EMP216

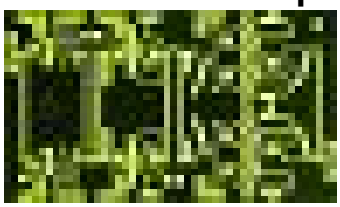
6 - 18 GHz 2 Watt Power Amplifier MMIC

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°C, 50 ohm, V_{DD}=8V, I_{DQ}=1250mA)

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_{Δ}	Small Signal Gain Flatness		±1.2		dB
ID_{1dB}	Supply current at 1dB Gain Compression		1400		mA
PAE	Power Added Efficiency at 1dB Gain Compression		20		%
OIMD3	Output 3rd Order Intermodulation Distortion @Δf=10MHz, Each Tone Pout 21.5dBm		-43.0		dBc
Input RL	Input Return Loss 6GHz – 8GHz		-8	-5	dB
	8GHz – 18GHz		-12	-8	dB
Output RL	Output Return Loss		-15	-10	dB
I_{DSS}	Saturated Drain Current V_{DD}=3V, V_{GG}=0V		2500		mA
R_{TH}	Thermal Resistance (Au-Sn Eutectic Attach)		5.5		°C/W

ABSOLUTE MAXIMUM RATINGS FOR CONTINUOUS OPERATION[1]

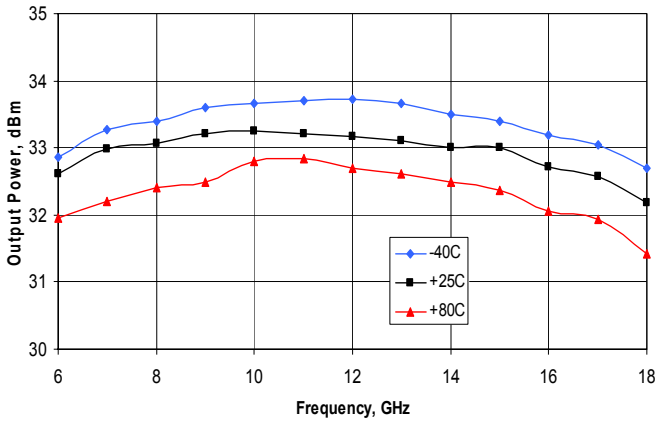
SYMBOL	CHARACTERISTIC	VALUE
V_{DS}	Drain to Source Voltage	8V
V_{GS}	Gate to Source Voltage	- 4V
I_{DD}	Drain Current	Idss
I_{GSF}	Forward Gate Current	70 mA
P_{IN}	Input Power	@ 3dB compression
T_{CH}	Channel Temperature	175°C
T_{STG}	Storage Temperature	-65/175°C
P_T	Total Power Dissipation	22W

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

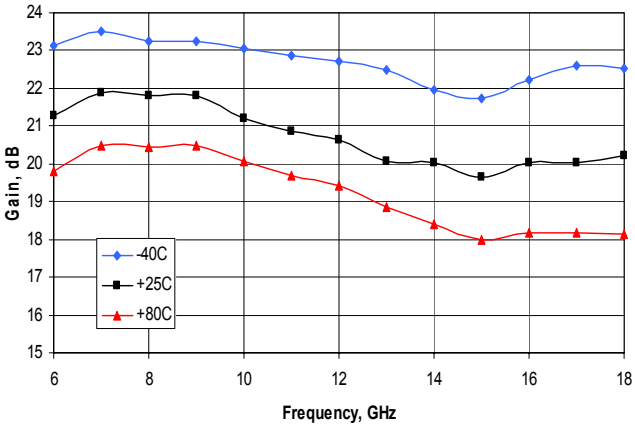
Typical Performance Characteristics

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

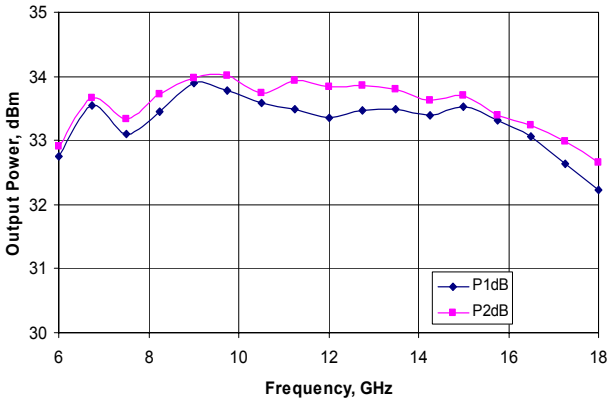
Output Power at 1dB gain compression over temperature



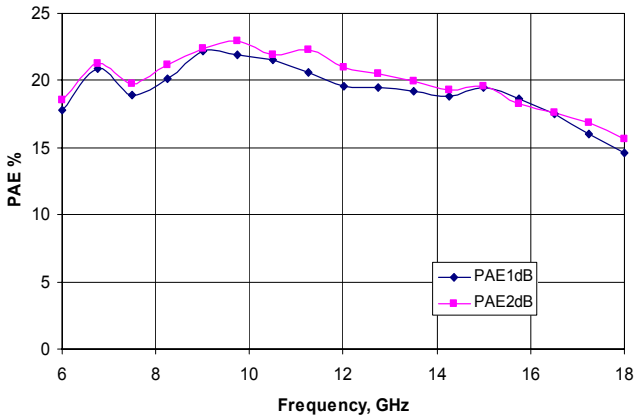
Gain over Temperature



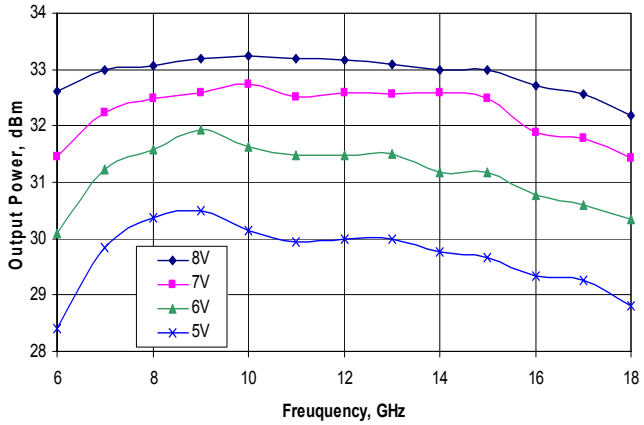
Output Power at 1dB and 2dB gain compression



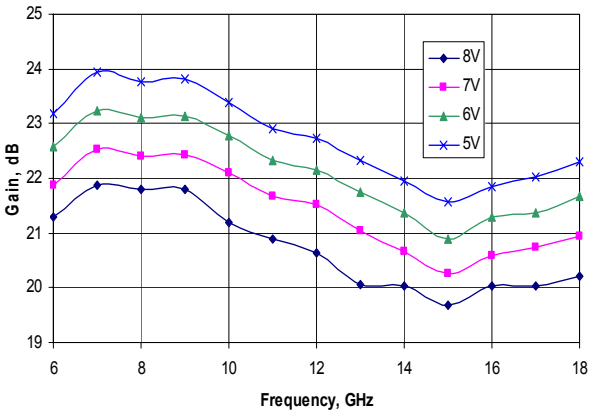
PAE at 1dB and 2dB gain compression



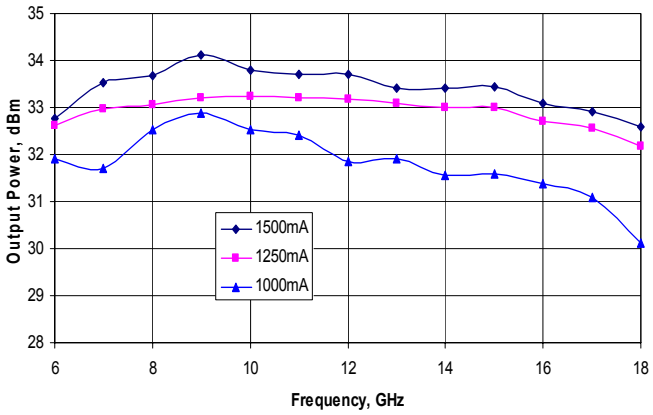
Output Power at 1dB gain compression vs Vdd, Iq = 1250mA



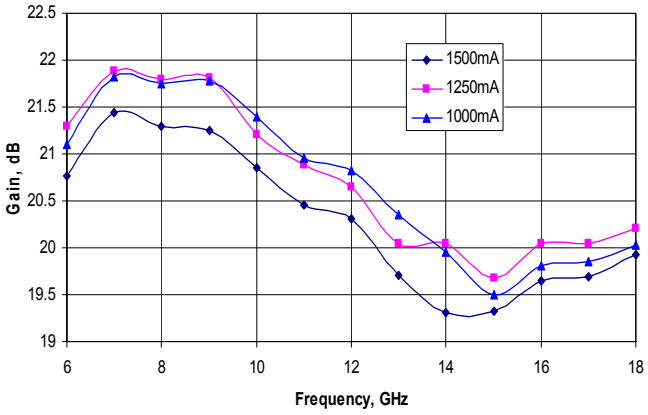
Gain vs Vdd, Iq = 1250mA



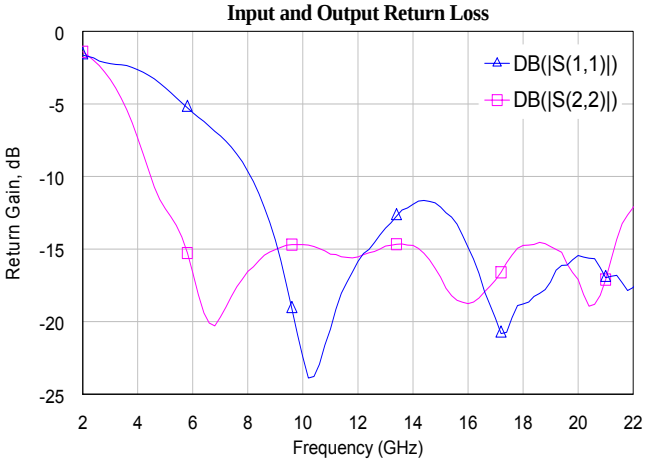
Output Power at 1dB Gain Compression vs Iq, Vdd=8V



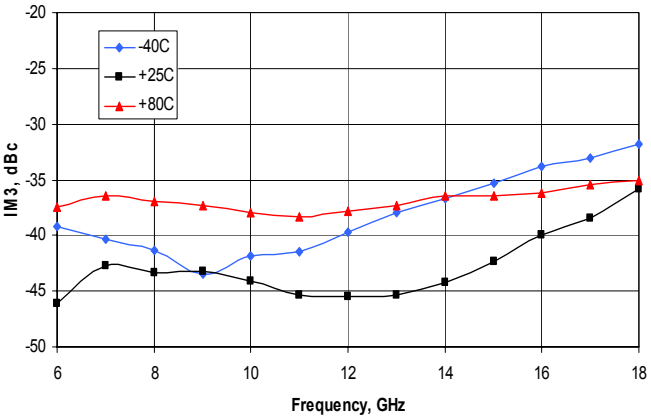
Gain vs Iq, Vdd = 8V



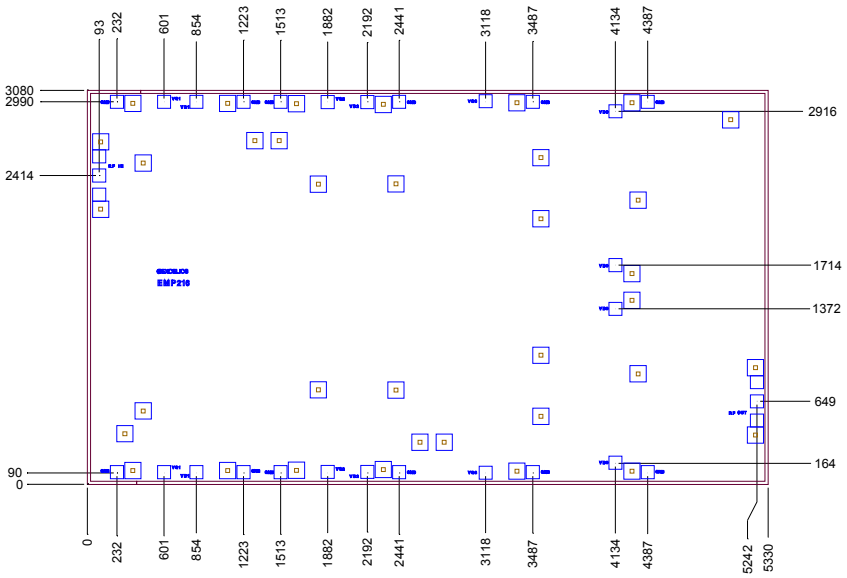
Input and Output Return Loss



IM3 over temperature Pout=21.5dBm/tone

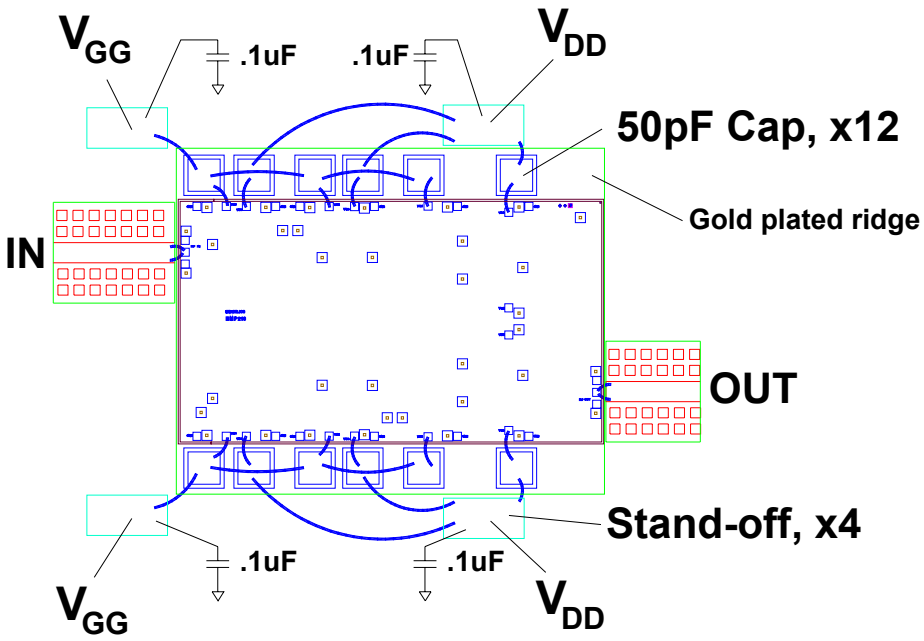


Outline Drawing



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

Assembly Drawing



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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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.