

DATA SHEET

NEC

NPN SILICON RF TRANSISTOR 2SC5507

NPN SILICON RF TRANSISTOR FOR LOW CURRENT, LOW-NOISE, HIGH-GAIN AMPLIFICATION FLAT-LEAD 4-PIN THIN-TYPE SUPER MINIMOLD (M04)

FEATURES

- Low noise and high gain with low collector current
- $NF = 1.2$ dB TYP., $G_a = 16$ dB TYP. @ $V_{CE} = 2$ V, $I_c = 2$ mA, $f = 2$ GHz
- Maximum stable power gain: $MSG = 22$ dB TYP. @ $V_{CE} = 2$ V, $I_c = 5$ mA, $f = 2$ GHz
- $f_T = 25$ GHz technology adopted
- Flat-lead 4-pin thin-type super minimold (M04) package

ORDERING INFORMATION

Part Number	Quantity	Supplying Form
2SC5507	50 pcs (Non reel)	<ul style="list-style-type: none"> • 8 mm wide embossed taping • Pin 1 (Emitter), Pin 2 (Collector) face the perforation side of the tape
2SC5507-T2	3 kpcs/reel	

Remark To order evaluation samples, contact your nearby sales office.
The unit sample quantity is 50 pcs.

ABSOLUTE MAXIMUM RATINGS ($T_A = +25^\circ\text{C}$)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	V_{CBO}	15	V
Collector to Emitter Voltage	V_{CEO}	3.3	V
Emitter to Base Voltage	V_{EBO}	1.5	V
Collector Current	I_c	12	mA
Total Power Dissipation	P_{tot} ^{Note}	39	mW
Junction Temperature	T_j	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-65 to +150	$^\circ\text{C}$

Note Free Air

Caution Observe precautions when handling because these devices are sensitive to electrostatic discharge.

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Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

THERMAL RESISTANCE

Parameter	Symbol	Ratings	Unit
Junction to Case Resistance	$R_{th\ j-c}$	240	°C/W
Junction to Ambient Resistance	$R_{th\ j-a}$	650	°C/W

ELECTRICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
DC Characteristics						
Collector Cut-off Current	I_{CBO}	$V_{CB} = 5\text{ V}, I_E = 0\text{ mA}$	—	—	100	nA
Emitter Cut-off Current	I_{EBO}	$V_{EB} = 1\text{ V}, I_C = 0\text{ mA}$	—	—	100	nA
DC Current Gain	h_{FE} ^{Note 1}	$V_{CE} = 2\text{ V}, I_C = 5\text{ mA}$	50	70	100	—
RF Characteristics						
Gain Bandwidth Product	f_T	$V_{CE} = 3\text{ V}, I_C = 10\text{ mA}, f = 2\text{ GHz}$	20	25	—	GHz
Insertion Power Gain	$ S_{21e} ^2$	$V_{CE} = 2\text{ V}, I_C = 5\text{ mA}, f = 2\text{ GHz}$	14	17	—	dB
Noise Figure	NF	$V_{CE} = 2\text{ V}, I_C = 2\text{ mA}, f = 2\text{ GHz}, Z_S = Z_{opt}$	—	1.2	1.5	dB
Reverse Transfer Capacitance	C_{re} ^{Note 2}	$V_{CB} = 2\text{ V}, I_E = 0\text{ mA}, f = 1\text{ MHz}$	—	0.08	0.12	pF
Maximum Stable Power Gain	MSG ^{Note 3}	$V_{CE} = 2\text{ V}, I_C = 5\text{ mA}, f = 2\text{ GHz}$	—	22	—	dB
Gain 1 dB Compression Output Power	$P_{O(1\text{ dB})}$	$V_{CE} = 2\text{ V}, I_C = 5\text{ mA}$ ^{Note 4} , $f = 2\text{ GHz}$	—	5	—	dBm
3rd Order Intermodulation Distortion Output Intercept Point	OIP ₃	$V_{CE} = 2\text{ V}, I_C = 5\text{ mA}$ ^{Note 4} , $f = 2\text{ GHz}$	—	15	—	dBm

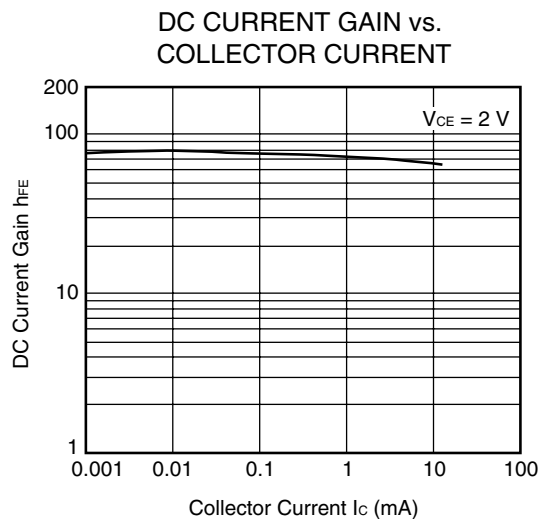
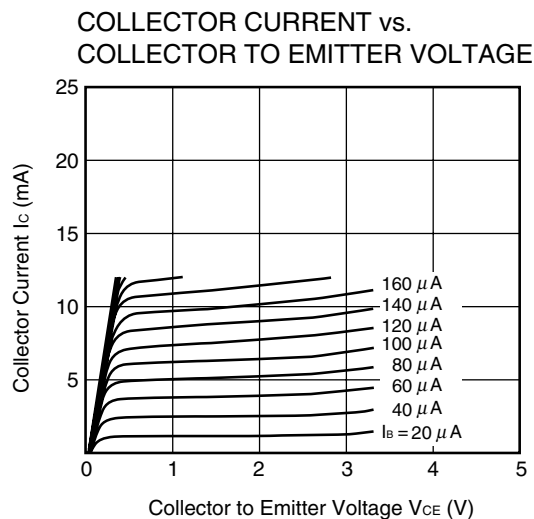
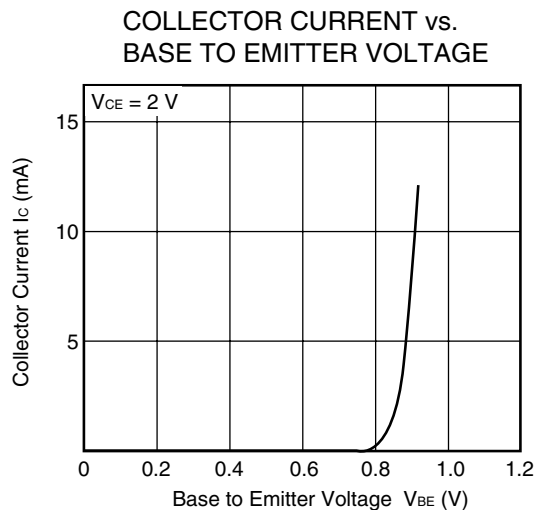
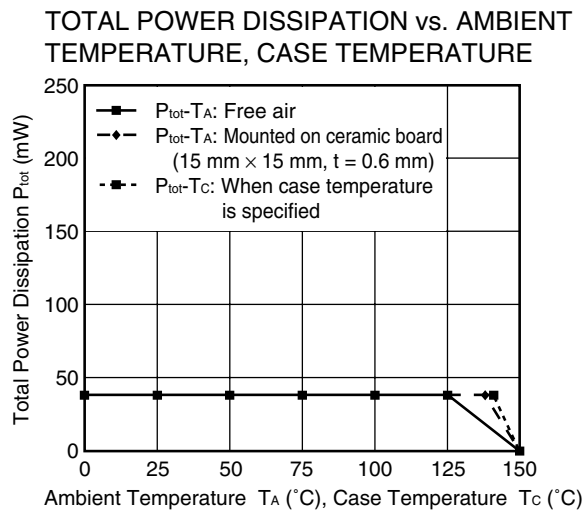
- Notes**
1. Pulse measurement: $PW \leq 350\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$
 2. Collector to base capacitance when the emitter grounded
 3. $MSG = \left| \frac{S_{21}}{S_{12}} \right|$
 4. Collector current when $P_{O(1\text{ dB})}$ is output

h_{FE} CLASSIFICATION

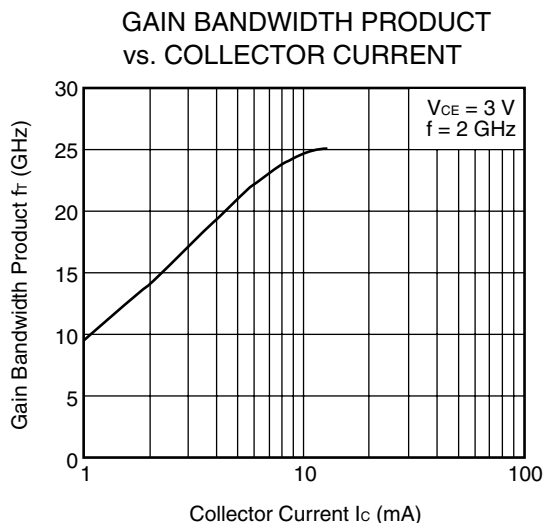
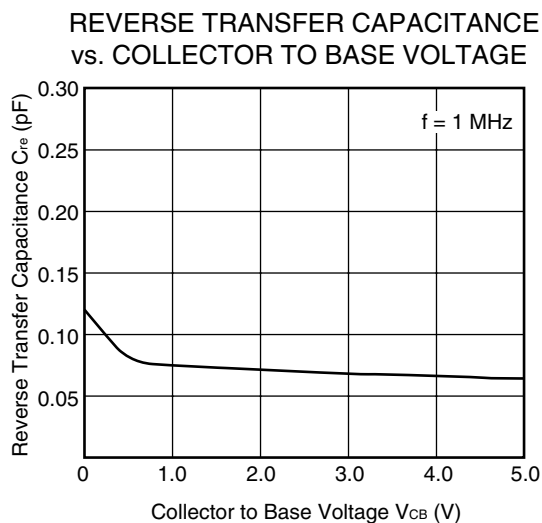
Rank	FB
Marking	T78
h_{FE} Value	50 to 100

★ TYPICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$, unless otherwise specified)

Thermal/DC Characteristics

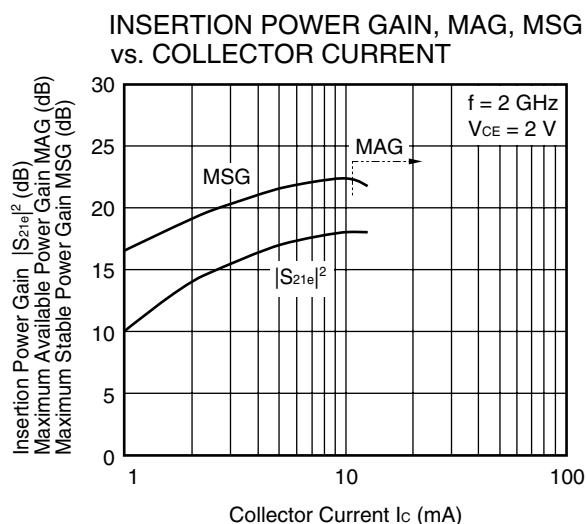
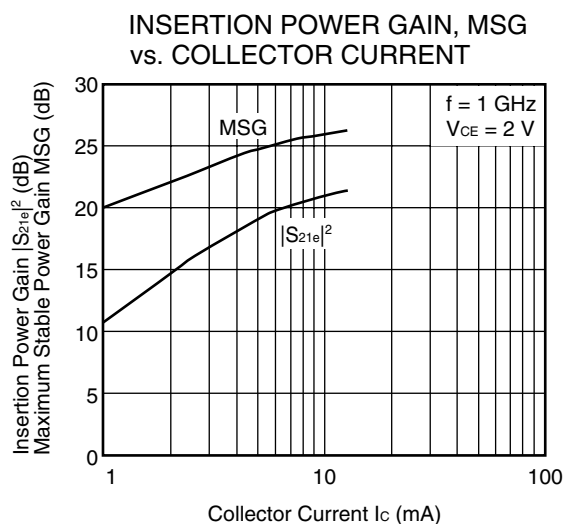
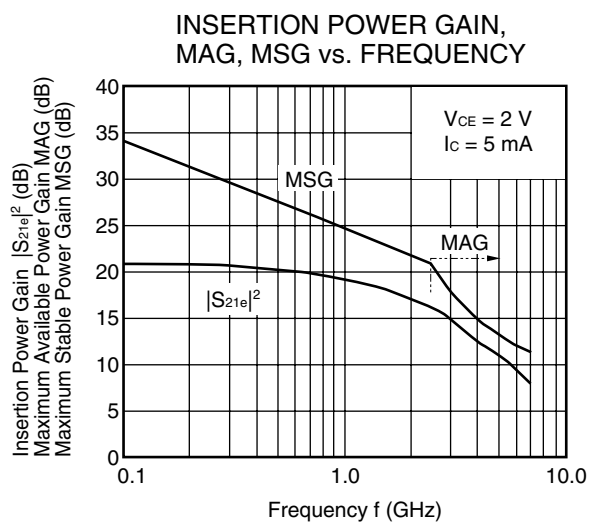


Capacitance/ f_T Characteristics

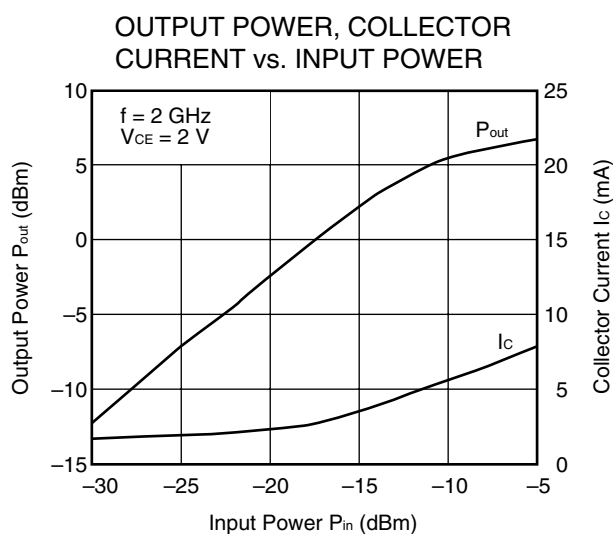
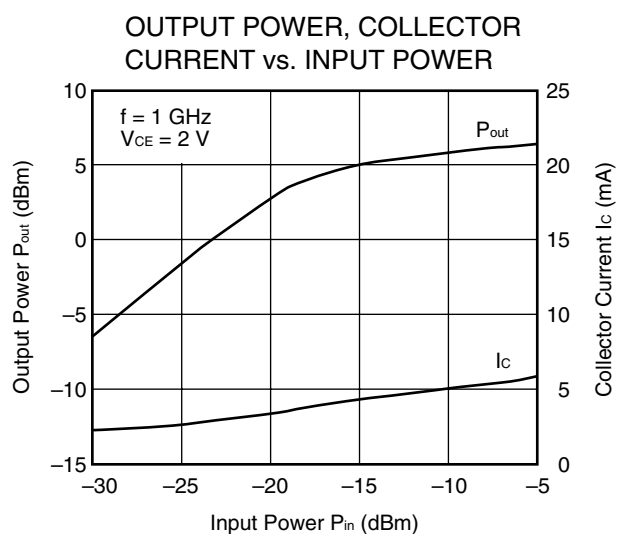


Remark The graphs indicate nominal characteristics.

Gain Characteristics



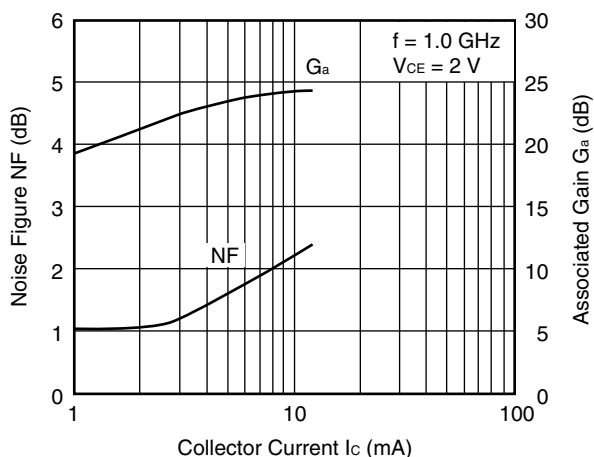
Output Characteristics



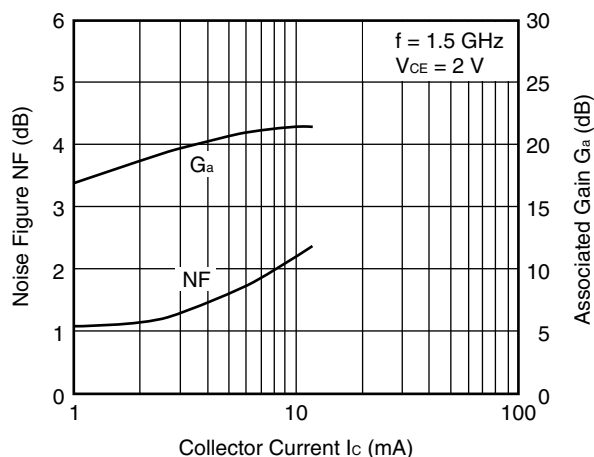
Remark The graphs indicate nominal characteristics.

Noise Characteristics

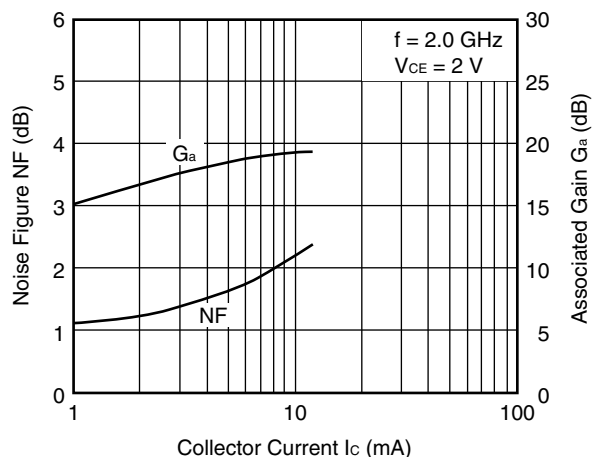
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



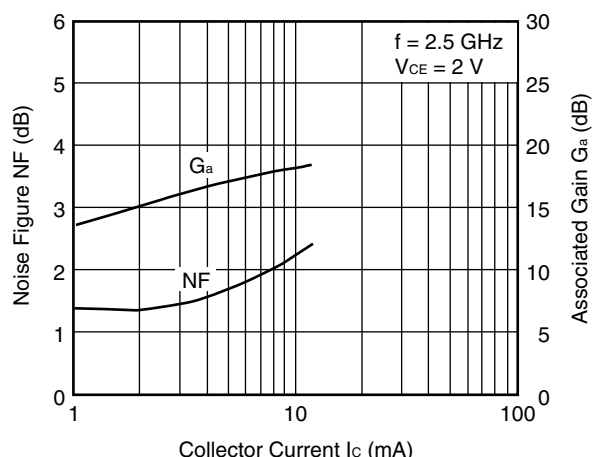
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.

★ S-PARAMETERS

S-parameters/Noise parameters are provided on the NEC Compound Semiconductor Devices Web site in a form (S2P) that enables direct import to a microwave circuit simulator without keyboard input.

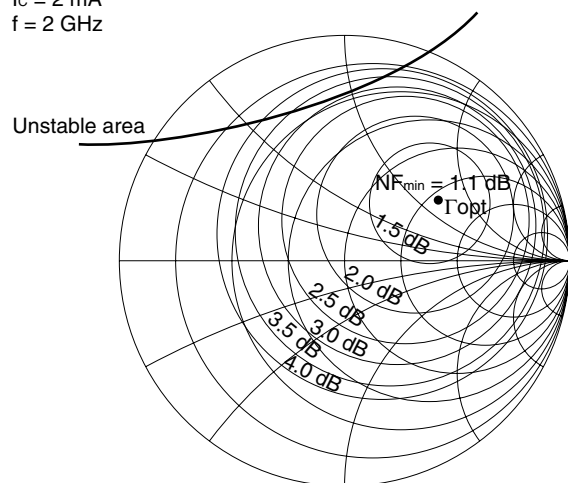
Click here to download S-parameters.

[RF and Microwave] → [Device Parameters]

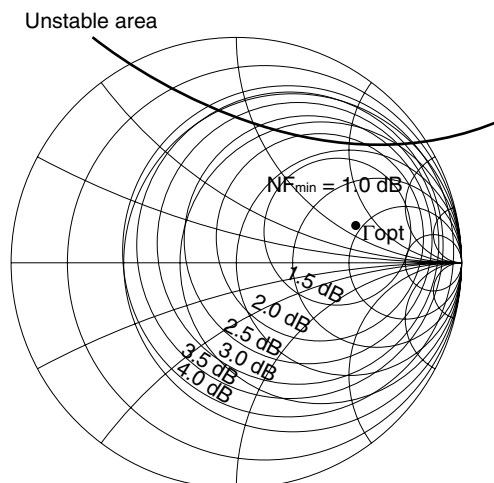
URL <http://www.ncsd.necel.com/>

EQUAL NF CIRCLE

$V_{CE} = 2\text{ V}$
 $I_C = 2\text{ mA}$
 $f = 2\text{ GHz}$



$V_{CE} = 2\text{ V}$
 $I_C = 2\text{ mA}$
 $f = 1\text{ GHz}$



NOISE PARAMETERS

$V_{CE} = 2\text{ V}$, $I_C = 2\text{ mA}$

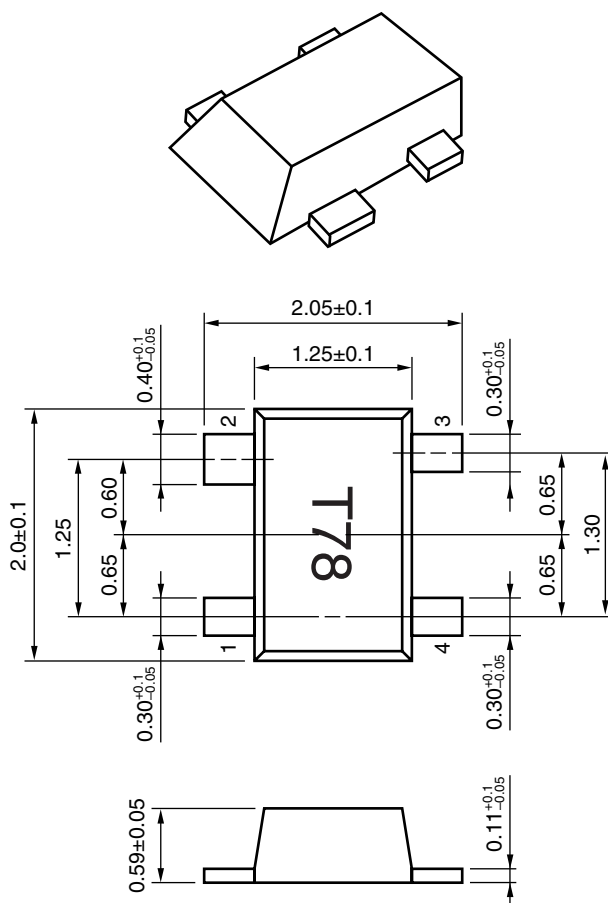
f (GHz)	NF _{min} (dB)	G _a (dB)	Γ _{opt}		Rn/50
			MAG.	ANG.	
0.8	0.93	22.9	0.54	13.3	0.47
0.9	0.95	22.2	0.54	14.9	0.47
1.0	0.97	21.6	0.54	16.4	0.47
1.5	1.08	18.8	0.53	24.6	0.45
1.8	1.14	17.5	0.51	30.3	0.43
1.9	1.16	17.1	0.50	32.4	0.42
2.0	1.18	16.7	0.49	34.6	0.41
2.5	1.29	15.2	0.44	47.7	0.35

$V_{CE} = 2\text{ V}$, $I_C = 5\text{ mA}$

f (GHz)	NF _{min} (dB)	G _a (dB)	Γ _{opt}		Rn/50
			MAG.	ANG.	
0.8	1.59	24.7	0.38	10.7	0.43
0.9	1.60	24.1	0.38	11.9	0.43
1.0	1.60	23.4	0.38	13.2	0.43
1.5	1.62	20.7	0.36	20.5	0.41
1.8	1.63	19.3	0.34	25.7	0.38
1.9	1.63	18.9	0.33	27.5	0.38
2.0	1.63	18.5	0.32	29.4	0.37
2.5	1.65	16.9	0.26	40.1	0.32

★ PACKAGE DIMENSIONS

FLAT-LEAD 4-PIN THIN-TYPE SUPER MINIMOLD (M04) PACKAGE (UNIT: mm)



PIN CONNECTIONS

1. Emitter
2. Collector
3. Emitter
4. Base

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M8E 00.4-0110

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