

2003.03.27

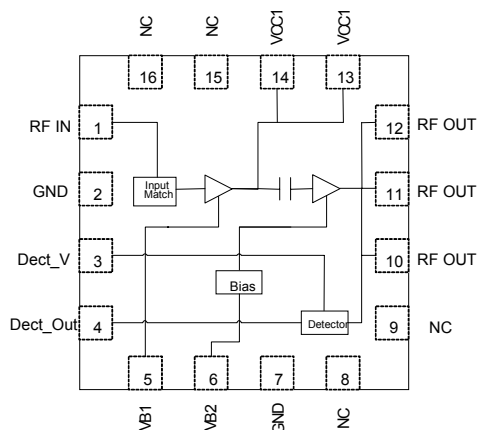
DESCRIPTION

AP1091 is a linear, two stages power amplifier MMIC with high output power in 2.4GHz band utilizing InGaP/GaAs HBT process. With the excellent linearity performance, the device delivers 26 dBm of linear output power (at 5V power supply) compliant with the IEEE802.11b standard, and 19 dBm output power, under 54Mbps OFDM (IEEE802.11g) modulation, with only 3% EVM. The PA also includes on-chip power detector, providing a DC voltage proportional to the output power of the device. It features a small signal gain of 28 dB and P1dB of 26.5 dBm at 3.3V power supply. AP1091 is housed in a 3 x 3 (mm), 16 Pin QFN leadless package.

Major Applications

- IEEE802.11b WLAN System
- IEEE802.11g (draft) WLAN System
- 2.4GHz ISM Radios

Functional Block Diagram



QFN- 16 pin, 3 x 3 (mm)

KEY FEATURES

- 26/24 dBm Linear Output Power at 5/3.3 V
- Power Supply With 11Mb/s, CCK Modulation
- 19 dBm Linear Output Power With 54Mb/s, OFDM Modulation (about 3% EVM)
- 28 dB Small Signal Gain
- Single 3.3 V Power Supply
- On-Chip Power Detector

Pin Details

Pin Number	Name	Description
1	RF_IN	RF input. With on chip input matching.
2	GND	DC and RF ground.
3	Dect_V	Supply voltage for on-chip power detector.
4	Dect_Out	Power detector output. Connect one 5.6kΩ resistor and one 1uF capacitor from pin4 to ground.
5	VB1	Bias current control voltage for the first/second stage. An external resistor bridge is necessary for single voltage supply application. The detail configuration can be found in Application Notes.
6	VB2	
7	GND	DC and RF ground.
8	NC	No contact
9	NC	
10	RF_OUT	RF output. Require external matching. The detail configuration can be found in Application Notes
11	RF_OUT	
12	RF_OUT	
13	VCC1	Supply voltage for first stage. Some bypass capacitors are needed for system application. The detail configuration can be found in Application Notes.
14	VCC1	
15	NC	No contact
16	NC	
Package Base	Center Metal	The package ground provides circuit ground as well as heat dissipation path for the power amplifier.

For more information, please contact us at:

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AP1091

2.4~2.5 GHz Power Amplifier

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<u>Parameter</u>	<u>Specification</u>			<u>Unit</u>	<u>Condition</u>
	<u>Min.</u>	<u>Typ.</u>	<u>Max.</u>		
Power Amplifier Overall Spec.					
Frequency Range	2.4		2.5	GHz	
P1dB		26.5		dBm	V _{cc} =3.3V
Power Gain		28		dB	P _{out} =24 dBm With 11Mb/s, CCK modulation
		27.5		dB	P _{out} =19 dBm With 54Mb/s, OFDM modulation
linear output power		24		dBm	V _{cc} =3.3V, Meeting 802.11b spectrum mask
Power Added Efficiency		33		%	V _{cc} =3.3V, P _{out} =24dBm, CW mode
Input Impedance		50		Ohm	On-chip matching
Harmonics (2f,3f)		-32		dBc	P _{OUT} at P1 dB
Input VSWR		2 : 1			P _{IN} <-17 dBm
Output VSWR		2.5 : 1			P _{IN} <-17 dBm
Supply Current		290		mA	P _{out} =24 dBm
		220		mA	P _{out} =19 dBm
Idle Current	120			mA	
Power Detector Spec.					
Detector Voltage Range	0.3		1.5	V	

Absolute Maximum Ratings

<u>Parameter</u>	<u>Rating</u>	<u>Unit</u>
DC Power Supply For Collector	+6	V
DC Supply Current For Collector	400	mA
RF Input Power	+2	dBm
Operating Ambient Temperature	-40 to +85	°C
Storage Temperature	-40 to +125	°C

Note: 1.Exceeding these ratings could cause damage to the device.
2.Nominal operation condition is biasing at 3.3V

Caution

RF Integrated Corp. believes the information provided is reliable at present time. However, we assumes no responsibility for inaccuracies and omissions and use of the information shall be entirely at the user's own risk. RF Integrated Corp. reserves the right to make change to the specifications without notice.

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Data Charts

(AP1091 Evaluation Kit, $V_{CC} = 3.3V$, $f = 2.45GHz$, RF Signal = With IEEE 802.11b Modulation or IEEE 802.11g Modulation (54Mbps), $T_A = 25^{\circ}C$, unless otherwise noted.)

Fig. 1

Power Gain vs. Supply Voltage

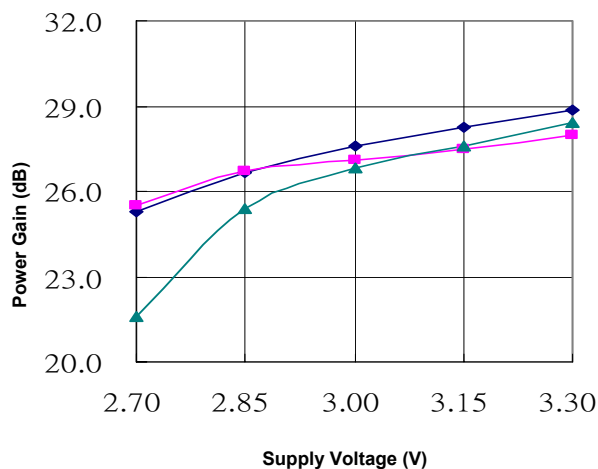


Fig. 2

Power Gain vs. Frequency

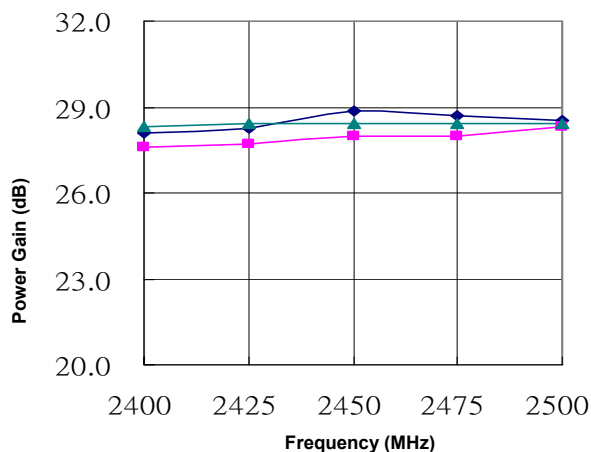


Fig. 3

I_{TOTAL} vs. Supply Voltage

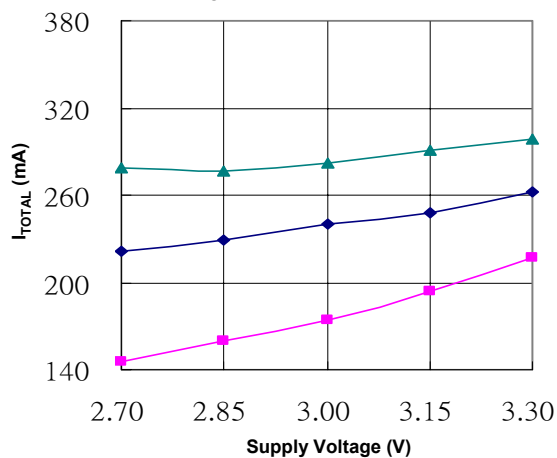
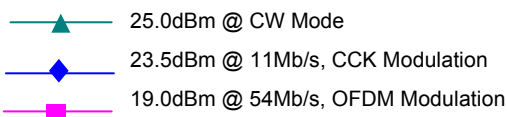
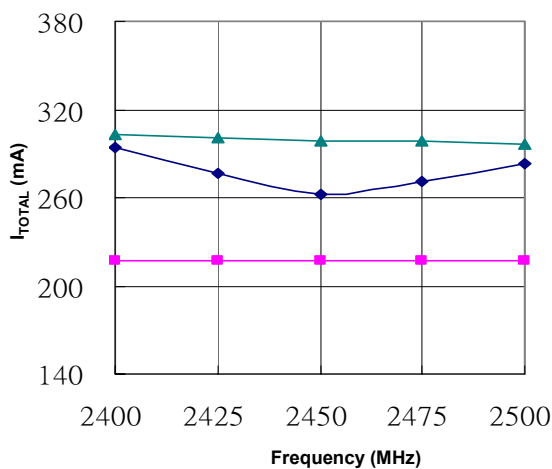


Fig. 4

I_{TOTAL} vs. Frequency



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Fig. 5

P_{OUT} , PAE vs. P_{IN}
(With 54Mb/s, OFDM Modulation)

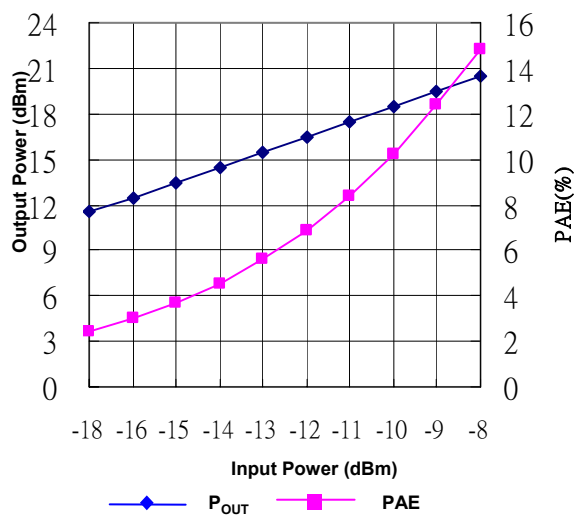


Fig. 6

I_{TOTAL} , Detector Output vs. Output Power
(With 54Mb/s, OFDM Modulation)

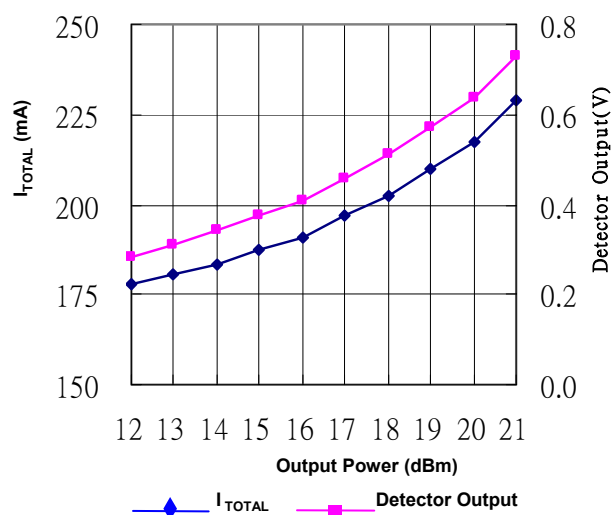


Fig. 7

ACPR vs. P_{OUT}
(With 11Mb/s, CCK Modulation)

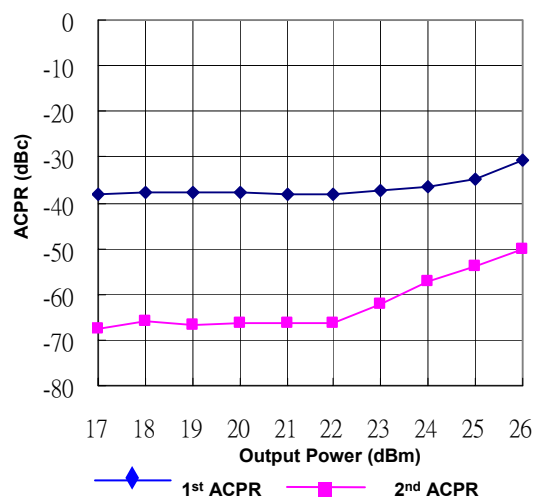
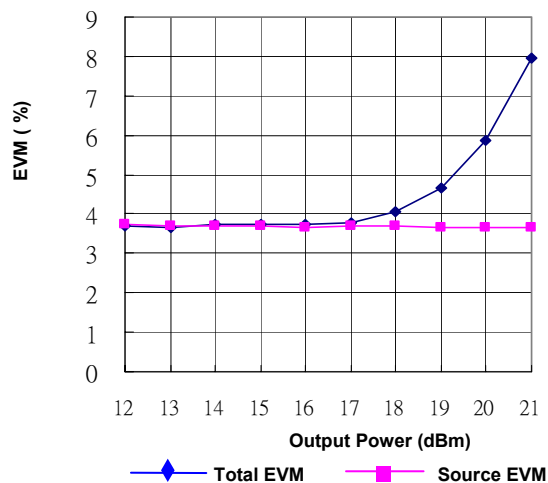


Fig. 8

EVM vs. Output Power
(With 54 Mb/s, OFDM Modulation)



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Fig. 9

P_{OUT} , PAE vs. P_{IN}
(CW Mode)

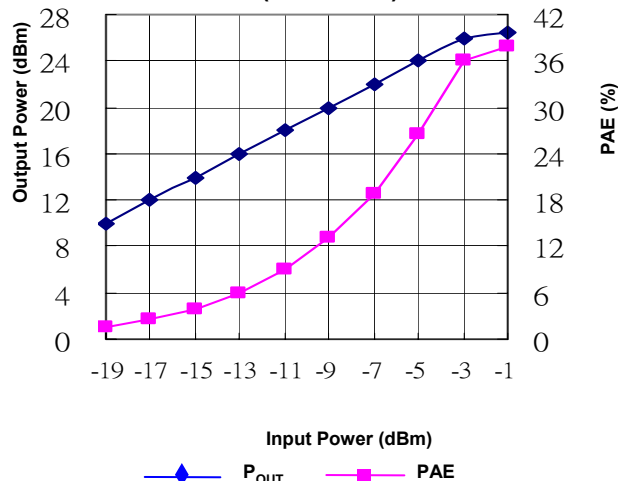


Fig. 11

I_{TOTAL} , Detector Output vs. Output Power
(CW Mode)

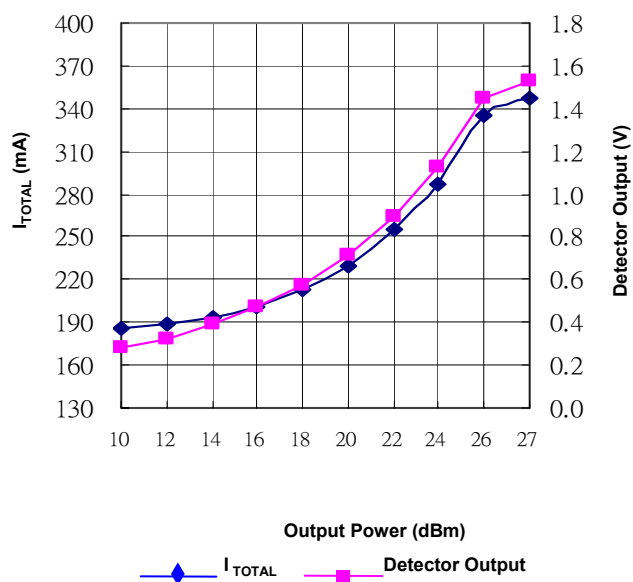


Fig. 10

P_{OUT} , PAE vs. P_{IN}
(With 11Mb/s, CCK Modulation)

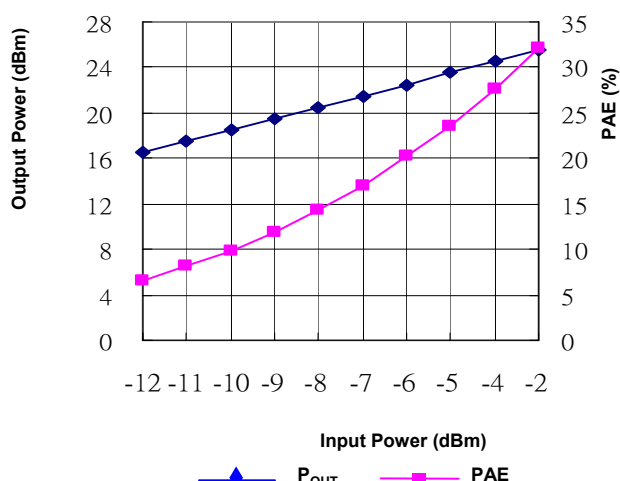
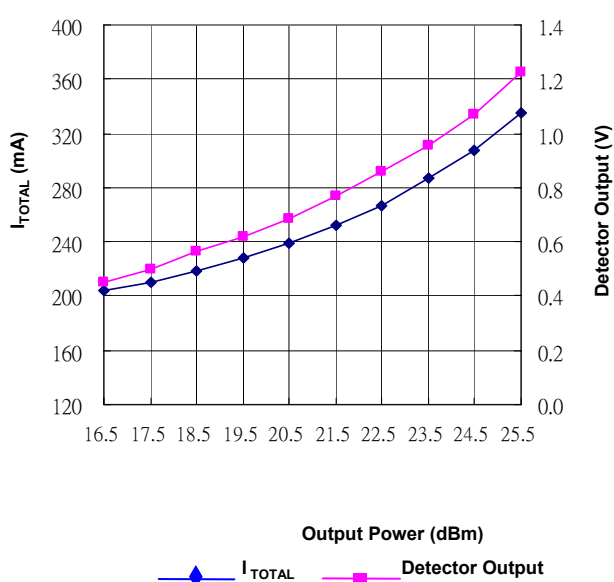


Fig. 12

I_{TOTAL} , Detector Output vs. Output Power
(With 11Mb/s, CCK Modulation)



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Fig. 13

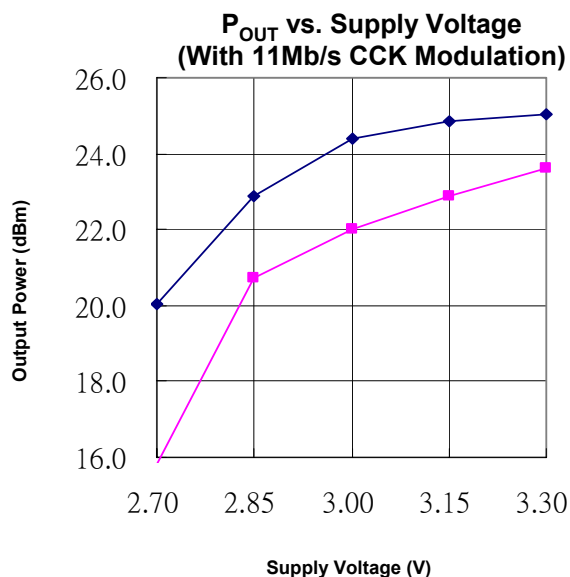
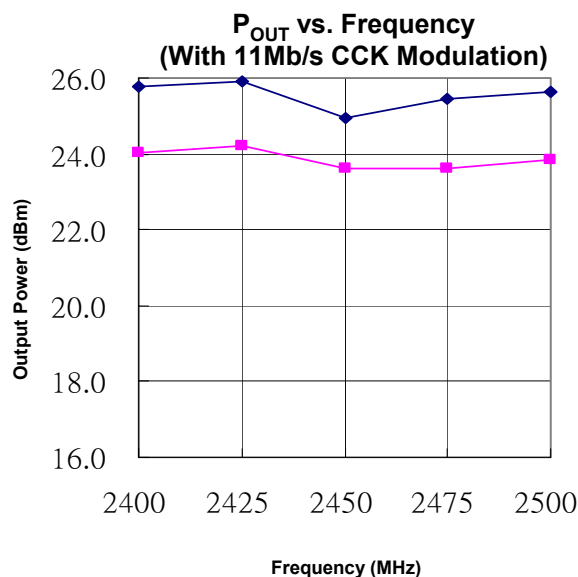


Fig. 14



 ACPR 1st < -33dBm 2nd < -55dBm
 ACPR 1st < -30dBm 2nd < -50dBm

Fig. 15

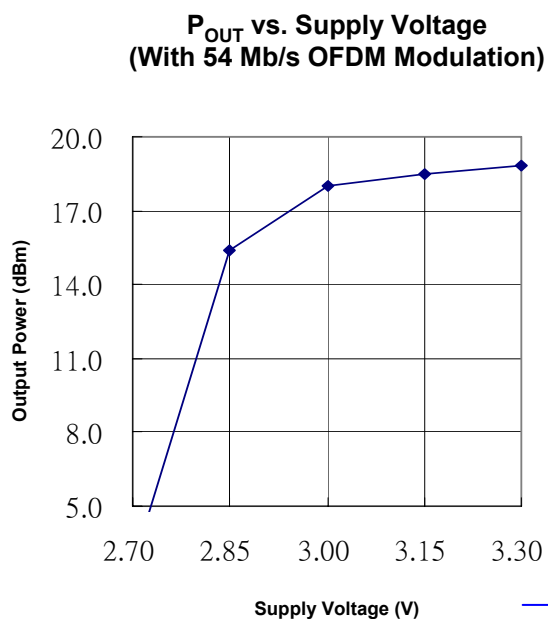
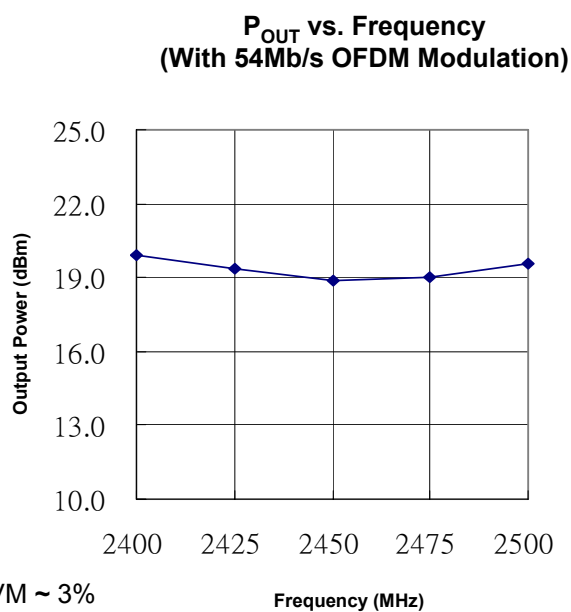


Fig. 16



 PA EVM ~ 3%

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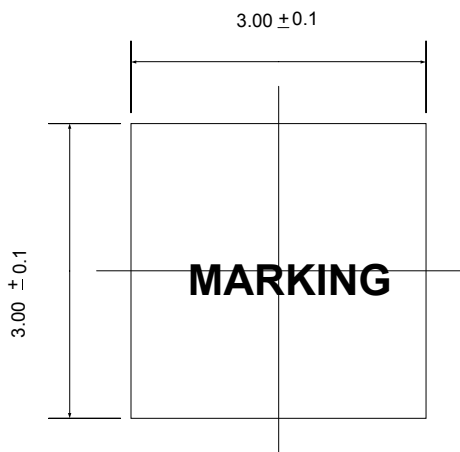
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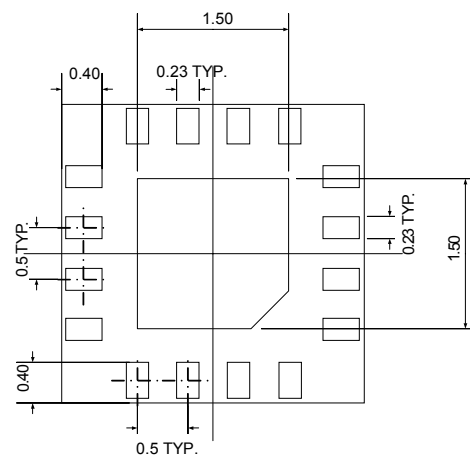
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Package Outline

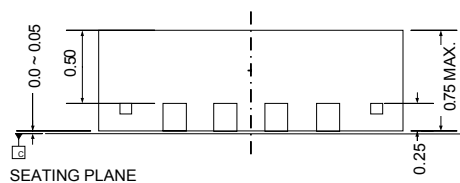
Top View



Bottom View



Side View



Unit: mm

Note :

1. Dimension and tolerance conform to ASME Y14.5M-1994.
2. Refer to JEDEC STD. MO-220 WEED-2 ISSUE B

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