



# EMP213

UPDATED 10/11/2004

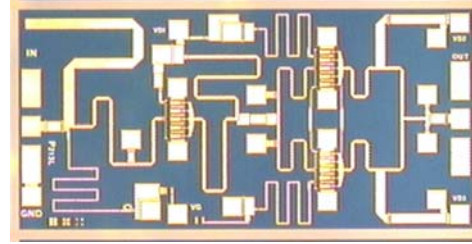
## 12.5 – 15.5 GHz Power Amplifier MMIC

### FEATURES

- 12.5 – 15.5 GHz Operating Frequency Range
- 27.0dBm Output Power at 1dB Compression
- 17.0 dB Typical Small Signal Gain
- -41dBc OIMD3 @Each Tone Pout 17dBm

### APPLICATIONS

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



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



Caution! ESD sensitive device.

### ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ , 50 ohm, VDD=7V, IDQ=400mA)

SYMBOL	PARAMETER/TEST CONDITIONS	MIN	TYP	MAX	UNITS
F	Operating Frequency Range	12.5		15.5	GHz
P1dB	Output Power at 1dB Gain Compression	26.0	27.0		dBm
Gss	Small Signal Gain	14.0	17.0		dB
OIMD3	Output 3 <sup>rd</sup> Order Intermodulation Distortion @ $\Delta f=10\text{MHz}$ , Each Tone Pout 17dBm $I_{ds} = 60\% \pm 10\% I_{dss}$		-41	-38	dBc
Input RL	Input Return Loss		-12	-8	dB
Output RL	Output Return Loss		-8	-5	dB
NF	Noise Figure		9		dB
Idss	Saturated Drain Current $V_{DS} = 3\text{V}$ , $V_{GS} = 0\text{V}$	475	620	750	mA
VDD	Drain Voltage		7	8	V
Rth	Thermal Resistance (Au-Sn Eutectic Attach)		22		$^\circ\text{C/W}$
Tb	Operating Base Plate Temperature	-35		+85	$^\circ\text{C}$

### MAXIMUM RATINGS AT $25^\circ\text{C}$ <sup>1,2</sup>

SYMBOL	CHARACTERISTIC	ABSOLUTE	CONTINUOUS
Vds	Drain to Source Voltage	12V	8 V
VGS	Gate to Source Voltage	-8V	- 4 V
Ids	Drain Current	Idss	650mA
IGSF	Forward Gate Current	57mA	9.5 mA
PIN	Input Power	24dBm	@ 3dB compression
TCH	Channel Temperature	175 $^\circ\text{C}$	150 $^\circ\text{C}$
TSTG	Storage Temperature	-65/175 $^\circ\text{C}$	-65/150 $^\circ\text{C}$
PT	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  $V_{ds} * I_{ds} < (T_{CH} - T_b) / R_{TH}$

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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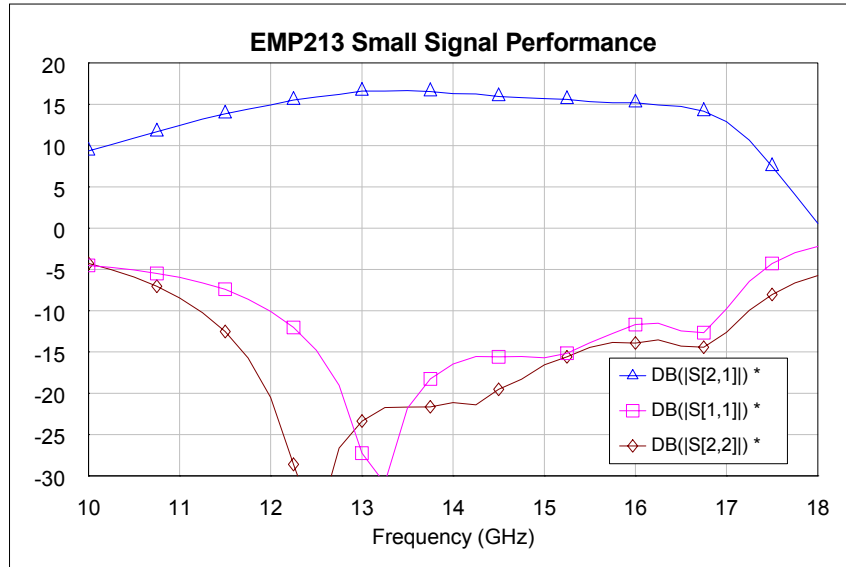
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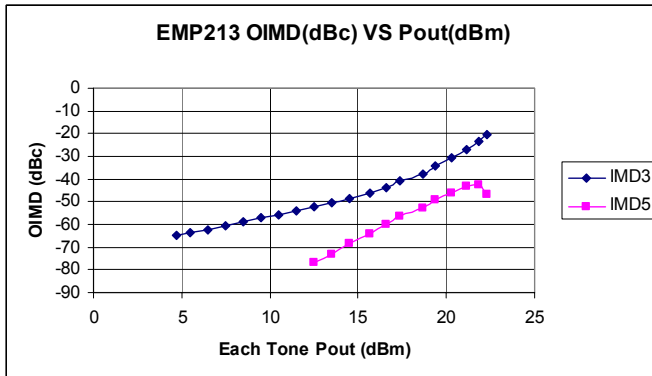
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### Typical Performance:

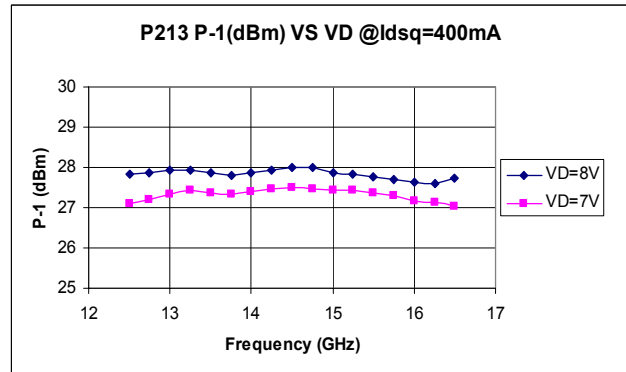
#### 1. Small Signal Performance (@7V, 400mA)



#### 2. OIMD VS Pout @7V 400mA (@15GHz, Δf=10MHz)



#### 3. P-1 VS VD @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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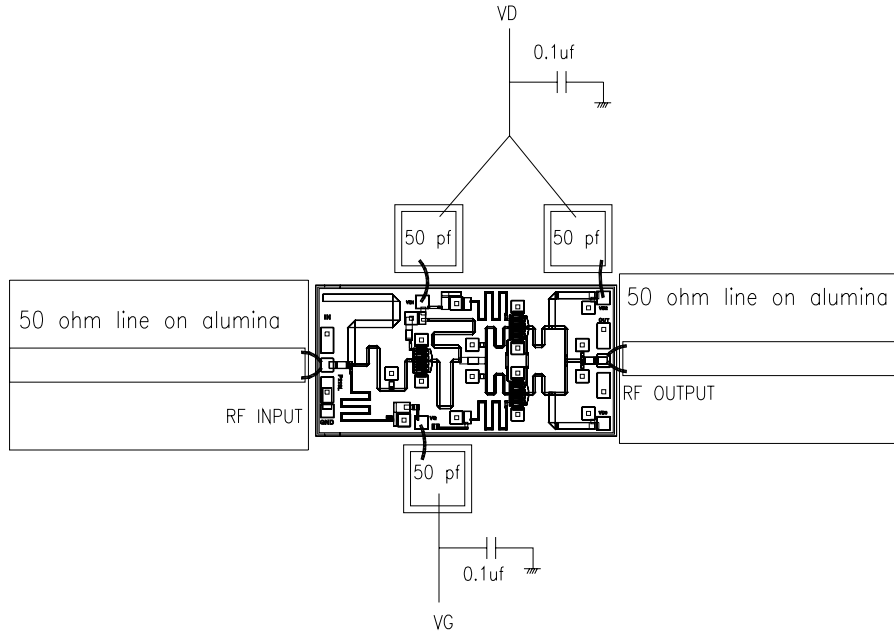


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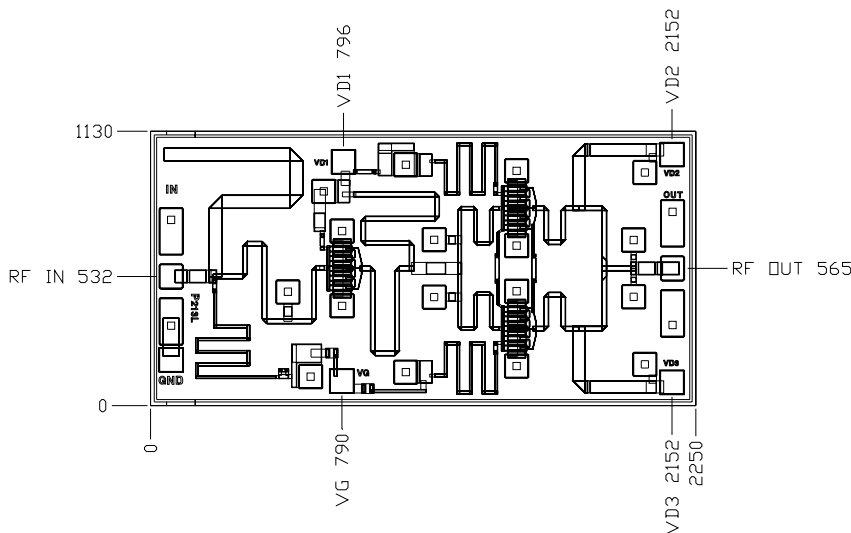
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### ASSEMBLY DRAWING



The length of RF wires should be as short as possible. Use at least two 1.0mil gold 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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