

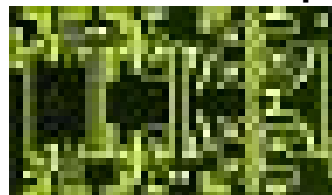
## 6 - 18 GHz 2 Watt Power Amplifier MMIC

### FEATURES

- 6 - 18 GHz Operating Frequency Range
- 33 dBm Output Power at 1dB Compression
- 20.0 dB Typical Small Signal Gain

### APPLICATIONS

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



Dimension: 5330um X 3080um  
Thickness: 85um ± 15um



Caution! ESD sensitive device.

### ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ , 50 ohm, $V_{DD}=8\text{V}$ , $I_{DQ}=1250\text{mA}$ )

SYMBOL	PARAMETER/TEST CONDITIONS	MIN	TYP	MAX	UNITS
F	Operating Frequency Range	6		18	GHz
$P_{1dB}$	Output Power at 1dB Gain Compression	31	33		dBm
$G_{SS}$	Small Signal Gain	17	20		dB
$G_\Delta$	Small Signal Gain Flatness		±1.2		dB
$I_{D1dB}$	Supply current at 1dB Gain Compression		1400		mA
PAE	Power Added Efficiency at 1dB Gain Compression		20		%
OIMD3	Output 3 <sup>rd</sup> Order Intermodulation Distortion @ $\Delta f=10\text{MHz}$ , Each Tone Pout 21.5dBm		-43.0		dBc
Input RL	Input Return Loss 6GHz – 8GHz 8GHz – 18GHz		-8	-5	dB
			-12	-8	dB
Output RL	Output Return Loss		-15	-10	dB
$I_{DSS}$	Saturated Drain Current $V_{DD}=3\text{V}$ , $V_{GG}=0\text{V}$		2500		mA
$R_{TH}$	Thermal Resistance (Au-Sn Eutectic Attach)		5.5		$^\circ\text{C/W}$

### ABSOLUTE MAXIMUM RATINGS FOR CONTINUOUS OPERATION<sup>1</sup>

SYMBOL	CHARACTERISTIC	VALUE
$V_{DS}$	Drain to Source Voltage	8V
$V_{GS}$	Gate to Source Voltage	- 4V
$I_{DD}$	Drain Current	$I_{DSS}$
$I_{GSF}$	Forward Gate Current	70 mA
$P_{IN}$	Input Power	@ 3dB compression
$T_{CH}$	Channel Temperature	175 $^\circ\text{C}$
$T_{STG}$	Storage Temperature	-65/175 $^\circ\text{C}$
$P_T$	Total Power Dissipation	22W

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



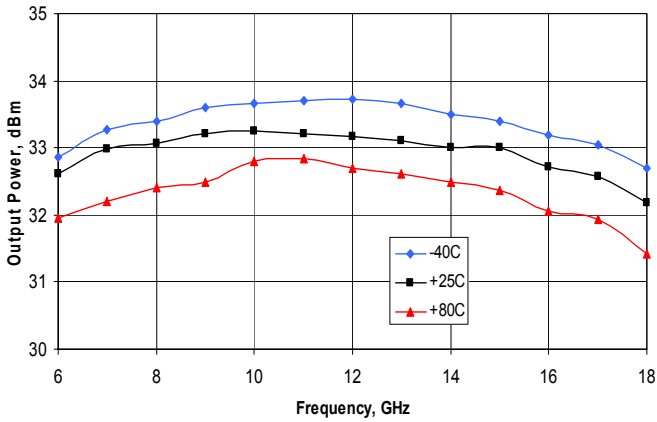
# EMP216

## 6 - 18 GHz 2 Watt Power Amplifier MMIC

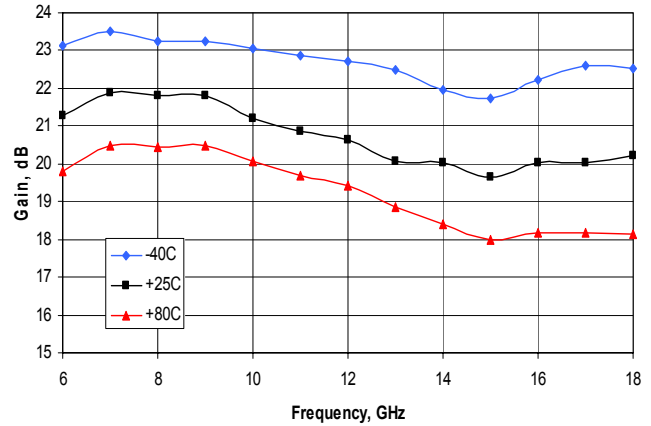
### Typical Performance Characteristics

All data measured at 8V,  $I_{DQ}=1250\text{mA}$  bias, 25°C unless otherwise noted.

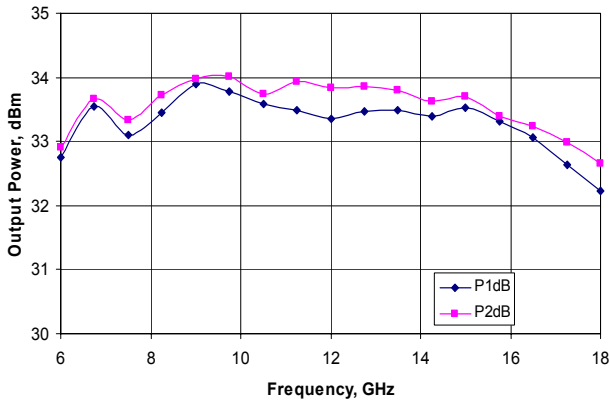
Output Power at 1dB gain compression over temperature



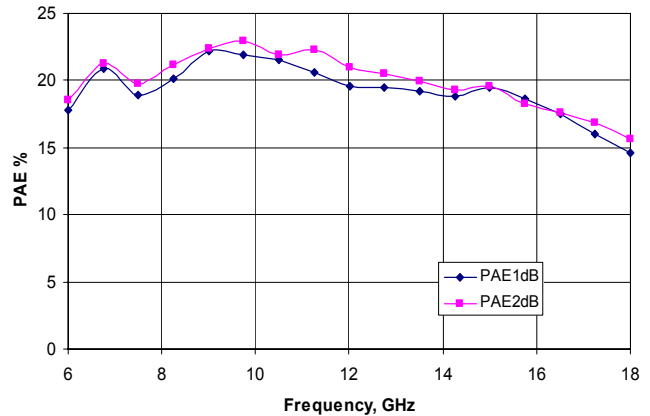
Gain over Temperature



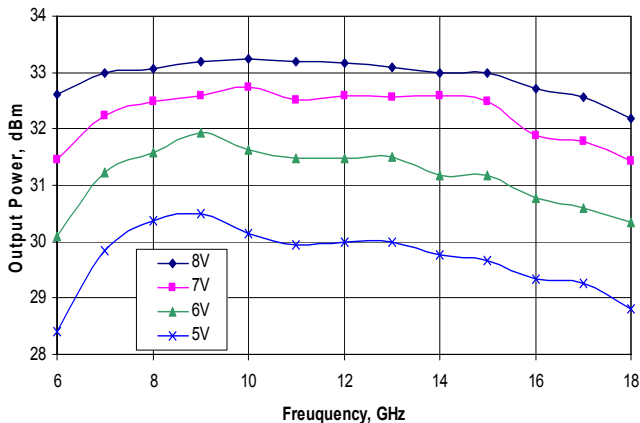
Output Power at 1dB and 2dB gain compression



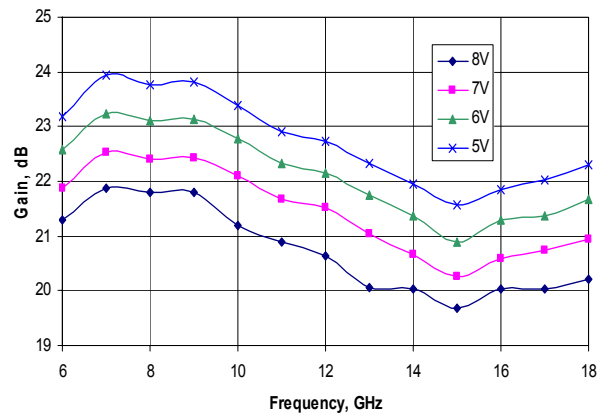
PAE at 1dB and 2dB gain compression



Output Power at 1dB gain compression vs Vdd, Iq = 1250mA



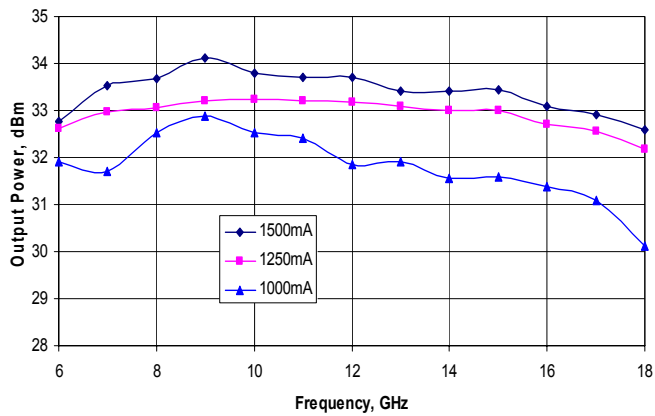
Gain vs Vdd, Iq = 1250mA



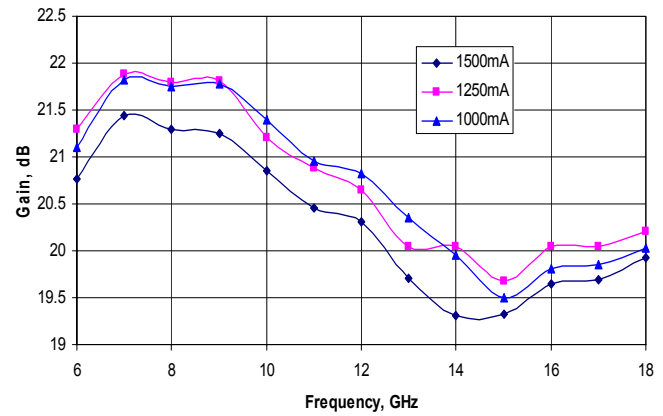
Specifications are subject to change without notice.

## 6 - 18 GHz 2 Watt Power Amplifier MMIC

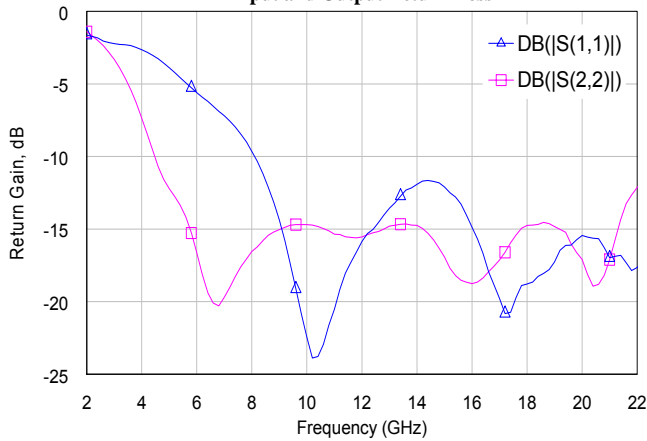
Output Power at 1dB Gain Compression vs Iq, Vdd=8V



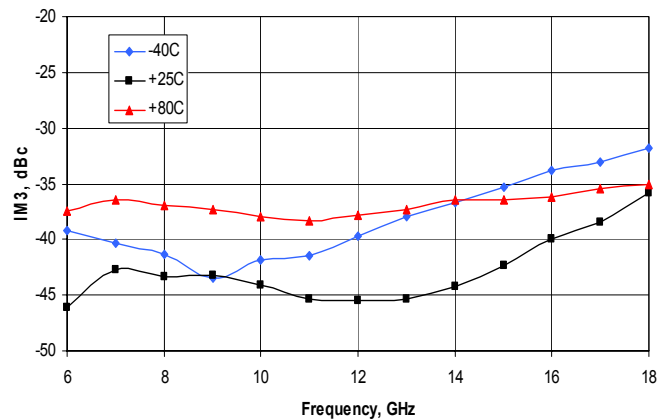
Gain vs Iq, Vdd = 8V



Input and Output Return Loss

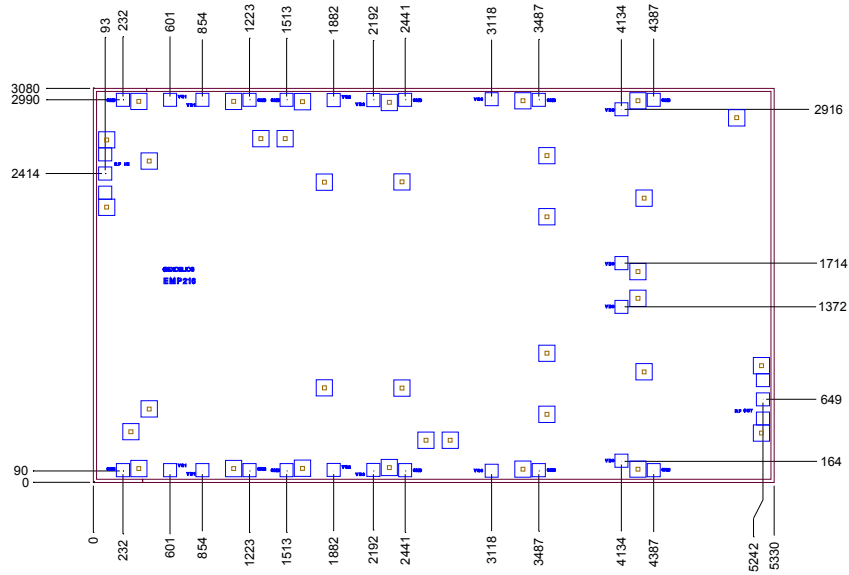


IM3 over temperature Pout=21.5dBm/tone



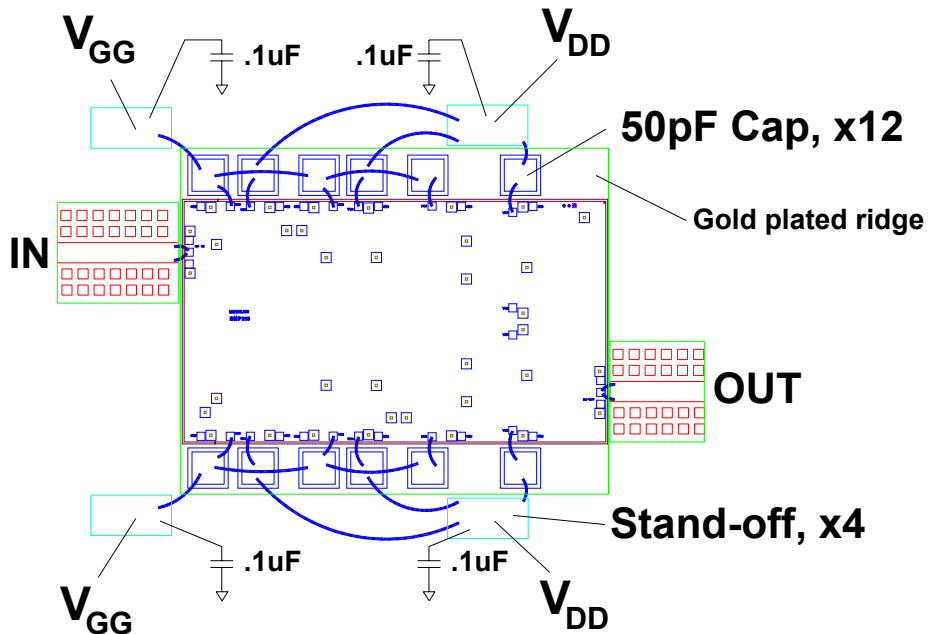
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### Outline Drawing



Dimensions in microns. Bond pad size 100um x 100um.  
 Thickness: 85um ± 15um

### Assembly Drawing



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# EMP216

## 6 - 18 GHz 2 Watt Power Amplifier MMIC

### Application Hints

#### Biasing

The EMP216 requires a negative bias voltage applied to  $V_{GG}$  and positive bias voltage applied to  $V_{DD}$ . Power supplies must be sequenced to apply  $V_{GG}$  first, then  $V_{DD}$ . When removing power,  $V_{DD}$  must be turned off first, then  $V_{GG}$ .  $V_{GG}$  will draw very little current under small signal RF conditions, but as output power approaches the 1dB compression point, the  $V_{GG}$  input will draw current up to several milliamps. The  $V_{GG}$  supply must be capable of both sinking and sourcing this current.

#### Assembly

Recommended method of die attachment is AuSn eutectic. Wire bonding should be thermocompression bonding with no ultrasonics.

To obtain full performance, RF input and output bond wires should be as short as possible. Wire length should be 7 mils maximum, with at least two wires per pad. Mounting the EMP216 on a "ridge" or pedestal is recommended to align the top surface of the MMIC to the interfacing substrate and minimize bond wire length.

#### ESD warning

The EMP216 is susceptible to damage from ESD and should only be handled in an ESD safe work station environment.

#### Military and Hi-Rel screening

Contact factory for military and hi-rel grades.

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Page 5 of 5  
Revision 03