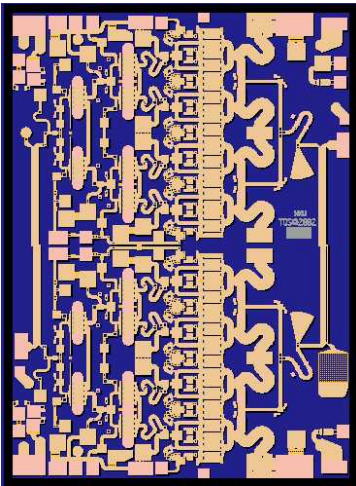


# Ku Band 6.5 W Power Amplifier

# TGA2514



## Key Features

- Frequency Range: 13 - 18 GHz
- 38.5 dBm Nominal Psat from 13.75 - 14 GHz
- 38 dBm Nominal Psat from 13-16 GHz
- 37.5 dBm Nominal Psat from 16-18 GHz
- 33 dBc IMD3 @ 27 dBm Pout/tone @ 14 GHz
- 24 dB Nominal Gain
- 12 dB Nominal Return Loss
- 0.25- $\mu$ m 3MI pHEMT Technology
- Bias Conditions: 8 V @ 2.6 A Idq
- Chip size: 2.87 x 3.90 x .10 mm  
(0.113 x 0.154 x 0.004)

## Primary Applications

- Ku band VSAT Transmitter
- Point to Point Radio

## Product Description

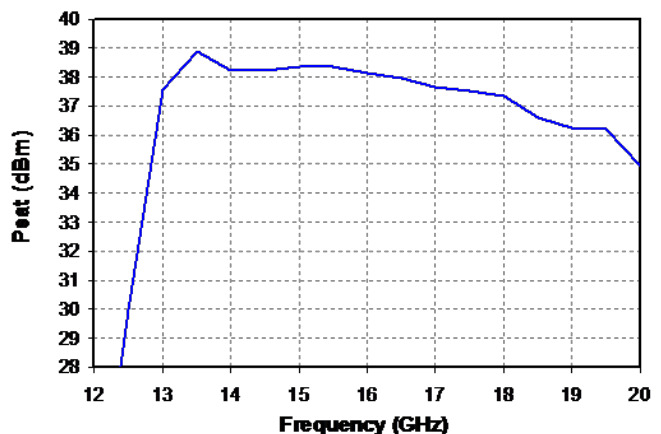
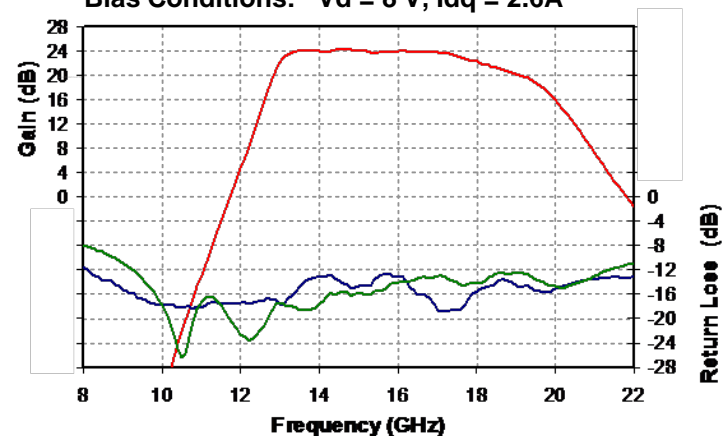
The TriQuint TGA2514 is a compact 6.5 W Ku-band Power Amplifier which operates from 13-18 GHz. The TGA2514 is designed using TriQuint's proven standard 0.25- $\mu$ m gate pHEMT production process.

The TGA2514 provides a nominal 38 dBm of saturated power with a small signal gain of 24 dB. Typical return loss is 14 dB.

The TGA2514 is 100% DC and RF tested on-wafer to ensure performance compliance.

### Measured Fixtured Data

Bias Conditions: Vd = 8 V, Idq = 2.6A



Note: Datasheet is subject to change without notice.

**TABLE I**  
**Absolute Maximum Ratings 1/**

<b>Symbol</b>	<b>Parameter</b>	<b>Value</b>	<b>Notes</b>
V+	Positive Supply Voltage	9 V	<u>2/</u>
V-	Negative Supply Voltage Range	-5V TO 0V	
I <sub>d</sub>	Drain Current	3.8 A	<u>2/</u>
I <sub>g</sub>	Gate Current Range	-18 to 18 mA	
P <sub>in</sub>	Input Continuous Wave Power	21 dBm	<u>2/</u>
T <sub>channel</sub>	Channel Temperature	200 °C	

1/ These ratings represent the maximum operable values for this device. Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device and/or affect device lifetime. These are stress ratings only, and functional operation of the device at these conditions is not implied.

2/ Combinations of supply voltage, supply current, input power, and output power shall not exceed maximum power dissipation listed in Table IV.

**TABLE II**  
**RF CHARACTERIZATION TABLE**  
 (T<sub>A</sub> = 25°C, Nominal)  
 (V<sub>d</sub> = 8V, I<sub>d</sub> = 2.6 A)

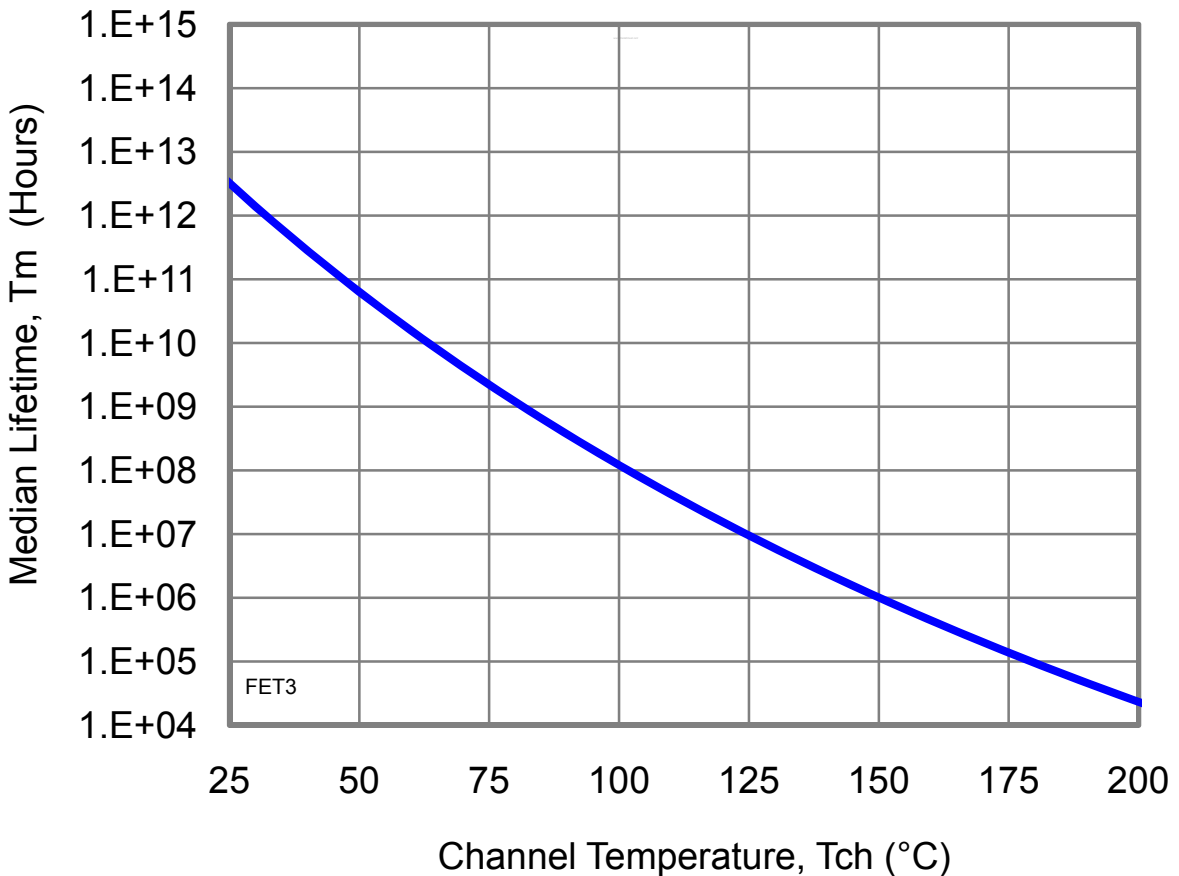
SYMBOL	PARAMETER	TEST CONDITION	TYPICAL	UNITS
Gain	Small Signal Gain	f = 13-18 GHz	24	dB
IRL	Input Return Loss	f = 13-18 GHz	12	dB
ORL	Output Return Loss	f = 13-18 GHz	12	dB
Psat	Saturated Power	f = 13-16 GHz f = 16-18 GHz	38 37.5	dBm
TOI	Third Order Intercept @ Pout/tone = 27dBm	f = 14 GHz	44	dBm
IMD3	Output IMD3 @ Pout/tone = 27 dBm	f = 14 GHz	33	dBc

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

**TABLE III**  
**Power Dissipation and Thermal Properties**

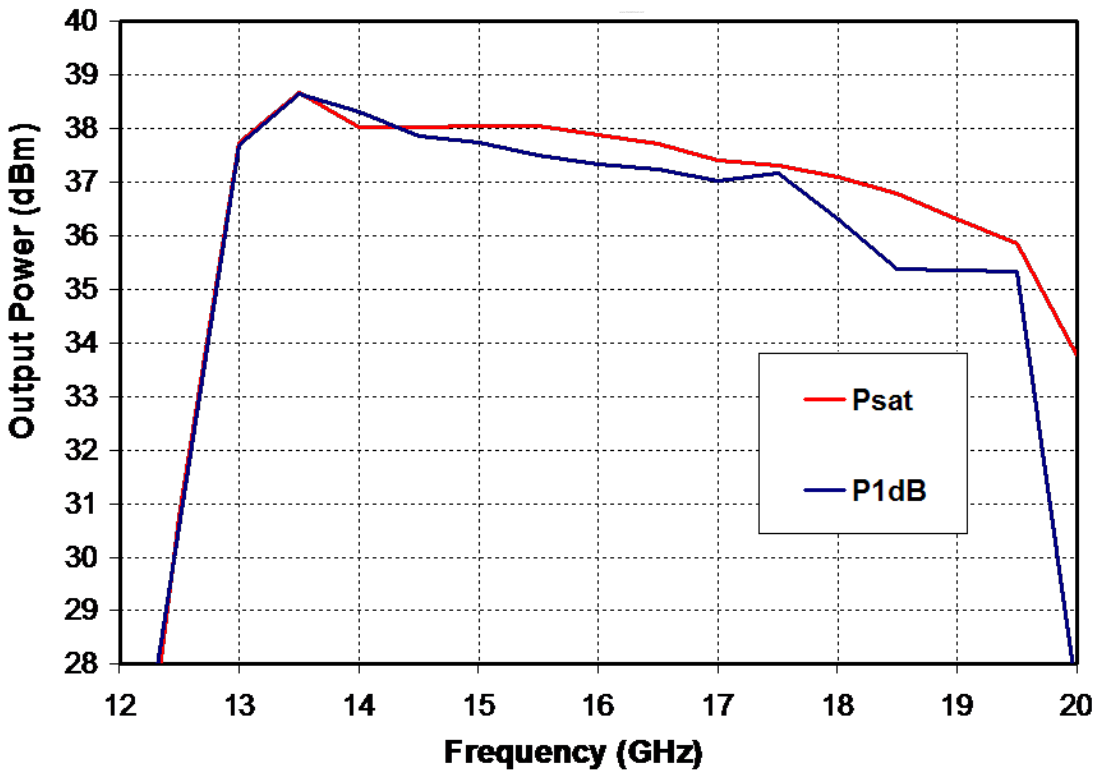
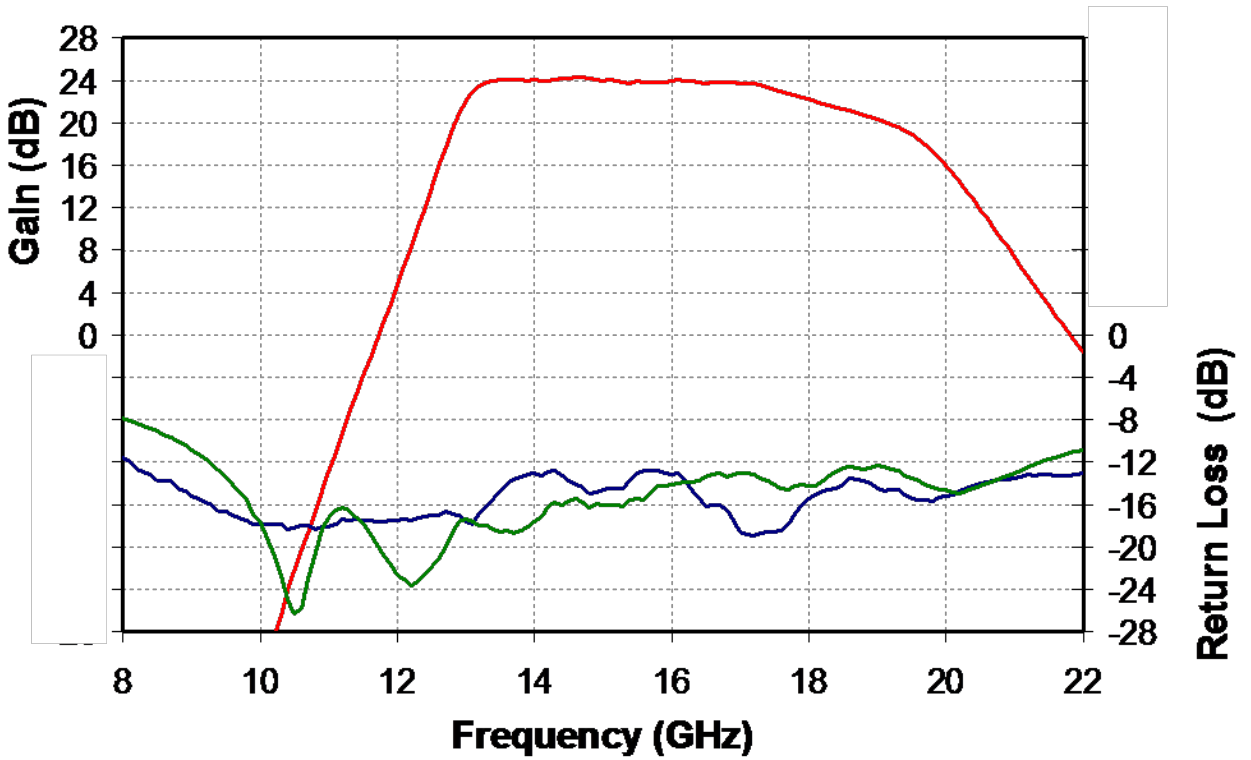
Parameter	Test Conditions	Value
Maximum Power Dissipation	Tbaseplate = 70	Pd = 33.3 W Tchannel = 200 °C
Thermal Resistance, $\theta_{jc}$	Vd = 8 V Id = 2.6 A Pd = 20.8 W	$\theta_{jc}$ = 3.9 °C/W Tchannel = 151 °C Tm = 9.3E5 hrs
Thermal Resistance, $\theta_{jc}$ Under RF Drive	Vd = 8 V Id = 3.6 A Pout = 38 dBm Pd = 22.5 W	$\theta_{jc}$ = 3.9 °C/W Tchannel = 158 °C Tm = 5.2E5 hrs
Mounting Temperature	30 Seconds	320°C
Storage Temperature		-65 to 150°C

**Median Lifetime (Tm) vs. Channel Temperature (Tch)**



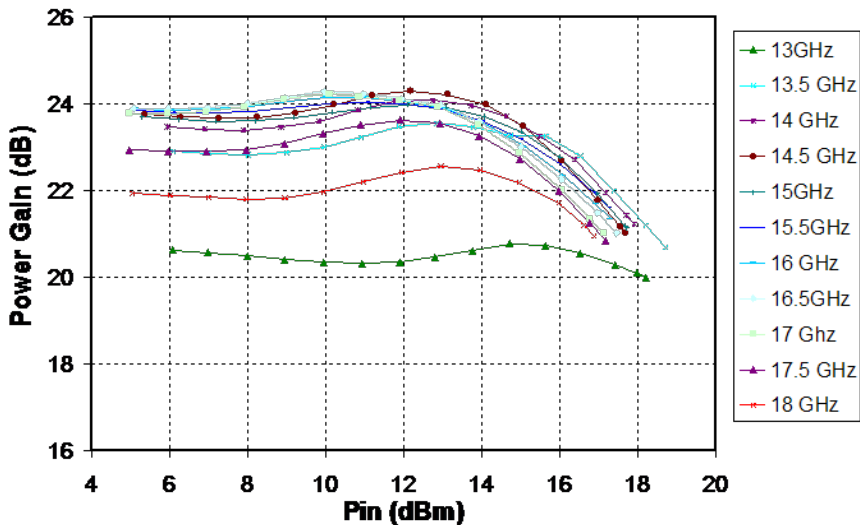
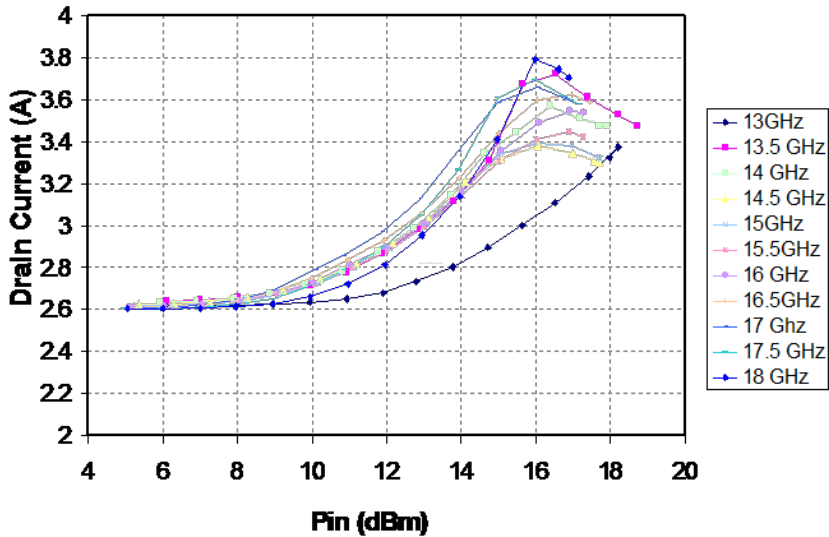
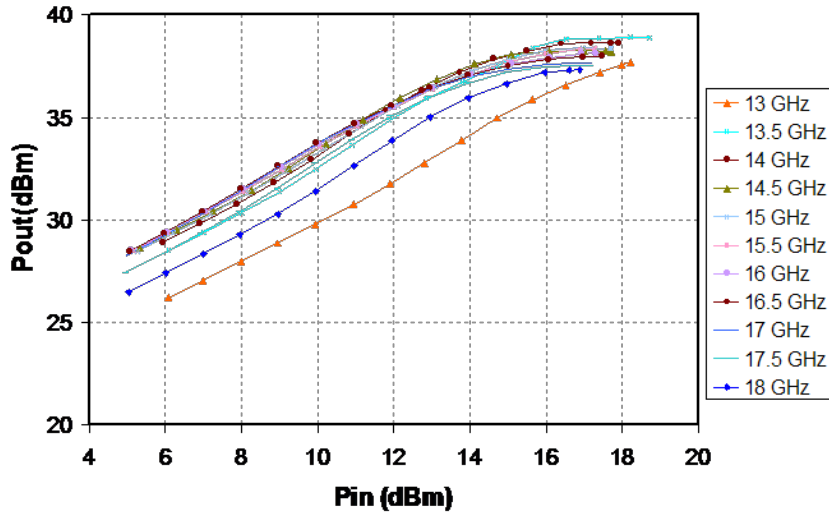
**Measured Fixture Data**

Bias Conditions:  $V_d = 8\text{ V}$ ,  $I_{dq} = 2.6\text{ A}$



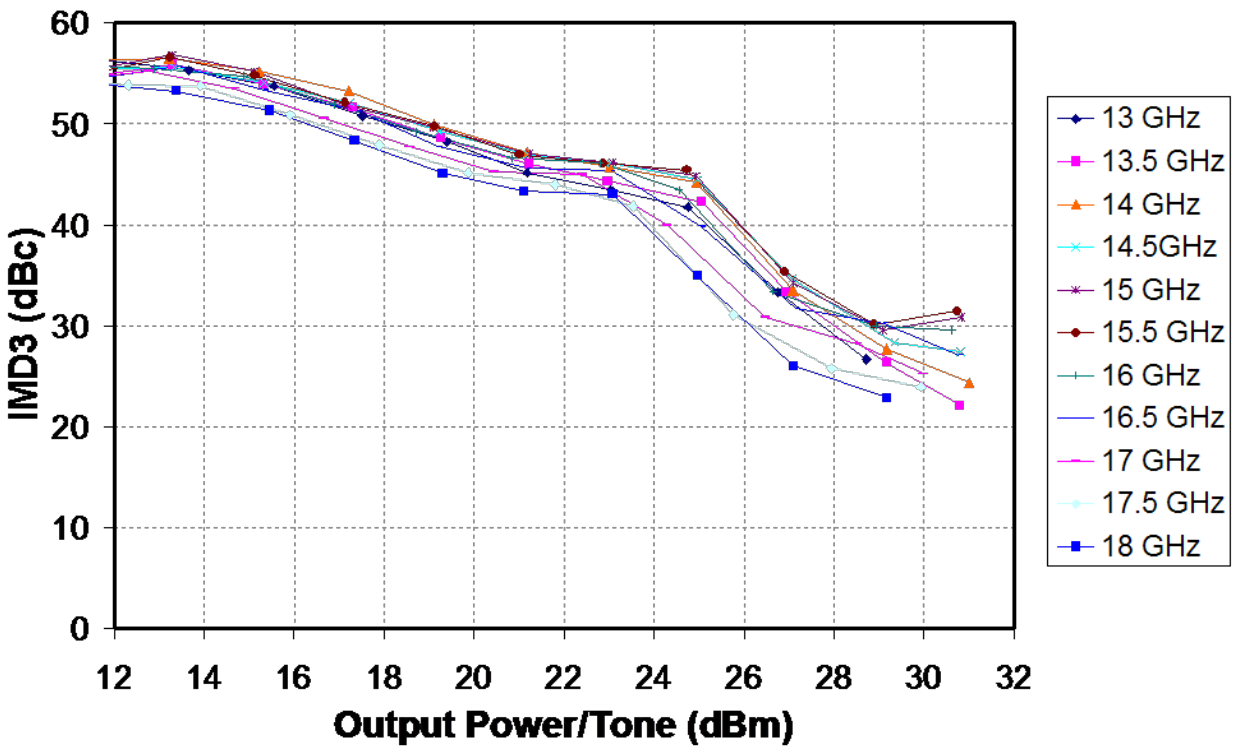
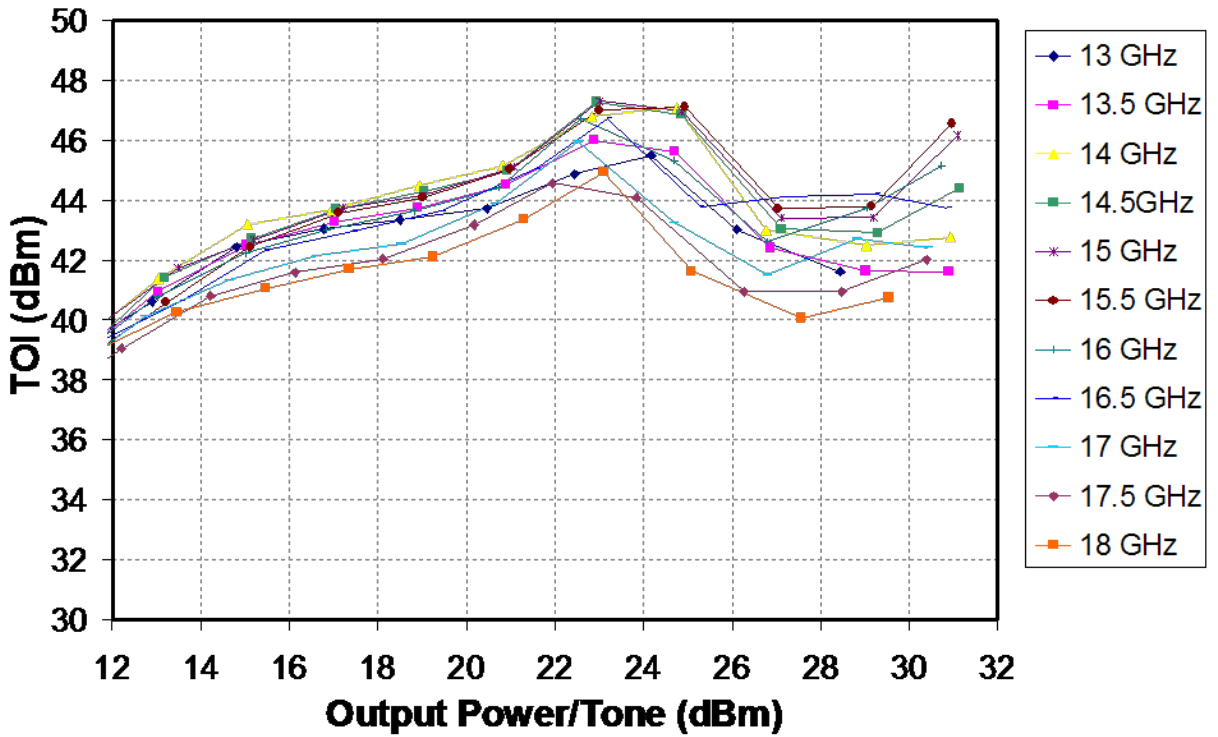
**Measured Fixture Data**

Bias Conditions:  $V_d = 8\text{ V}$ ,  $I_{dQ} = 2.6\text{ A}$

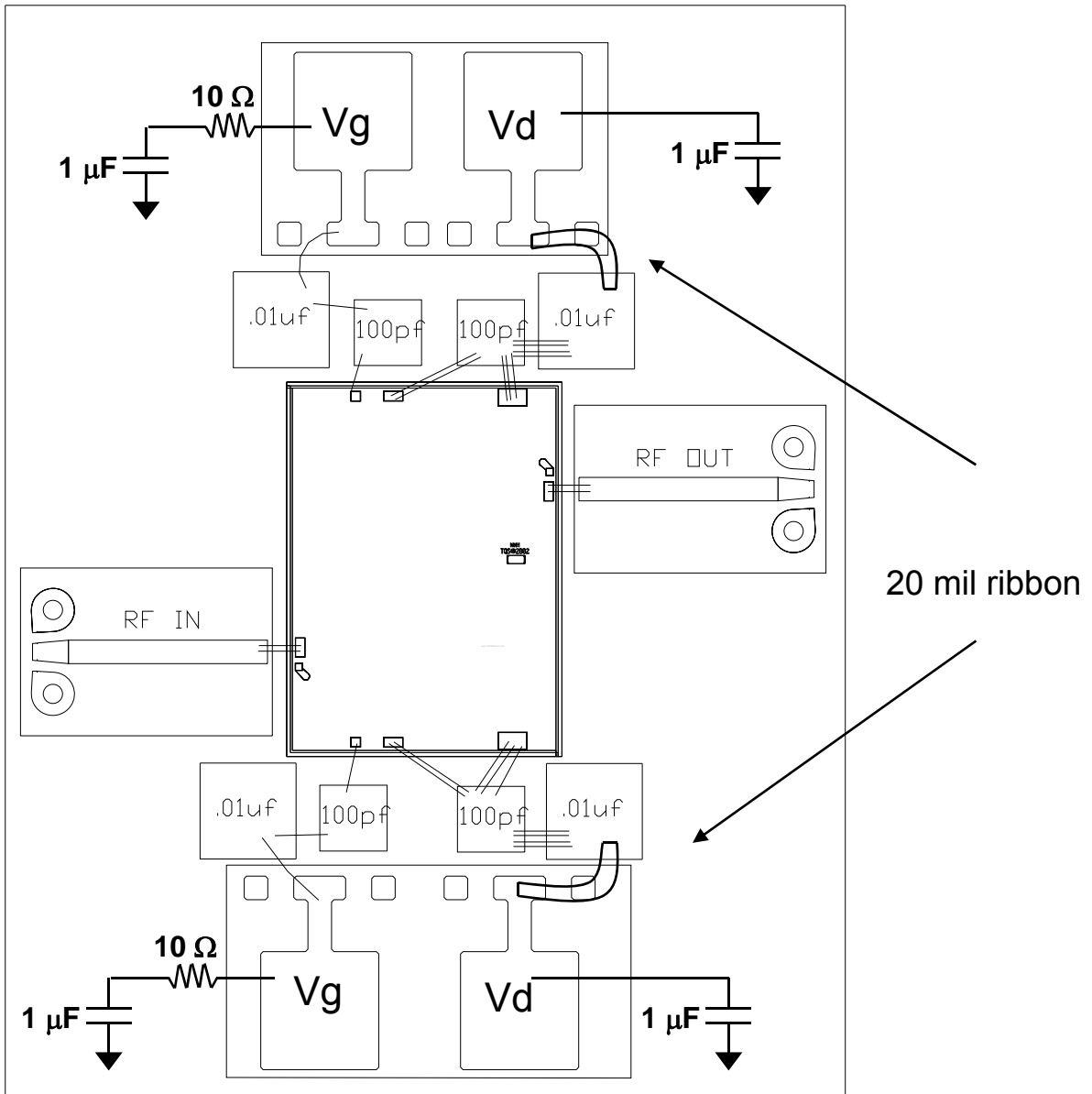


**Measured Fixture Data**

Bias Conditions:  $V_d = 8\text{ V}$ ,  $I_{dQ} = 2.6\text{ A}$



## Recommended Chip Assembly Diagram



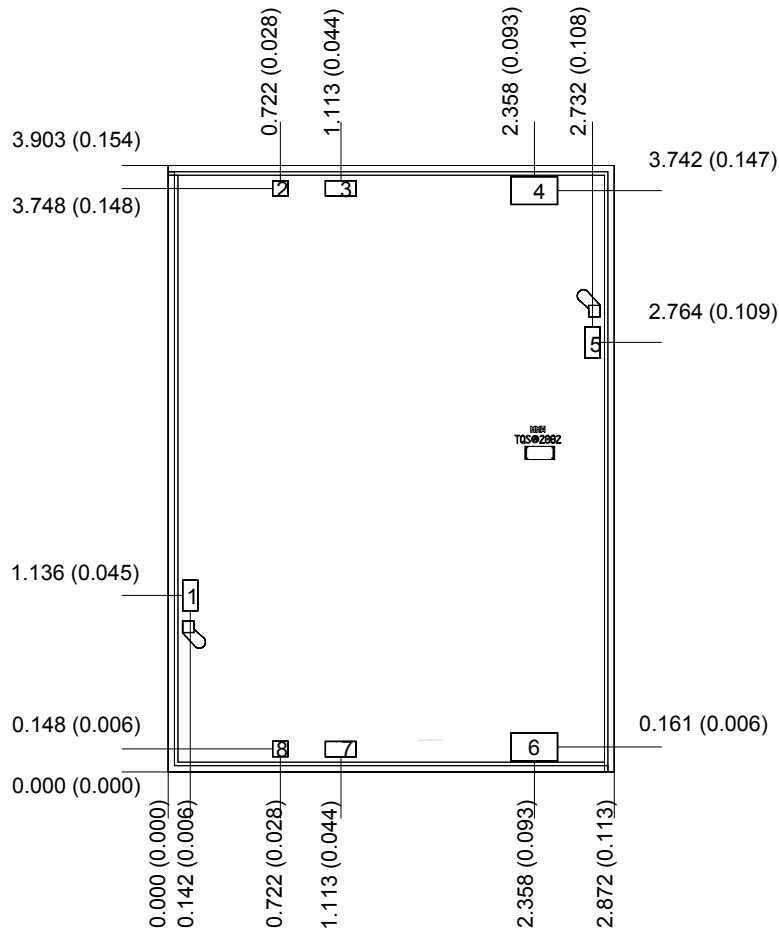
Notes:

1. Vg can be connected from either side, but 100 pf, 0.01 uf , 1 uf caps and 10 ohm resistor are needed for both sides.
2. Vd connection must be biased from both sides.

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



**Mechanical Drawing**



**Units: Millimeters (inches)**

**Thickness: 0.100 (0.004) (reference only)**

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

**Chip size +/- 0.05 (0.002)**

**GND IS BACKSIDE OF MMIC**

Bond pad #1	RF Input	0.096 x 0.200 (0.004 x 0.008)
Bond pads #2, 8	Vg	0.098 x 0.098 (0.004 x 0.004)
Bond pads #3, 7	Vd	0.198 x 0.100 (0.008 x 0.004)
Bond pads # 4, 6	Vd	0.296 x 0.178 (0.012 x 0.007)
Bond pad #5	RF Output	0.096 x 0.200 (0.004 x 0.008)

**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 (for 30 sec 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.
- Discrete FET devices with small pad sizes should be bonded with 0.0007-inch wire.
- Maximum stage temperature is 200°C.

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