



# EMP109

UPDATED 12/15/2004

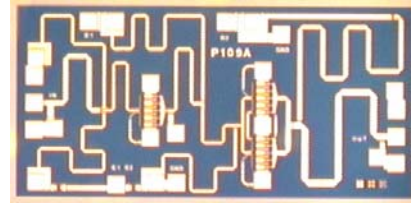
## 5.0 – 6.5 GHz Power Amplifier MMIC

### FEATURES

- 5.0 – 6.5 GHz Operating Frequency Range
- 27.0dBm Output Power at 1dB Compression
- 20.0 dB Typical Small Signal Gain
- -41dBc OIMD3 @Each Tone Pout 17 dBm

### APPLICATIONS

- Point-to-point and point-to-multipoint radio
- Military Radar Systems



Dimension: 1130um X 2250um  
Thickness: 85um ± 15um



Caution! ESD sensitive device.

### ELECTRICAL CHARACTERISTICS

(T<sub>b</sub> = 25 °C, 50 ohm, V<sub>ds</sub> = 7 V, I<sub>dss</sub> = 400 mA, Unless Otherwise Specified)

SYMBOL	PARAMETER/TEST CONDITIONS	MIN	TYP	MAX	UNITS
F	Operating Frequency Range	5.0		6.5	GHz
P <sub>1dB</sub>	Output Power at 1dB Gain Compression	26.0	27.0		dBm
G <sub>ss</sub>	Small Signal Gain	17.0	20.0		dB
OIMD3	Output 3 <sup>rd</sup> Order Intermodulation Distortion @Δf=10MHz, Each Tone Pout 17dBm, 7V, 60%±10%I <sub>dss</sub>		-41	-38	dBc
Input RL	Input Return Loss		-12	-8	dB
Output RL	Output Return Loss		-6		dB
I <sub>dss</sub>	Saturated Drain Current V <sub>ds</sub> =3V, V <sub>GS</sub> =0V	490	570	660	mA
V <sub>ds</sub>	Drain to Source Voltage		7	8	V
NF	Noise Figure @6GHz		7		dB
R <sub>th</sub>	Thermal Resistance (Au-Sn Eutectic Attach)		22		°C/W
T <sub>b</sub>	Operating Base Plate Temperature	- 35		+ 85	°C

### MAXIMUM RATINGS AT 25°C<sup>1,2</sup>

SYMBOL	CHARACTERISTIC	ABSOLUTE	CONTINUOUS
V <sub>ds</sub>	Drain to Source Voltage	12V	8 V
V <sub>GS</sub>	Gate to Source Voltage	-8V	- 4 V
I <sub>ds</sub>	Drain Current	I <sub>dss</sub>	650mA
I <sub>GSF</sub>	Forward Gate Current	57mA	9.5 mA
P <sub>IN</sub>	Input Power	24dBm	@ 3dB compression
T <sub>CH</sub>	Channel Temperature	175°C	150°C
T <sub>STG</sub>	Storage Temperature	-65/175°C	-65/150°C
P <sub>T</sub>	Total Power Dissipation	6.2W	5.2W

1. Operating the device beyond any of the above rating may result in permanent damage.

2. Bias conditions must also satisfy the following equation  $V_{ds} \cdot I_{ds} < (T_{CH} - T_b) / R_{TH}$

Specifications are subject to change without notice.

Excelics Semiconductor, Inc. 310 De Guigne Drive, Sunnyvale, CA 94085

Phone: 408-737-1711 Fax: 408-737-1868 Web: [www.excelics.com](http://www.excelics.com)

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Revised December 2004



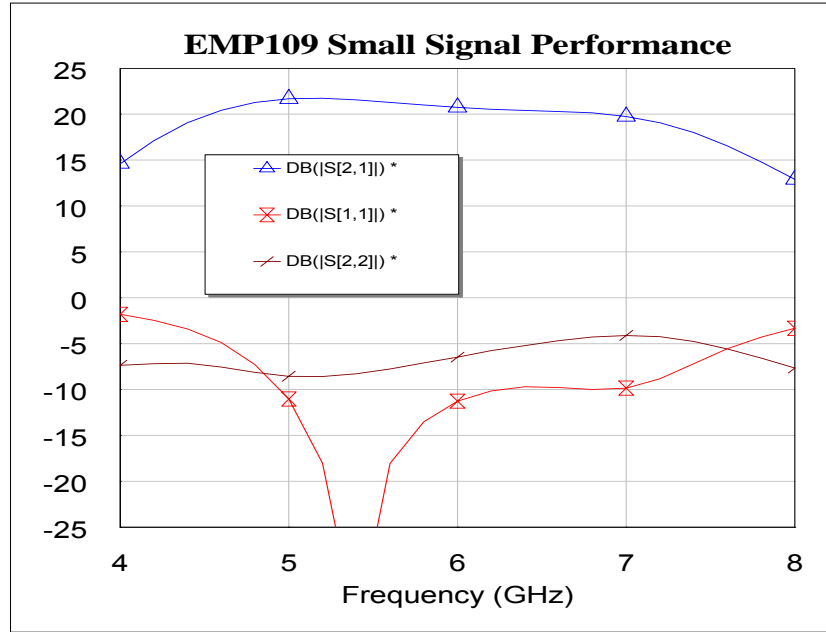
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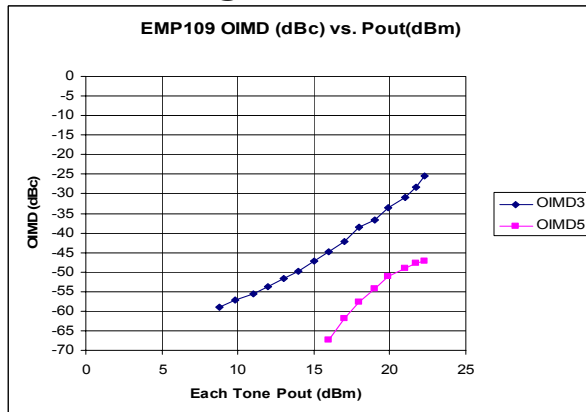
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### Typical Performance:

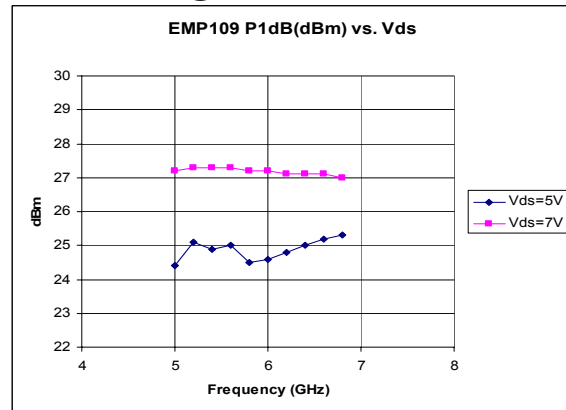
#### 1. Small Signal Performance (@7V, 400mA)



#### 2. OIMD VS Pout @7V, 400mA (@6GHz, Δf=10MHz)



#### 3. P-1 VS Vds @I<sub>dsq</sub>=400mA



### APPLICATION INFORMATION (CAUTION: THIS IS AN ESD SENSITIVE DEVICE)

Chip carrier should match GaAs thermal coefficient of expansion and have high thermal conductivity, such as copper tungsten or copper molybdenum. The chip carrier should be nickel-gold plated and capable of withstanding 325°C for 20 minutes.

Die attach should be done with Gold/Tin (80/20) eutectic alloy in inert ambient gas. The backside is used as heatsinking, DC, and RF contacts.

All die attach and wire bond equipment, especially the tools which touch a die, should be well grounded to avoid accidental discharge through a die.

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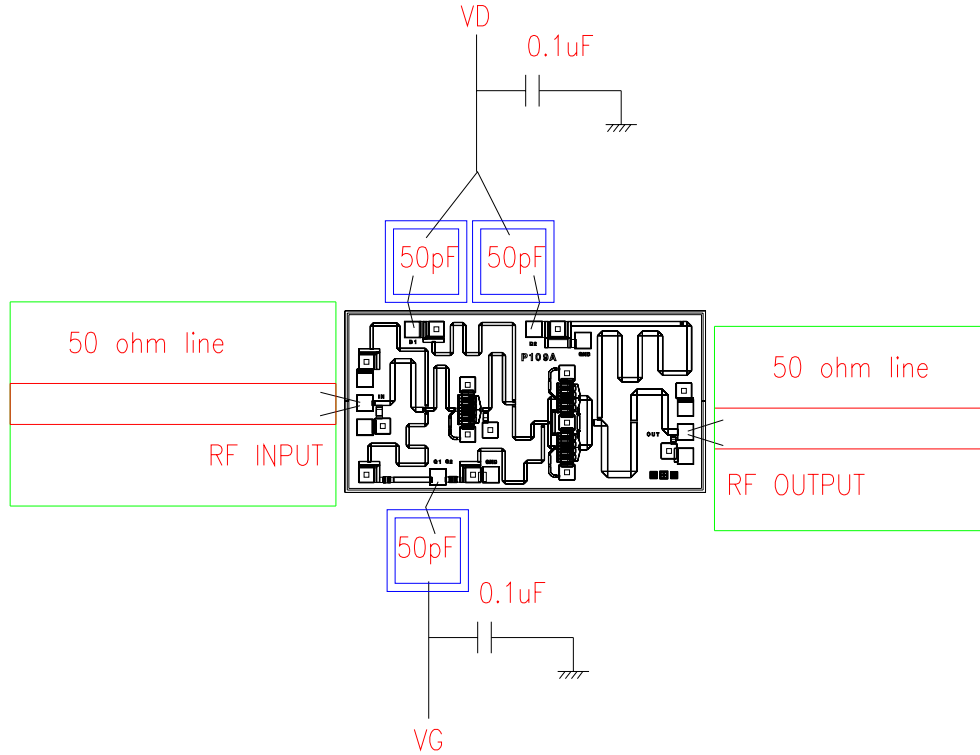


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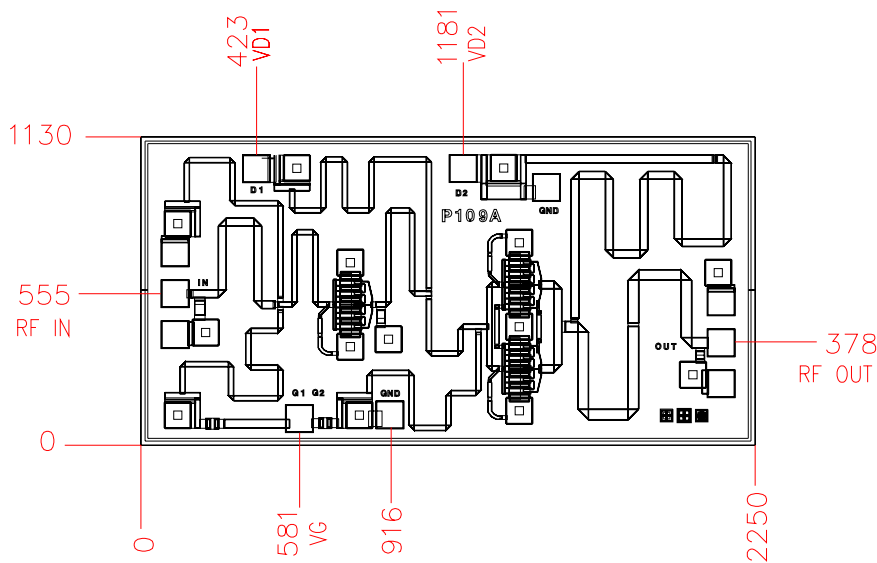
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### ASSEMBLY DRAWING



The length of RF wires should be as short as possible. Use at least two wires between RF pad and 50 ohm line and separate the wires to minimize the mutual inductance.

### CHIP OUTLINE



Chip Size 1130 x 2250 microns  
 Chip Thickness: 85 ± 15 microns  
 PAD Dimensions: 100 x 100 microns  
 All Dimensions in Microns

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