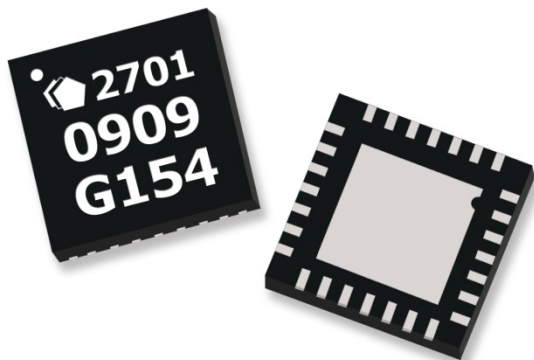
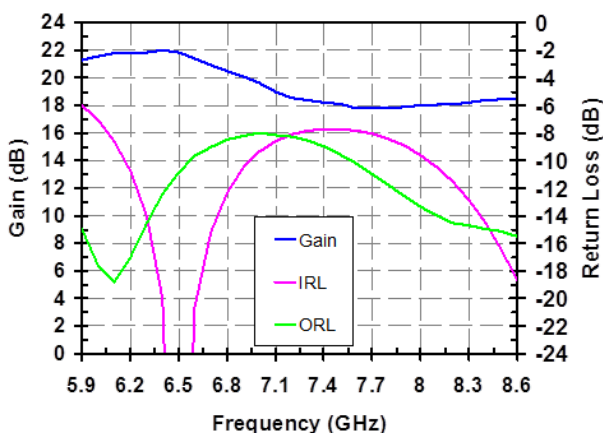
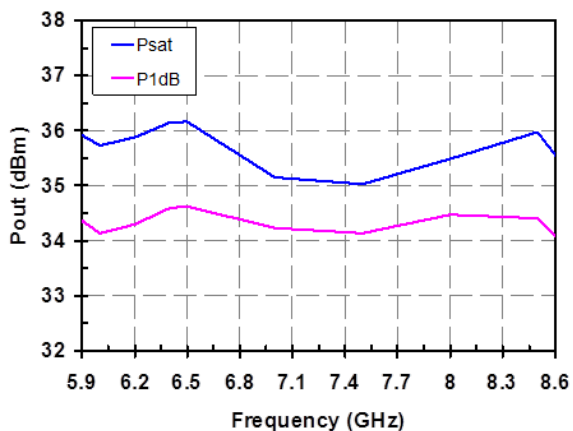


## 3 Watt C-Band Packaged Power Amplifier



### Measured Performance

Bias conditions:  $V_d = 6\text{ V}$ ,  $I_d = 1.0\text{ A}$ ,  $V_g = -0.6\text{ V}$  Typical



### Key Features

- Frequency Range: 5.9 – 8.5 GHz
- Power: 35 dBm Psat, 34 dBm P1dB
- Gain: 18 dB
- TOI: 42 dBm
- PAE: 37%
- NF: 7.5 dB
- Bias:  $V_d = 6\text{ V}$ ,  $I_d = 1.0\text{ A}$ ,  $V_g = -0.6\text{ V}$  Typical
- Package Dimensions: 6 x 6 x 0.85 mm

### Primary Applications

- Point-to-Point Radio
- Communications

### Product Description

The TriQuint TGA2701-SM is a packaged 35dBm Power Amplifier for C-band applications. The TGA2701-SM provides a nominal 35 dBm of output power at an input power level of 22 dBm with a small signal gain of 18 dB. Nominal TOI is 42 dBm and noise figure is 7.5 dB.

The TGA2701-SM is a QFN 6x6 mm surface mount package. It is ideally suited for low cost emerging markets such as point to point radio and communications.

Lead-Free & RoHS compliant.

**Table I**  
**Absolute Maximum Ratings 1/**

Symbol	Parameter	Value	Notes
Vd-Vg	Drain to Gate Voltage	9.2 V	
Vd	Drain Voltage	8 V	2/
Vg	Gate Voltage Range	-1.2 to +0.5 V	
Id	Drain Current	3.85 A	2/
Ig	Gate Current Range	-14 to 126mA	
Pin	Input Continuous Wave Power	29 dBm	
Tchannel	Channel Temperature	200 °C	2/

- 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 the maximum power dissipation listed in Table IV.

**Table II**  
**Recommended Operating Conditions**

Symbol	Parameter 1/	Value
Vd	Drain Voltage	6 V
Idq	Drain Current	1.0 A
Id_Drive	Drain Current under RF Drive	1.6 A
Vg	Gate Voltage	-0.6 V

- 1/ See assembly diagram for bias instructions.

**Table III**  
**RF Characterization Table**

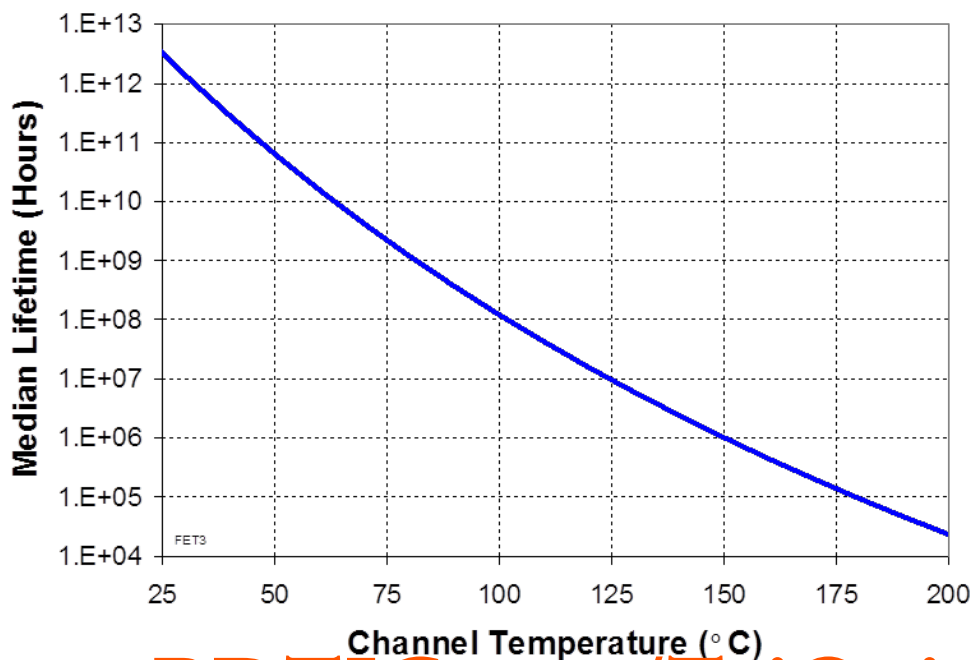
**Bias: Vd = 6 V, Id = 1.0 A, Vg = -0.6 V Typical**

<b>SYMBOL</b>	<b>PARAMETER</b>	<b>TEST CONDITIONS</b>	<b>NOMINAL</b>	<b>UNITS</b>
Gain	Small Signal Gain	F = 5.9 – 8.5 GHz	18	dB
IRL	Input Return Loss	F = 5.9 – 8.5 GHz	-10	dB
ORL	Output Return Loss	F = 5.9 – 8.5 GHz	-10	dB
Psat	Saturated Output Power	F = 5.9 – 8.5 GHz	35	dBm
P1dB	Output Power @ 1dB Compression	F = 5.9 – 8.5 GHz	34	dBm
TOI	Output TOI	F = 5.9 – 8.5 GHz	42	dBm
NF	Noise Figure	F = 5.9 – 8.5 GHz	7.5	dB
	Gain Temperature Coefficient	F = 5.9 – 8.5 GHz	-0.03	dB/°C
	Power Temperature Coefficient	F = 5.9 – 8.5 GHz	-0.01	dBm/°C

**Table IV**  
**Power Dissipation and Thermal Properties**

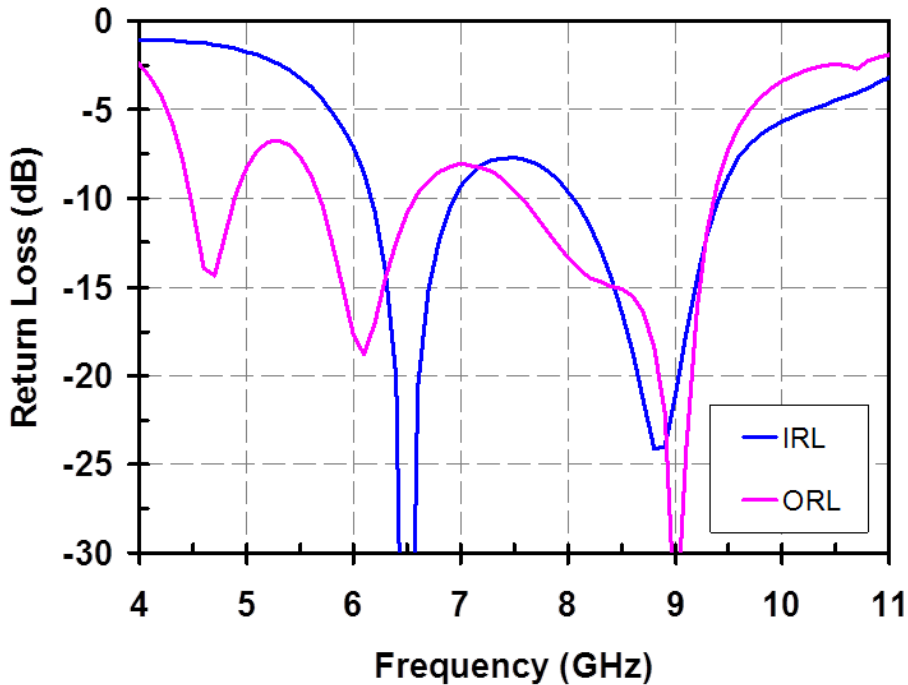
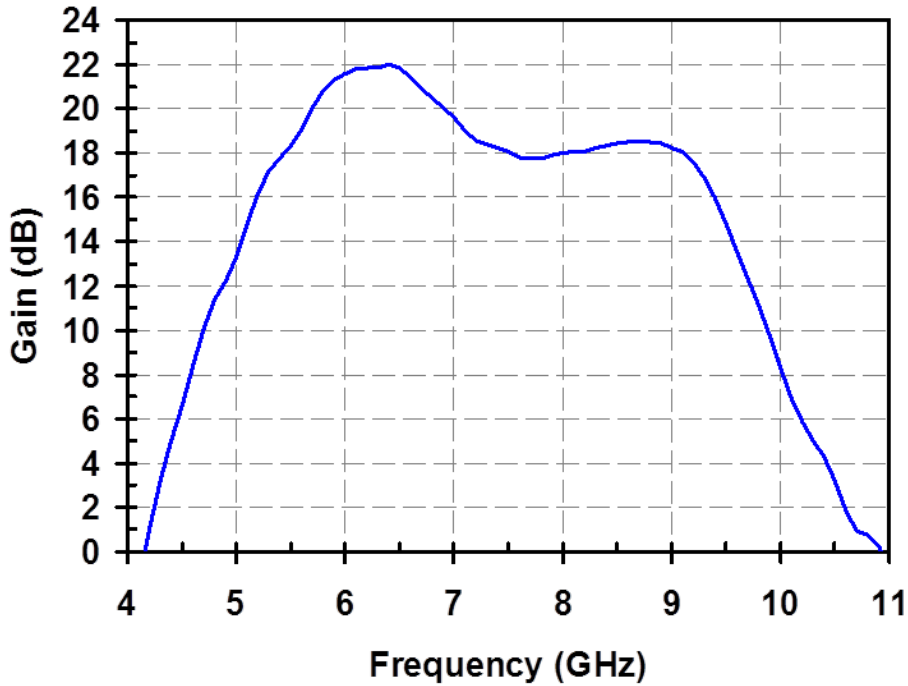
Parameter	Test Conditions	Value
Maximum Power Dissipation	Tbaseplate = 85 °C	Pd = 18.5 W Tchannel = 200 °C
Thermal Resistance, $\theta_{jc}$	Vd = 6 V Id = 1A Pd = 6 W Tbaseplate = 85 °C	$\theta_{jc}$ = 6.2 °C/W Tchannel = 122 °C Tm = 1.3E+7Hrs
Thermal Resistance, $\theta_{jc}$ Under RF Drive	Vd = 6 V Id = 1.6 A Pout = 35.5 dBm Pd = 6 W Tbaseplate = 85 °C	$\theta_{jc}$ = 6.2 °C/W Tchannel = 122 °C Tm = 1.3E+7 Hrs
Mounting Temperature		Refer to Solder Reflow Profiles (pg 16)
Storage Temperature		-65 to 150 °C

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



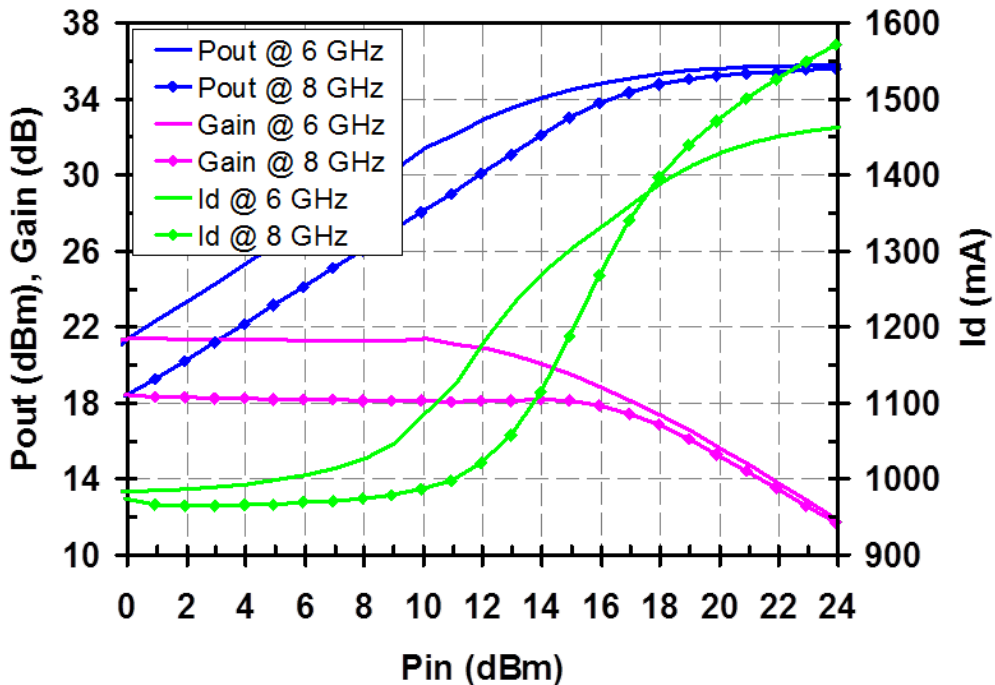
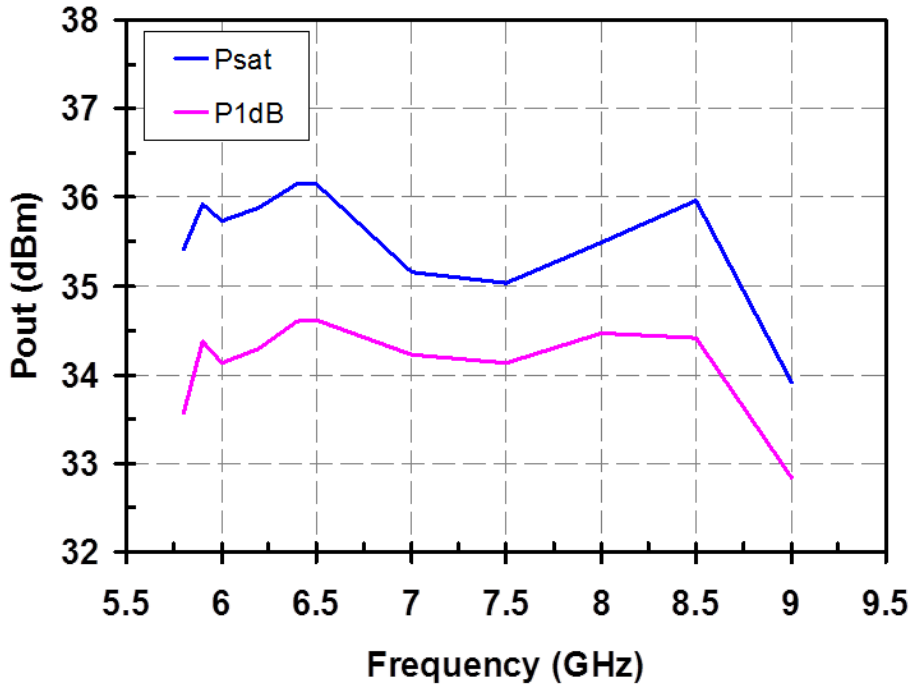
**Measured Data**

Bias conditions:  $V_d = 6\text{ V}$ ,  $I_d = 1000\text{ mA}$ ,  $V_g = -0.6\text{ V}$  Typical



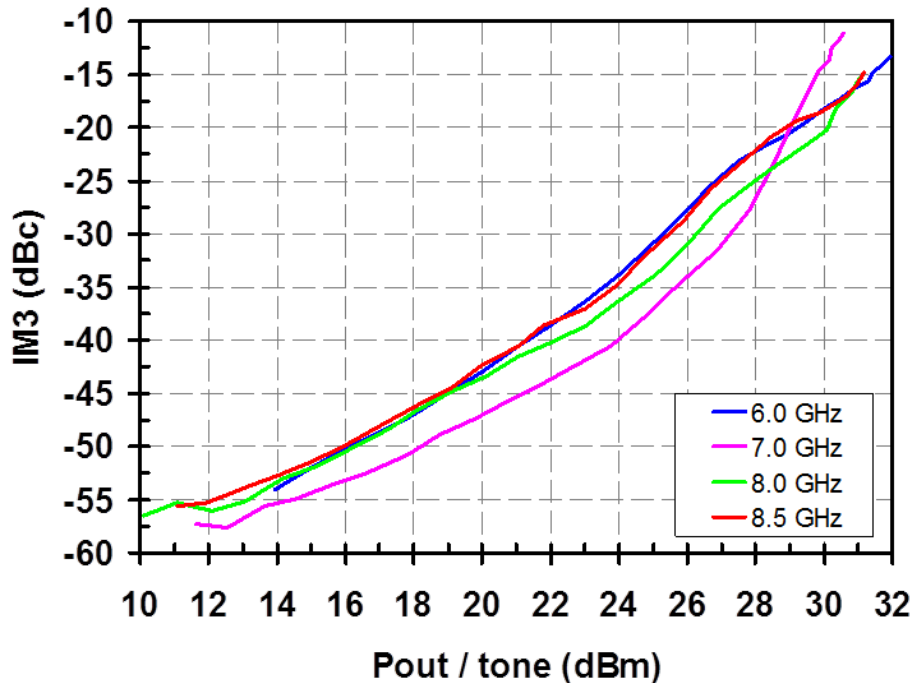
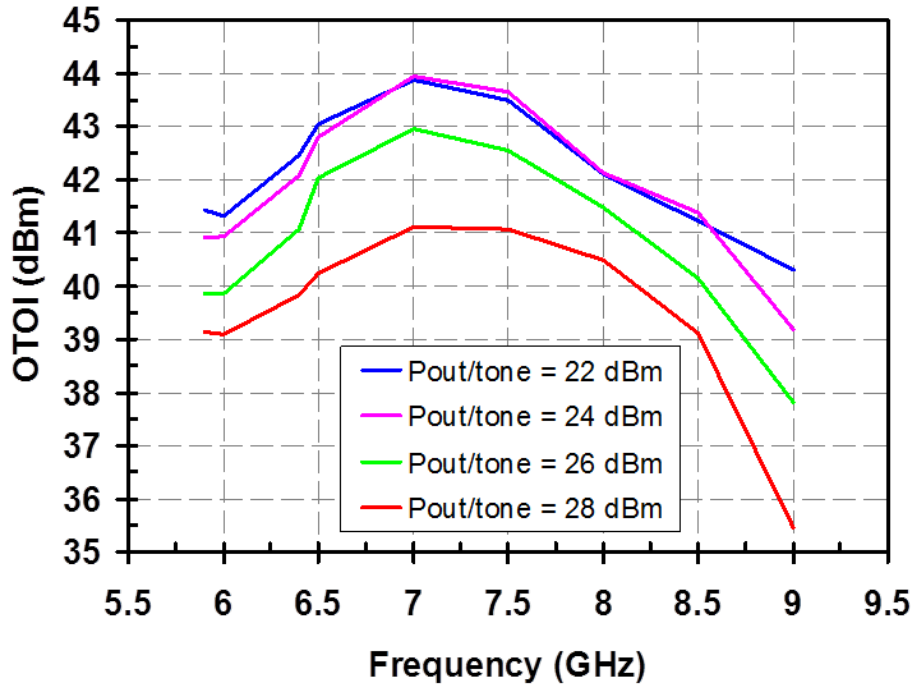
**Measured Data**

Bias conditions:  $V_d = 6\text{ V}$ ,  $I_d = 1000\text{ mA}$ ,  $V_g = -0.6\text{ V}$  Typical



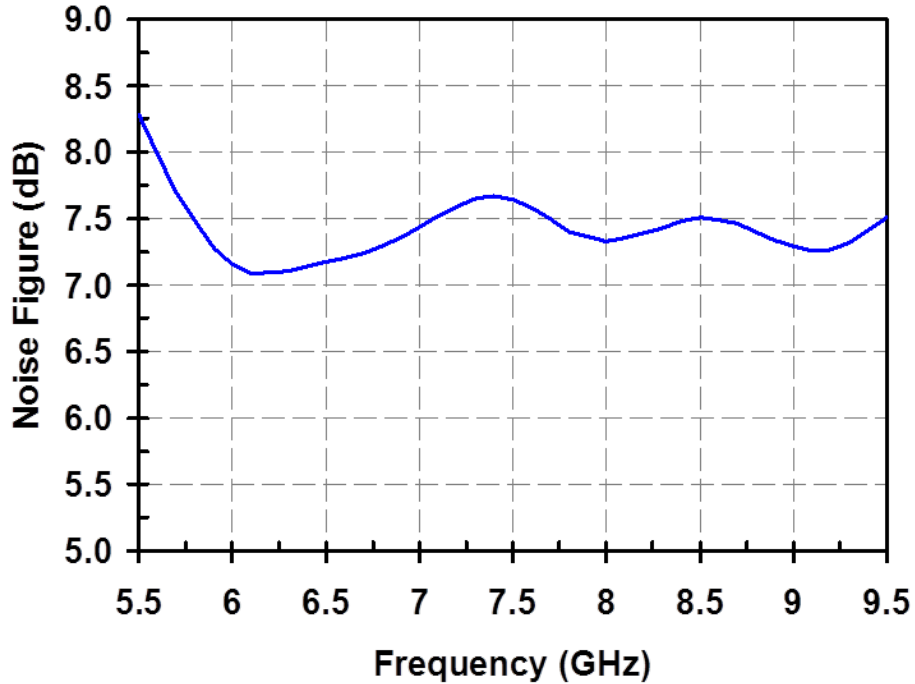
**Measured Data**

Bias conditions:  $V_d = 6\text{ V}$ ,  $I_d = 1000\text{ mA}$ ,  $V_g = -0.6\text{ V}$  Typical



**Measured Data**

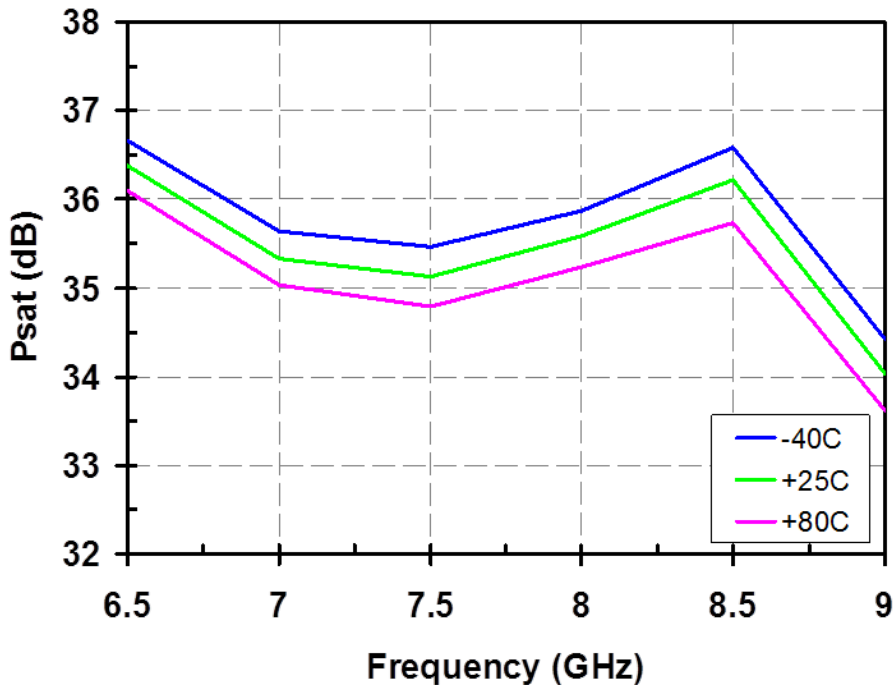
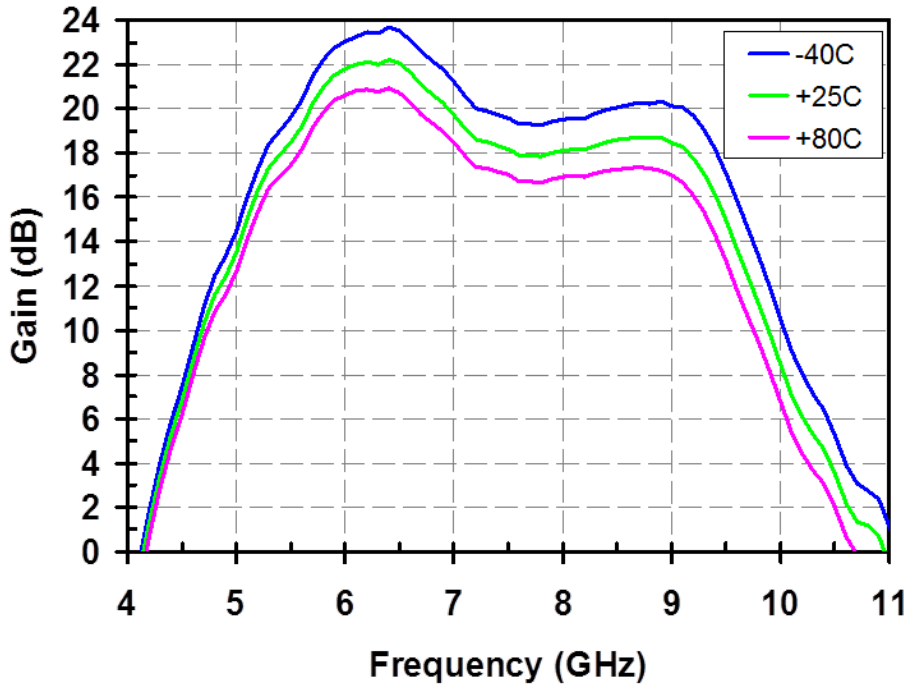
**Bias conditions:  $V_d = 6\text{ V}$ ,  $I_d = 1000\text{ mA}$ ,  $V_g = -0.6\text{ V}$  Typical**





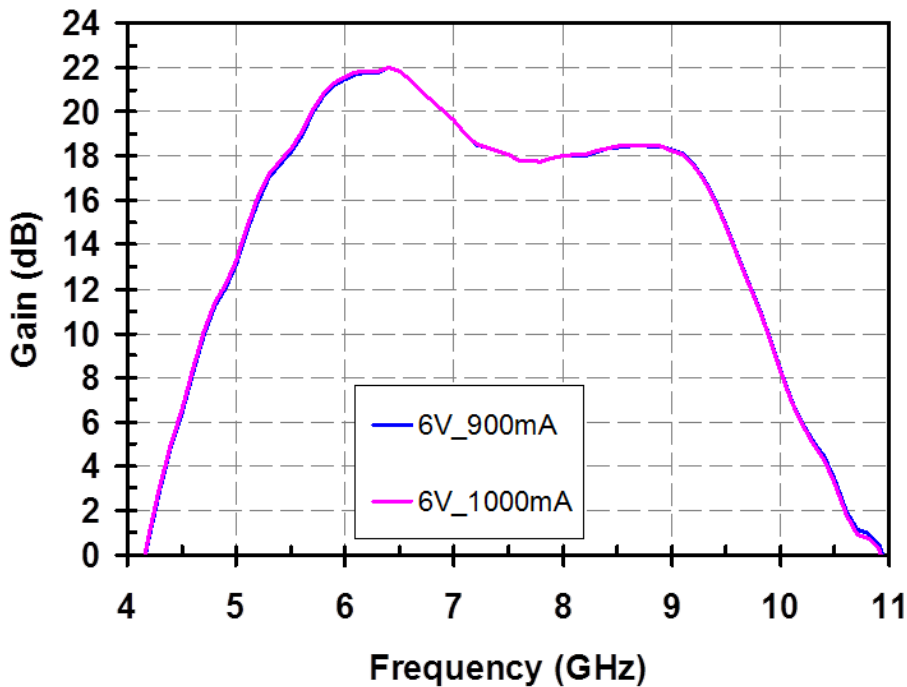
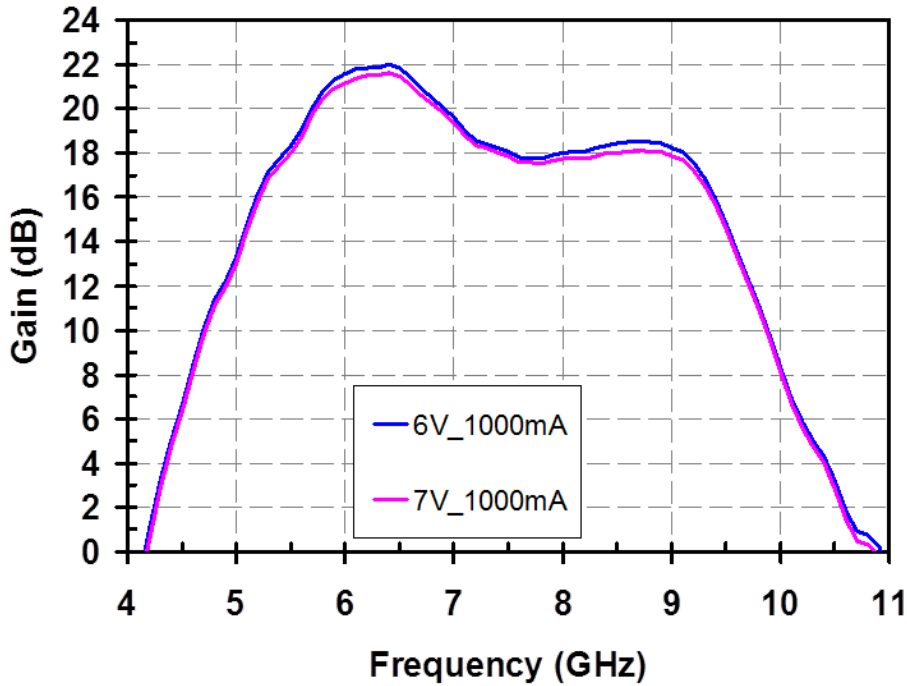
**Measured Data**

Bias conditions:  $V_d = 6\text{ V}$ ,  $I_d = 1000\text{ mA}$ ,  $V_g = -0.6\text{ V}$  Typical



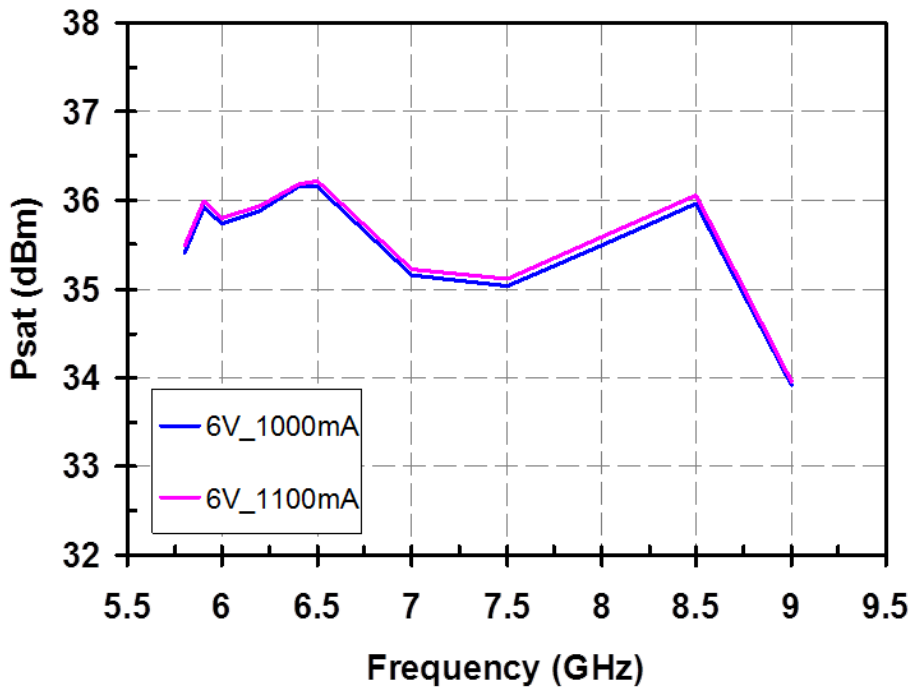
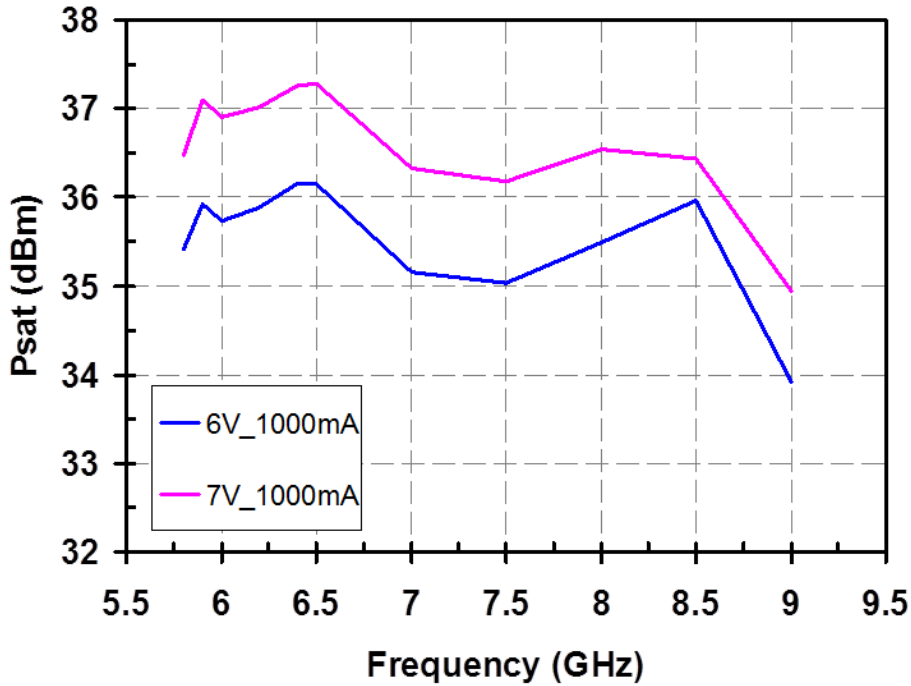
**Measured Data**

**Bias conditions: Varies**

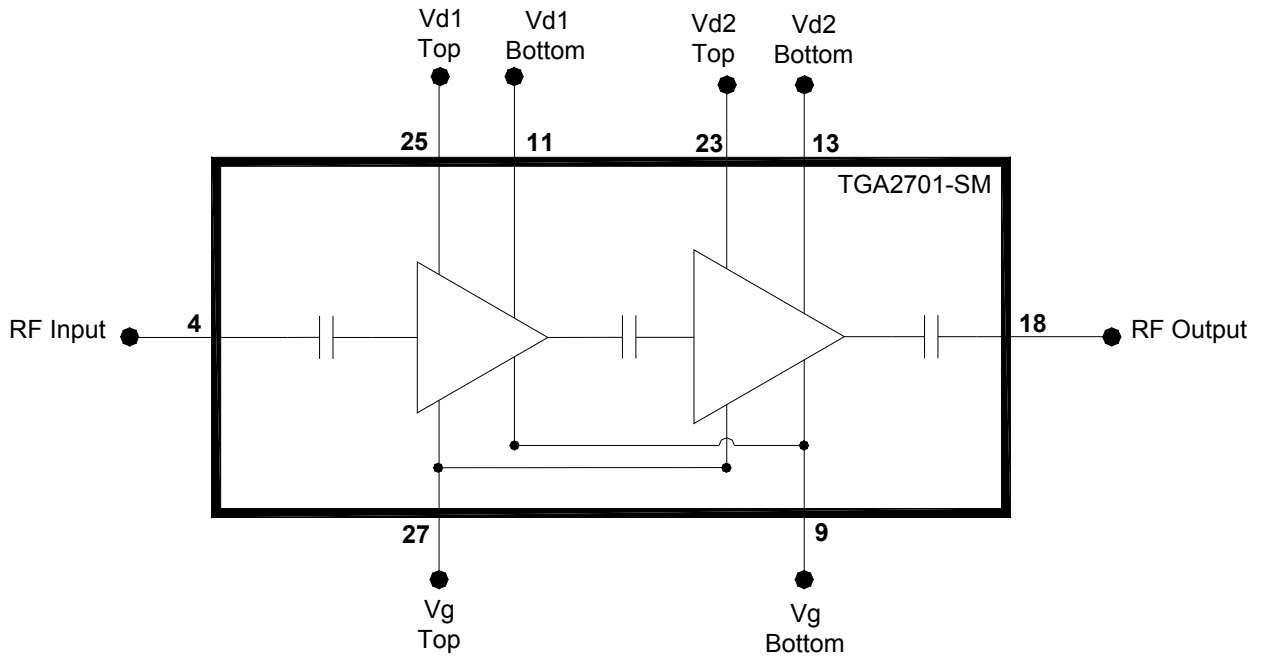


**Measured Data**

**Bias conditions: Varies**



**Electrical Schematic**



**Bias Procedures**

**Bias-up Procedure**

Vg (combined Vg\_Top & Vg\_Bottom) set to -1.2 V

Vd (combined all four Vd) set to +6 V

Adjust Vg more positive until Idq is 1 A.

This will be ~ Vg = -0.6 V

**Bias-down Procedure**

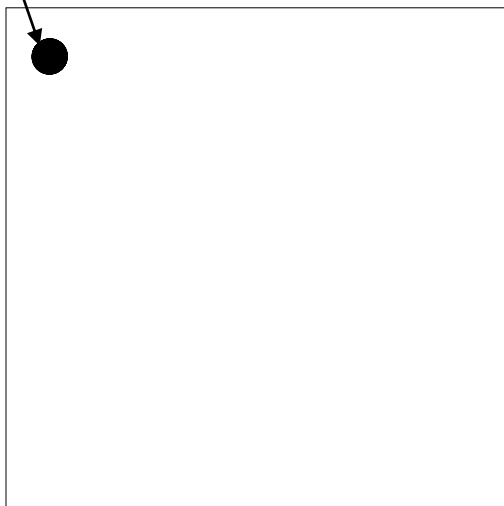
Turn off RF supply

Reduce Vg to -1.2 V. Ensure Id ~ 0 mA

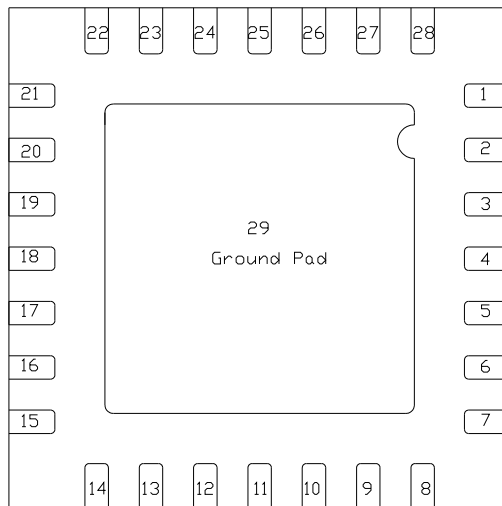
Turn Vd to 0 V

**Package Pinout**

Pin #1 Dot

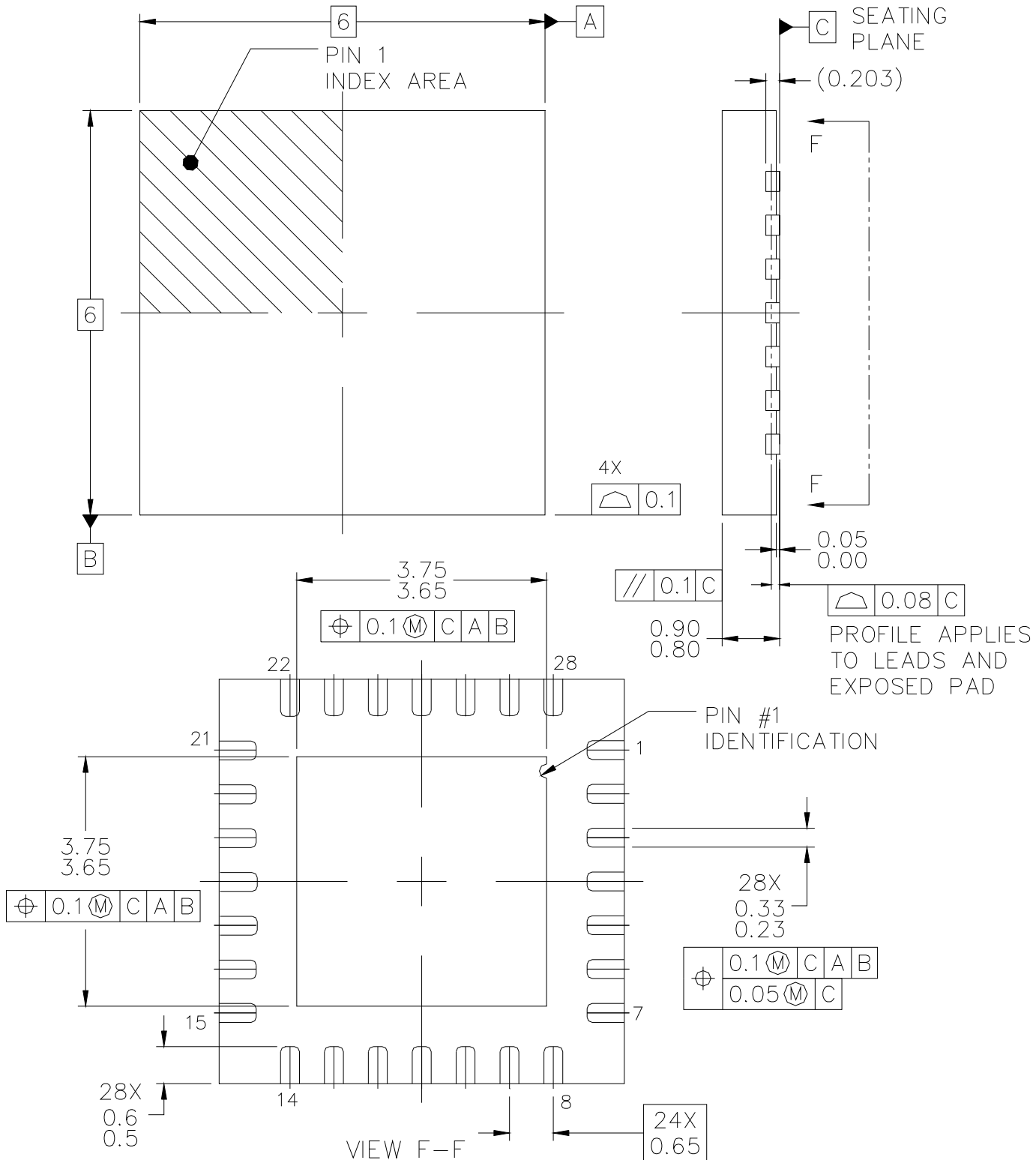


TOP VIEW



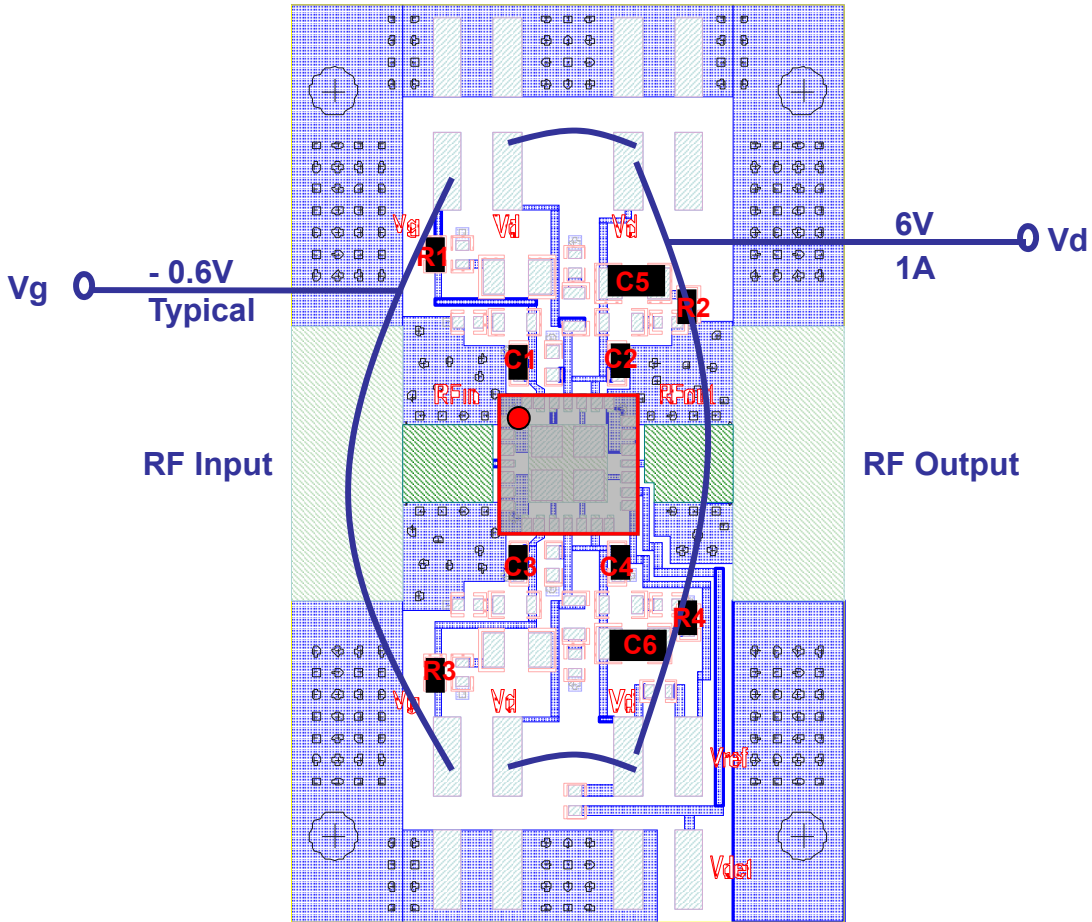
BOTTOM VIEW

Pin	Description
4	RF Input
9	Vg_Bottom
11	Vd1_Bottom
13	Vd2_Bottom
18	RF Output
23	Vd2_Top
25	Vd1_Top
27	Vg_Top
29	Ground
1, 2, 3, 5, 6, 7, 8, 10, 12, 14, 15, 16, 17, 19, 20, 21, 22, 24, 26, 28	NC

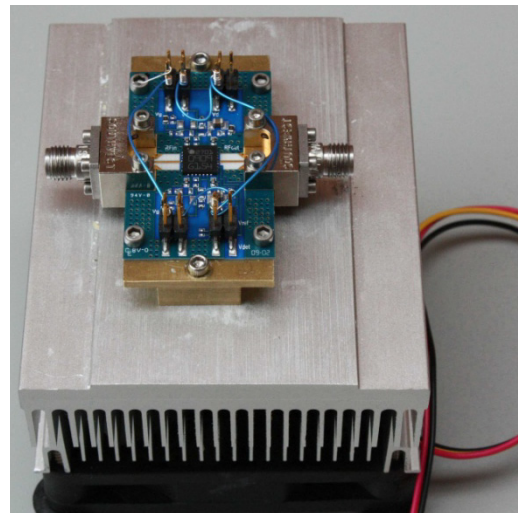


**GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.**

**Recommended Assembly Board**



Part	Description
C1, C2, C3, C4	1000 pF Capacitor (0402)
C5, C6	1 uF Capacitor (0805)
R1, R2, R3, R4	0 Ohm Resistor Jumper (0402)



Board is 8mil thick RO4003 with 1oz copper cladding.

Board is mounted on metal block and adequate heatsinking with fan is required.

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

## Assembly Notes

### Recommended Surface Mount Package Assembly

- Proper ESD precautions must be followed while handling packages.
- Clean the board with acetone. Rinse with alcohol. Allow the circuit to fully dry.
- TriQuint recommends using a conductive solder paste for attachment. Follow solder paste and reflow oven vendors' recommendations when developing a solder reflow profile. Typical solder reflow profiles are listed in the table below.
- Hand soldering is not recommended. Solder paste can be applied using a stencil printer or dot placement. The volume of solder paste depends on PCB and component layout and should be well controlled to ensure consistent mechanical and electrical performance.
- Clean the assembly with alcohol.

## Typical Solder Reflow Profiles

Reflow Profile	SnPb	Pb Free
Ramp-up Rate	3 °C/sec	3 °C/sec
Activation Time and Temperature	60 – 120 sec @ 140 – 160 °C	60 – 180 sec @ 150 – 200 °C
Time above Melting Point	60 – 150 sec	60 – 150 sec
Max Peak Temperature	240 °C	260 °C
Time within 5 °C of Peak Temperature	10 – 20 sec	10 – 20 sec
Ramp-down Rate	4 – 6 °C/sec	4 – 6 °C/sec

## Ordering Information

Part	Package Style
TGA2701-SM	QFN 6x6 Surface Mount

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