



# WHM0104AE

## 100 - 400 MHz WIDE BAND 2 WATTS AMPLIFIER

REV A  
Feb. 2009

### Key Features



- 100 ~ 400 MHz
- 3.2 dB noise figure
- 43.0 dBm output IP<sub>3</sub>
- 17.0 dB Gain
- +/-0.2 dB Gain Flatness
- 32 dBm P<sub>1dB</sub>
- 1.5:1 VSWR
- Surface Mount Package
- >68 Years MTBF
- RoHS Compliant
- MLS-1 Moisture Sensitivity Level

### Product Description

WHM0104AE 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. The amplifier has optimal input and output matching in the specified frequency range at 50-Ohm impedance system. The amplifier has standard 0.40" x 0.20" x 0.085" surface mount package.

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

- Mobile Infrastructures
- GPS
- CATV/DBS
- Defense
- Security System
- Measurement
- Fixed Wireless

### Applications

### Specifications

Summary of the key electrical specifications at room temperature

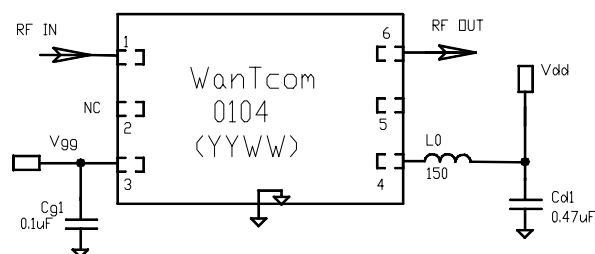
Index	Testing Item	Symbol	Test Constraints	Min	Nom	Max	Unit
1	Gain	S <sub>21</sub>	100 – 400 MHz	16	17.0	18	dB
2	Gain Variation	ΔG	100 – 400 MHz		+/-0.2		dB
3	Input VSWR	SWR <sub>1</sub>	100 – 400 MHz			2:1	Ratio
4	Output VSWR	SWR <sub>2</sub>	100 – 400 MHz			1.8:1	dB
5	Reverse Isolation	S <sub>12</sub>	100 – 400 MHz		30		dB
6	Noise Figure	NF	100 – 400 MHz		3.3		dB
7	Output Power 1dB Compression Point	P <sub>1dB</sub>	100 – 400 MHz, V <sub>dd</sub> = 10.0V, I <sub>dd</sub> = 400 mA	31	32		dBm
8	Output-Third-Order Interception point	IP <sub>3</sub>	Two-Tone, P <sub>out</sub> = 20 dBm each, 1 MHz separation	42			dBm
9	Current Consumption	I <sub>dd</sub>	V <sub>dd</sub> = +10.0 V		400		mA
10	Power Supply Voltage	V <sub>dd</sub>		+9	+10	+12	V
11	Thermal Resistance	R <sub>th,c</sub>	WHM0104AE, Junction to case			18	°C/W
12	Operating Temperature	T <sub>e</sub>		-40		+85	°C
13	Maximum Average RF Input Power	P <sub>IN, MAX</sub>	DC – 6.0 GHz			20	dBm

### Absolute Maximum Ratings

Parameters	Units	Ratings
DC Power Supply Voltage	V	12
Drain Current	mA	500
Total Power Dissipation	W	4.5
RF Input Power	dBm	20
Channel Temperature	°C	160
Storage Temperature	°C	-65 ~ 150
Operating Temperature	°C	-40 ~ +85

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

### Application Diagram



Important: Sequencing bias circuit required to Vgg and Vdd  
Vdd=+11V, Idd=400 mA. Adjust Vgg and Vdd slightly for best IP<sub>3</sub>.  
The resistance between Vgg and Pin 3 should be less than 200 Ohm

### Ordering Information

Model Number	WHM0104AE
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Specifications and information are subject to change without notice.



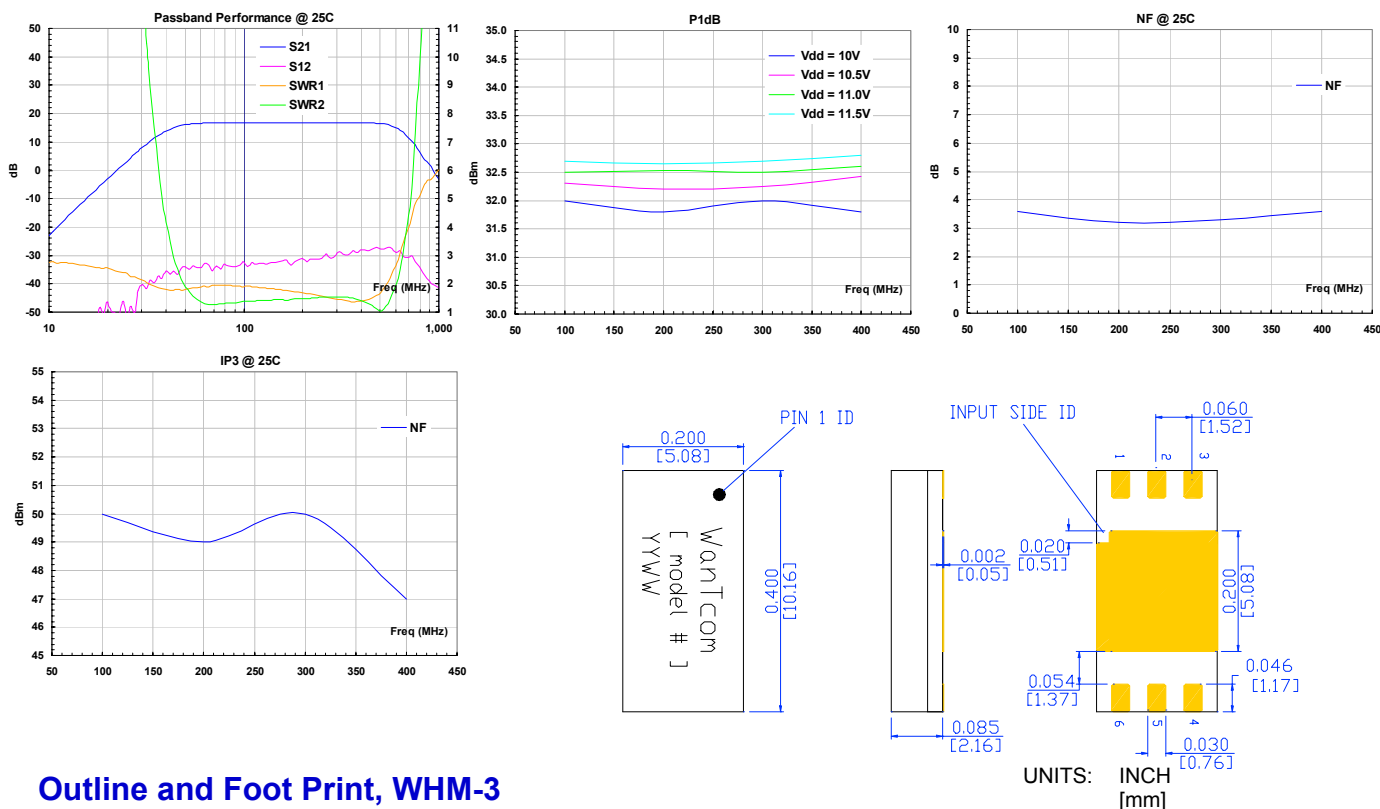
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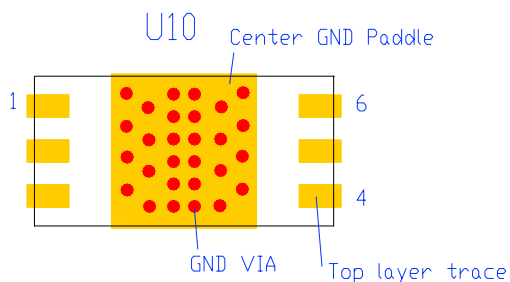
ESD resistant tube with the capacity of 10 pieces is used for the packing. Contact factory for tape and reel packing option for higher volume order.

### Typical Data



### Outline and Foot Print, WHM-3

PIN	1	2	3	4	5	6	CTR
ID	RF IN	NC	V <sub>gg</sub>	V <sub>dd</sub>	NC	RF OUT	GND



Note: GND vias are metallic plated and connected to ground layer on back side

Fig. 1 Footprint

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## **Application Notes:**

### **A. Motherboard Layout**

The recommended motherboard layout is shown in **Figure 1**. Sufficient numbers of ground vias on the motherboard are essential for the RF grounding. The width of the 50-Ohm microstrip lines at the input and output RF ports may be different for different property of the substrate. The ground plane is needed to connect the center ground pad of the device through the vias. The ground plane is also essential for the 50-Ohm microstrip line launches at the input and output ports.

### **B. DC Bias Sequence**

Always bias the  $V_{gg}$  of the negative voltage first at Pin 3 before applying  $V_{dd}$  at Pin 4. Always disconnect  $V_{dd}$  first before disconnecting  $V_{gg}$ .

### **C. L0, the RF choke requirement**

L0, the RF choke at the  $V_{dd}$  path, needs to have better than 600 mA DC current rating and the parasitic resonant frequency is higher than 400 MHz.

### **D. Assembly**

The regular low temperature and none clean solder paste such as SN63 is recommended. The high temperature solder has been used for the WHM series amplifier internal assembly. The melting temperature point of the high temperature solder is around 217 ~ 220 °C. Thus, melting temperature of the solder paste should be below 215 °C for assembling WHM series amplifier on the test board to reduce the possible damaging possibility. The temperature melting point of the SN63 solder paste is around 183 °C and is suitable for the assembly purpose.

The SN63 solder paste can be dispensed by a needle manually or driven by a compressed air. **Figure 2** shows the example of the dispensed solder paste pattern. Each solder paste dot is in about diameter of 0.005" ~ 0.010" (0.125 ~ 0.250 mm).

For higher volume assembly, a production solder paste stencil with 0.004" (0.10 mm) is recommended to print the solder paste on the circuit board.

For more detail assembly process, refer to AN-109 at [www.wantcominc.com](http://www.wantcominc.com) website.

### **E. Heat Sink**

Sufficient heat sink is required. The assembled part shall be mounted on a heat sink securely. Thermal compound is needed between the heat sink surface and the backside of the motherboard of the assembly.

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