.5:1	1.3:1
Control Level	Vco	——	TTL	——
Switch Time (10%~90%)	——	μs	1.0 (Ton) 1.5 (Toff)	—— ——
DC Supply	V+	V	+5	——
DC Supply	V-	V	-5	——
DC Current	I_c	mA	25	——

Absolute Maximum Rating

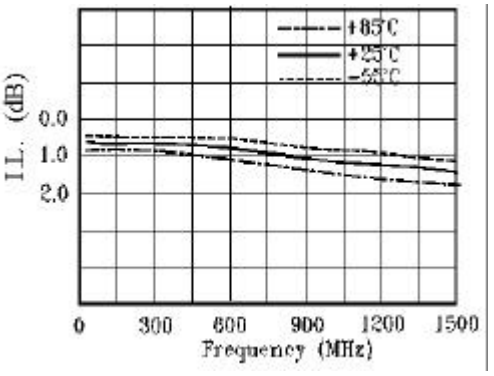
Maximum Input Power : +20dBm
Storage Temperature : +125℃



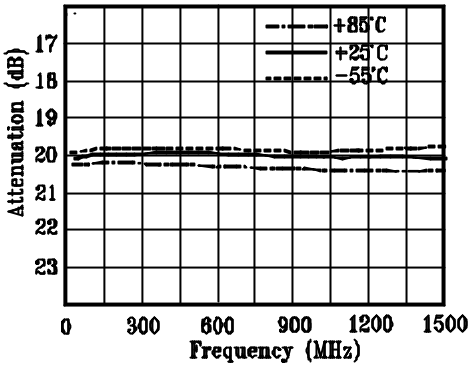
TO-8E

Typical Performance Curves

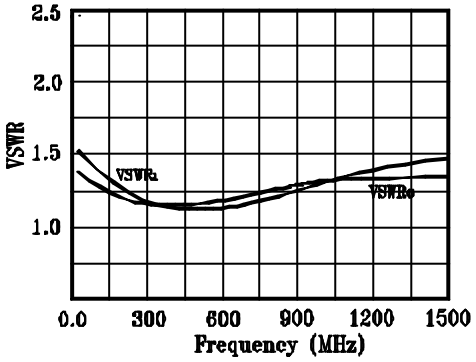
Insertion Loss vs. Frequency



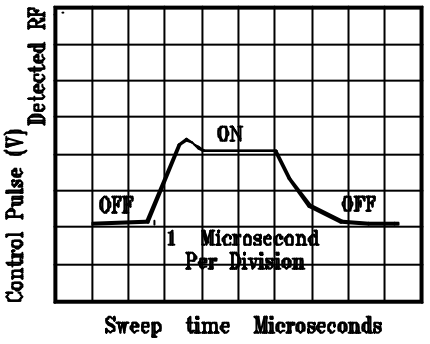
Attenuation vs. Frequency



VSWR vs. Frequency

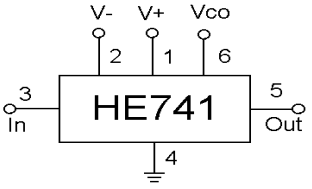


Switch Performance



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Input and output port can interchange directly.
3. Logic 0:Insertion loss, Logic 1:Attenuation.
4. Customers' attenuators can be offered, attenuation:0.5~32dB.



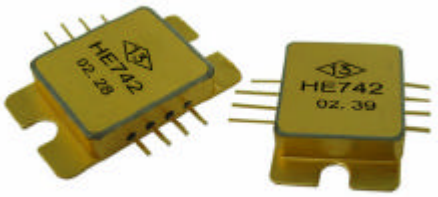
1.V_+ 2. V_- 3.Input port
4.GND 5.Output port 6.Control port

HE742

Integrated Digital Step Attenuator

Features

- Broadband: 15~1500MHz(Typ)
- Attenuation: 10~40dB
- Low insertion loss: 1.3dB
- Controlled by TTL
- Microstrip package
- Wide Operation Temperature:-55℃~+85℃

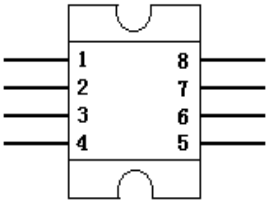


Specifications (Test at V_C =±5V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency	f_L~f_H	MHz	15~1350	15~1500
Insertion loss	IL	dB	2.0	1.8
Total Attenuation	Att	dB	30	—
Attenuation Accuracy	ΔAtt	dB	±1.0	±0.5
Attenuation Step	Att1	dB	10	—
	Att2	dB	20	—
Step Accuracy	ΔAtt	dB	±0.5	±0.3
Input/Output VSWR	VSWR	—	1.5:1	1.3:1
DC Supply	V+	V	+5	—
DC Supply	V-	V	-5	—
DC Current	I_C	mA	40	—

Absolute Maximum Rating

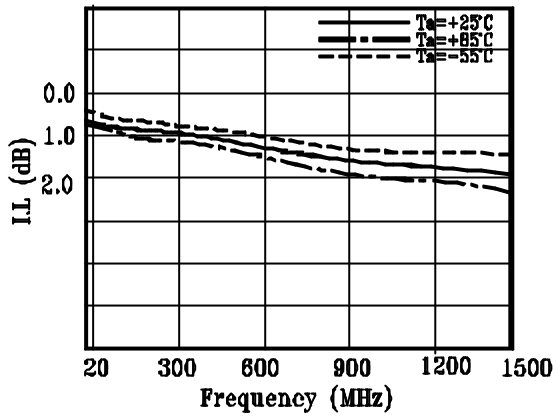
Maximum Input Power : +20dBm
Storage Temperature : +125℃



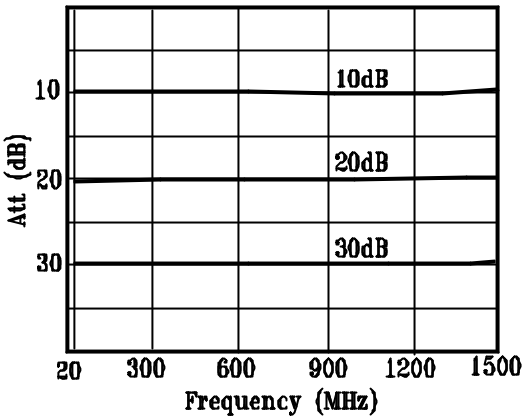
SP-2

Typical Performance Curves

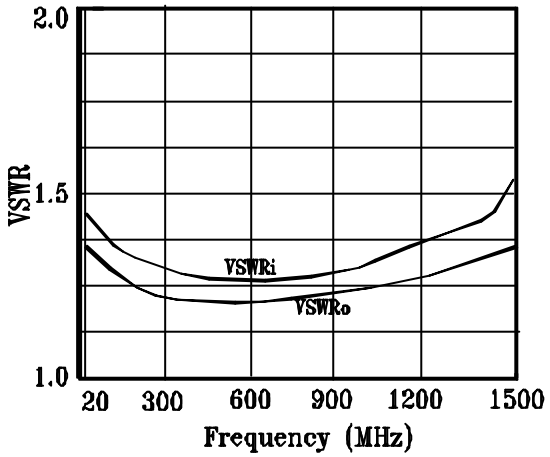
Insertion Loss vs. Frequency



Attenuation vs. Frequency



VSWR vs. Frequency

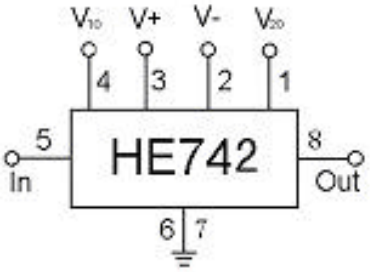


Pin Function

Pin No	Function	Pin No	Function
1	20dB Control	5	Input
2	V_-	6	NC
3	V_+	7	NC
4	10dB Control	8	Output

Note:

1. Required the Plug-in package bottom grounded tightly.
2. Input and output port can interchange directly.
3. Logic 0:Insertion loss, Logic 1:Attenuation.



HE751

Integrated Digital Step Attenuator(6 Bits)

Features

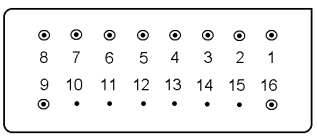
- Frequency range: 15~200MHz
- Total Attenuation: 63dB
- Minimum step: 1.0dB
- Insertion loss: 3.5dB
- Controlled by TTL
- Standard package: DIP—16
- Wide Operation Temperature:-55℃~+85℃

Specifications (Test at V_C =+5V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency	f_L~f_H	MHz	15~200	15~200
Insertion loss	IL	dB	4.5	3.5
Total Attenuation	Att	dB	63.0±2.0	63.0±1.0
Attenuation Step	Att	dB	1, 2, 4, 8, 16, 32	1, 2, 4, 8, 16, 32
Attenuation Accuracy	——	dB	±0.3(1, 2, 4dB) ±0.5(8, 16, 32dB)	——
Input/Output VSWR	VSWR	——	2.0:1	1.3:1
Control Level	Vco	——	TTL	——
Switching Time (10%~90%)	t	μs	1.0 (Ton) 2.5 (Toff)	—— ——
DC Supply	Vcc	V	+5	——
DC Current	Icc	mA	110	——

Absolute Maximum Rating

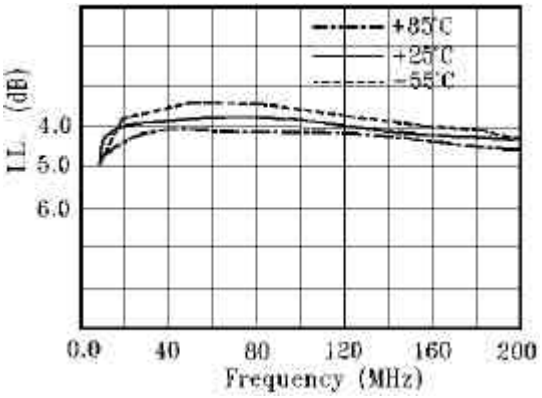
Maximum Input Power : +20dBm
Storage Temperature : +125℃



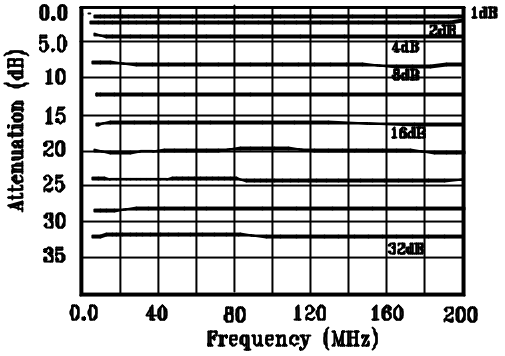
DIP-16

Typical Performance Curves

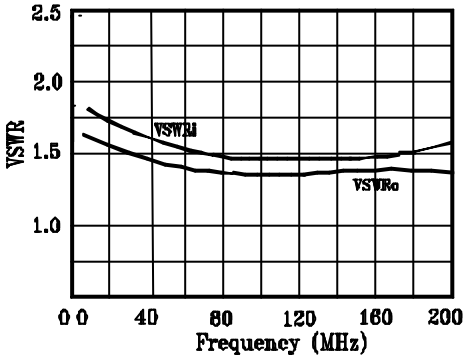
Insertion Loss vs. Frequency



Attenuation vs. Frequency



VSWR vs. Frequency

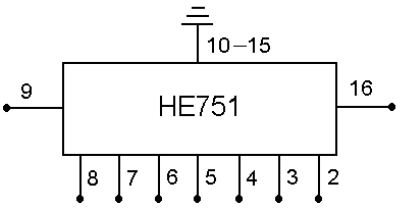


Pin Function

Pin No.	Function	Pin No.	Function
8	1 dB	4	Vcc
7	2 dB	9	RFi
6	4 dB	16	RFo
5	8 dB	10—15	GND
3	16dB	1	NC
2	32dB		

Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Input and output port can interchange directly.
3. Logic 0:Insertion loss, Logic 1:Attenuation.
4. Customers' digital attenuators can be offered, minimum step 0.5dB.



HE751A

Integrated Digital Step Attenuator(6 Bits)

Features

- Frequency range: 50～500MHz
- Total Attenuation: 63dB
- Minimum step: 1.0dB
- Insertion loss: 4.5dB
- Controlled by TTL
- Standard package: DIP—16
- Wide Operation Temperature:-55℃～+85℃

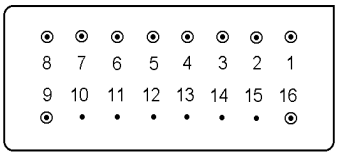
Specifications (Test at V_C =+5V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency	f_L～f_H	MHz	50～500	50～500
Insertion loss	IL	dB	6.0	4.5
Total Attenuation	Att	dB	63.0±2.0	63.0±1.0
Attenuation Step	Att	dB	1, 2, 4, 8, 16, 32	1, 2, 4, 8, 16, 32
Attenuation Accuracy	——	dB	±0.3(1, 2, 4,8dB) ±0.5(16, 32dB)	——
Input/Output VSWR	VSWR	——	2.0:1	1.6:1
Control Level	Vco	——	TTL	——
Switching Time (10%～90%)	t	μs	1.0 (Ton) 2.5 (Toff)	—— ——
DC Supply	Vcc	V	+5	——
DC Current	I_c	mA	120	110

Absolute Maximum Rating

Maximum Input Power : +20dBm

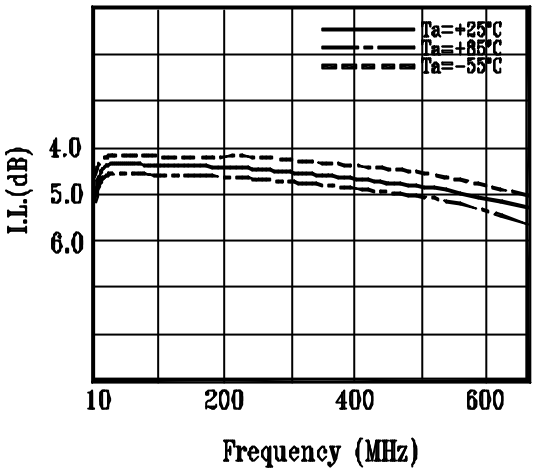
Storage Temperature : +125℃



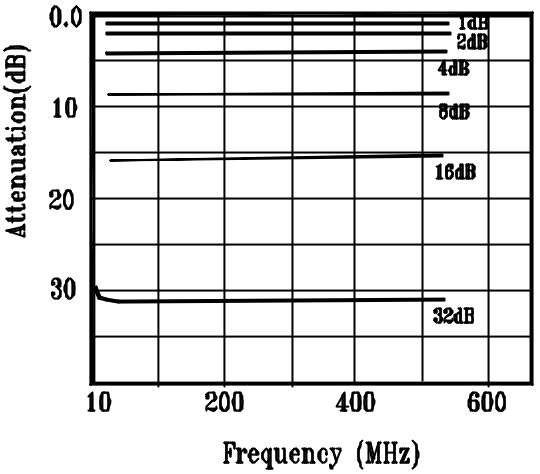
DIP-16

Typical Performance Curves

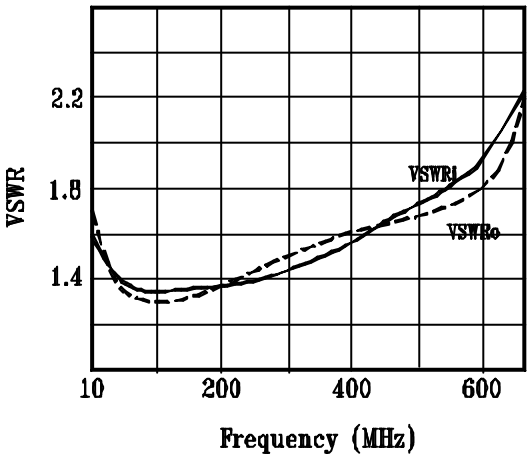
Insertion Loss vs. Frequency



Attenuation vs. Frequency



VSWR vs. Frequency

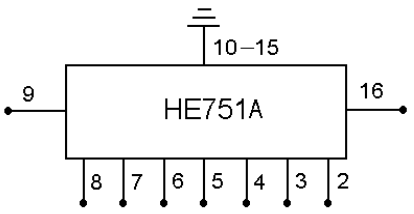


Pin Function

Pin No.	Function	Pin No.	Function
8	1 dB	4	Vcc
7	2 dB	9	RFi
6	4 dB	16	RFo
5	8 dB	10—15	GND
3	16dB	1	NC
2	32dB		

Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Input and output port can interchange directly.
3. Logic 0:Insertion loss, Logic 1:Attenuation.
4. Customers' digital attenuators can be offered, minimum step 0.5dB.



HE752

Integrated Digital Step Attenuator(4 Bits)

Features

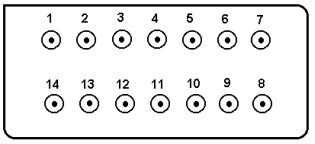
- Frequency range: 15～200MHz
- Total Attenuation: 30dB
- Minimum step: 2.0dB
- Insertion loss: 2.5dB
- Controlled by TTL
- Standard package: DIP—14A
- Wide Operation Temperature:-55℃～+85℃

Specifications (Test at V_C =+5V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency	f_L～f_H	MHz	15～200	15～200
Insertion loss	IL	dB	3.5	2.5
Total Attenuation	Att	dB	30.0±1.5	30.0±0.8
Attenuation Step	Att	dB	2, 4, 8,16	2, 4, 8,16
Attenuation Accuracy	——	dB	±0.3	——
Input/Output VSWR	VSWR	——	2.0:1	1.5:1
Control Level	Vco	——	TTL	——
Switching Time (10%～90%)	t	μs	1.0 (Ton) 2.5 (Toff)	——
DC Supply	Vcc	V	+5	——
DC Current	I_c	mA	75	——

Absolute Maximum Rating

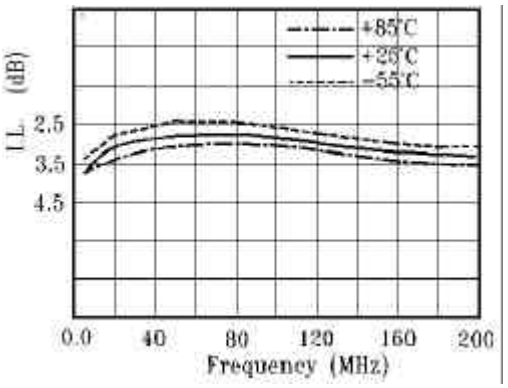
Maximum Input Power : +20dBm
Storage Temperature : +125℃



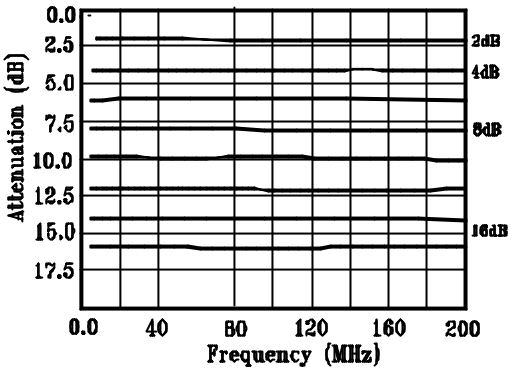
DIP-14A

Typical Performance Curves

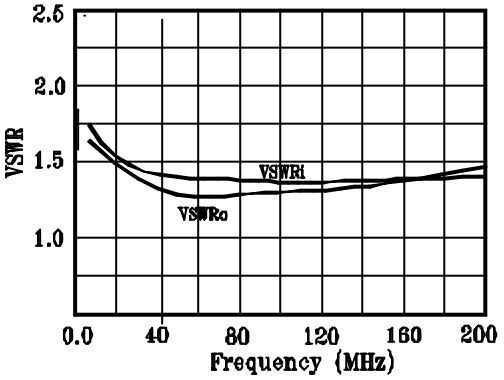
Insertion Loss vs. Frequency



Attenuation vs. Frequency



VSWR vs. Frequency

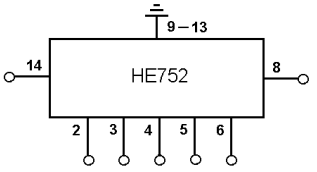


Pin Function

Pin No.	Function	Pin No.	Function
2	2 dB	4	Vcc
3	4 dB	14	RFi
5	8 dB	8	RFo
6	16 dB	9 –13	GND
		1 7	NC

Note:

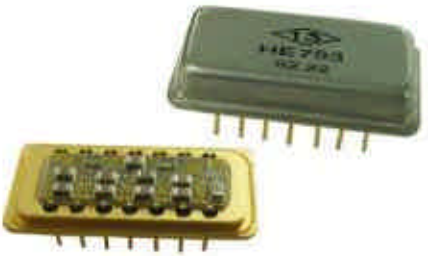
1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Input and output port can interchange directly.
3. Logic 0:Insertion loss, Logic 1:Attenuation.
4. Customers' digital attenuators can be offered.



HE753

Integrated Digital Step Attenuator(3 Bits)

Features



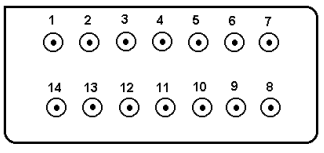
- Frequency range: 15~200MHz
- Total Attenuation: 14dB
- Minimum step: 2.0dB
- Insertion loss: 2.0dB
- Controlled by TTL
- Standard package: DIP—14A
- Wide Operation Temperature:-55℃~+85℃

Specifications (Test at V_C =+5V, T_A=25℃ Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency	f_L~f_H	MHz	15~200	15~200
Insertion loss	IL	dB	2.5	2.0
Total Attenuation	Att	dB	14.0±0.8	14.0±0.5
Attenuation Step	Att	dB	2, 4, 8	2, 4, 8
Attenuation Accuracy	——	dB	±0.3	——
Input/Output VSWR	VSWR	——	2.0:1	1.5:1
Control Level	Vco	——	TTL	——
Switching Time (10%~90%)	t	μs	1.0 (Ton) 2.5 (Toff)	——
DC Supply	Vcc	V	+5.0	——
DC Current	I_c	mA	60	——

Absolute Maximum Rating

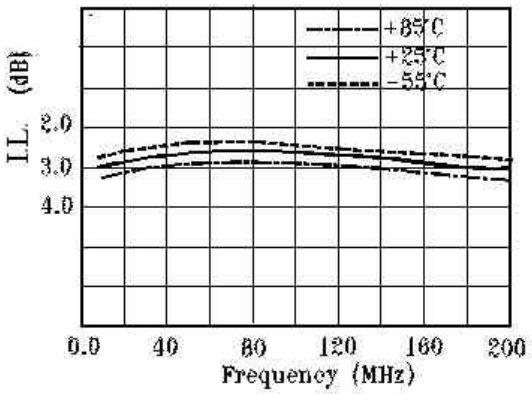
Maximum Input Power : +20dBm
Storage Temperature : +125℃



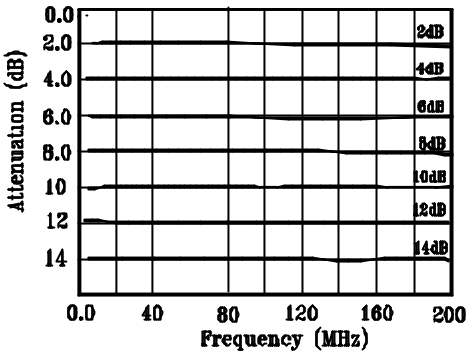
DIP-14A

Typical Performance Curves

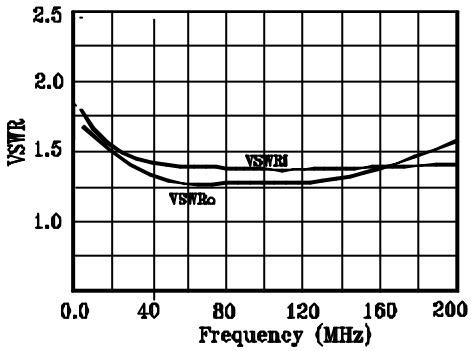
Insertion Loss vs. Frequency



Attenuation vs. Frequency



VSWR vs. Frequency

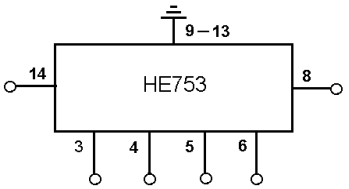


Pin Function

Pin No.	Function	Pin No.	Function
3	2 dB	4	Vcc
5	4 dB	14	RFi
6	8 dB	8	RFo
9 –13	GND	1 2 7	NC

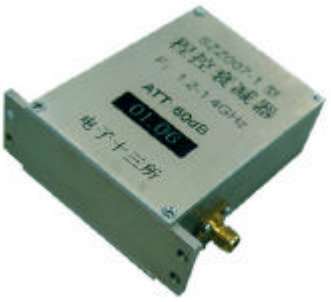
Note:

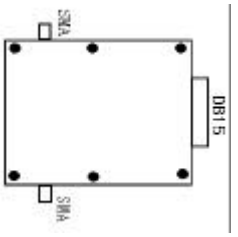
1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Input and output port can interchange directly.
3. Logic 0:Insertion loss, Logic 1:Attenuation.
4. Customers' digital attenuators can be offered.



Features

- TTL and CMOS input compatible
- Minimum step: 0.25dB
- Maximum attenuation: 70dB
- Temperature compensation design
- Temperature coefficient: 0.03dB/℃
- Attenuation accuracy: <±1dB
- RF port: SMA
- Operation temperature: -20℃~+70℃





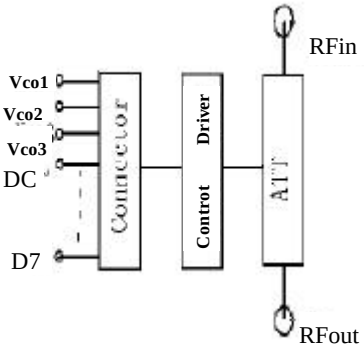
SZZ007 Series

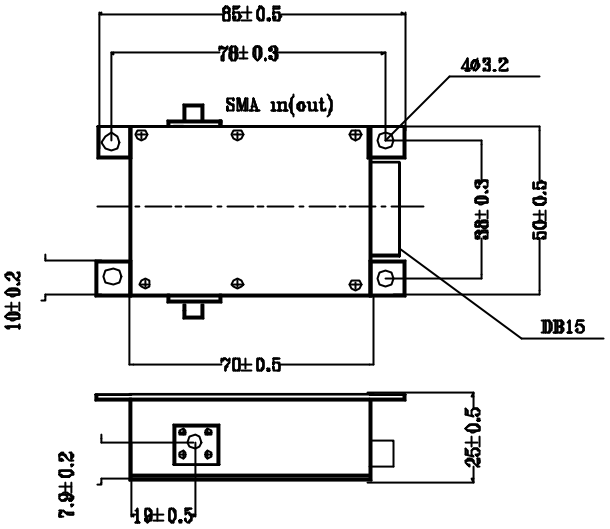
Model	Frequency Range (GHz)	Min Step (dB)	TTL Control Bits	Insertion Loss (dB)	ATT (dB)	Flatness		VSWR (max)
						<30dB	<60dB	
SZZ007-1	1.0~2.0	0.5	7	2.0	60	±0.5	±1.5	1.5:1
SZZ007-2	2.0~3.0	0.5	7	2.0	60	±0.5	±1.5	1.5:1
SZZ007-3	3.0~4.0	0.5	7	2.0	60	±0.5	±1.5	1.5:1
SZZ007-4	4.0~5.0	0.5	7	2.5	60	±0.5	±1.5	2:1
SZZ007-5	5.2~5.8	0.5	7	2.5	60	±0.5	±1	2:1
SZZ007-6	6.0~7.0	0.5	7	3.0	60	±0.5	±1.5	2:1
SZZ007-7	7.0~8.0	0.5	7	3.0	60	±0.5	±1.5	2:1
SZZ007-8	8.0~9.0	0.5	7	3.0	60	±0.5	±1.5	2:1
SZZ007-9	9.0~10.0	0.5	7	3.0	60	±0.5	±1.5	2:1
SZZ007-10	10.0~12.0	0.5	7	3.0	60	±1.0	±1.5	2:1

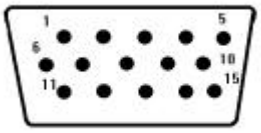
Note: 1. Less bandwidth, more attenuation accuracy.

2. The frequency range, attenuation step and maximum attenuation should be offered by users.

1. Schematic:







DB15Z

3. PIN Function:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 dB	4 dB	16 dB	NC	GND	0.5 dB	2 dB	8 dB	32 dB	GND	GND	GND	V_{CC3}	V_{CC2}	V_{CC1}

Logic Function: TTL high activates associated in-line attenuation. TTL low bypass this attenuation.

VCC_1=12V（60mA:MAX） VCC_2=-12V(20mA) VCC_3=5V(10mA)

SZZ00930 Outline Diagram

Features

- TTL and CMOS input compatible
- Minimum step: 0.25dB
- Maximum attenuation: 60dB
- Temperature compensation design
- Temperature coefficient: 0.025dB/℃
- RF port: SMA
- Operation temperature: -20℃~+70℃

SZZ009 Series

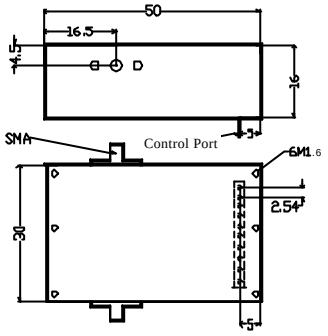
Model	Frequency Range (GHz)	Insertion Loss(dB)	Attenuation(dB)	VSWR	*latness*
ZZ00930-1	**1~2**	**1.3**	**31.5**	**≤1.6:1**	**1dB**
SZZ00930-2	**2~3**	**1.5**	**31.5**	**≤1.6:1**	**1dB**
SZZ00930-3	**3~4**	**1.8**	**31.5**	**≤1.8:1**	**1dB**
SZZ00930-4	**4~5**	**1.8**	**31.5**	**≤2:1**	**1dB**
SZZ00930-5	**5~6**	**2.0**	**31.5**	**≤2:1**	**1dB**
SZZ00960-1	**1~2**	**1.8**	**60**	**≤1.6:1**	**2dB**
SZZ00960-2	**2~3**	**2.5**	**60**	**≤1.6:1**	**2dB**
SZZ00960-3	**3~4**	**2.8**	**60**	**≤1.8:1**	**2dB**
SZZ00960-4	**4~5**	**3.0**	**60**	**≤2:1**	**2dB**
SZZ00960-5	**5~6**	**3.5**	**60**	**≤2:1**	**2dB**

Note: 1. Less bandwidth, more attenuation accuracy.

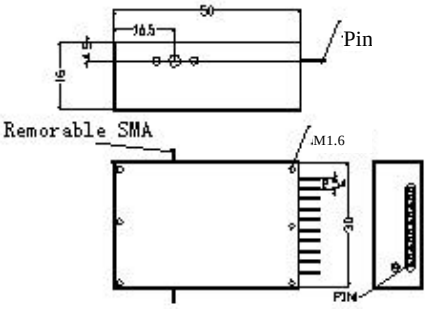
2. The frequency range, attenuation step and maximum attenuation should be offered by users.

1. SZZ00930 Outline Diagram

Series A: Control Ports at Bottom

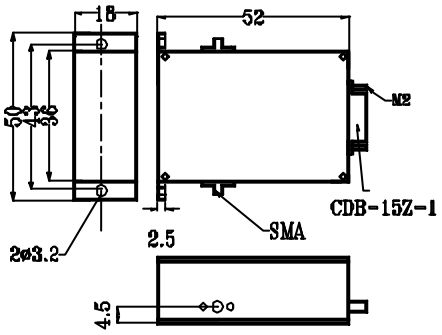


Series B: Control Ports at Side Face

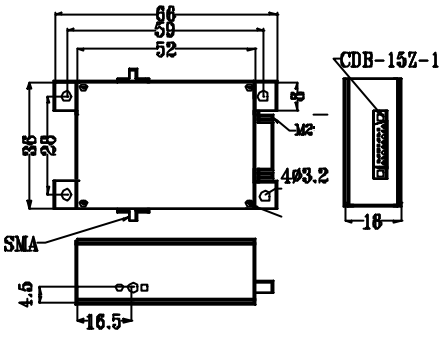


Weight:50g

2. **SZZ00960** Series A Outline Diagram



2. SZZ00960 Series B Outline Diagram



Weight:65g

3. SZZ00930 Pin Function

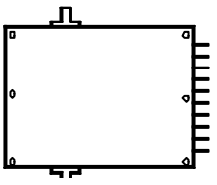
1	2	3	4	5	6	7	8	9	10
V_+	GND	V_-	0.5dB	1dB	2dB	4dB	8dB	16 dB	32 dB

4. SZZ00960 Pin Function

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0.5dB	1dB	2 dB	4 dB	8 dB	16dB	32dB	NC	NC	NC	GND	GND	NC	V_-	V_+

Note:TTL and CMOS input compatible. Logic Function: TTL high activates associated in-line attenuation. TTL low bypass this attenuation.

DC Supply: V_+=12~15V/60mA(MAX);V_-=-15V~-12V/60mA;



Absolute Maximum Rating

Maximum Input Power ----- +20dBm

Storage Temperature ----- -40℃~+100

HE021-2

2 way 0^0 power splitter/combiner

Features

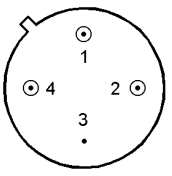
- Frequency Range: 10~800MHz(Typ)
- Input Power: 1W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Standard Package: TO-8A
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	10~200	10~750	10~200	10~800
Insertion Loss	I.L	dB	0.6(Max)	1.3(Max)	0.4	0.9
Isolation	Iso	dB	24(Min)	20(Min)	30	23
Phase Unbalance	ΔP	deg	1.5°(Max)	4°(Max)	1.0°	2.0°
Amplitude Unbalance	ΔM	dB	0.2(Max)	0.4(Max)	0.05	0.2
VSWR	VSWR	—	1.4:1(Max)	1.5:1(Max)	1.2:1	1.3:1

Absolute Maximum Rating

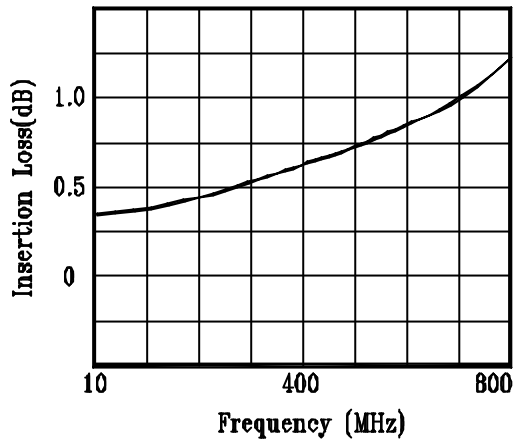
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



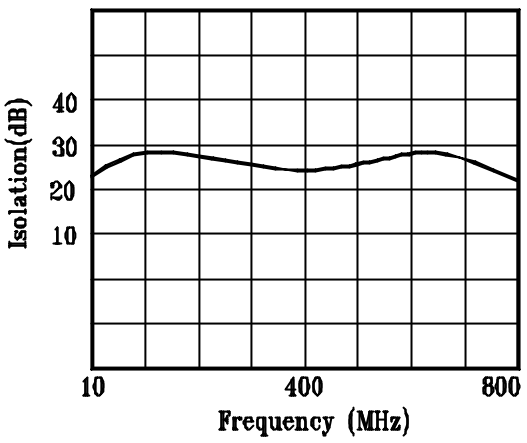
To-8A

Typical Performance Curves

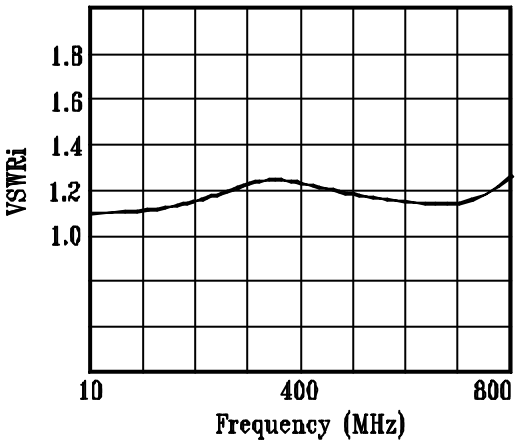
Insertion Loss vs. Frequency



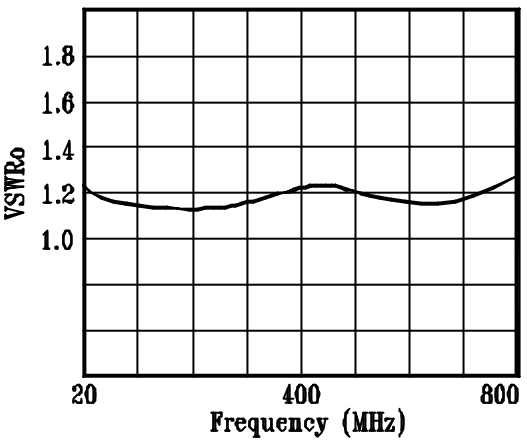
Isolation vs. Frequency



Input VSWR vs. Frequency

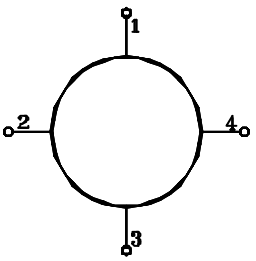


Output VSWR vs. Frequency



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Microstrip package product can be offered.



1. Input
2. Output
3. GND
4. Output

HE021-2A

2 way 0^0 power splitter/combiner

Features

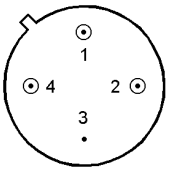
- Frequency Range: 30~1500MHz(Typ)
- Input Power: 1W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Standard Package: TO-8F
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	30~500	500~1500	30~500	500~1500
Insertion Loss	I.L	dB	0.5(Max)	1.2(Max)	0.3	0.7
Isolation	Iso	dB	25(Min)	25(Min)	28	28
Phase Unbalance	ΔP	deg	1.5°(Max)	2°(Max)	0.5°	1°
Amplitude Unbalance	ΔM	dB	0.2(Max)	0.4(Max)	0.1	0.15
VSWR	VSWR	—	1.5:1(Max)	1.5:1(Max)	1.3:1	1.2:1

Absolute Maximum Rating

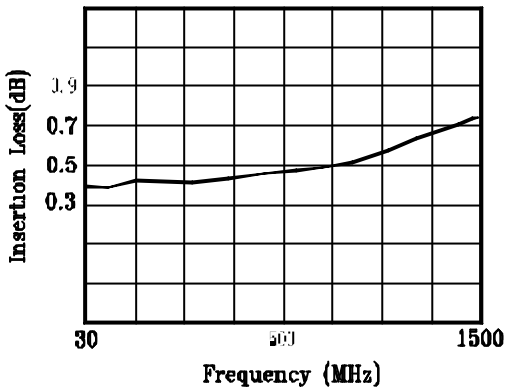
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



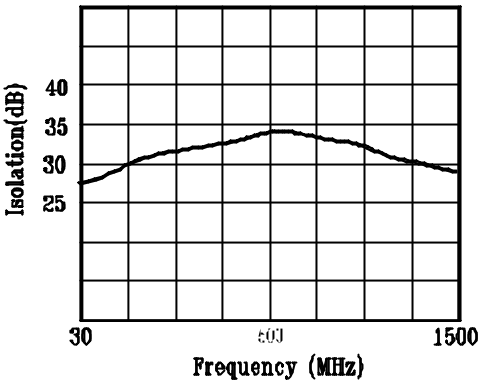
To-8F

Typical Performance Curves

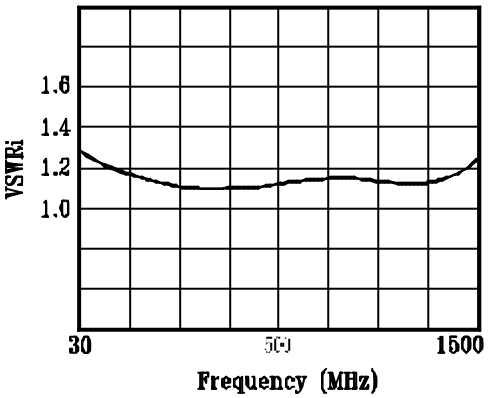
Insertion Loss vs. Frequency



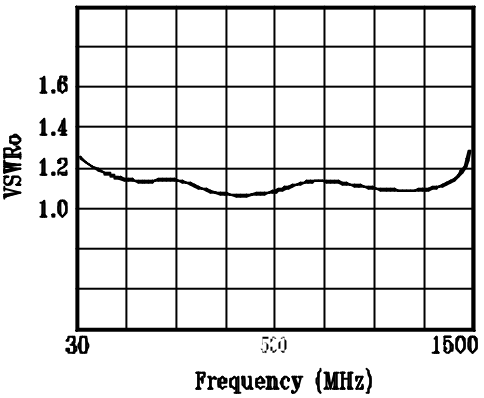
Isolation vs. Frequency



Input VSWR vs. Frequency

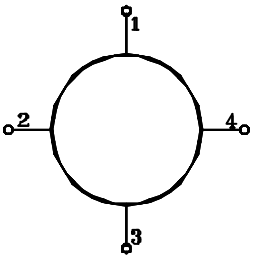


Output VSWR vs. Frequency



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Microstrip package product can be offered.



1. Input
2. Output
3. GND
4. Output

HE021-2B

2 way 0^0 power splitter/combiner

Features

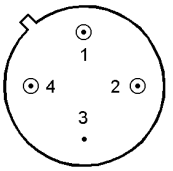
- Frequency Range: 0.5~200MHz(Typ)
- Input Power: 1W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Standard Package: TO-8A
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	0.5~50	0.5~200	0.5~50	0.5~200
Insertion Loss	I.L	dB	0.35(Max)	0.6(Max)	0.2	0.3
Isolation	Iso	dB	35(Min)	32(Min)	40	35
Phase Unbalance	ΔP	deg	0.5°(Max)	1.0°(Max)	0.2°	0.5°
Amplitude Unbalance	ΔM	dB	0.15(Max)	0.2(Max)	0.05	0.1
VSWR	VSWR	—	1.25:1(Max)	1.25:1(Max)	1.2:1	1.2:1

Absolute Maximum Rating

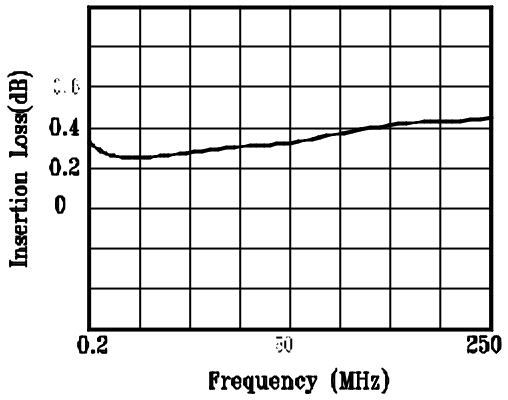
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



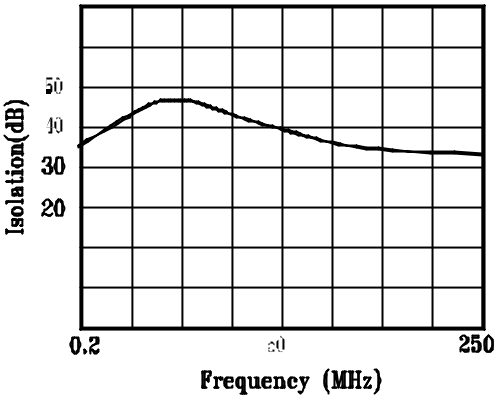
To-8A

Typical Performance Curves

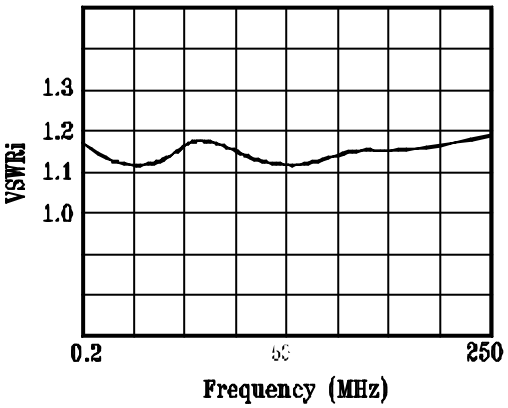
Insertion Loss vs. Frequency



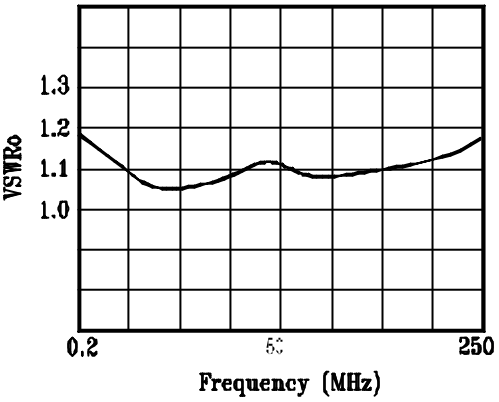
Isolation vs. Frequency



Input VSWR vs. Frequency

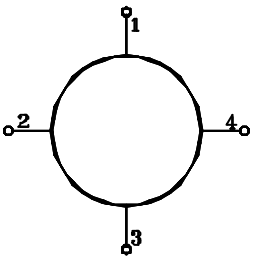


Output VSWR vs. Frequency



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Microstrip package products can be offered.



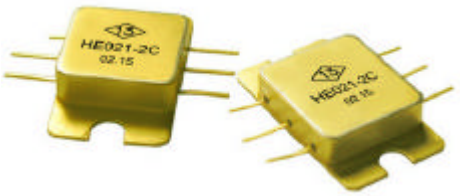
1. Input
2. Output
3. GND
4. Output

HE021-2C

2 way 0^0 power splitter/combiner

Features

- Frequency Range: 700~2400MHz
- Input Power: 1W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Package: Microstrip
- Wide Operating Temperature: -55℃~+85℃

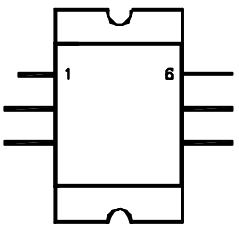


Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Guaranteed	Typical	Typical
Frequency Range	F_L~f_H	MHz	700~1500	700~2400	700~1500	700~2400
Insertion Loss	I.L	dB	0.5(Max)	0.7(Max)	0.3	0.5
Isolation	Iso	dB	22(Min)	20(Min)	25	23
Phase Unbalance	ΔP	deg	2°(Max)	3°(Max)	1°	1.5°
Amplitude Unbalance	ΔM	dB	0.3(Max)	0.5(Max)	0.2	0.3
VSWR	VSWR	—	1.35:1(Max)	1.35:1(Max)	1.2:1	1.2:1

Absolute Maximum Rating

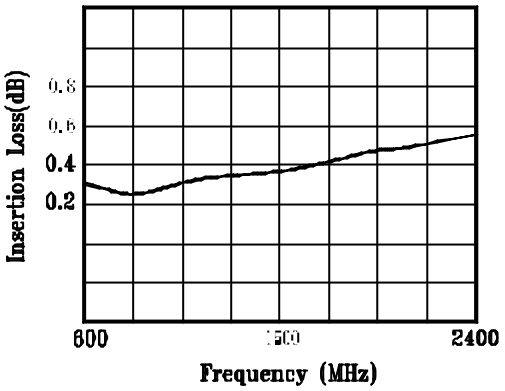
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



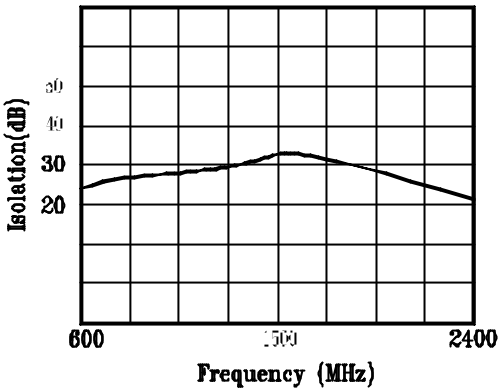
SP-1

Typical Performance Curves

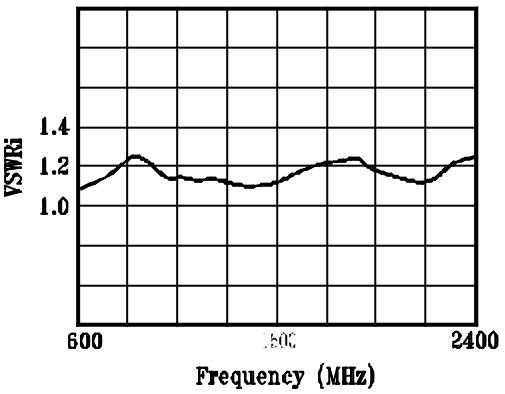
Insertion Loss vs. Frequency



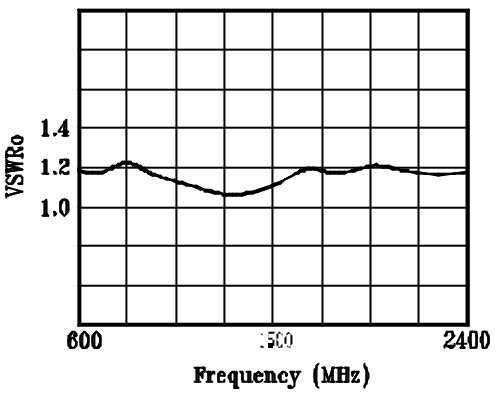
Isolation vs. Frequency



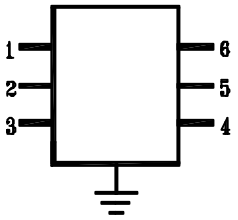
Input VSWR vs. Frequency



Output VSWR vs. Frequency



Note: Required the package bottom grounded tightly.



1. NC 4. Output
2. Input 5. NC
3. NC 6. Output

Case:GND

HE022-2A

2 way 0^0 power splitter/combiner

Features

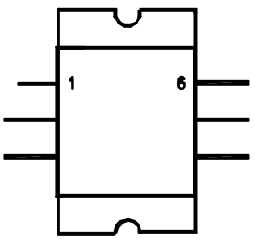
- Frequency Range: 800~1200MHz
- Input Power: 1W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Package: Microstrip
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	F_L~f_H	MHz	800~1200	800~1200
Insertion Loss	I.L	dB	1.0(Max)	0.7
Isolation	Iso	dB	20(Min)	21
Phase Unbalance	ΔP	deg	4°(Max)	2°
Amplitude Unbalance	ΔM	dB	0.4(Max)	0.1
VSWR	VSWR	—	1.6:1(Max)	1.4:1

Absolute Maximum Rating

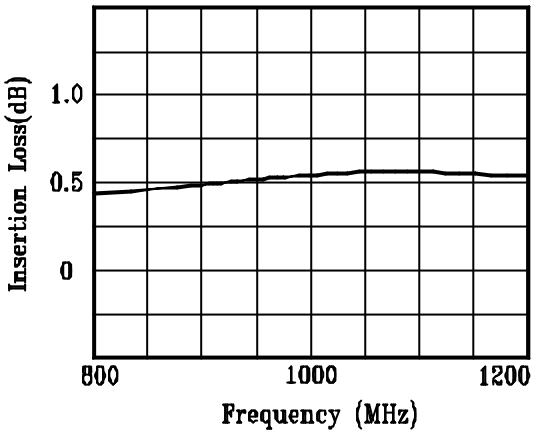
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



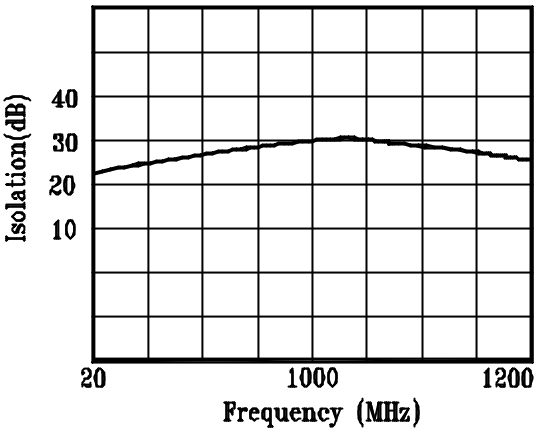
SP-1

Typical Performance Curves

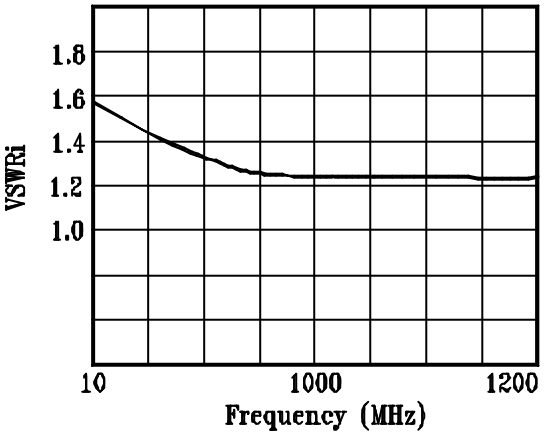
Insertion Loss vs. Frequency



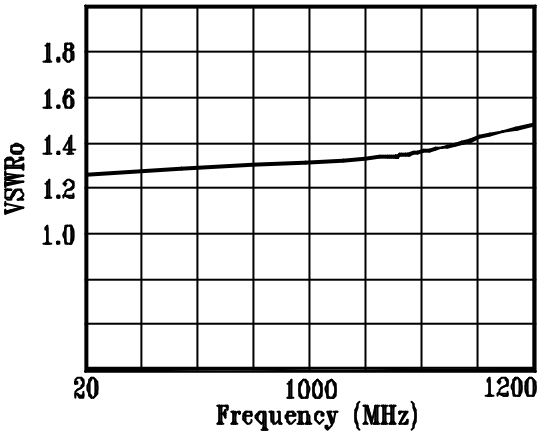
Isolation vs. Frequency



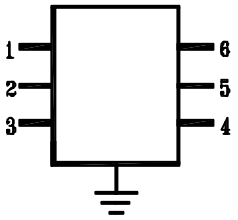
Input VSWR vs. Frequency



Output VSWR vs. Frequency



Note: Required the package bottom grounded tightly.



1. NC 4. Output
2. Input 5. NC
3. NC 6. Output

Case:GND

HE022-2B

2 way 0^0 power splitter/combiner

Features

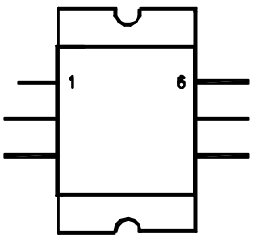
- Frequency Range: 1000~2000MHz
- Input Power: 1W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Package: Microstrip
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	F_L~f_H	MHz	1000~2000	1000~2400
Insertion Loss	I.L	dB	1.2(Max)	0.5
Isolation	Iso	dB	20(Min)	24
Phase Unbalance	ΔP	deg	4°(Max)	2°
Amplitude Unbalance	ΔM	dB	0.4(Max)	0.15
VSWR	VSWR	—	1.5:1(Max)	1.4:1

Absolute Maximum Rating

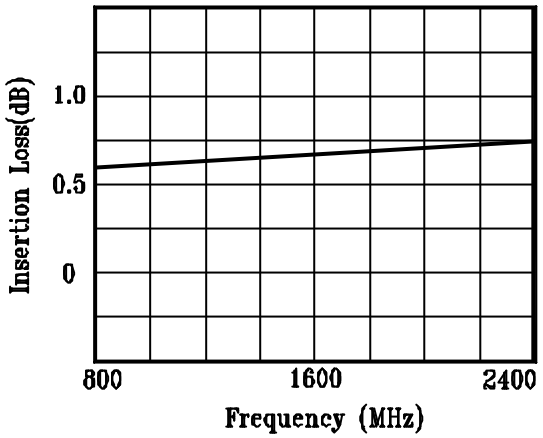
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



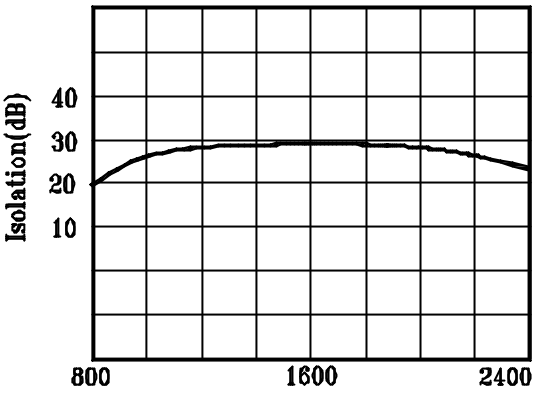
SP-1

Typical Performance Curves

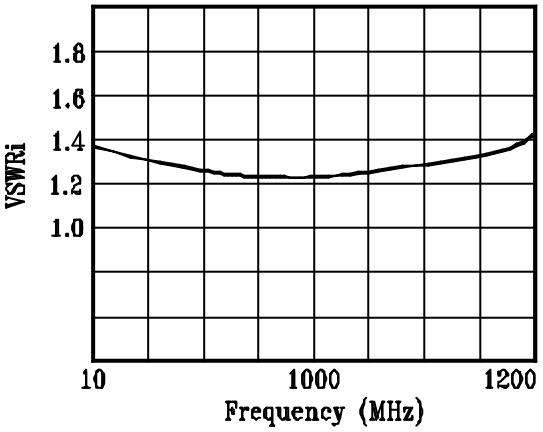
Insertion Loss vs. Frequency



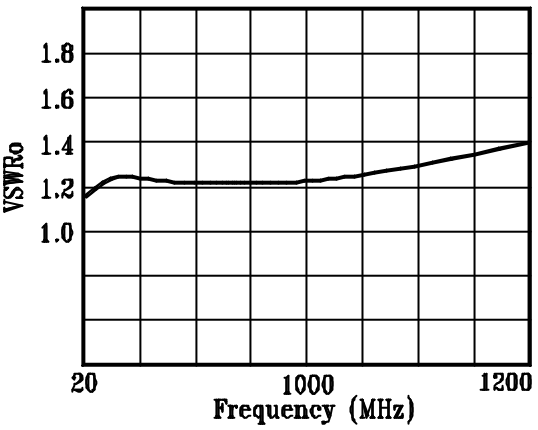
Isolation vs. Frequency



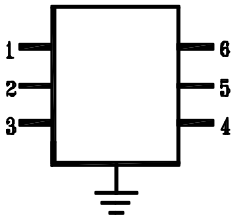
Input VSWR vs. Frequency



Output VSWR vs. Frequency



Note: Required the package bottom grounded tightly.



1. NC 4. Output
2. Input 5. NC
3. NC 6. Output

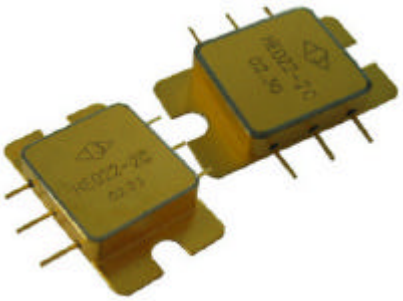
Case:GND

HE022-2C

2 way 0^0 power splitter/combiner

Features

- Frequency Range: 1600~3000MHz
- Input Power: 1W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Package: Microstrip
- Wide Operating Temperature: -55℃~+85℃

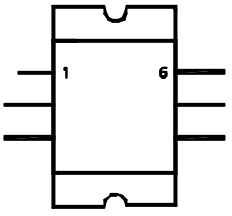


Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	1600~2500	2500~3000	1500~2500	2500~3000
Insertion Loss	I.L	dB	0.8(Max)	1.3(Max)	0.5	0.7
Isolation	Iso	dB	20(Min)	28(Min)	23	30
Phase Unbalance	ΔP	deg	6°(Max)	8°(Max)	4°	6°
Amplitude Unbalance	ΔM	dB	0.4(Max)	0.5(Max)	0.2	0.3
VSWR	VSWR	—	1.5:1(Max)	1.7:1(Max)	1.3:1	1.5:1

Absolute Maximum Rating

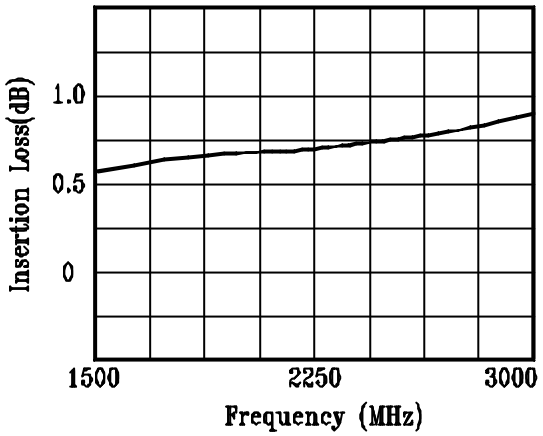
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



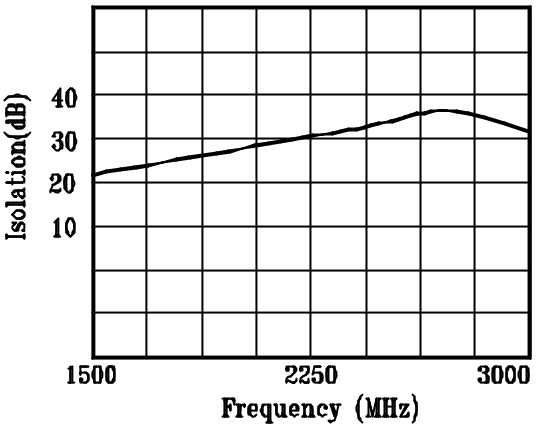
SP-1

Typical Performance Curves

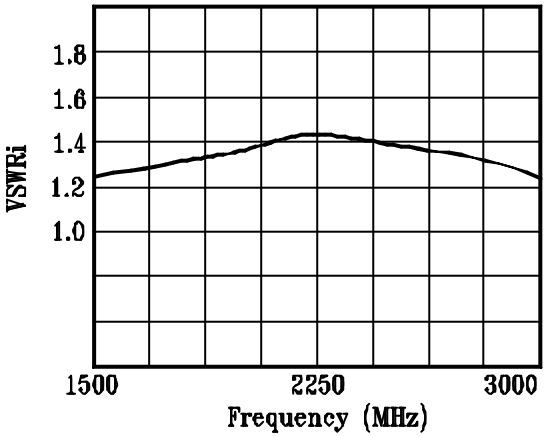
Insertion Loss vs. Frequency



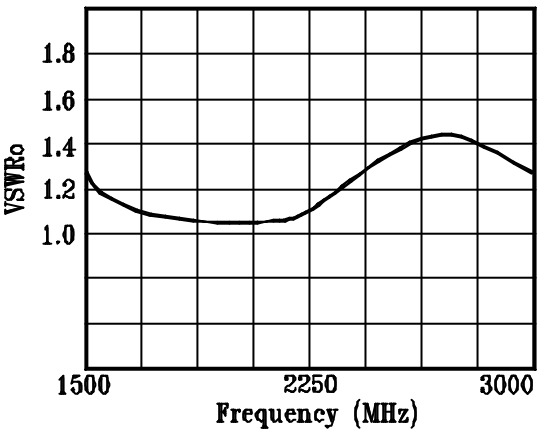
Isolation vs. Frequency



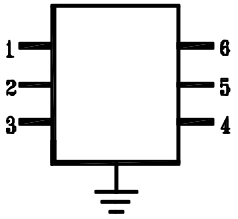
Input VSWR vs. Frequency



Output VSWR vs. Frequency



Note: Required the package bottom grounded tightly.



1. NC 4. Output
2. Input 5. NC
3. NC 6. Output

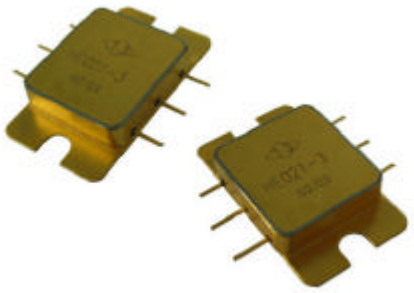
Case:GND

HE021-3

3 way 0^0 power splitter/combiner

Features

- Frequency Range: 10~1000MHz
- Input Power: 1W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Package: Microstrip
- Wide Operating Temperature: -55℃~+85℃

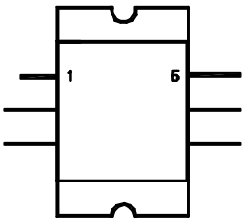


Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	20~500	10~1000	20~500	10~1200
Insertion Loss	I.L	dB	0.5(Max)	1.3(Max)	0.3	0.8
Isolation	Iso	dB	20(Min)	18(Min)	27	22
Phase Unbalance	ΔP	deg	2°(Max)	4°(Max)	1°	2°
Amplitude Unbalance	ΔM	dB	0.3(Max)	0.5(Max)	0.2	0.3
VSWR	VSWR	—	1.35:1(Max)	1.5:1(Max)	1.2:1	1.3:1

Absolute Maximum Rating

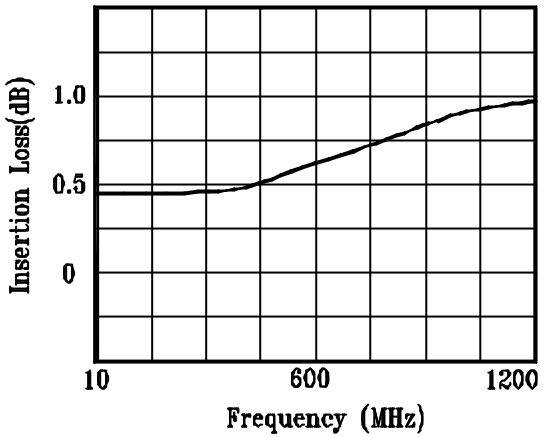
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



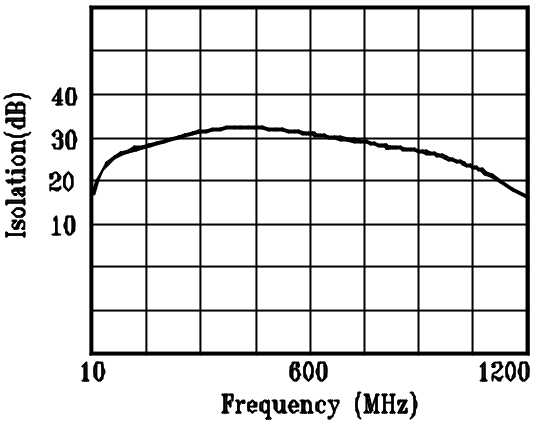
SP-1

Typical Performance Curves

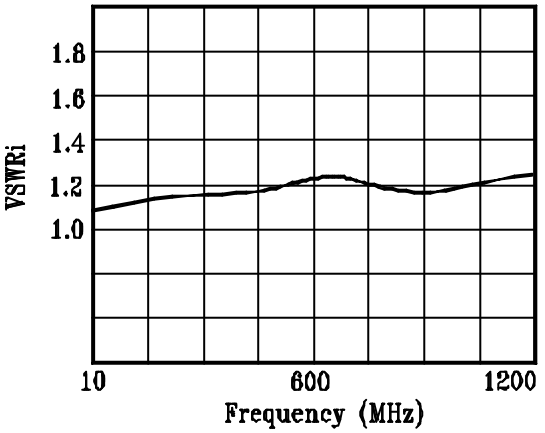
Insertion Loss vs. Frequency



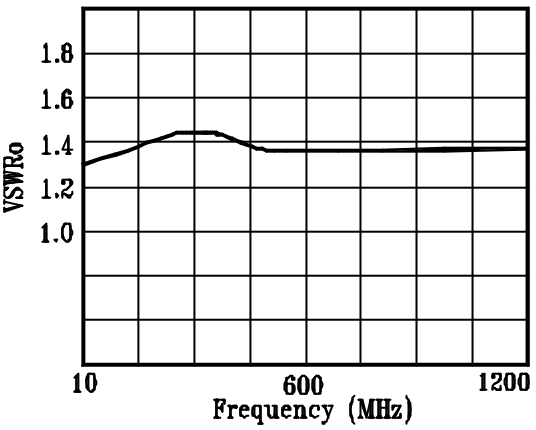
Isolation vs. Frequency



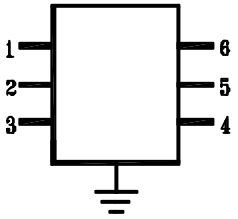
Input VSWR vs. Frequency



Output VSWR vs. Frequency



Note: Required the package bottom grounded tightly.



1. NC 4. Output
2. Input 5. Output
3. NC 6. Output

Case:GND

HE021-3A

3 way 0^0 power splitter/combiner

Features

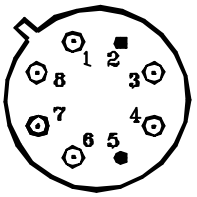
- Frequency Range: 0.5~200MHz
- Input Power: 1W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Standard Package: TO-8H
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	0.5~50	0.5~200	0.5~50	0.5~200
Insertion Loss	I.L	dB	0.4(Max)	0.6(Max)	0.3	0.4
Isolation	Iso	dB	32(Min)	23(Min)	35	25
Phase Unbalance	ΔP	deg	1°(Max)	1.5°(Max)	0.5°	1°
Amplitude Unbalance	ΔM	dB	0.2(Max)	0.3(Max)	0.05	0.1
VSWR	VSWR	—	1.3:1(Max)	1.3:1(Max)	1.2:1	1.2:1

Absolute Maximum Rating

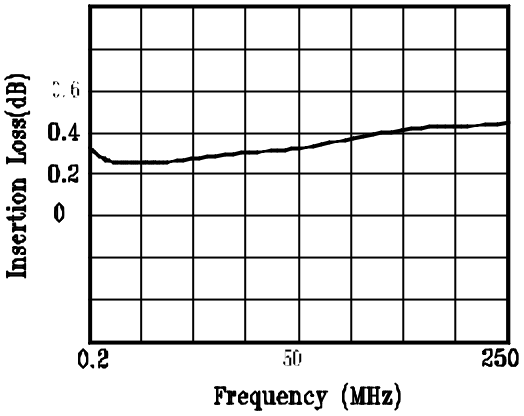
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



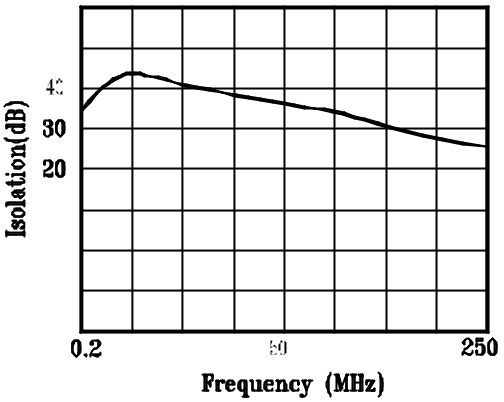
TO-8H

Typical Performance Curves

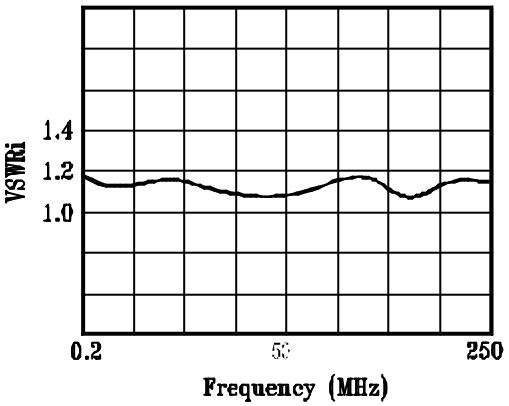
Insertion Loss vs. Frequency



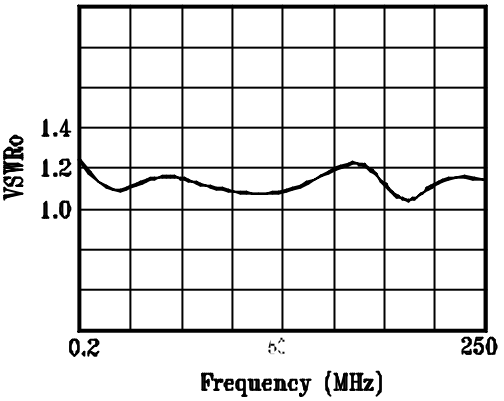
Isolation vs. Frequency



Input VSWR vs. Frequency

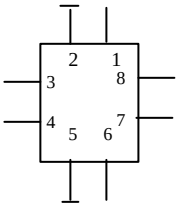


Output VSWR vs. Frequency



Note:

1. Required the plug-in package bottom grounded tightly with PCB. (Mounting kit can be provided).
2. Microstrip package products can be offered.



1.NC 5.GND
2 GND 6.Output
3.Input 7.Output
4.NC 8.Output

HE021-3B

3 way 0^0 power splitter/combiner

Features

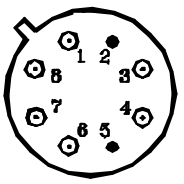
- Frequency Range: 5~500MHz
- Input Power: 1W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Standard Package: TO-8H
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	5~200	5~500	5~200	5~500
Insertion Loss	I.L	dB	0.5(Max)	0.8(Max)	0.3	0.4
Isolation	Iso	dB	25(Min)	23(Min)	28	25
Phase Unbalance	ΔP	deg	1.5°(Max)	3°(Max)	0.5°	1°
Amplitude Unbalance	ΔM	dB	0.2(Max)	0.4(Max)	0.1	0.2
VSWR	VSWR	—	1.3:1(Max)	1.5:1(Max)	1.2:1	1.3:1

Absolute Maximum Rating

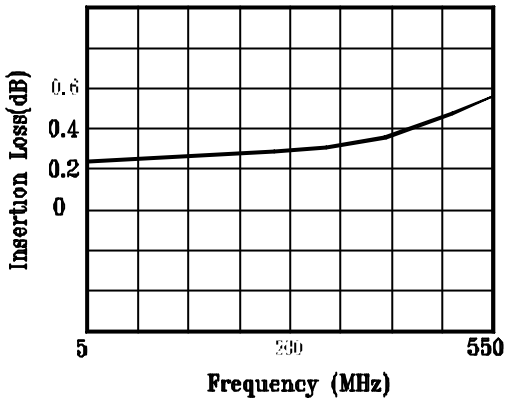
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



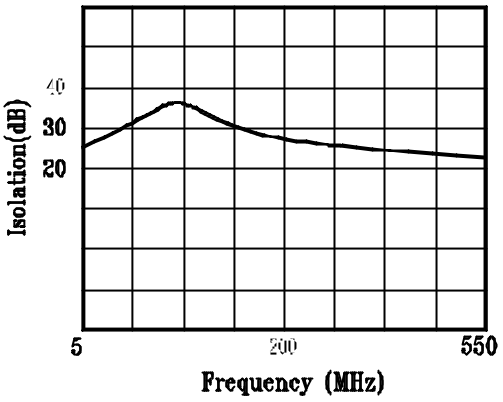
TO-8H

Typical Performance Curves

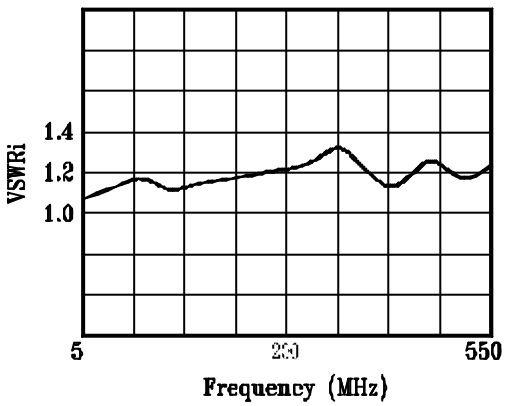
Insertion Loss vs. Frequency



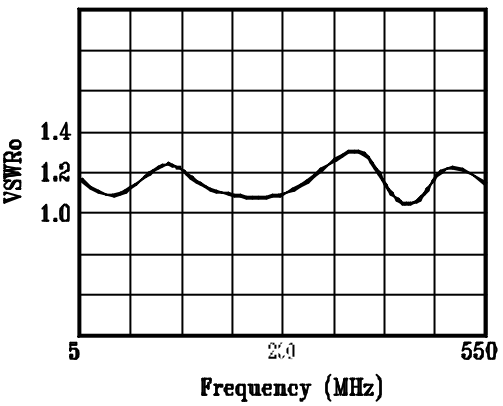
Isolation vs. Frequency



Input VSWR vs. Frequency

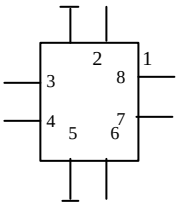


Output VSWR vs. Frequency



Note:

1. Required the plug-in package bottom grounded tightly with PCB. (Mounting kit can be provided).
2. Microstrip package products can be offered.



1.NC 5.GND
2 GND 6.Output
3.Input 7.Output
4.NC 8.Output

HE021-3C

3 way 0^0 power splitter/combiner

Features

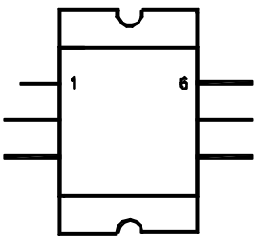
- Frequency Range: 700~1800MHz
- Input Power: 1W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Package: Microstrip
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	700~1500	700~1800	700~1500	700~1800
Insertion Loss	I.L	dB	0.7(Max)	1.2(Max)	0.5	0.7
Isolation	Iso	dB	21(Min)	20(Min)	23	22
Phase Unbalance	ΔP	deg	2°(Max)	3°(Max)	1°	2°
Amplitude Unbalance	ΔM	dB	0.4(Max)	0.5(Max)	0.2	0.2
VSWR	VSWR	—	1.4:1(Max)	1.5:1(Max)	1.2:1	1.3:1

Absolute Maximum Rating

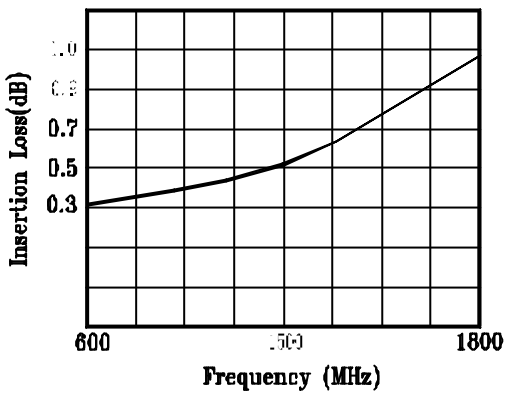
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



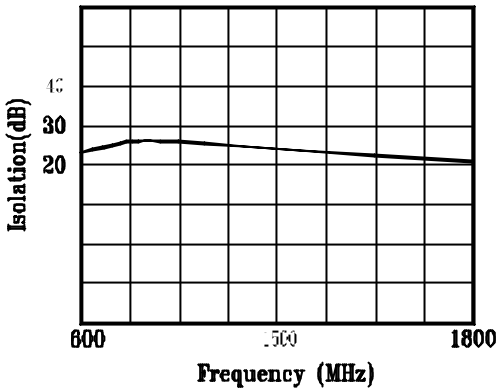
SP-1

Typical Performance Curves

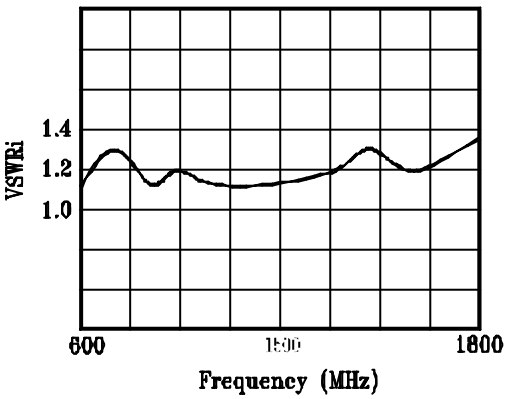
Insertion Loss vs. Frequency



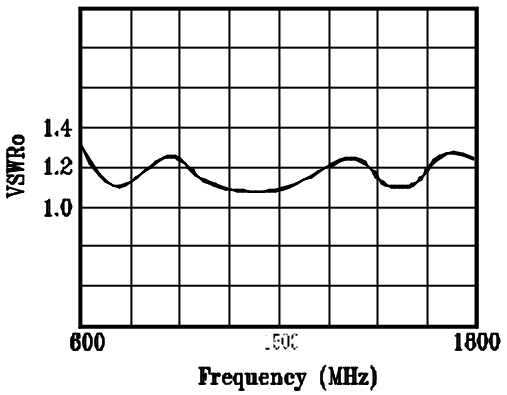
Isolation vs. Frequency



Input VSWR vs. Frequency

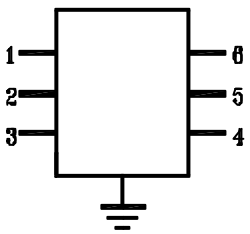


Output VSWR vs. Frequency



Note:

Required the package bottom grounded tightly.



1.NC 4.Output
2.Input 5.Output
3.NC 6.Output
Case: GND

HE022-3A

3 way 0^0 power splitter/combiner

Features

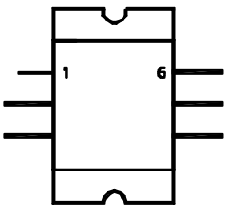
- Frequency Range: 1100~2200MHz
- Input Power: 1W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Package: Microstrip
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	1100~1800	1800~2200	1100~1800	1800~2400
Insertion Loss	I.L	dB	0.8(Max)	1.0(Max)	0.5	0.7
Isolation	Iso	dB	19(Min)	22(Min)	20	25
Phase Unbalance	ΔP	deg	6°(Max)	12°(Max)	4°	6°
Amplitude Unbalance	ΔM	dB	0.3(Max)	0.5(Max)	0.1	0.2
VSWR	VSWR	—	1.5:1(Max)	1.5:1(Max)	1.5:1	1.3:1

Absolute Maximum Rating

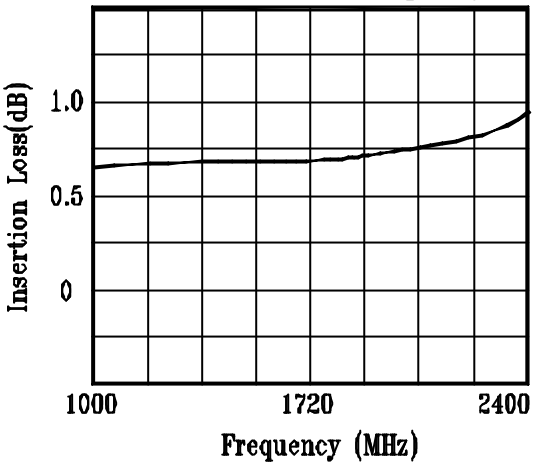
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



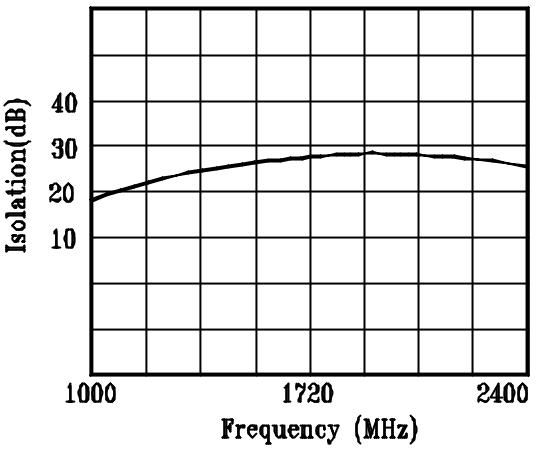
SP-1

Typical Performance Curves

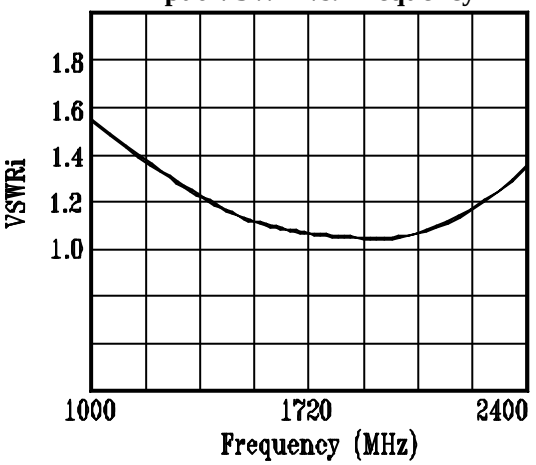
Insertion Loss vs. Frequency



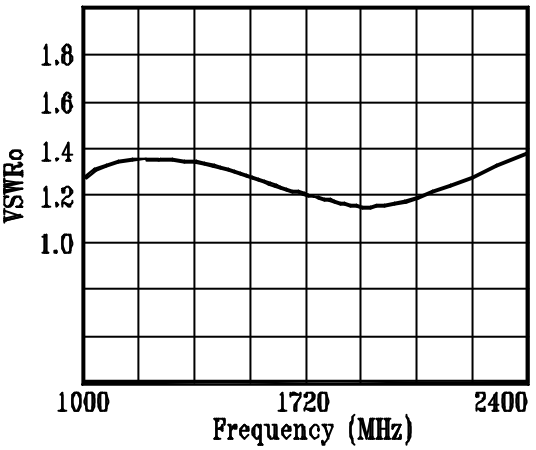
Isolation vs. Frequency



Input VSWR vs. Frequency

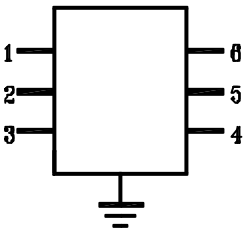


Output VSWR vs. Frequency



Note:

Required the package bottom grounded tightly.



1.NC 4.Output
2.Input 5.Output
3.NC 6.Output
Case: GND

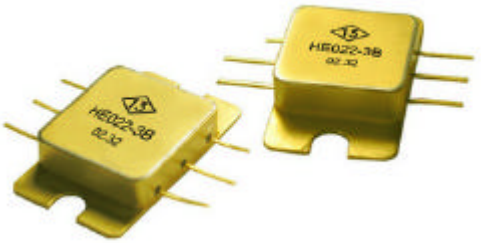
`

HE022-3B

3 way 0^0 power splitter/combiner

Features

- Frequency Range: 1800~3000MHz
- Input Power: 1W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Package: Microstrip
- Wide Operating Temperature: -55℃~+85℃

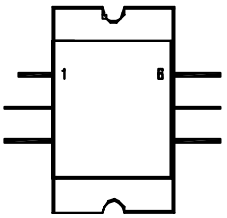


Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	1600~2500	2500~3000	1500~2500	2500~3000
Insertion Loss	I.L	dB	1.0(Max)	1.3(Max)	0.5	0.7
Isolation	Iso	dB	20(Min)	21(Min)	23	25
Phase Unbalance	ΔP	deg	7°(Max)	10°(Max)	3°	6°
Amplitude Unbalance	ΔM	dB	0.3(Max)	0.5(Max)	0.1	0.2
VSWR	VSWR	—	1.5:1(Max)	1.5:1(Max)	1.3	1.4

Absolute Maximum Rating

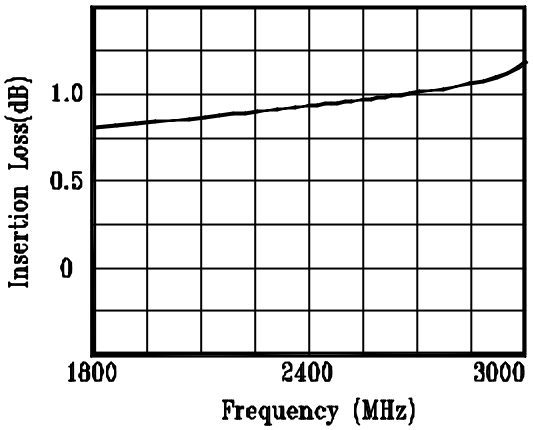
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



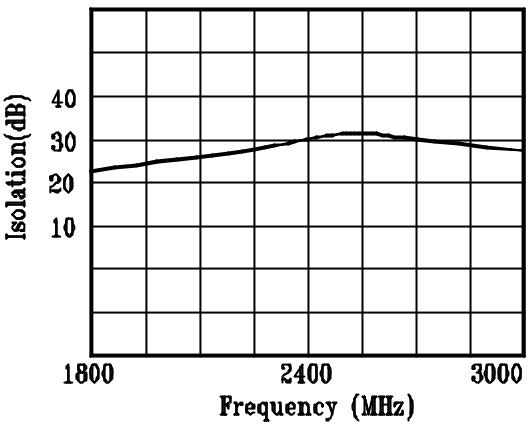
SP-1

Typical Performance Curves

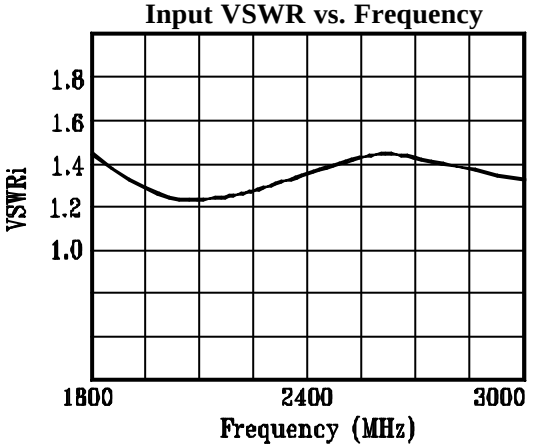
Insertion Loss vs. Frequency



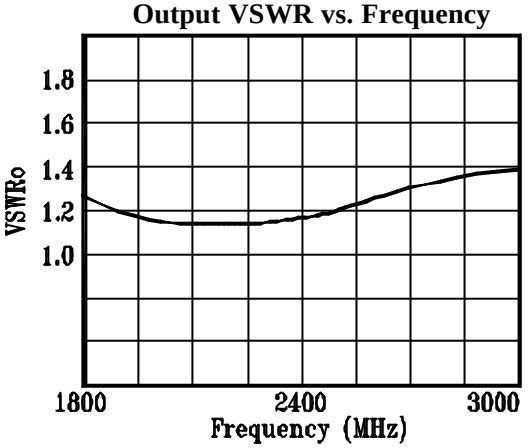
Isolation vs. Frequency



Input VSWR vs. Frequency

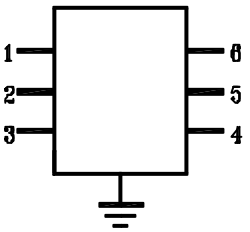


Output VSWR vs. Frequency



Note:

Required the package bottom grounded tightly.



1.NC 4.Output
2.Input 5.Output
3.NC 6.Output
Case: GND

HE021-4

4 way 0^0 power splitter/combiner

Features

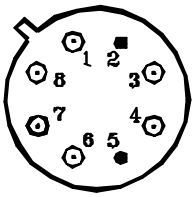
- Frequency Range: 10~500MHz
- Input Power: 1W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Standard Package: TO-8H
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	10~100	10~500	10~100	5~550
Insertion Loss	I.L	dB	0.6(Max)	1.3(Max)	0.3	0.9
Isolation	Iso	dB	25(Min)	20(Min)	27	23
Phase Unbalance	ΔP	deg	2°(Max)	4°(Max)	2°	3°
Amplitude Unbalance	ΔM	dB	0.3(Max)	0.5(Max)	0.1	0.2
VSWR	VSWR	—	1.5:1(Max)	1.5:1(Max)	1.3:1	1.4:1

Absolute Maximum Rating

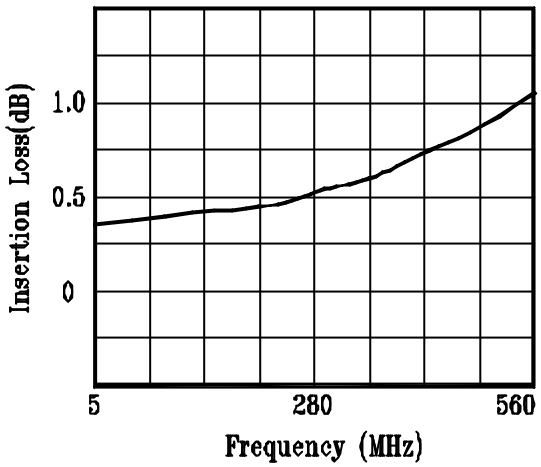
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



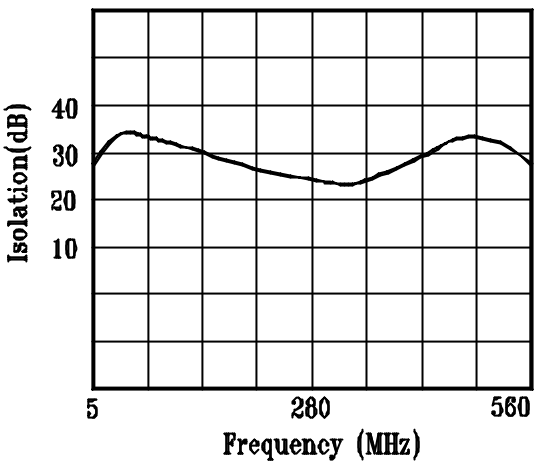
TO-8H

Typical Performance Curves

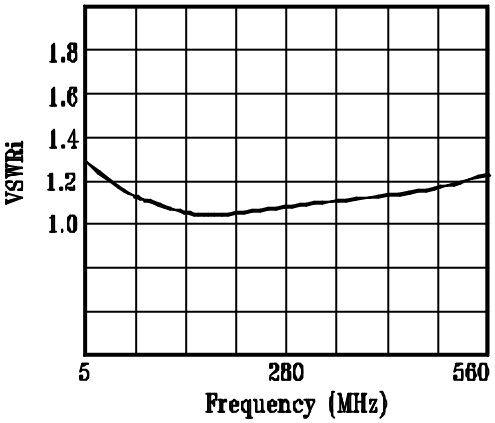
Insertion Loss vs. Frequency



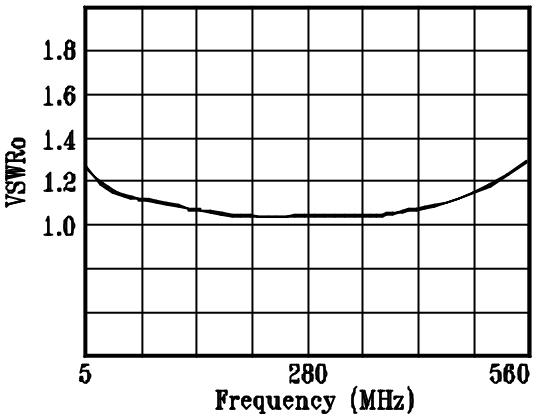
Isolation vs. Frequency



Input VSWR vs. Frequency

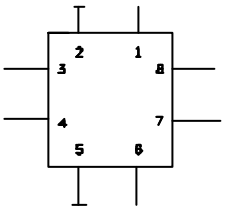


Output VSWR vs. Frequency



Note:

1. Required the plug-in package bottom grounded tightly with PCB. (Mounting kit can be provided).
2. Microstrip package products can be offered.



1.Output 5.GND
2 GND 6.Output
3.Input 7.Output
4.NC 8.Output

HE021-4A

4 way 0^0 power splitter/combiner

Features

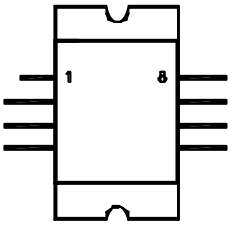
- Frequency Range: 20~1200MHz
- Input Power: 1W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Package: Microstrip
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	100~600	20~1200	10~600	20~1200
Insertion Loss	I.L	dB	1.5	2.0(Max)	1.0	1.5
Isolation	Iso	dB	17(Min)	15(Min)	20	18
Phase Unbalance	ΔP	deg	3°	7°	2°	4°
Amplitude Unbalance	ΔM	dB	0.5(Max)	1.0(Max)	0.3	0.5
VSWR	VSWR	—	1.5:1(Max)	1.5:1(Max)	1.4:1	1.4:1

Absolute Maximum Rating

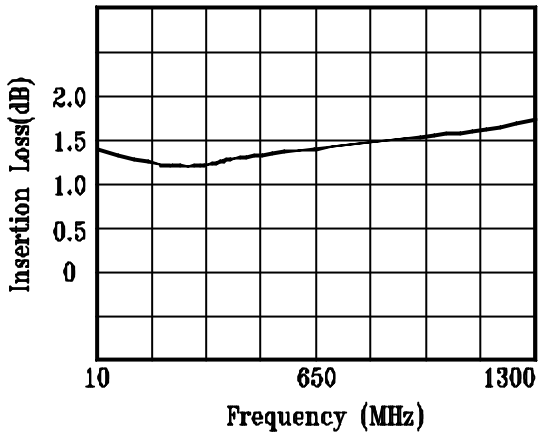
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



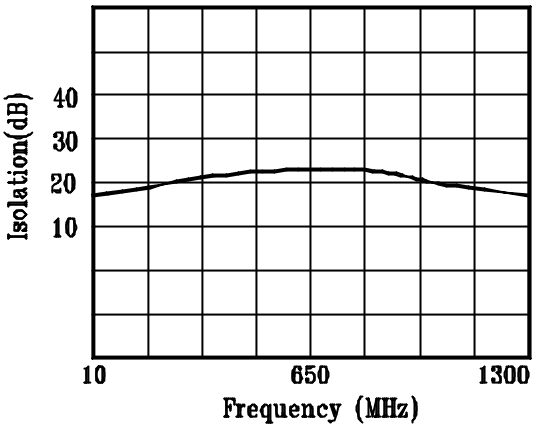
SP-2

Typical Performance Curves

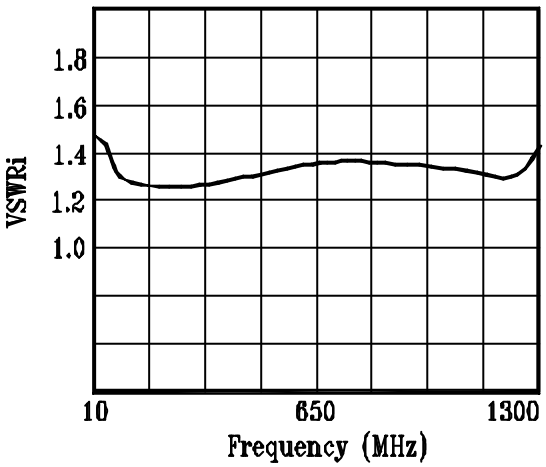
Insertion Loss vs. Frequency



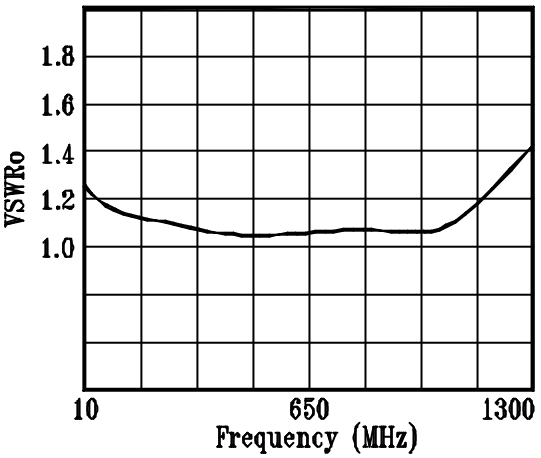
Isolation vs. Frequency



Input VSWR vs. Frequency

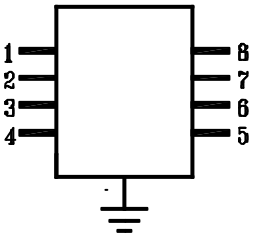


Output VSWR vs. Frequency



Note:

Required the package bottom grounded tightly.

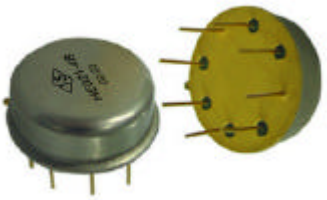


1.NC 5.Output
2.Input 6. Output
3.NC 7. Output
4.NC 8. Output
Case: GND

HE021-4B

4 way 0^0 power splitter/combiner

Features



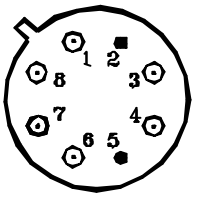
- Frequency Range: 10~500MHz
- Input Power: 1W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Standard Package: TO-8H
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	0.5~50	0.5~200	0.5~50	0.5~200
Insertion Loss	I.L	dB	0.5(Max)	0.8(Max)	0.3	0.5
Isolation	Iso	dB	25(Min)	25(Min)	28	27
Phase Unbalance	ΔP	deg	1°(Max)	1.5°(Max)	0.5°	1°
Amplitude Unbalance	ΔM	dB	0.2(Max)	0.3(Max)	0.1	0.1
VSWR	VSWR	—	1.35:1(Max)	1.35:1(Max)	1.15:1	1.15:1

Absolute Maximum Rating

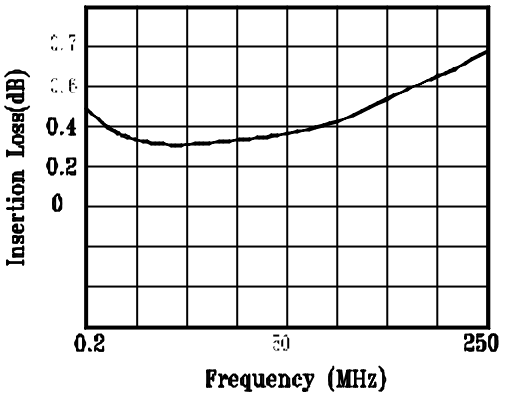
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



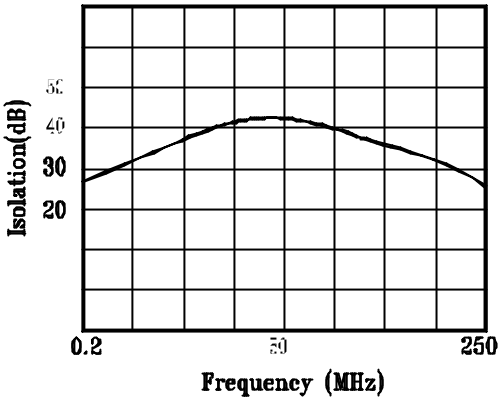
TO-8H

Typical Performance Curves

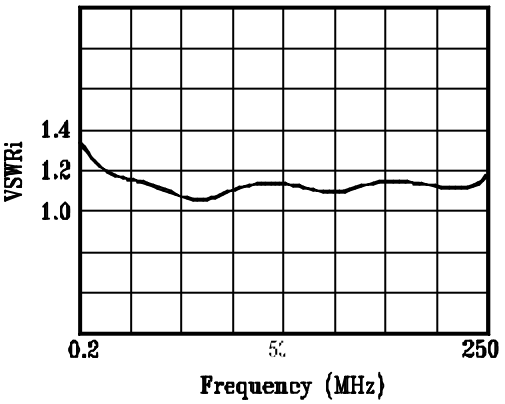
Insertion Loss vs. Frequency



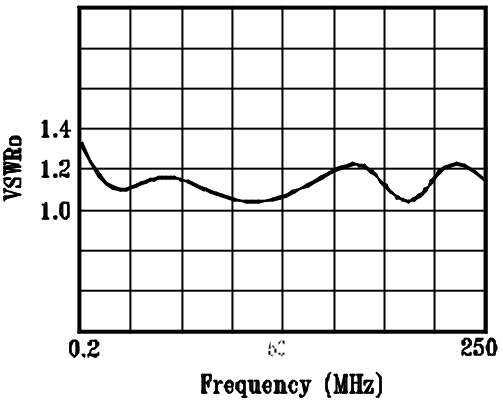
Isolation vs. Frequency



Input VSWR vs. Frequency

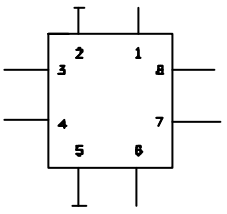


Output VSWR vs. Frequency



Note:

1. Required the plug-in package bottom grounded tightly with PCB. (Mounting kit can be provided).
2. Microstrip package products can be offered.



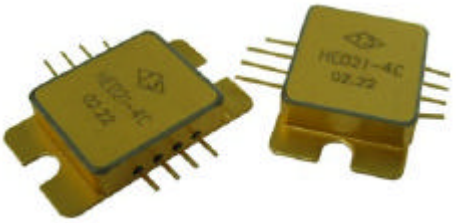
1.Output 5.GND
2.GND 6.Output
3.Input 7.Output
4.NC 8.Output

HE021-4C

4 way 0^0 power splitter/combiner

Features

- Frequency Range: 750~1500MHz
- Input Power: 1W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Package: Microstrip
- Wide Operating Temperature: -55℃~+85℃

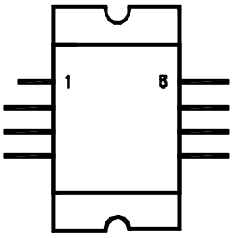


Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	F_L~f_H	MHz	750~1500	750~1500
Insertion Loss	I.L	dB	1.4(Max)	0.8
Isolation	Iso	dB	15(Min)	20
Phase Unbalance	ΔP	deg	5°(Max)	3°
Amplitude Unbalance	ΔM	dB	0.5(Max)	0.2
VSWR	VSWR	—	1.5:1(Max)	1.2:1

Absolute Maximum Rating

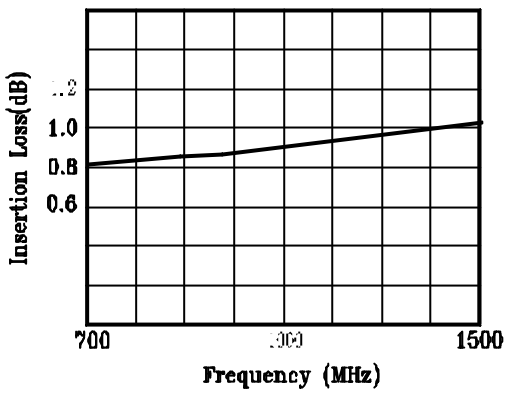
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



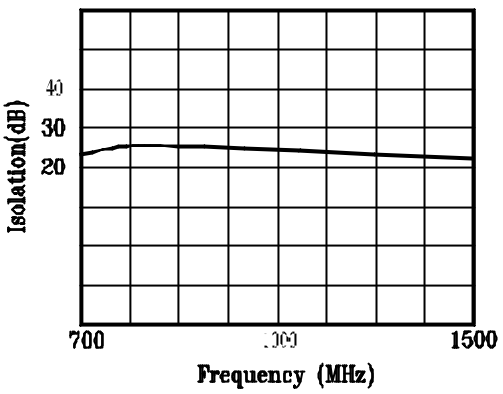
SP-2

Typical Performance Curves

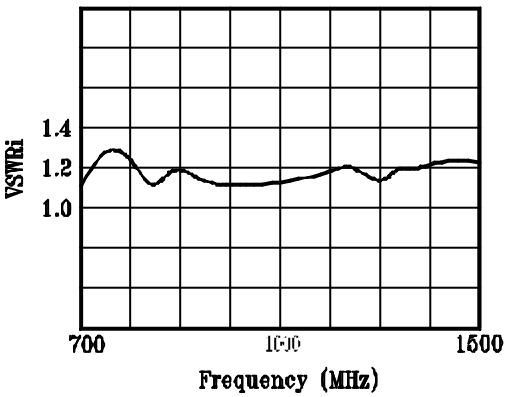
Insertion Loss vs. Frequency



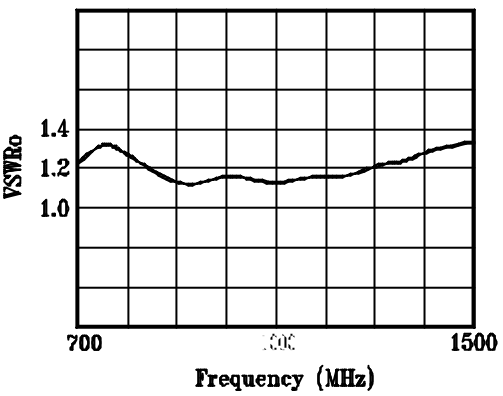
Isolation vs. Frequency



Input VSWR vs. Frequency

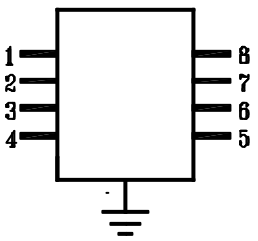


Output VSWR vs. Frequency



Note:

Required the package bottom grounded tightly.

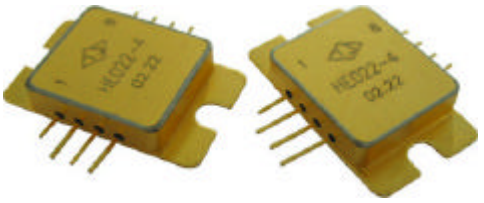


1.NC 5.Output
2.Input 6. Output
3.NC 7. Output
4.NC 8. Output
Case: GND

HE022-4

4 way 0^0 power splitter/combiner

Features



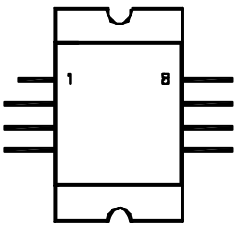
- Frequency Range: 1000~2200MHz
- Input Power: 1W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Package: Microstrip
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	1000~1300	1300~2200	1000~1300	1300~2400
Insertion Loss	I.L	dB	1.2	1.2(Max)	0.8	0.7
Isolation	Iso	dB	19(Min)	22(Min)	20	25
Phase Unbalance	ΔP	deg	4°(Max)	5°(Max)	2.5°	3°
Amplitude Unbalance	ΔM	dB	0.3(Max)	0.5(Max)	0.1	0.3
VSWR	VSWR	—	1.7:1(Max)	1.5:1(Max)	1.5:1	1.3:1

Absolute Maximum Rating

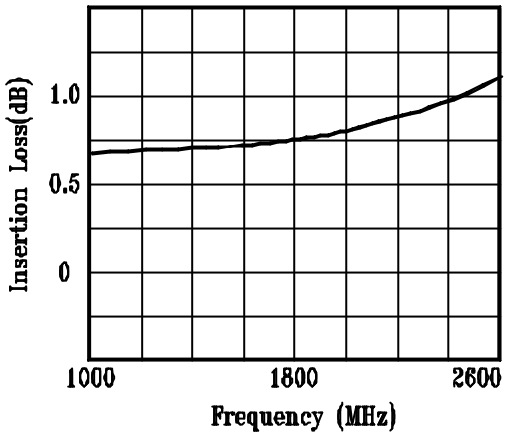
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



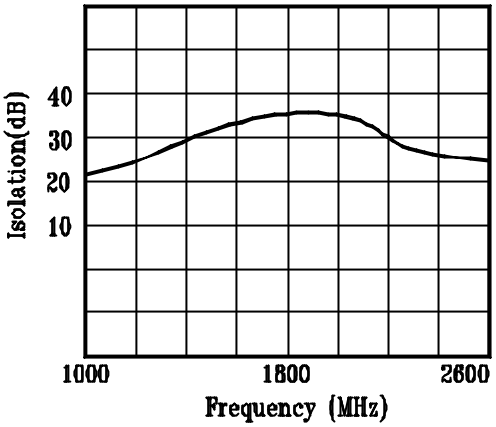
SP-2

Typical Performance Curves

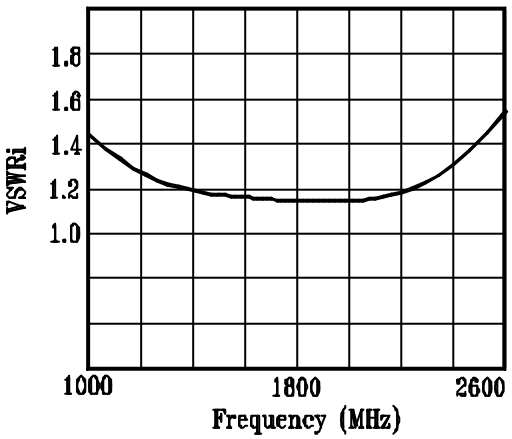
Insertion Loss vs. Frequency



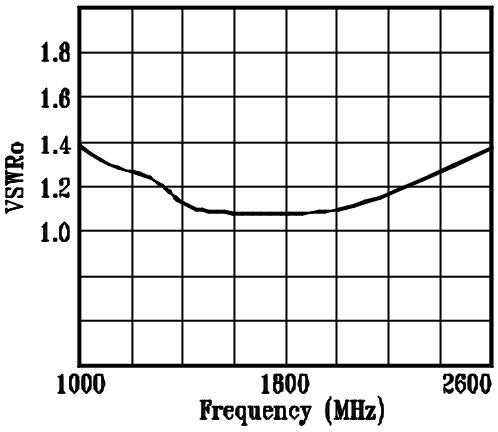
Isolation vs. Frequency



Input VSWR vs. Frequency

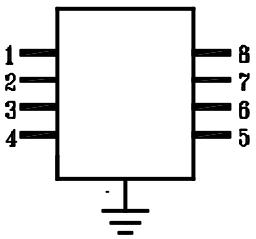


Output VSWR vs. Frequency



Note:

Required the package bottom grounded tightly.



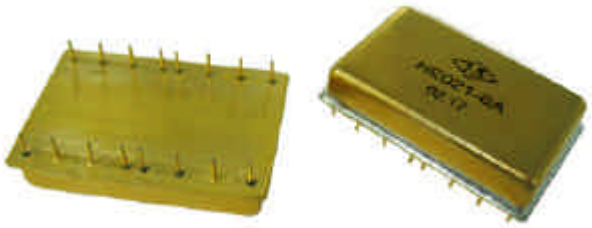
1.NC 5.Output
2.Input 6. Output
3.NC 7. Output
4.NC 8. Output
Case: GND

HE021-6A

6 way 0^0 power splitter/combiner

Features

- Frequency Range: 10~500MHz
- Input Power: 1W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Standard Package: HD-28C
- Wide Operating Temperature: -55℃~+85℃

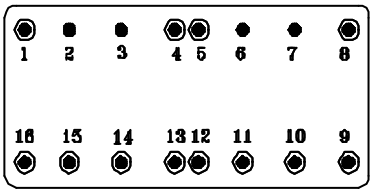


Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	10~200	10~500	5~200	10~600
Insertion Loss	I.L	dB	1.2(Max)	1.6(Max)	0.6	0.8
Isolation	ISO	dB	20(Min)	25(Min)	25	25
Phase Unbalance	ΔP	deg	3°(Max)	5°(Max)	1°	2°
Amplitude Unbalance	ΔM	dB	0.2(Max)	0.6(Max)	0.1	0.3
VSWR	VSWR	—	1.5:1(Max)	1.5:1(Max)	1.2:1	1.3:1

Absolute Maximum Rating

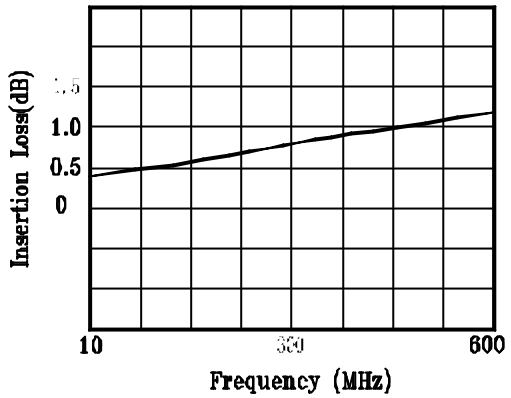
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



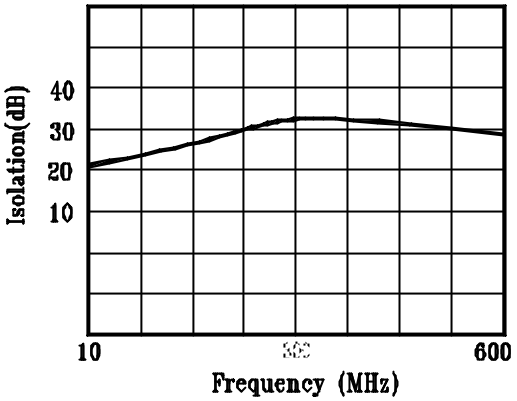
HD-28C

Typical Performance Curves

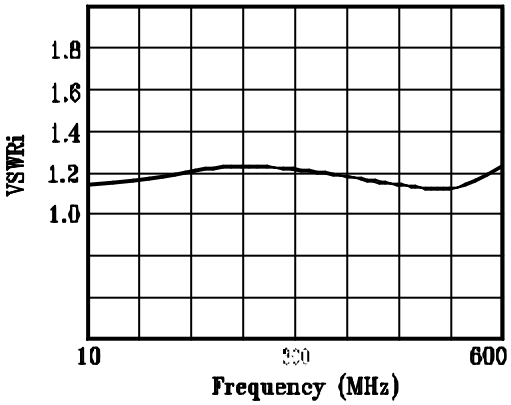
Insertion Loss vs. Frequency



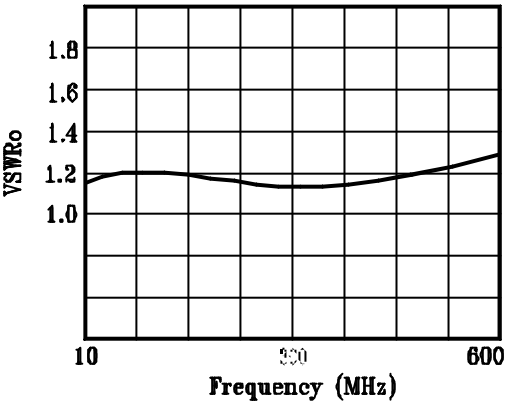
Isolation vs. Frequency



Input VSWR vs. Frequency

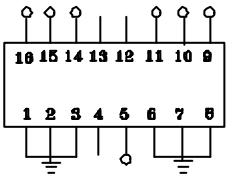


Output VSWR vs. Frequency



Note:

Required the plug-in package bottom grounded tightly with PCB.



5: Input

9,10,11,14,15,16 :Output

1,2,3,6,7,8: GND

Others: NC

HE022-6A

6 way 0^0 power splitter/combiner

Features

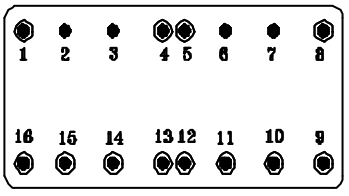
- Frequency Range: 600~1200MHz
- Input Power: 1W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Standard Package: HD-32A
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	F_L~f_H	MHz	600~1200	500~1300
Insertion Loss	I.L	dB	1.6(Max)	0.9
Isolation	ISO	dB	20(Min)	25
Phase Unbalance	ΔP	deg	6°(Max)	2°
Amplitude Unbalance	ΔM	dB	0.6(Max)	0.3
VSWR	VSWR	—	1.5:1(Max)	1.3:1

Absolute Maximum Rating

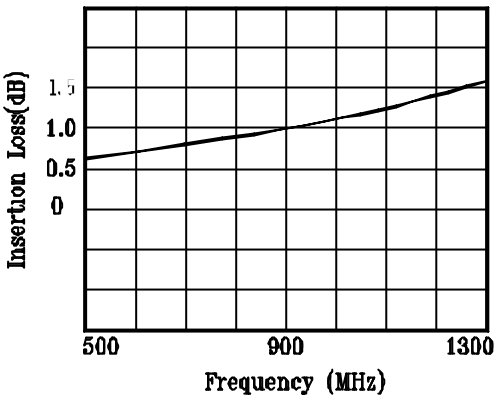
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



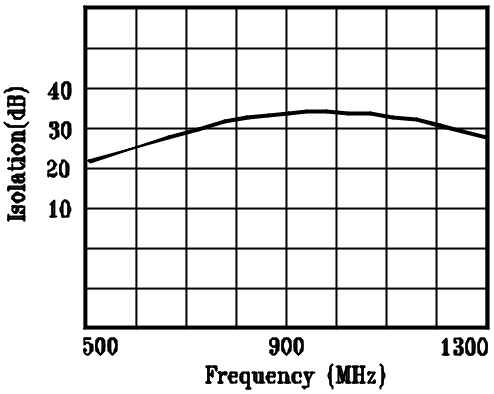
HD-32A

Typical Performance Curves

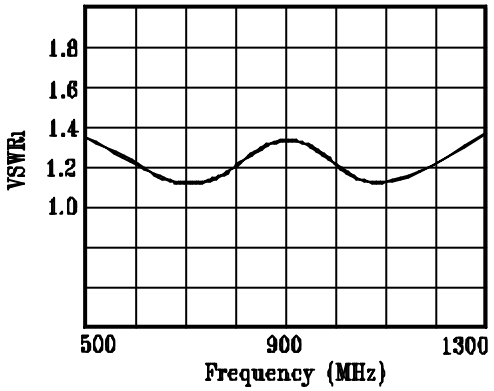
Insertion Loss vs. Frequency



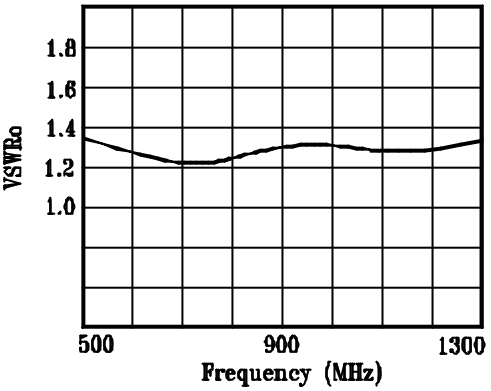
Isolation vs. Frequency



Input VSWR vs. Frequency

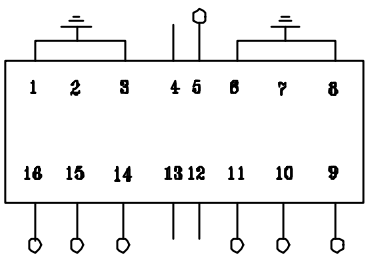


Output VSWR vs. Frequency



Note:

1. Required the plug-in package bottom grounded tightly with PCB.



5:Input

9,10,11,14,15,16: Output

1,2,3,6,7,8: GND

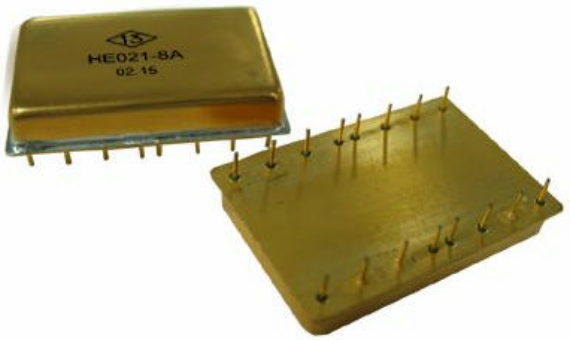
Others: NC

HE021-8A

8way 0^0 power splitter/combiner

Features

- Frequency Range: 10~500MHz
- Input Power: 1W (CW)
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Standard Package: HD-28C
- Wide Operating Temperature: -55℃~+85℃

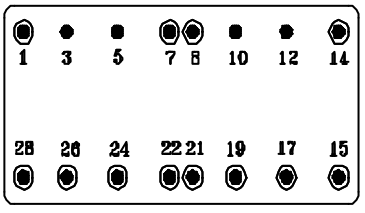


Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	10~200	10~500	5~200	10~600
Insertion Loss	I.L	dB	1.2(Max)	1.6(Max)	0.7	1.0
Isolation	ISO	dB	20(Min)	20(Min)	23	28
Phase Unbalance	ΔP	deg	5°(Max)	7°(Max)	1°	2°
Amplitude Unbalance	ΔM	dB	0.3(Max)	0.5(Max)	0.1	0.2
VSWR	VSWR	—	1.5:1(Max)	1.5:1(Max)	1.3:1	1.3:1

Absolute Maximum Rating

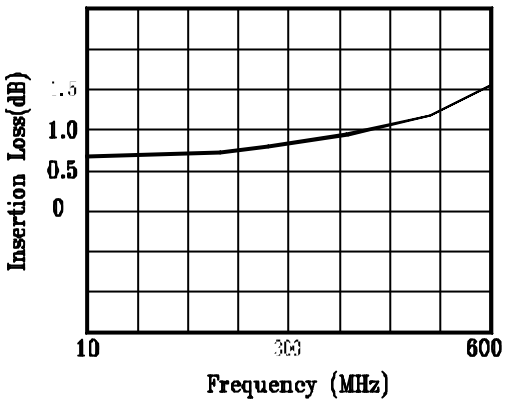
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



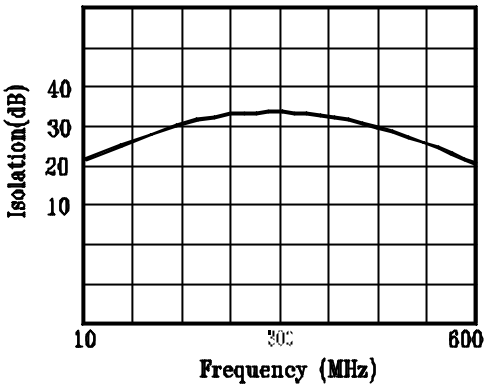
HD-28C

Typical Performance Curves

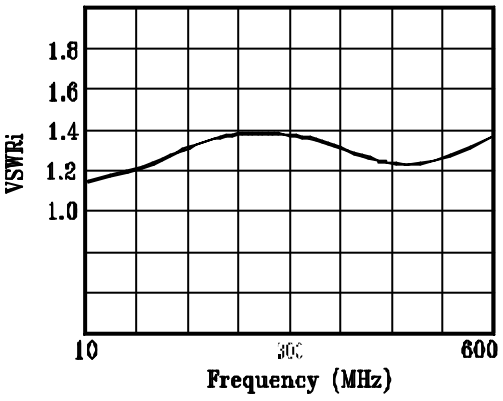
Insertion Loss vs. Frequency



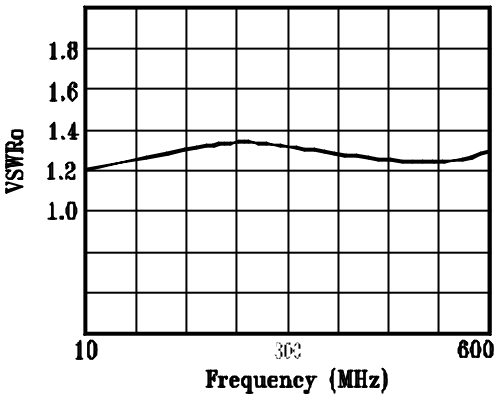
Isolation vs. Frequency



Input VSWR vs. Frequency

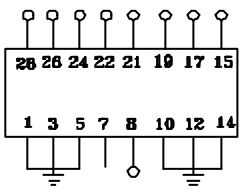


Output VSWR vs. Frequency



Note:

1. Required the plug-in package bottom grounded tightly with PCB.



8: Input
15,17,19,21: Output
22,24,26,28 : Output
1,3,5,10,12,14: GND
Others: NC

PSM2

2 way 0^0 Microwave power splitter/combiner

Features

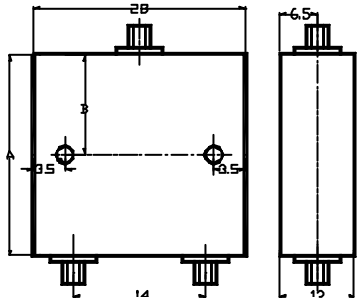
- Broad Bandwidth：One or Multi-Octave
- High Input Power： 5W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Removable SMA
- Wide Operating Temperature：-55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Model	F_L~f_H (GHz)	I.L dB (Max)	Iso dB(Min)	ΔP deg (Max)	ΔM dB(Max)	VSWR (Max)	Outline（mm）	
							A	**B**
PSM2-2-4	2~4	0.40	20	1.5	0.2	1.25:1	36.0	18
PSM2-3-6	3~6	0.45	20	3	0.2	1.35:1	25.4	12.7
PSM2-4-8	4~8	0.45	22	3	0.2	1.30:1	25.4	
PSM2-4-10	4~10	0.70	20	5	0.3	1.35:1	25.4	
PSM2-7-12.5	7~12.5	0.50	20	5	0.3	1.50:1	25.4	
PSM2-2-8	2~8	0.50	18	4	0.3	1.35:1	36.0	18

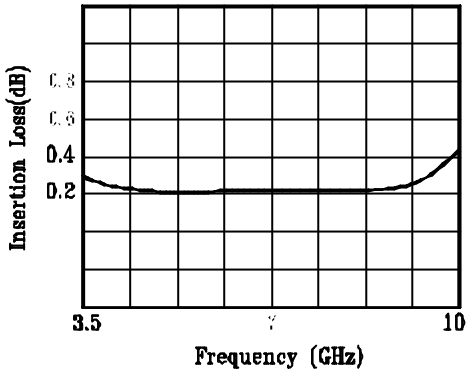
Absolute Maximum Rating

Maximum Input Power ----- 5W
Storage Temperature -- +125℃

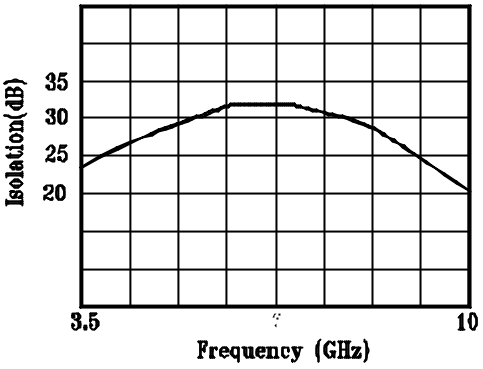


PSM2-4-10 Typical Performance Curves

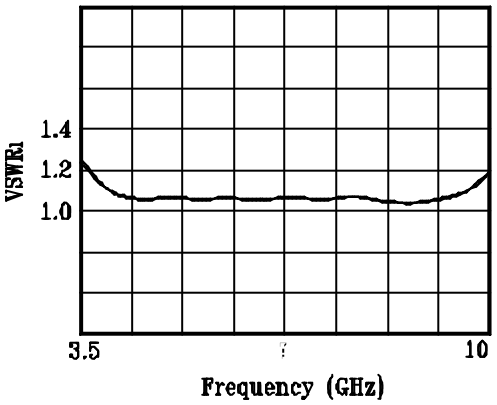
Insertion Loss vs. Frequency



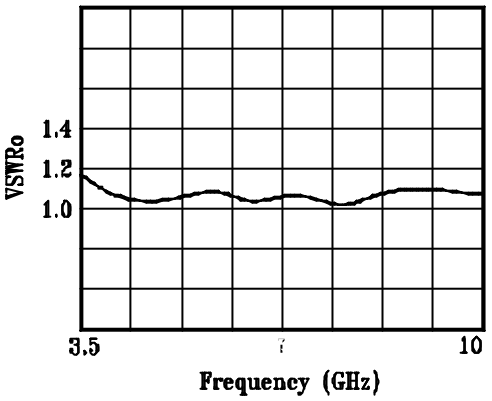
Isolation vs. Frequency



Input VSWR vs. Frequency



Output VSWR vs. Frequency



Note:

1. Required module bottom grounded tightly.
2. VSWR of load should be ≤1.2 under maximum input power.

PSM3

3 way 0^0 Microwave power splitter/combiner

Features

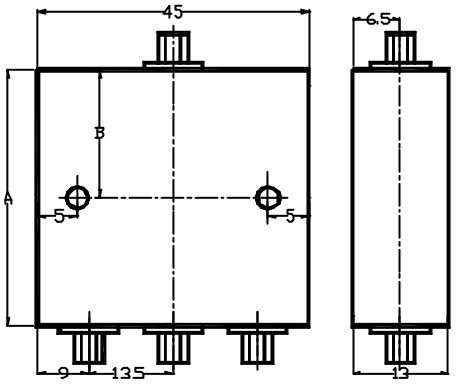
- Broad Bandwidth：Octave Bandwidth
- High Input Power： 5W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Removable SMA
- Wide Operating Temperature：-55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Model	F_L~f_H （GHz）	I.L dB (Max)	Iso dB(Min)	ΔP deg (Max)	ΔM dB(Max)	VSWR (Max)	Outline （mm）	
							A	B
PSM3-2-4	2~4	0.4	20	2.5	0.3	1.30:1	42	21
PSM3-3-6	3~6	0.5	20	3	0.3	1.35:1	30	15
PSM3-4-8	4~8	0.5	20	4	0.4	1.30:1	30	

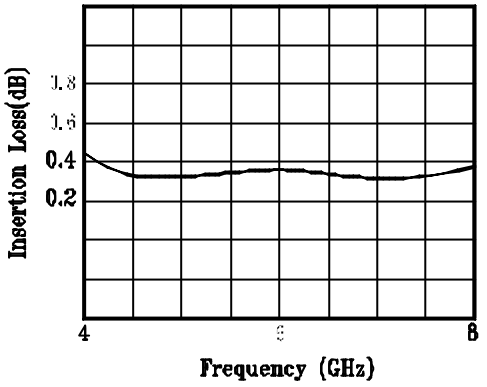
Absolute Maximum Rating

Maximum Input Power ----- 5W
Storage Temperature -- +125℃

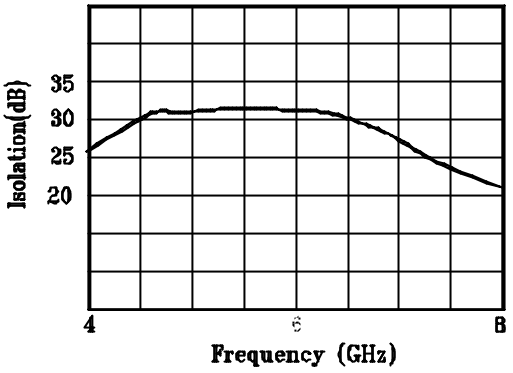


PSM3-4-8 Typical Performance Curves

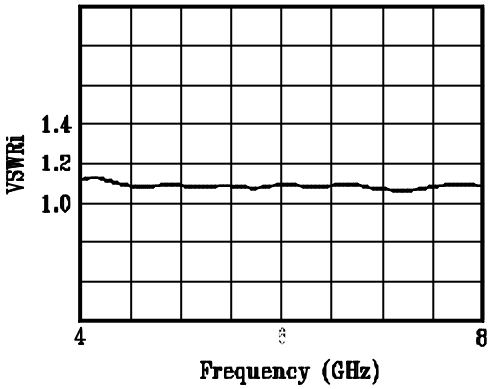
Insertion Loss vs. Frequency



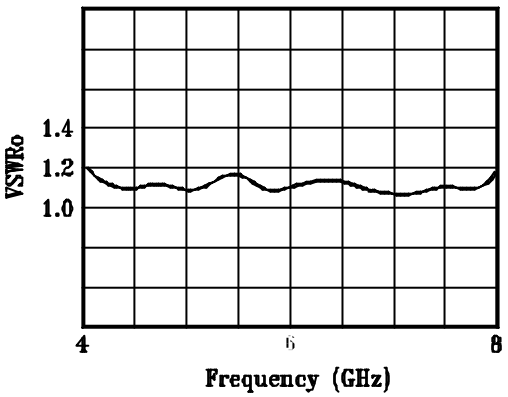
Isolation vs. Frequency



Input VSWR vs. Frequency



Output VSWR vs. Frequency



.

Note:

1. Required module bottom grounded tightly.
2. VSWR of load should be ≤1.2 under maximum input power.

PSM4

4 way 0^0 Microwave power splitter/combiner

Features

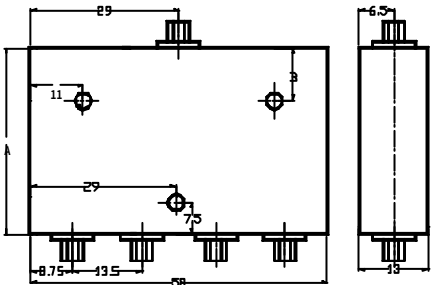
- Broad Bandwidth：One or Multi-Octave
- High Input Power： 5W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Removable SMA
- Wide Operating Temperature：-55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Model	F_L~f_H (GHz)	I.L dB (Max)	Iso dB(Min)	ΔP deg (Max)	ΔM dB(Max)	VSWR (Max)	Outline（mm）	
							A	B
PSM4-2-4	2~4	0.5	20	4	0.3	1.30:1	34	12
PSM4-3-6	3~6	0.5	20	4	0.3	1.35:1	34	
PSM4-4-8	4~8	0.8	20	6	0.4	1.40:1	34	
PSM4-5-10	5~10	0.8	20	6	0.4	1.40:1	34	
PSM4-7-12.5	7~12.5	0.8	18	8	0.4	1.40:1	34	
PSM4-2-8	2~8	1.0	18	6	0.4	1.50:1	56	

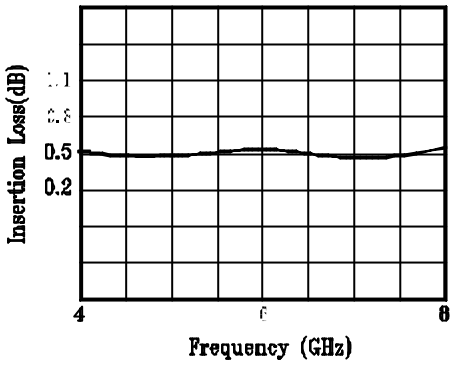
Absolute Maximum Rating

Maximum Input Power ----- 5W
Storage Temperature -- +125℃

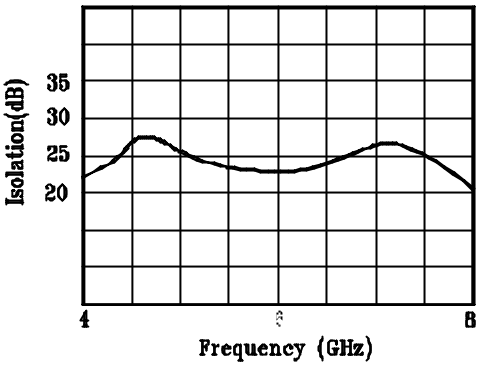


PSM4-4-8 Typical Performance Curves

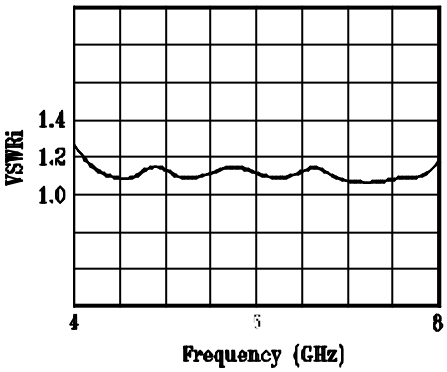
Insertion Loss vs. Frequency



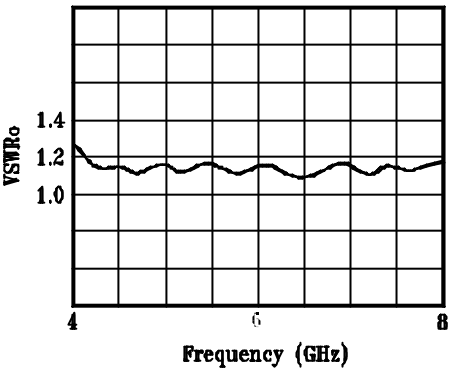
Isolation vs. Frequency



Input VSWR vs. Frequency



Output VSWR vs. Frequency



Note:

1. Required module bottom grounded tightly.
2. VSWR of load should be ≤1.2 under maximum input power.

HE020-2A

2 way 0^0 high power splitter/combiner

Features

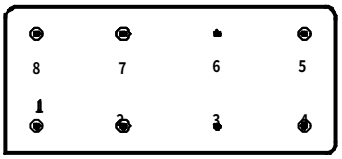
- Frequency Range: 0.5~200MHz
- High Input Power: 20W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Package: DIP-22A
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	0.5~50	0.5~200	0.5~50	0.5~200
Insertion Loss	I.L	dB	0.5(Max)	0.6(Max)	0.3	0.4
Isolation	Iso	dB	25(Min)	23(Min)	28	25
Phase Unbalance	ΔP	deg	0.5°(Max)	1.5°(Max)	0.2°	1.0°
Amplitude Unbalance	ΔM	dB	0.1(Max)	0.2(Max)	0.05	0.1
VSWR	VSWR	—	1.25:1(Max)	1.25:1(Max)	1.15:1	1.15:1
Input Power(Max)	P_{in}	W	20	20	—	—

Absolute Maximum Rating

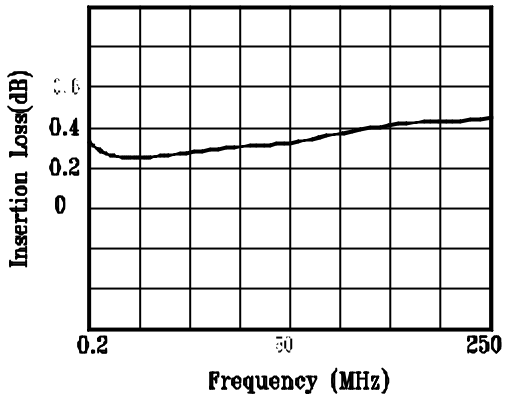
Maximum Input Power ----- 20W
Storage Temperature -- +125℃



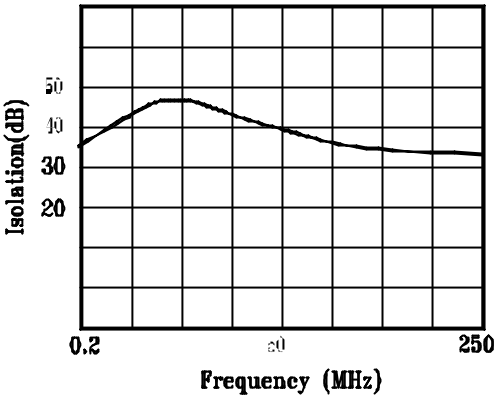
DIP-22A

Typical Performance Curves

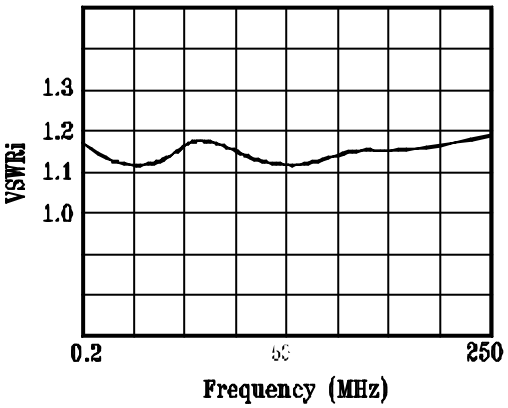
Insertion Loss vs. Frequency



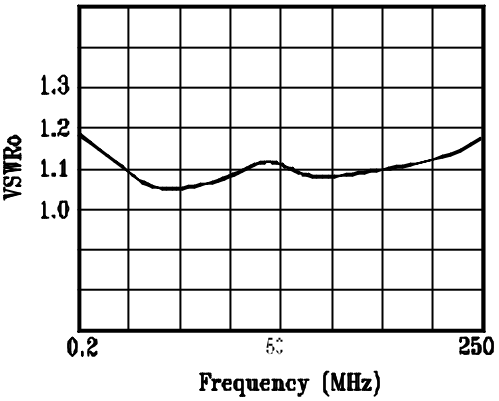
Isolation vs. Frequency



Input VSWR vs. Frequency

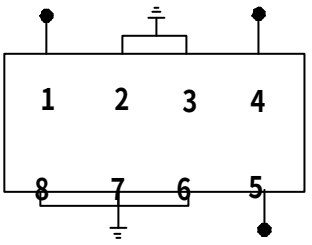


Output VSWR vs. Frequency



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Pay attention to heat dispersion.



1. Input
4,5 Output
Others: GND

HE020-2B

2 way 0^0 high power splitter/combiner

Features

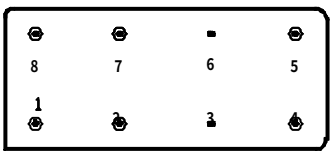
- Frequency Range: 10~500MHz
- High Input Power: 20W (CW)
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Package: DIP-22A
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	30~200	10~500	30~200	10~500
Insertion Loss	I.L	dB	0.4(Max)	0.6(Max)	0.3	0.4
Isolation	Iso	dB	28(Min)	20(Min)	30	25
Phase Unbalance	ΔP	deg	1°(Max)	1.5°(Max)	0.5°	0.5°
Amplitude Unbalance	ΔM	dB	0.15(Max)	0.25(Max)	0.05	0.1
VSWR	VSWR	—	1.25:1(Max)	1.25:1(Max)	1.2:1	1.2:1
Input Power(Max)	P_{in}	W	20	20	—	—

Absolute Maximum Rating

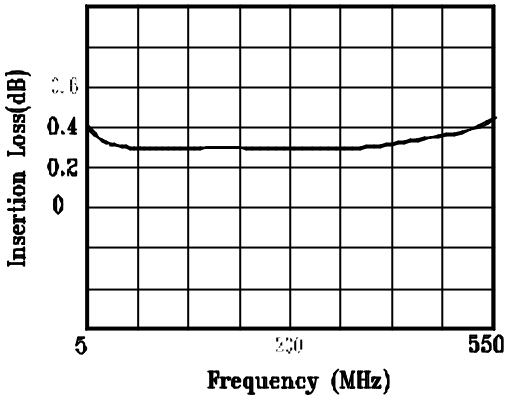
Maximum Input Power ----- 20W
Storage Temperature -- +125℃



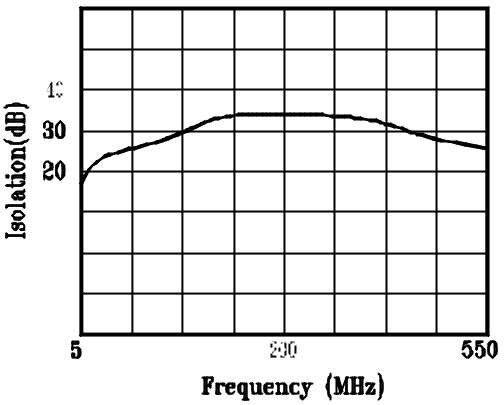
DIP-22A

Typical Performance Curves

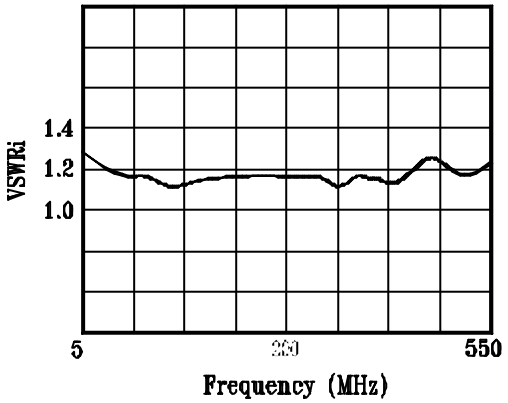
Insertion Loss vs. Frequency



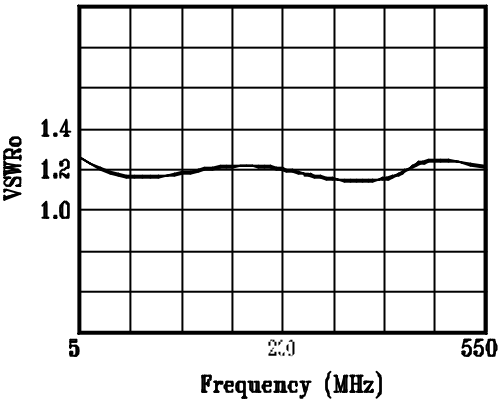
Isolation vs. Frequency



Input VSWR vs. Frequency

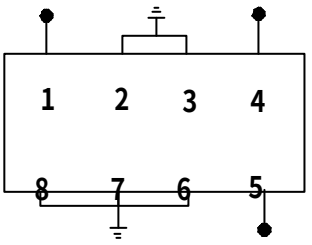


Output VSWR vs. Frequency



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Pay attention to heat dispersion.

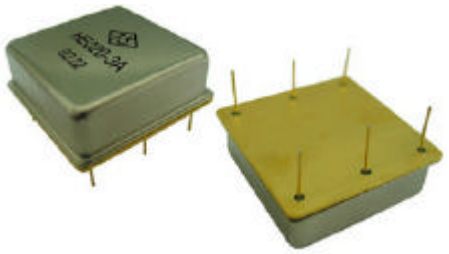


1. Input
4,5 Output
Others: GND

HE020-3A

3 way 0^0 high power splitter/combiner

Features



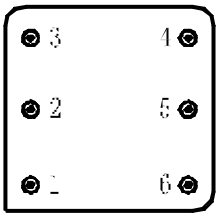
- Frequency Range: 0.5~200MHz
- High Input Power: 20W (CW)
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Package: HD-6
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	0.5~50	0.5~200	0.5~50	0.5~200
Insertion Loss	I.L	dB	0.5(Max)	0.7(Max)	0.3	0.5
Isolation	Iso	dB	26(Min)	25(Min)	30	28
Phase Unbalance	ΔP	deg	1°(Max)	2°(Max)	0.5°	1.0°
Amplitude Unbalance	ΔM	dB	0.2(Max)	0.3(Max)	0.1	0.2
VSWR	VSWR	—	1.3:1(Max)	1.3:1(Max)	1.2:1	1.2:1
Input Power(Max)	P_{in}	W	20	20	—	—

Absolute Maximum Rating

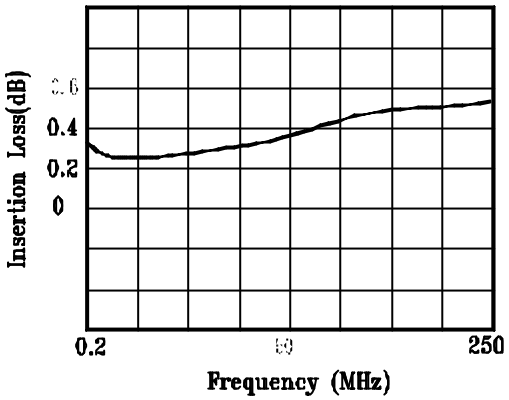
Maximum Input Power ----- 20W
Storage Temperature -- +125℃



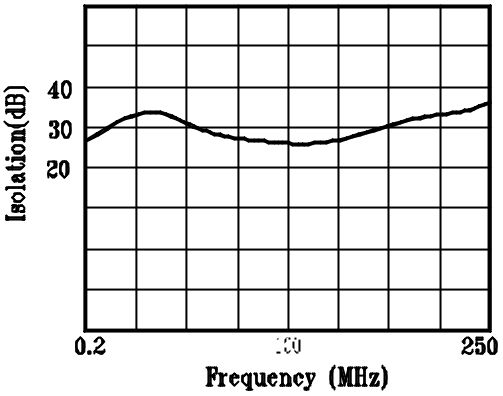
HD-6

Typical Performance Curves

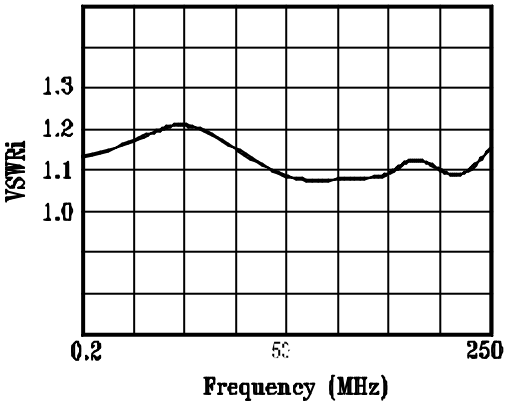
Insertion Loss vs. Frequency



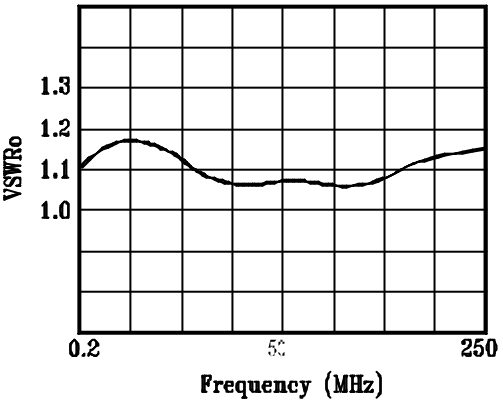
Isolation vs. Frequency



Input VSWR vs. Frequency

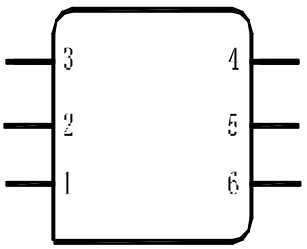


Output VSWR vs. Frequency



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Pay attention to heat dispersion.



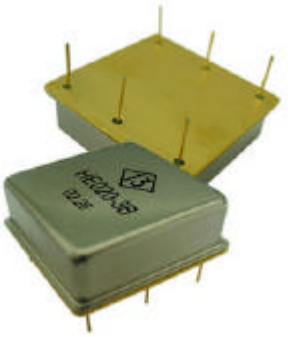
2 Input
4,5,6 Output
1,3 GND

HE020-3B

3 way 0^0 high power splitter/combiner

Features

- Frequency Range: 5~400MHz
- High Input Power: 20W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Package: HD-6
- Wide Operating Temperature: -55℃~+85℃

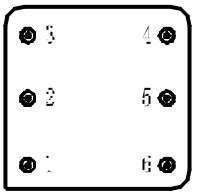


Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	10~100	5~400	10~100	5~400
Insertion Loss	I.L	dB	0.5(Max)	0.8(Max)	0.3	0.5
Isolation	Iso	dB	25(Min)	20(Min)	28	26
Phase Unbalance	ΔP	deg	1°(Max)	2°(Max)	0.5°	1.0°
Amplitude Unbalance	ΔM	dB	0.2(Max)	0.3(Max)	0.1	0.2
VSWR	VSWR	—	1.3:1(Max)	1.5:1(Max)	1.2:1	1.3:1
Input Power(Max)	P_{in}	W	20	20	—	—

Absolute Maximum Rating

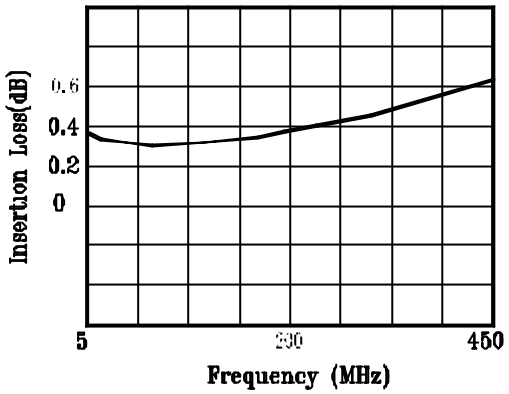
Maximum Input Power ----- 20W
Storage Temperature -- +125℃



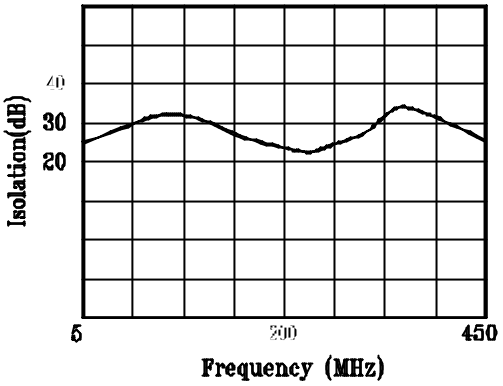
HD-6

Typical Performance Curves

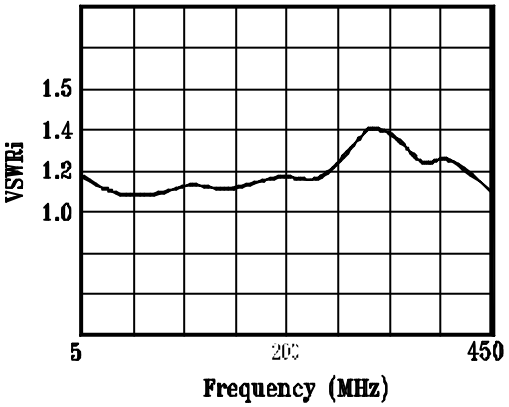
Insertion Loss vs. Frequency



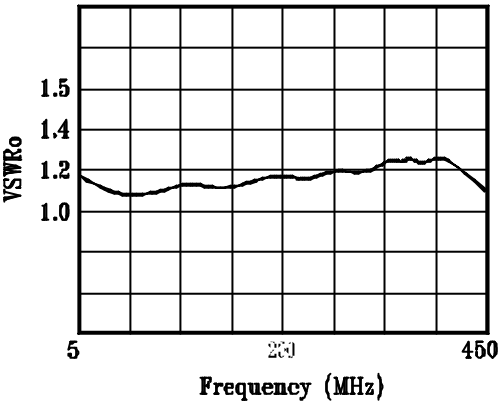
Isolation vs. Frequency



Input VSWR vs. Frequency

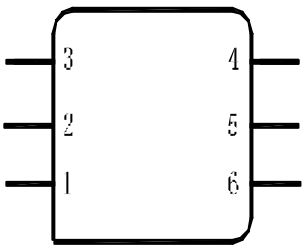


Output VSWR vs. Frequency



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Pay attention to heat dispersion.



2 Input
4,5,6 Output
1,3 GND

HE020-4A

4 way 0^0 high power splitter/combiner

Features

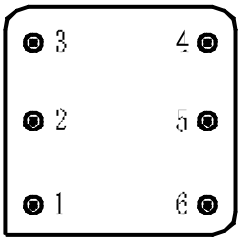
- Frequency Range: 0.5~200MHz
- High Input Power: 20W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Package: HD-6
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	0.5~50	0.5~200	0.5~50	0.5~200
Insertion Loss	I.L	dB	0.7(Max)	0.9(Max)	0.6	0.7
Isolation	Iso	dB	25(Min)	25(Min)	28	28
Phase Unbalance	ΔP	deg	2°	3°	1°	2°
Amplitude Unbalance	ΔM	dB	0.2(Max)	0.3(Max)	0.05	0.1
VSWR	VSWR	—	1.35:1(Max)	1.35:1(Max)	1.2:1	1.2:1
Input Power(Max)	P_{in}	W	20	20	—	—

Absolute Maximum Rating

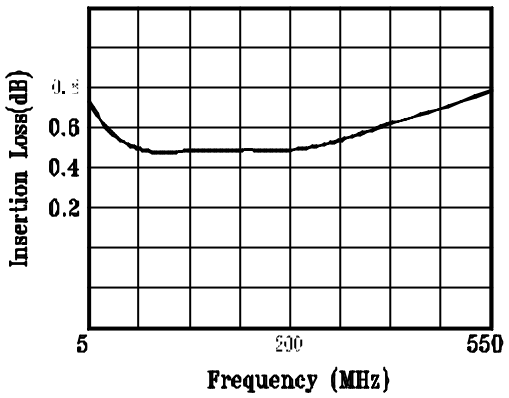
Maximum Input Power ----- 20W
Storage Temperature -- +125℃



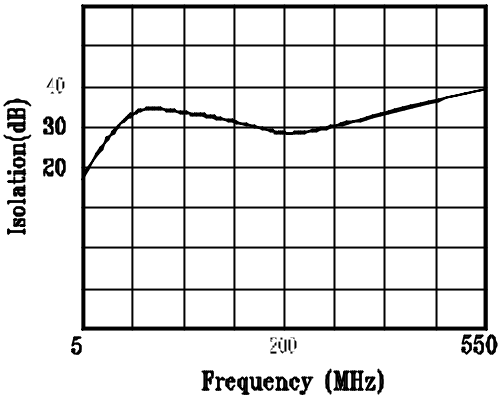
HD-6

Typical Performance Curves

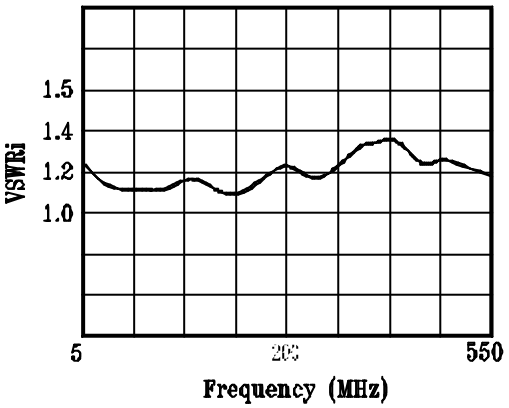
Insertion Loss vs. Frequency



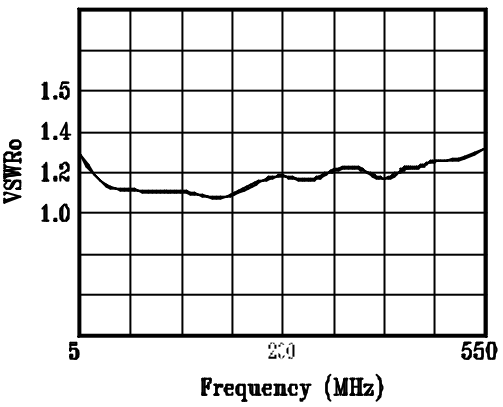
Isolation vs. Frequency



Input VSWR vs. Frequency

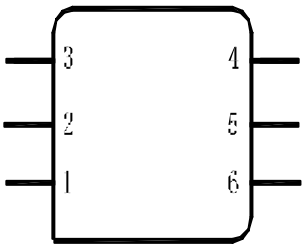


Output VSWR vs. Frequency



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Pay attention to heat dispersion.



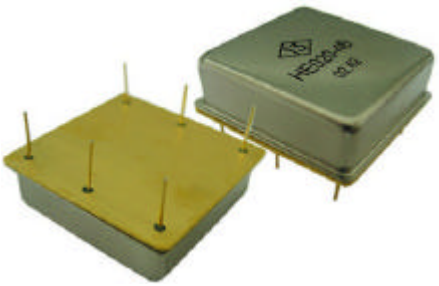
2	Input
1,3,4,6	Output
5	GND

HE020-4B

4 way 0^0 high power splitter/combiner

Features

- Frequency Range: 10~500MHz
- High Input Power: 20W (CW)
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Package: HD-6
- Wide Operating Temperature: -55℃~+85℃

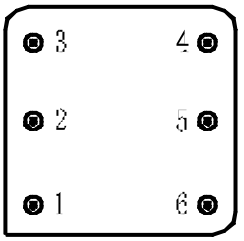


Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	10~200	10~500	10~200	10~500
Insertion Loss	I.L	dB	0.8(Max)	1.0(Max)	0.5	0.7
Isolation	Iso	dB	25(Min)	25(Min)	30	30
Phase Unbalance	ΔP	deg	2°(Max)	4°(Max)	1°	2°
Amplitude Unbalance	ΔM	dB	0.2(Max)	0.3(Max)	0.1	0.2
VSWR	VSWR	—	1.35:1(Max)	1.35:1(Max)	1.2:1	1.2:1
Input Power(Max)	P_{in}	W	20	20	—	—

Absolute Maximum Rating

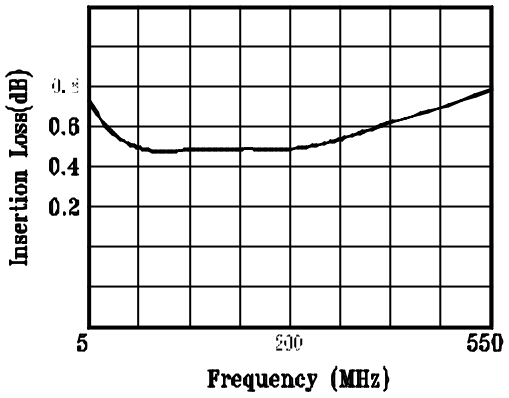
Maximum Input Power ----- 20W
Storage Temperature -- +125℃



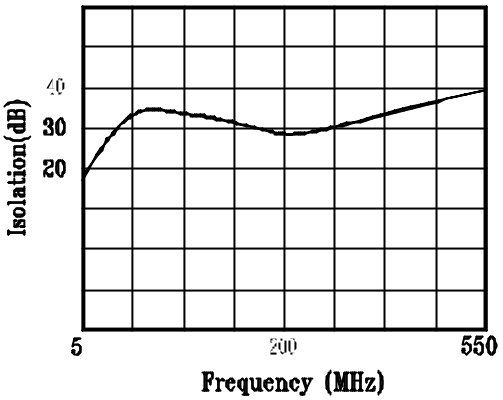
HD-6

Typical Performance Curves

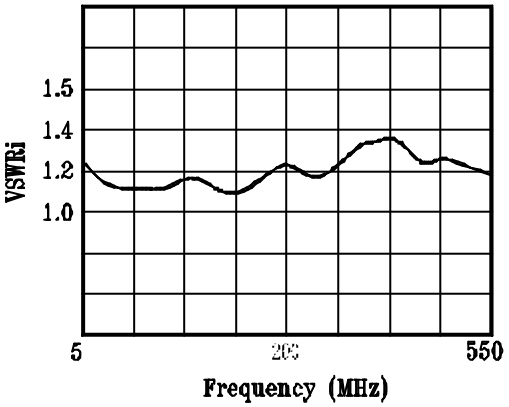
Insertion Loss vs. Frequency



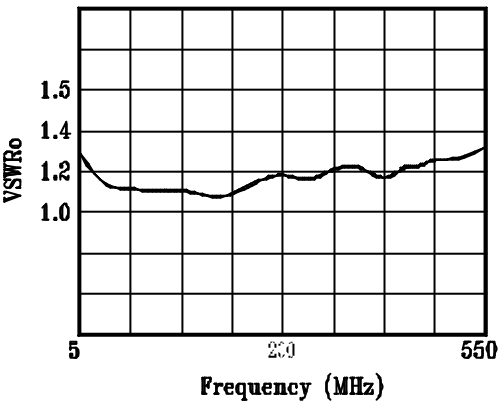
Isolation vs. Frequency



Input VSWR vs. Frequency

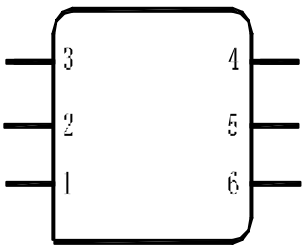


Output VSWR vs. Frequency



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Pay attention to heat dispersion.



2	Input
1,3,4,6	Output
5	GND

Series PD2

2 way 90^0 Broadband power splitter/combiner

Model	Center frequency (f_0)	Relative bandwidth
PD2-10	10MHz	6.7~13.4MHz
PD2-30	30.0MHz	20~40MHz
PD2-60	60.0MHz	40~80MHz
PD2-120	120MHz	80~160MHz
PD2-150	150MHz	100~200MHz
PD2-300	300MHz	200~400MHz
PD2-375	375MHz	250~500MHz
PD2-***	5-375MHz	Octave bandwidth

Features

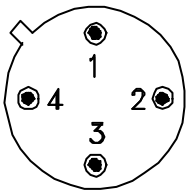
- Low Insertion Loss, High Isolation
- Excellent Phase, Amplitude Unbalance
- Standard Package: TO-8A-1
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	F_L~f_H	MHz	Octave bandwidth	Octave bandwidth
Coupling	Coupling	dB	-3	—
Insertion Loss	I.L	dB	1.0(Max)	0.6
Isolation	Iso	dB	18(Min)	22
Phase Unbalance	ΔP	deg	2° (Max)	2°
Amplitude Unbalance	ΔM	dB	1.0(Max)	0.6
VSWR	VSWR	—	1.5:1(Max)	1.3:1

Absolute Maximum Rating

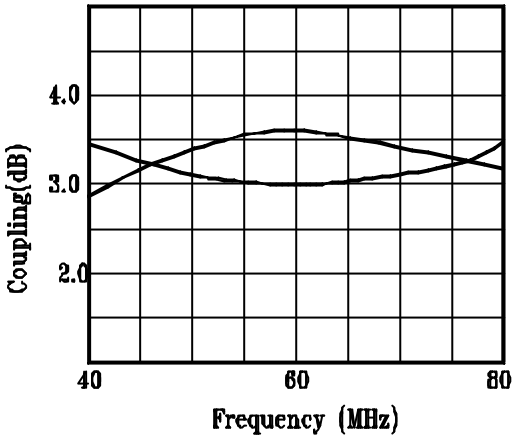
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



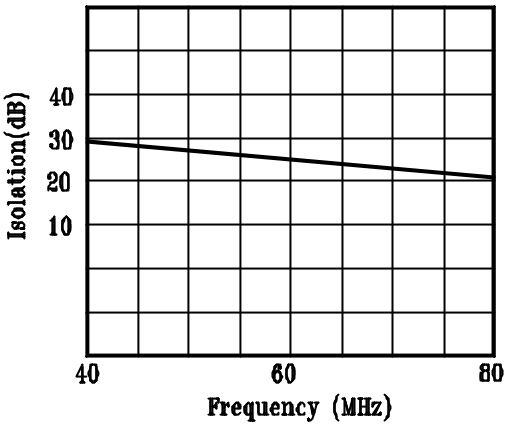
TO-8A-1

PD2-60 Typical Performance Curves

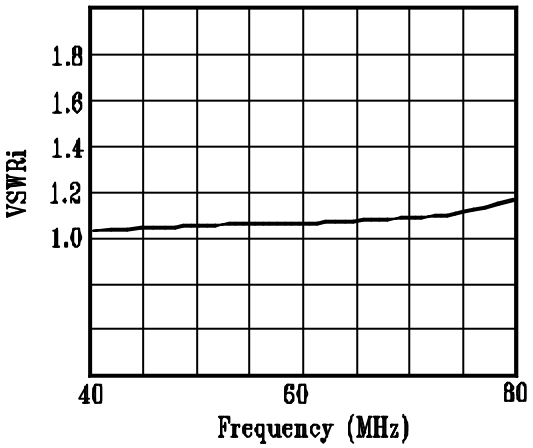
Coupling vs. Frequency



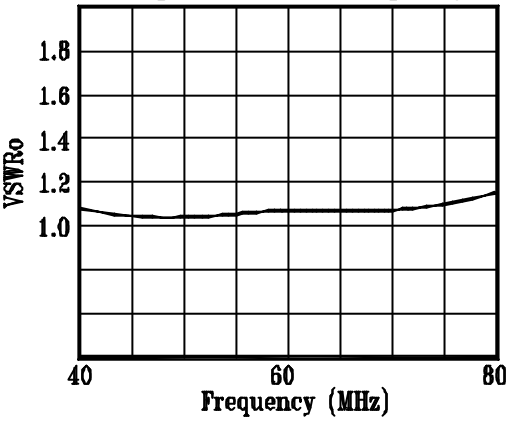
Isolation vs. Frequency



Input VSWR vs. Frequency

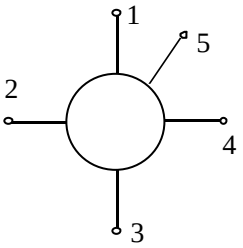


Output VSWR vs. Frequency



Note:

Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).



1.Output(+90°)
2.Input
3.Isolation port required connecting 50Ω load
4.Output(0°)
5.Case: GND

PD2-750

2 way 90^0 power splitter/combiner

Features

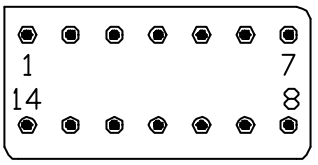
- Frequency Range: 500~1000MHz(Typ)
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Standard Package: DIP-14A
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	F_L~f_H	MHz	500~1000	500~1000
Coupling	Coupling	dB	-3	—
Insertion Loss	I.L	dB	1.0(Max)	0.8
Isolation	ISO	dB	20(Min)	25
Phase Unbalance	ΔP	deg	4°	**1.5°**
Amplitude Unbalance	ΔM	dB	1.3(Max)	0.4
VSWR	VSWR	—	1.5:1(Max)	1.2:1

Absolute Maximum Rating

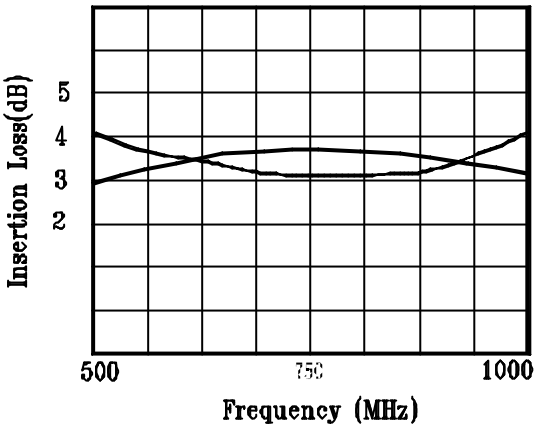
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



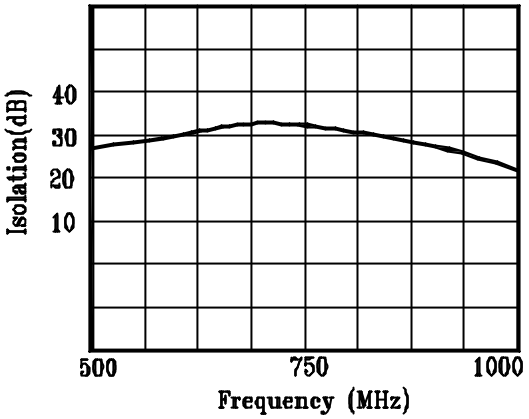
DIP-14A

Typical Performance Curves

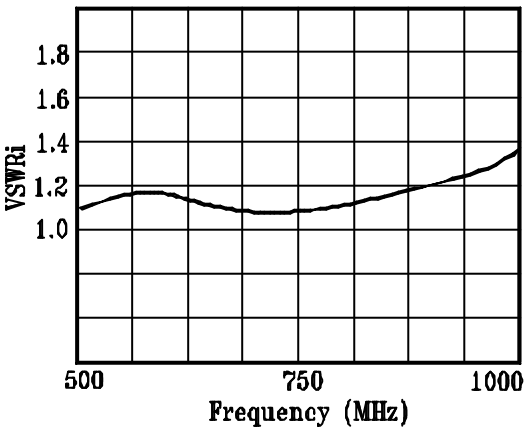
Insertion Loss vs. Frequency



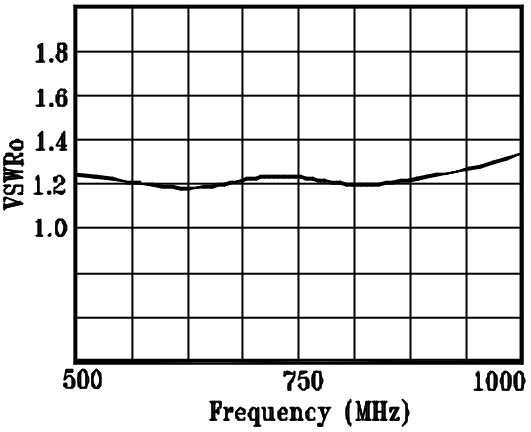
Isolation vs. Frequency



Input VSWR vs. Frequency

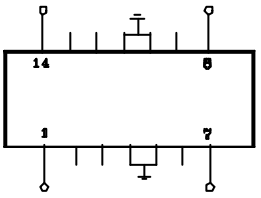


Output VSWR vs. Frequency



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Microstrip package products can be offered.



1: Input
7: Isolation port, required connecting 50Ω load
8: Output（0°）
14: Output（+90°）
4: GND
Others: NC

PD2-1500

2 way 90^0 power splitter/combiner

Features

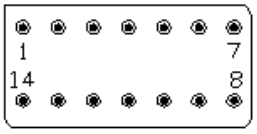
- Frequency Range:1000~2000MHz(Typ)
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Standard Package: DIP-14A
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	1000~1500	1500~2000	1000~1500	1500~2000
Coupling	Coupling	dB	-3	-3	—	—
Insertion Loss	I.L	dB	1.0(Max)	1.5(Max)	0.7	0.9
Isolation	ISO	dB	24(Min)	18(Min)	30	23
Phase Unbalance	ΔP	deg	3°(Max)	5°(Max)	2°	3°
Amplitude Unbalance	ΔM	dB	1.2(Max)	1.2(Max)	0.3	0.5
VSWR	VSWR	—	1.5:1(Max)	1.5:1(Max)	1.3:1	1.4:1

Absolute Maximum Rating

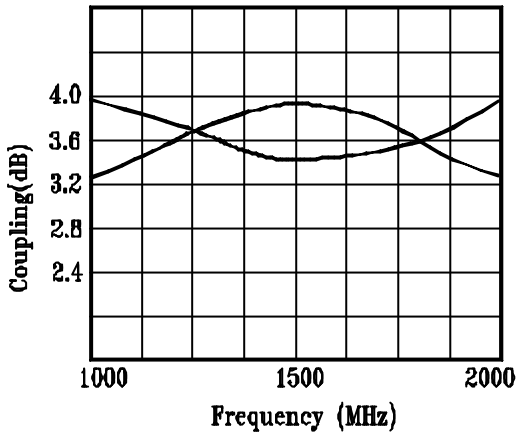
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



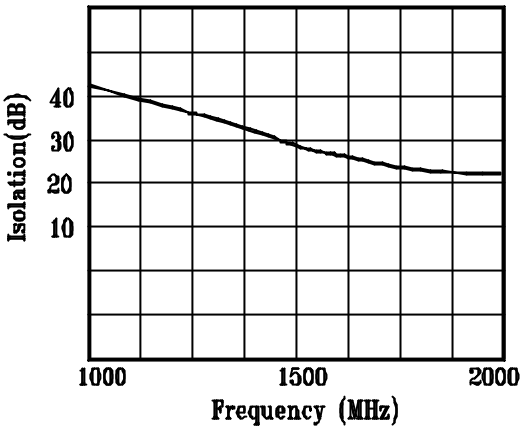
DIP-14A

Typical Performance Curves

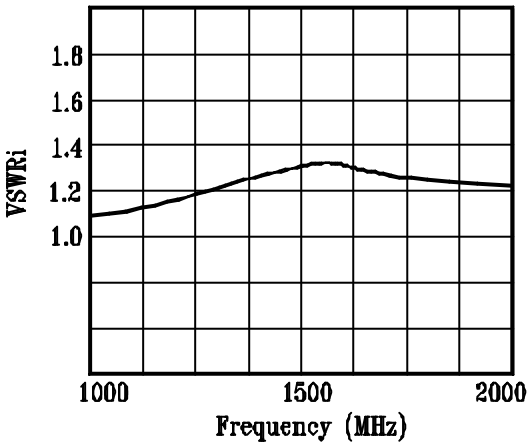
Coupling vs. Frequency



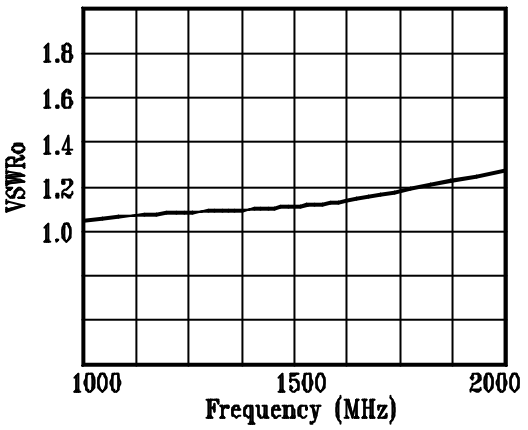
Isolation vs. Frequency



Input VSWR vs. Frequency

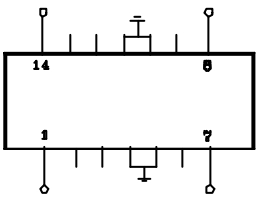


Output VSWR vs. Frequency



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Microstrip package products can be offered.



1: Input
7: Isolation port, required connecting 50Ω load
8: Output（0°）
14: Output（+90°）
4: GND
Others: NC

QHP-100

2 way 90^0 Ultra-Broadband power splitter/combiner

Features

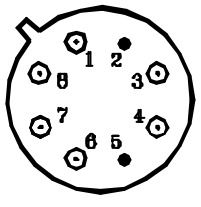
- Frequency Range: 40~250MHz(Typ)
- High Input Power: 1W（CW）
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Standard Package: TO-8H
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	50~200	40~250	50~200	40-300
Insertion Loss	Coupling	dB	-3	-3	—	—
Isolation	I.L	dB	1.3(Max)	1.5(Max)	0.8	1.0
Phase Unbalance	ISO	dB	16(Min)	15(Min)	18	16
Amplitude Unbalance	ΔP	deg	4°(Max)	7°(Max)	2°	4°
VSWR	ΔM	dB	0.8(Max)	1.2(Max)	0.6	0.8
Frequency Range	VSWR	—	1.6:1(Max)	1.8:1(Max)	1.4:1	1.5

Absolute Maximum Rating

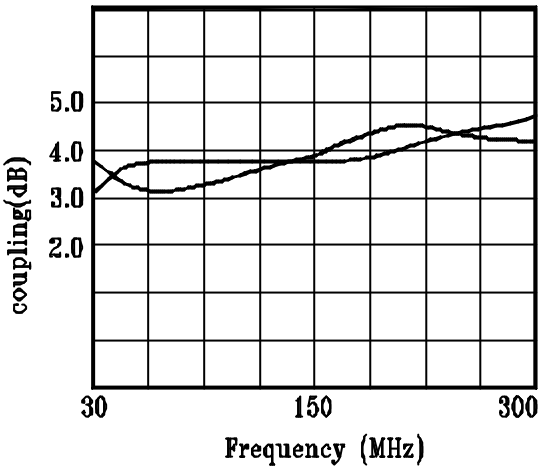
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



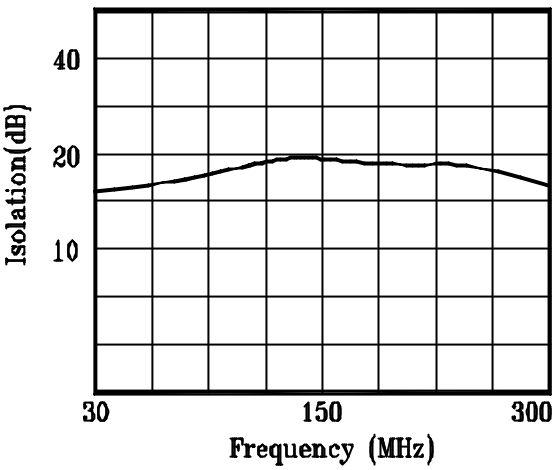
To-8H

Typical Performance Curves

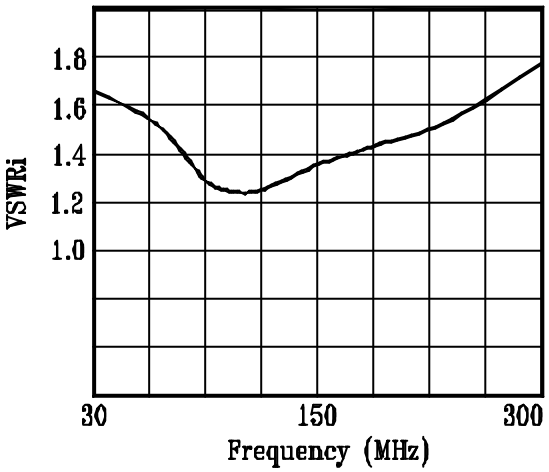
Coupling vs. Frequency



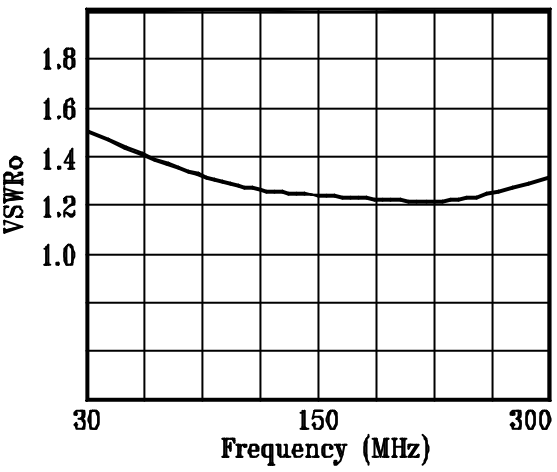
Isolation vs. Frequency



Input VSWR vs. Frequency

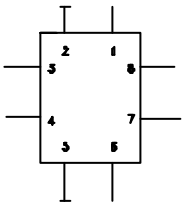


Output VSWR vs. Frequency



Note:

Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).



1,6: NC 2,5: GND
3.Input 7.Output(0°)
4.Isolation port, required connecting 50Ω load.
8.Output(+90°)

Series PDN

2 way 90^0 Narrowband power splitter/combiner

Model	Center frequency（f_0）	Relative bandwidth
PDN-10	10.0MHz	9.5~10.5MHz
PDN-30	30.0MHz	28.5~31.5MHz
PDN-60	60.0MHz	57.0~63.0MHz
PDN-120	120MHz	114~126MHz
PDN-600	600MHz	570~630MHz
PDN-800	800MHz	760~840MHz
PDN-1.6G	1600MHz	1520~1680MHz
PDN-2.2G	2200MHz	2090~2310MHz
PDN-***	5-2200MHz	f_o±5%

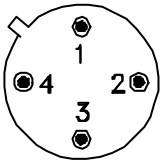
- Low Insertion Loss, High Isolation
- Excellent Phase, Amplitude Unbalance
- Standard Package: TO-8A-1
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed	Typical
Frequency Range	F_L~f_H	MHz	f_o±5%	f_o±7.5%
Coupling	Coupling	dB	-3	—
Insertion Loss	I.L	dB	1.0(Max)	0.6
Isolation	ISO	dB	18(Min)	22
Phase Unbalance	ΔP	deg	3° (Max)	2°
Amplitude	ΔM	dB	1.0(Max)	0.6
VSWR	VSWR	—	1.5:1(Max)	1.3:1

Absolute Maximum Rating

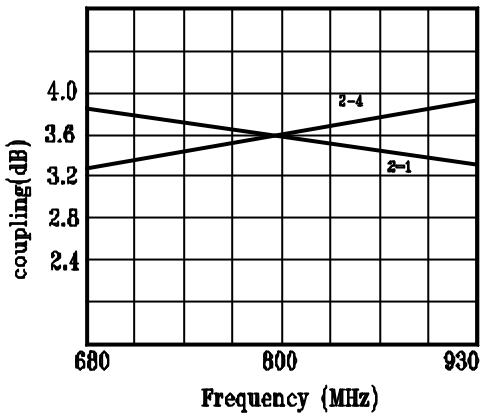
Maximum Input Power ----- 1W
Storage Temperature -- +125℃



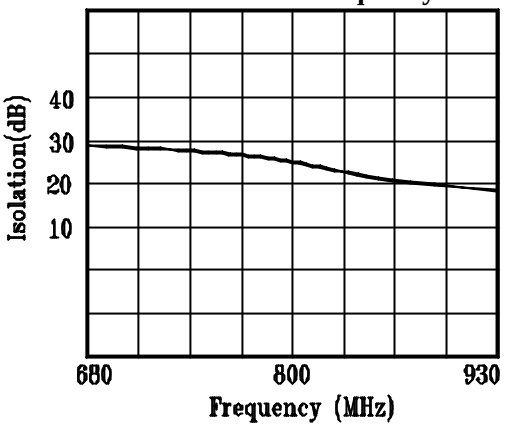
TO-8A-1

PDN-800 Typical Performance Curves

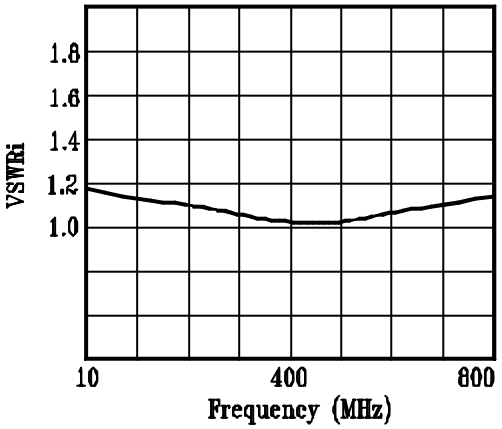
Coupling vs. Frequency



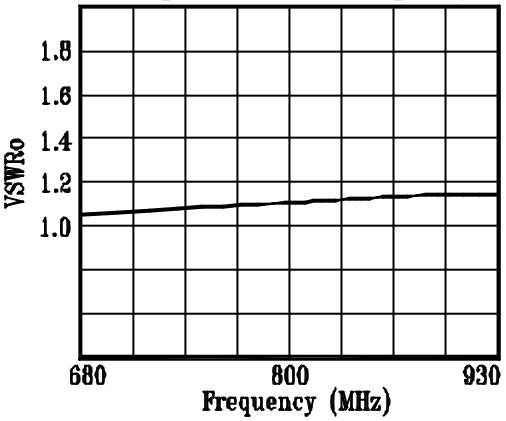
Isolation vs. Frequency



Input VSWR vs. Frequency

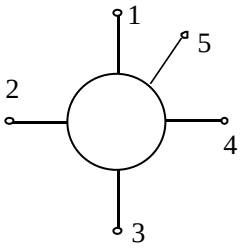


Output VSWR vs. Frequency



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).



1.Output(+90°)
2.Input
3.Isolation port required connecting 50Ω load
4.Output(0°)
5.Case: GND

PD-180

2 way 180^0 power splitter/combiner

Features

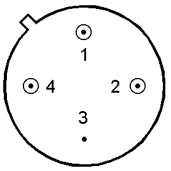
- Frequency Range: 10~500MHz
- Low Insertion Loss, High Isolation
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Package: TO-8A
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Symbol	Unit	Guaranteed		Typical	
Frequency Range	F_L~f_H	MHz	10~300	10~500	10~300	5~600
Insertion Loss	I.L	dB	1.0(Max)	1.5(Max)	0.7	1.0
Isolation	ISO	dB	25(Min)	20(Min)	30	23
Phase Unbalance	ΔP	deg	2°	4°	**1.0°**	2.5°
Amplitude Unbalance	ΔM	dB	0.5(Max)	0.6(Max)	0.3	0.5
VSWR	VSWR	—	1.5:1(Max)	1.5:1(Max)	1.2:1	1.3:1

Absolute Maximum Rating

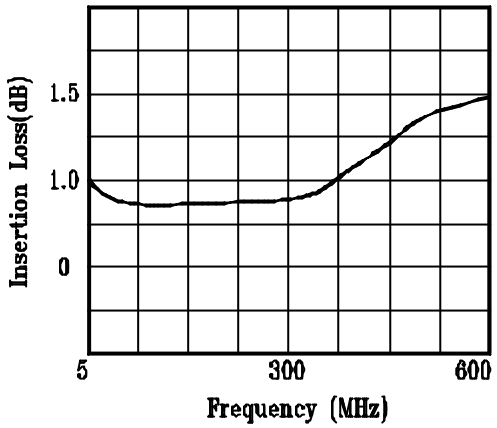
Maximum Input Power ----- 500mW
Storage Temperature -- +125℃



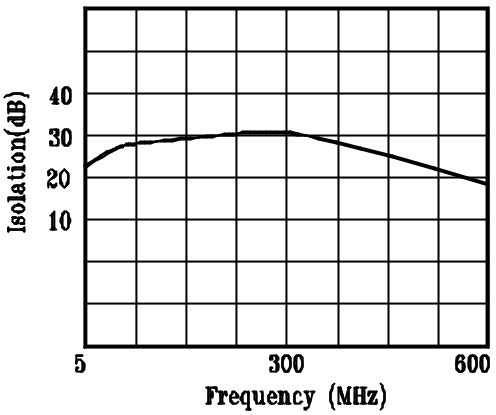
TO-8A

Typical Performance Curves

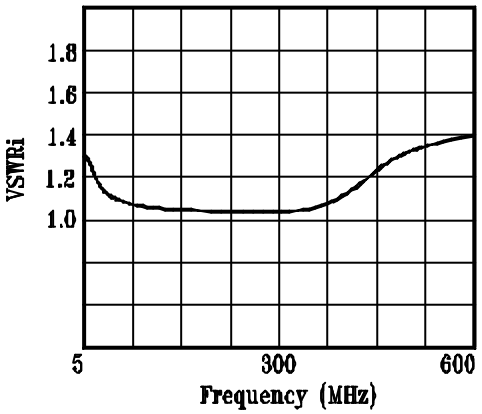
Insertion Loss vs. Frequency



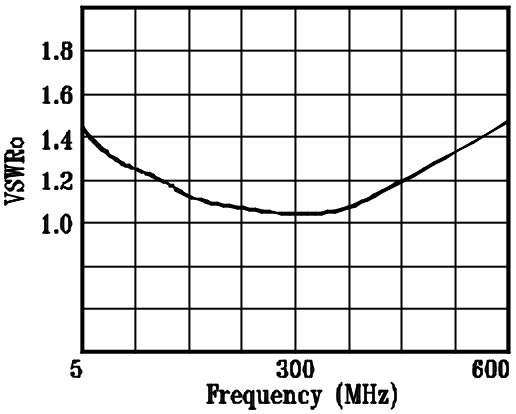
Isolation vs. Frequency



Input VSWR vs. Frequency

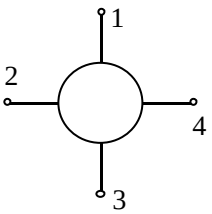


Output VSWR vs. Frequency



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Microstrip package products can be offered.



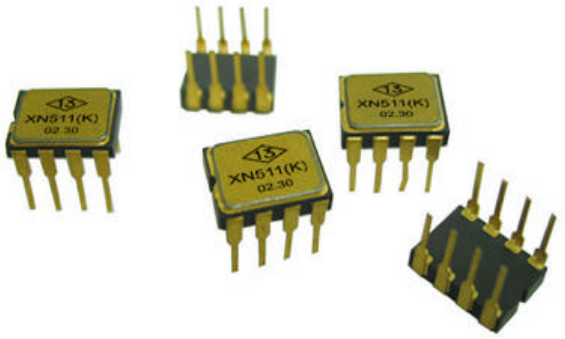
1.Input
2.Output(+180°)
3.GND
4.Output(0°)

XN511(K)

Integrated GaAs SPST Switch

Features

- Passive switch
- High Speed
- High Isolation: 60dB/100MHz
- Low Control current:10μA
- Standard Package: DS-8
- Operating Temperature: -40℃~+85℃



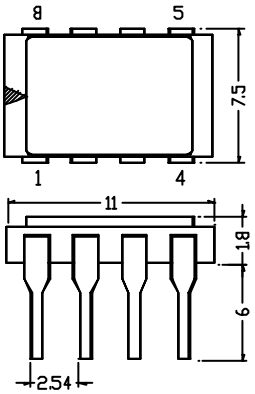
Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Unit	Guaranteed			Conditions
		Nin	Typ	Max	
Control Voltage	V	3.0	3.5	4.0	XN511(K)A
		4.5	5.0	5.5	XN511(K)B
On-Resistance	Ω	——	8	15	——
Switching Time	ns	——	15	30	——
Isolation	dB	60	64	——	f=100MHz, Pin 8 grounded through Rm=510Ω.
Insertion Loss	dB	——	1.3	1.5	
VSWR(On)	——	——	1.14	1.2	

Absolute Maximum Ratings

Control Voltage ---- +8VDC

Storage Temperature---- +100℃



1、3、5、7GND
2: RF Inpu
4: Controlport
6: RF Output
8: Tuning port

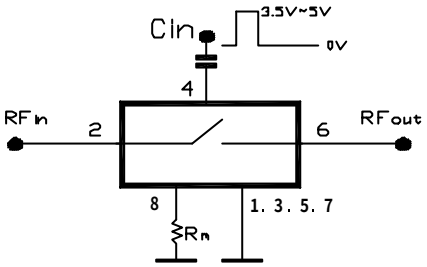
Unit: mm

Typical Application:

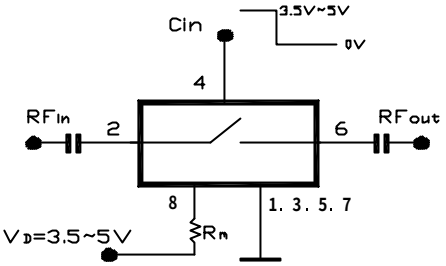
Pin 8 grounded through Rm=510Ω or NC. When Pin 8 grounded through Rm=510Ω, the isolation can be higher 5~6dB than NC.

1. Needn't additional components. Logic 1(0V): On; Logic 0(-3.5~-5V):Off.

2. TTL and CMOS input compatible when control port (Pin 4) connect a capacitance. The capacitance is between1000pf~10000pf depends upon TTL cycle. Logic 1(+3V~+5V V): On; Logic 0(0V):Off.

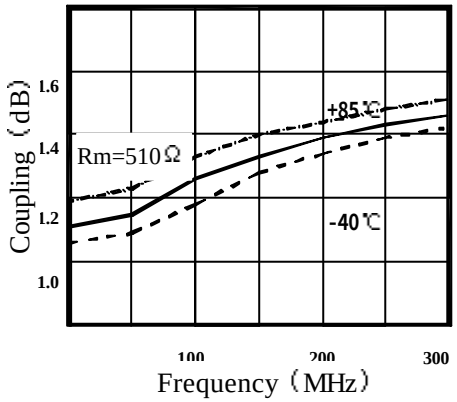


2. TTL and CMOS input compatible as below application. Logic 1(+3V~+5V V): On;
   Logic 0(0V):Off. DC voltage should be equal to control level(TTL or CMOS).

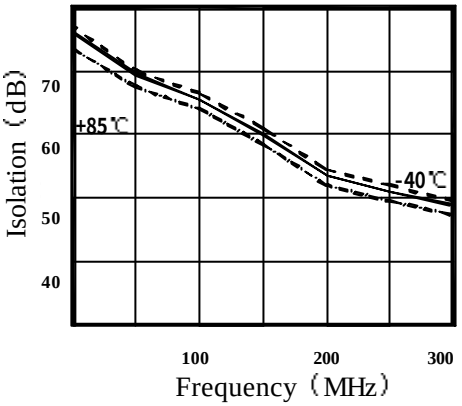


Typical Performance Curves

Insertion Loss vs. Frequency



Isolation vs. Frequency



Note:

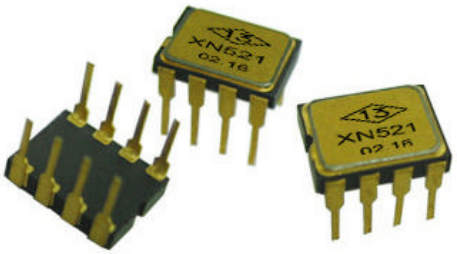
1. Anti-electrostatic measures should be adopted.
2. Required Package grounded tightly for good Isolation.

XN521

Integrated GaAs SPST Switch

Features

- Built-in TTL Driver
- High Speed: 5ns
- High Isolation: 67dB/100MHz(TYP)
- Low Control Current: 10μA
- Standard Package: DS-8



Specifications (Test at T_A=25℃, Measured in a 50Ω system)

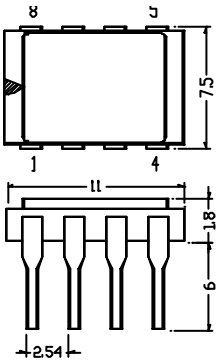
Parameter	Unit	Guaranteed			Conditions
		Nin	Typ	Max	
On-Resistance	Ω	——	7	15	——
Switching Time	ns	——	12	15	XN521A
		——	5	10	XN521B
		——	4	5	XN521C
Isolation	dB	60	67	——	f=100MHz;
Insertion Loss	dB	——	1.3	1.5	
VSWR(On)	——	——	1.2	1.4	

Absolute Maximum Ratings

DC Voltage(+) ---- +5.5VDC

DC Voltage(+) ---- -13VDC

Storage Temperature---- +125℃



1: +5v

2,4: GND

3: RF input

5,7: Control port

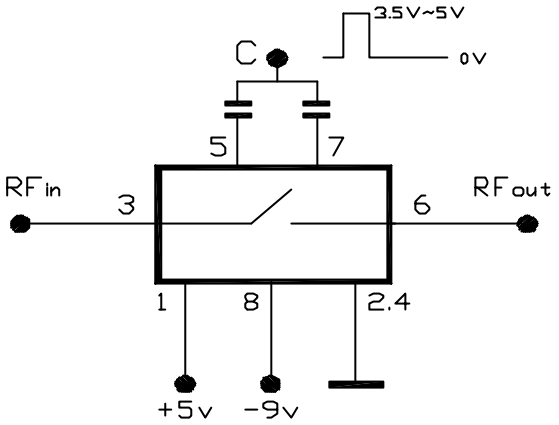
6: RF output

9: -9v

Unit：mm

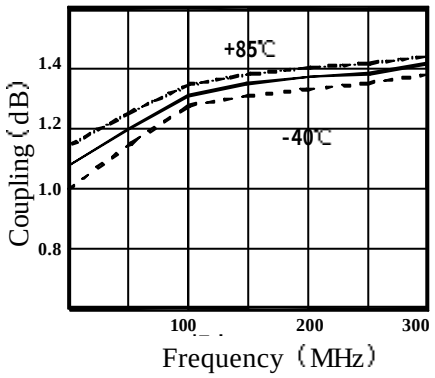
Typical Application:

The capacitance is between1000pf~10000pf depends upon TTL cycle. Logic 1: Off; Logic 0: On.

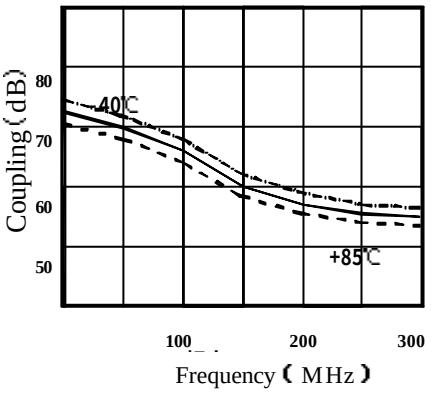


Typical Performance Curves

Insertion Loss vs. Frequency



Isolation vs. Frequency



Note:

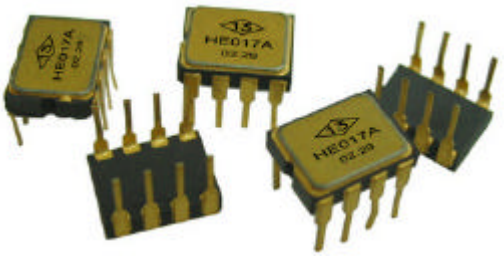
1. Anti-electrostatic measures should be adopted.
2. Required Package grounded tightly for good Isolation.

HE017A

Integrated GaAs SPDT Switch

Features

- Built-in TTL Driver, TTL and CMOS input compatible
- High Speed
- Low Insertion Loss: 1dB/100MHz(TYP)
- High Isolation: 60dB/100MHz(TYP)
- Standard Package: DS-8



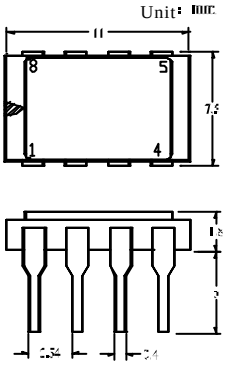
Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Unit	Guaranteed			Conditions
		Nin	Typ	Max	
Switching time	ns	——	20	40	——
Rise,Fall Time	ns	——	10	15	——
Isolation	dB	55	60	——	f =100MHz
Insertion Loss	dB	——	1.0	1.5	f =100MHz
Overshoot	mV	——	30	50	
1dB Comp. Point	dBm	——	16	——	
DC Supply (-)	——	-5V(4mATyp)			——

Absolute Maximum Ratings

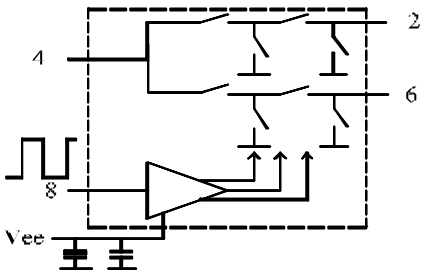
DC Supply(-) ----- -7VDC

Storage Temperature---- +125℃



1：NC
2：Output K1
3：GND
4：Input
5：GND
6：Output K2
7：DC(-)
8：TTL

Schematic

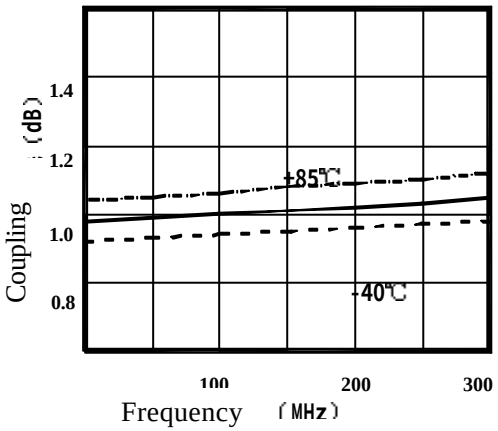


Truth Table

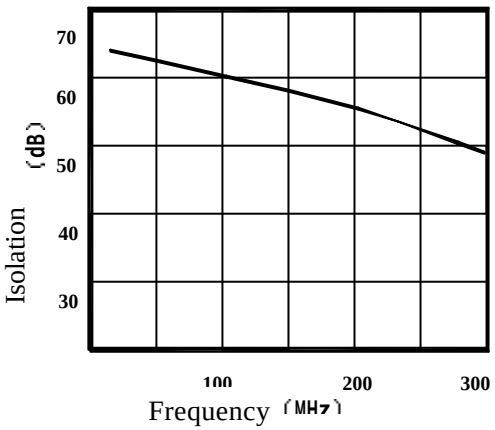
TTL	K1 4—2	K2 4—6
1	On	Off
0	Off	On

Typical Performance Curves

Insertion Loss vs. Frequency



Isolation vs. Frequency



Note:

1. Anti-electrostatic measures should be adopted.
2. Reflective switches can be offered.
3. Required Package grounded tightly for good Isolation.

HE017

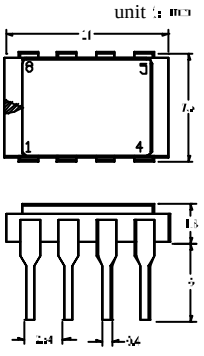
Integrated GaAs SPDT Switch

Features

- Built-in TTL Driver, TTL and CMOS input compatible
- High Speed
- Low Insertion Loss: 1dB/100MHz(TYP)
- High Isolation: 60dB/100MHz(TYP)
- Standard Package: DS-8

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Unit	Guaranteed			Conditions
		Nin	Typ	Max	
Switching time	ns	——	15	20	——
Rise,Fall Time	ns	——	5	10	——
Isolation	dB	55	60	——	f =100MHz
Insertion Loss	dB	——	1.0	1.5	f =100MHz
Overshoot	mV	——	30	50	——
1dB Comp. Point	dBm	——	16	——	
DC Supply(-)	——	-12V/15mA (Typ)			——
DC Supply(+)	——	5V/5mA (Typ)			——

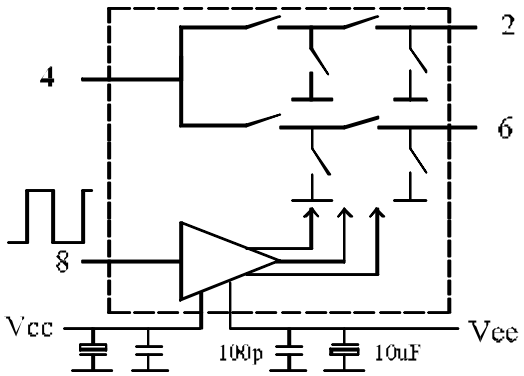


1: DC(-)
2: Output K1
3: GND
4: Input
5: GND
6: Output K2
7: DC(+)
8: TTL

Absolute Maximum Ratings

DC Supply(-) ----- -15VDC
DC Supply(+) ----- +7VDC
Storage Temperature---- +125℃

Schematic

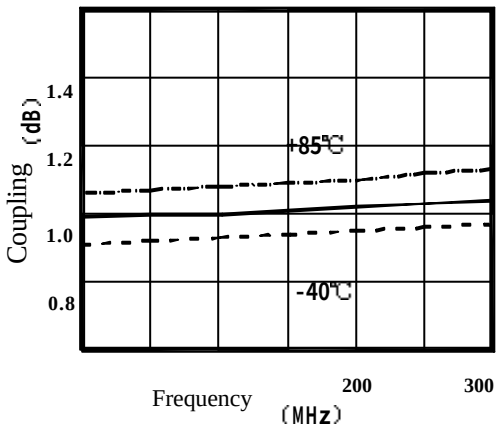


Truth Table

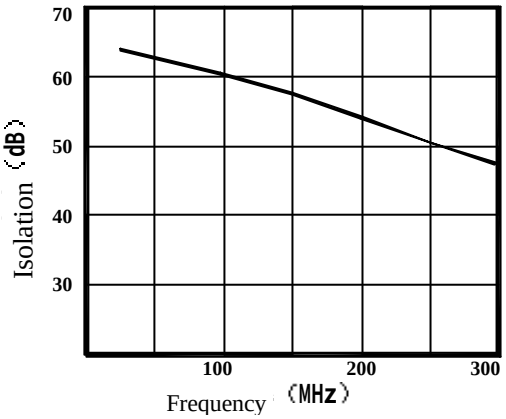
TTL	K1 4—2	K2 4—6
1	Off	On
0	On	Off

Typical Performance Curves

Insertion Loss vs. Frequency



Isolation vs. Frequency



Note:

1. Anti-electrostatic measures should be adopted.
2. Non-Reflective switches can be offered.
3. Required Package grounded tightly for good Isolation.

HE065

Integrated GaAs SPST Switch

Features

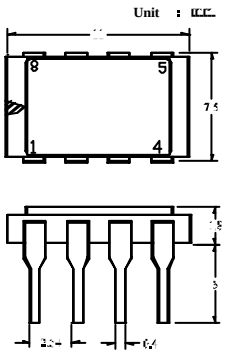
- Built-in TTL Driver, TTL and CMOS input compatible
- High Speed
- Low Insertion Loss: 1dB/100MHz(TYP)
- High Isolation: 60dB/100MHz(TYP)
- Standard Package: DS-8

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Unit	Guaranteed			Conditions
		Nin	Typ	Max	
Switching time	ns	——	15	20	——
Rise,Fall Time	ns	——	5	10	——
Isolation	dB	60	65	——	100MHz
Insertion Loss	dB	——	1.0	1.5	100MHz
Overshoot	mV	——	15	30	——
1dB Comp. Point	dBm	——	16	——	(consult)
DC Supply (-)	——	−12V(15mA TYP)			——
DC Supply (+)	——	5V(5mA TYP)			——

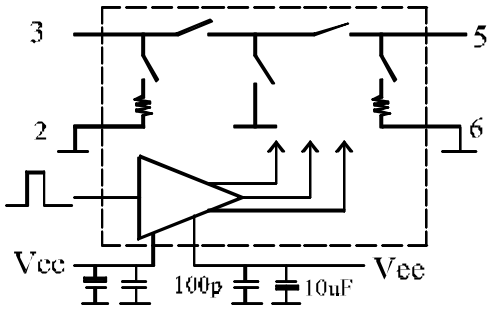
Absolute Maximum Ratings

DC Supply(-) ----- -15VDC
DC Supply(+) ----- +7VDC
Storage Temperature---- +125℃



1 : DC(-)
2 : GND
3 : Input
4 : GND
5 : Output
6 : GND
7 : DC(+)
8 : TTL

Schematic

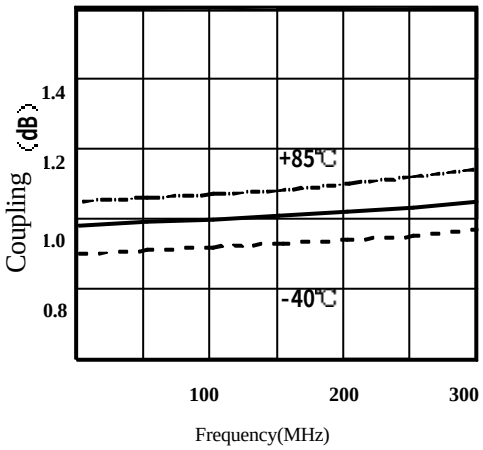


Truth Table

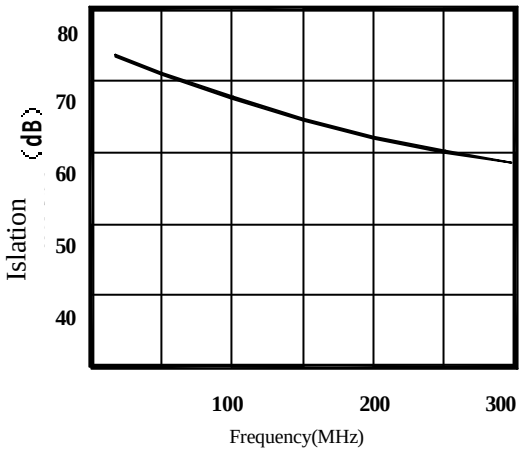
TTL	3— 5
1	Off
0	ON

Typical Performance Curves

Insertion Loss vs. Frequency



Isolation vs. Frequency



Note:

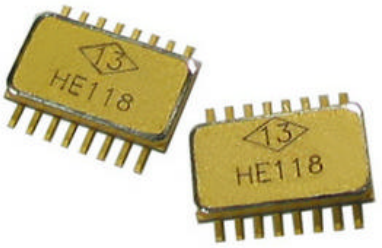
1. Anti-electrostatic measures should be adopted.
2. Required Package grounded tightly for good Isolation.

HE118

Integrated GaAs SPST Switch

Features

- Built-in TTL Driver, TTL and CMOS input compatible
- High Speed
- Low Control Current: 1mA
- Standard Package: CR-9
- Interchanged Directly with SW05-0311,SW-311(M/A-COM)



Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Unit	Guaranteed			Conditions
		Nin	Typ	Max	
Switching time	ns	——	7	10	——
Rise,Fall Time	ns	——	5	8	——
Isolation	dB	45	50	——	DC~0.5GHz
		35	40	——	DC ~1GHz
		25	30	——	DC ~3GHz
Insertion Loss	dB	——	0.7	1.0	DC~0.5GHz
		——	0.9	1.2	DC ~1GHz
		——	1.2	1.5	DC ~3GHz
VSWR		——	1.2∶1	——	DC~0.5GHz
		——	1.3∶1	——	DC ~1GHz
		——	1.4∶1	——	DC ~3GHz
1dB Comp. Point	dBm	+16			DC~0.5GHz
		+24			0.5GHz~3GHz
DC Supply(-)	V	-5			——

Absolute Maximum Ratings

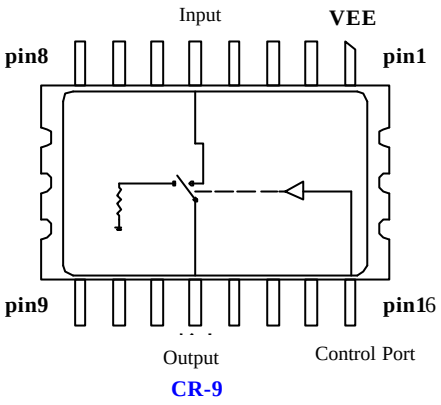
DC Supply(-) ----- -7VDC

Storage Temperature---- +125℃

Operating Temperature---- －55~＋125℃

Maximum Input Power: ----- ＋18dBm/50MHz; ＋26dBm/500~2000MHz

Schematic and PIN Function



CR-9

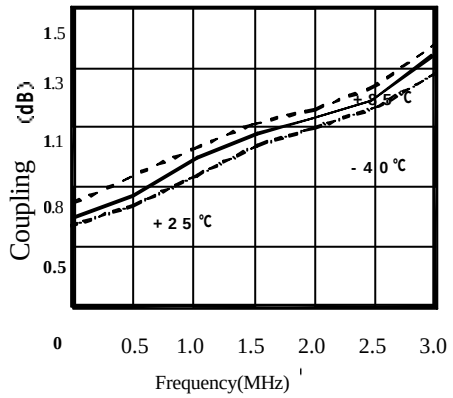
1	−5V	9	GND
2	GND	10	GND
3	GND	11	GND
4	GND	12	Output
5	Input	13	GND
6	GND	14	GND
7	GND	15	GND
8	GND	16	TTL

Truth Table

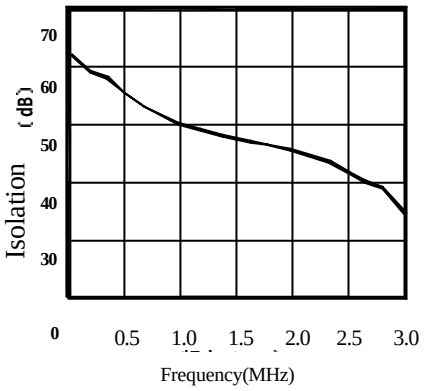
TTL	Function
1	Off
0	On

Typical Performance Curves

Insertion Loss vs. Frequency



Isolation vs. Frequency



Note:

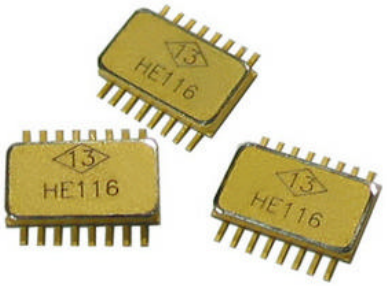
1. Anti-electrostatic measures should be adopted.
2. Required Package grounded tightly for good Isolation.

HE116

Integrated GaAs SPDT Switch

Features

- Built-in TTL Driver, TTL and CMOS input compatible
- High Speed
- Low Control Current: 1mA
- Standard Package: CR-9
- Interchanged Directly with SW-313(M/ACOM)



Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter	Unit	Guaranteed			Conditions
		Nin	Typ	Max	
Switching time	ns	——	7	10	——
Rise,Fall Time	ns	——	5	8	——
Isolation	dB	50	55	——	DC~0.5GHz
		45	50	——	DC ~1GHz
		30	35	——	DC ~3GHz
Insertion Loss	dB	——	0.8	1.2	DC~0.5GHz
		——	1.0	1.5	DC ~1GHz
		——	1.5	2.0	DC ~3GHz
VSWR	——	——	1.2∶1	——	DC~0.5GHz
		——	1.3∶1	——	DC ~1GHz
		——	1.4∶1	——	DC ~3GHz
1dB Comp. Point	dBm	+16			DC~0.5GHz
		+24			0.5GHz~3GHz
DC Supply(-)	V	-5			——

Absolute Maximum Ratings

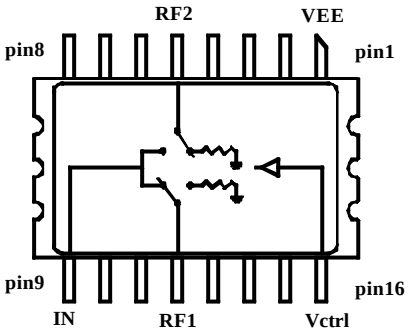
DC Supply(-) ----- -7VDC

Storage Temperature---- +125℃

Operating Temperature---- －55~＋125℃

Maximum Input Power: ----- ＋27dBm/50MHz; ＋33dBm/500~2000MHz

Schematic and PIN Function



CR-9

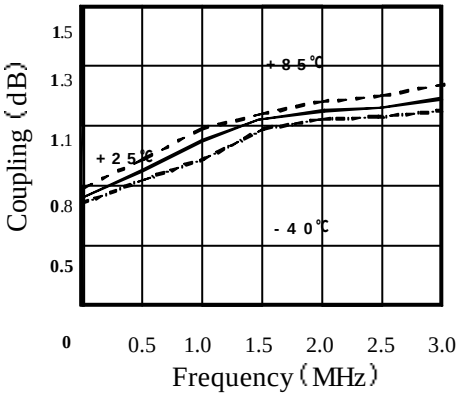
1	−5V	9	Input
2	GND	10	GND
3	GND	11	GND
4	GND	12	RF 1
5	RF 2	13	GND
6	GND	14	GND
7	GND	15	GND
8	GND	16	TTL

Truth Table

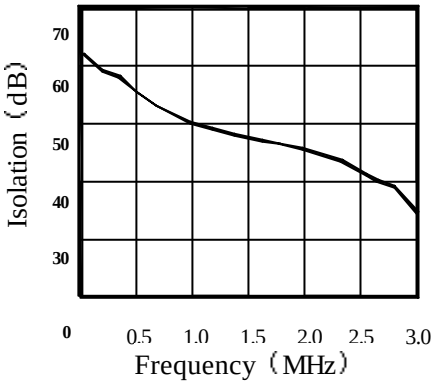
TTL	RF1	RF2
1	Off	On
0	On	Off

Typical Performance Curves

Insertion Loss vs. Frequency



Isolation vs. Frequency



Note:

1. Anti-electrostatic measures should be adopted.
2. Required Package grounded tightly for good Isolation.

SWST-1

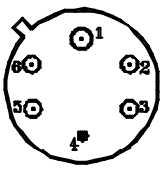
Integrated PIN SPST Switch

Features

- Broadband
- High Isolation
- Built-in TTL Driver
- Reflective Design
- +5V@28mA/-5v@25mA
- Wide Operating Temperature: -55℃~+85℃

Specifications

Parameter	Symbol	Tested at T_A = +25℃, Measured in a 50Ω system	Guaranteed			Unit
			Min	Typ	Max	——
Insertion Loss	I_L	f=20~200MHz f=20~1000MHz f=20~2000MHz	——	0.5 0.8 1.4	0.8 1.2 1.8	dB
Input VSWR	VSWR1	f=20~2000MHz	——	1.3	1.7	——
Output VSWR	VSWR2		——	1.3	1.7	——
Isolation	I_{S0}	f=20~200MHz f=20~1000MHz f=20~2000MHz	60 55 50	66 60 54	——	dB
Switching Time	——	——	0.3(Typ)			us



TO-8E

Absolute Maximum Ratings

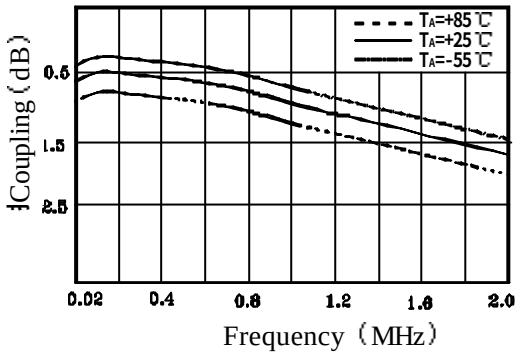
1dB compression input power ----- +20dBm
Storage Temperature ------ -55℃~+125℃

PIN Function and Logic Table

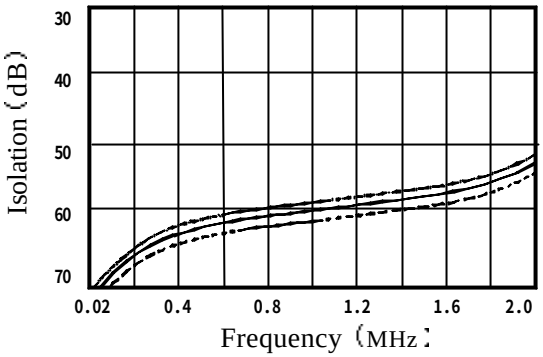
1 +5V	2 TTL Control port	3 RF Input
4 GND	5 RF Output	6 -5V
2 Truth Table TTL		
	TTL "1"	On
	TTL "0"	Off

Typical Performance Curves

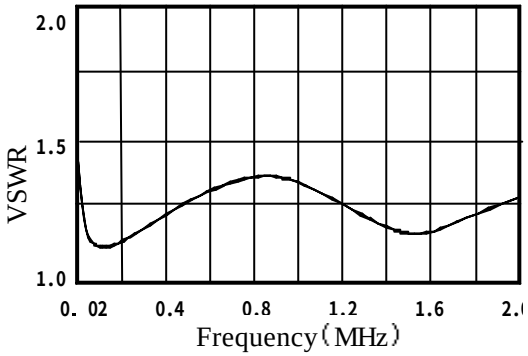
Insertion loss vs. frequency



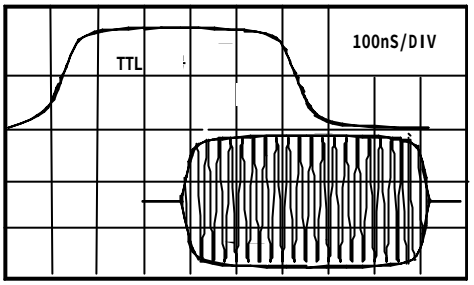
Isolation vs. frequency



VSWR vs. frequency

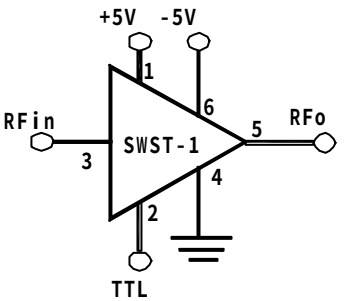


Switching time



Note:

1. Decoupling capacitances at DC supplies should be higher than 0.1μF and 10000PF.
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Isolation measures should be used between RF input and output for achieving high isolation.
5. TTL Logic high level should be higher than 3.5v and 3mA current can be provided.



SWDT-1A

Integrated PIN SPDT Switch

Features

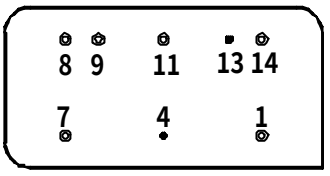
- Broadband
- High Isolation
- Built-in TTL Driver
- Reflective Design
- +5V@28mA/-5v@25mA
- Switching Time: 0.1us(f≥1G)
- Wide Operating Temperature: -55℃~+85℃

Specifications

Parameter	Symbol	Tested at T_A = +25 ℃, Measured in a 50Ω system	Guaranteed			Unit
			Min	Typ	Max	——
Insertion Loss	I_L	f=20~200MHz f=20~1000MHz f=20~2000MHz	——	0.5 0.8 1.5	0.7 1.2 2.0	dB
Input VSWR	VSWR1	f=20~2000MHz	——	1.5	2.0	——
Output VSWR	VSWR2		——	1.6	2.0	——
Isolation	Iso	f=20~200MHz f=20~1000MHz f=20~2000MHz	60 50 40	65 55 45	——	dB
Switching Time	——	——	0.3(Typ)			us

Absolute Maximum Ratings

1dB compression input power ----- +18dBm
Storage Temperature -55℃----- +125℃



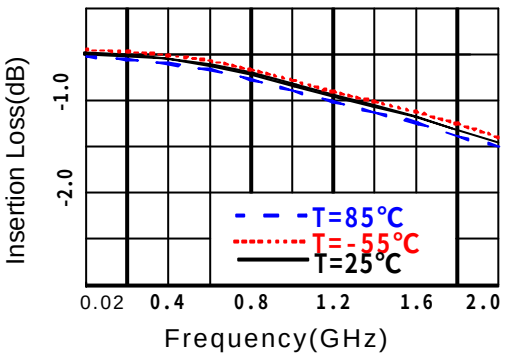
DIP-14C

PIN Function and Logic Table

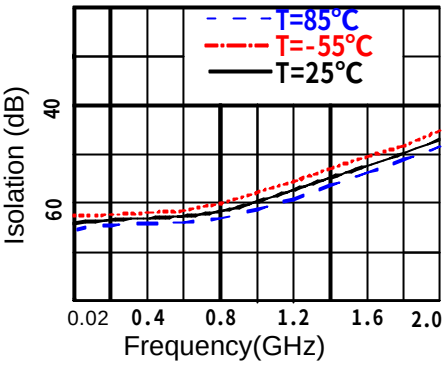
1 RF1 Output	7 RF2 Output	8 +5V	4,13 GND
9 -5V	11 RF Input	14 Control port TTL	
14 Truth Table TTL			
	TTL "1"	RF1 On	RF2 Off
	TTL "0"	RF1 Off	RF2 On

Typical Performance Curves

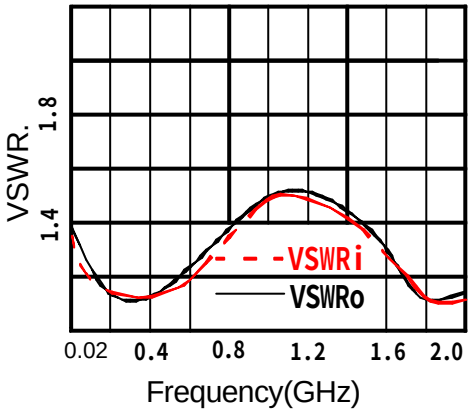
Insertion loss vs. frequency



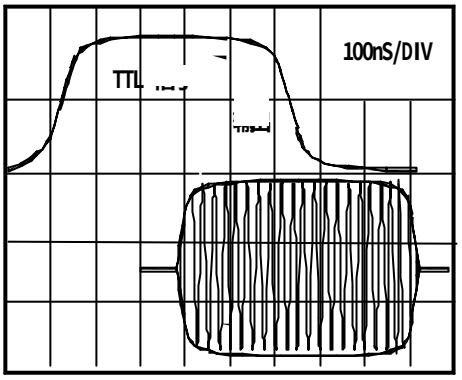
Isolation vs. frequency



VSWR vs. frequency

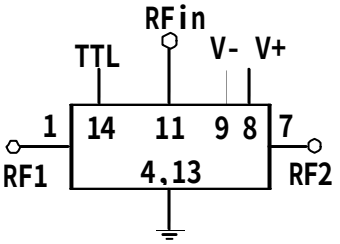


Switching time



Note:

1. Decoupling capacitances at DC supplies should be higher than 0.1μF and 10000PF.
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Isolation measures should be used between RF input and output for achieving high isolation.
5. TTL Logic high level should be higher than 3.5v and 3mA current can be provided.



SWDT-1B

Integrated PIN SPDT Switch

Features

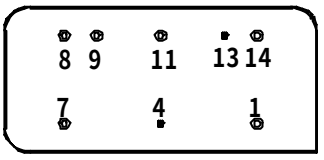
- Broadband
- High Isolation
- Built-in TTL Driver
- Reflective Design
- +5V@28mA/-5v@25mA
- Switching Time：0.1us(f≥1G)
- Wide Operating Temperature：-55℃~+85℃

Specifications

Parameter	Symbol	Tested at T_A = +25 ℃, Measured in a 50Ω system	Guaranteed			Unit
			Min	Typ	Max	——
Insertion Loss	I_L	f=20~200MHz f=20~1000MHz f=20~2000MHz	——	0.5 0.9 1.6	0.7 1.3 2.2	dB
Input / Output VSWR	VSWR	f=20~2000MHz	——	1.4	1.7	——
Isolation	Iso	f=20~200MHz f=20~1000MHz f=20~2000MHz	70 65 60	75 70 65	——	dB
Switching Time	——	——	0.3(Typ)			us

Absolute Maximum Ratings

1dB compression input power ----- +18dBm
Storage Temperature -55℃----- +125℃



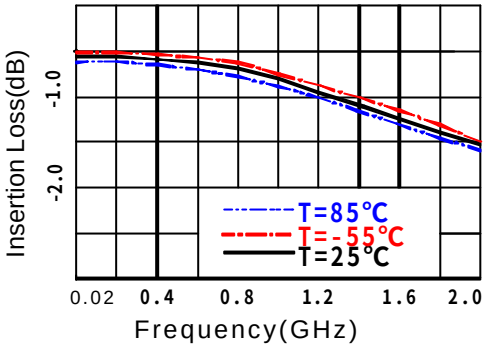
DIP-14C

PIN Function and Logic Table

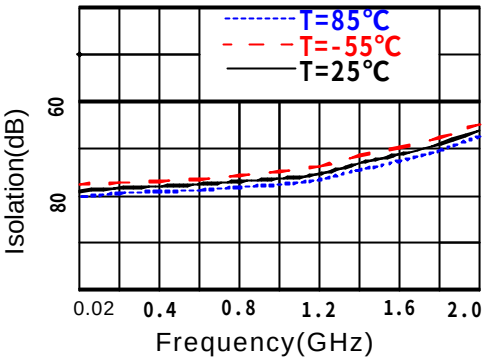
1 RF1 Output	7 RF2 Output	8 +5V	4,13 GND
9 -5V	11 RF Input	14 Control port TTL	
14 Truth Table TTL			
	TTL “1”	RF1 On	RF2 Off
	TTL “0”	RF1 Off	RF2 On

Typical Performance Curves

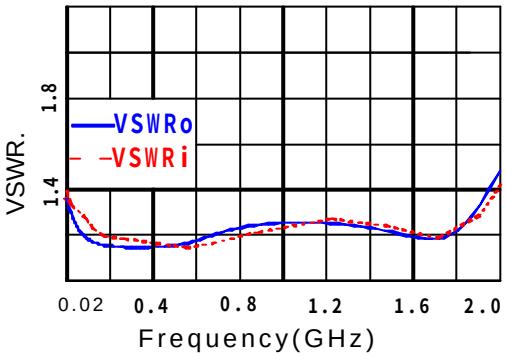
Insertion loss vs. frequency



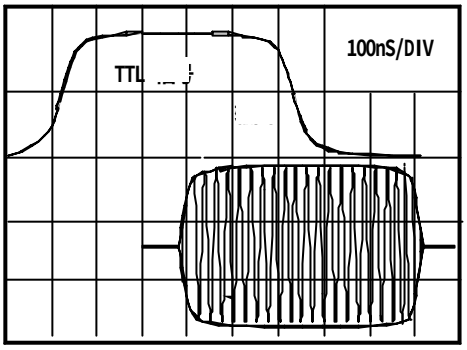
Isolation vs. frequency



VSWR vs. frequency

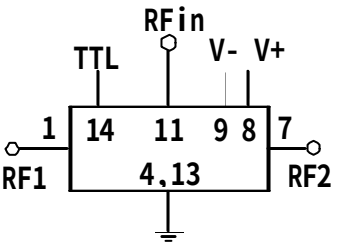


Switching time



Note:

1. Decoupling capacitances at DC supplies should be higher than 0.1μF and 10000PF.
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Isolation measures should be used between RF input and output for achieving high isolation.
5. TTL Logic high level should be higher than 3.5v and 3mA current can be provided.



SW4T-1

Integrated PIN SP4T Switch

Features

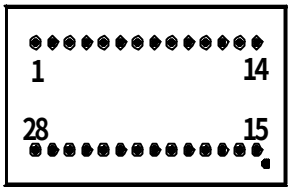
- Broadband
- High Isolation
- Built-in TTL Driver
- Reflective Design
- +5V@28mA/-5v@25mA
- +5V@90mA/-5v@50mA
- Wide Operating Temperature: -55℃~+85℃

Specifications ℃

Parameter	Symbol	Tested at T_A = +25 ℃,RF Input Power 0dBm Measured in a 50Ω system	Guaranteed			Unit
			Min	Typ	Max	——
Insertion Loss	I_L	f=20~200MHz f=20~1500MHz	——	0.9 1.5	1.3 2.0	dB
Input VSWR	VSWR1	f=20~2000MHz	——	1.2	1.5	——
Output VSWR	VSWR2		——	1.3	1.5	——
Isolation	I_{SO}	f=20~200MHz f=20~1500MHz	60 50	64 53	——	dB
Switching Time	——	——	0.3(Typ)			us

Absolute Maximum Ratings

1dB compression input power ----- +20dBm
Storage Temperature -55℃----- +125℃



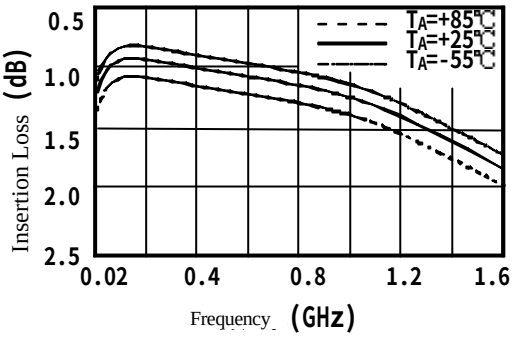
HD-28B

PIN Function and Logic Table

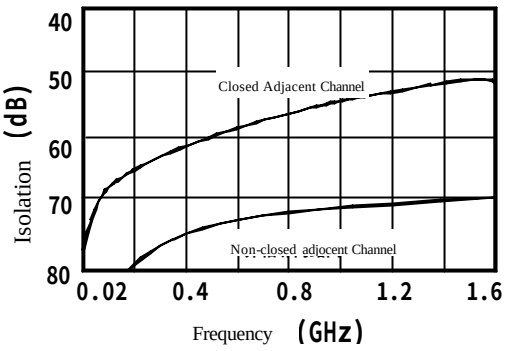
2 RF1 Output	5 RF2 Output		10 RF3 Output			13 RF4 Output
16 -5V	17 +5V		21 RFin			24 TTL T4
25 TTL T3	26 TTL T2		27 TTL T1			7,8,18,19: GND
Others: NC						
Truth Table TTL						
	T1	1	0	0	0	RF1 On;Others:Off
	T2	0	1	0	0	RF2 On;Others:Off
	T3	0	0	1	0	RF3 On;Others:Off
	T4	0	0	0	1	RF4 On;Others:Off

Typical Performance Curves

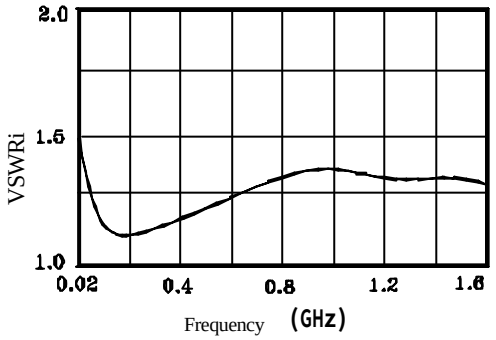
Insertion loss vs. frequency



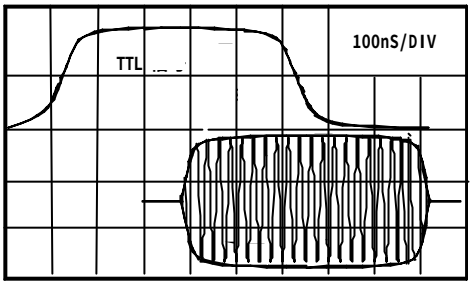
Isolation vs. frequency



Input VSWR vs. frequency

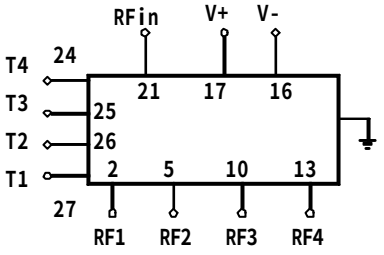


Switching time

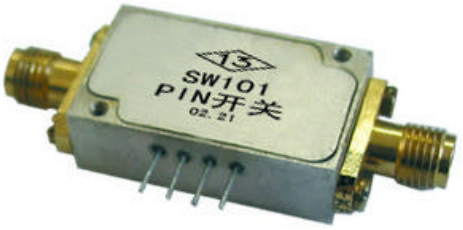


Note:

1. Decoupling capacitances at DC supplies should be higher than 0.1μF and 10000PF.
2. Required the Plug-in package bottom grounded tightly with PCB (Mounting kit can be provided).
3. Anti-electrostatic measures should be adopted.
4. Isolation measures should be used between RF input and output for achieving high isolation.
5. TTL Logic high level should be higher than 3.5v and 3mA current can be provided.



Features



- Broadband
- Low Insertion Loss,High Isolation
- Built-in TTL Driver
- Reflective Design
- Removable SMA
- +5V@50mA/-5v@2mA
- Wide Operating Temperature：-55℃~+85℃

Specifications(Tested at T_A = +25℃,Measured in a 50Ω system)

Model	Frequency Range（GHz）								
	0.5~2			2~4			4~8		
	IL(dB) (Max)	Iso(dB) (Min)	VSWR(on) (Max)	IL(dB) (Max)	Iso(dB) (Min)	VSWR(on) (Max)	IL(dB) (Max)	Iso(dB) (Min)	VSWR(on) (Max)
SW101	1.0	60	1.5						
SW102				1.4	60	1.5			
SW103							1.8	60	1.7

Customer's switches can be offered

☆ No driver ☆ Higher isolation
☆ Logic 1: Off Logic 0:On ☆Multi-Pole Multi-Throw

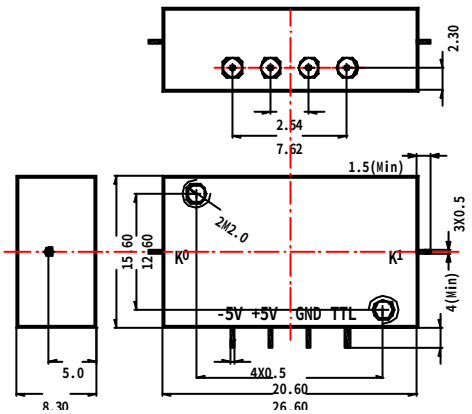
Truth Table

Switching Time ： 50 ns

TTL ： Logic 1（2.5~5V ， 1mA Max） On
Logic 0 （0~0.6V， 3mA Max） Off

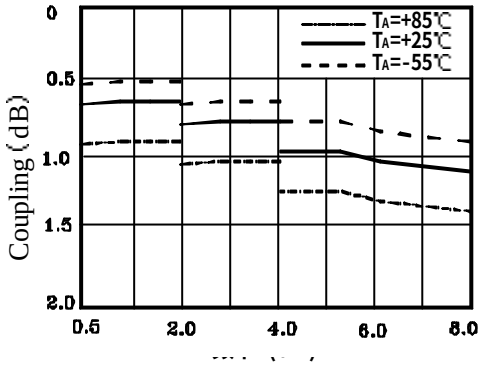
Absolute Maximum Ratings

Maximum input power ----- 1W(CW)
Storage Temperature ------ -55℃~+125℃

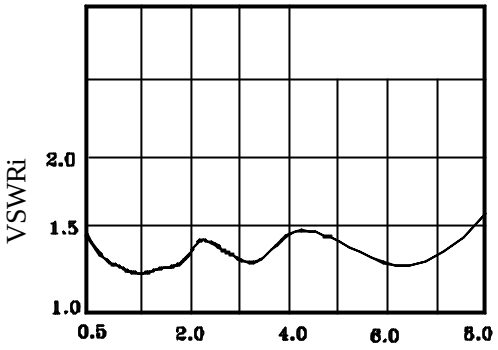


Typical Performance Curves

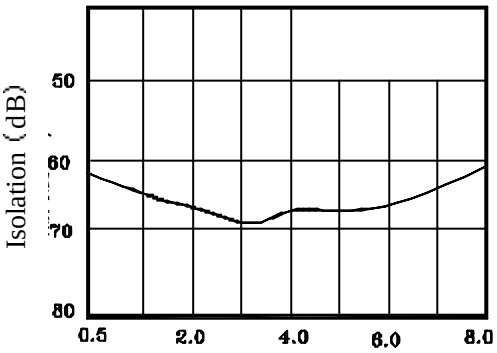
Insertion loss vs. frequency



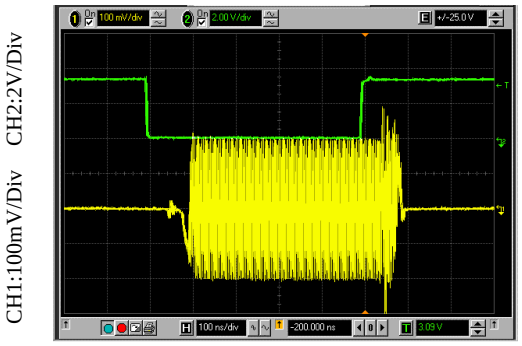
VSWR vs. frequency



Isolation vs. frequency



Switching time



Note:

1. Decoupling capacitances at DC supplies should be higher than 0.1μF and 10000PF.
2. Required the module bottom grounded tightly.
3. TTL Logic high level should be higher than 3.5v and 3mA current can be provided.

Series SW20X

Integrated PIN SPDT Switch

Features

- Broadband
- Low Insertion Loss,High Isolation
- Built-in TTL Driver
- Reflective Design
- Removable SMA
- +5V@50mA/-5v@50mA
- Wide Operating Temperature: -55℃~+85℃

Specifications(Tested at T_A = +25℃,Measured in a 50Ω system)

Model	Frequency Range（GHz）					
	0.5~2			2~4		
	IL(dB) (Max)	Iso(dB) (Min)	VSWR(on) (Max)	IL(dB) (Max)	Iso(dB) (Min)	VSWR(on) (Max)
SW201	1.0	60	1.5	———	———	———
SW202	———	———	———	1.5	60	1.7

Customer's switches can be offered

☆ No driver ☆ Higher isolation

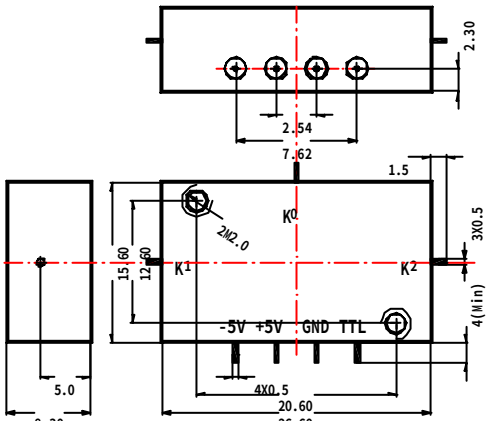
☆ Customer's Logic ☆Multi-Pole Multi-Throw

Truth Table

Switching Time ： 50 ns

TTL ：Logic 1（2.5~5V ，1mA Max）K1 On, K2 Off

Logic 0 （0~0.6V，3mA Max）K1Off, K2 On



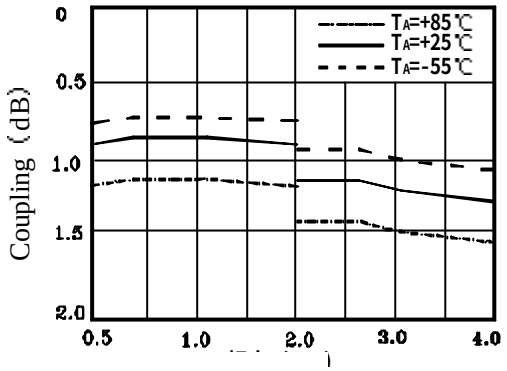
Absolute Maximum Ratings

Maximum input power ----- 1W(CW)

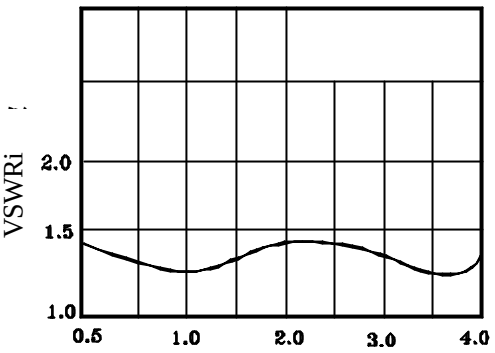
Storage Temperature ------ -55℃~+125℃

Typical Performance Curves

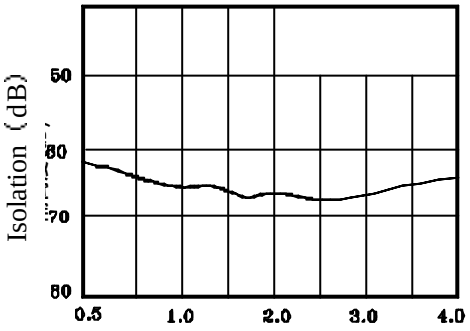
Insertion loss vs. frequency



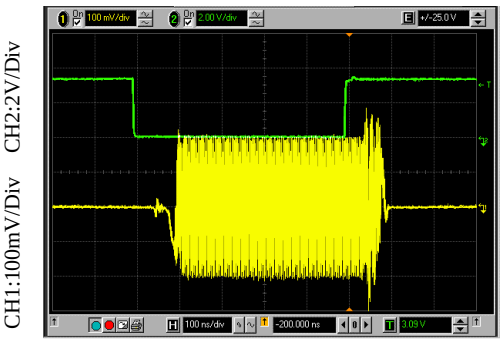
VSWR vs. frequency



Isolation vs. frequency



Switching time



100ns/Div

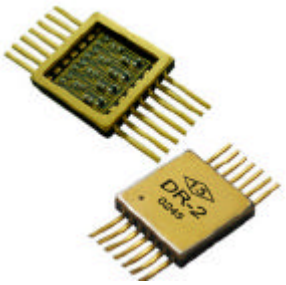
Note:

1. Decoupling capacitances at DC supplies should be higher than 0.1μF and 10000PF.
2. Required the module bottom grounded tightly.
3. TTL Logic high level should be higher than 3.5v and 3mA current can be provided.

HE042

Integrated PIN Switches Driver

Features



Four Separated Drivers
DC Supply :+5/-5V~-30V

- TTL Control, Inverting Output
- Standard Package: DH-14
- Wide Operating Temperature: -55℃~+85℃

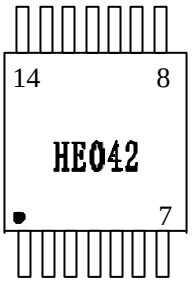
Specifications (Tested at T_A = +25℃,V+=5V V-=-30V f=400KHz)

Parameter	Symbol	Tested Conditions	Guaranteed		Typical	Unit
		TA=25 ℃	Min	Max		
Input Low level	V_{IL}	——	——	0.8	0.2	V
Input High level	V_{IH}	——	3.5	——	4.0	V
Input Current (Low level)	I_{IL}	V_{IN}=0V	——	——	3.5	mA
Input Current (High level)	I_{IH}	$V_{IN}\geqslant$3.5V	——	——	10	uA
Output High level	V_{OH}	V_{IN}=0V	3.5V	——	——	V
Output Low level	V_{OL}	$V_{IN}\geqslant$3.5V	——	-29	——	V
Output Current	I_O	V_{IN}=0V	——	80	——	mA
Switching On Time	t_{on} [1)]	C_L =330PF	——	100	30	ns
Switching Off Time	t_{off} [1)]	L_L=300nH	——	100	50	nS
Static Current	Icc	$V_{IN}\geqslant$3.5V or NC NC	——	100	——	uA
	I_{EE}		——	100	——	uA

Note[1)]: The diode 1N4148 was loaded at output port.

Absolute Maximum Ratings

DC Supply(-) ----- --32VDC
DC Supply(+) ----- +6VDC
Input Voltage ---- +6V
Operating Current---- 100mA
Storage Temperature---- +125℃

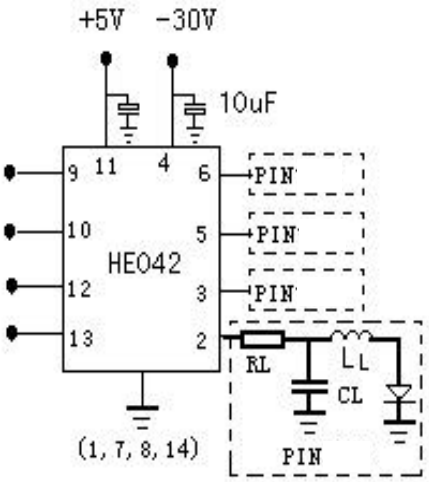


DH-14

Pin Function:

1. GND	8. GND
2. OUT1	9. IN4
3. OUT2	10. IN3
4. V-	11. V+
5. OUT3	12. IN2
6. OUT4	13. IN1
7. GND	14. GND

TTL Control



Note:

1. Anti-electrostatic measures should be adopted.
2. For high speed switching time, required TTL control level: tr≤20ns tf≤20ns Vtop≥4.0V.
3. HC or HCT244 digital circuit is recommended at fore end of DR-5.

HE051

Integrated PIN Switches Driver

Features

Five Separated Drivers
DC Supply :+5/-5V~-10V
High Switching Time: **10nS(Typ)**

- TTL Control, Noninverting Output
- Package: DIP-14A
- Wide Operating Temperature: -55℃~+85℃

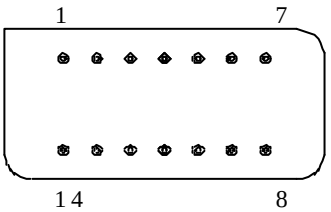
Specifications (Tested at T_A = +25℃,V+=5V V-=-10V f=400KHz)

Parameter	Symbol	Tested Conditions	Guaranteed		Typical	Unit
		TA=25 ℃	Min	Max		
Input Low level	V_{IL}	——	——	0.8	0.2	V
Input High level	V_{IH}	——	3.5	——	4.0	V
Input Current (Low level)	I_{IL}	V_{IN}=0V	——	50	——	uA
Input Current (High level)	I_{IH}	$V_{IN}\geqslant$3.5V	——	50	——	uA
Output High level	V_{OH}	$V_{IN}\geqslant$3.5V	4.0V	——	——	V
Output Low level	V_{OL}	V_{IN}=0V	——	-9.5	——	V
Output Current	I_O	$V_{IN}\geqslant$3.5V	——	50	——	mA
Rise Time	T_r [1)]	R_L=75Ω	——	20	10	nS
Fall Time	T_f [1)]		——	20	10	nS
Delay Time	Tpd		——	50	10	nS
Static Current	Icc	V_{IN}=0V NC	——	5	——	mA
	I_{EE}		——	100	——	uA

Note[1)]: The diode 1N4148 was loaded at output port.

Absolute Maximum Ratings

DC Supply(-) ----- --12VDC
DC Supply(+) ----- +6VDC
Input Voltage ---- +6V
Operating Current---- **80**mA
Storage Temperature---- **+**125℃

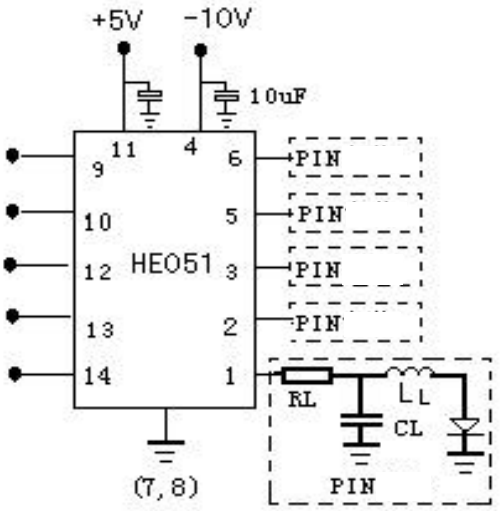


DIP-14A

Pin Function

1. OUT1
2. OUT2
3. OUT3
4. V-
5. OUT4
6. OUT5
7. GND
8. GND
9. IN5
10. IN4
11. V+
12. IN3
13. IN2
14. IN1

TTL Control



Note:

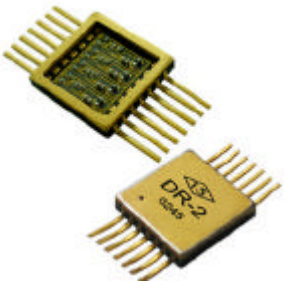
1. Anti-electrostatic measures should be adopted.
2. For high speed switching time, required TTL control level: tr≤20ns tf≤20ns Vtop≥ 4.0V.
3. HC or HCT244 digital circuit is recommended at fore end of DR-5.

DR-2

Integrated PIN Switches Driver

Features

- Four Separated Drivers
- TTL control, Inverting Output
- Standard Package: DH-14
- Wide Operating Temperature: -55℃~+85℃

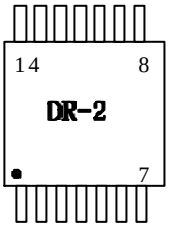


Specifications (Tested at T_A = +25℃,V+=5V V-=-5V f=400KHz)

Parameter	Symbol	Tested Conditions	Guaranteed		Typical	Unit
		TA=25 ℃	Min	Max		
Input Low level	V_{IL}	——	——	0.8	0.2	V
Input High level	V_{IH}	——	3.5	——	4.0	V
Input Current (Low level)	I_{IL}	V_{IN}=0V	——	——	3.5	mA
Input Current (High level)	I_{IH}	$V_{IN}\geqslant$3.5V	——	——	10	uA
Output High level	V_{OH}	V_{IN}=0V	3.5V	——	——	V
Output Low level	V_{OL}	$V_{IN}\geqslant$3.5V	——	-3.5	——	V
Output Current	I_O	——	——	±50	——	mA
Switching On Time	t_{on} [1)]	C_L =330pF	——	80	30	ns
Switching Off Time	t_{off} [1)]	L_L=300nH	——	100	50	nS
Static Current	Icc	$V_{IN}\geqslant$3.5V Or NC No Load	——	——	5	uA
	I_{EE}		——	——	5	uA
	Icc	V_{IN}=0V No Load	——	——	12	mA
	I_{EE}		——	——	9	mA

Absolute Maximum Ratings

DC Supply(-) ----- -6VDC
DC Supply(+) ----- +6VDC
Input Voltage ---- +7V
Operating Current---- ±80mA
Storage Temperature---- +125℃

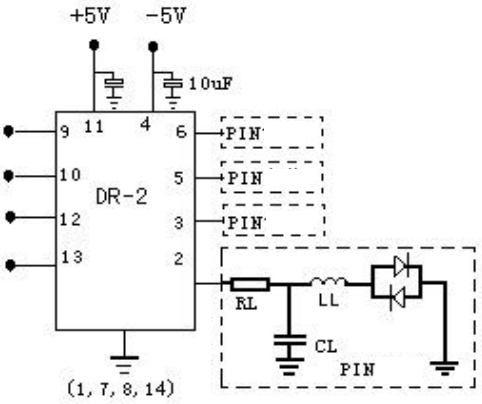


DH-14

Pin Function

1.	GND	8.	GND
2.	OUT1	9.	IN4
3.	OUT2	10.	IN3
4.	V-	11.	V+
5.	OUT3	12.	IN2
6.	OUT4	13.	IN1
7.	GND	14.	GND

TTL Control



Note:

1. Anti-electrostatic measures should be adopted.
2. For high speed switching time, required TTL control level: tr≤20ns tf≤20ns Vtop≥4.0V.
3. HC or HCT244 digital circuit is recommended at fore end of DR-2.

HE063

Integrated PIN Switches Driver

Features

Three Separated Drivers
DC Supply :+5/-5V~-10V

- TTL Control, Inverting Output
- Package: DH-08
- Wide Operating Temperature: -55℃~+85℃

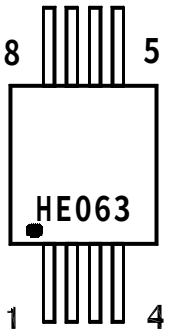
Specifications (Tested at T_A = +25℃,V+=5V V-=-5V f=400KHz)

Parameter	Symbol	Tested Conditions	Guaranteed		Typical	Unit
		TA=25 ℃	Min	Max		
Input Low level	V_{IL}	——	——	0.8	0.2	V
Input High level	V_{IH}	——	3.5	——	4.0	V
Input Current (Low level)	I_{IL}	V_{IN}=0V	——	——	3.5	mA
Input Current (High level)	I_{IH}	$V_{IN}\geqslant$3.5V	——	——	10	uA
Output High level	V_{OH}	V_{IN}=0V	3.5V	——	——	V
Output Low level	V_{OL}	$V_{IN}\geqslant$3.5V	——	-4	——	V
Output Current	I_O	V_{IN}=0V	——	50	——	mA
On Time	t_{on} [1)]	C_L =300pF	——	70	30	ns
Off Time	t_{off} [1)]	L_L=50nH	——	70	50	nS
Static Current	Icc	$V_{IN}\geqslant$3.5V or NC	——	——	100	uA
	I_{EE}	NC	——	——	100	uA
	Icc	V_{IN}=0V NC	——	——	12	mA
	I_{EE}		——	——	9	mA

Note[1)]: The diode 1N4148 was loaded at output port.

Absolute Maximum Ratings

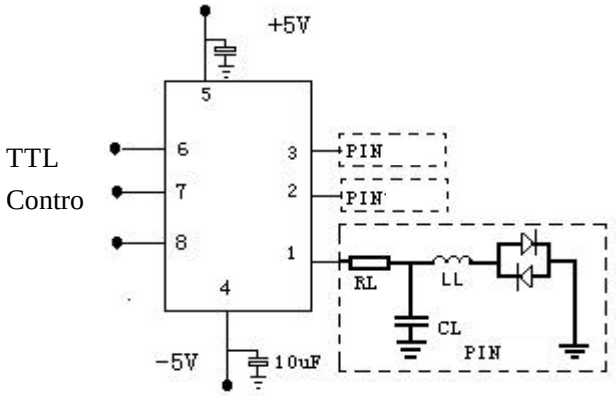
DC Supply(-) ----- --6VDC
DC Supply(+) ----- +6VDC
Input Voltage ---- +7V
Operating Current---- 70mA
Storage Temperature---- +125℃



DH-08

Pin Function

1. OUT1
2. OUT2
3. OUT3
4. V-
5. V+
6. IN3
7. IN2
8. IN1



Note:

1. Anti-electrostatic measures should be adopted.
2. For high speed switching time, required TTL control level: tr≤20ns tf≤20ns Vtop≥ 4.0V.
3. HC or HCT244 digital circuit is recommended at fore end of DR-5.

DR-4

Integrated PIN Switches Driver

Features

High DC Supply(-100V) For High Power switches
High Output Current:100mA
TTL Control, Noninverting Output
Standard package: TO-8G
Wide Operating Temperature: -55℃~+85℃

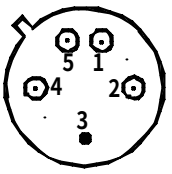
Specifications (Tested at T_A = +25℃,V+=5V V-=-100V f=50KHz)

Parameter	Symbol	Tested Conditions	Guaranteed		Typical	Unit
		T_A=25 ℃	Min	Max		
Input Low level	V_{IL}	——	——	0.8	0.2	V
Input High level	V_{IH}	——	3.5	——	4.0	V
Input Current (Low level)	I_{IL}	V_{IN}=0V	——	100	——	uA
Input Current (High level)	I_{IH}	$V_{IN}\geqslant$3.5V	——	100	——	uA
Output High level	V_{OH}	$V_{IN}\geqslant$3.5V	2.5	——	——	V
Output Low level	V_{OL}	V_{IN}=0V	——	-95	——	V
Output Current	I_O	$V_{IN}\geqslant$3.5V	——	100	80	mA
Switching On Time	t_{on} [1)]	R_L=33Ω	——	150	80	ns
Switching Off Time	t_{off} [1)]	——	——	300	150	nS
Static Current	Icc	V_{IN}=0V	——	2	——	mA
	I_{EE}	V_{IN}=0V No Load	——	200	——	uA
Max operating Frequency	f_{MAX}		——	50	——	KHz

Note[1)]: The diode 1N4148 was loaded at output port.

Absolute Maximum Ratings

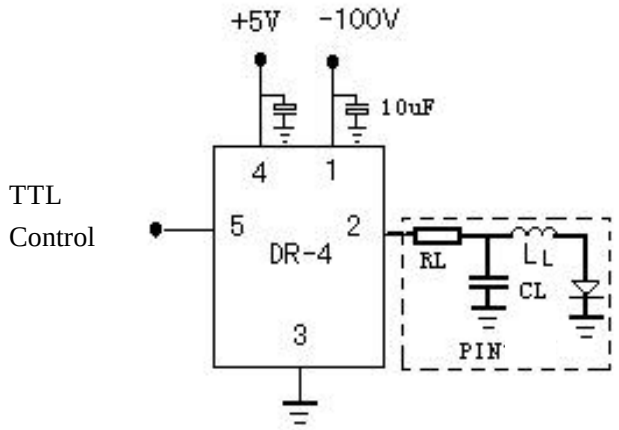
DC Supply(-) ----- -110VDC
DC Supply(+) ----- +6VDC
Input Voltage ---- +7V
Operating Current---- **+10**0mA
Storage Temperature---- **+**125℃



TO-8G

Pin Function:

1. V-
2. OUT
3. GND
4. V+
5. IN



Note:

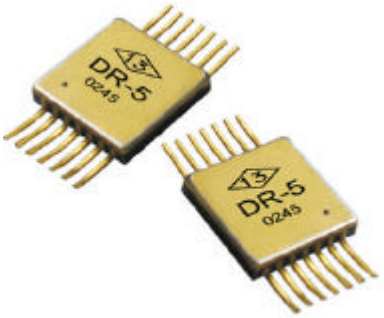
1. Anti-electrostatic measures should be adopted.
2. For high speed switching time, required TTL control level: tr≤20ns tf≤20ns Vtop≥4.0V.
3. Decoupling capacitances (10nF and 10μF) should be used.
4. Pay attention to heat dispersion.

DR-5

Integrated PIN Switches Driver

Features

- Compensatory Output
- For Driving SPDT switches
- TTL Control
- Package: DH-14A
- Wide Operating Temperature: -55℃~+85℃



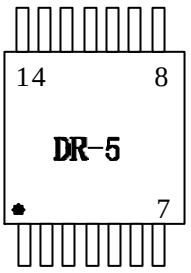
Specifications (Tested at T_A = +25℃,V+=5V V-=-5V f=400KHz)

Parameter	Symbol	Tested Conditions	Guaranteed		Typical	Unit
		T_A=25 ℃	Min	Max		
Input Low level	V_{IL}	——	——	0.8	0.2	V
Input High level	V_{IH}	——	3.5	——	4.0	V
Input Current (Low level)	I_{IL}	V_{IN}=0V	——	——	3.5	mA
Input Current (High level)	I_{IH}	$V_{IN}\geqslant$3.5V	——	——	10	uA
Output High level	V_{OH}	V_{IN}=0V	3.0	——	——	V
Output Low level	V_{OL}	$V_{IN}\geqslant$3.5V	——	-3.0	——	V
Output Current	I_O	——	——	±60	——	mA
Switching On Time	t_{on} [1)]	C_L =330PF	——	60	30	ns
Switching Off Time	t_{off} [1)]	L_L=300nH	——	80	50	nS
Static Current	Icc	$V_{IN}\geqslant$3.5V or NC	——	——	20	mA
	I_{EE}	NC	——	——	22	mA
	Icc	V_{IN}=0V NC	——	——	32	mA
	I_{EE}		——	——	25	mA

Note[1)]: The diode 1N4148 was loaded at output port.

Absolute Maximum Ratings

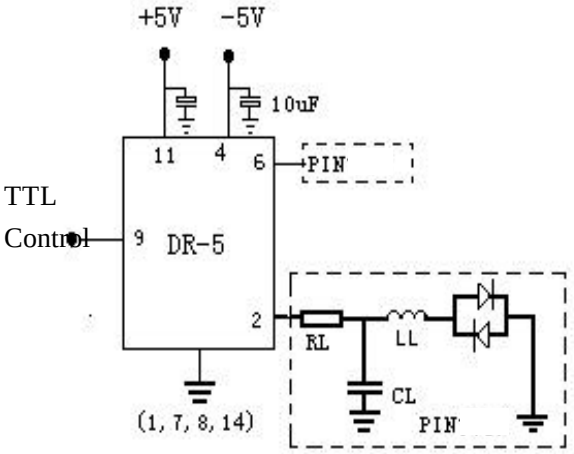
DC Supply(-) ----- -6VDC
DC Supply(+) ----- +6VDC
Input Voltage ---- +7V
Operating Current---- ±80mA
Storage Temperature---- +125℃



DH-14

Pin Function:

1. GND	8. GND
2. Noninverting OUT1	9. IN
3. NUL	10. NUL
4. V-	11. V+
5. NUL	12. NUL
6. Inverting OUT2	13. NUL
7. GND	14. GND



Note:

1. Anti-electrostatic measures should be adopted.
2. For high speed switching time, required TTL control level: tr≤20ns tf≤20ns Vtop≥ 4.0V.
3. HC or HCT244 digital circuit is recommended at fore end of DR-5.

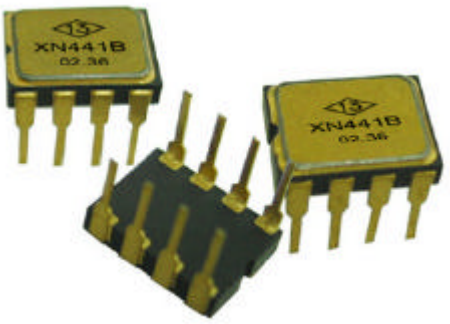
XN441B

Integrated PIN Switches Driver

Features

Two Separated Drivers
Output Driving current: ±40mA

- TTL Control, Inverting Output
- Package: DIP-8
- Wide Operating Temperature: -55℃~+85℃

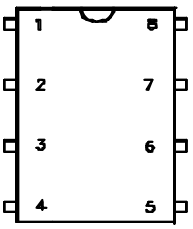


Specifications (Tested at T_A = +25℃,V+=5V V-=-5V)

Parameter	Symbol	Unit	Tested Conditions	Guaranteed	Typical
Output High level	V_{OH}	V	V_{IN}≥2V	≥4. 5	4.7
Output Low level	V_{OL}	V	V_{IN}≤0.8V	≤-4. 5	-4.7
Output Current	I_O	mA	In put TTL	±40	40
Static Current(+)	I_Q	mA	Input TTL 空载	≤10	5
Delay Time	τ	μS	Input , TTL	≤1. 0	0.8
Operating Temperature	T_L—T_H	℃		-55~+85	

Absolute Maximum Ratings

DC Supply ----- ±6VDC
Input Voltage ---- +6V
Operating Current---- ±45mA
Storage Temperature---- +125℃



XN441B

1. NC
2. V_{O1}
3. V_{IN1}
4. V-
5. GND
6. V_{IN2}
7. V_{O2}
8. V+

Note:

1. TTL control port shouldn't be NC.
2. The driver can operate at single positive DC supply, VDC=0v

MDB-01

Integrated Broadband Double-Balanced Mixer

Features

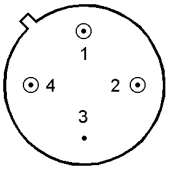
- LO power: +7dBm(Typ)
- LO&RF Frequency Range:1～500MHz
- Low Conversion Loss, High Port Isolation
- Input/Output Impedance: 50Ω
- Standard Package: TO-8C
- Wide Operating Temperature: -55℃～+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter		Symbol	Unit	Guaranteed	Typical
Frequency Range	LO&RF	f	MHz	1～500	1～600
	IF			DC～500	DC～600
Conversion Loss		C.L	dB	7.0 (10～100MHz)	6.5 (10～100 MHz)
				8.0 (100～200MHz)	7.5 (100～200 MHz)
				9.0 (1～500MHz)	8.5 (1～500 MHz)
Isolation	LO-RF	ISO	dB	50 (1～10 MHz)	70 (1～10 MHz)
				40 (10～100 MHz)	50 (10～100 MHz)
				30 (100～500 MHz)	40 (100～500 MHz)
	LO-IF			40 (1～10 MHz)	60 (1～10 MHz)
				30 (10～100 MHz)	40 (10～100 MHz)
				25 (100～500 MHz)	30 (100～500 MHz)
	RF-IF			25 (1～50 MHz)	30 (1～50 MHz)
				20 (50～500 MHz)	25 (50～500 MHz)
1dB Comp. Point		P_{-1}	dBm	0	2
Input Intercept 3rd order point		IP3	dBm	—	12

Absolute Maximum Rating

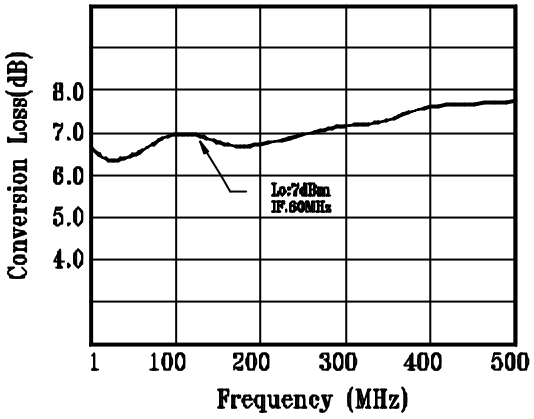
Maximum RF Input Power ---- +13dBm
Storage Temperature ---- +125℃



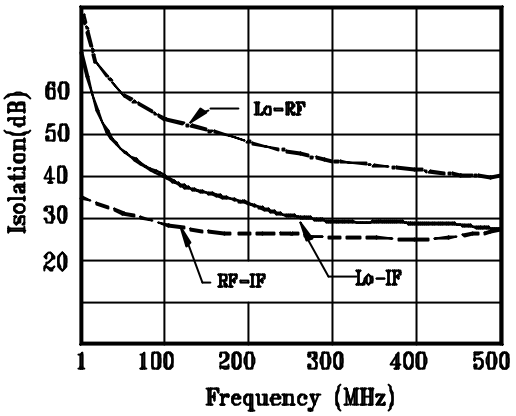
TO-8C

Typical Performance Curves

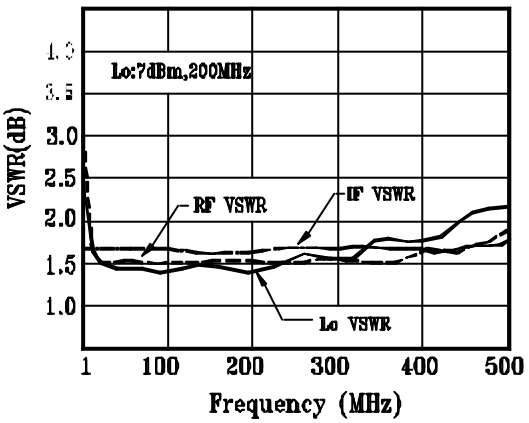
Conversion Loss vs. Frequency



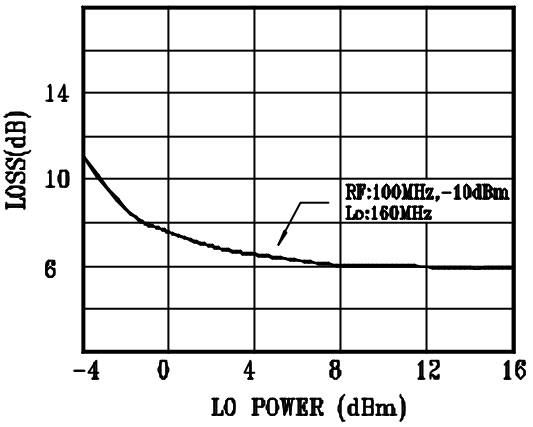
Isolation vs. Frequency



LO&RF VSWR vs. Frequency

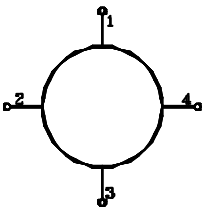


Conversion Loss vs. LO Power



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Microstrip package products can be offered.



1. IF
2. RF
3. GND
4. LO

Case: GND

MDB-02

Integrated Broadband Double-Balanced Mixer

Features

- LO power: +17dBm(Typ)
- LO&RF Frequency Range:1～500MHz
- Low Conversion Loss, High Port Isolation
- Input/Output Impedance: 50Ω
- Standard Package: TO-8C
- Wide Operating Temperature: -55℃～+85℃

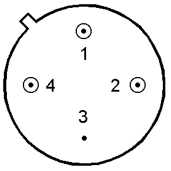
Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter		Symbol	Unit	Guaranteed	Typical
Frequency Range	LO&RF	f	MHz	1～500	1～600
	IF			DC～500	DC～600
Conversion Loss			dB	7.0 (10～100MHz)	6.5 (10～100 MHz)
				8.0 (100～200MHz)	7.5 (200～200 MHz)
				9.0 (1～500MHz)	8.5 (1～500 MHz)
Isolation	LO-RF	ISO	dB	50 (1～10 MHz)	70 (1～10 MHz)
				30 (10～100 MHz)	40 (10～100 MHz)
				25 (100～500 MHz)	30 (100～500 MHz)
	LO-IF			40 (1～10 MHz)	60 (1～10 MHz)
				30 (10～100 MHz)	40 (10～100 MHz)
				25 (100～500 MHz)	30 (100～500 MHz)
	RF-IF			25 (1～50 MHz)	30 (1～50 MHz)
				20 (50～500 MHz)	25 (50～500 MHz)
1dB Comp. Point			dBm	10	12
Input Intercept 3rd order point			dBm	—	21

Absolute Maximum Rating

Maximum RF Input Power ---- +23dBm

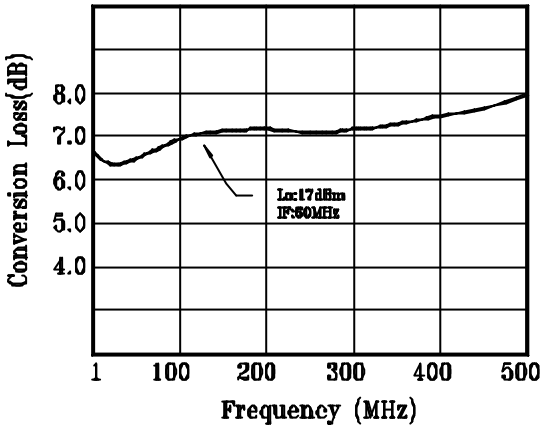
Storage Temperature ---- +125℃



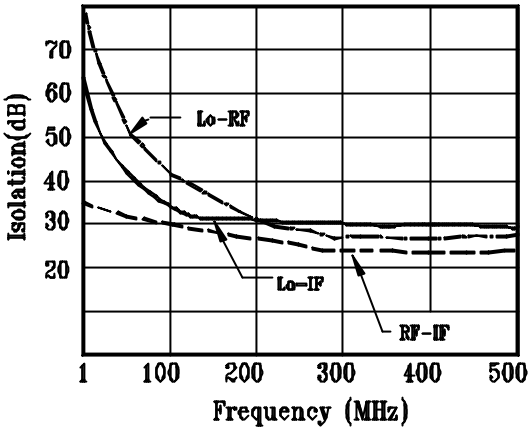
TO-8C

Typical Performance Curves

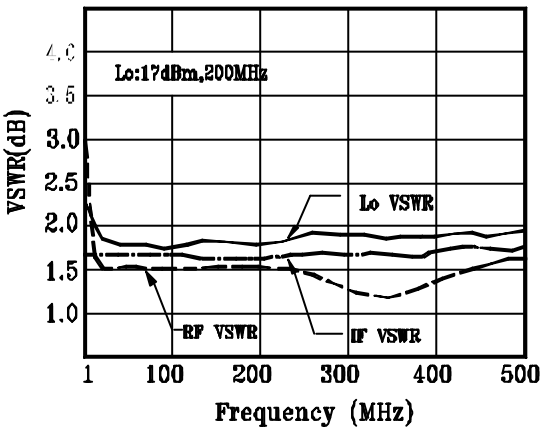
Conversion Loss vs. Frequency



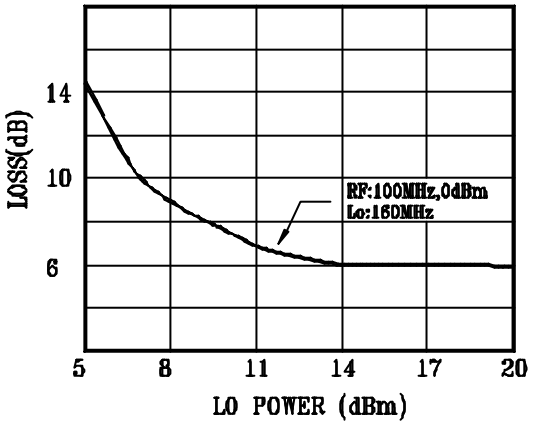
Isolation vs. Frequency



LO&RF VSWR vs. Frequency

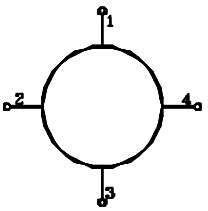


Conversion Loss vs. LO Power



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Microstrip package products can be offered.



1. IF
2. RF
3. GND
4. LO

Case: GND

MDB-03

Integrated Broadband Double-Balanced Mixer

Features

- LO power: +7dBm(Typ)
- LO&RF Frequency Range:10～1000MHz
- Low Conversion Loss, High Port Isolation
- Input/Output Impedance: 50Ω
- Standard Package: TO-8C
- Wide Operating Temperature: -55℃～+85℃

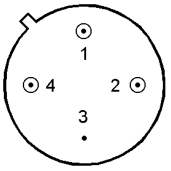
Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter		Symbol	Unit	Guaranteed	Typical
Frequency Range	LO&RF	f	MHz	10～1000	——
	IF			DC～1000	——
Conversion Loss			dB	7.0 (20～200MHz)	6.5 (20～200MHz)
				8.0 (200～600MHz)	7.5 (200～600 MHz)
				9.5 (10～1000MHz)	8.5 (10～1000 MHz)
Isolation	LO-RF	ISO	dB	50 (10～100 MHz)	70 (10～100 MHz)
				40 (100～500 MHz)	50 (100～500 MHz)
				20 (500～1000 MHz)	30 (500～1000 MHz)
	LO-IF			35 (10～100 MHz)	45 (10～100 MHz)
				30 (100～500 MHz)	35 (100～500 MHz)
				20 (500～1000 MHz)	25 (500～1000 MHz)
	RF-IF			25 (10～200 MHz)	30 (10～200 MHz)
				10 (200～1000 MHz)	20 (20～1000 MHz)
1dB Comp. Point			dBm	0	2
Input Intercept 3rd order point			dBm	—	12

Absolute Maximum Rating

Maximum RF Input Power ---- +13dBm

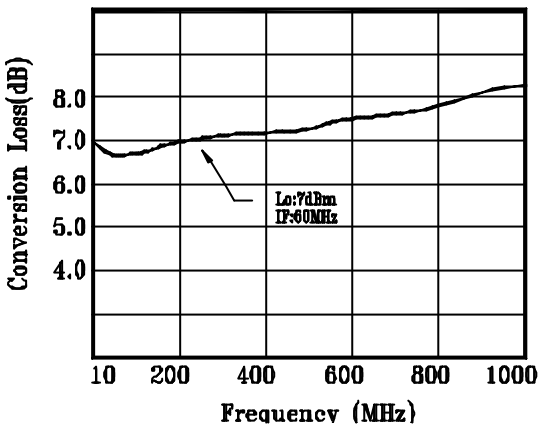
Storage Temperature ---- +125℃



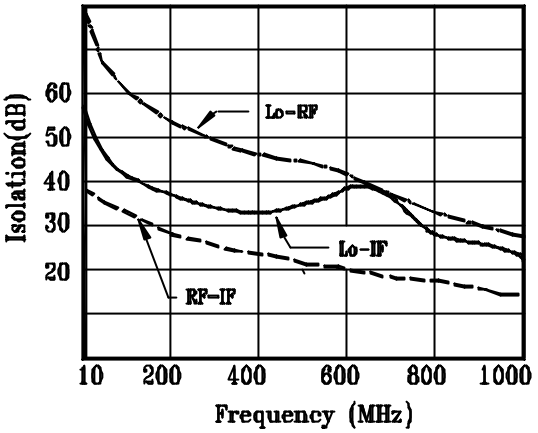
TO-8C

Typical Performance Curves

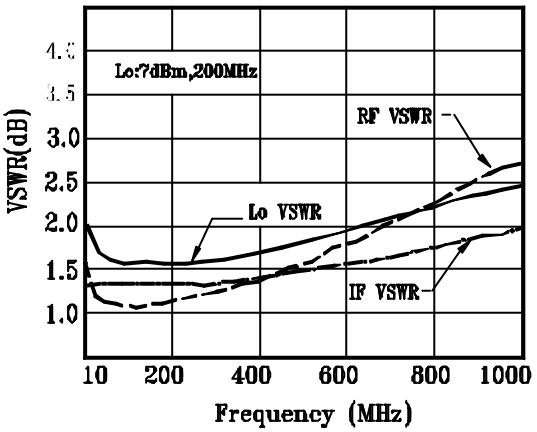
Conversion Loss vs. Frequency



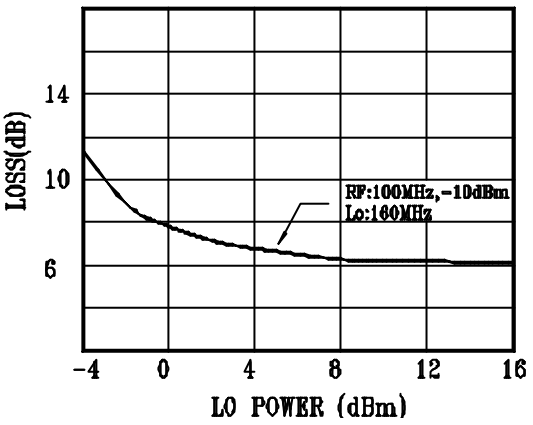
Isolation vs. Frequency



LO&RF VSWR vs. Frequency

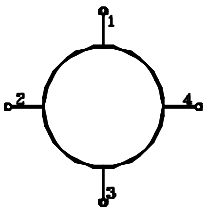


Conversion Loss vs. LO Power



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Microstrip package products can be offered.



1. IF
2. RF
3. GND
4. LO

Case: GND

MDB-04

Integrated Broadband Double-Balanced Mixer

Features

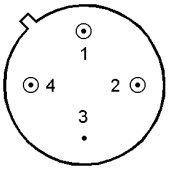
- LO power: +17dBm(Typ)
- LO&RF Frequency Range:10～1000MHz
- Low Conversion Loss, High Port Isolation
- Input/Output Impedance: 50Ω
- Standard Package: TO-8C
- Wide Operating Temperature: -55℃～+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter		Symbol	Unit	Guaranteed	Typical
Frequency Range	LO&RF	f	MHz	10～1000	——
	IF			DC～1000	——
Conversion Loss		C.L	dB	8.0 (20～600MHz)	7.5 (20～600MHz)
				9.5 (10～1000MHz)	8.5 (10～1000 MHz)
Isolation	LO-RF	ISO	dB	45 (10～100 MHz)	60 (10～100 MHz)
				35 (100～500 MHz)	45 (100～500 MHz)
				20 (500～1000 MHz)	35 (500～1000 MHz)
	LO-IF			35 (10～100 MHz)	45 (10～100 MHz)
				30 (100～500 MHz)	35 (100～500 MHz)
				20 (500～1000 MHz)	25 (500～1000 MHz)
	RF-IF			25 (10～100 MHz)	30 (10～100 MHz)
				10 (50～500 MHz)	20 (50～500 MHz)
1dB Comp. Point		P_{-1}	dBm	10	12
Input Intercept 3rd order point		IP3	dBm	—	21

Absolute Maximum Rating

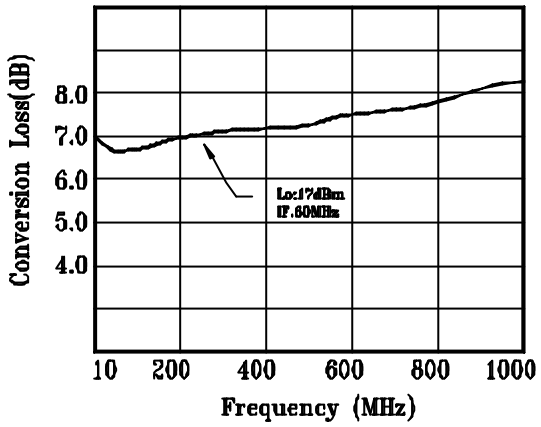
Maximum RF Input Power ---- +23dBm
Storage Temperature ---- +125℃



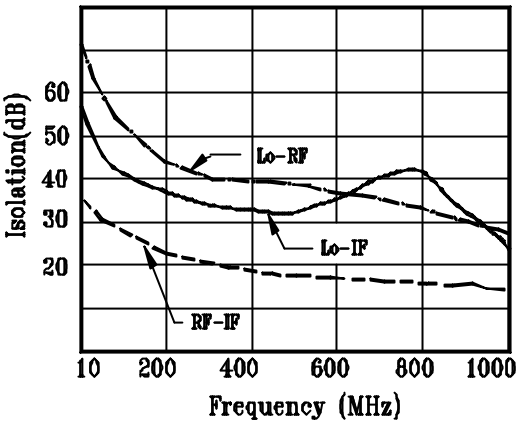
TO-8C

Typical Performance Curves

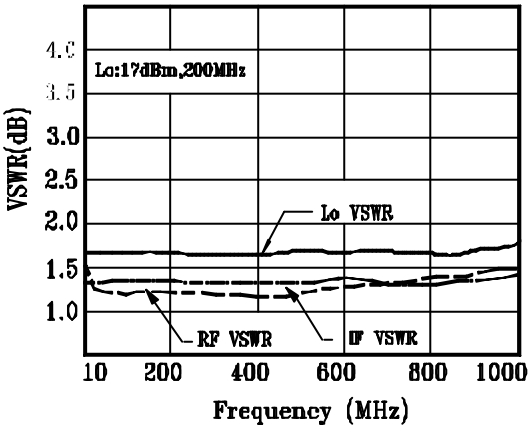
Conversion Loss vs. Frequency



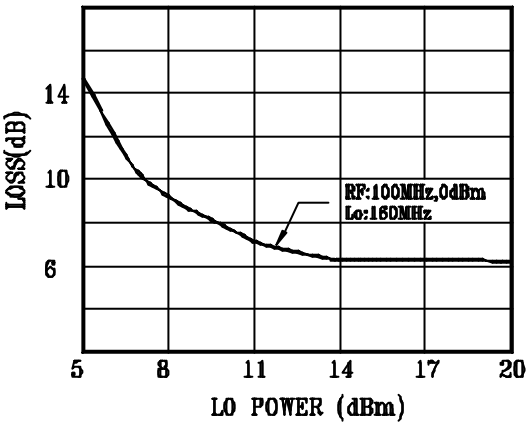
Isolation vs. Frequency



VSWR vs. Frequency

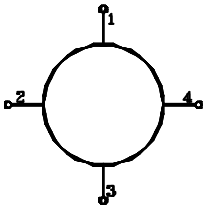


Conversion Loss vs. LO Power



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Microstrip package products can be offered.



1. IF
2. RF
3. GND
4. LO

Case: GND

MDB-05

Integrated Broadband Double-Balanced Mixer

Features

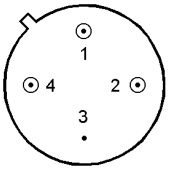
- LO power: +7dBm(Typ)
- LO&RF Frequency Range:10～1500MHz
- Low Conversion Loss, High Port Isolation
- Input/Output Impedance: 50Ω
- Standard Package: TO-8C
- Wide Operating Temperature: -55℃～+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter		Symbol	Unit	Guaranteed	Typical
Frequency Range	LO&RF	f	MHz	10～1500	——
	IF			DC～1000	——
Conversion Loss		C.L	dB	7.5 (20～200MHz)	7.0 (20～200MHz)
				8.5 (200～800MHz)	8.0 (200～800 MHz)
				9.5 (10～1500MHz)	8.5 (10～1500 MHz)
Isolation	LO-RF	ISO	dB	40 (10～200 MHz)	50 (10～200 MHz)
				30 (200～800 MHz)	40 (200～800 MHz)
				20 (800～1500 MHz)	30 (800～1500 MHz)
	LO-IF			35 (10～200 MHz)	45 (10～200 MHz)
				20 (200～800 MHz)	30 (200～800 MHz)
				15 (800～1500 MHz)	25 (800～1500 MHz)
	RF-IF			20 (10～500 MHz)	35 (10～500 MHz)
				10 (500～1500 MHz)	20 (500～1500 MHz)
1dB Comp. Point		P_{-1}	dBm	0	2
Input Intercept 3rd order point		IP3	dBm	—	12

Absolute Maximum Rating

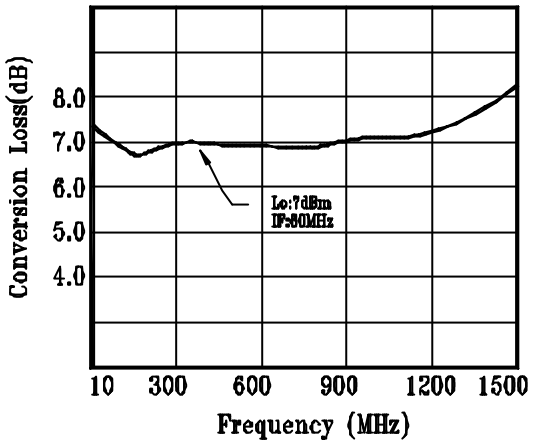
Maximum RF Input Power ---- +13dBm
Storage Temperature ---- +125℃



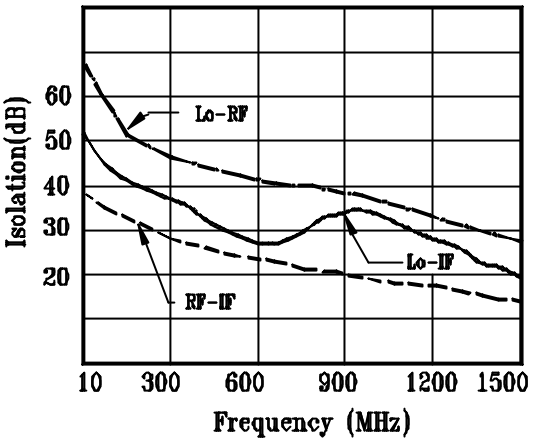
TO-8C

Typical Performance Curves

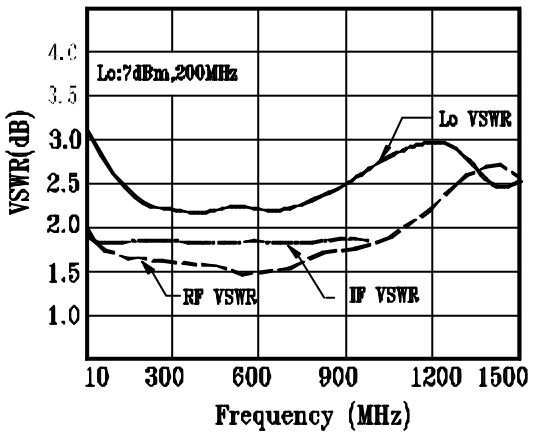
Conversion Loss vs. Frequency



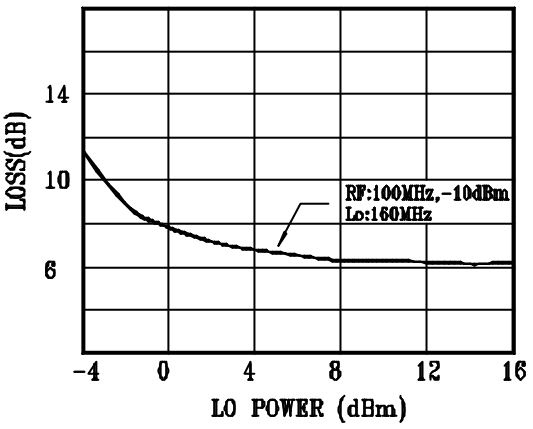
Isolation vs. Frequency



LO&RF VSWR vs. Frequency

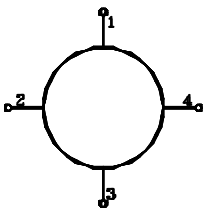


Conversion Loss vs. LO Power



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Microstrip package products can be offered.



1. IF
2. RF
3. GND
4. LO

Case: GND

MDB-06

Integrated Broadband Double-Balanced Mixer

Features

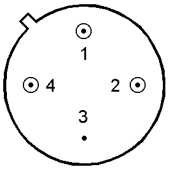
- LO power: +17dBm(Typ)
- LO&RF Frequency Range:10～1500MHz
- Low Conversion Loss, High Port Isolation
- Input/Output Impedance: 50Ω
- Standard Package: TO-8C
- Wide Operating Temperature: -55℃～+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter		Symbol	Unit	Guaranteed	Typical
Frequency Range	LO&RF	f	MHz	10～1500	——
	IF			DC～1000	——
Conversion Loss			dB	8.0 (20～600MHz)	7.5 (20～600MHz)
				9.5 (10～1500MHz)	8.5 (10～1500MHz)
Isolation	LO-RF	ISO	dB	40 (10～200 MHz)	50 (10～200 MHz)
				30 (200～800 MHz)	40 (200～800 MHz)
				20 (800～1500 MHz)	30 (800～1500 MHz)
	LO-IF			35 (10～200 MHz)	45 (10～200 MHz)
				20 (200～800 MHz)	30 (200～800 MHz)
				15 (800～1500 MHz)	25 (800～1500 MHz)
	RF-IF			20 (10～500 MHz)	35 (10～500 MHz)
				10 (500～1500 MHz)	20 (500～1500 MHz)
1dB Comp. Point			dBm	10	12
Input Intercept 3rd order point			dBm	—	21

Absolute Maximum Rating

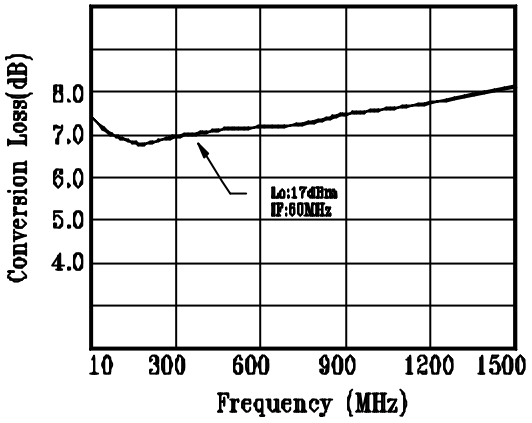
Maximum RF Input Power ---- +23dBm
Storage Temperature ---- +125℃



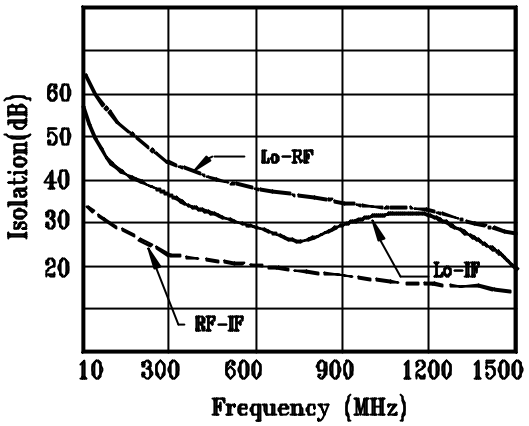
TO-8C

Typical Performance Curves

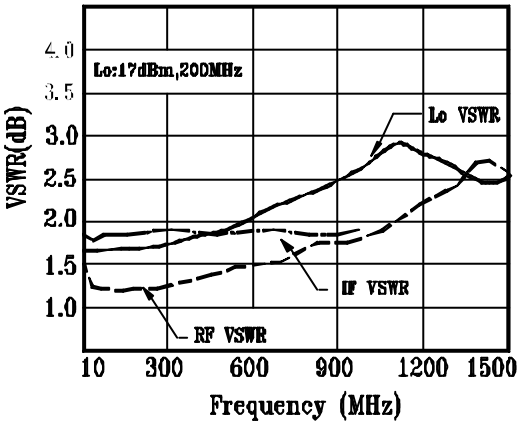
Conversion Loss vs. Frequency



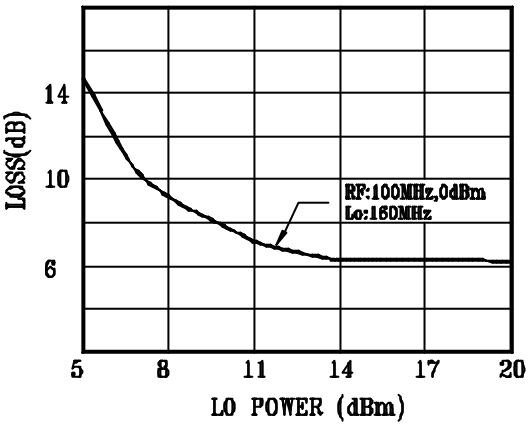
Isolation vs. Frequency



LO&RF VSWR vs. Frequency

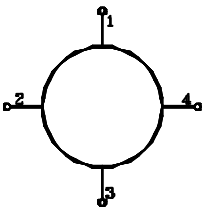


Conversion Loss vs. LO Power



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Microstrip package products can be offered.



1. IF
2. RF
3. GND
4. LO

Case: GND

MDB-07

Integrated Broadband Double-Balanced Mixer

Features

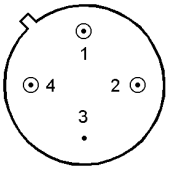
- LO power: +7dBm(Typ)
- LO&RF Frequency Range:50～2500MHz
- Low Conversion Loss, High Port Isolation
- Input/Output Impedance: 50Ω
- Standard Package: TO-8C
- Wide Operating Temperature: -55℃～+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter		Symbol	Unit	Guaranteed	Typical
Frequency Range	LO&RF	f	MHz	50～2500	50～2500
	IF			DC～600	DC～700
Conversion Loss		C.L	dB	6.5 (50～500MHz)	5.8 (50～500 MHz)
				8.0 (500～1000MHz)	6.5 (500～1000 MHz)
				9.0 (1000～2500MHz)	8.0 (1000～2500 MHz)
Isolation	LO-RF	ISO	dB	35 (50～500 MHz)	50 (50～500 MHz)
				30 (500～1000 MHz)	35 (500～1000 MHz)
				20 (1000～2500 MHz)	25 (1000～2500 MHz)
	LO-IF			25 (50～500 MHz)	40 (50～500 MHz)
				15 (500～1000 MHz)	20 (500～1000 MHz)
				12 (1000～2500 MHz)	18 (1000～2500 MHz)
	RF-IF			30 (50～500 MHz)	35 (50～500 MHz)
				25 (500～2500 MHz)	30 (500～2500 MHz)
1dB Comp. Point		P_{-1}	dBm	0	2
Input Intercept 3rd order point		IP3	dBm	—	12

Absolute Maximum Rating

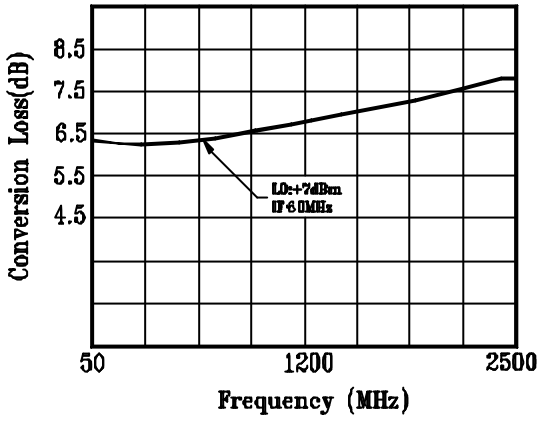
Maximum RF Input Power ---- +15dBm
Storage Temperature ---- +125℃



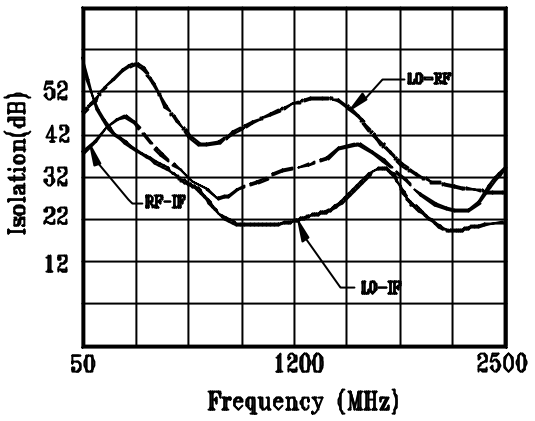
TO-8C

Typical Performance Curves

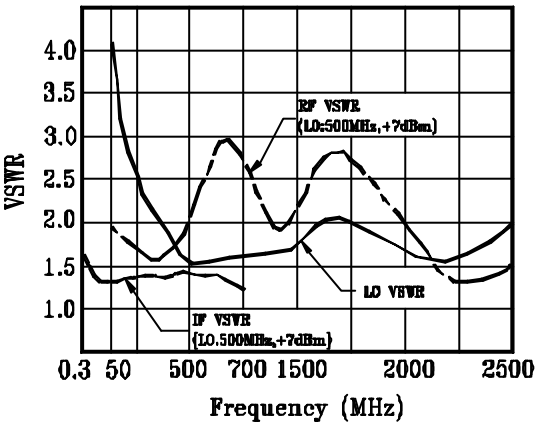
Conversion Loss vs. Frequency



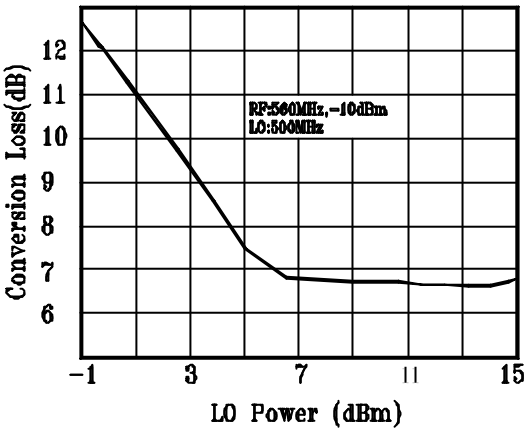
Isolation vs. Frequency



VSWR vs. Frequency

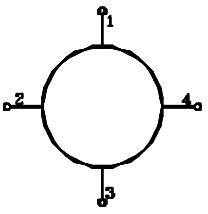


Conversion Loss vs. LO Power



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Microstrip package products can be offered.



1. IF
2. RF
3. GND
4. LO

Case: GND

MDB-08

Integrated Broadband Double-Balanced Mixer

Features

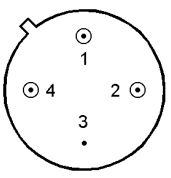
- LO power: +13dBm(Typ)
- LO&RF Frequency Range:50～2000MHz
- Low Conversion Loss, High Port Isolation
- Input/Output Impedance: 50Ω
- Standard Package: TO-8C
- Wide Operating Temperature: -55℃～+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system))

Parameter		Symbol	Unit	Guaranteed	Typical
Frequency Range	LO&RF	f	MHz	50～2000	50～2000
	IF			DC～600	DC～700
Conversion Loss		C.L	dB	7.5 (50～500MHz)	6.0 (50～500 MHz)
				8.5 (500～3000MHz)	7.0 (500～3000 MHz)
Isolation	LO-RF	ISO	dB	40 (50～800 MHz)	55 (50～800 MHz)
				25 (800～2000 MHz)	30 (800～2000 MHz)
	LO-IF			30 (50～500 MHz)	40 (50～500 MHz)
				15 (500～2000 MHz)	20 (500～2000 MHz)
	RF-IF			40 (50～200 MHz)	45 (50～200 MHz)
				25 (200～2000 MHz)	35 (200～2000 MHz)
1dB Comp. Point		P_{-1}	dBm	5	6
Input Intercept 3rd order point		IP3	dBm	—	15

Absolute Maximum Rating

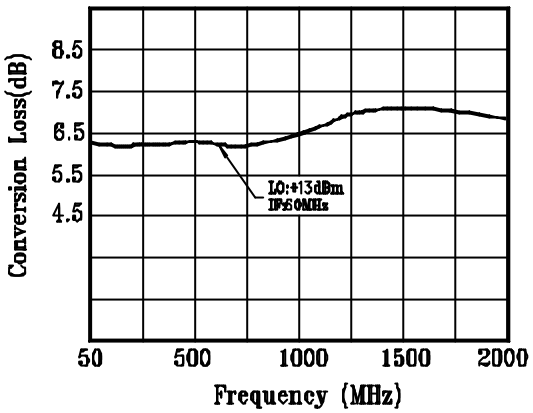
Maximum RF Input Power ---- +23dBm
Storage Temperature ---- +125℃



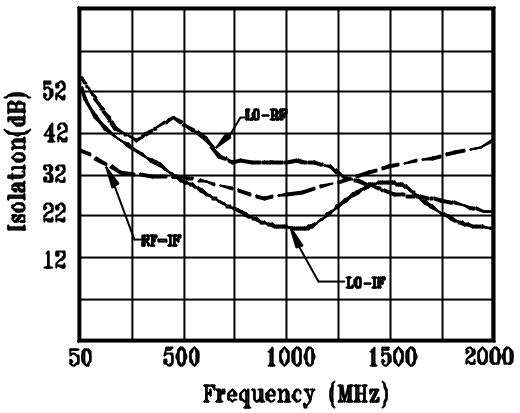
TO-8C

Typical Performance Curves

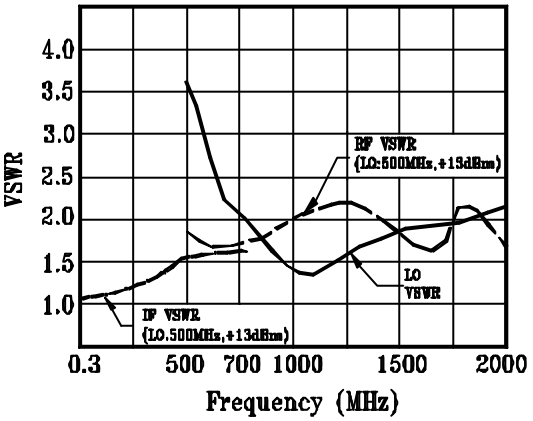
Conversion Loss vs. Frequency



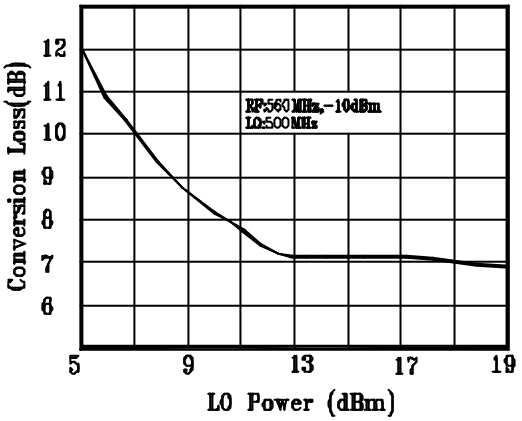
Isolation vs. Frequency



LO&RF VSWR vs. Frequency

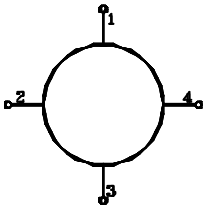


Conversion Loss vs. LO Power



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Microstrip package products can be offered.



1. IF
2. RF
3. GND
4. LO

Case: GND

MDB-09

Integrated Broadband Double-Balanced Mixer

Features

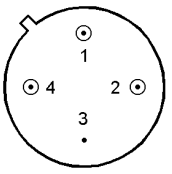
- LO power: +7dBm(Typ)
- LO&RF Frequency Range:500~3000MHz
- Low Conversion Loss, High Port Isolation
- Input/Output Impedance: 50Ω
- Standard Package: TO-8C
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter		Symbol	Unit	Guaranteed	Typical
Frequency Range	LO&RF	f	MHz	500~3000	500~3000
	IF			DC~600	DC~700
Conversion Loss		C.L	dB	7 (500~1000MHz)	6 (500~1000 MHz)
				8.0 (1000~2000MHz)	6.5 (1000~2000 MHz)
				9.0 (2000~3000MHz)	8.0 (2000~3000 MHz)
Isolation	LO-RF	ISO	dB	35 (500~800 MHz)	45 (500~800 MHz)
				28 (800~2000 MHz)	35 (800~2000 MHz)
				20 (2000~3000 MHz)	25 (2000~3000 MHz)
	LO-IF			20 (500~800 MHz)	24 (500~800 MHz)
				14 (800~3000 MHz)	20 (800~3000 MHz)
	RF-IF			20 (500~3000 MHz)	32 (500~3000 MHz)
1dB Comp. Point		P_{-1}	dBm	0	2
Input Intercept 3rd order point		IP3	dBm	—	12

Absolute Maximum Rating

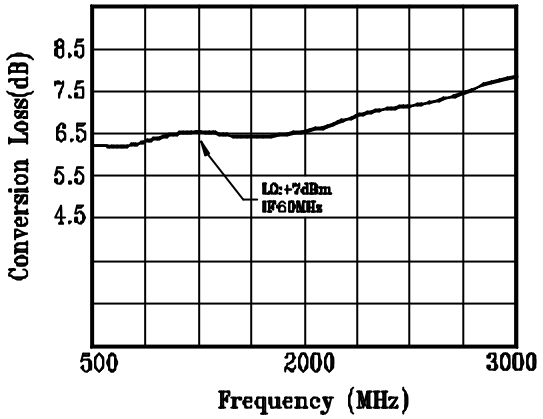
Maximum RF Input Power ---- +15dBm
Storage Temperature ---- +125℃



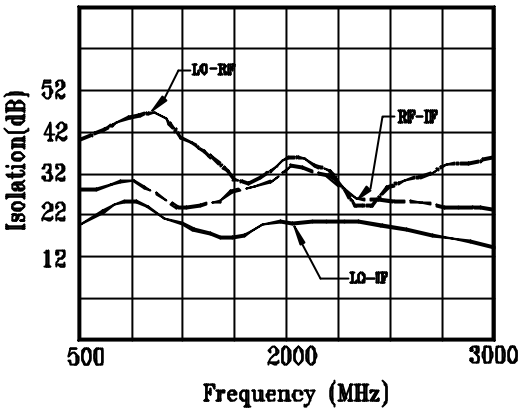
TO-8C

Typical Performance Curves

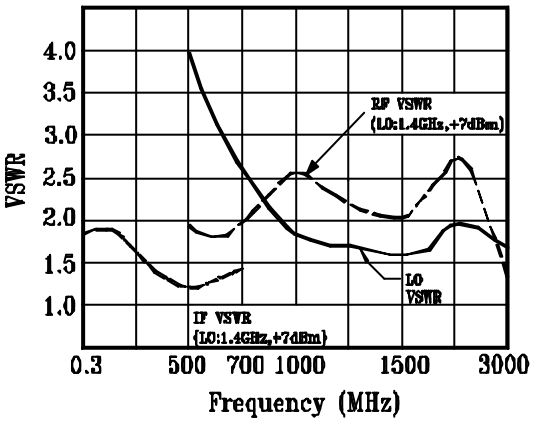
Conversion Loss vs. Frequency



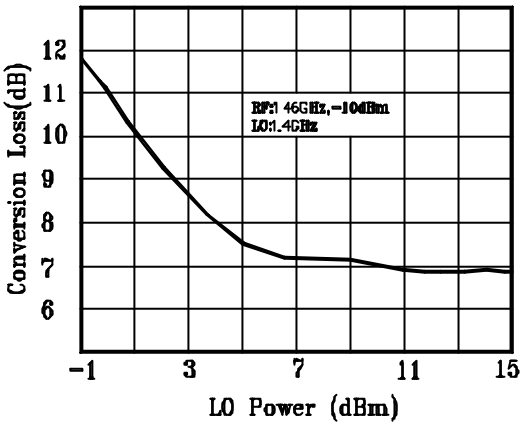
Isolation vs. Frequency



VSWR vs. Frequency

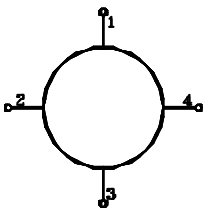


Conversion Loss vs. LO Power



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Microstrip package products can be offered.



1. IF
2. RF
3. GND
4. LO

Case: GND

MDB-10

Integrated Broadband Double-Balanced Mixer

Features

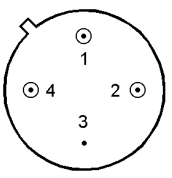
- LO power: +13dBm(Typ)
- LO&RF Frequency Range:500～3000MHz
- Low Conversion Loss, High Port Isolation
- Input/Output Impedance: 50Ω
- Standard Package: TO-8C
- Wide Operating Temperature: -55℃～+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter		Symbol	Unit	Guaranteed	Typical
Frequency Range	LO&RF	f	MHz	500～3000	500～3000
	IF			DC～1000	DC～1000
Conversion Loss		C.L	dB	7 (500～1500MHz)	6 (500～1500 MHz)
				8.5 (500～3000MHz)	6.5 (500～3000 MHz)
Isolation	LO-RF	ISO	dB	35 (500～1000 MHz)	45 (500～1000 MHz)
				26 (1000～2000 MHz)	30 (1000～2000 MHz)
				20 (2000～3000 MHz)	25 (2000～3000 MHz)
	LO-IF			25 (500～1000 MHz)	30 (500～1000 MHz)
				14 (1000～3000 MHz)	18 (1000～3000 MHz)
	RF-IF			20 (500～1000 MHz)	24 (500～1000 MHz)
				25 (1000～2500 MHz)	30 (500～2500 MHz)
				20 (2500～3000 MHz)	25 (2500～3000 MHz)
1dB Comp. Point		P_{-1}	dBm	5	6
Input Intercept 3rd order point		IP3	dBm	—	15

Absolute Maximum Rating

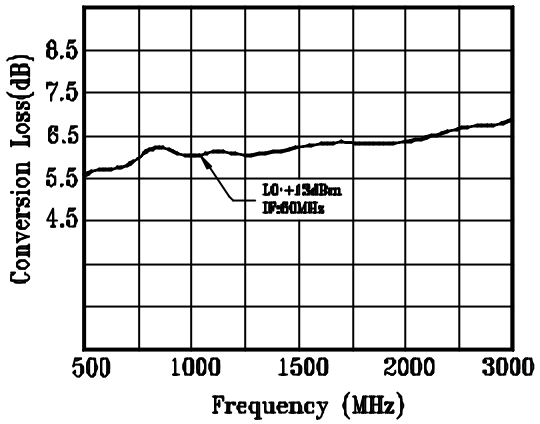
Maximum RF Input Power ---- +23dBm
Storage Temperature ---- +125℃



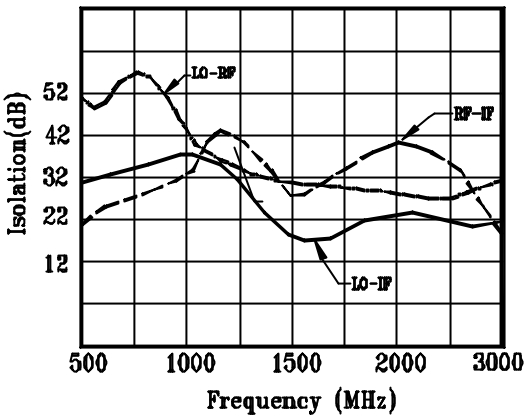
TO-8C

Typical Performance Curves

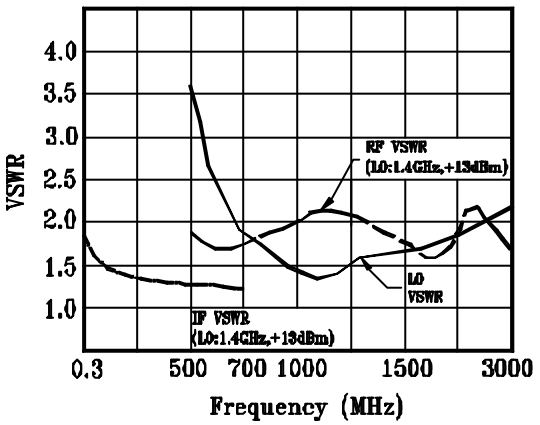
Conversion Loss vs. Frequency



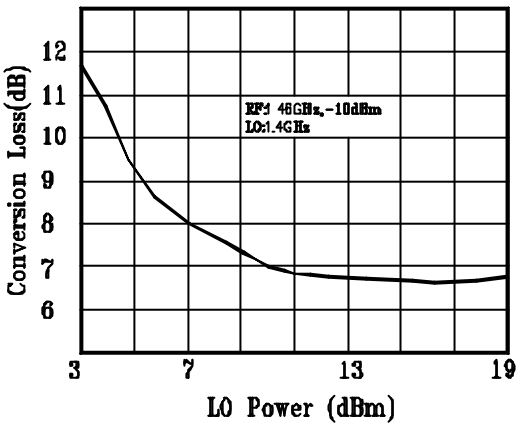
Isolation vs. Frequency



VSWR vs. Frequency

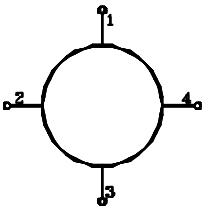


Conversion Loss vs. LO Power



Note:

1. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
2. Microstrip package products can be offered.



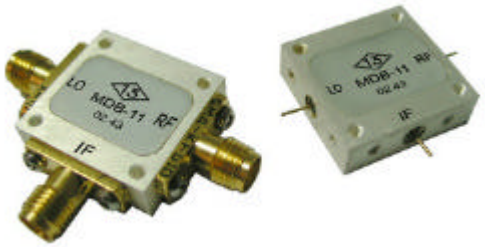
1. IF
2. RF
3. GND
4. LO

Case: GND

MDB-11

Integrated Broadband Double-Balanced Mixer

Features



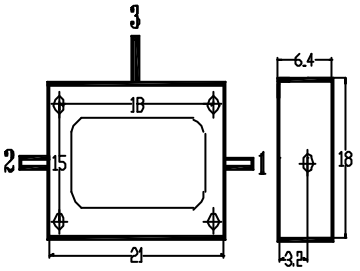
- LO power: +7dBm(Typ)
- LO&RF Frequency Range:2.0~6.0GHz
- Low Conversion Loss, High Port Isolation
- Input/Output Impedance: 50Ω
- Removable SMA
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter		Symbol	Unit	Guaranteed	Typical
Frequency Range	LO&RF	f	GHz	2.0~6.0	2.0~6.0
	IF			DC~1.0	DC~1.0
Conversion Loss		C.L	dB	7.0 (2.0~4.0GHz)	6.0 (2.0~4.0GHz)
				8.0 (4.0~6.0GHz)	7.0 (4.0~6.0GHz)
Isolation	LO-RF	ISO	dB	35 (2.0~3.0GHz)	40 (2.0~3.0GHz)
				20 (3.0~6.0GHz)	25 (3.0~6.0GHz)
	LO-IF			16 (2.0~6.0GHz)	20 (2.0~5.0GHz)
	RF-IF			20 (2.0~5.0GHz)	30 (2.0~5.0GHz)
1dB Comp. Point		P_{-1}	dBm	0	1
Input Intercept 3rd order point		IP3	dBm	—	12

Absolute Maximum Rating

Maximum RF Input Power ---- +15dBm
Storage Temperature ---- +125℃



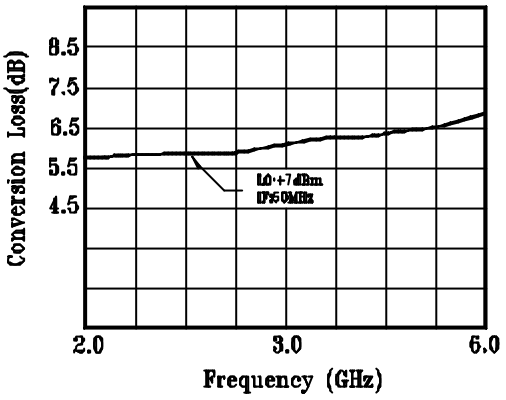
1. LO
2. RF
3. IF

Case: GND

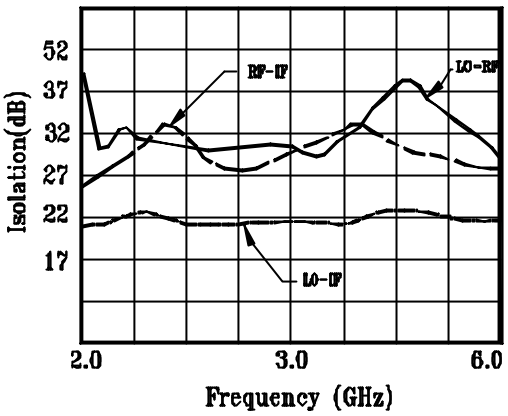
MDB-11 Outline diagram

Typical Performance Curves

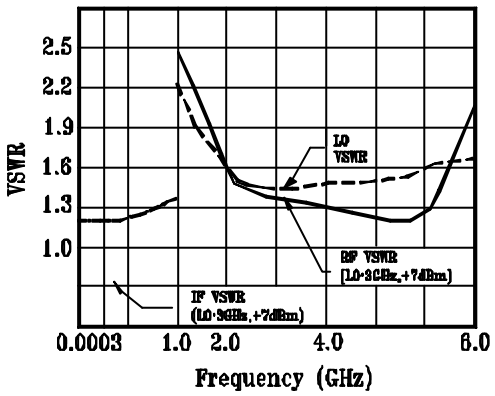
Conversion Loss vs. Frequency



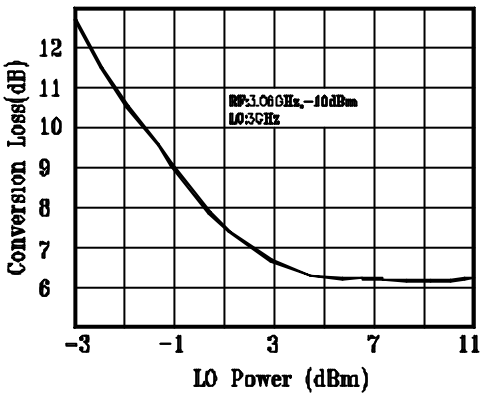
Isolation vs. Frequency



VSWR vs. Frequency



Conversion Loss vs. LO Power



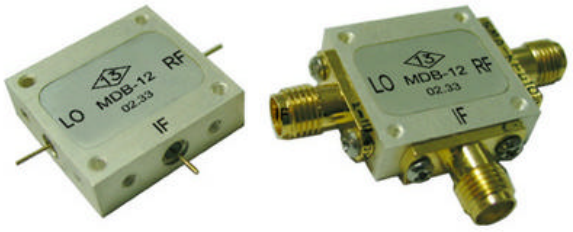
Note:

Required the module bottom grounded tightly.

MDB-12

Integrated Broadband Double-Balanced Mixer

Features



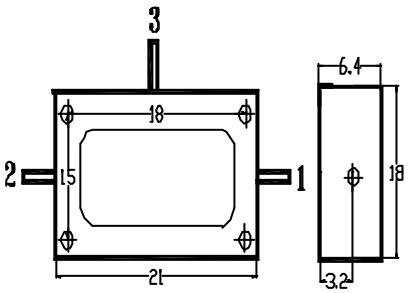
- LO power: +7dBm(Typ)
- LO&RF Frequency Range:3.0~8.0GHz
- Low Conversion Loss, High Port Isolation
- Input/Output Impedance: 50Ω
- Removable SMA
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Parameter		Symbol	Unit	Guaranteed	Typical
Frequency Range	LO&RF	f	GHz	3.0~8.0	3.0~8.0
	IF			DC~1.0	DC~1.0
Conversion Loss		C.L	dB	6.5 (3.0~5.0GHz)	6.0 (3.0~5.0GHz)
				8.0 (5.0~8.0GHz)	7.0 (5.0~8.0GHz)
Isolation	LO-RF	ISO	dB	25 (3.0~5.0GHz)	35 (3.0~5.0GHz)
				20 (5.0~8.0GHz)	25 (5.0~8.0GHz)
	LO-IF			16 (3.0~8.0GHz)	25 (3.0~8.0GHz)
	RF-IF			18 (3.0~8.0GHz)	22 (3.0~8.0GHz)
1dB Comp. Point		P_{-1}	dBm	0	1
Input Intercept 3rd order point		IP3	dBm	—	11

Absolute Maximum Rating

Maximum RF Input Power ---- +15dBm
Storage Temperature ---- +125℃



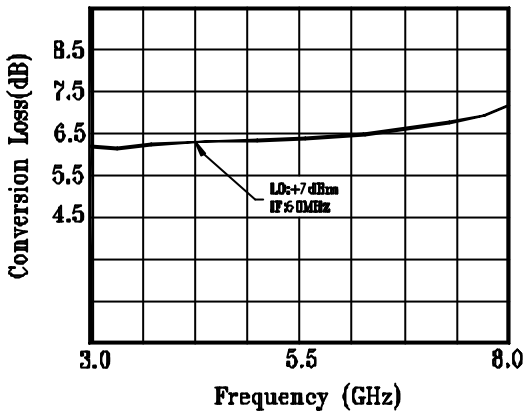
1. LO
2. RF
3. IF

Case: GND

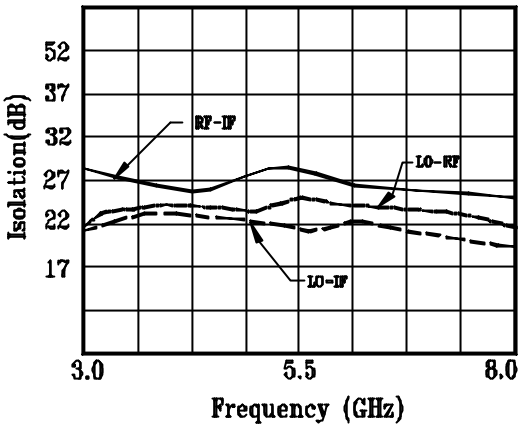
MDB-12 Outline diagram

Typical Performance Curves

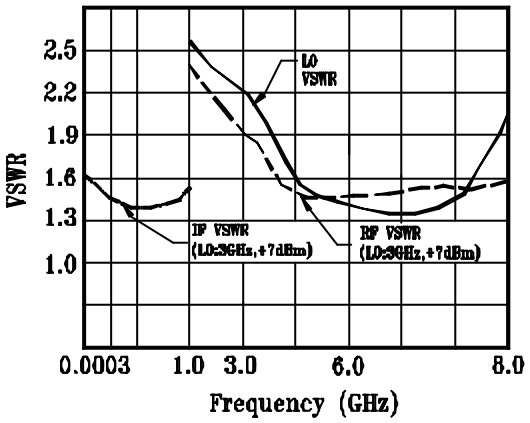
Conversion Loss vs. Frequency



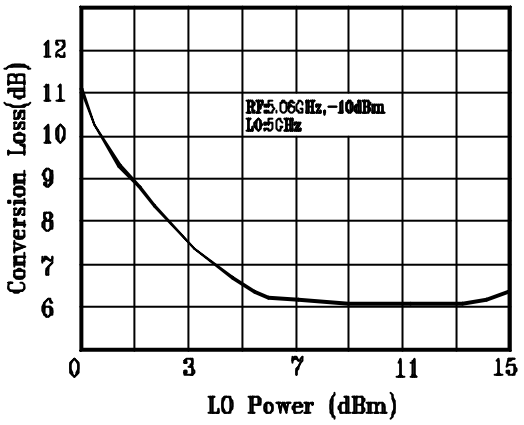
Isolation vs. Frequency



VSWR vs. Frequency



Conversion Loss vs. LO Power



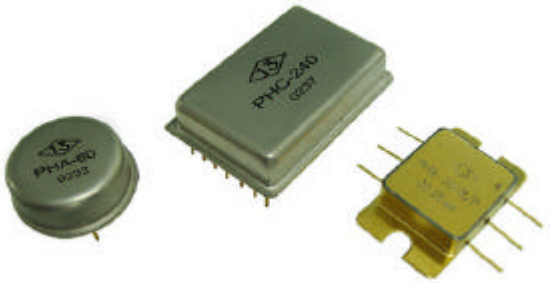
Note:

Required the module bottom grounded tightly.

Series PH

Reflective Voltage-controlled Phase shifter

Features



- Fixed Frequency Design
- Full Integrated
- Multi-Package Selected
- Input/Output Impedance:50Ω
- Excellent Phase Stability vs. Temp
- Wide Operating Temp：-55℃~+85℃

Principal Specifications:

PHΦ—Freq/Vc/Package

Φ： Phase Shift Range: Series A, B, C

Series **A：** 0° ~90° (min)

Series **B：** 0° ~180° (min)

Series **C：** 0° ~360° (min)

Freq： Center frequency in MHz.

Vc： Control Voltage Level: Series A, B

Series **A：** 0V~10V

Series **B：** 0V~15V

Package： Three kind package

D： DIP-14

F： TO-8F

P： SP-1

For Example：

PHA—30/A/P

Center Frequency 30MHz，Phase Shift Range 0° ~90° (min)，Control Voltage Level 0~10V，SP-1Package.

PHB—700/B/F

Center Frequency 700MHz，Phase Shift Range 0° ~180° (min)，Control Voltage Level 0~15V，TO-8F Package.

PHC—60/A/D

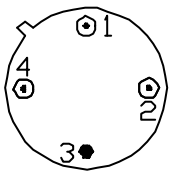
Center Frequency 60MHz，Phase Shift Range 0° ~360° (min)，Control Voltage Level 0~10V，

DIP-14 Package.

Specifications (Test at T_A=25℃, Measured in a 50Ω system, at center frequency)

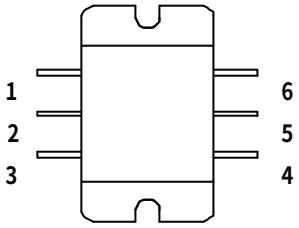
Model	Center Frequency (MHz)	Relative Bandwidth	Phase Shift Range ° min	I.L (dB)	I.L Flatness (dB)	VSWR	Phase Stability vs. Temp (°/℃)	Harmonic Suppression (dB)
PHA-XXX	10—300	±5%F_0	0~90°	1.5	0.5	1.5	0.05	See About Harmonic Suppression
PHB-XXX	10—300	±5%F_0	0~180°	1.5	0.5	1.5	0.1	
PHC-XXX	10—300	±5%F_0	0~360°	3.0	1.0	1.5	0.2	
PHA-XXX	300—700	±5%F_0	0~90°	1.8	0.5	1.6	0.05	
PHB-XXX	300—700	±5%F_0	0~180°	2.0	0.6	1.6	0.1	

Package:



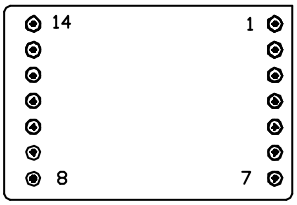
1.Control Port
2.Input
3.GND
4.Output

To-8F（Bottom）



1. Input
2. Nc
3. Control Port
4. GND
5. Nc
6. Output

SP-1（Top）



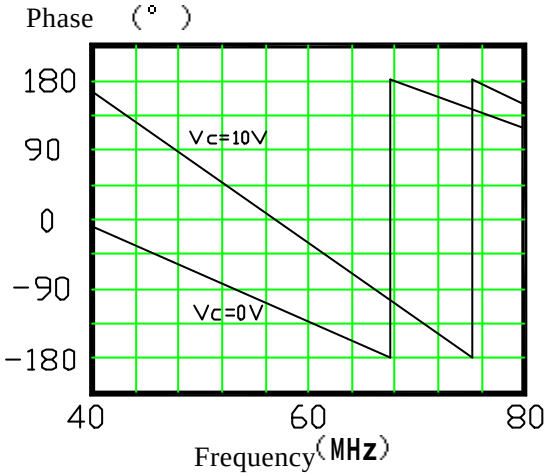
1. Nc
2. Input
3. Nc
4. Nc
5. GND
6. GND
7. Control port
8. GND
9. GND
10. GND
11. Nc
12. Nc
13. Output
14. N

DIP-14（Bottom）

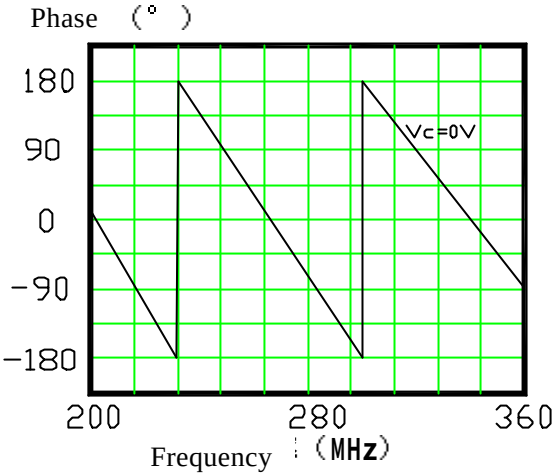
Note:

1. About Frequency:

PHB-60/B/F



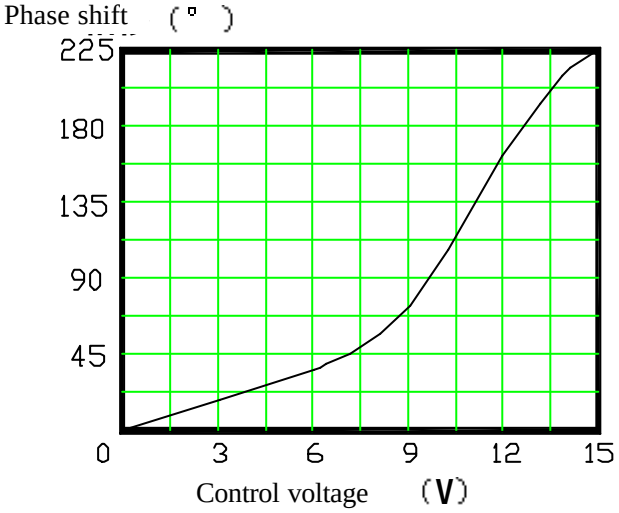
PHC-280/A/D



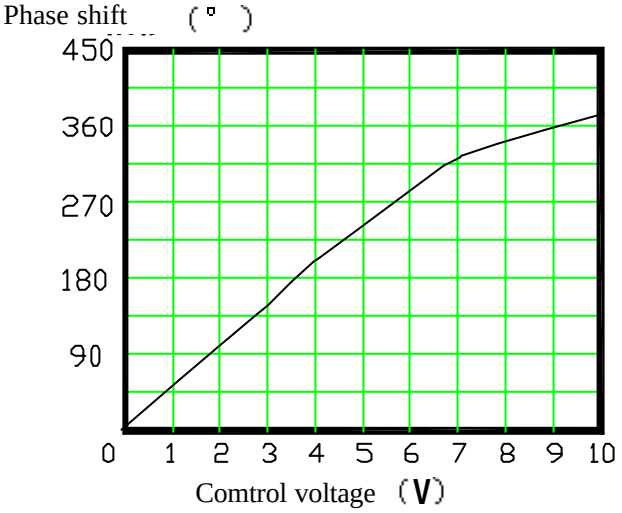
Near center frequency, phase shift is linear with Frequency.

2. About Control voltage

PHB-60/B/F



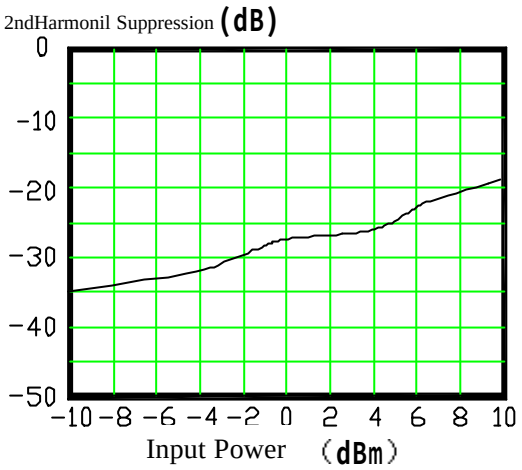
PHC-280/A/D



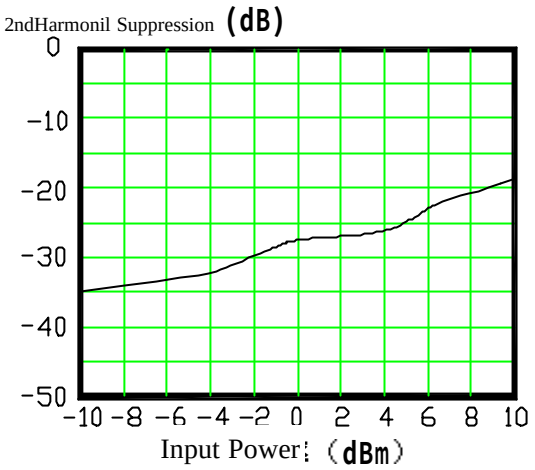
Phase shift isn't linear with control voltage, it depends upon varactor's characteristic.

3. About Harmonic Suppression

PHB-60/B/F



PHC-280/A/D



PH

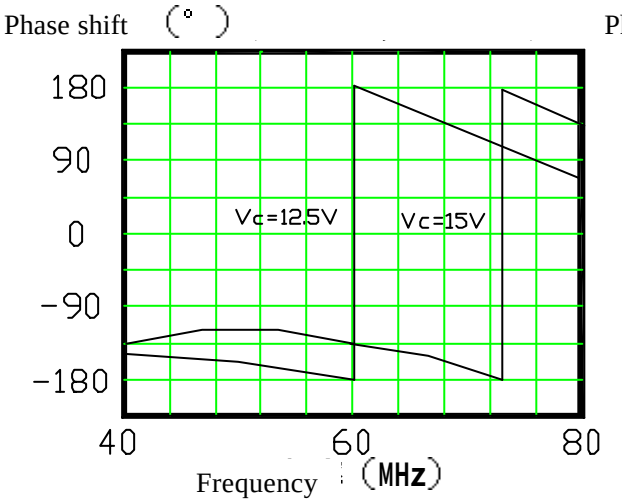
Series PH phase shifters should be used at small signal.

4. About operating bandwidth

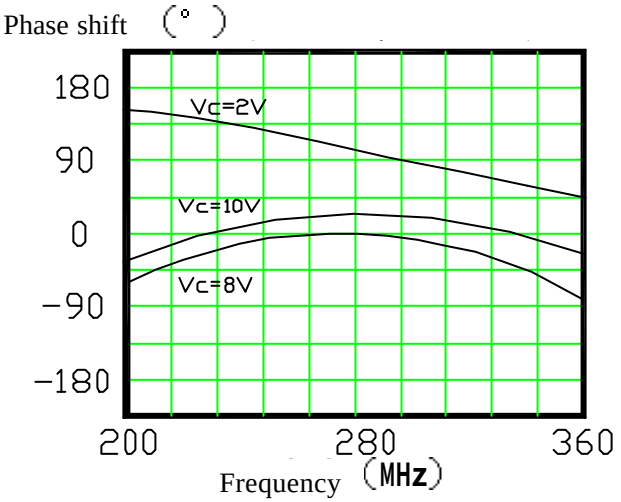
Operating relative bandwidth of Series PH phase shifters is about 10%.

Phase shift range vs. Frequency

PHB-60/B/F

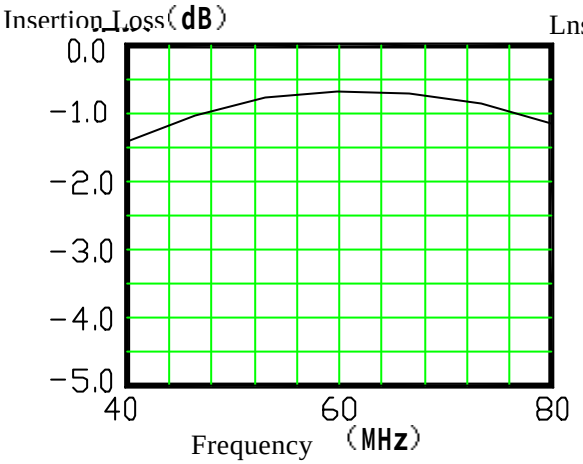


PHC-280/A/D

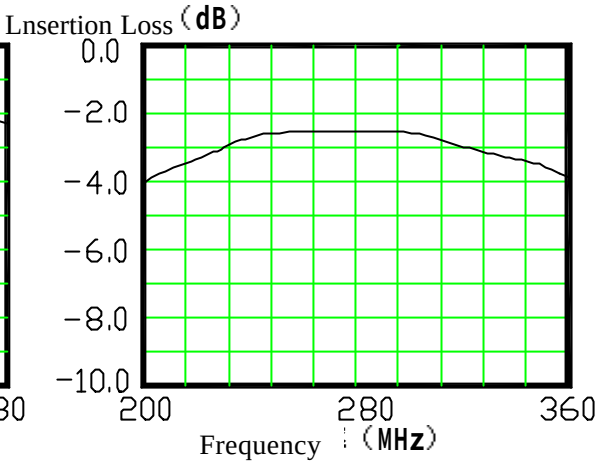


Insertion Loss vs. Frequency

PHB-60/B/F

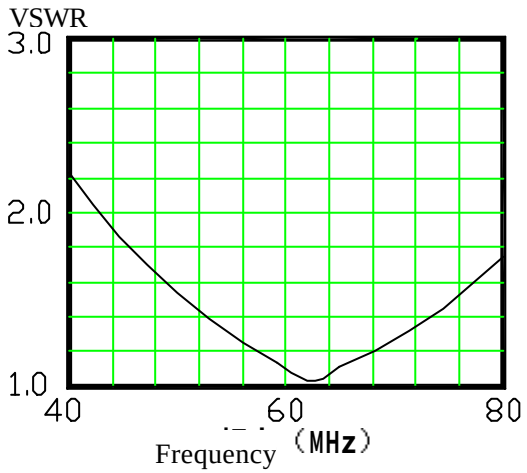


PHC-280/A/D

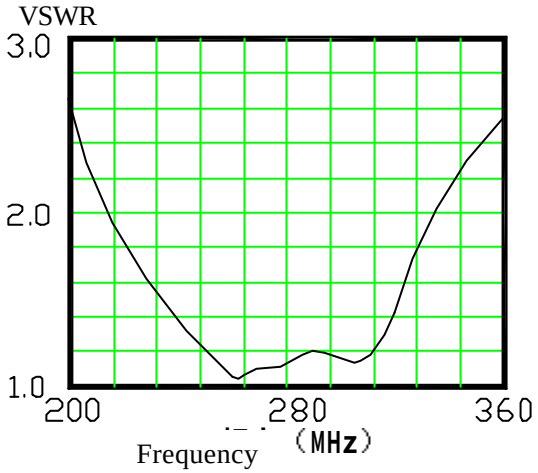


VSWR vs. Frequency

PHB-60/B/F



PHC-280/A/D



In $F_O \pm 5\%$,The specifications can be guaranteed.

Note:

1. Anti-electrostatic measures should be adopted.
2. Required Package grounded tightly for good Isolation.

SPLL2150-100

Integrated PLL Synthesizer

Features

- **Frequency Range：200~2500MHz**
- **Relative Bandwidth:<50%**
- **Serial TTL Control**
- **Output Power :Po>10dBm**
- **Excellent Phase Noise**
- **Reference frequency: 5~100MHz**
- **Wide Operating Temperature：-40℃~+85℃**

Specifications (Test at V_{CC} = +5V ,+12V, T_A=25℃ Measured in a 50Ω system)

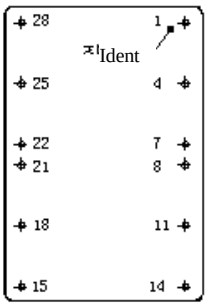
Parameter	Symbol	Unit	Guaranteed	Condition
Bandwidth	BW	MHz	2100~2200	——
Output Power	Po	dBm	>10	——
Step Size	F_{step}	kHz	1000	——
Reference frequency	F_r	MHz	5~100	——
Frequency Switching Time	T_{set}	mSec	<15	——
Phase Noise	S_ϕ	dBc/Hz	90/110	Offset:10k/100k
Harmonic Suppression	R_{fn}	dBc	15/25	2nd/3rd
Spurious Suppression	R_{fs}	dBc	>65	——
Operation Temp	T_A	℃	-40~85	——
Operation Current	I	mA	<90	——

Customer's synthesizer can be offered.

Absolute Maximum Rating

DC Supply ----- +6, +15VDC

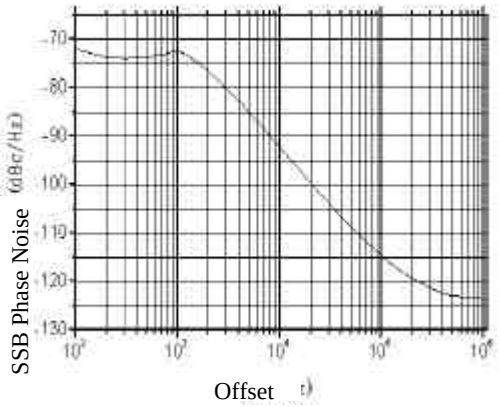
Storage Temp ----- -45~+100℃



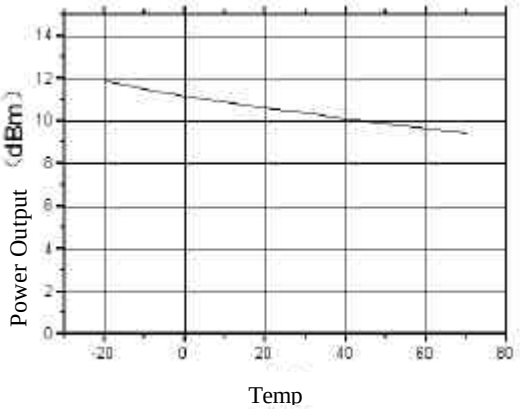
HD-28C

Typical Performance Curves

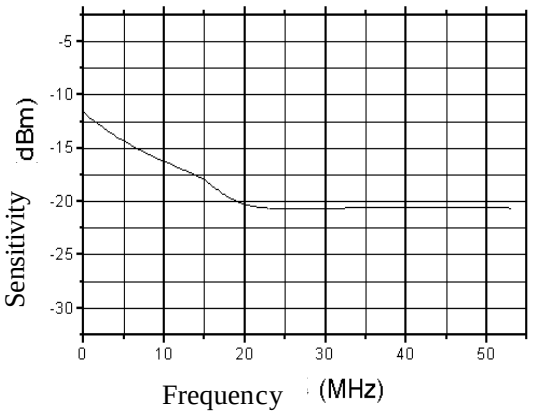
SSB Phase Noise Of SPLL（2168MHz）



Power Output vs. Temp



Reference Power vs. Frequency



Note:

1. Decoupling measures in DC supply should be used.
2. Required the Plug-in package bottom grounded tightly with PCB.
3. Data input:
   RFout=（P×B+A）×F_{osc}/R
   RFout：Output Frequency
   P：　Prescaler

Pin No	Function	Pin No	Function
1	NC	15	Control Port
4	GND	18	Data Input
7	PLL Lock Monitor Output	21	Load Enable Input
8	＋12V	22	＋5V
11	GND	25	RF Output
14	Reference Frequency Input	28	＋12V

TDC-10、TDC-15

Integrated wide band directional couplers

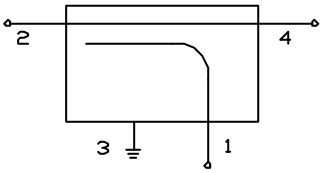
Features

- Wide Operating Frequency Range
- High Input Power
- Input/Output Impedance: 50Ω
- Excellent Phase, Amplitude Unbalance
- Standard Package: TO-8C
- Wide Operating Temperature: -55℃~+85℃

Specifications (Test at T_A=25℃, Measured in a 50Ω system)

Model	Frequency Range MHz	Coupling (dB)	Coupling Flatness (dB)	Insertion Loss (dB)	Isolation (dB)	VSWR
TDC-10A	20~500	10.5±0.5	≤±0.5	≤ 2.0	>25	1.5:1
TDC-10B	20~1500	10.5±0.5	≤±0.5	≤ 2.5	>25	1.5:1
TDC-15A	20~500	14.5±0.5	≤±0.5	≤ 1.0	>30	1.5:1
TDC-15B	20~1500	14.5±0.5	≤±0.5	≤ 1.5	>30	1.5:1

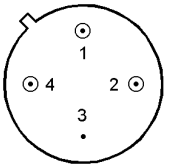
Note:



1 Coupling port 2. Input port 3. GND 4 Output

ALL Rorts connect GND directly for DC,

Required plug-in bottom grounded tightly.



TO-8C

Absolute Maximum Rating

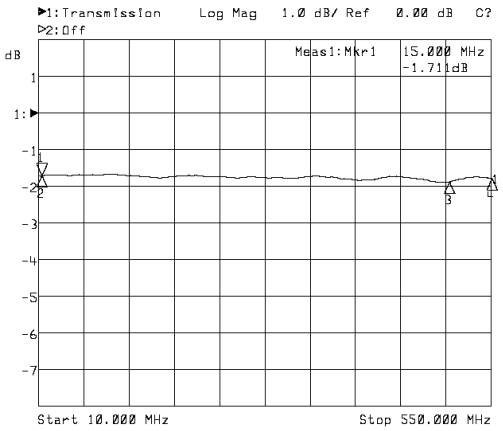
Maximum Input Power ----- 30dBm

Storage Temperature -- +125℃

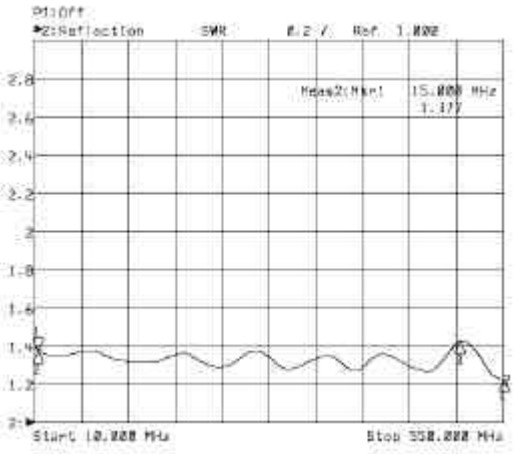
Typical Performance Curves

(TDC-10A)

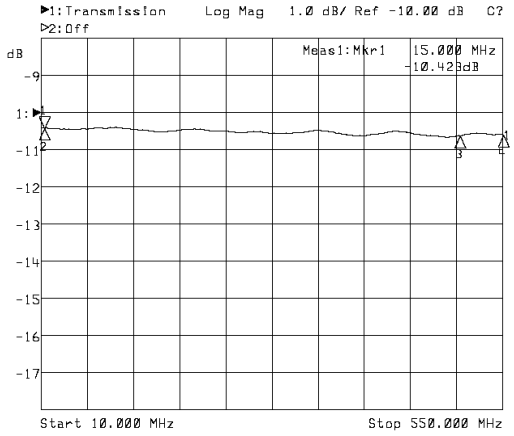
Insertion Loss vs. Frequency



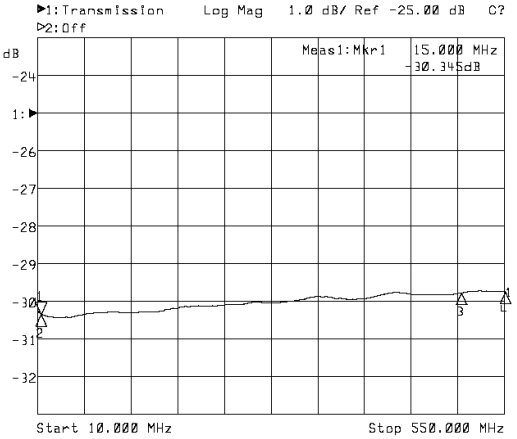
Input VSWR vs. Frequency



Coupling vs. Frequency



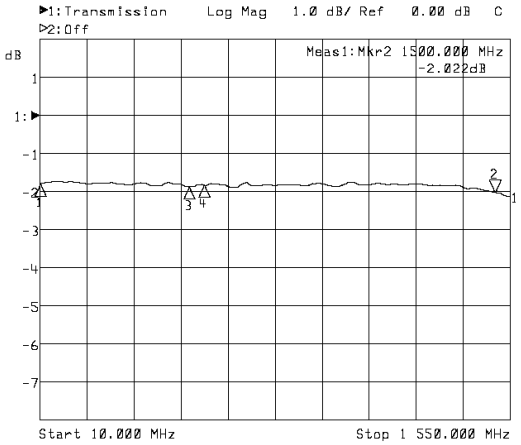
Isolation vs. Frequency



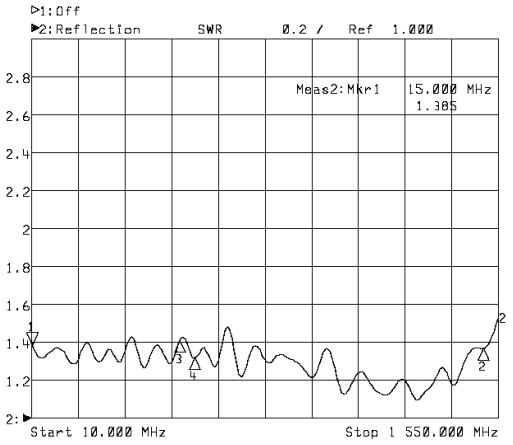
Typical Performance Curves

(TDC-10B)

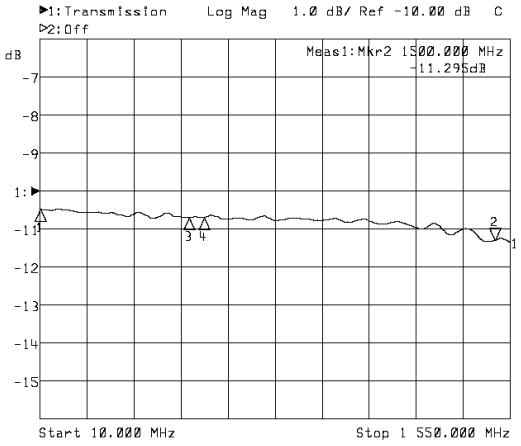
Insertion Loss vs. Frequency



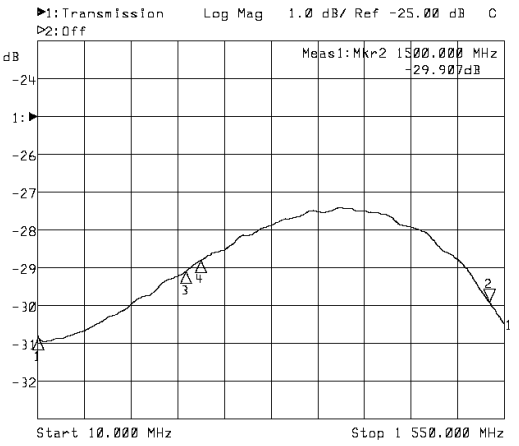
Input VSWR vs. Frequency



Coupling vs. Frequency



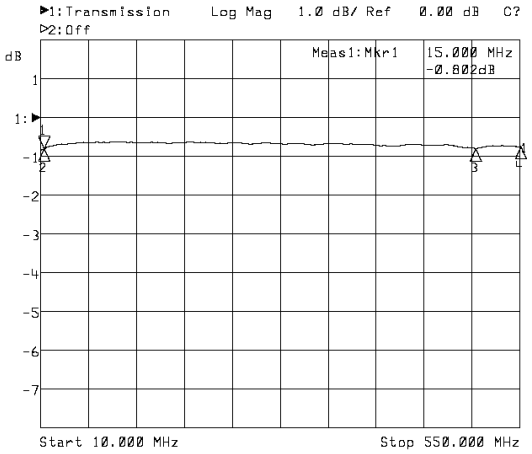
Isolation vs. Frequency



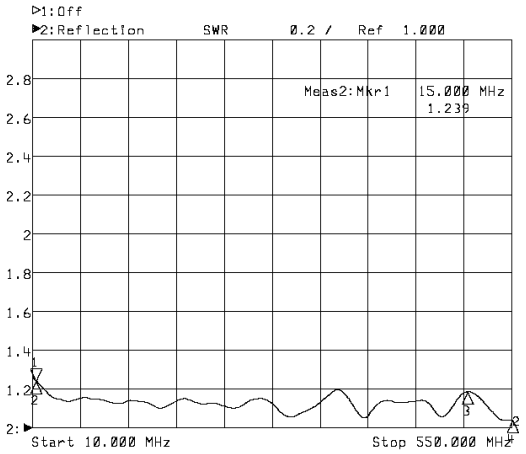
Typical Performance Curves

(TDC-15A)

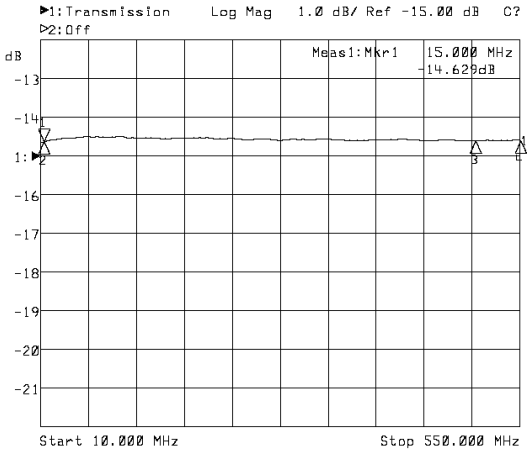
Insertion Loss vs. Frequency



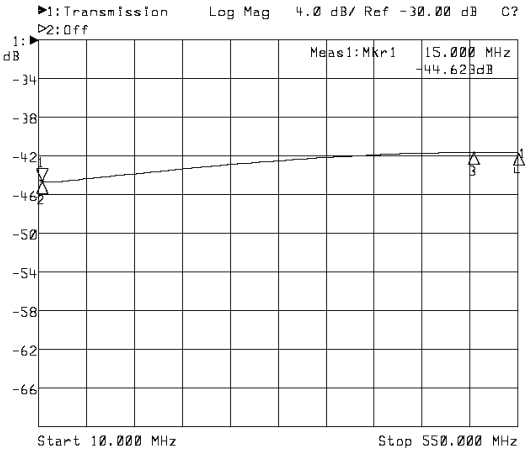
Input VSWR vs. Frequency



Coupling vs. Frequency



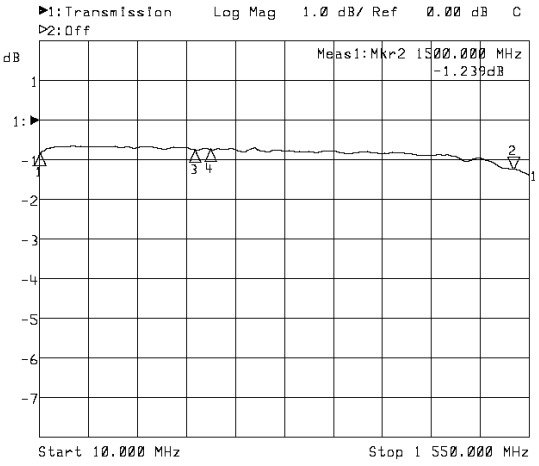
Isolation vs. Frequency



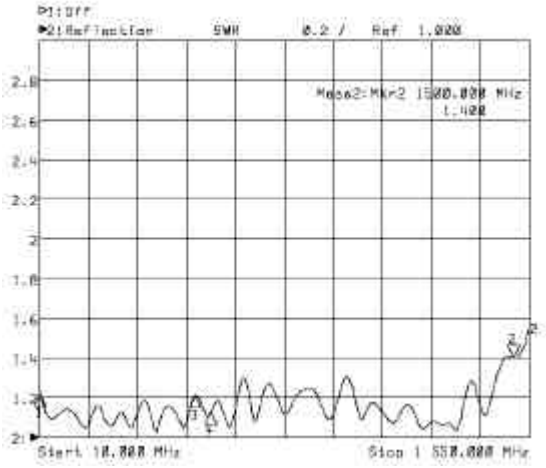
Typical Performance Curves

(TDC-15B)

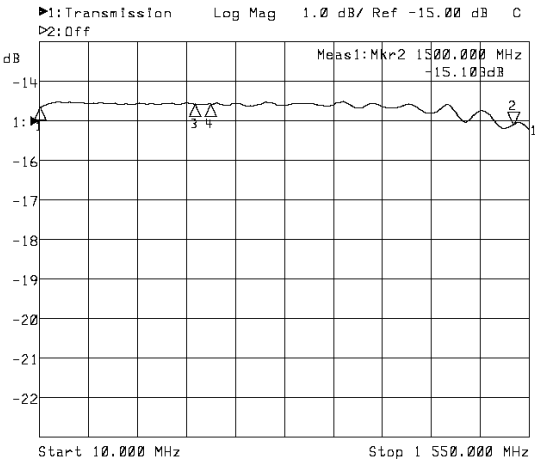
Insertion Loss vs. Frequency



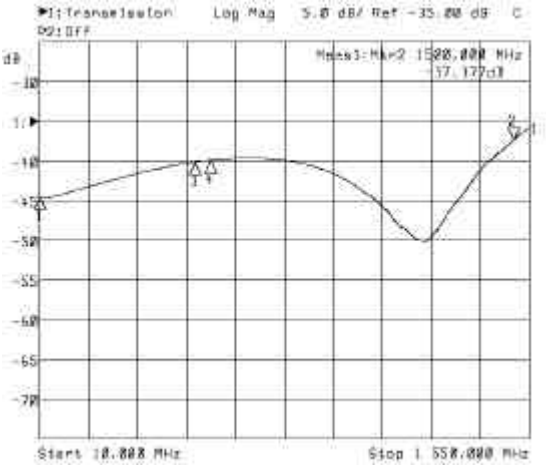
Input VSWR vs. Frequency



Coupling vs. Frequency



Isolation vs. Frequency



HE043

Microwave & RF Threshold Detector

Features

- Broadband
- Internal Temperature Compensation
- Tunable Threshold Level
- TTL Output
- Low Static Dissipation:+5V@4mA, R_L=1MΩ(typ)
- Wide Operating Temperature: -55℃~+85℃

Specifications

Parameter	Symbol	Tested Conditions (Vcc=5V T_A = +25 ℃)	Guaranteed		Unit
			Min	Max	——
Frequency Range	f_L-f_H	——	0.01	2	GHz
Input Power Range	Pi	——	-10	+10	dBm
Flatness	——	f=0.01~2Ghz R_{th}=330Ω	——	±1	dB
Temp Stability	——	T_A=-55℃~+85℃	——	±1	dB
TTL Output	V_{OH}	R_L=1MΩ	3.0	——	V
	V_{OL}		——	0.3	
Output Current	——	R_L=280Ω	10(typ)		mA

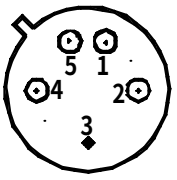
Absolute Maximum Rating

Maximum DC Voltage ----- +5.5VDC

Maximum Output Current----+15mA

Maximum Input Power(CW)---- +17dBm

Storage Temperature -- +125℃

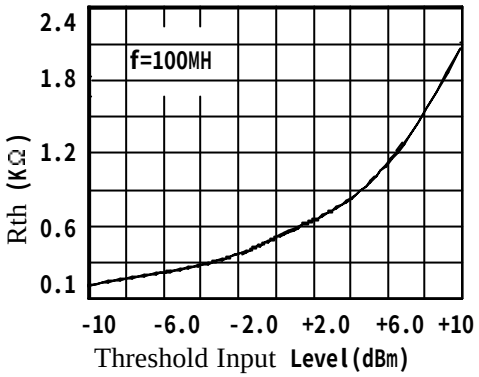


TO-8G

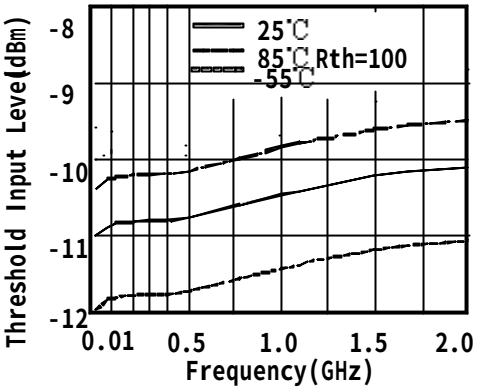
1: R_{th} For Tuning Threshold Level
2: RF Input
3: GND
4: Output TTL_{OUT}
5: Vcc=+5V

Typical Performance Curves

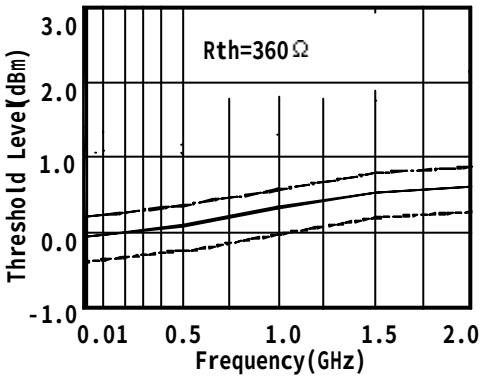
R_{th} vs. Threshold Level



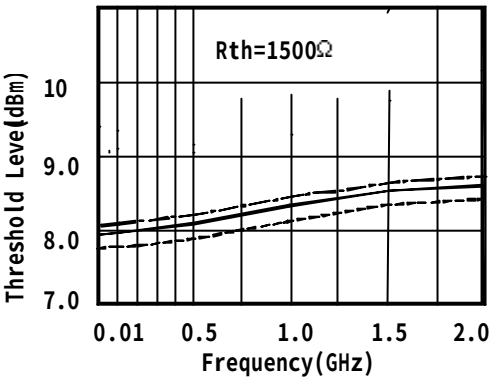
Threshold Level Vs. Frequency



Threshold Level Vs. Frequency

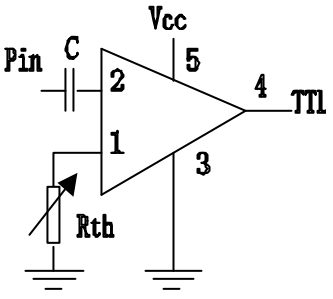


Threshold Level Vs. Frequency



Note:

1. **Required input capacitance .**
2. **Threshold level should be lower 3dB than tested RF Power.**
3. **Noninvertion Output.**
4. **Required Decoupling capacitances(0.1μF and 10000pF).**
5. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
6. Anti-electrostatic measures should be adopted when solder device.
7. **Rth reference value is between 90~2200Ω.**



HE043P

Pulse Modulation RF Threshold Detector

Features

- Detected Pulse Modulation RF
- Broadband
- Internal Temperature Compensation
- Tunable Threshold Level
- TTL Output
- Low Static Dissipation:+5V@4mA, R_L=1MΩ (typ)
- Wide Operating Temperature: -55℃~+85℃

Specifications

Parameter	Symbol	Tested Conditions (Vcc=5V T_A = +25 ℃)	Guaranteed		Unit
			Min	Max	——
Frequency Range	f_L-f_H	——	10	2000	MHz
Pulse width	t_w	——	100	——	ns
Keeping Time[1)]	t_s	f=100MHz	——	3	ms
Input Power	——	f=100MHz tw=1us	-20	0	dBm
Output High Level	V_{OH}	——	3.5	——	V
Output Low Level	V_{OL}	——	——	0.3	
Output Current	——	R_L=300Ω	10(typ)		mA
Note[1)]: Customer's detectors can be offered, Max keeping time 100ms.					

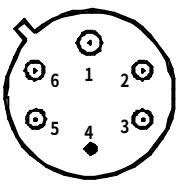
Absolute Maximum Rating

Maximum DC Voltage ----- +5.5VDC

Maximum Output Current----+15mA

Maximum Input Power(CW)---- +10dBm

Storage Temperature -- +125℃

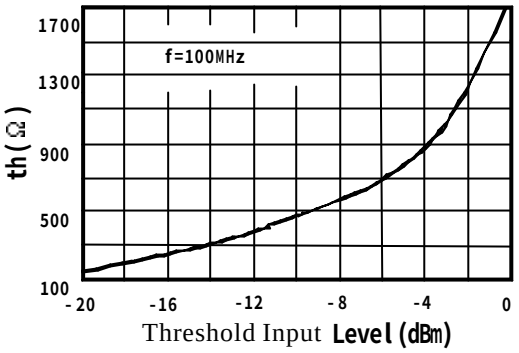


TO-8E

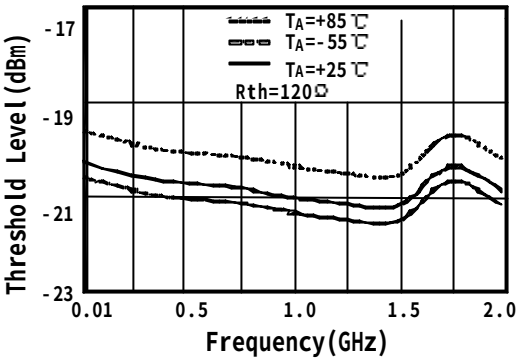
1: Vcc=+5V
2: R_{th} For Tuning Threshold Level
3: RF Input
4: GND
5: NC
6: Output

Typical Performance Curves

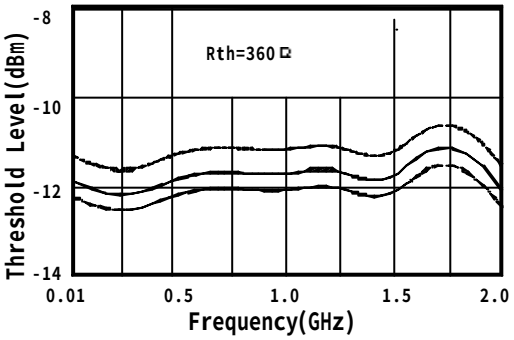
R_{th} vs. Threshold Level



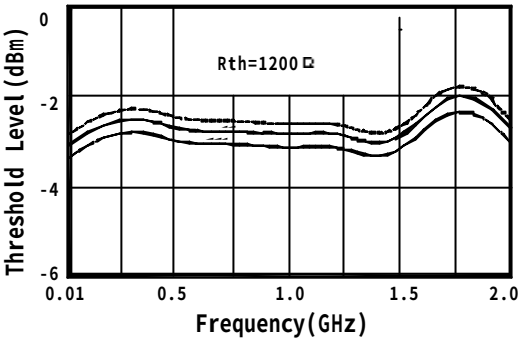
Threshold Level Vs. Frequency



Threshold Level Vs. Frequency

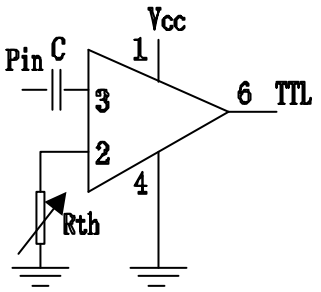


Threshold Level Vs. Frequency



Note:

1. Required input capacitance .
2. Threshold level should be lower 3dB than tested RF Power.
3. Noninvertion Output.
4. Required Decoupling capacitances(0.1μF and 10000pF).
5. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
6. Anti-electrostatic measures should be adopted when soldering device.
7. Rth reference value is between 100~2000Ω.



HE043P-2

Pulse Modulation RF Threshold Detector

Features

- CW And Pulse Modulation RF Compatible
- Broadband
- Internal Temperature Compensation
- Tunable Threshold Level
- TTL Output
- Low Static Dissipation:+5V@4mA, R_L=1MΩ (typ)
- Wide Operating Temperature: -55℃~+85℃

Specifications

Parameter	Symbol	Tested Conditions (Vcc=5V T_A = +25 ℃)	Guaranteed		Unit
			Min	Max	——
Frequency Range	f_L-f_H	——	0.01	2	GHz
Pulse width	t_w	——	100	——	ns
Keeping Time[1)]	t_s	f=0.1GHz	——	3	ms
Input Power(CW and Pulse)	——	f=0.1GHz tw=1us	-20	0	dBm
Output High Level	V_{OH}	——	3.0	——	V
Output Low Level	V_{OL}	——	——	0.3	
Output Current	——	R_L=300Ω	10(typ)		mA
Note[1)]: Customer's detectors can be offered, Max keeping time 100ms.					

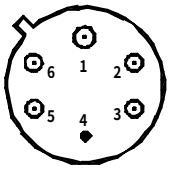
Absolute Maximum Rating

Maximum DC Voltage ----- +5.5VDC

Maximum Output Current----+15mA

Maximum Input Power(CW)---- +10dBm

Storage Temperature -- +125℃

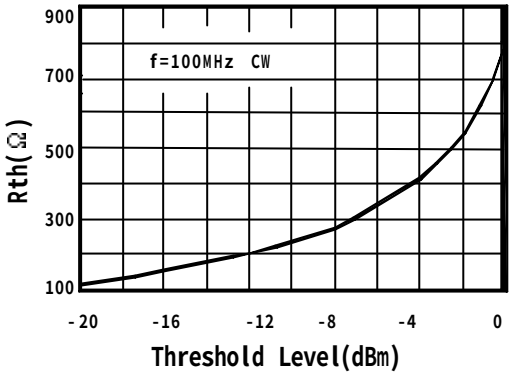


TO-8E

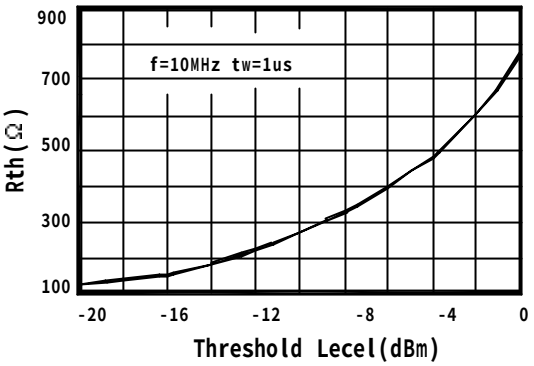
1: RF Input
2: R_{th} For Tuning Threshold Level
3: Output
4: GND
5: NC
6: Vcc=+5V

Typical Performance Curves

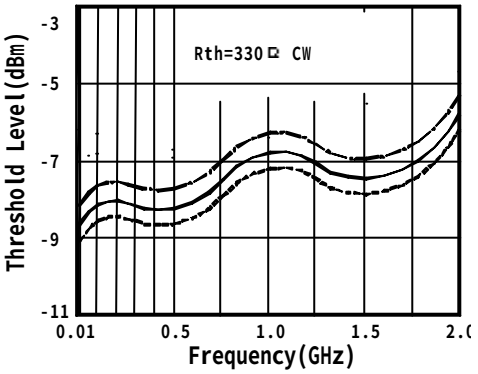
R_{th} vs. Threshold Level



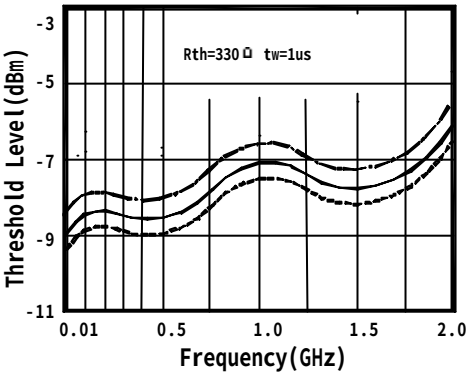
R_{th} vs. Threshold Level



Threshold Level Vs. Frequency

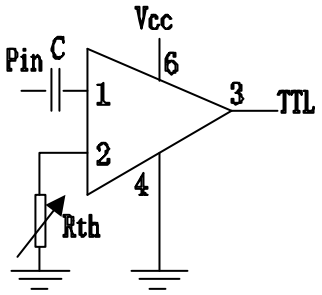


Threshold Level Vs. Frequency



Note:

1. **Required input capacitance .**
2. **Threshold level should be lower 3dB than tested RF Power.**
3. **Noninvertion Output.**
4. **Required Decoupling capacitances(0.1μF and 10000pF).**
5. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
6. Anti-electrostatic measures should be adopted when solder device.
7. **Rth reference value is between 90~1200Ω.**



HE111

Demodulator For Pulse Modulation RF

Features

- Broadband
- TTL Compensatory Output
- Internal Temperature Compensation
- Tunable Threshold Level
- TTL Output
- Low Static Dissipation:+5V@5mA, R_L=1MΩ (typ)
- Wide Operating Temperature: -55℃~+85℃

Specifications

Parameter	Symbol	Tested Conditions (Vcc=5V T_A = +25 ℃)	Guaranteed		Unit
			Min	Max	——
Carrier Frequency	f_L-f_H	——	0.03	2	GHz
Input Pulse Width	tw	——	0.2	CW	us
Pulse Input Power	Pi	——	-10	+10	dBm
Output Delay	——	f=0.03~2GHz tw=0.5us Pi=0dBm	——	0.1	us
Rise Time	tr		——	20	ns
Fall Time	tf		——	20	ns
Input/Output Pulse Width Ratio[1)]	γ		0.9	1.1	——
TTL Output	V_{OH}	R_L=1kΩ	3.0	——	V
	V_{OL}		——	0.3	

Note[1)] :Max output pulse width can change 50ns when carrier frequency and pulse width lower 50MHz and 500ns respectively.

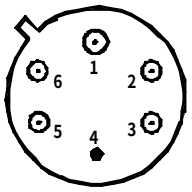
Absolute Maximum Rating

Maximum DC Voltage ----- +5.5VDC

Maximum Output Current----+13mA

Maximum Input Power(CW)---- +17dBm

Storage Temperature -- +125℃

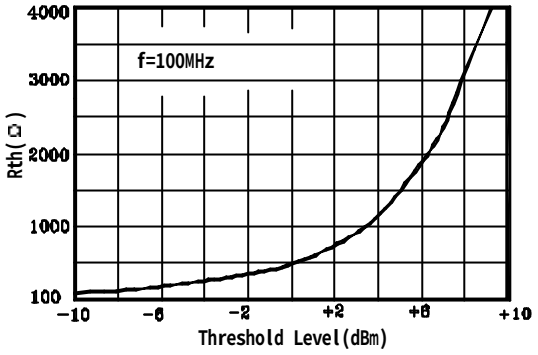


TO-8E

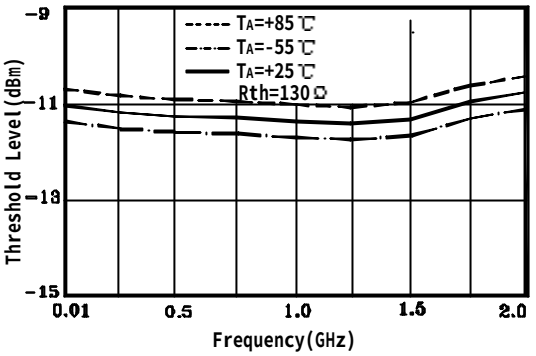
1: Vcc=+5V
2: R_{th} For Tuning Threshold Level
3: RF Input
4: GND
5: Noninverting Output Q
6: Inverting Output Q'

Typical Performance Curves

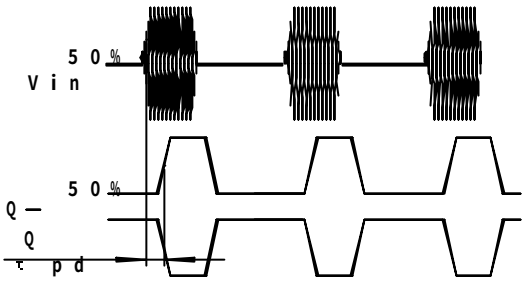
R_{th} vs. Threshold Level



Threshold Level Vs. Frequency

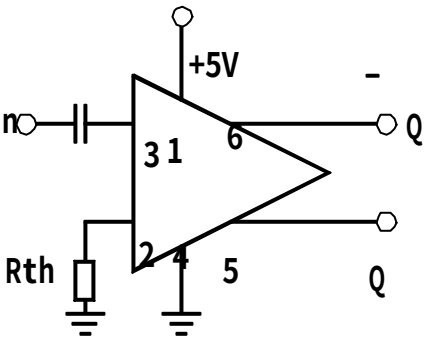


Input/Output Performance



Note:

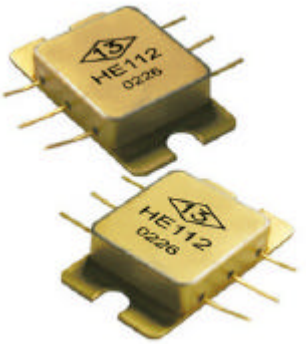
1. **Required input capacitance .**
2. **Noninvertion output will keep high level or low level when R_{th} is too small or too large, R_{th} should be adjusted. Inverting output is similar to.**
3. **Required Decoupling capacitances(0.1μF and 10000pF).**
4. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
5. Anti-electrostatic measures should be adopted when soldering device.
6. **Rth reference value is between 90Ω~5kΩ.**



HE112

Demodulator For Pulse Modulation RF

Features



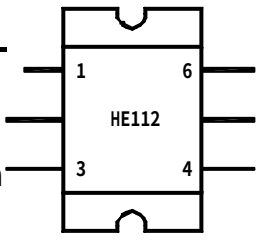
- Broadband
- TTL Compensatory Output
- Internal Temperature Compensation
- Tunable Threshold Level
- TTL Output
- Low Static Dissipation:+5V@5mA, R_L=1MΩ (typ)
- Wide Operating Temperature: -55℃~+85℃

Specifications

Parameter	Symbol	Tested Conditions (Vcc=5V T_A = +25 ℃)	Guaranteed		Unit
			Min	Max	——
Carrier Frequency	f_L-f_H	——	0.1	6	GHz
Input Pulse Width	tw	——	0.2	CW	us
Pulse Input Power	Pi	——	-10	+10	dBm
Output Delay	——	f=0.1~6Ghz tw=0.5us Pi=0dBm	——	0.1	us
Rise Time	tr		——	20	ns
Fall Time	tf		——	20	ns
Input/Output Pulse Width Ratio	γ		0.9	1.1	——
TTL Output	V_{OH}	R_L=1kΩ	3.0	——	V
	V_{OL}		——	0.3	

Absolute Maximum Rating

Maximum DC Voltage ----- +5.5VDC
Maximum Output Current----+13mA
Maximum Input Power(CW)---- +15dBm
Storage Temperature -- +125℃

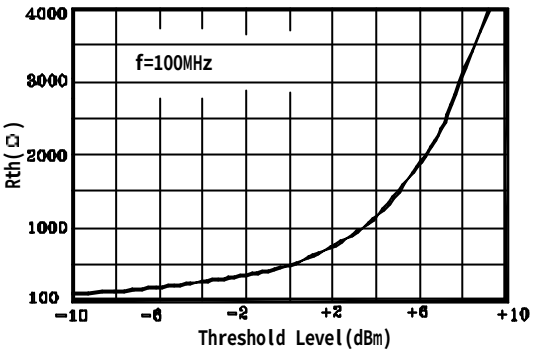


SP-1

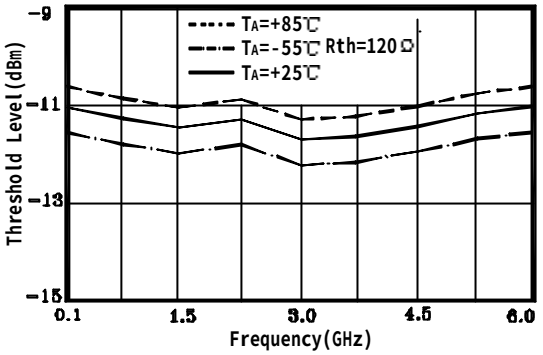
1: R_{th} For Tuning Threshold Level
2: RF Input
3: GND
4: Noninverting Output Q
5: Inverting Output Q'
6: Vcc=+5V

Typical Performance Curves

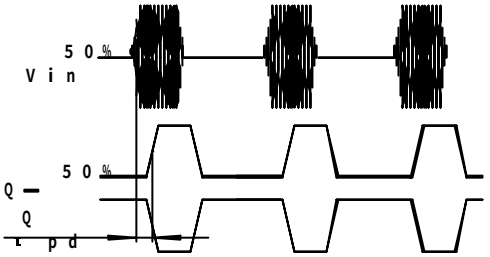
R_{th} vs. Threshold Level



Threshold Level Vs. Frequency

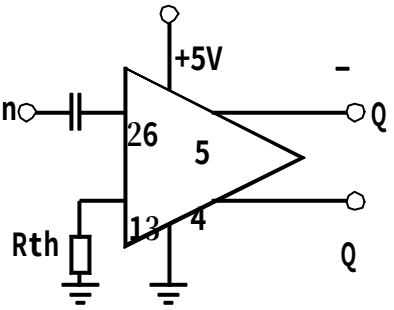


Input/Output Performance



Note:

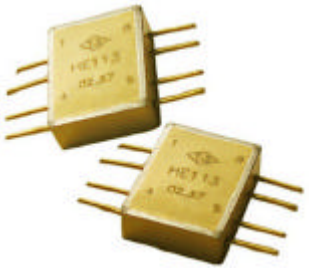
1. Required input capacitance .
2. Noninvertion output will keep high level or low level when R_{th} is too small or too large, R_{th} should be adjusted. Inverting output is similar to.
3. Required Decoupling capacitances(0.1μF and 10000pF).
4. Anti-electrostatic measures should be adopted when soldering device.
5. Rth reference value is between 90Ω~5kΩ.



HE113

Microwave & RF Threshold Detector

Features



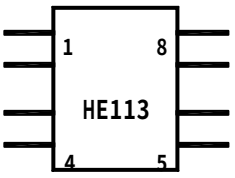
- Broadband
- Internal Temperature Compensation
- Tunable Threshold Level
- Pulse Modulation RF Input, Long Keeping Time
- TTL Output
- Low Static Dissipation:+5V@4mA， R_L=1MΩ（typ）
- Wide Operating Temperature：-55℃~+85℃

Specifications

Parameter	Symbol	Tested Conditions (Vcc=5V T_A = +25 ℃)	Guaranteed		Unit
			Min	Max	——
Carrier Frequency	f_L-f_H	——	0.1	2	GHz
Input Pulse Width	tw	——	0.2	——	us
Pulse Input Cycle	T_s	——	20	——	Hz
Output Keeping Time	——	——	——	50	ms
Input Power	Pi	——	0	+12	dBm
Temp Stability	——	T_A=-55℃~+85℃	——	±1	dB
TTL Output	V_{OH}	R_L=1MΩ	3.0	——	V
	V_{OL}		——	0.3	
Output Current	——	R_L=300Ω	10(typ)		mA

Absolute Maximum Rating

Maximum DC Voltage ----- +5.5VDC
Maximum Output Current----+13mA
Maximum Input Power(CW)---- +15dBm
Storage Temperature -- +125℃

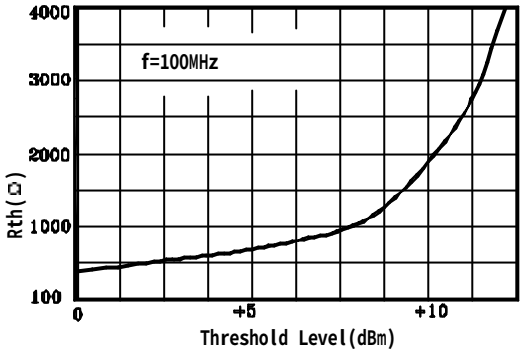


SP-251

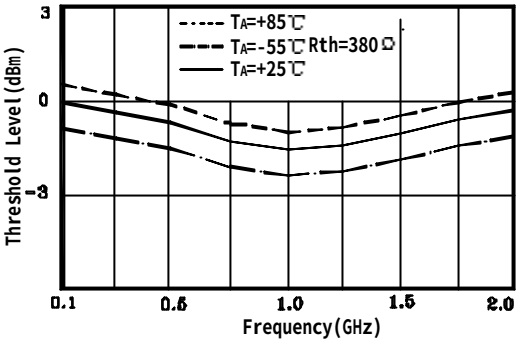
1: TTL OUTPUT
2.3.6.7: GND
4: RF Input
5: R_{th} For Tuning Threshold Level
8: Vcc=+5V

Typical Performance Curves

R_{th} vs. Threshold Level

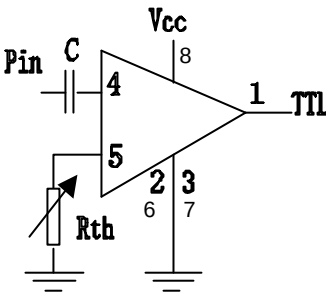


Threshold Level Vs. Frequency



Note:

1. Required input capacitance .
2. Threshold level should be lower 3dB than tested RF Power.
3. Noninvertion Output.
4. Required Decoupling capacitances(0.1μF and 10000pF).
5. Anti-electrostatic measures should be adopted when soldering device.
6. Rth reference value is between 90Ω~10kΩ.



HE057

Pulse Modulation RF Threshold Detector

Features

- Selected Detecting, Anti- disturbance
- High Detecting Sensitivity
- Internal Temperature Compensation
- Tunable Threshold Level
- TTL Output
- Low Static Dissipation:+5V@4mA, R_L=1MΩ (typ)
- Wide Operating Temperature: -55℃~+100℃

Specifications

Parameter	Symbol	Tested Conditions (Vcc=5V T_A = +25 ℃)	Guaranteed			Unit
			Min	typ	Max	——
Frequency Range[1)]	f_0	——	10	——	200	MHz
Pulse width	t_w	——	100	——	——	ns
Detectable Sensitivity	Vs(V_{P-P})	f=60MHz tw=0.2us	——	100	120	mV
Detecting Time	τ_{PD1}	f=60MHz tw=0.2us	——	100	200	ns
Clear Time	τ_{PD2}	f=60MHz tw=0.2us	——	40	100	ns
Output High Level	V_{OH}	——	3.5	4.8	——	V
Output Low Level	V_{OL}	f=60MHz tw=0.2us	——	0.1	0.3	
Output Current	——	R_L=300Ω	10(typ)			mA
Note[1)]: Customer's detectors can be offered, frequency range 10MHz—2000MHz.						

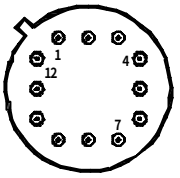
Absolute Maximum Rating

Maximum DC Voltage ----- +5.5VDC

Maximum Output Current----+15mA

Maximum Input Voltage---- 2V (Vp-p)

Storage Temperature -- +125℃



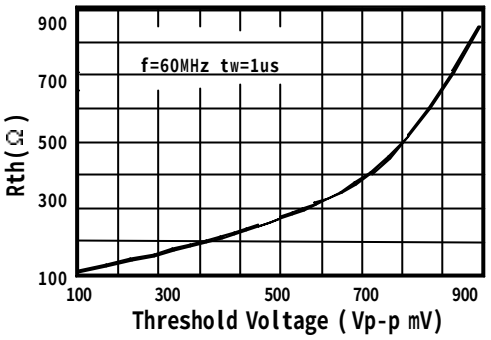
TO-8-12

Pin Function

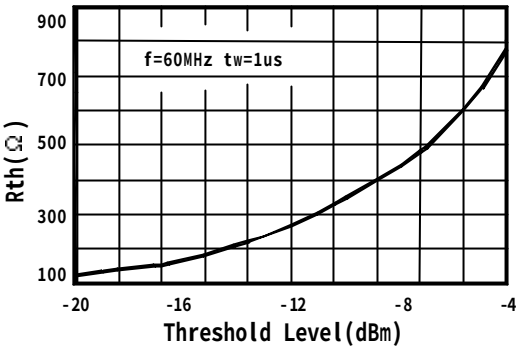
2: Pulse Input[1)]	3: Pulse Modulation Rfin[1)]	Note[1)]: The device can operate either inputing pulse or pulse modulation RF.
4: R_{th} For Tuning Threshold Level	6: TTL Output	
7: GND	10: Cp-Clock Signal	
11: +5V	1、5、8、9、11 :NC	

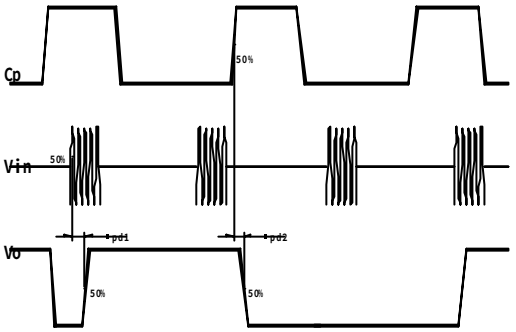
Typical Performance Curves

R_{th} vs. Threshold Voltage



R_{th} vs. Input Level





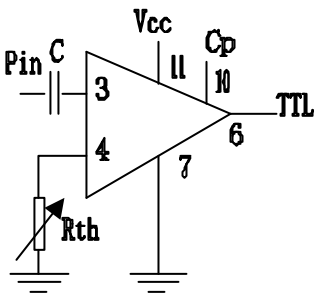
Input/Output Wave

About Input/Output Wave:

TTL output will reset when Cp rise edge occurs. Within the high level of Cp and the RF input power is beyond the threshold level, TTL output change to high level.,without the Cp high level, TTL output will hold itself as the primary stage, regardless any input power. So the device has excellently anti- disturbance characteristic. Input signal should drop behind more than 100ns relative to Cp rise edge; The operation frequency of HE057 can reach 2GHz under fixed frequency detecting.

Notes:

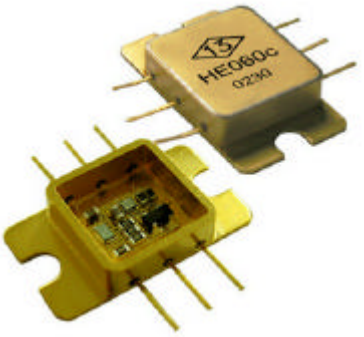
1. **Required input capacitance .**
2. **Threshold level should be lower 3dB than tested RF Power.**
3. **Noninvertion Output.**
4. **Required Decoupling capacitances.**
5. Required the Plug-in package bottom grounded tightly with PCB(Mounting kit can be provided).
6. Anti-electrostatic measures should be adopted when soldering device.
7. **Rth reference value is between 100~1200Ω.**



HE060C

Microwave & RF Threshold Detector

Features



- Detected CW
- Broadband, High Sensitivity
- Internal Temperature Compensation
- Tunable Threshold Level
- TTL Output
- Low Static Dissipation:+5V@4mA, R_L=1MΩ（typ）

Specifications

Parameter	Symbol	Tested Conditions (Vcc=5V T_A = +25 ℃)	Guaranteed		Unit
			Min	Max	——
Frequency Range	f_L-f_H	——	2	6	GHz
Input Power	Pi	——	-20	0	dBm
Flatness	-	R_{th}=330Ω	——	±1.5	dB
TTL Output	V_{OH}	R_L=1MΩ	3.5	——	V
	V_{OL}		——	0.3	
Output Current	——	R_L=300Ω	10(typ)		mA

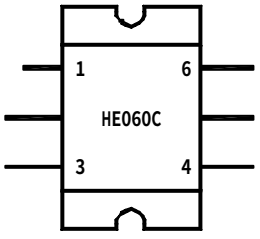
Absolute Maximum Rating

Maximum DC Voltage ----- +5.5VDC

Maximum Output Current----+15mA

Maximum Input Power(CW)---- +10dBm

Storage Temperature -- +125℃

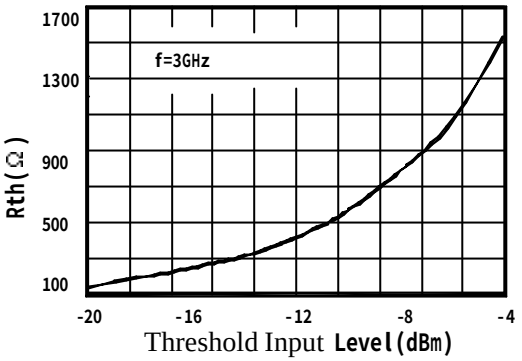


SP-1

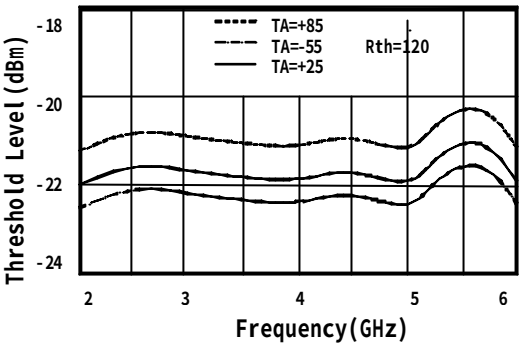
1: R_{th} For Tuning Threshold Level
2: RF InPut
3: GND
4: NC
5: TTL Output
6: Vcc=+5V

Typical Performance Curves

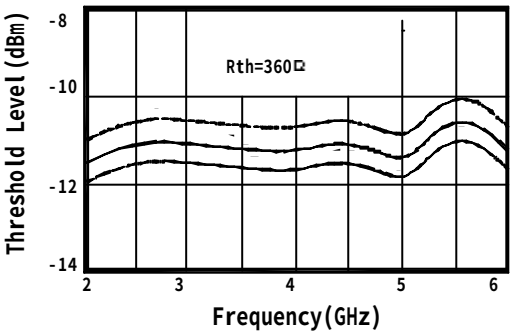
R_{th} vs. Threshold Level



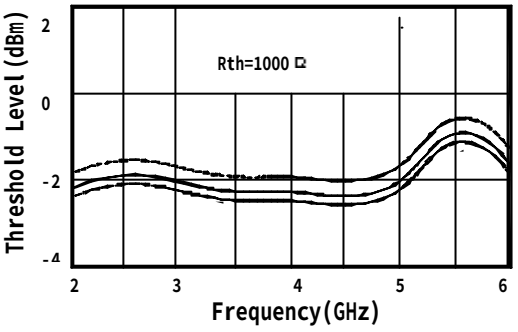
Threshold Level Vs. Frequency



Threshold Level Vs. Frequency

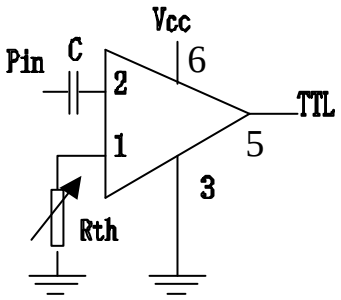


Threshold Level Vs. Frequency



Note:

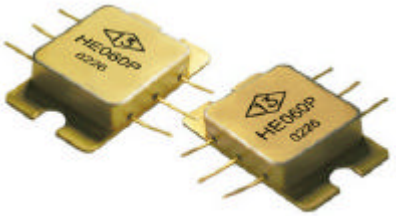
1. Required input capacitance .
2. Threshold level should be lower 3dB than tested RF Power.
3. Noninvertion Output.
4. Required Decoupling capacitances(0.1μF and 10000pF).
5. Required the Plug-in package bottom grounded tightly.
6. Anti-electrostatic measures should be adopted when soldering device.
7. Rth reference value is between 100~1200Ω.



HE060P

Pulse Modulation RF Threshold Detector

Features



- Detected Pulse Modulation RF
- Broadband, High Sensitivity
- Internal Temperature Compensation
- Tunable Threshold Level
- TTL Output
- Low Static Dissipation:+5V@4mA, R_L=1MΩ (typ)
- Wide Operating Temperature: -55℃~+85℃

Specifications

Parameter	Symbol	Tested Conditions (Vcc=5V T_A = +25 ℃)	Guaranteed		Unit
			Min	Max	——
Frequency Range	f_L-f_H	——	2	6	GHz
Pulse width	t_w	——	100	——	ns
Keeping Time[1)]	t_s	f=2GHz	——	3	ms
Input Power	——	f=2GHz tw=1us	-20	0	dBm
Output High Level	V_{OH}	——	3.5	——	V
Output Low Level	V_{OL}	——	——	0.3	
Output Current	——	R_L=300Ω	10(typ)		mA
Note[1)]: Customer's detectors can be offered, Max keeping time 100ms.					

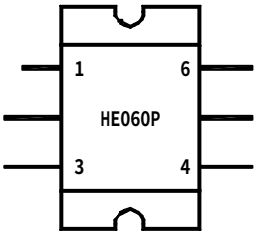
Absolute Maximum Rating

Maximum DC Voltage ----- +5.5VDC

Maximum Output Current----+15mA

Maximum Input Power(CW)---- +10dBm

Storage Temperature -- +125℃

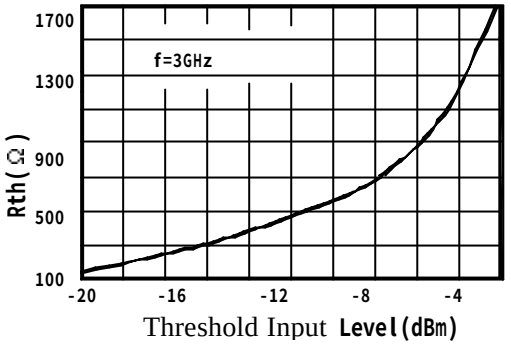


1: R_{th} For Tuning Threshold Level
2: RF Input
3: GND
4:NC
5: Output
6: Vcc=+5V

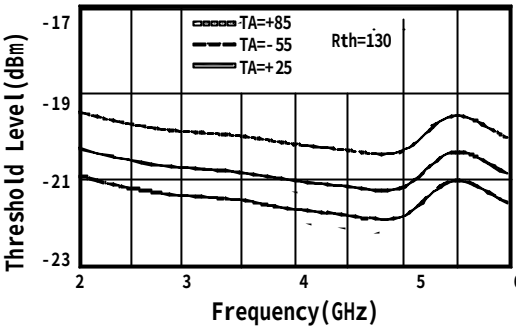
SP-1

Typical Performance Curves

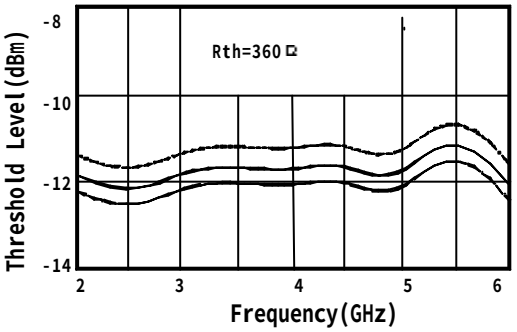
R_{th} vs. Threshold Level



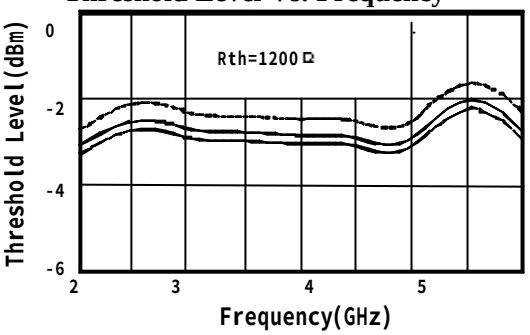
Threshold Level Vs. Frequency



Threshold Level Vs. Frequency

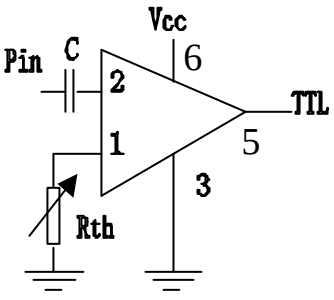


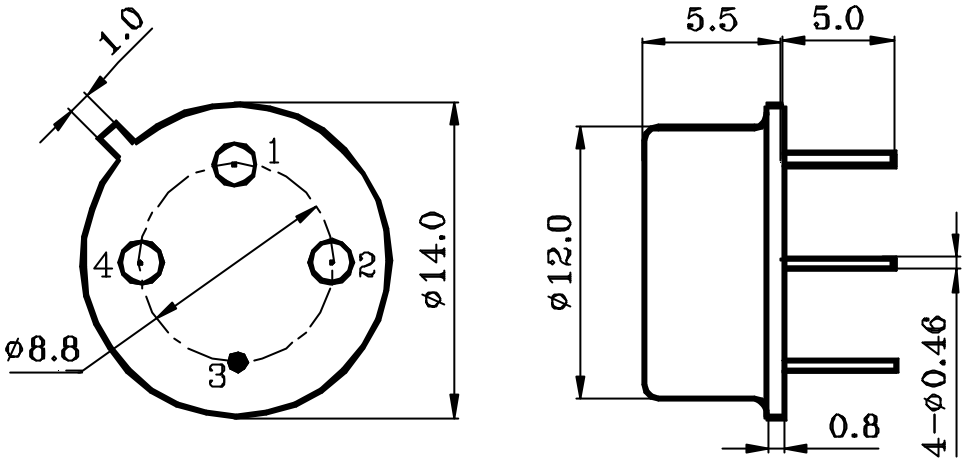
Threshold Level Vs. Frequency



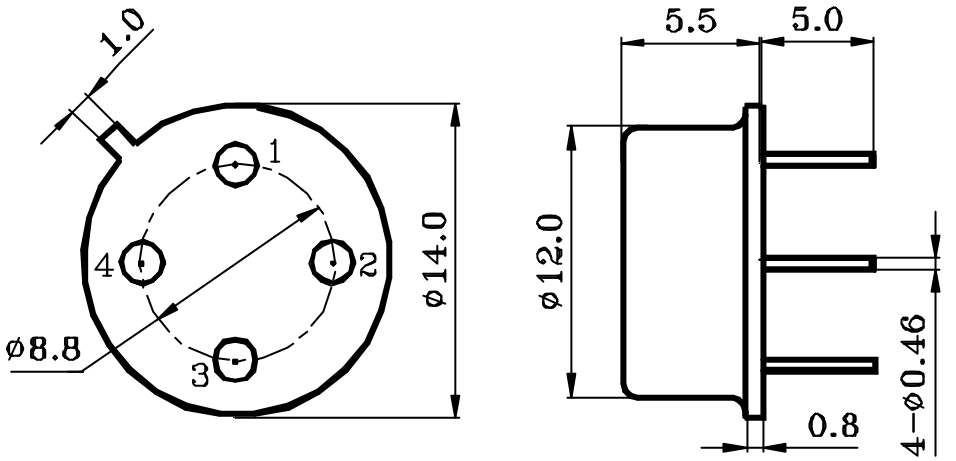
Note:

1. Required input capacitance .
2. Threshold level should be lower 3dB than tested RF Power.
3. Noninvertion Output.
4. Required Decoupling capacitances(0.1μF and 10000pF).
5. Required the Plug-in package bottom grounded tightly.
6. Anti-electrostatic measures should be adopted when soldering device.
7. Rth reference value is between 100~2000Ω.





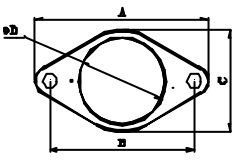
TO-8A



TO-8A-1

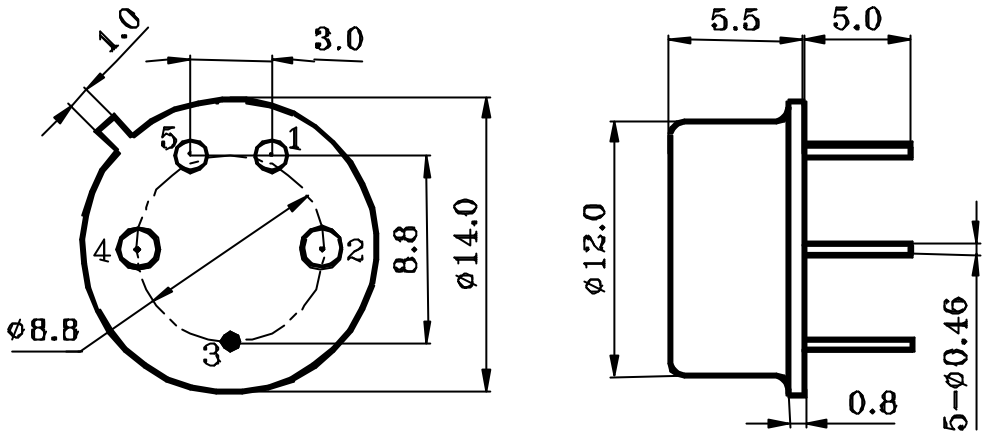
Mounting Kit For TO-8 Package

Model	A	B	C	D
	mm	mm	mm	mm
TO-8A TO-8A-1 TO-8B	21.8	17.4	13.2	12.5
TO-8C TO-8C-1	21.8	17.4	13.2	12.0
TO-8D TO-8E TO-8G	27.8	22.2	17.0	14.5
To-8F TO-8H	29.8	22.2	18.7	16.5
B-3	19.0	14.5	10.5	8.6

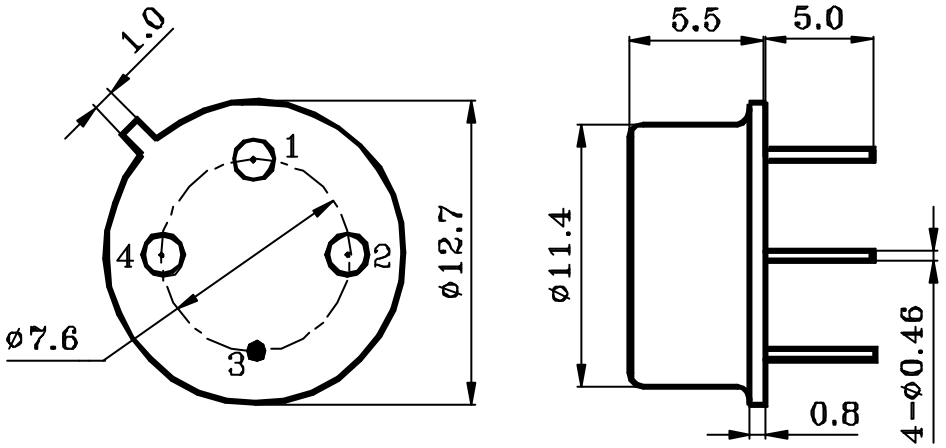


TO-8

Package Dimensions



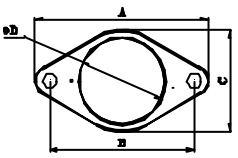
TO-8B



TO-8C

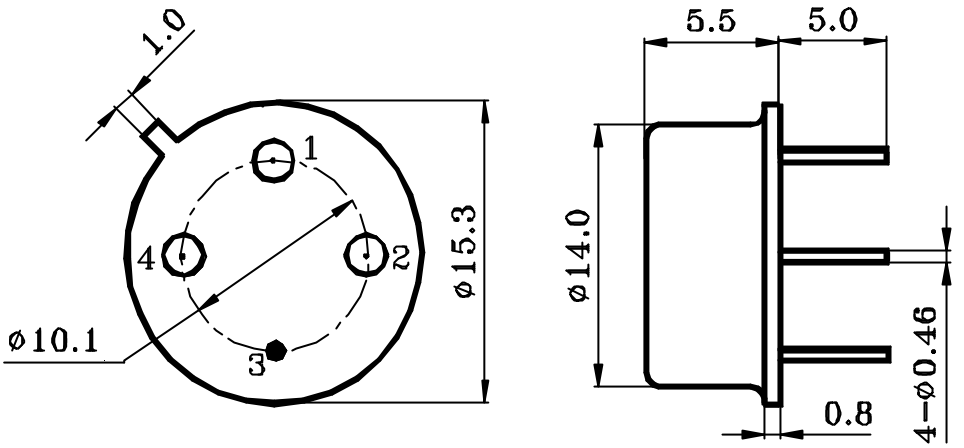
Mounting Kit For TO-8 Package

Model	A	B	C	D
	mm	mm	mm	mm
TO-8A TO-8A-1 TO-8B	21.8	17.4	13.2	12.5
TO-8C TO-8C-1	21.8	17.4	13.2	12.0
TO-8D TO-8E TO-8G	27.8	22.2	17.0	14.5
To-8F TO-8H	29.8	22.2	18.7	16.5
B-3	19.0	14.5	10.5	8.6

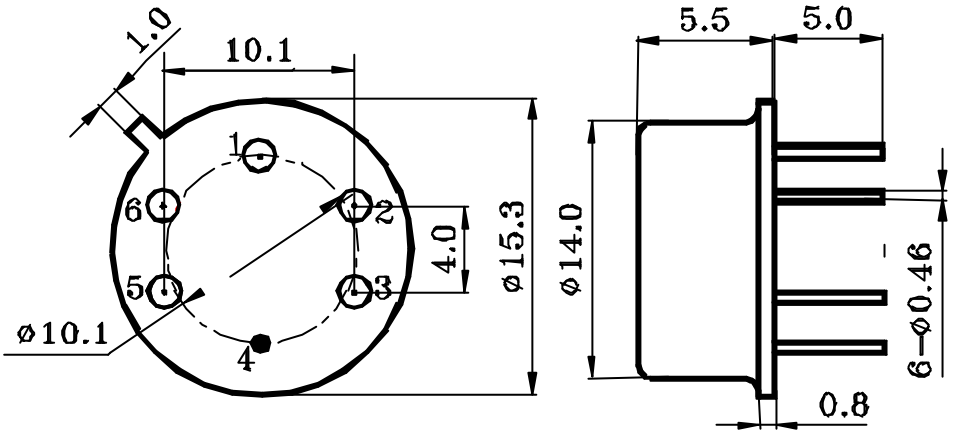


TO-8

Package Dimensions



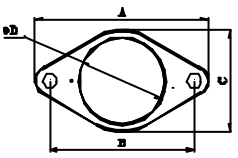
TO-8D



TO-8E

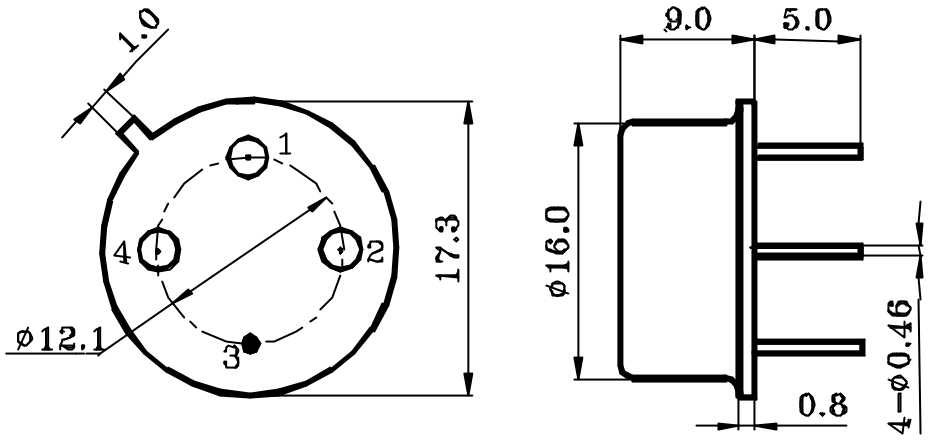
Mounting Kit For TO-8 Package

Model	A	B	C	D
	mm	mm	mm	mm
TO-8A TO-8A-1 TO-8B	21.8	17.4	13.2	12.5
TO-8C TO-8C-1	21.8	17.4	13.2	12.0
TO-8D TO-8E TO-8G	27.8	22.2	17.0	14.5
To-8F TO-8H	29.8	22.2	18.7	16.5
B-3	19.0	14.5	10.5	8.6

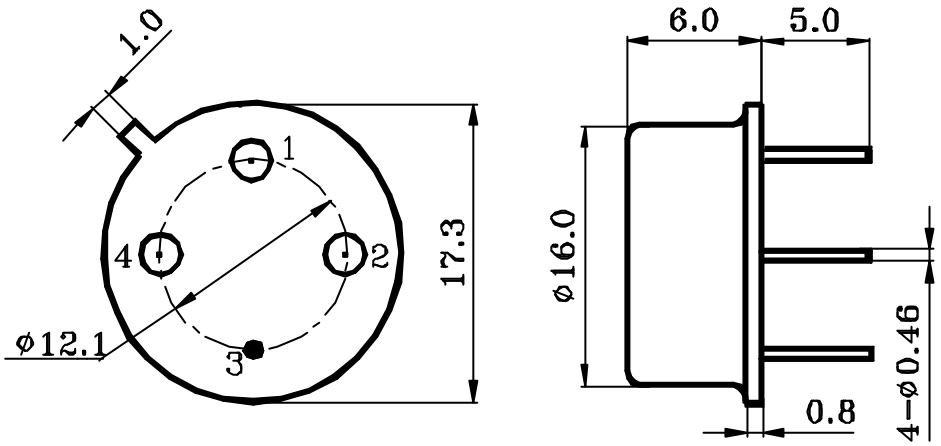


TO-8

Package Dimensions



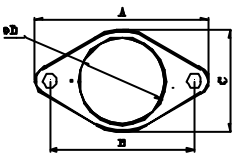
TO-8F-1



TO-8F

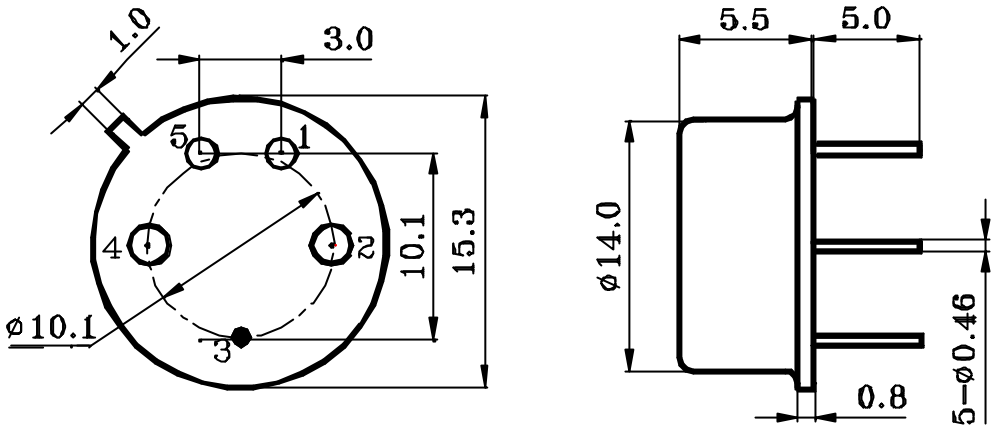
Mounting Kit For TO-8 Package

Model	A	B	C	D
	mm	mm	mm	mm
TO-8A TO-8A-1 TO-8B	21.8	17.4	13.2	12.5
TO-8C TO-8C-1	21.8	17.4	13.2	12.0
TO-8D TO-8E TO-8G	27.8	22.2	17.0	14.5
To-8F TO-8H	29.8	22.2	18.7	16.5
B-3	19.0	14.5	10.5	8.6

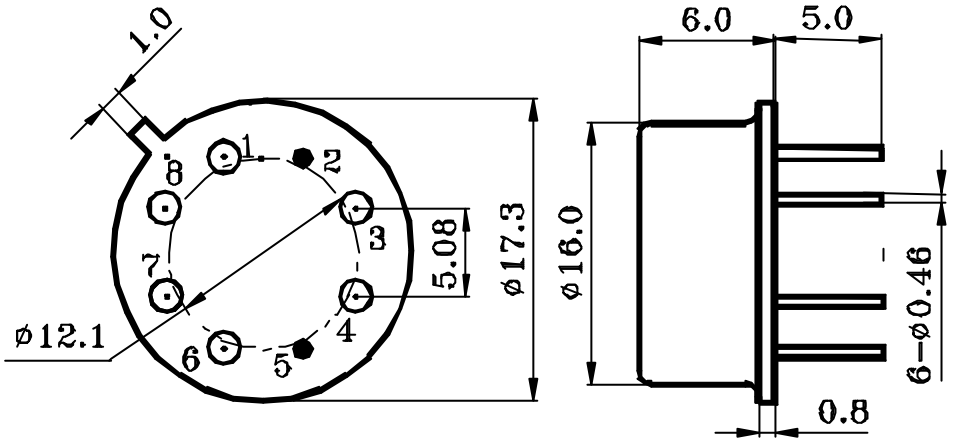


TO-8

Package Dimensions



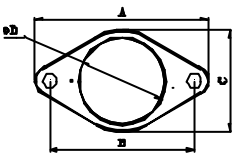
TO-8G



TO-8H

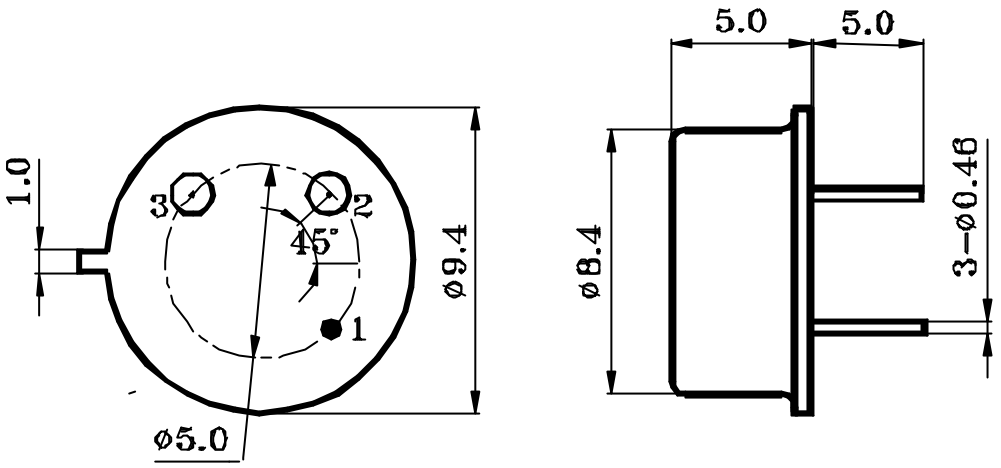
Mounting Kit For TO-8 Package

Model	A	B	C	D
	mm	mm	mm	mm
TO-8A TO-8A-1 TO-8B	21.8	17.4	13.2	12.5
TO-8C TO-8C-1	21.8	17.4	13.2	12.0
TO-8D TO-8E TO-8G	27.8	22.2	17.0	14.5
To-8F TO-8H	29.8	22.2	18.7	16.5
B-3	19.0	14.5	10.5	8.6

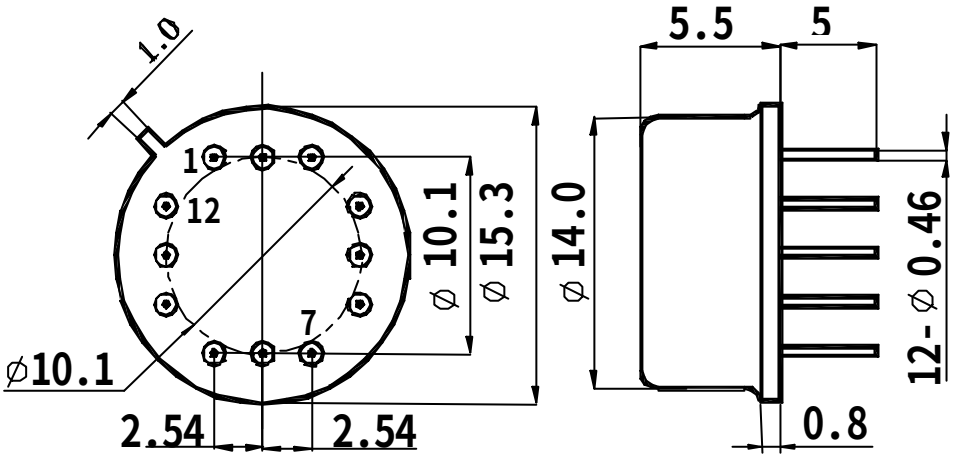


TO-8

Package Dimensions



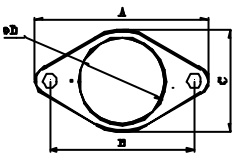
B-3



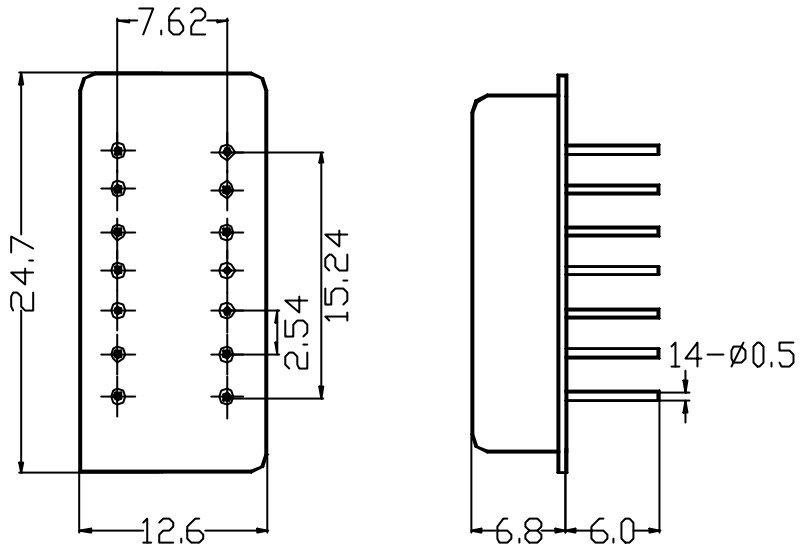
TO-8-12

Mounting Kit For TO-8 Package

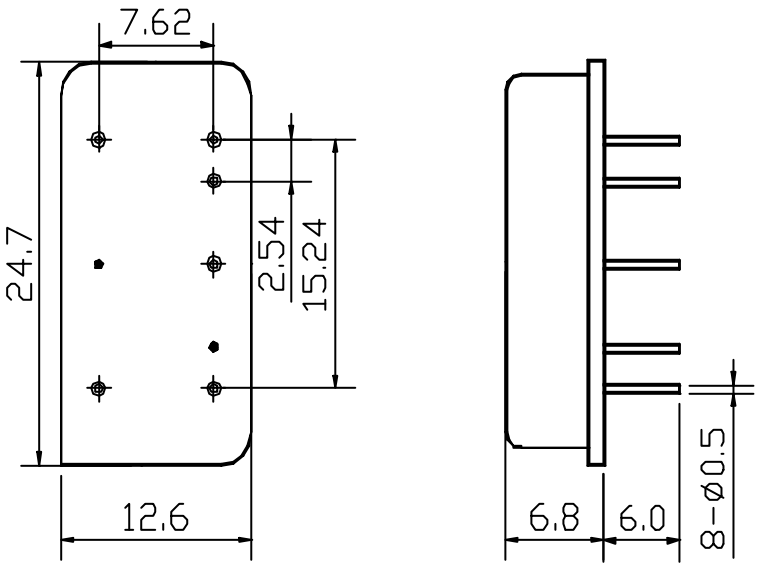
Model	A	B	C	D
	mm	mm	mm	mm
TO-8A TO-8A-1 TO-8B	21.8	17.4	13.2	12.5
TO-8C TO-8C-1	21.8	17.4	13.2	12.0
TO-8D TO-8E TO-8G	27.8	22.2	17.0	14.5
To-8F TO-8H	29.8	22.2	18.7	16.5
B-3	19.0	14.5	10.5	8.6



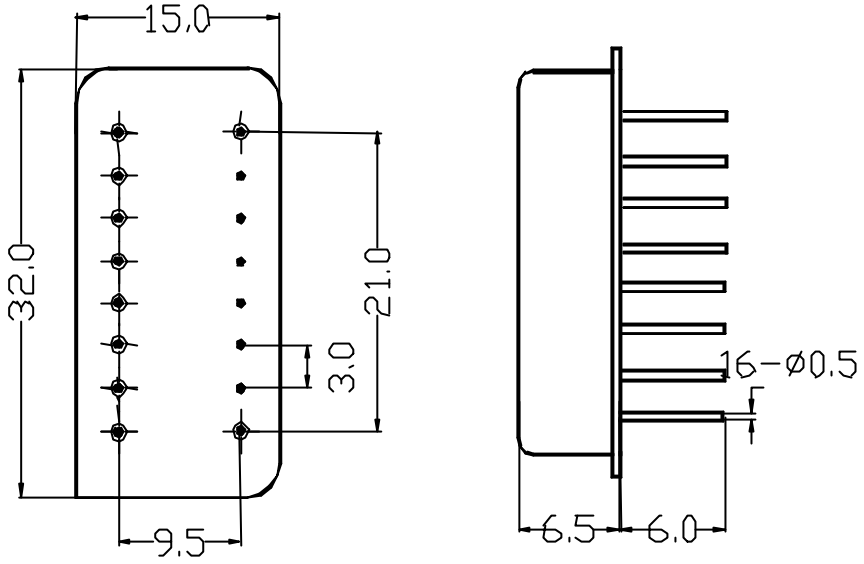
TO-8



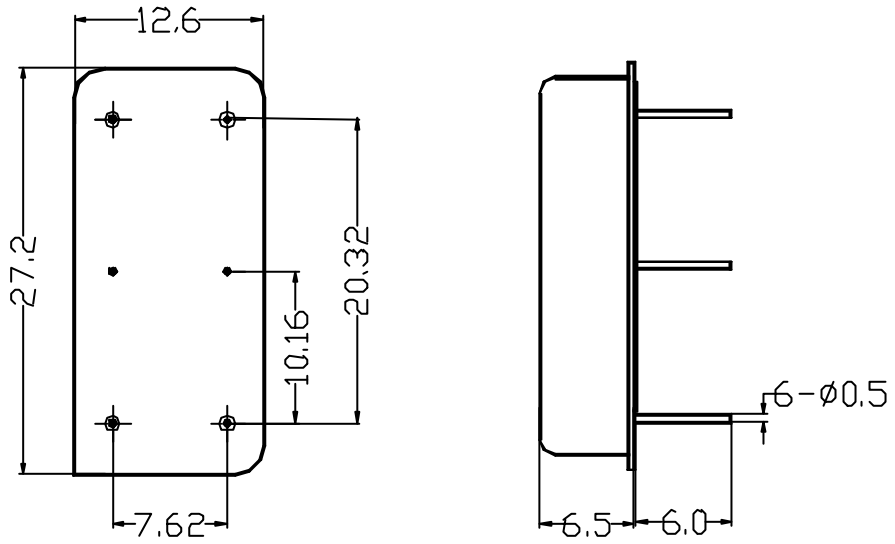
DIP-14A



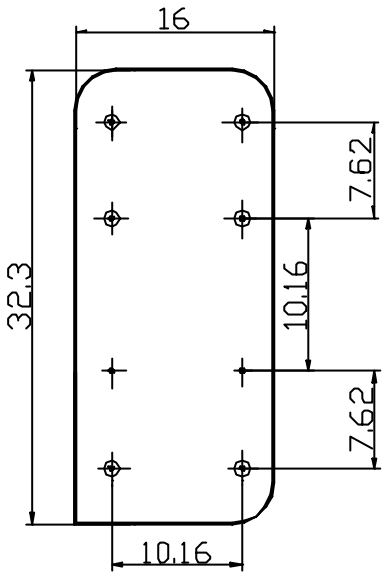
DIP-14C

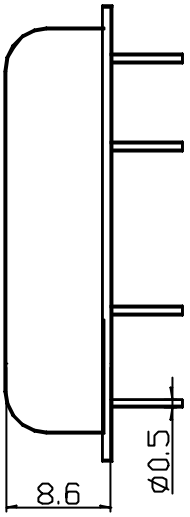


DIP-16

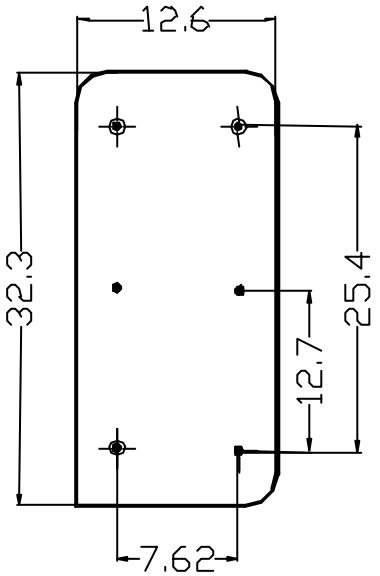


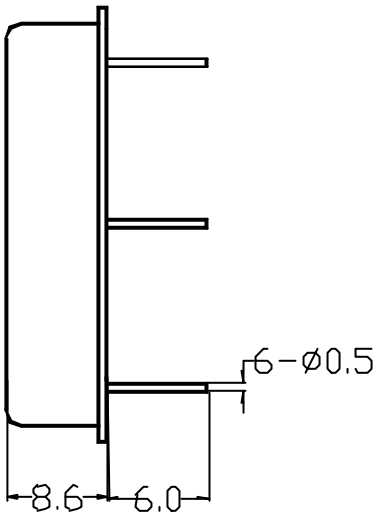
DIP-18C



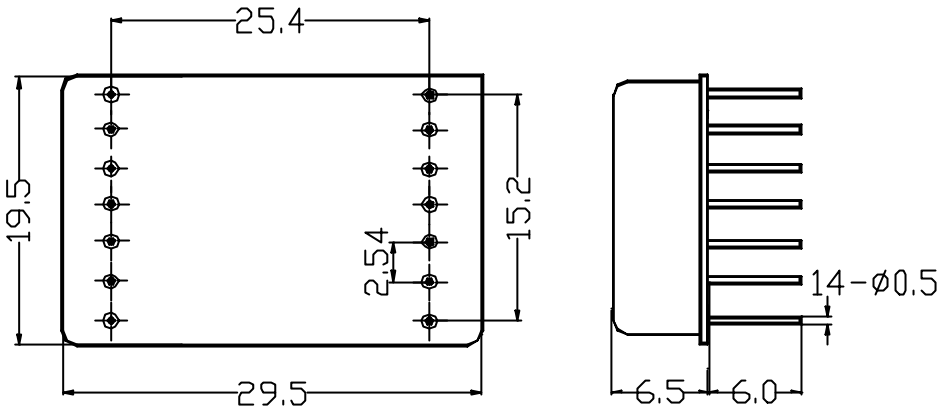


DIP-22A

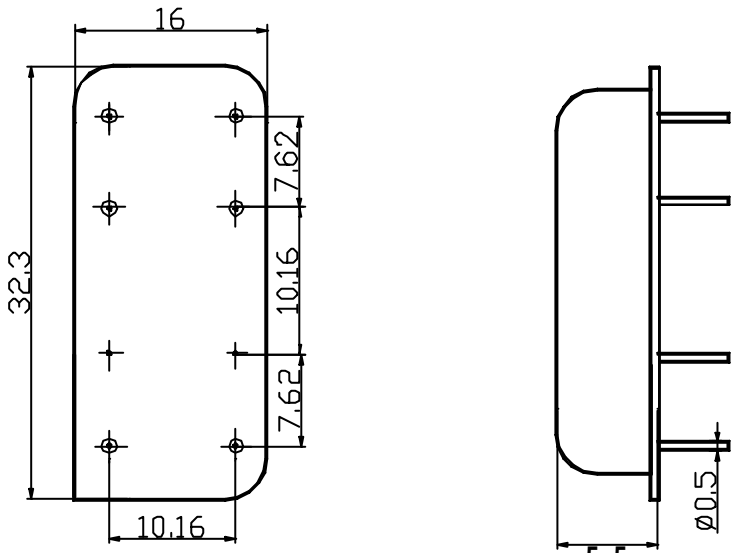




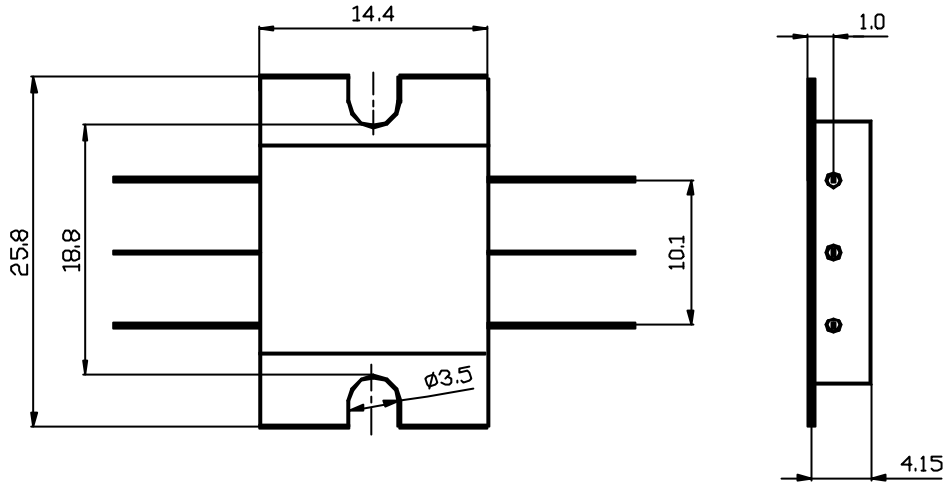
DIP-22C



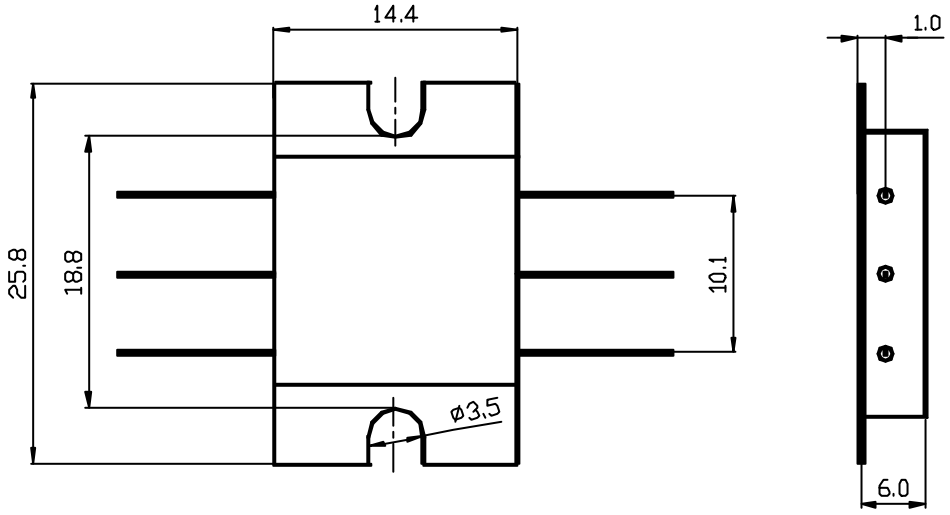
DIP-15



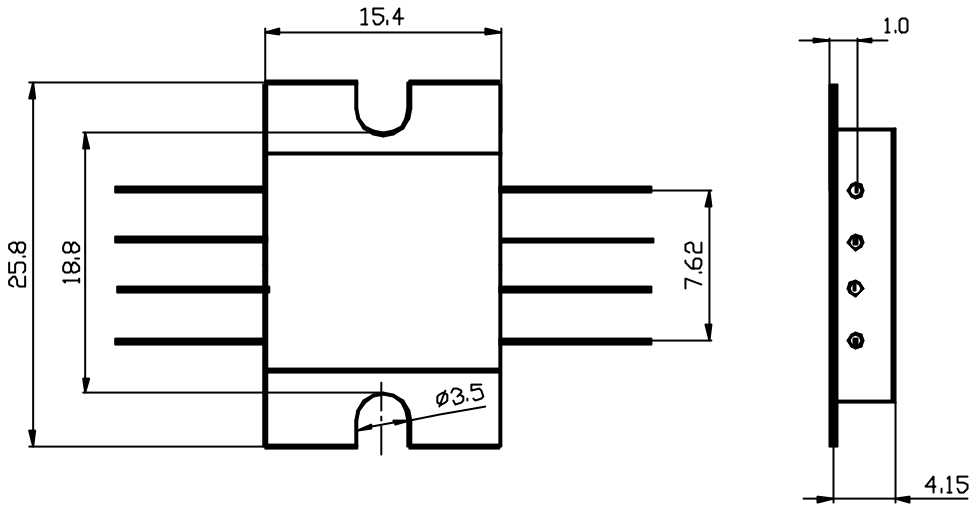
DIP-22D



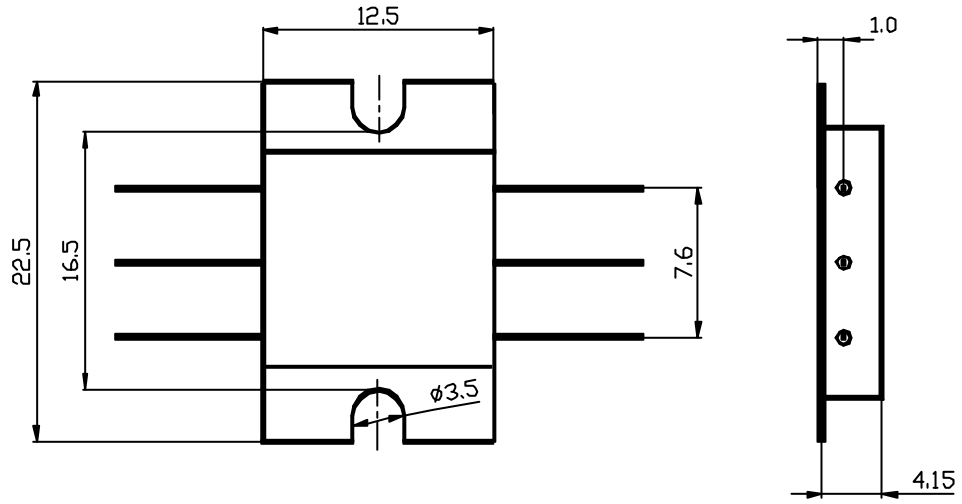
SP-1



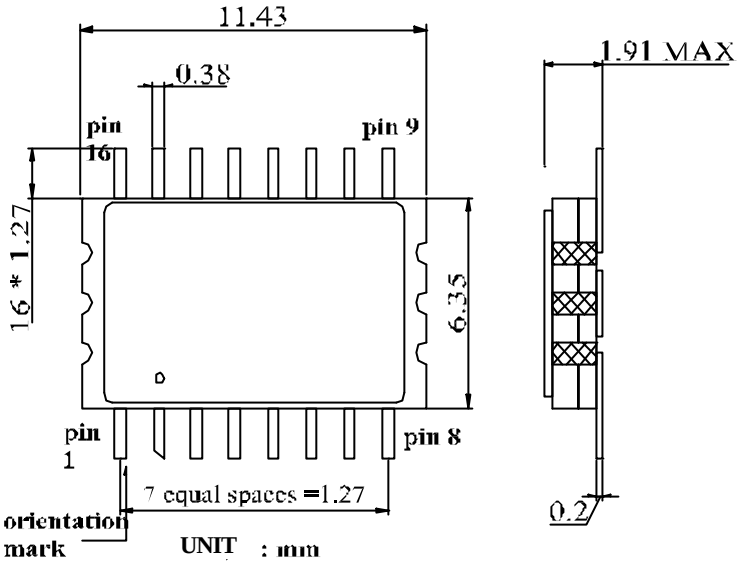
SP-1A



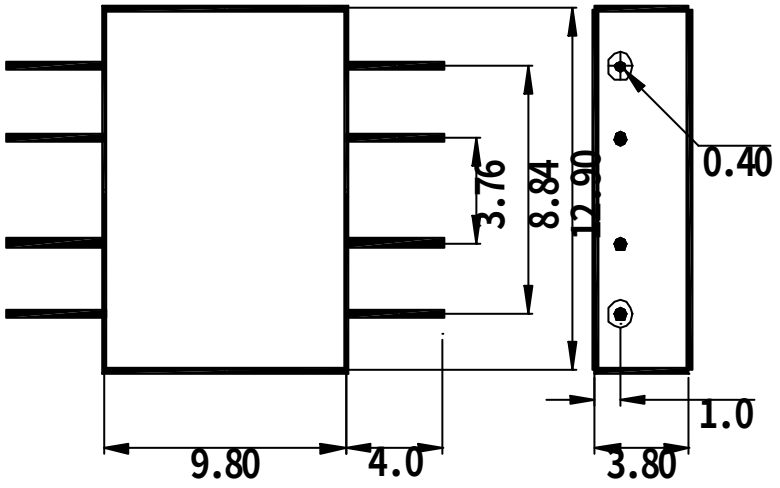
SP-2



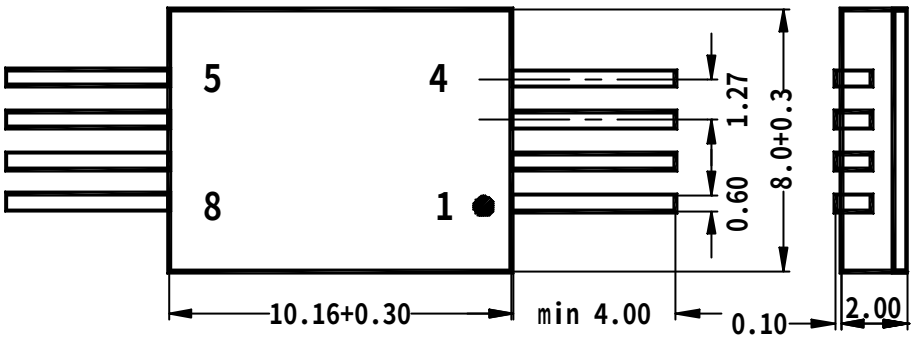
SP-3


11.43
0.38
1.91 MAX
pin 16
pin 9
16 * 1.27
6.35
pin 1
pin 8
7 equal spaces =1.27
0.2
orientation mark
UNIT : mm

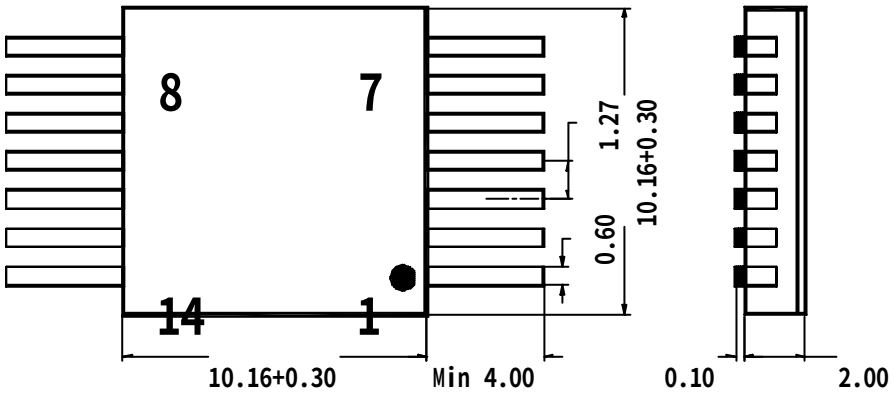
CR-9


3.76
8.84
12.90
0.40
1.0
9.80
4.0
3.80

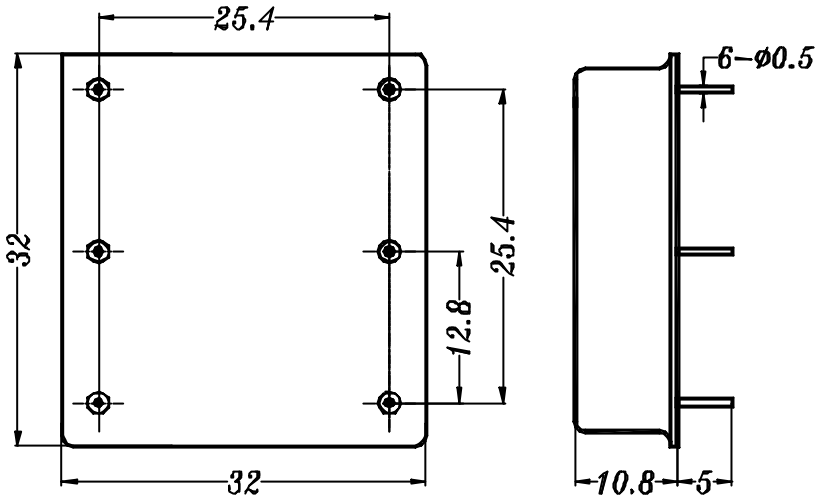
SP-251


5
4
8
1
1.27
0.60
8.0+0.3
10.16+0.30
min 4.00
0.10
2.00

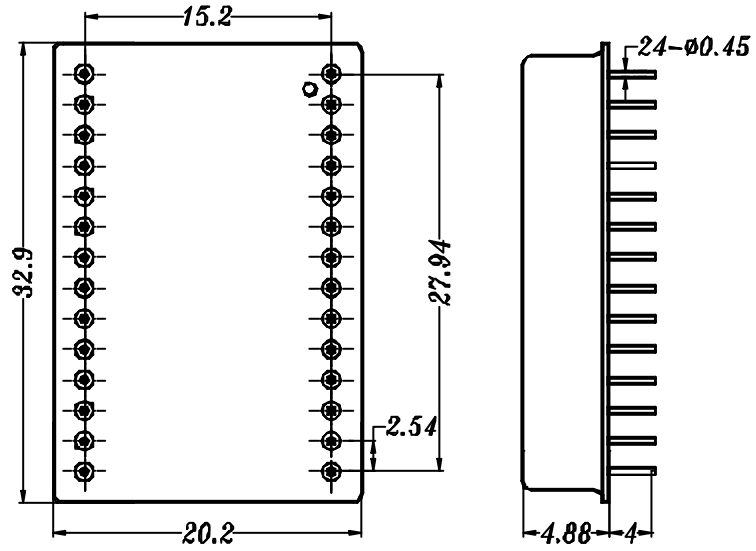
DH-08


8
7
14
1
1.27
0.60
10.16+0.30
10.16+0.30
Min 4.00
0.10
2.00

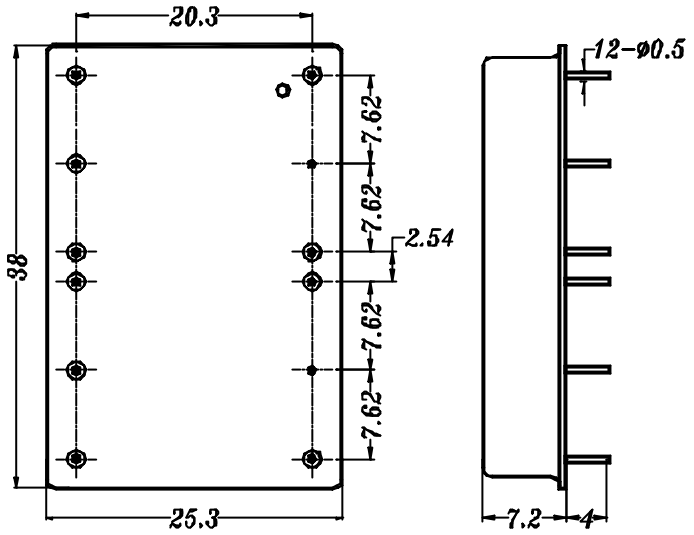
DH-14



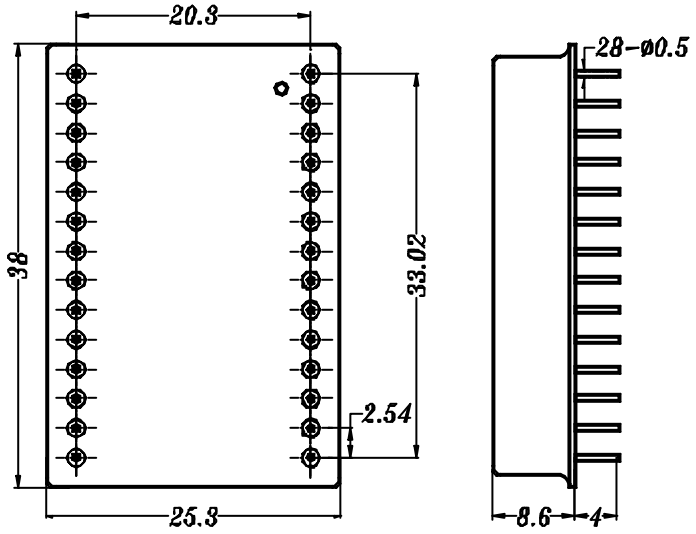
HD-6



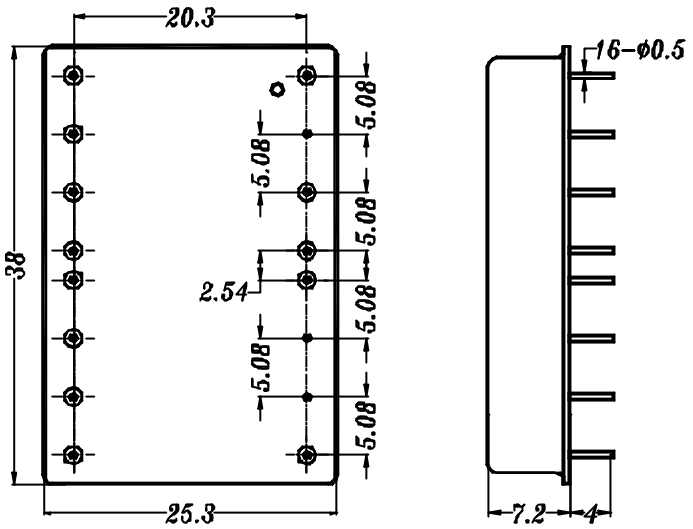
HD-24


20.3
12-Ø0.5
7.62
7.62
2.54
7.62
7.62
38
25.3
7.2
4

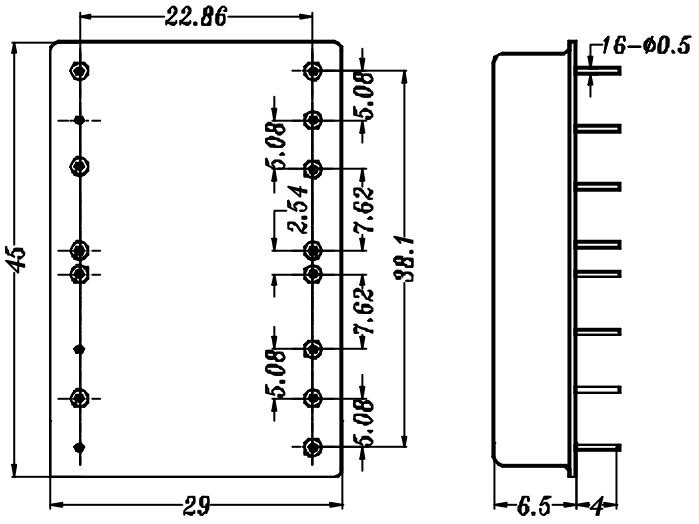
HD-28A


20.3
28-Ø0.5
38
33.02
2.54
25.3
8.6
4

HD-28B


20.3
38
25.3
5.08
5.08
5.08
2.54
5.08
5.08
5.08
16-φ0.5
7.2
4

HD-28C


22.86
45
29
5.08
5.08
2.54
7.62
7.62
5.08
5.08
38.1
16-φ0.5
6.5
4

HD-32A