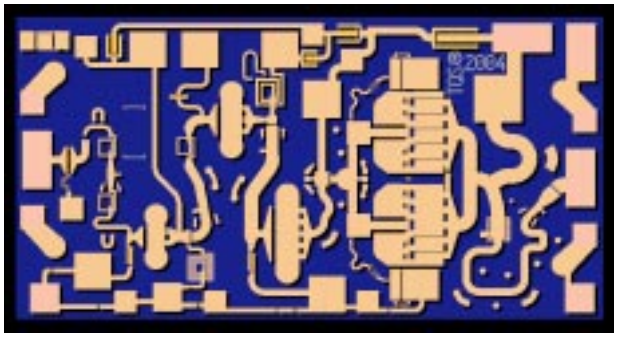
12-19 GHz VSAT Amplifier

TGA2508



Key Features

- Frequency Range: 12 - 19 GHz
- 30 dB Nominal Gain
- 30 dBm Nominal P1dB @ 15 GHz
- 32 dBm Nominal OTOI
- Bias Conditions: 7 V, 433 mA
- 0.50 um 3MI pHEMT Technology
- Chip Dimensions: 2.1 x 1.1 x 0.1 mm (0.083 x 0.118 x 0.004 in)

Product Description

The TriQuint TGA2508 is a compact Medium Power Amplifier MMIC for VSAT applications. The part is designed using TriQuint's 0.5 um power pHEMT production process.

The TGA2508 provides a nominal 30 dB Gain from 12-19 GHz, with Output Power @ 1dB Gain compression of 30 dBm. The MMIC also provides 32 dBm Output TOI @ Pin/Tone = -10 dBm.

The part is ideally suited for low cost emerging markets such as VSAT Ground Terminals, Point-to-Point Radio, Military Ku Band applications.

The TGA2508 is 100% DC and RF tested on-wafer to ensure performance compliance.

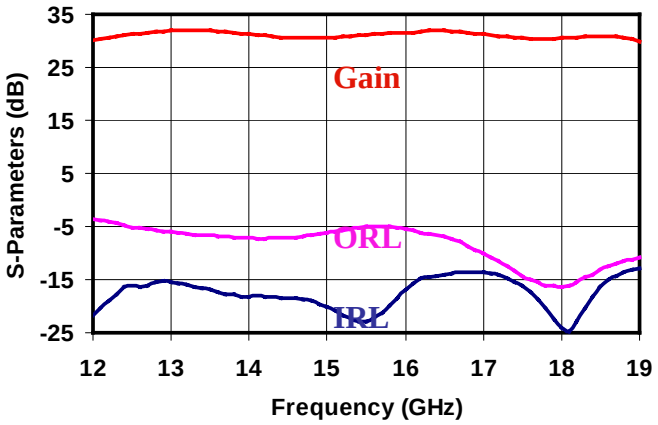
Evaluation boards are available.

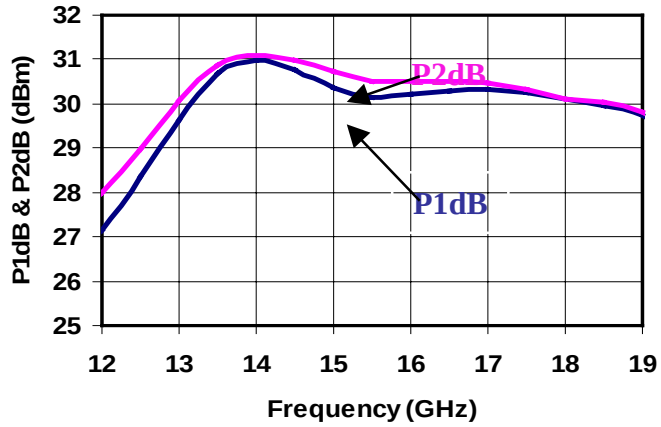
Primary Applications

- VSAT Ground Terminals
- Point to Point Radio
- Military Ku Band

Measured Data

Bias Conditions: Vd = 7 V, Id = 433 mA





Note: This device is early in the characterization process prior to finalizing all electrical specifications. Specifications are subject to change without notice.

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TABLE I
MAXIMUM RATINGS 1/

SYMBOL	PARAMETER	VALUE	NOTES
V^+	Positive Supply Voltage	8 V	2/
V^-	Negative Supply Voltage Range	-2 to 0 V	
I^+	Positive Supply Current (Quiescent)	591 mA	2/ 3/
$\mid I_G \mid$	Gate Supply Current	16 mA	3/
P_{IN}	Input Continuous Wave Power	17 dBm	
P_D	Power Dissipation	3.3 W	2/ 4/
T_{CH}	Operating Channel Temperature	150 ^{0}C	5/ 6/
T_M	Mounting Temperature (30 Seconds)	320 ^{0}C	
T_{STG}	Storage Temperature	-65 to 150 ^{0}C	

1/ These ratings represent the maximum operable values for this device.

2/ Combinations of supply voltage, supply current, input power, and output power shall not exceed P_D.

3/ Total current for the entire MMIC.

4/ When operated at this bias condition with a base plate temperature of 70 ^{0}C, the median life is 1E+6 hrs.

5/ Junction operating temperature will directly affect the device median time to failure (MTTF). For maximum life, it is recommended that junction temperatures be maintained at the lowest possible levels.

6/ These ratings apply to each individual FET

TABLE II
DC PROBE TEST
(Ta = 25 °C ± 5 °C)

SYMBOL	PARAMETER	MINIMUM	MAXIMUM	UNIT
Idss $_{(Q4)}$	Saturated Drain Current	50	350	mA
Gm $_{(Q4)}$	Transconductance	200	500	mS
Vp $_{(Q1, 2, 3, 4, 5)}$	Pinch-off Voltage	-1.3	-0.3	V
BVGS $_{(Q4)}$	Breakdown Voltage Gate-Source	-30	-8	V
BVGD $_{(Q1-5)}$	Breakdown Voltage Gate-Drain	-30	-11	V

Q1 is 240um FET, Q2 is 420um FET, Q3 is 800um FET, Q4 & Q5 are 1000um FETs

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TABLE III
ELECTRICAL CHARACTERISTICS
(Ta = 25°C ± 5°C)

PARAMETER	TYPICAL	UNITS
Frequency Range	12 - 19	GHz
Drain Voltage, Vd	7	V
Drain Current, Id	433	mA
Small Signal Gain, S21	30	dB
Input Return Loss, S11	17	dB
Output Return Loss, S22	7	dB
Output Power @ 1dB Gain compression @ 15GHz, P1dB	30	dBm
Output TOI @ Pin/Tone = -10dBm	32	dBm
Temperature Gain Coefficient	0.06	dB/°C

TABLE IV
THERMAL INFORMATION

PARAMETER	TEST CONDITIONS	T_{CH} (°C)	θ_{JC} (°C/W)	T_M (HRS)
θ_{JC} Thermal Resistance (channel to backside of carrier)	Vd = 7 V I_D = 433 mA Pdiss = 3.03 W	143	24.1	1.8E+6

Note: Assumes eutectic attach using 1.5 mil 80/20 AuSn mounted to a 20 mil CuMo Carrier at 70°C baseplate temperature. Worst case condition with no RF applied, 100% of DC power is dissipated.

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Measured Data

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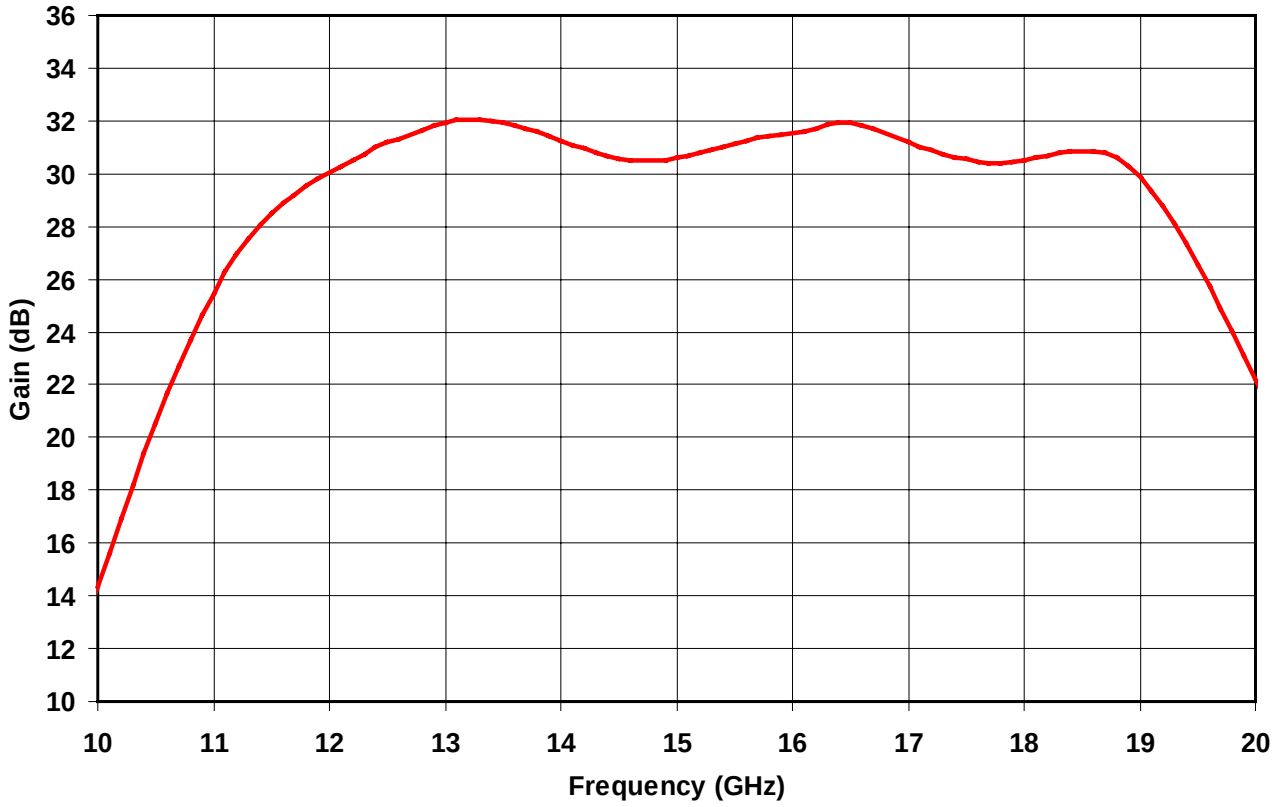

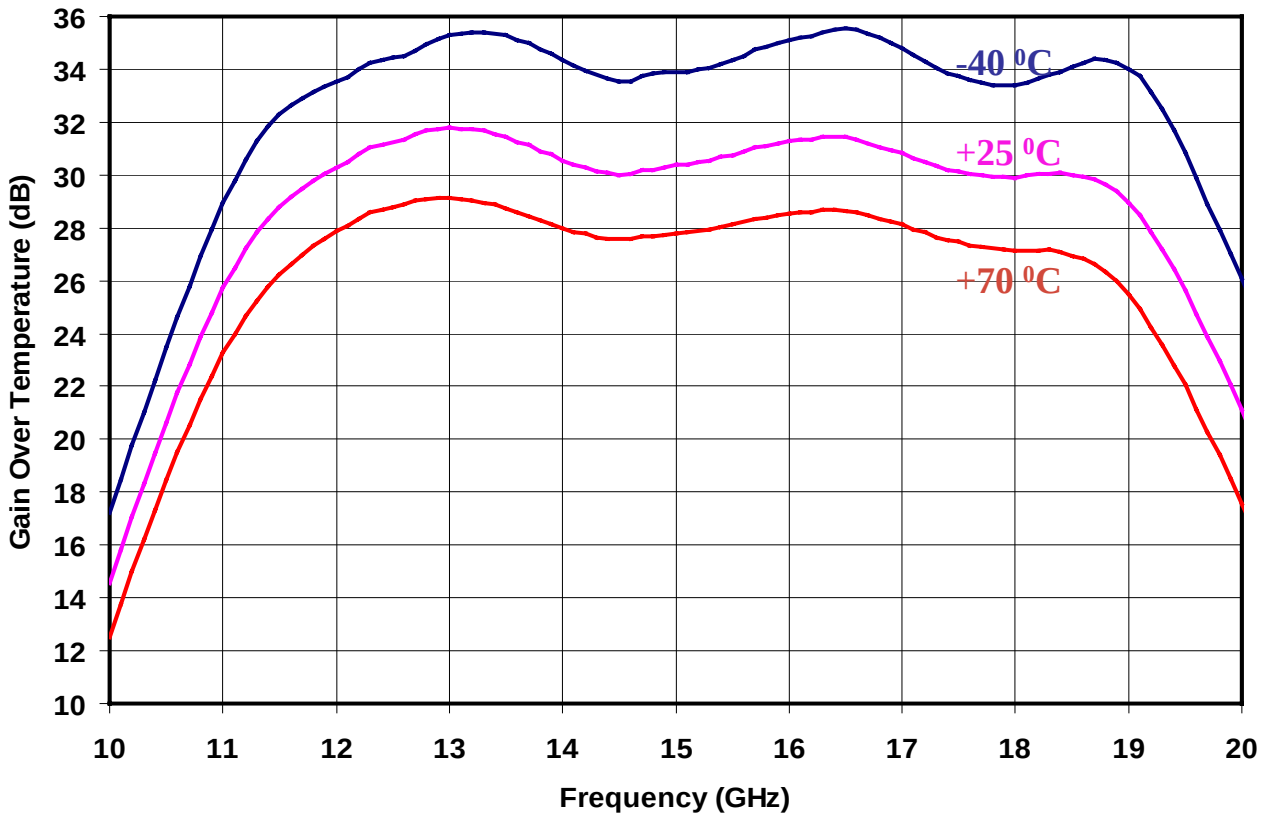

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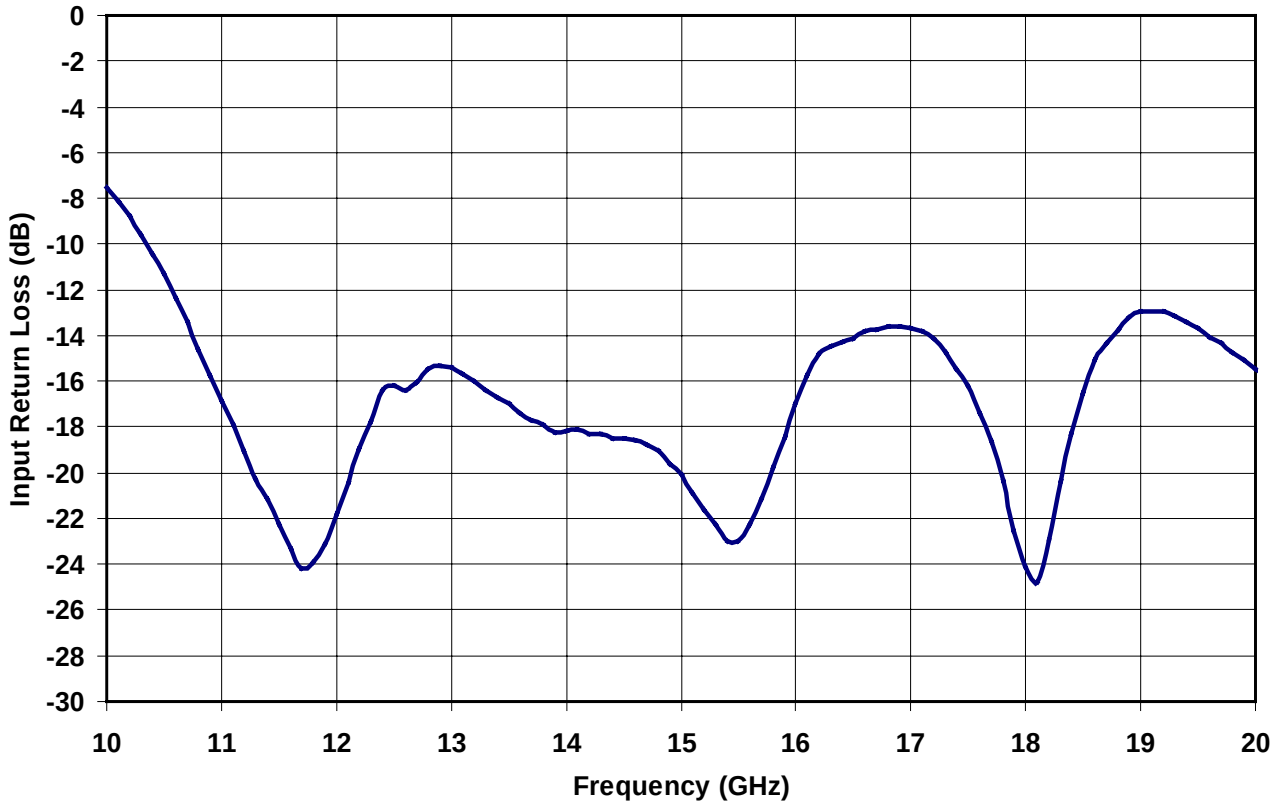

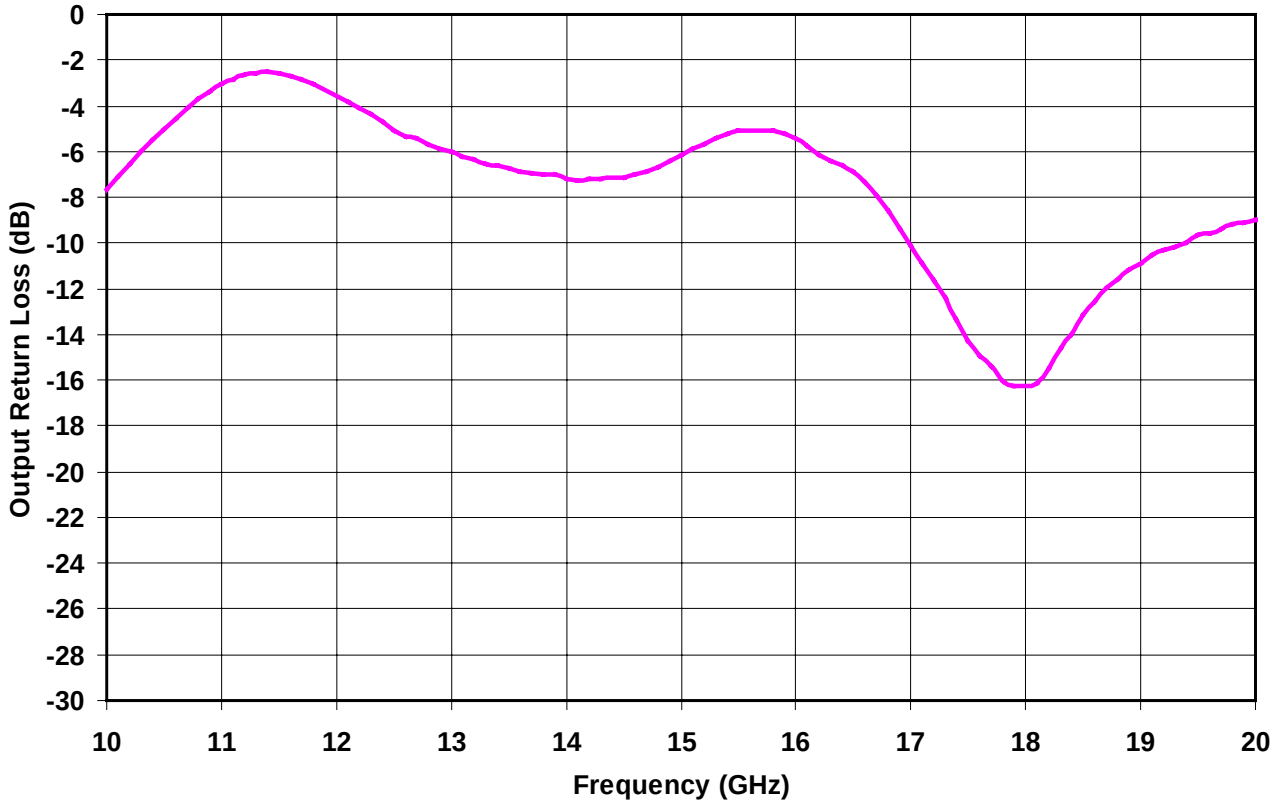

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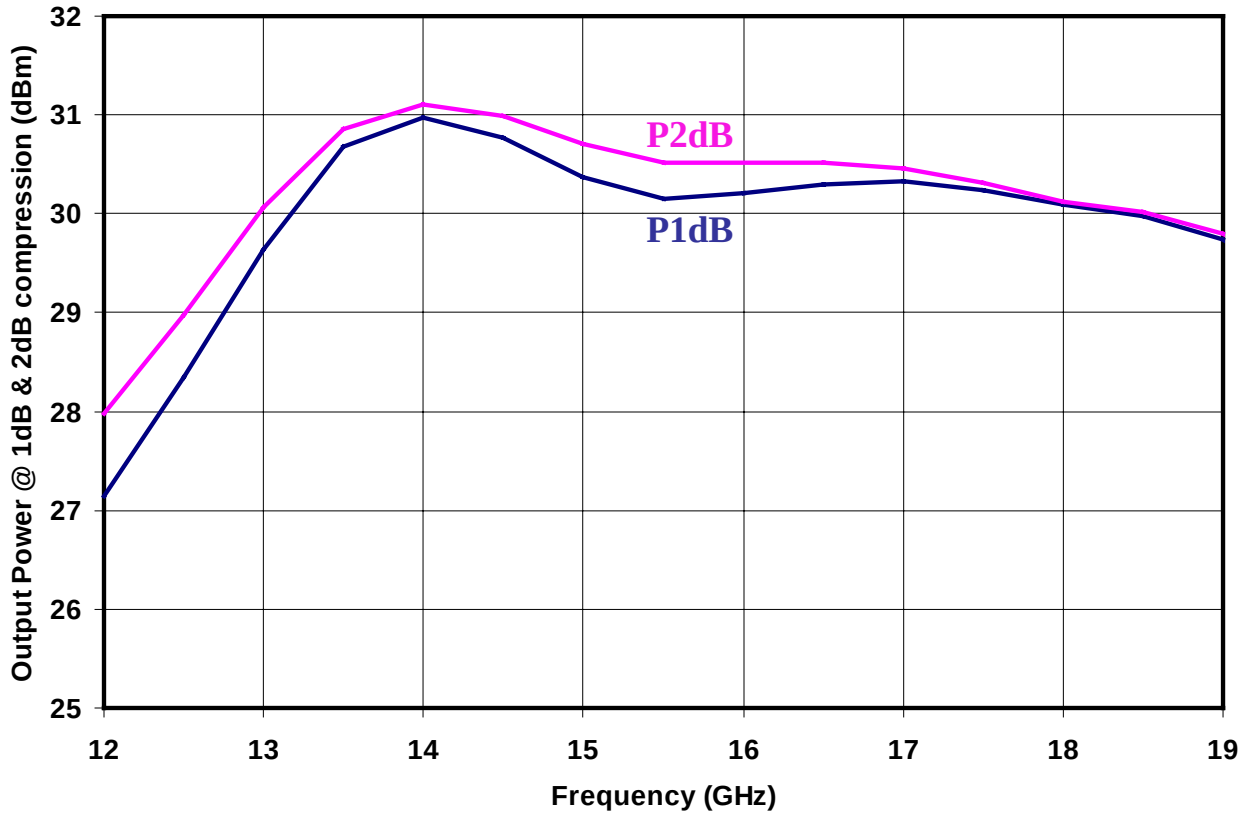

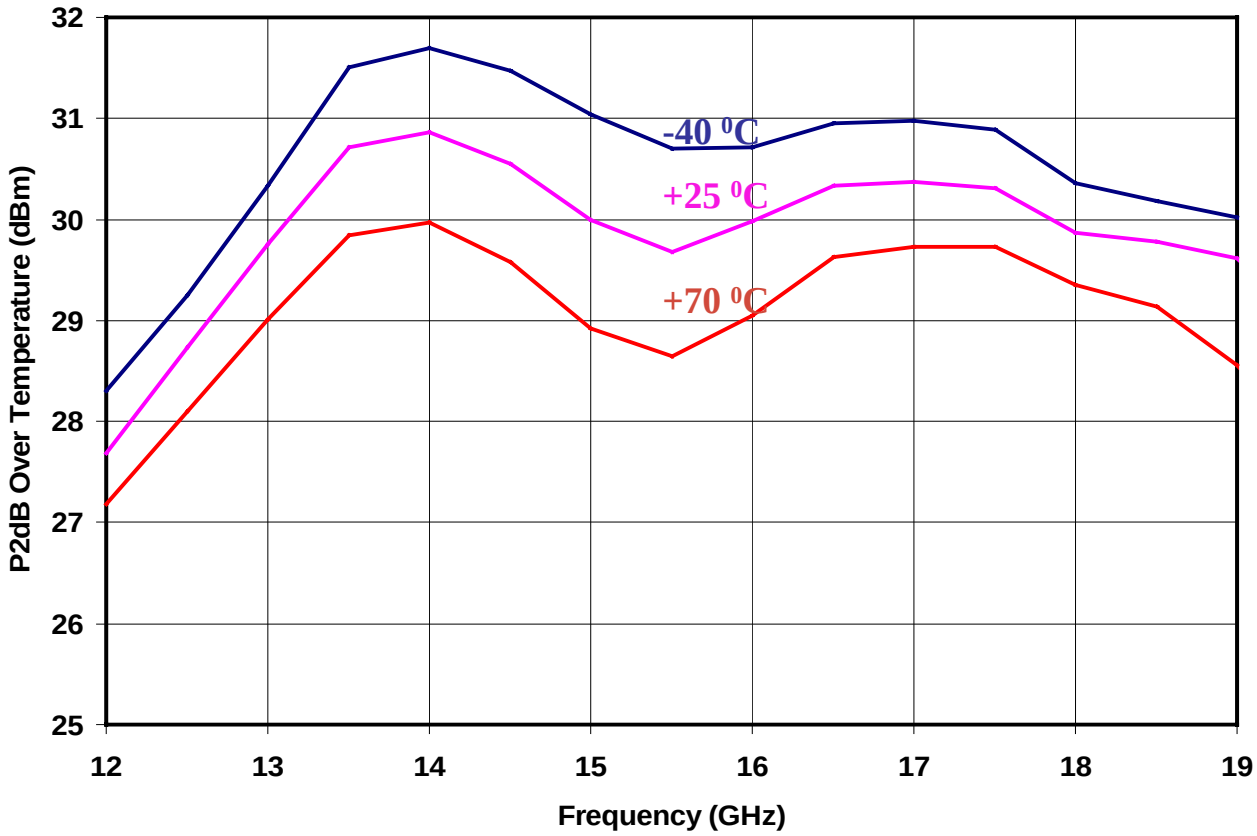

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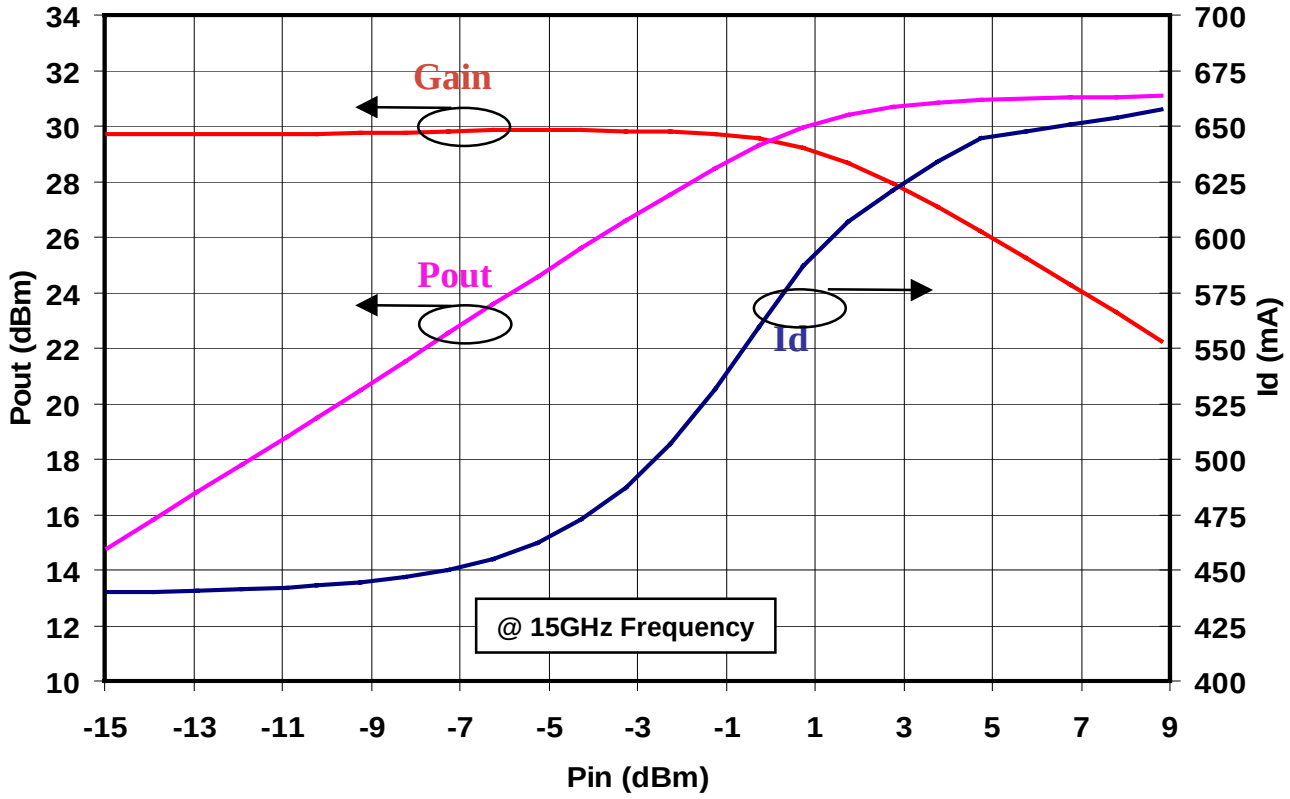

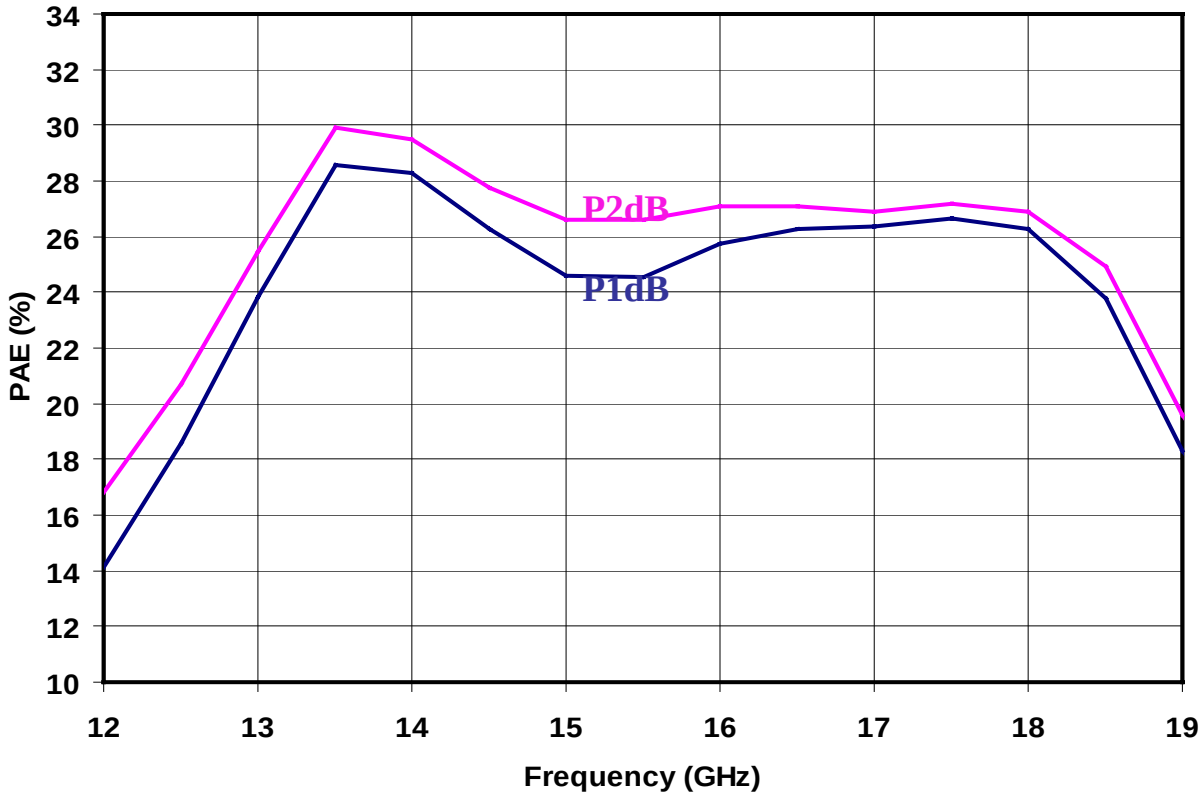

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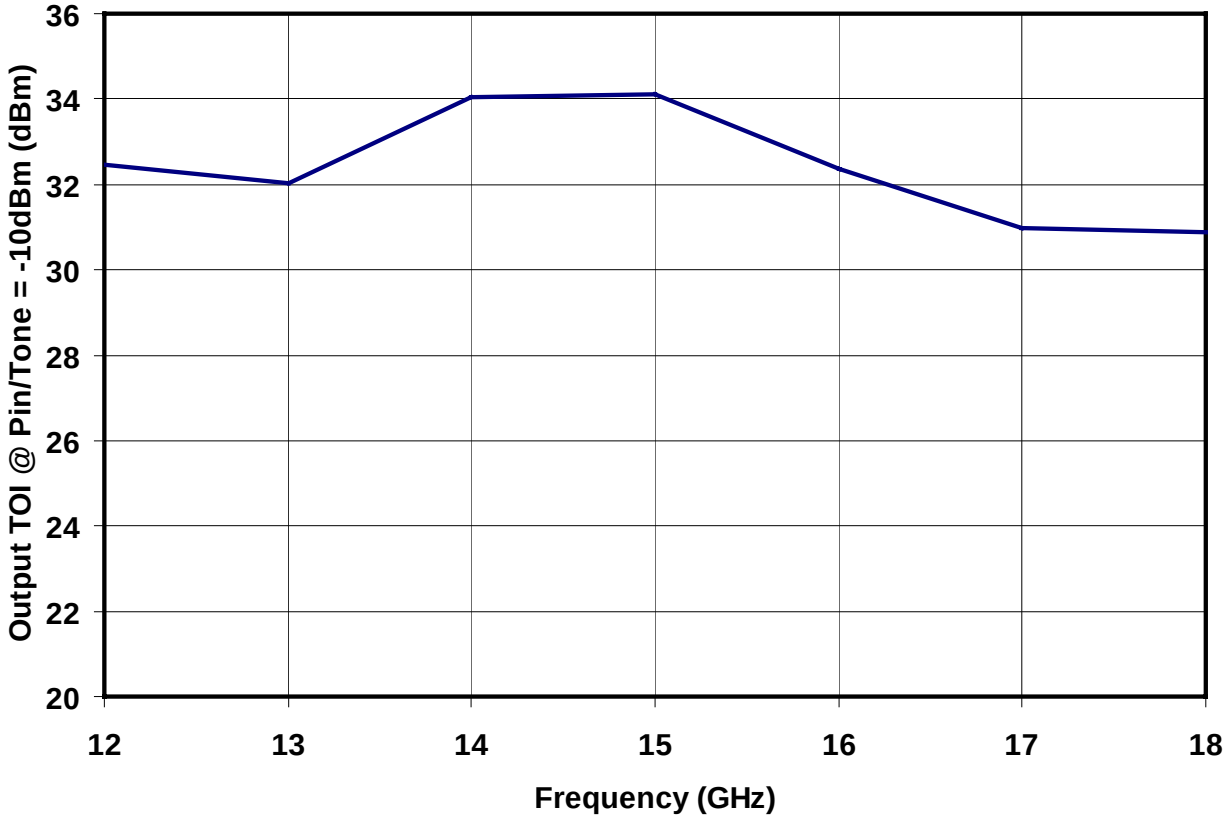

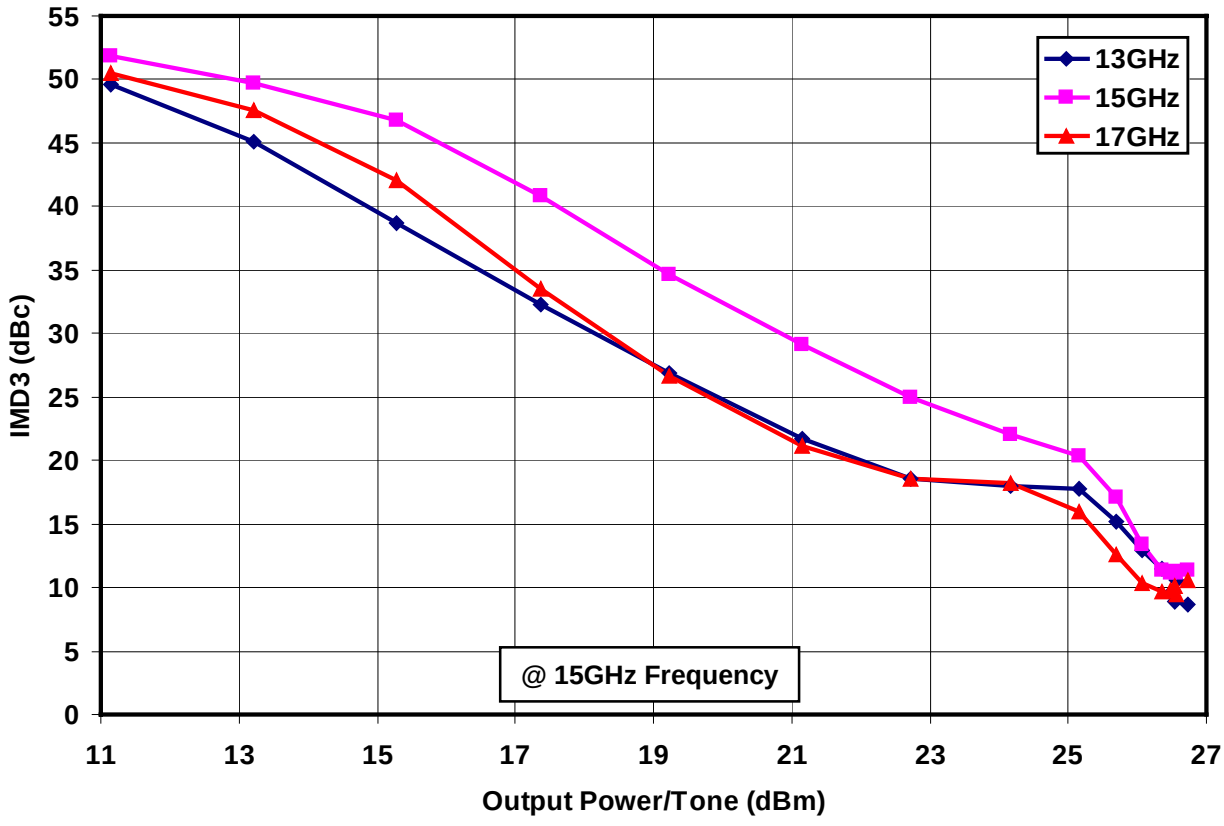

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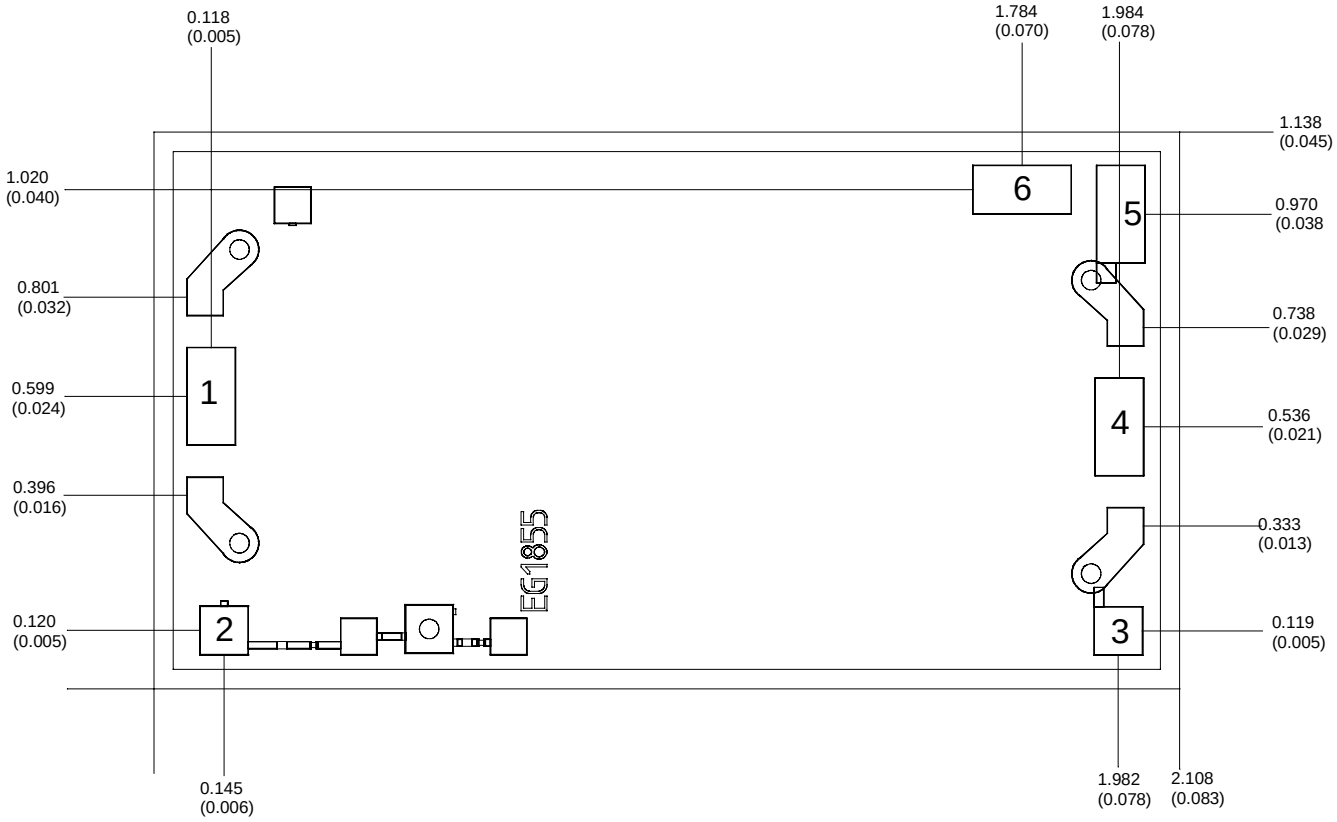
Mechanical Drawing



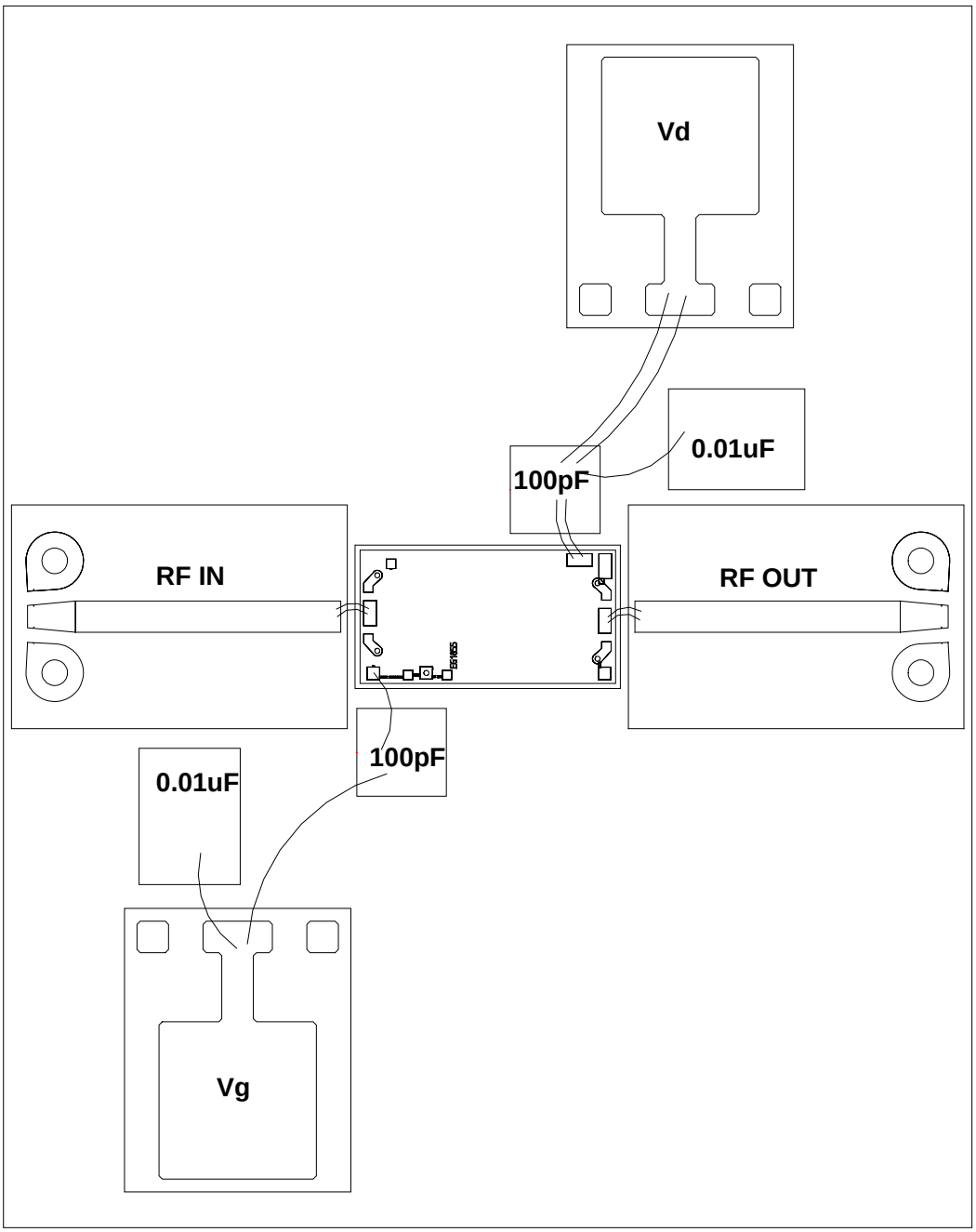
Units: millimeters (inches)
Thickness: 0.100 (0.004)
Chip edge to bond pad dimensions are shown to center of bond pad
Chip size tolerance: +/- 0.051 (0.002)

Bond pad #1:	(RF In)	0.098 x 0.199	(0.004 x 0.008)
Bond pad #2:	(Vg)	0.099 x 0.099	(0.004 x 0.004)
Bond pad #3:	(DC GND)*	0.098 x 0.099	(0.004 x 0.004)
Bond pad #4:	(RF Out)	0.099 x 0.198	(0.004 x 0.008)
Bond pad #5:	(DC GND)*	0.098 x 0.198	(0.004 x 0.008)
Bond pad #6:	(Vd)	0.202 x 0.098	(0.008 x 0.004)

* Note: RF GND is back side of MMIC.

GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.

Recommended Chip Assembly Diagram



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Assembly Process Notes

Reflow process assembly notes:

- Use AuSn (80/20) solder with limited exposure to temperatures at or above 300^0C (30 seconds max).
- An alloy station or conveyor furnace with reducing atmosphere should be used.
- No fluxes should be utilized.
- Coefficient of thermal expansion matching is critical for long-term reliability.
- Devices must be stored in a dry nitrogen atmosphere.

Component placement and adhesive attachment assembly notes:

- Vacuum pencils and/or vacuum collets are the preferred method of pick up.
- Air bridges must be avoided during placement.
- The force impact is critical during auto placement.
- Organic attachment can be used in low-power applications.
- Curing should be done in a convection oven; proper exhaust is a safety concern.
- Microwave or radiant curing should not be used because of differential heating.
- Coefficient of thermal expansion matching is critical.

Interconnect process assembly notes:

- Thermosonic ball bonding is the preferred interconnect technique.
- Force, time, and ultrasonics are critical parameters.
- Aluminum wire should not be used.
- Maximum stage temperature is 200^0C.

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