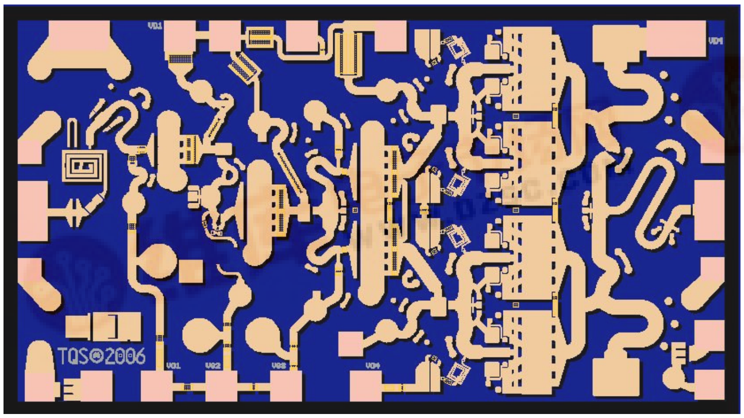
TriQuint SEMICONDUCTOR®

Advance Product Information

12-16 GHz High Linearity Amplifier TGA2520

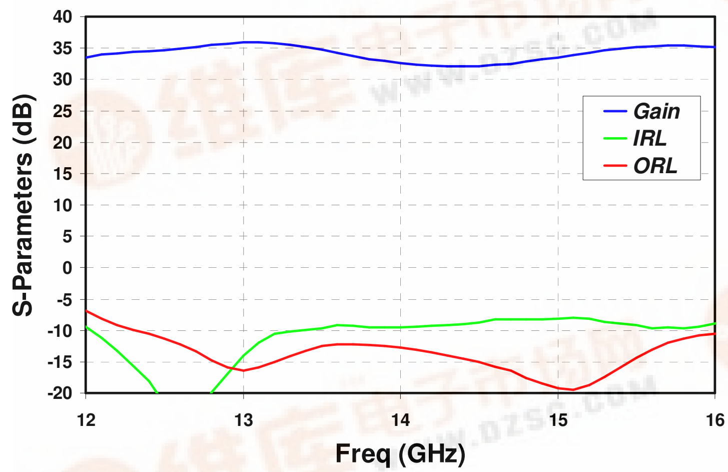


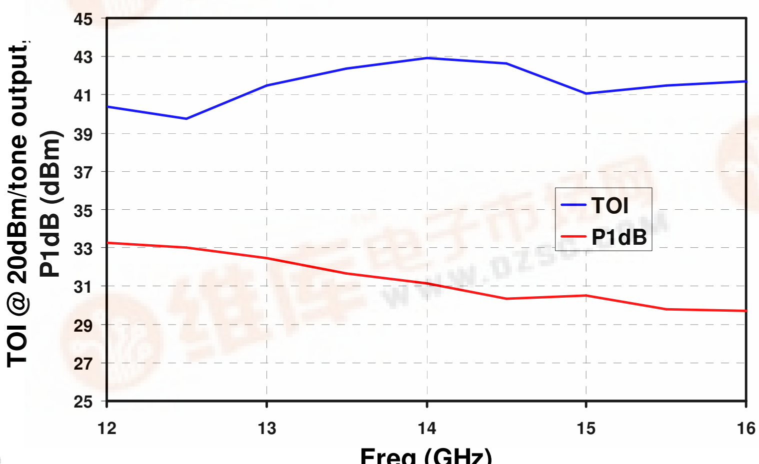
Key Features and Performance

- 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 Interconnect (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.

Note: This device is early in the characterization process prior to finalizing all electrical test specifications. Specifications are 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	6 W	2/ 3/
T_{CH}	Operating Channel Temperature	150 ^{0}C	3/ 4/ 5/
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/ When operated at this bias condition with a base plate temperature of 70° C the median life is reduced to 1.0 E+6.

4/ These ratings apply to each individual FET.

5/ Junction operating temperature will directly affect the device median time to failure (T_M). 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

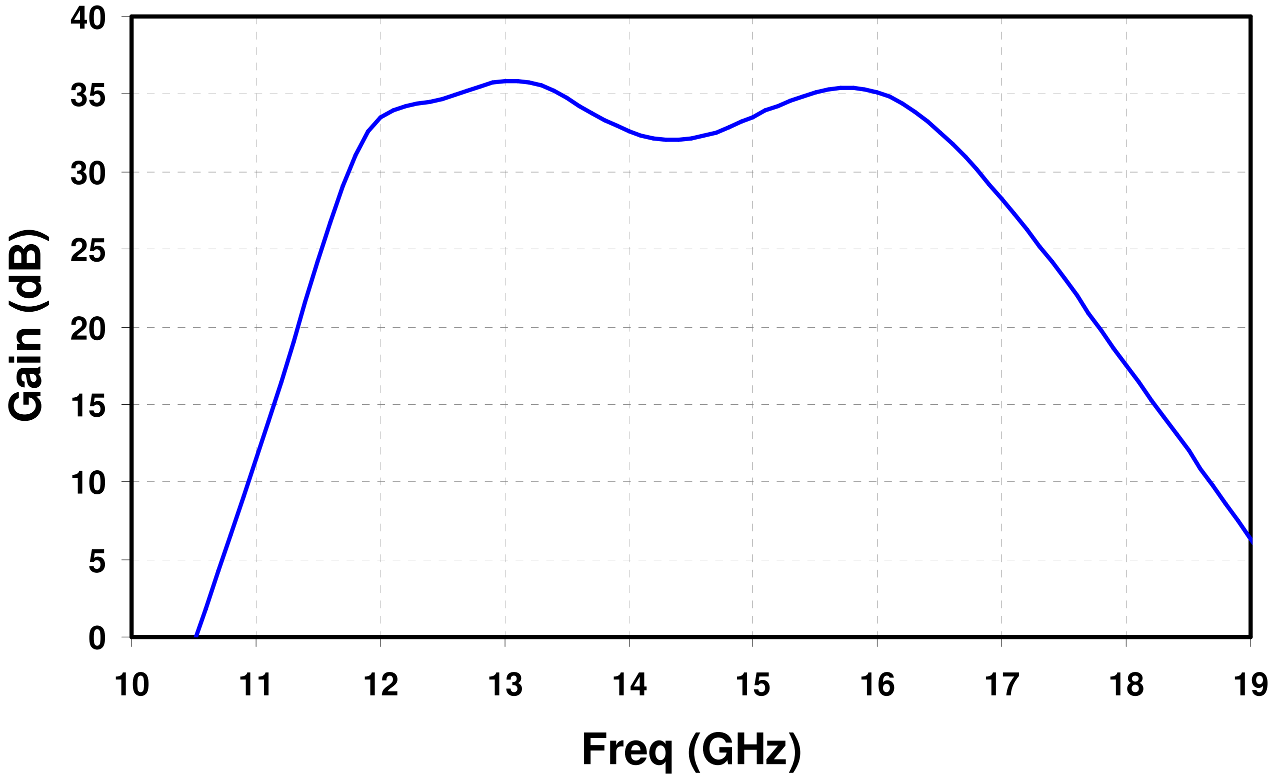
Note: Table II Lists the RF Characteristics of typical devices as determined by fixtured measurements.

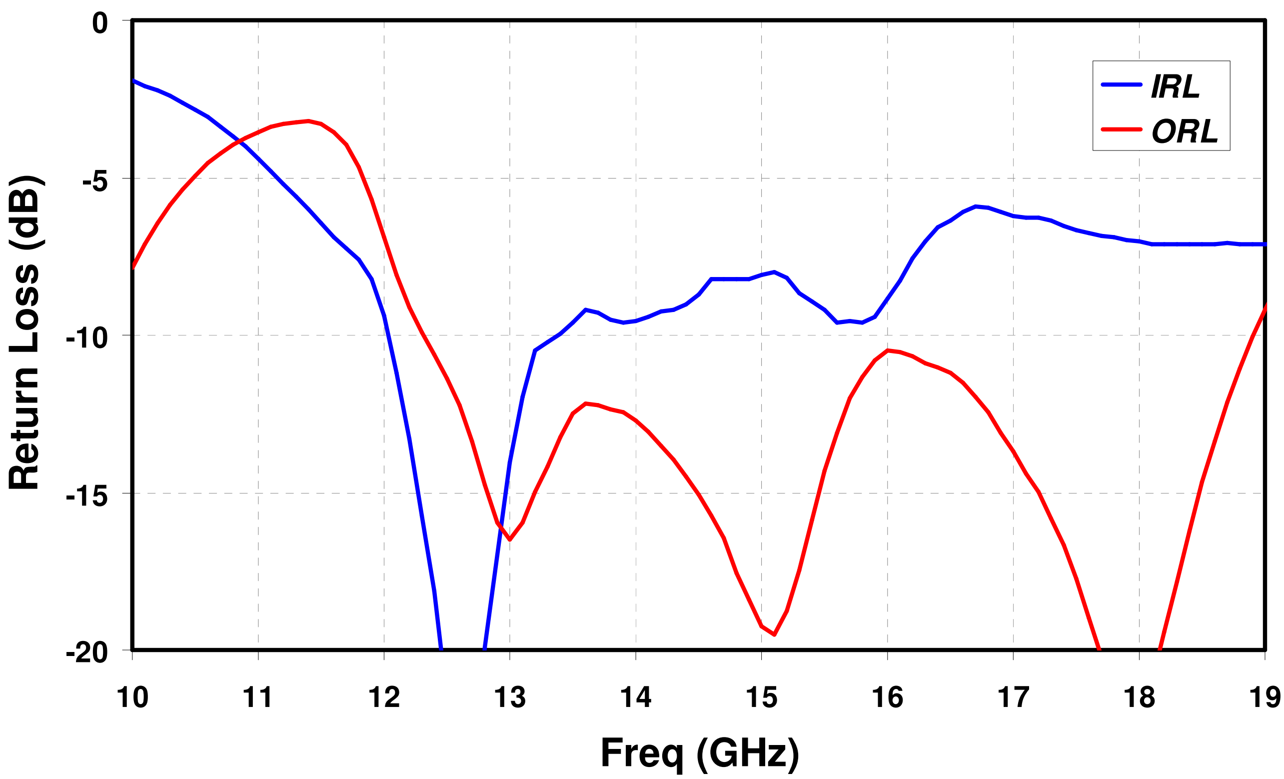
TABLE III
THERMAL INFORMATION

PARAMETER	TEST CONDITION	T_{CH} (°C)	$R_{\theta jc}$ (°C/W)	MTTF (HRS)
$R_{\theta jc}$ 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
$R_{\theta jc}$ 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

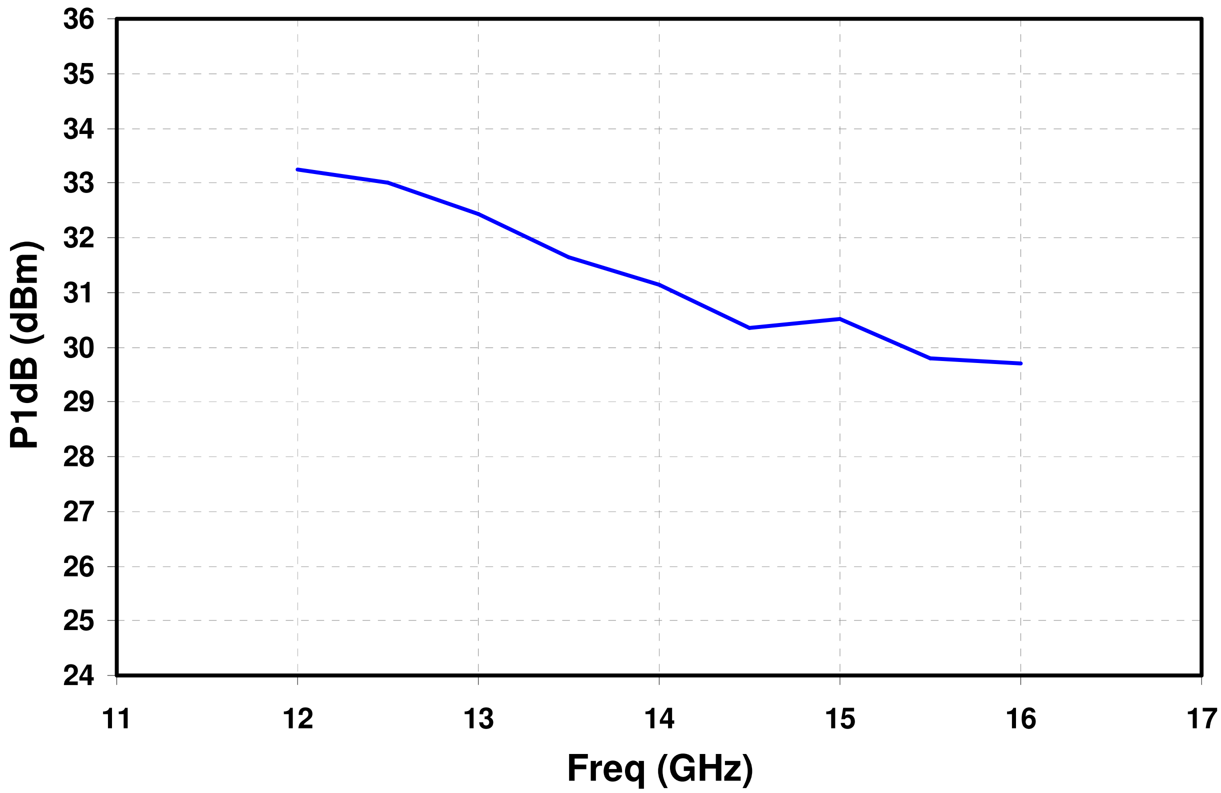
Note: Assumes eutectic attach using 1.5mil 80/20 AuSn mounted to a 20mil CuMo carrier at 70°C baseplate temperature. Worst case condition with no RF applied, 100% of DC power is dissipated.

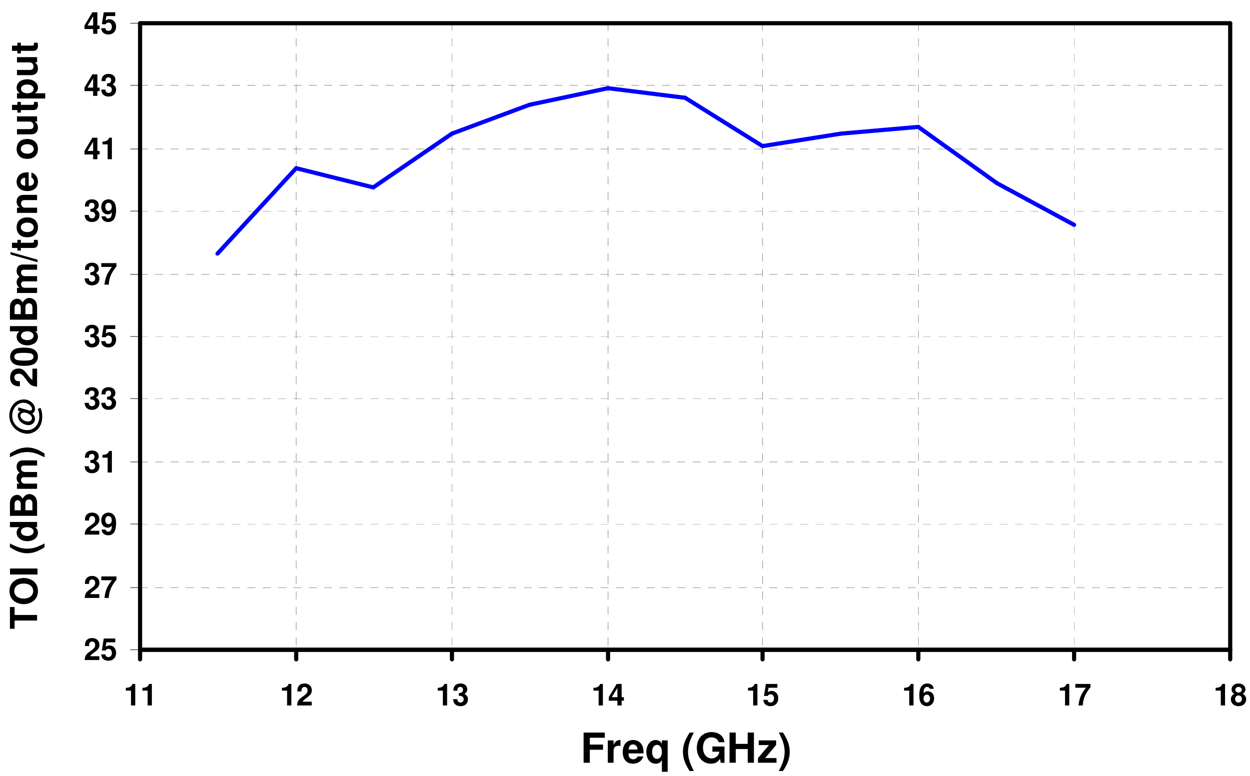
Typical Fixtured Performance



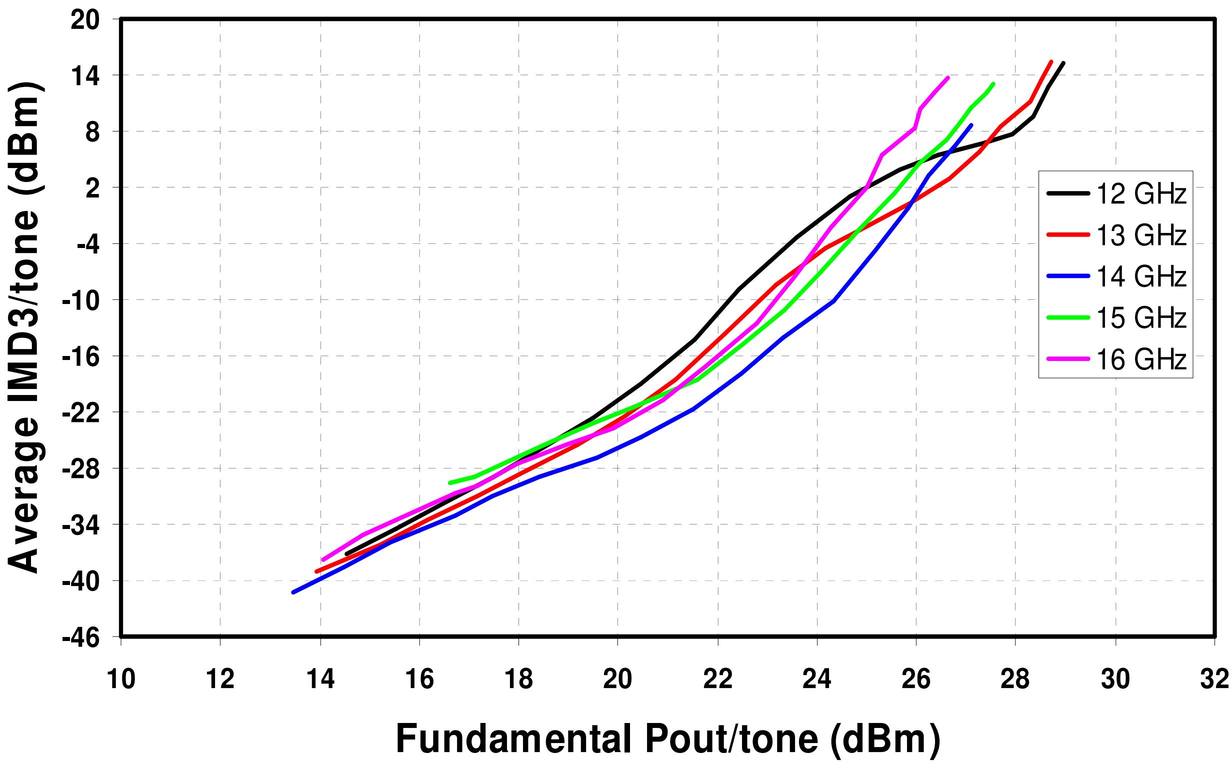


Typical Fixtured Performance

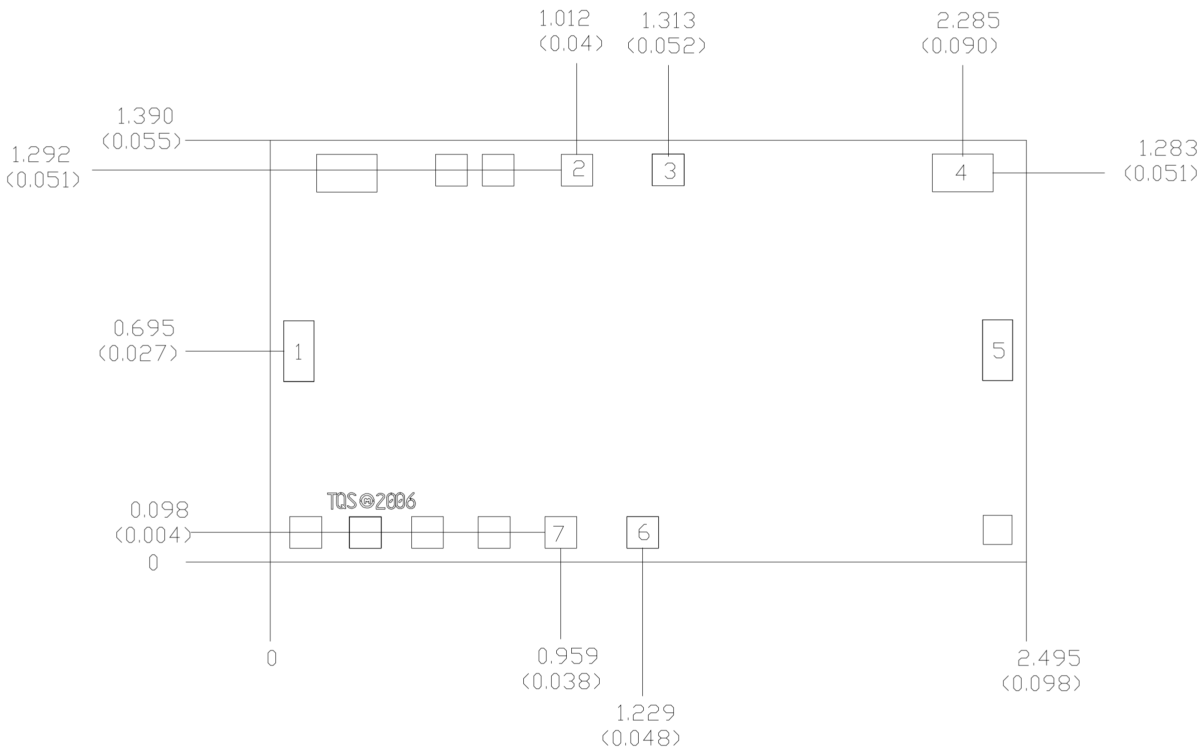




Typical Fixtured Performance



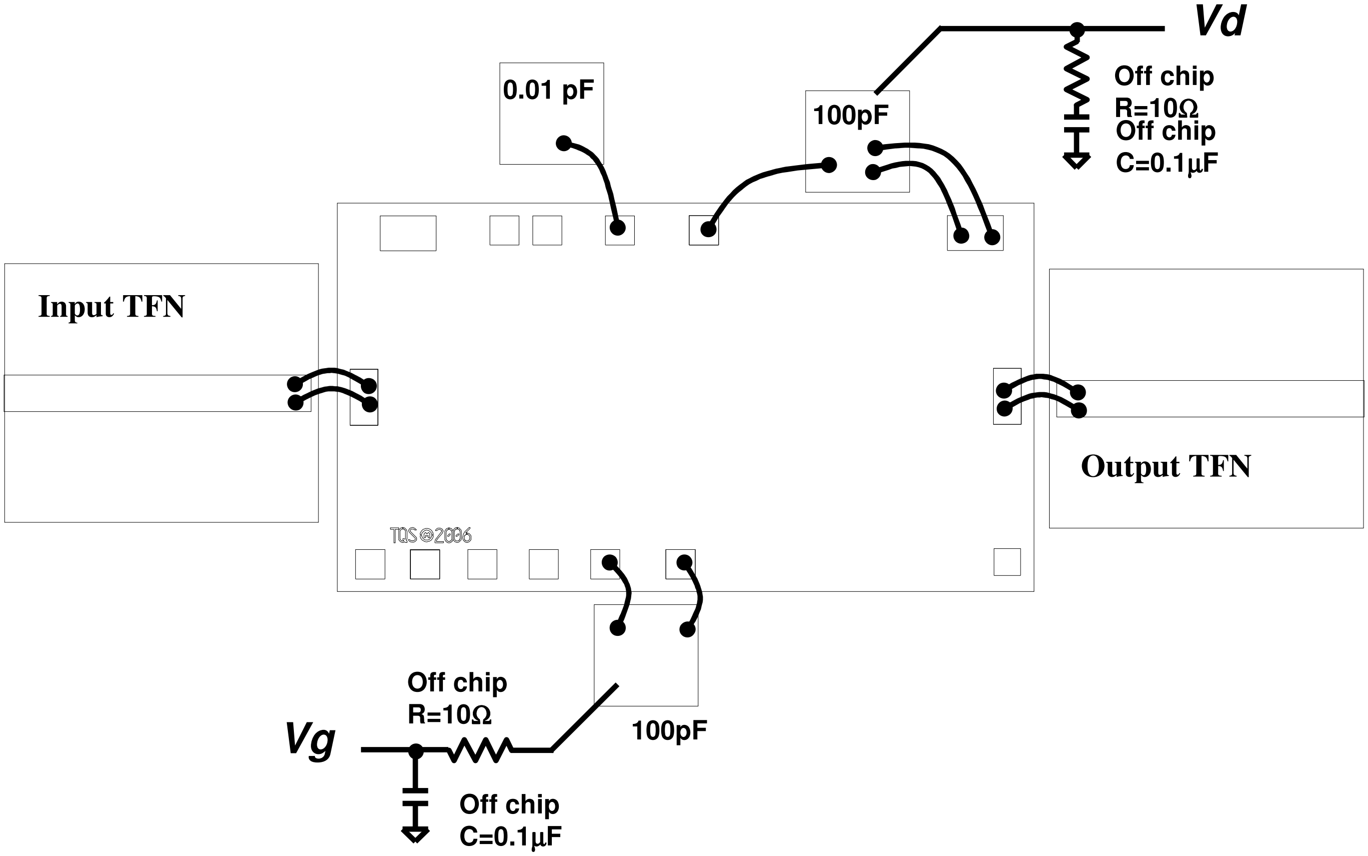
Mechanical Drawing



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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