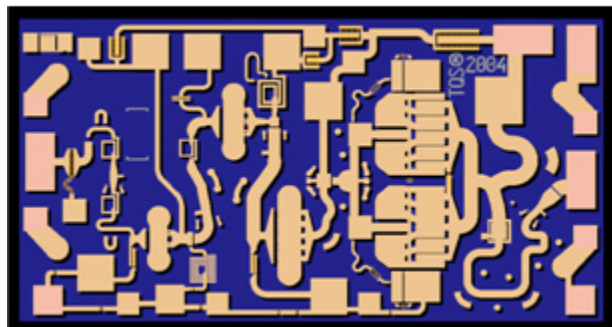


12-19 GHz VSAT Amplifier

TGA2508-SCC



Product Description

The TriQuint TGA2508 is a compact Medium Power Amplifier MMIC for VSAT applications. The part is designed using TriQuint's 0.5 μ m 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.

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 μ m 3MI pHEMT Technology
- Chip Dimensions: 2.1 x 1.1 x 0.1 mm
(0.083 x 0.118 x 0.004 in)

Primary Applications

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

Measured Data

Bias Conditions: $V_d = 7$ V, $I_d = 433$ mA

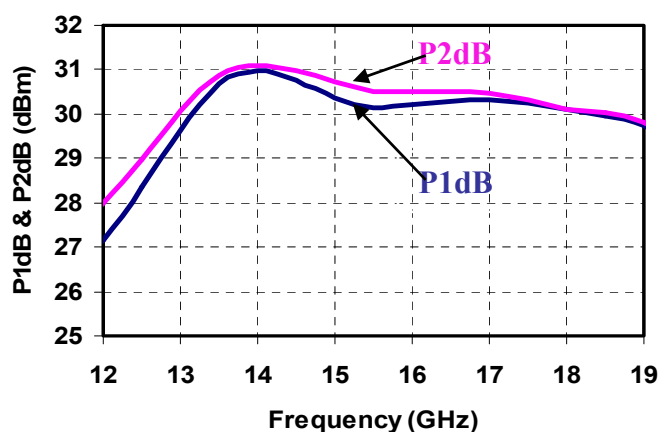
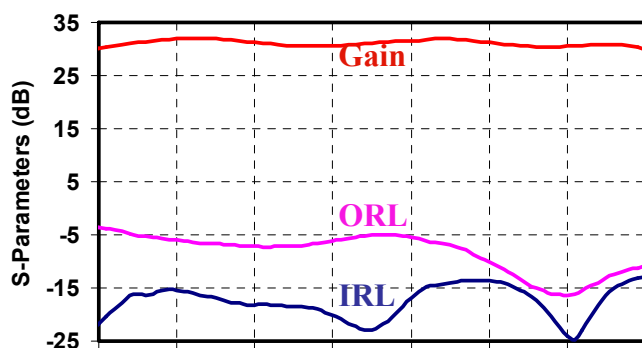


TABLE I
MAXIMUM RATINGS ^{1/}

SYMBOL	PARAMETER	VALUE	NOTES
V ⁺	Positive Supply Voltage	8 V	<u>2/</u>
V ⁻	Negative Supply Voltage Range	-2 to 0 V	
I ⁺	Positive Supply Current (Quiescent)	591 mA	<u>2/</u> <u>3/</u>
I _G	Gate Supply Current	16 mA	<u>3/</u>
P _{IN}	Input Continuous Wave Power	17 dBm	
P _D	Power Dissipation	5.6 W	<u>2/</u> <u>4/</u>
T _{CH}	Operating Channel Temperature	150 °C	<u>5/</u> <u>6/</u>
T _M	Mounting Temperature (30 Seconds)	320 °C	
T _{STG}	Storage Temperature	-65 to 150 °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 °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
(T_a = 25 °C ± 5 °C)

SYMBOL	PARAMETER	MINIMUM	MAXIMUM	UNIT
I _{dss} (Q4)	Saturated Drain Current	50	350	mA
G _m (Q4)	Transconductance	200	500	mS
V _p (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

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

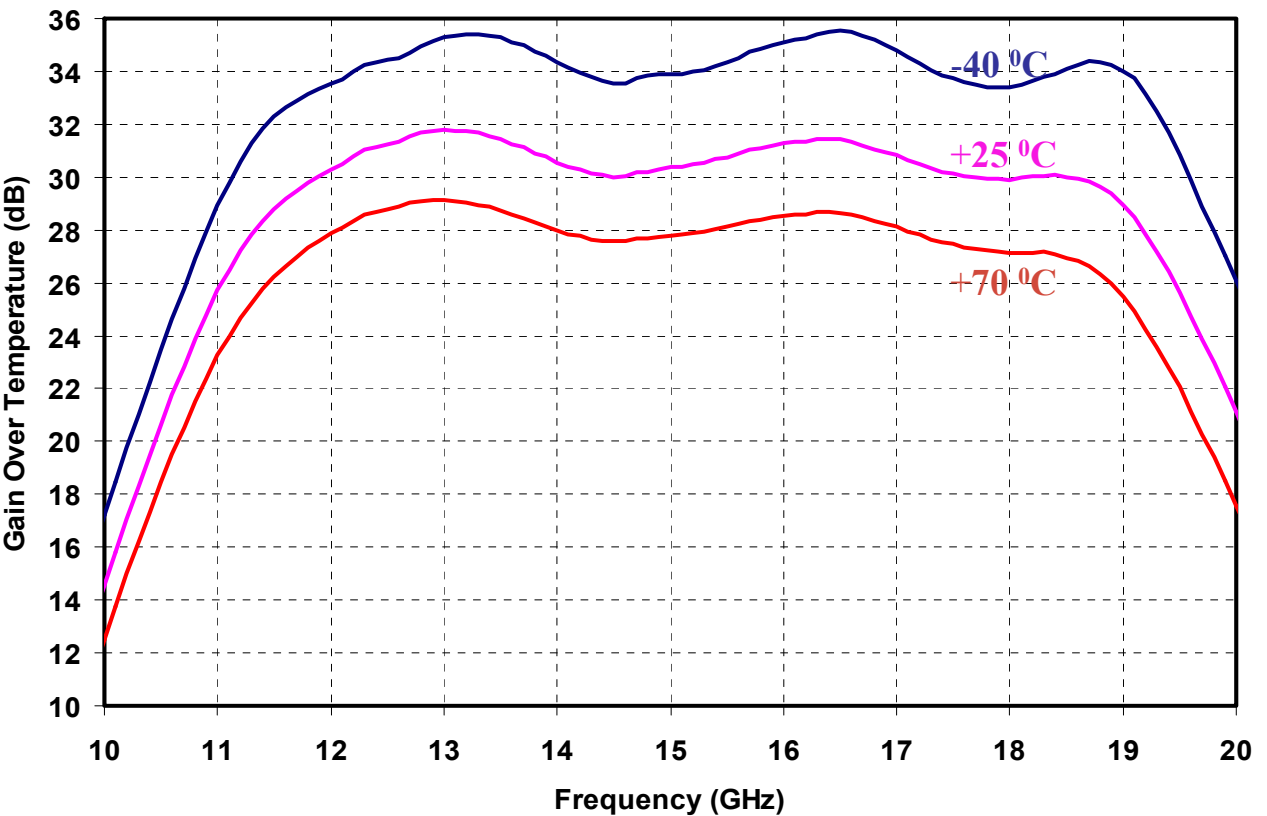
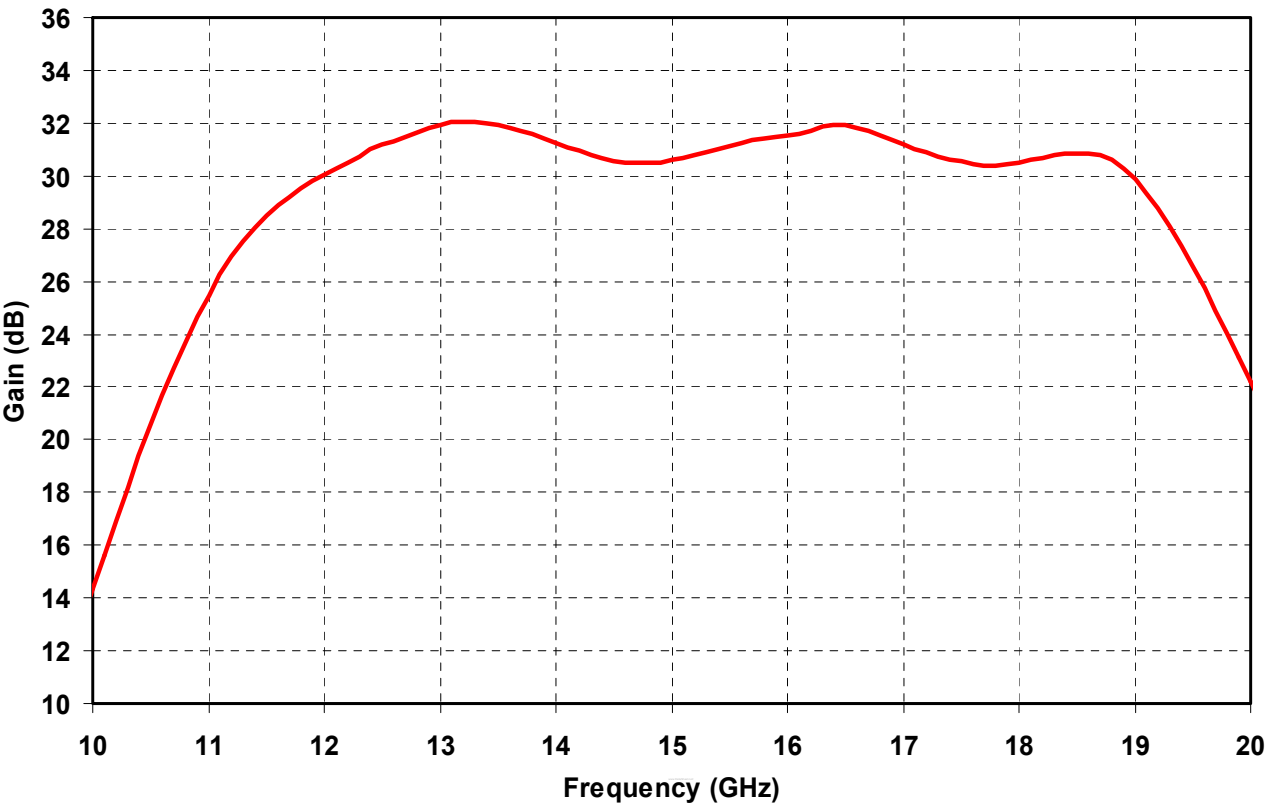
TABLE IV
THERMAL INFORMATION

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 P _{diss} = 3.031 W	105.92	11.85	6.4E+7

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.

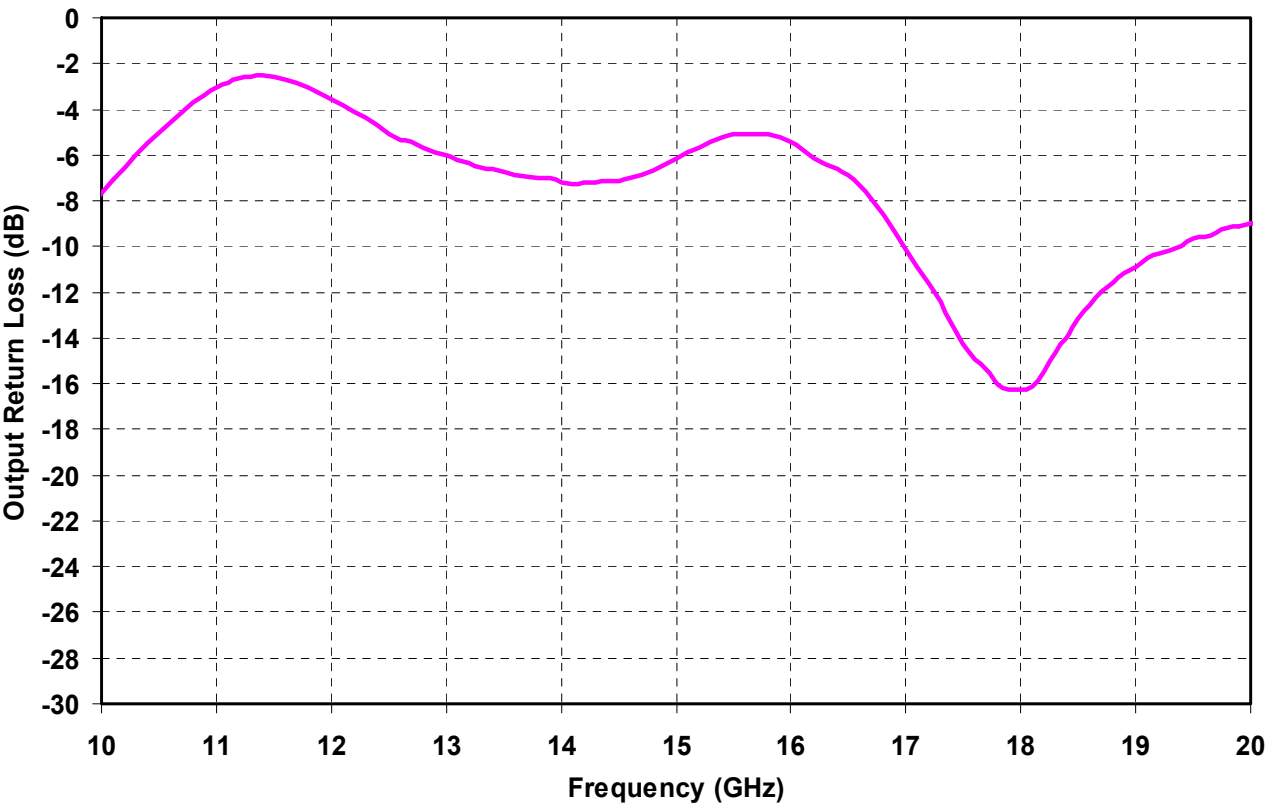
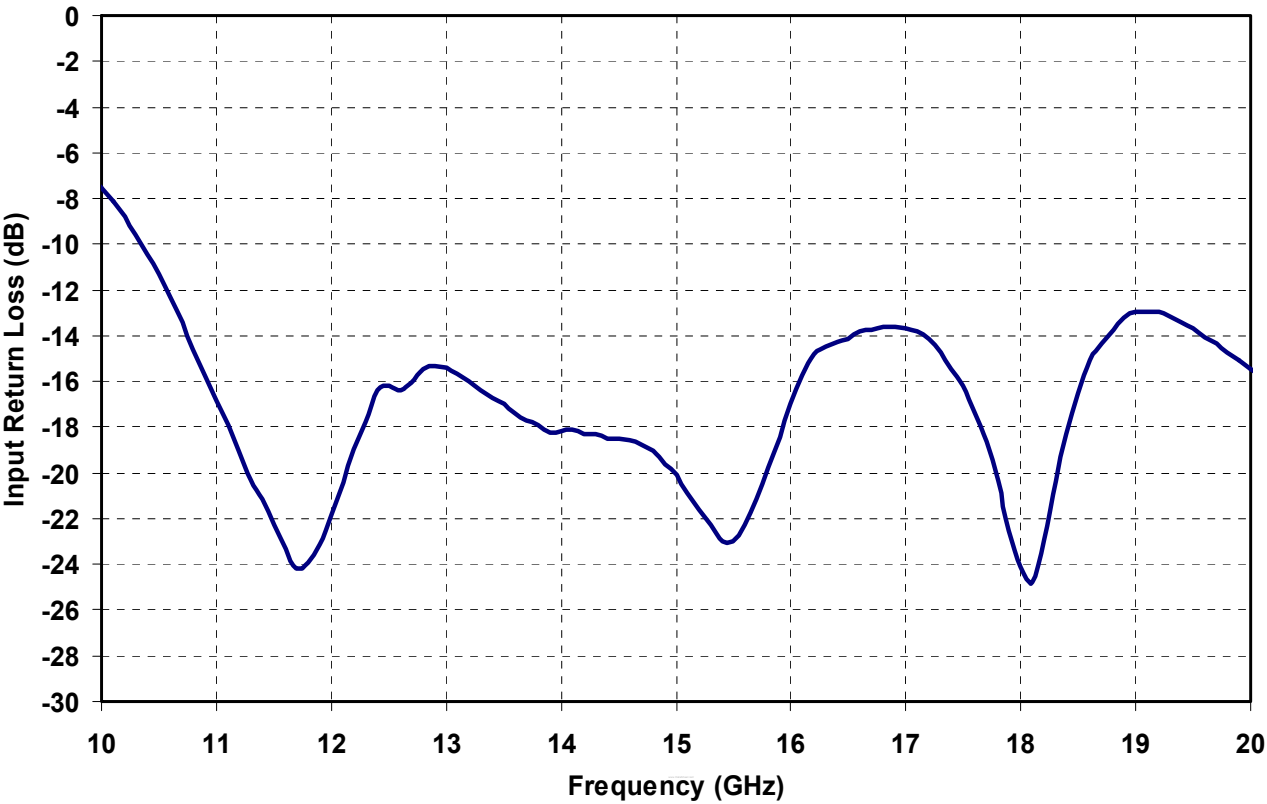
Measured Data

Bias Conditions: $V_d = 7\text{ V}$, $I_d = 433\text{ mA}$



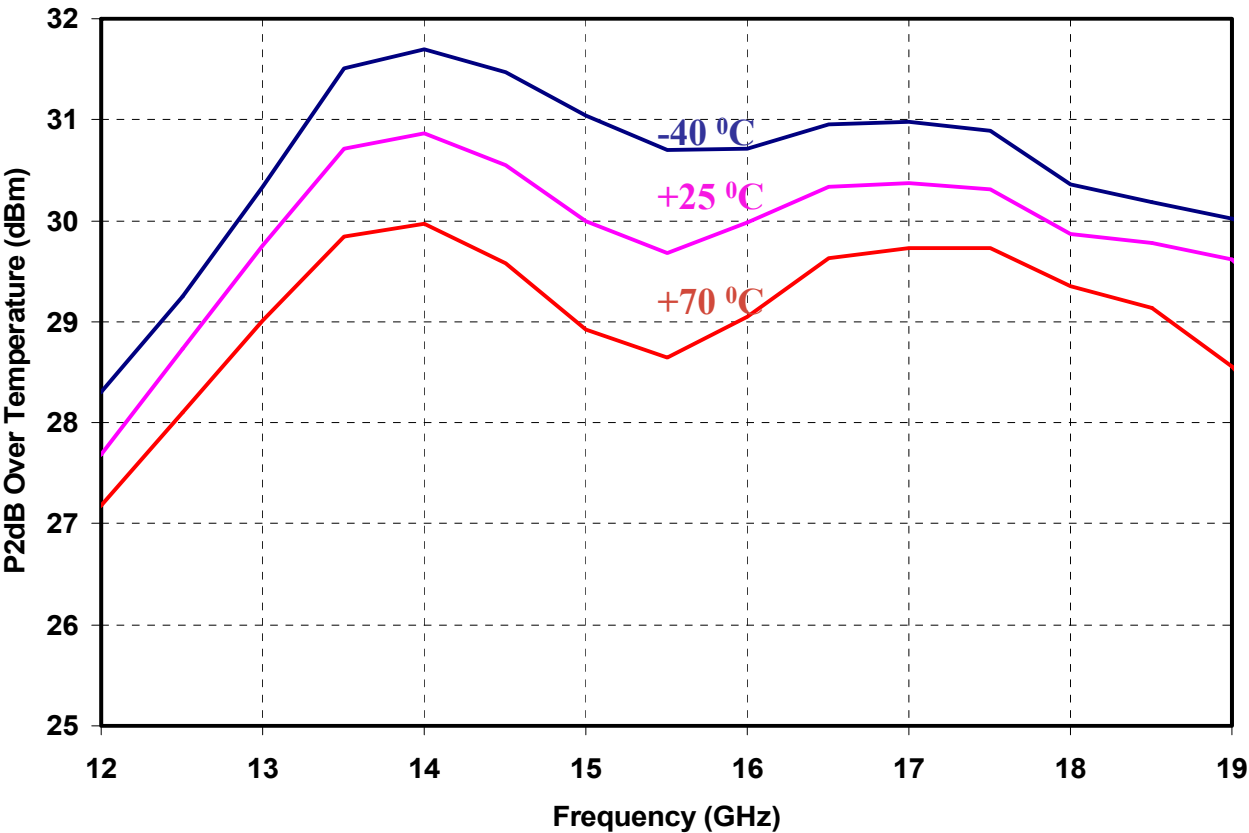
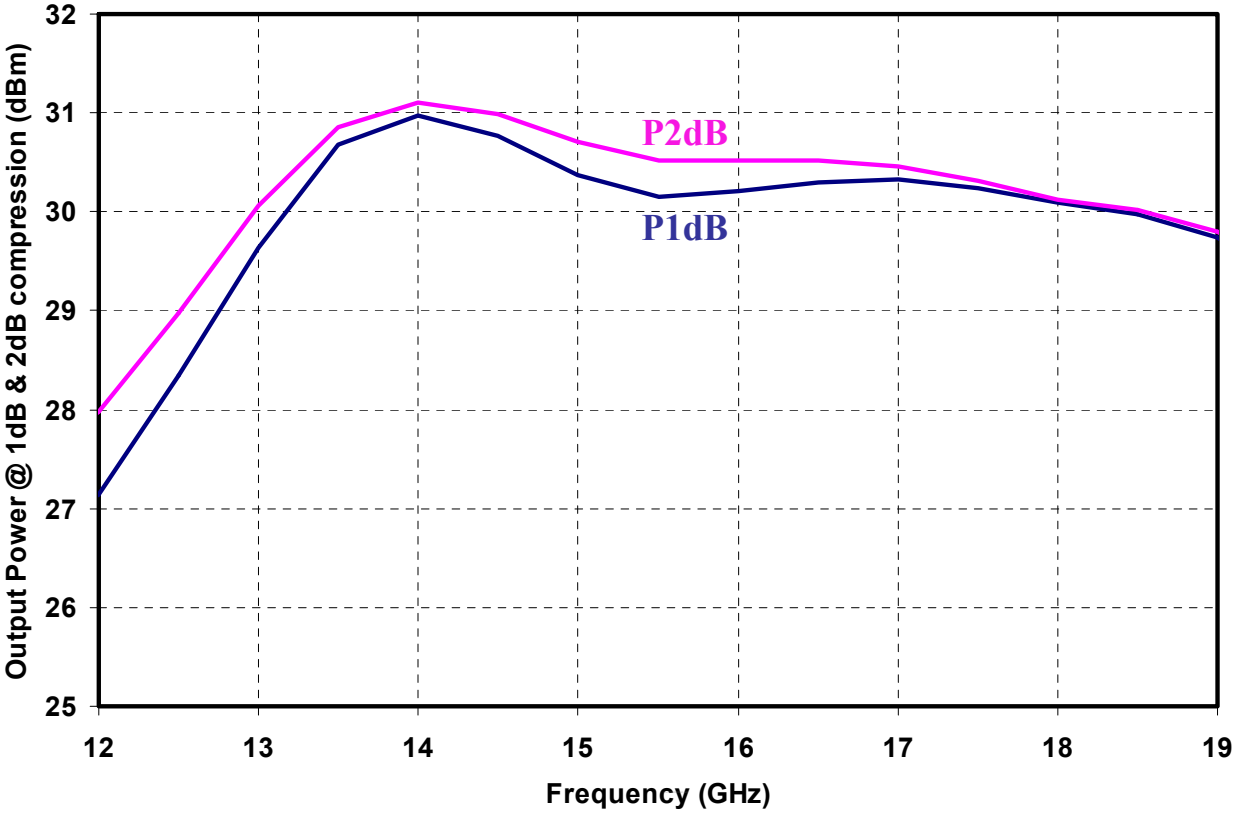
Measured Data

Bias Conditions: $V_d = 7\text{ V}$, $I_d = 433\text{ mA}$



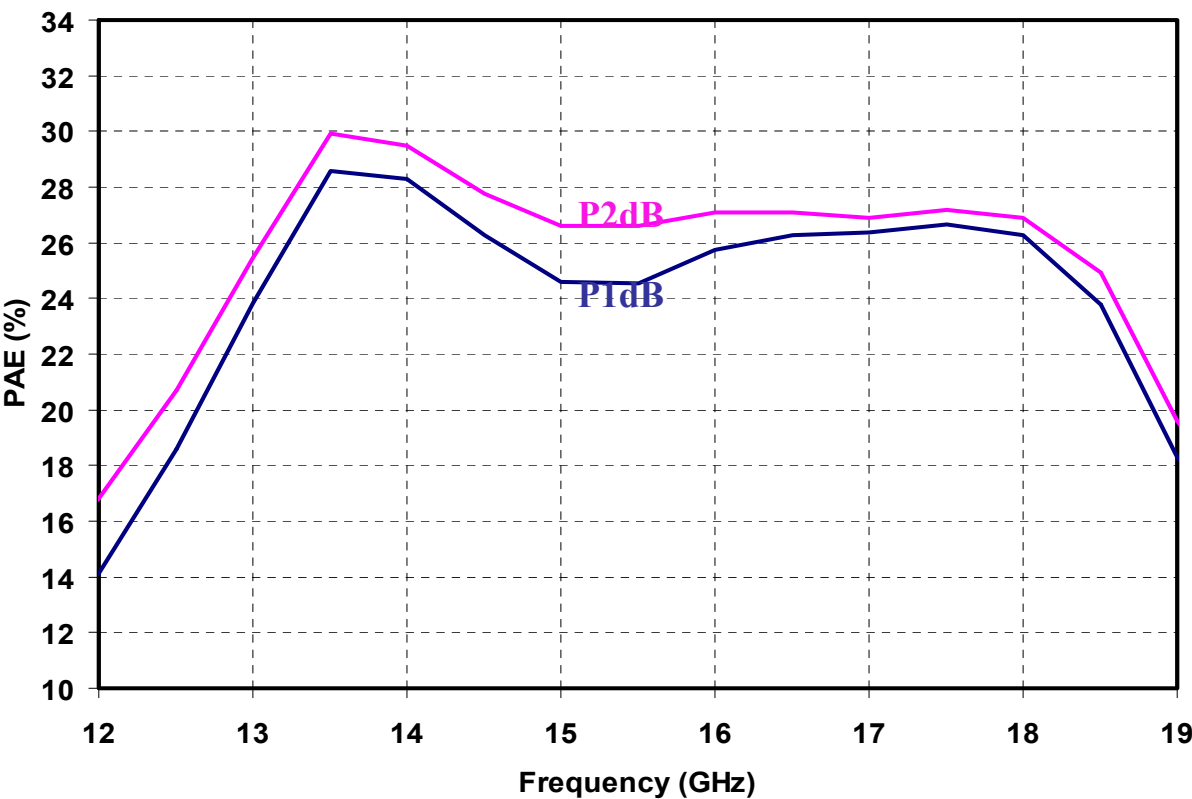
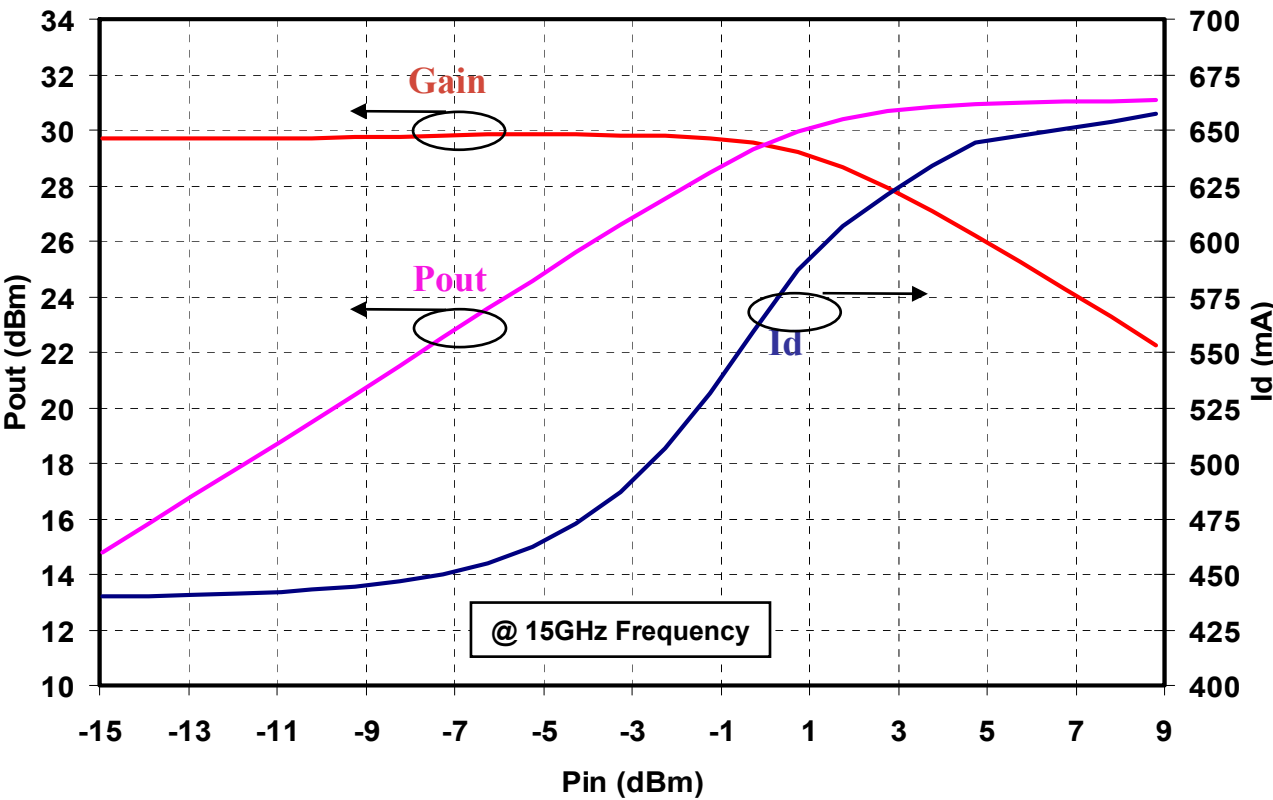
Measured Data

Bias Conditions: $V_d = 7\text{ V}$, $I_d = 433\text{ mA}$



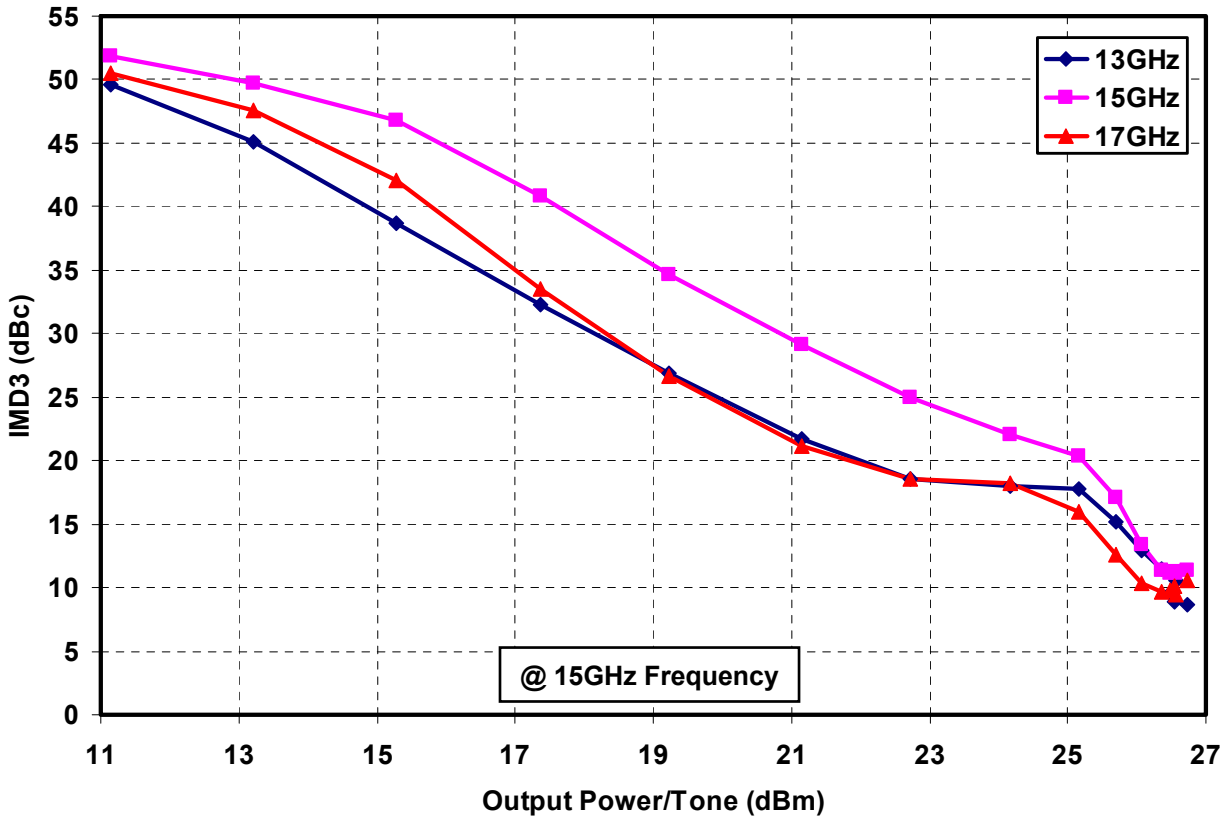
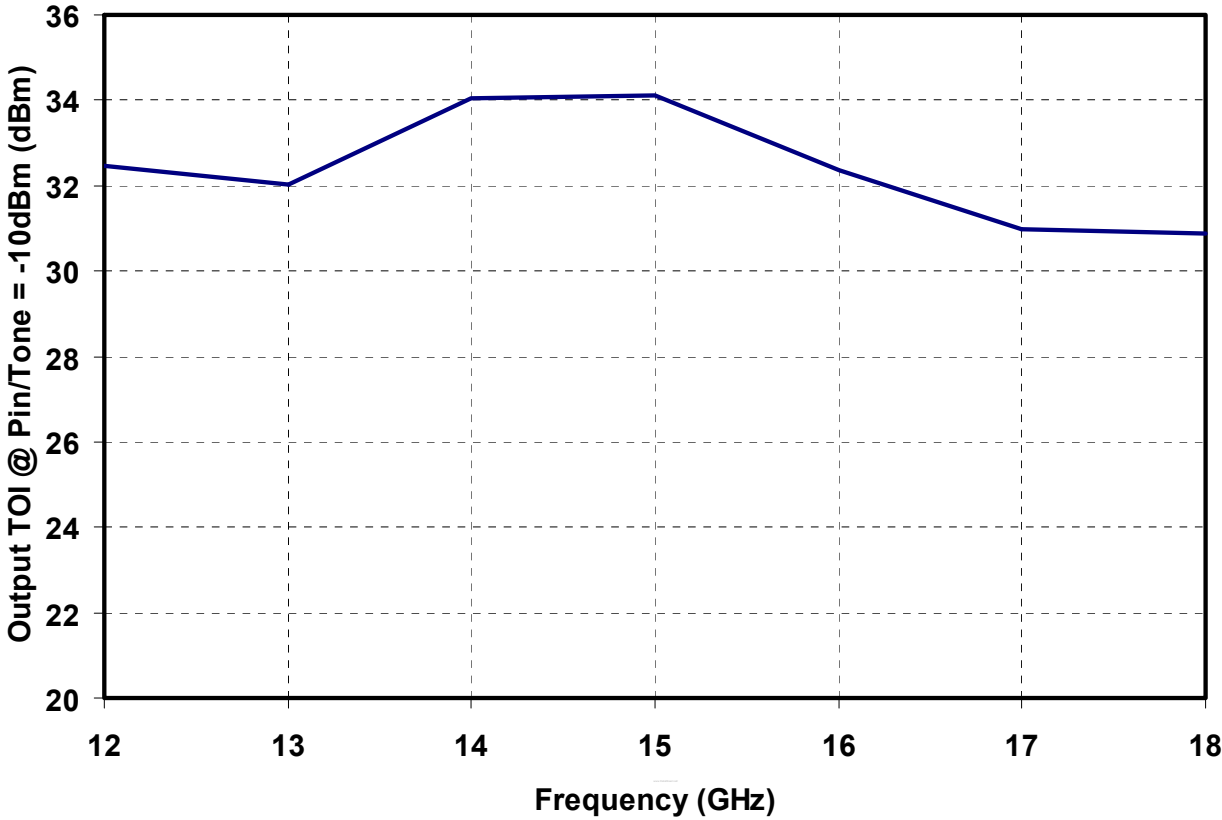
Measured Data

Bias Conditions: $V_d = 7\text{ V}$, $I_d = 433\text{ mA}$

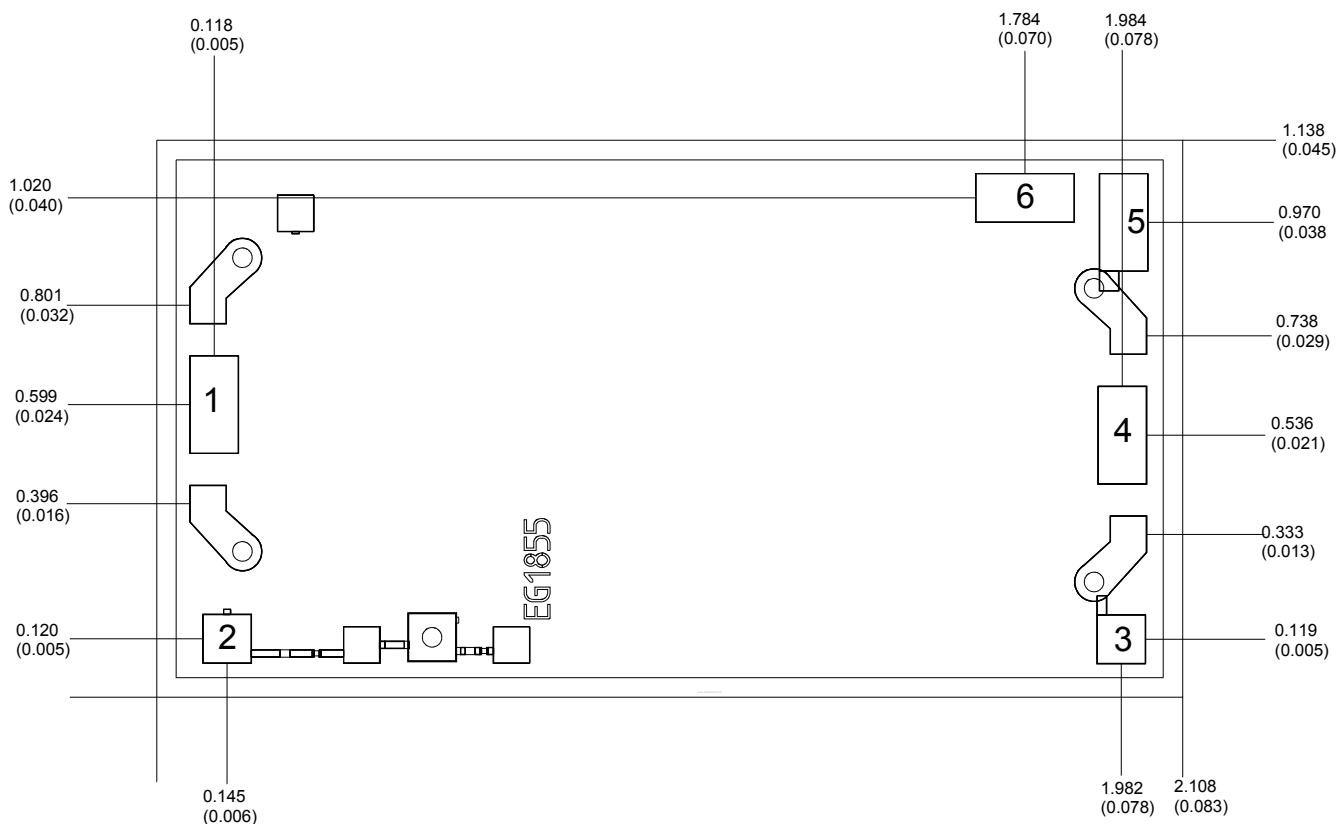


Measured Data

Bias Conditions: $V_d = 7\text{ V}$, $I_d = 433\text{ mA}$



Mechanical Drawing



Units: millimeters (inches)

Thickness: 0.100 (0.004)

Chip edge to bond pad dimensions are shown to center of bond pad

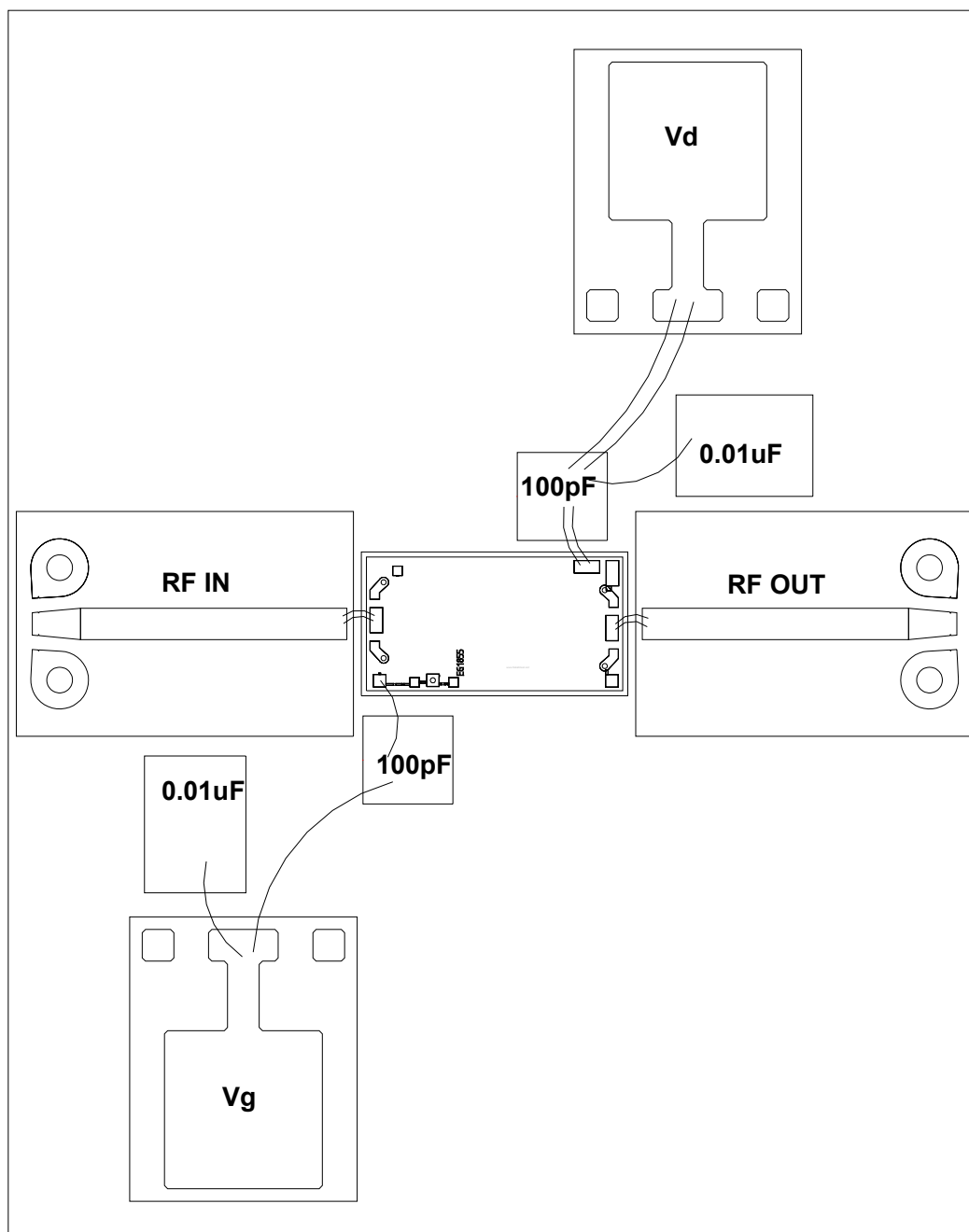
Chip size tolerance: +/- 0.051 (0.002)

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



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

Assembly Process Notes

Reflow process assembly notes:

- Use AuSn (80/20) solder with limited exposure to temperatures at or above 300⁰C (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 200⁰C.

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