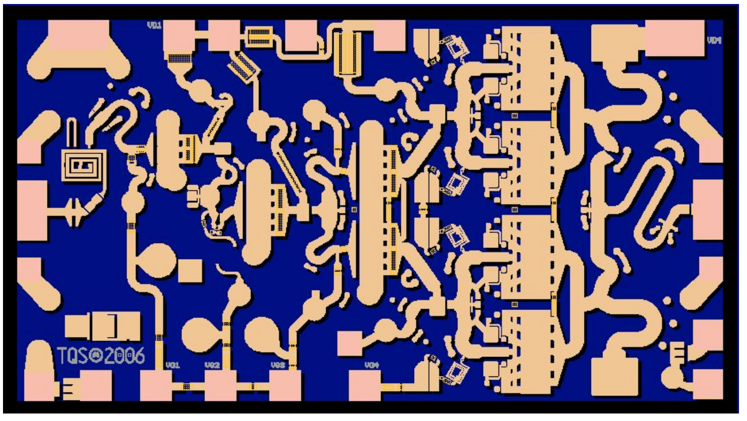
TriQuint SEMICONDUCTOR

TGA2520

12 - 16 GHz High Linearity Amplifier

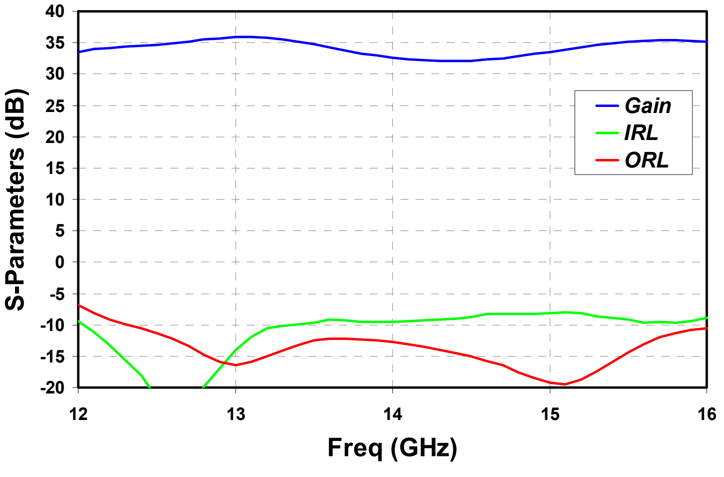


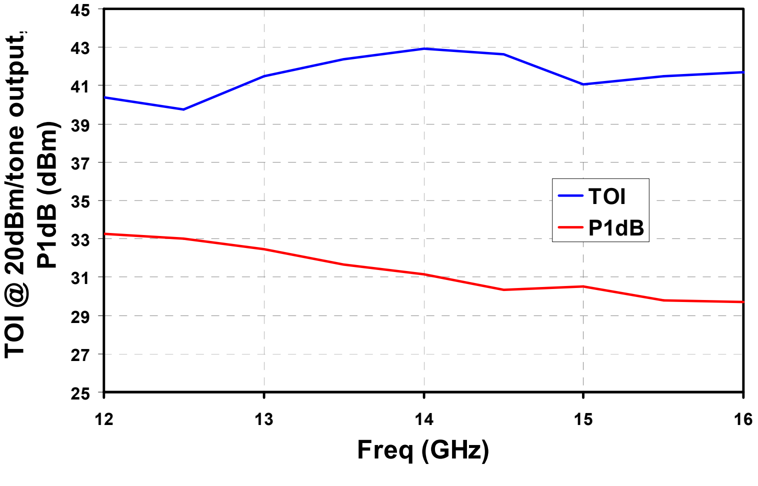
Key Features and Performance

- 31 dBm Midband Pout
- 33 dB Nominal Gain
- TOI > 40 dBm
- 0.5 µm pHEMT 3MI Technology
- Bias Conditions: 6 V, 850mA
- Chip dimensions: 2.5 x 1.4 x 0.1 mm (98 x 55 x 4 mils)

Preliminary Measured Data

Bias Conditions: Vd=6 V Id=850 mA





Primary Applications

- Point-to-Point Radio
- VSAT
- Ku Band Sat-Com

Product Description

The TriQuint TGA2520 MMIC is an extremely linear, high gain amplifier, capable of 1 Watt output power at P1dB for the frequency range of 12 – 16 GHz. This performance makes this amplifier ideally suited for Point to Point Radios and current Ku-Band satellite ground terminal applications. The TGA2520 utilizes TriQuint's robust 0.5um power pHEMT process coupled with 3 layer Metal Inteconnect (3MI) technology. The TGA2520 provides the high power transmit function in an extremely compact (< 3.5mm^2) chip footprint.

The combination of a high-yield process, electrical performance, and compact die size is exactly what is required to support the aggressive pricing targets required for low-cost transmit modules. Each device is 100% DC and RF tested on–wafer to ensure performance compliance. The device is available in chip form.

Datasheet subject to change without notice

TABLE I
MAXIMUM RATINGS

Symbol	Parameter 1/	Value	Notes
V^+	Positive Supply Voltage	8 V	2/
V^-	Negative Supply Voltage Range	-5V to 0V	
I^+	Positive Supply Current (under RF Drive)	1300 mA	2/
I_G	Gate Supply Current Range	-7 to 56 mA	
P_{IN}	Input Continuous Wave Power	23.2 dBm	2/
P_D	Power Dissipation	9.8 W	2/ 3/
T_{CH}	Operating Channel Temperature	200 °C	3/ 4/ 5/
	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/ When operated at this bias condition with a base plate temperature of 70°C the median life is 2.3E4.

4/ These ratings apply to each individual FET.

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

TABLE II
RF CHARACTERIZATION TABLE
(T_A = 25°C, Nominal)
(Vd =6 V, Id = 850mA ± 5%)

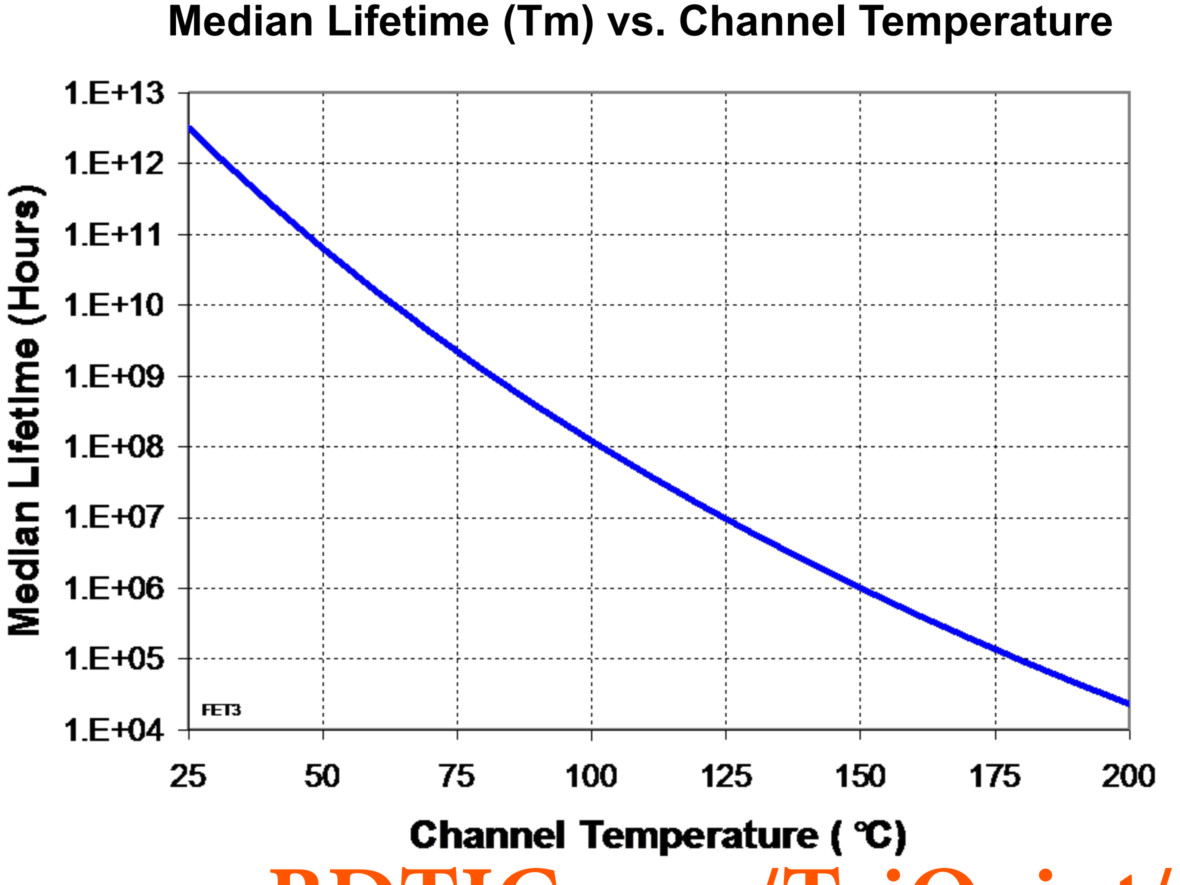
SYMBOL	PARAMETER	TEST CONDITION	LIMITS			UNITS
			MIN	TYP	MAX	
Gain	Small Signal Gain	F = 12-16		33		dB
IRL	Input Return Loss	F = 12-16		8		dB
ORL	Output Return Loss	F = 12-16		12		dB
PWR	Output Power @ Pin = +5 dBm	F = 12-16		31		dBm

Note: Table II Lists the RF Characteristics of typical devices as determined by fixtured measurements.

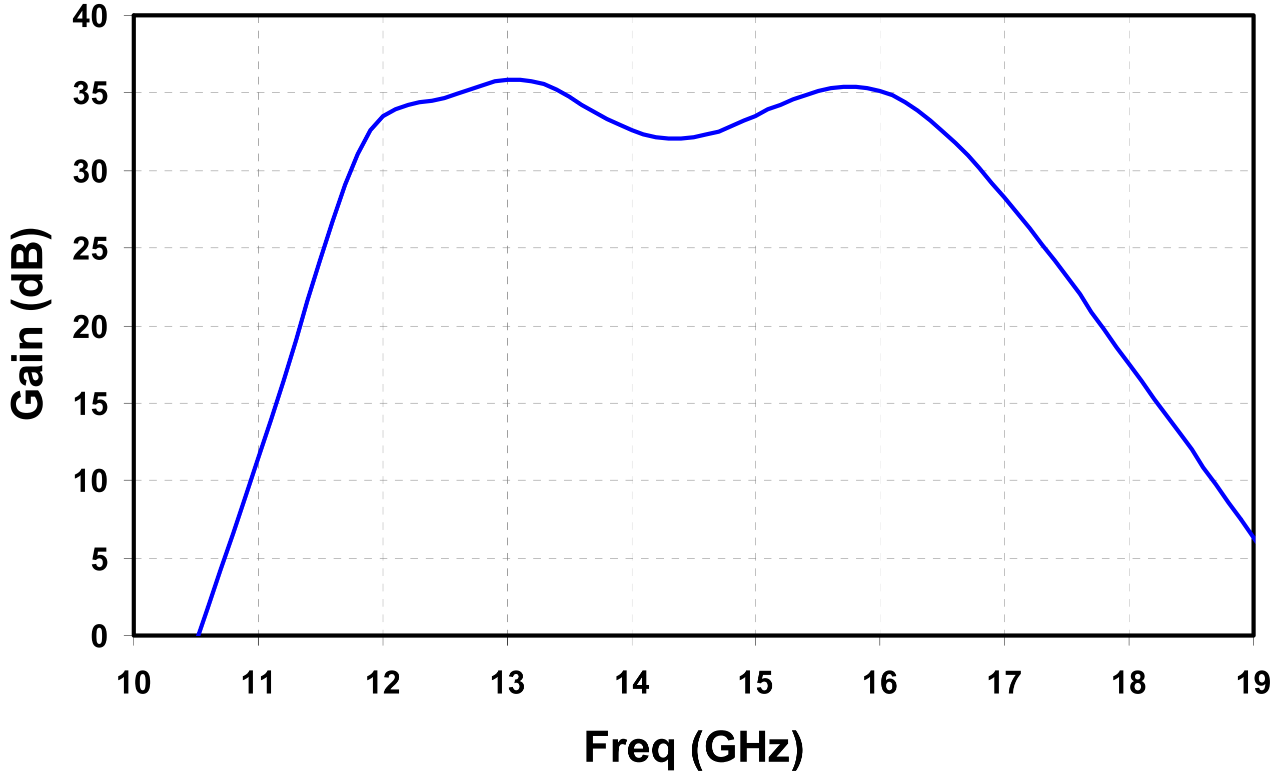
TABLE III
THERMAL INFORMATION

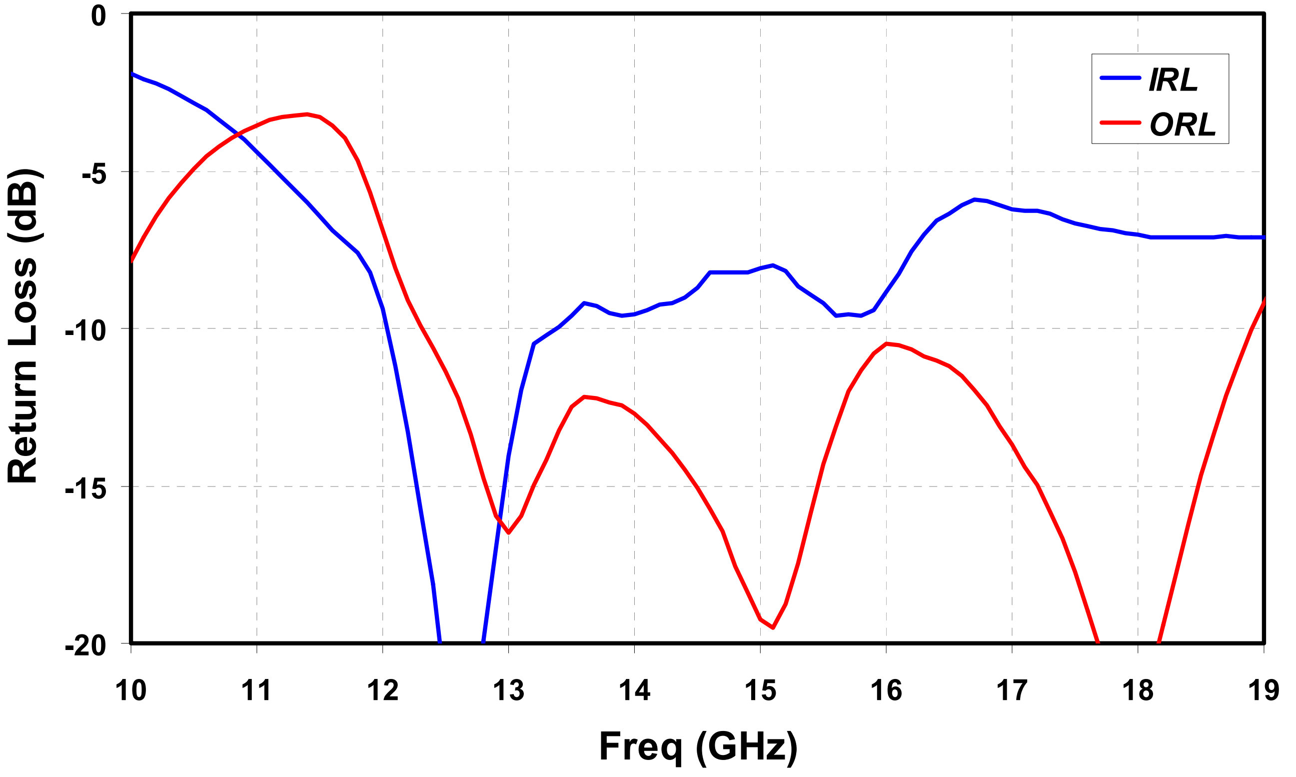
PARAMETER	TEST CONDITION	T_{CH} (°C)	θ_{JC} (°C/W)	Tm (HRS)
θ_{JC} Thermal Resistance (Channel to Backside)	V_D = 6 V I_D = 850 mA P_D = 5.1 W	138	13.33	2.9 E+6
θ_{JC} Thermal Resistance (Channel to Backside)	Vd = 6V Id = 1200 mA (under drive) Pdiss = 6 W Pout = 1.2 W (RF)	150	13.33	1.0 E+6

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

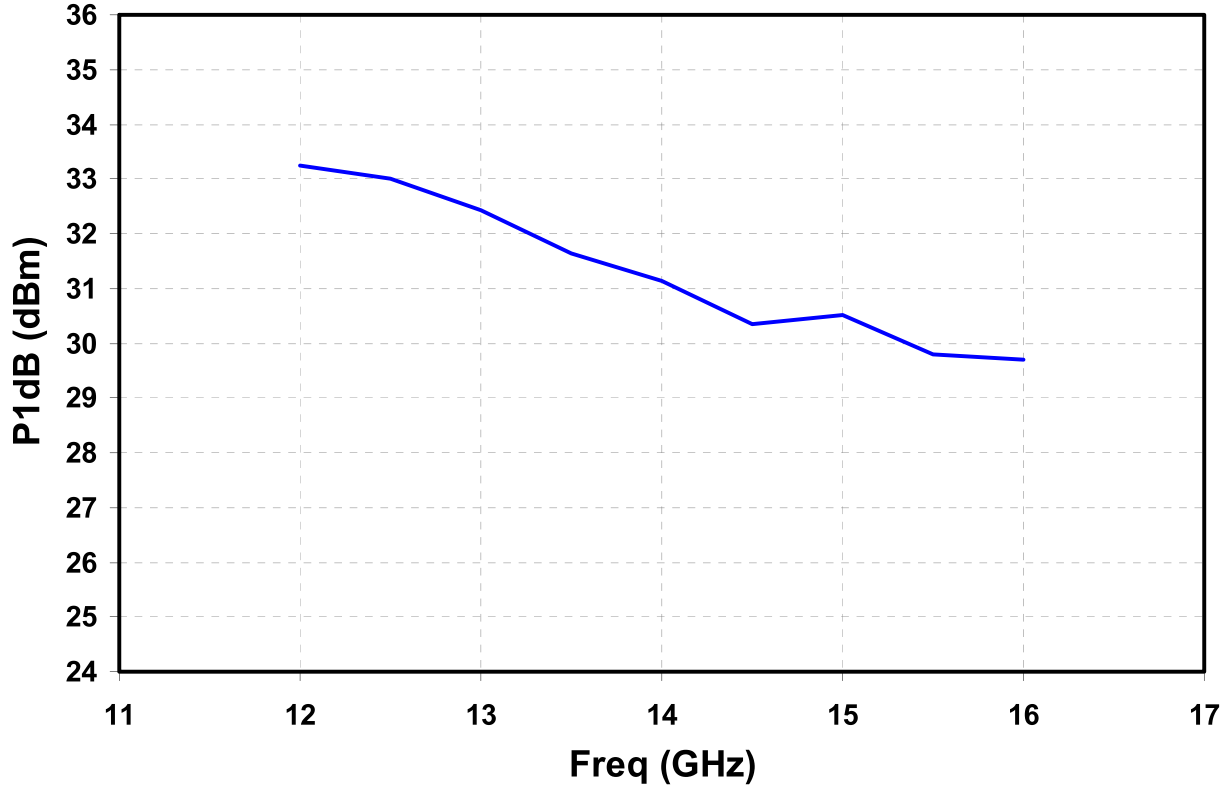


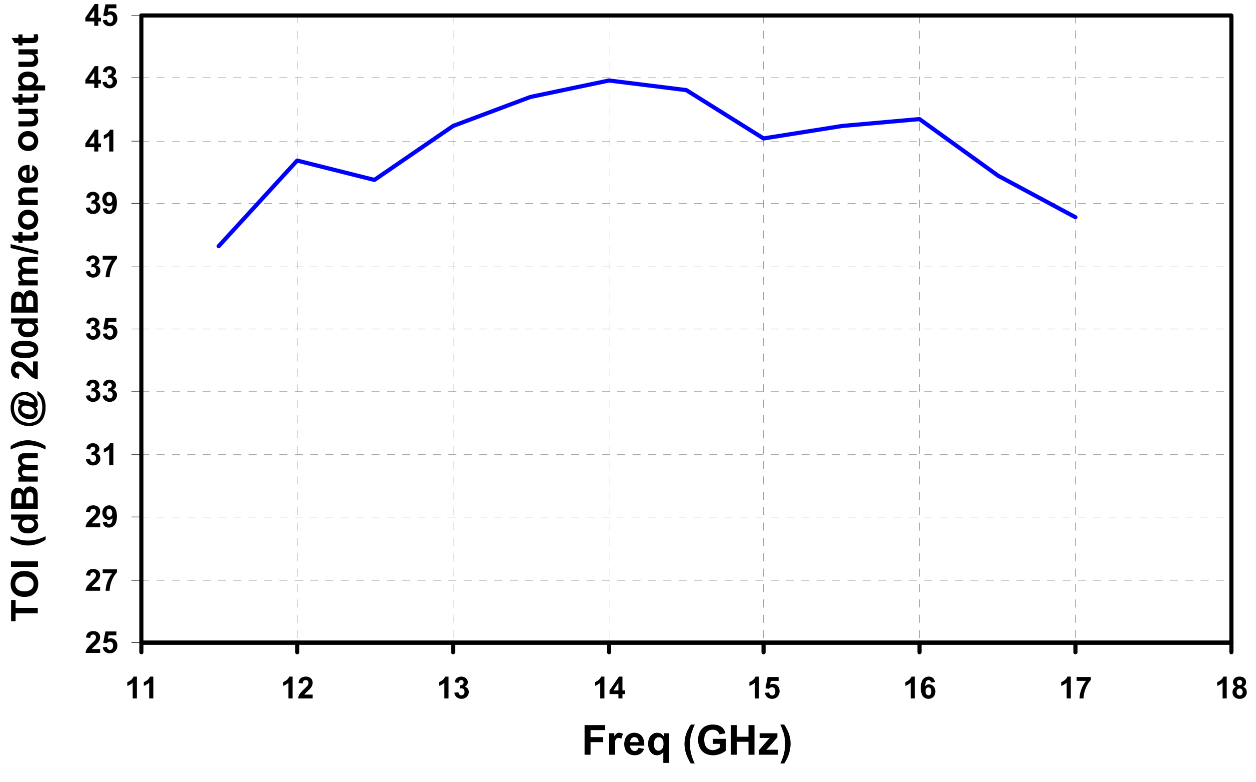
Typical Fixtured Performance



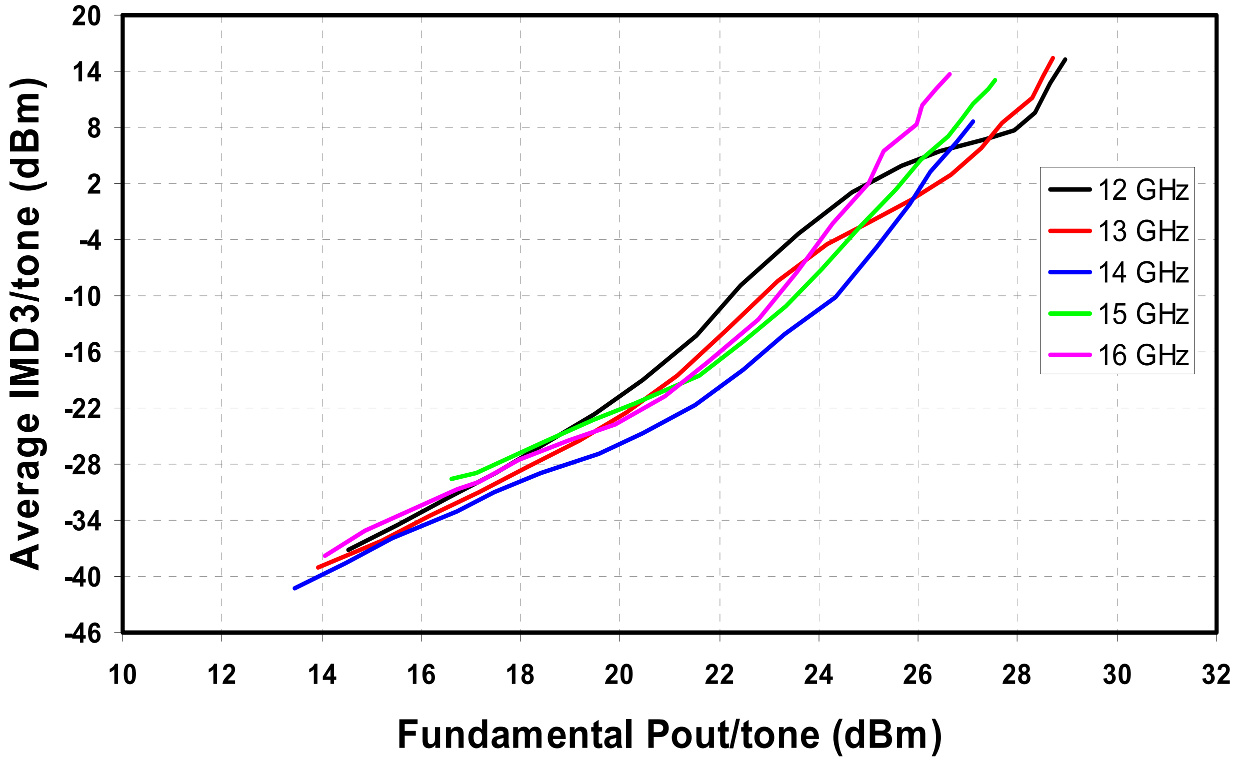


Typical Fixtured Performance

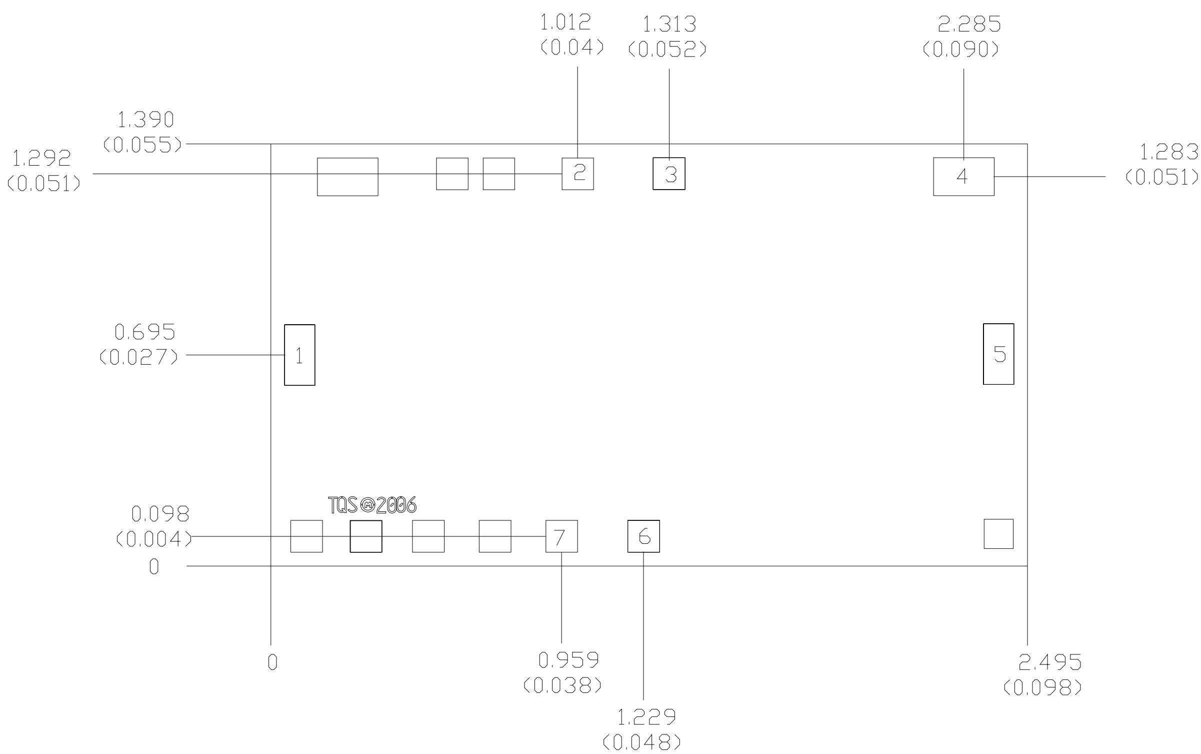




Typical Fixtured Performance



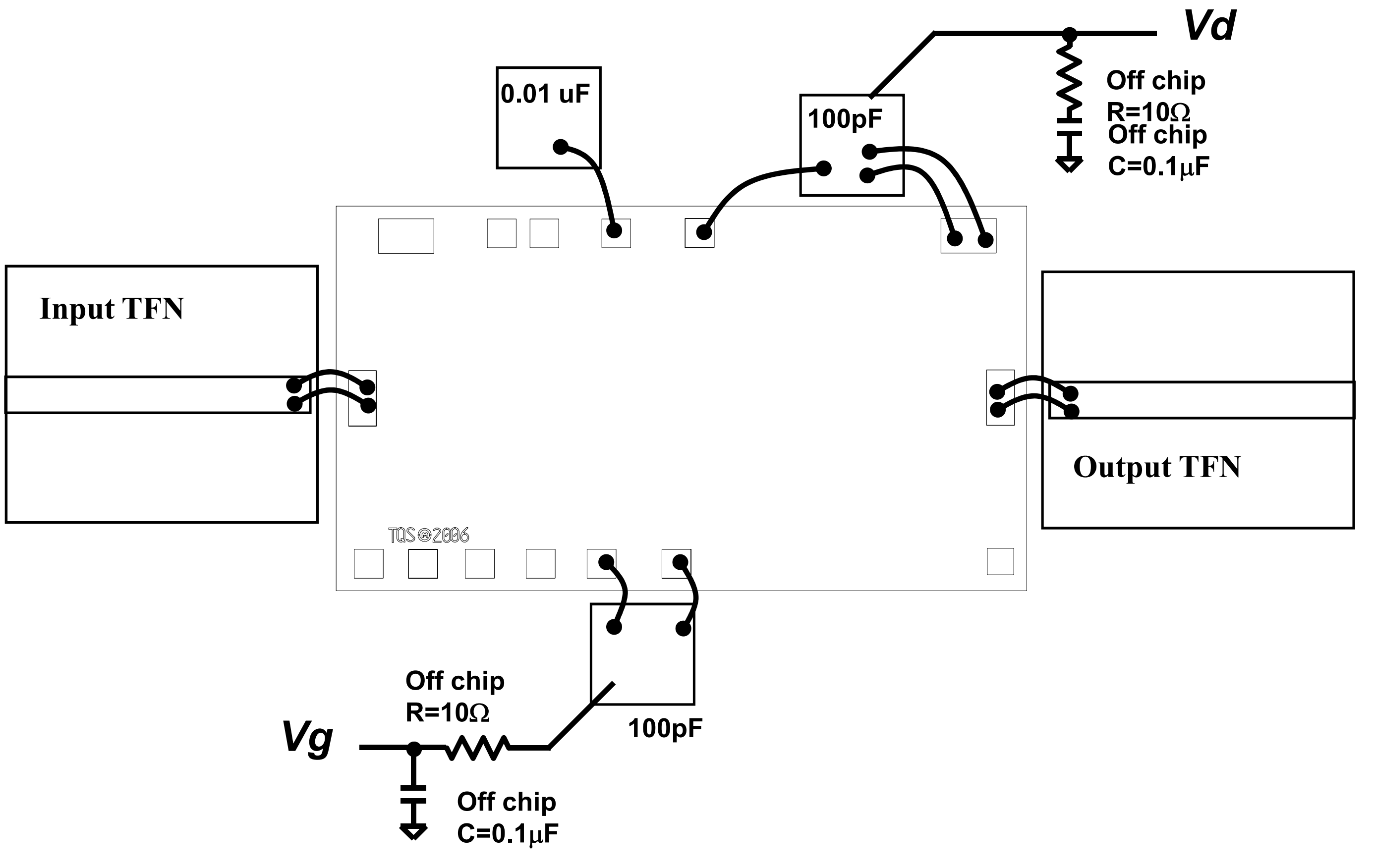
Mechanical Drawing



Units: millimeters (inches)
Thickness: 0.1016 (0.004) (reference only)
Chip edge to bond pad dimensions are shown to center of Bond pads.
Chip size tolerance: +/- 0.0508 (0.002)
RF Ground through Backside

Bond Pad #1 (RF Input)	0.100 x 0.200	(0.004 x 0.008)
Bond Pad #2 (Bypass)	0.100 x 0.100	(0.004 x 0.004)
Bond Pad #3 (Vd1)	0.100 x 0.100	(0.004 x 0.004)
Bond Pad #4 (Vd2)	0.200 x 0.125	(0.008 x 0.005)
Bond Pad #5 (RF Output)	0.100 x 0.200	(0.004 x 0.008)
Bond Pad #6 (Vg2)	0.100 x 0.100	(0.004 x 0.004)
Bond Pad #7 (Vg1)	0.100 x 0.100	(0.004 x 0.004)

Chip Assembly & Bonding Diagram



Typical Vg ≈ -0.5 V

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 300°C. (30 seconds maximum)
- 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.
- Discrete FET devices with small pad sizes should be bonded with 0.0007-inch wire.
- Maximum stage temperature is 200°C.

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