



WLLA1045A

1.0 – 4.2 GHz LOW NOISE WIDE BAND LIMITER AMPLIFIER

REV A
March 2008

Key Features



- 1.0 ~ 4.2 GHz
- 1.30 dB Noise Figure
- **30.0 dBm Max P_{IN}**
- 26.0 dBm Output IP_3
- 26.0 dB Gain
- 15.0 dBm P_{1dB}
- 1.5:1 VSWR Fully Matched
- Unconditional Stable, $k > 1$
- Single Power Supply
- >68 Years MTBF
- RoHS Compliant
- MLS-1 Moisture Sensitivity Level

Product Description

WLLA1045A integrates WanTcom proprietary low noise amplifier technologies, high frequency micro electronic assembly techniques, and high reliability designs to realize optimum low noise figure, wideband, and high performances together. With single DC voltage operation, the amplifier has optimal input and output matching in the specified frequency range at 50-Ohm impedance system. The amplifier has standard SMA connectorized WP-5 gold plated housing.

The amplifier is designed to meet the rugged standard of MIL-STD-883.

Applications

- Mobile Infrastructures
- GPS
- Satellite
- WiMAX
- Defense
- Security System
- Measurement
- Fixed Wireless



Specifications

Summary of the key electrical specifications at room temperature

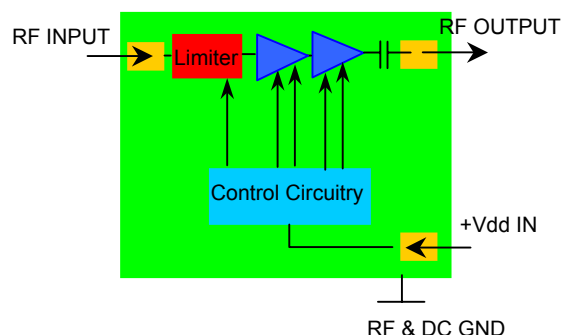
Index	Testing Item	Symbol	Test Constraints	Min	Nom	Max	Unit
1	Gain	S_{21}	1.0 – 4.0 GHz	24	26		dB
2	Gain Variation	ΔG	1.0 – 4.0 GHz		+/-0.5	+/- 0.8	dB
3	Input VSWR	SWR_1	1.0 – 4.0 GHz	1.5:1		1.6:1	Ratio
4	Output VSWR	SWR_2	1.0 – 4.0 GHz	1.5:1		1.6:1	Ratio
5	Reverse Isolation	S_{12}	1.0 – 4.0 GHz	40	45		dB
6	Noise Figure	NF	1.0 – 4.0 GHz		1.30	1.6	dB
7	Output Power 1dB Compression Point	P_{1dB}	1.0 – 4.0 GHz	14	15		dBm
8	Output-Third-Order Interception point	IP_3	Two-Tone, $P_{out} = 0$ dBm each, 1 MHz separation	24	26		dBm
9	Current Consumption	I_{dd}	$V_{dd} = +5.0$ V ($V_{dd} = 7 \sim 25$ V for WLLA1045B)		50		mA
10	Power Supply Operating Voltage	V_{dd}	WLLA1045A	+4.7	+5	+5.3	V
			WLLA1045B	+7.0		+25	
11	Thermal Resistance	$R_{th,c}$	Junction to case			215	°C/W
12	Operating Temperature	T_o		-40		+85	°C
13	Maximum Average RF Input Power	$P_{IN, MAX}$	DC – 6.0 GHz			30	dBm

Absolute Maximum Ratings

Parameters	Units	Ratings
DC Power Supply Voltage	V	7.0 (25V for WLLA1045B)
Drain Current	mA	80
Total Power Dissipation	mW	400
RF Input Power	dBm	30
Channel Temperature	°C	150
Storage Temperature	°C	-65 ~ 150
Operating Temperature	°C	-55 ~ +100
Thermal Resistance ¹	°C/W	215

Operation of this device beyond any one of these parameters may cause permanent damage.

Functional Block Diagram



¹ The last stage transistor dominates the heat dissipation. The drain bias voltage is +3.5V and the drain current is 30.0 mA. The total power dissipation of the last stage transistor is thus 105 mW. The junction temperature arise $0.105 \times 215 = 23$ (°C).

Specifications and information are subject to change without notice.



WLLA1045A

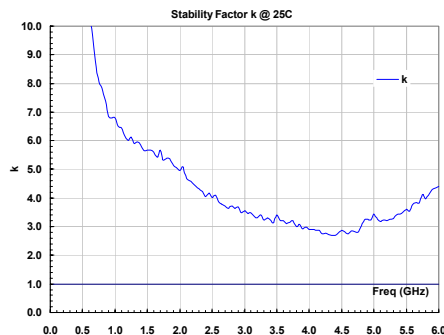
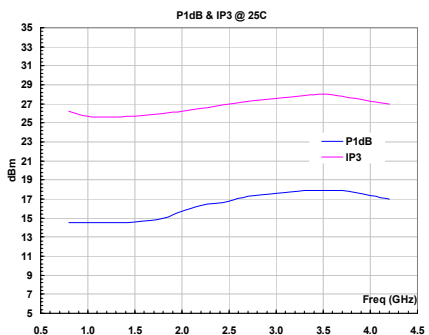
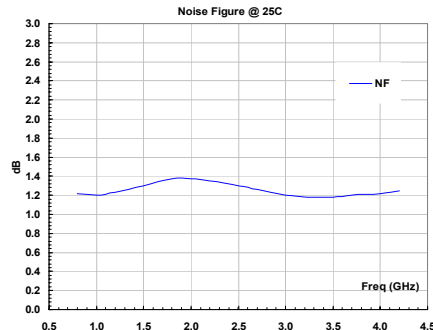
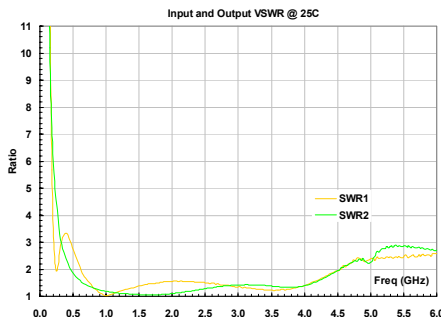
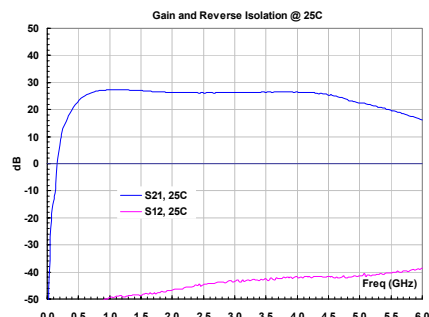
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Ordering Information

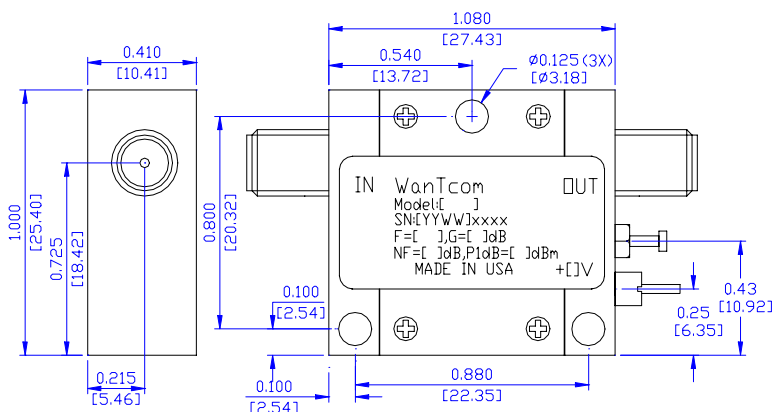
Model Number	Feature
WLLA1045A	$V_{dd} = +5.0V$
WLLA1045B	$V_{dd} = +7.0 \sim +25.0V$

Typical Data



Outline, WP-5 Housing

UNITS: INCH [mm]
 BODY: Brass
 Finish: Gold Plating
 RF Connector: SMA F Gold
 V_{dd} PWR: Feed through



DO NOT SCALE!

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Small Signal S-Parameters:

! WLLA1045A, +25C, S-parameters at $V_{dd}=5V$, $I_{dd}=50mA$, including WP-5 test fixture, last updated 3/29/08.

GHZ s MA R 50

!Freq(GHz)	MAGS11	ANGS11	MAGS21	ANGS21	MAGS12	ANGS12	MAGS22	ANGS22
0.05	0.97	-20.7	0.05	-98.7	0.00004	-155.0	0.99	-22.5
0.1	0.93	-40.7	0.21	-139.1	0.00013	156.3	0.92	-45.2
0.3	0.45	-68.6	5.97	137.6	0.00052	157.2	0.54	-117.1
0.5	0.47	-132.5	14.45	63.6	0.00171	116.6	0.3	-170.7
0.7	0.24	172.4	20.39	2.4	0.00257	77.4	0.17	144.5
0.8	0.15	150.2	21.89	-23.0	0.00282	64.1	0.13	123.2
0.9	0.07	131.6	22.77	-46.2	0.00317	49.7	0.11	102.3
1	0.01	175.5	23.14	-67.5	0.00317	40.0	0.08	80.8
1.1	0.04	-95.1	23.34	-86.9	0.00332	30.7	0.07	59.0
1.2	0.08	-101.8	23.17	-105.2	0.00358	24.2	0.05	37.8
1.3	0.11	-120.3	22.93	-122.6	0.00366	16.5	0.05	16.4
1.4	0.14	-134.0	22.62	-139.2	0.00373	9.7	0.04	-3.1
1.5	0.16	-146.9	22.34	-155.1	0.00386	4.5	0.03	-20.0
1.6	0.18	-161.2	21.86	-170.1	0.00398	-1.4	0.03	-28.5
1.7	0.19	-172.9	21.52	175.4	0.00397	-5.9	0.02	-27.6
1.8	0.2	174.6	21.13	161.3	0.00424	-11.2	0.03	-24.4
1.9	0.21	162.4	20.85	147.4	0.00449	-17.3	0.04	-26.6
2	0.22	149.9	20.7	133.8	0.00467	-21.7	0.05	-34.7
2.1	0.21	138.1	20.58	120.2	0.00497	-28.1	0.06	-46.3
2.2	0.21	125.0	20.51	107.0	0.00515	-32.3	0.08	-60.0
2.3	0.21	112.6	20.5	93.5	0.00538	-39.3	0.09	-74.3
2.4	0.21	102.5	20.59	79.9	0.00571	-43.2	0.11	-89.8
2.5	0.2	89.9	20.38	66.8	0.00582	-51.3	0.12	-104.5
2.6	0.19	79.0	20.48	53.1	0.00603	-57.4	0.14	-119.8
2.7	0.18	66.2	20.59	39.2	0.00625	-63.2	0.15	-134.8
2.8	0.17	54.4	20.53	26.4	0.00629	-71.3	0.16	-149.0
2.9	0.16	42.2	20.66	12.8	0.0063	-80.4	0.17	-163.2
3	0.15	29.2	20.67	-0.8	0.00656	-87.4	0.17	-176.4
3.1	0.14	16.5	20.63	-14.4	0.00674	-94.4	0.18	171.1
3.2	0.12	-0.4	20.8	-27.7	0.00707	-102.7	0.17	158.8
3.3	0.11	-18.2	20.61	-41.3	0.00736	-108.2	0.17	148.4
3.4	0.1	-36.0	20.83	-56.0	0.00731	-117.7	0.17	138.5
3.5	0.1	-61.9	20.84	-70.3	0.00692	-124.8	0.16	130.6
3.6	0.09	-84.1	20.76	-85.1	0.00745	-129.8	0.15	123.9
3.7	0.11	-111.7	21.09	-99.2	0.00748	-140.0	0.14	120.0
3.8	0.12	-136.3	21.19	-113.9	0.00782	-147.0	0.14	118.9
3.9	0.15	-160.8	21.34	-129.2	0.00795	-156.3	0.15	117.8
4	0.16	-179.9	21.04	-144.6	0.00801	-162.8	0.16	118.0
4.2	0.23	146.5	20.58	-175.6	0.00828	177.0	0.22	110.5
4.5	0.32	99.0	18.53	134.9	0.00778	150.7	0.33	80.5
5	0.4	26.6	13.12	58.6	0.0082	106.6	0.38	25.9
5.5	0.42	-36.9	9.71	-16.9	0.00946	63.7	0.48	-40.8
6	0.44	-109.3	6.5	-90.3	0.012	13.2	0.46	-111.4

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Application Notes:

A. SMA Torque Wrench Selection

Always use a torque wrench with 5 ~ 6 inch-lb coupling torque setting for mating the SMA cables to the amplifier. Never use torque more than 8 inch-lb wrench for tightening the mating cable to the connector. Otherwise, the permanent damage will occur to the SMA connectors of the amplifier. 8710-1582 (5 inch-lb) is one of the ideal torque wrench choice from Agilent Technology.

B. DC Power Line Connection

Strip the insulation layer at the end of DC power supply wire. The stripped distance should be in the range of 0.100" to 0.200". The 24 ~ 26 American Wire Gauge wire is suitable. Wound the stripped terminal wire about 1 to 2 turns on the DC feed thru center pin. Solder the wounded wire and the center pin together. Clean the soldering area by Q-tip with alcohol to remove the flux and residue.

Repeat the process to solder the DC return wire on the ground turret.

C. Mounting the Amplifier

Use three pieces of #4-40 with longer than 9/16" screws for mounting the amplifier on a metal-based chase. Flat and spring washers are needed to prevent the screw loosening during the shock and vibration. Always use the appropriate torque setting of the power screwdriver to mount them.
