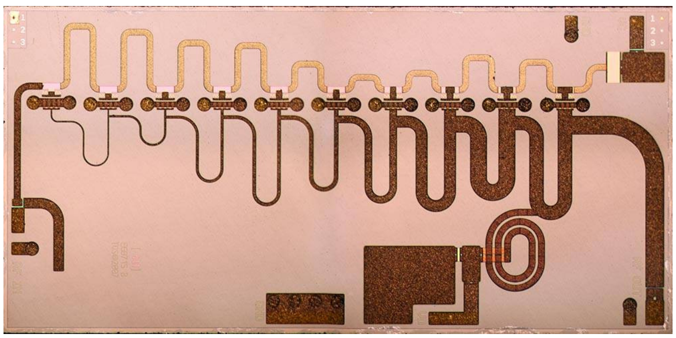
TGA2570

2-17 GHz 10 Watt GaN Amplifier

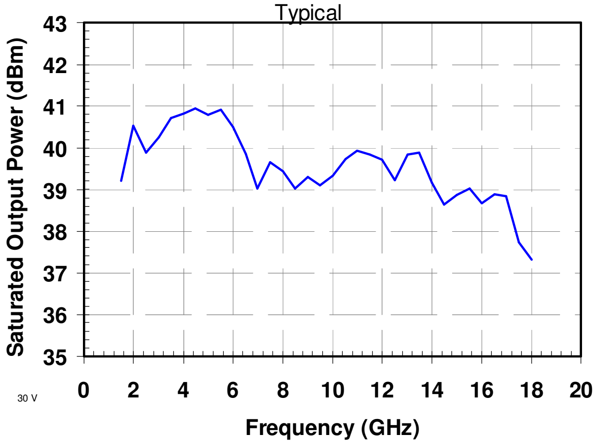


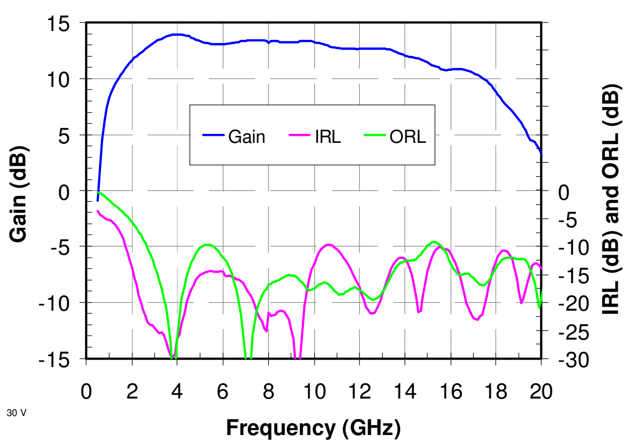
Key Features

- Frequency Range: 2 - 17 GHz
- Psat: > 39 dBm Nominal
- PAE: 15 to 35% Nominal
- Power Gain: > 7 dB Nominal
- Bias: Vd = 30 V, Idq = 450 mA, Vg = -3.3 V Typical
- Technology: 0.25 um Power GaN on SiC
- Chip Dimensions: 2.77 x 5.54 x 0.10 mm

Measured Performance

Bias conditions: Vd = 30 V, Idq = 450 mA, Vg = -3.3 V Typical





Primary Applications

- Wideband High Power Amplifier Block
- Military Radar, Communications, EW and ECM
- Test Equipment

Product Description

TriQuint's TGA2570 is a High Power GaN HEMT Amplifier that achieves world class, wideband performance. Operating from 2-17GHz, the TGA2570 typically provides > 39 dBm of saturated output power with power gain of > 7 dB. Such performance allows it to be ideally suited for a wide range of defense related applications such as radar, communications, electronic warfare and ECM.

The TGA2570 utilizes TriQuint's standard 0.25um GaN production process.

Lead-free and RoHS compliant

Datasheet subject to change without notice.

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Table I
Absolute Maximum Ratings 1/

Symbol	Parameter	Value	Notes
Vd-Vg	Drain to Gate Voltage	65 V	
Vd	Drain Voltage	35 V	2/
Vg	Gate Voltage Range	-8 to 0 V	
Id	Drain Current	1.0 A	2/
Ig	Gate Current	95 mA	
Pin	Input Continuous Wave Power	32.5 dBm	2/
Tch	Channel Temperature	200 ºC	

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	Value
Vd	Drain Voltage	30 V
Idq	Drain Current	450 mA
Id_Drive	Drain Current under RF Drive	950 mA
Vg	Gate Voltage	-3.3 V

Table III
RF Characterization Table 1/
Bias: Vd = 30 V, Idq = 450 mA, Vg = - 3.3 V Typical

SYMBOL	PARAMETER	TEST CONDITIONS	NOMINAL	UNITS
Gain	Small Signal Gain	F = 2 - 17 GHz	12	dB
IRL	Input Return Loss	F = 2 - 17 GHz	-15	dB
ORL	Output Return Loss	F = 2 - 17 GHz	-15	dB
Psat	Saturated Output Power	F = 2 - 6 GHz	41	dBm
Psat	Saturated Output Power	F = 6 – 10 GHz	39	dBm
Psat	Saturated Output Power	F = 10 - 14 GHz	40	dBm
Psat	Saturated Output Power	F = 14 - 17 GHz	39	dBm

Table IV
Power Dissipation and Thermal Properties 1/

Parameter	Test Conditions	Value	Notes
Thermal Resistance, θjc	Vd = 30 V Id = 450 mA Pd = 13.5 W Tbaseplate = 96 ºC	θjc = 5.1 (ºC/W) Tchannel = 165 ºC Tm = 1.0E+6 Hrs	
Thermal Resistance, θjc Under RF Drive at 4 GHz	Vd = 30 V Id = 1000 mA Pout = 41.0 dBm Pd = 17.4 W Tbaseplate = 111 ºC	θjc = 5.1 (ºC/W) Tchannel = 200 ºC Tm = 1.3E+5 Hrs	4/
Thermal Resistance, θjc Under RF Drive at 17 GHz	Vd = 30 V Id = 1000 mA Pout = 38.5 dBm Pd = 22.9 W Tbaseplate = 86 ºC	θjc = 5.1 (ºC/W) Tchannel = 200 ºC Tm = 1.3E+5 Hrs	4/
Mounting Temperature	30 Seconds	320 ºC	
Storage Temperature		-65 to 150 ºC	

1/ Assumes eutectic attach using 1mil thick 80/20 AuSn mounted to a 10mil CuMo Carrier Plate

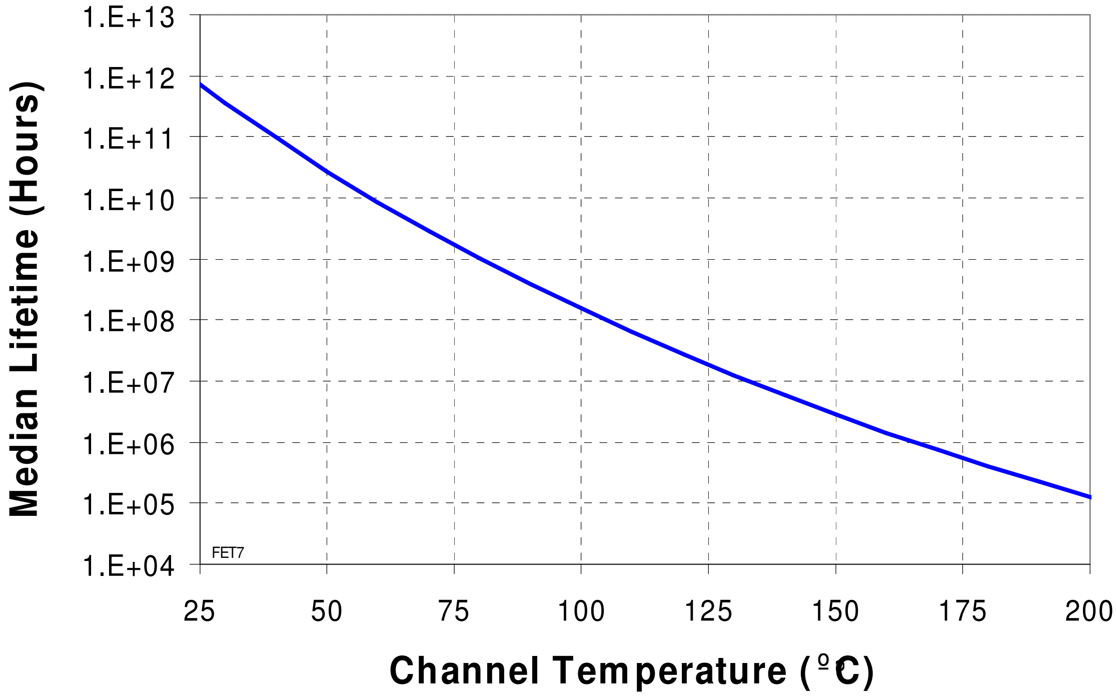
2/ For a median lifetime of 1E+5 hours, Power Dissipation is limited to

Pd(max) = (200 ºC – Tbase ºC)/θjc.

3/ Channel operating temperature will directly affect the device median lifetime (Tmo). For maximum life, it is recommended that channel temperatures be maintained at the lowest possible levels.

4/ Channel temperatures at high drain voltages can be excessive, leading to reduced median lifetime (Tmo). Operation at reduced baseplate temperatures and/or pulsed RF modulation is recommended.

Median Lifetime (Tmo) vs. Channel Temperature



Measured Data

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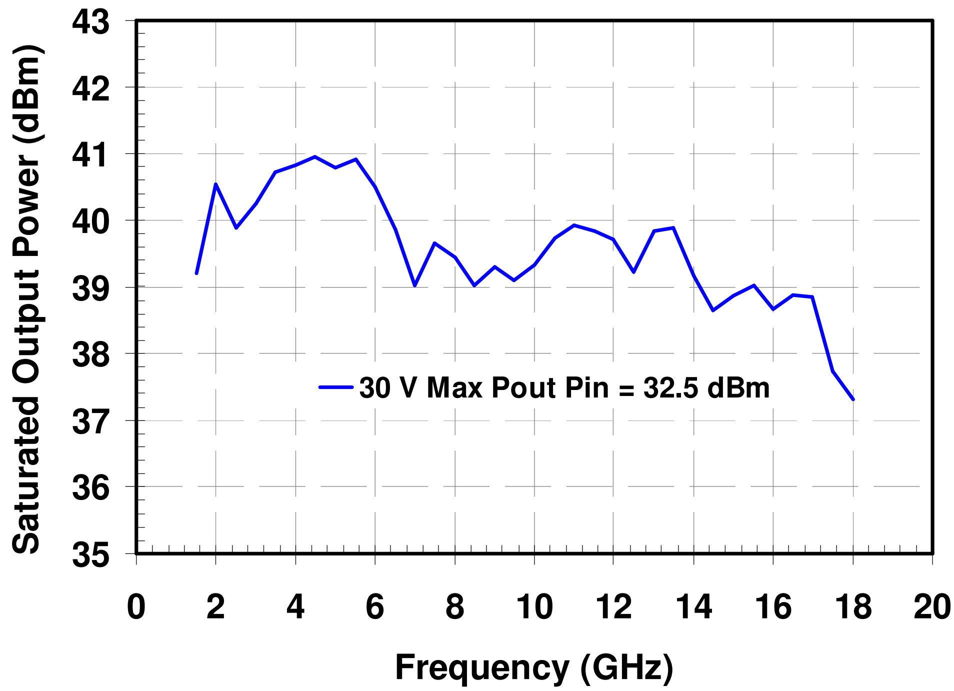

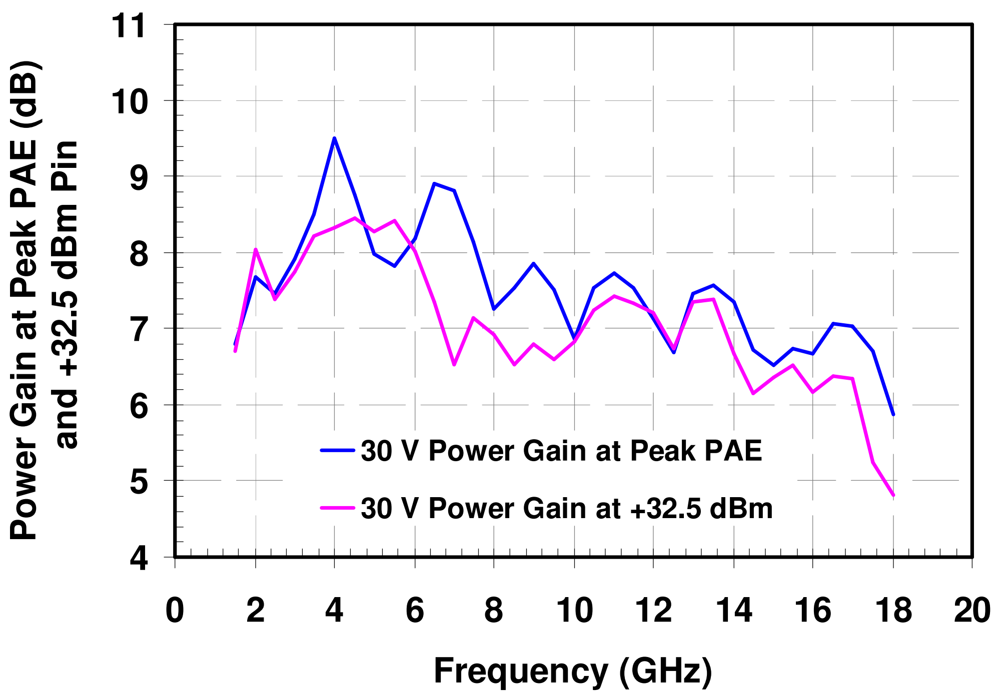

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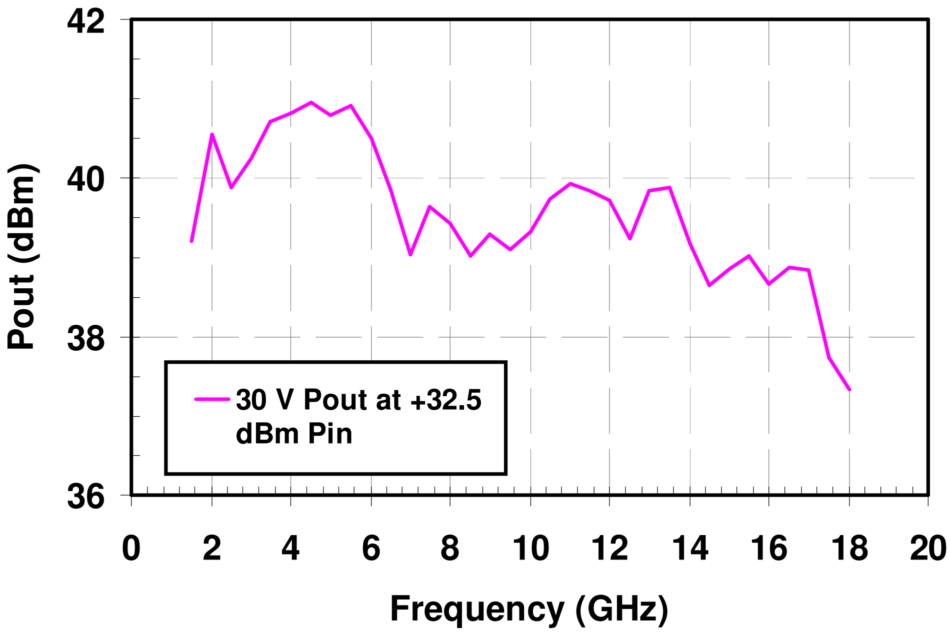

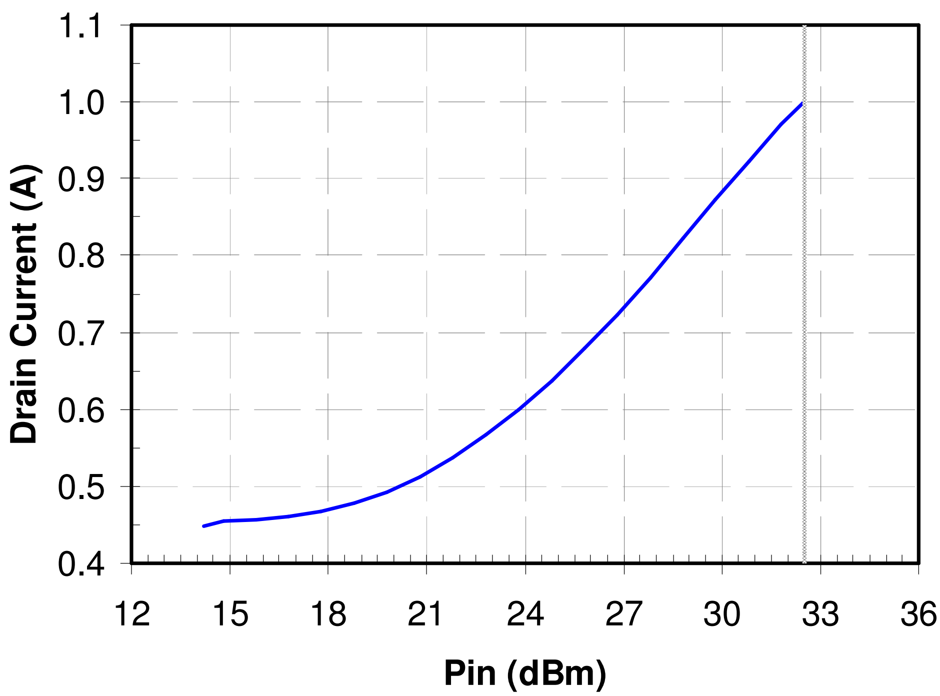

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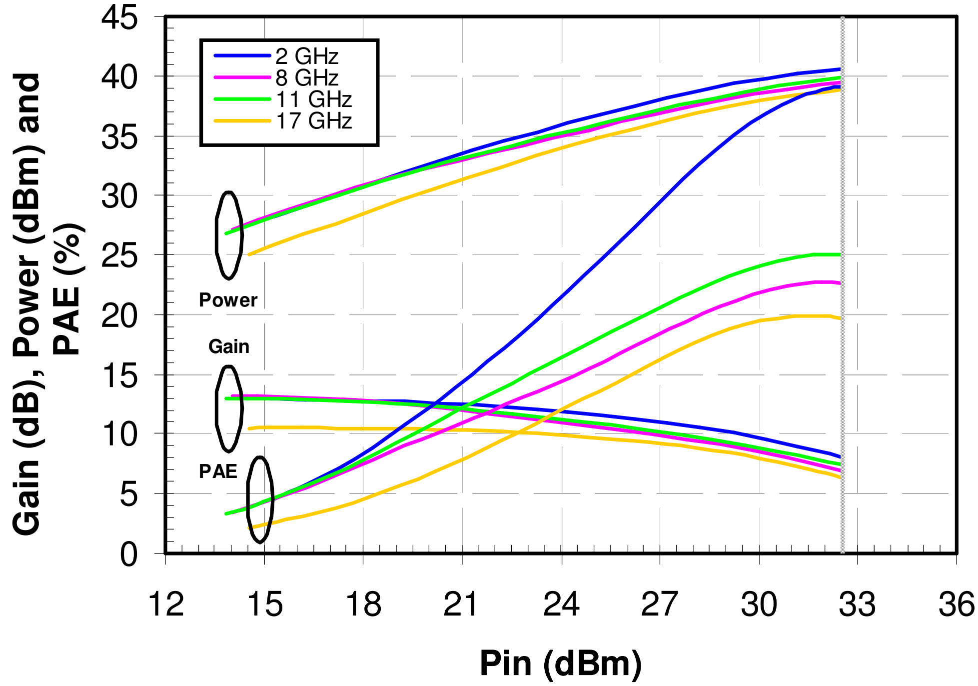

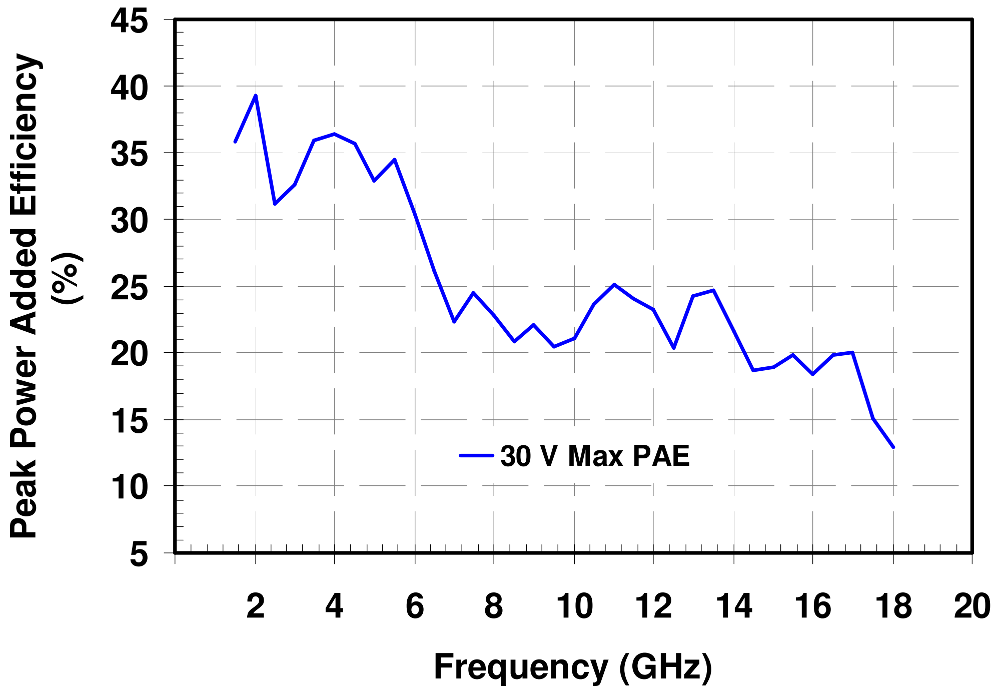

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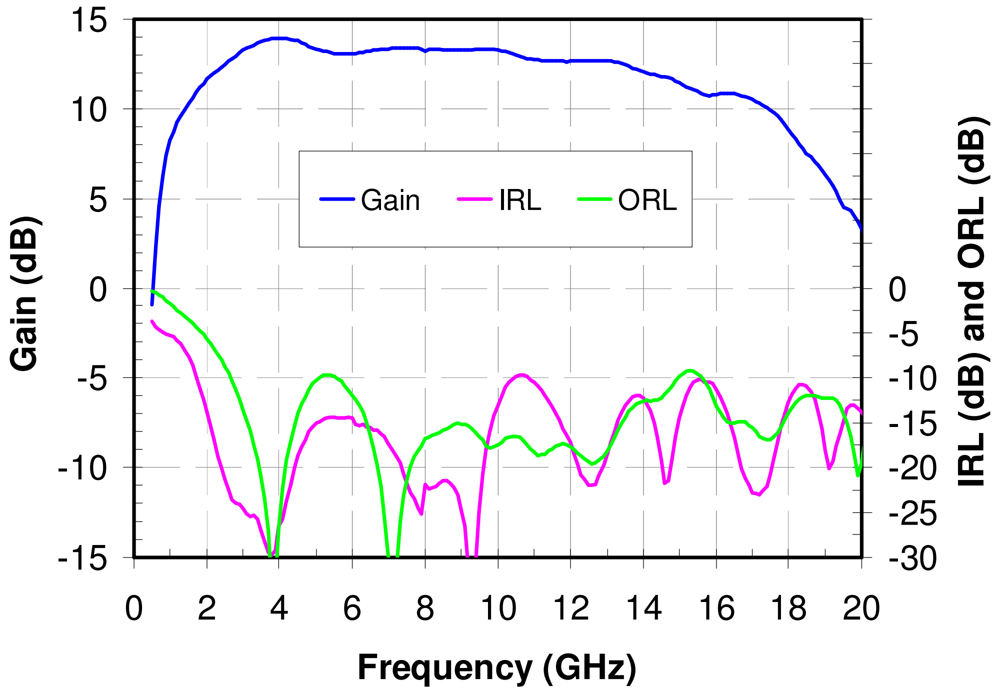

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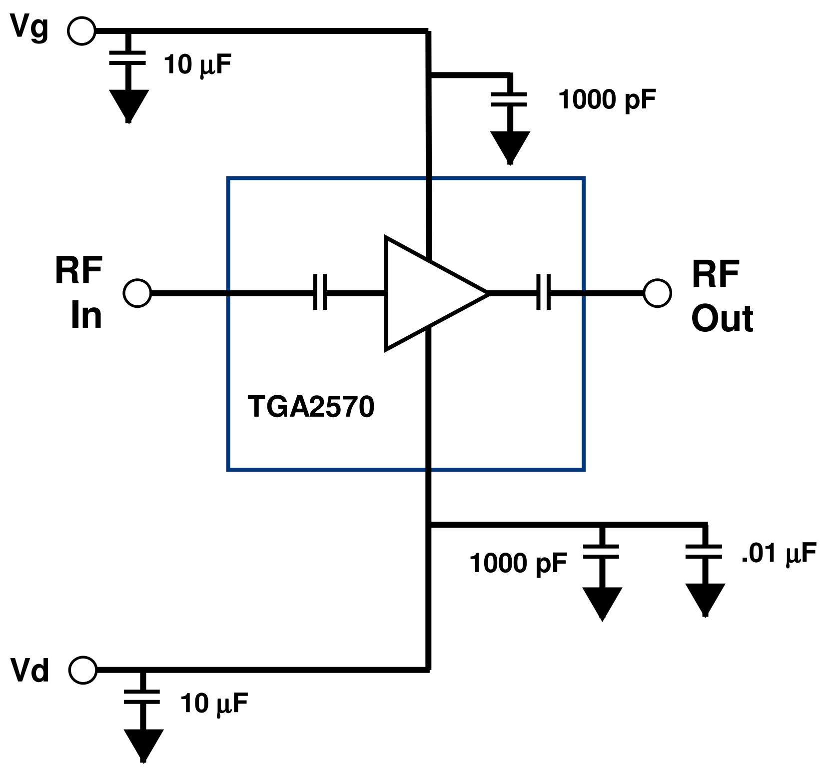
Electrical Schematic



Bias Procedures

Bias-up Procedure

Vg set to -6.0 V

Vd set to +30 V

Adjust Vg more positive until total Id is 450 mA. This will be ~ Vg = -3.3 V

Apply RF source to input

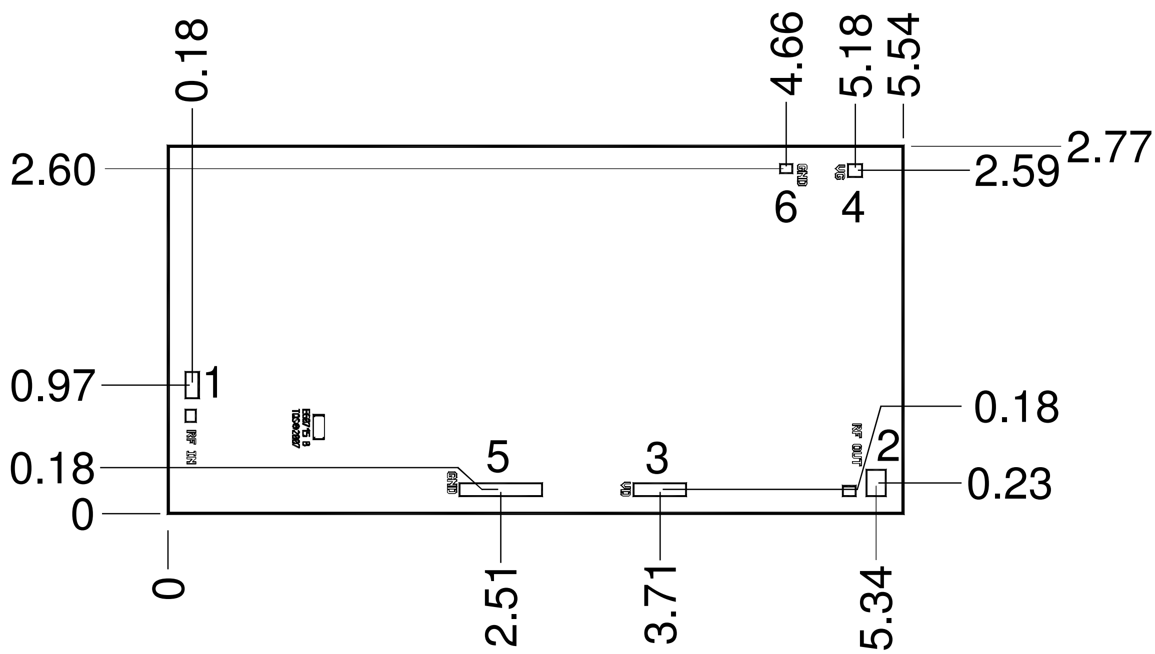
Bias-down Procedure

Turn off RF source

Vg set to -6.0 V

Vd set to 0 V

Mechanical Drawing

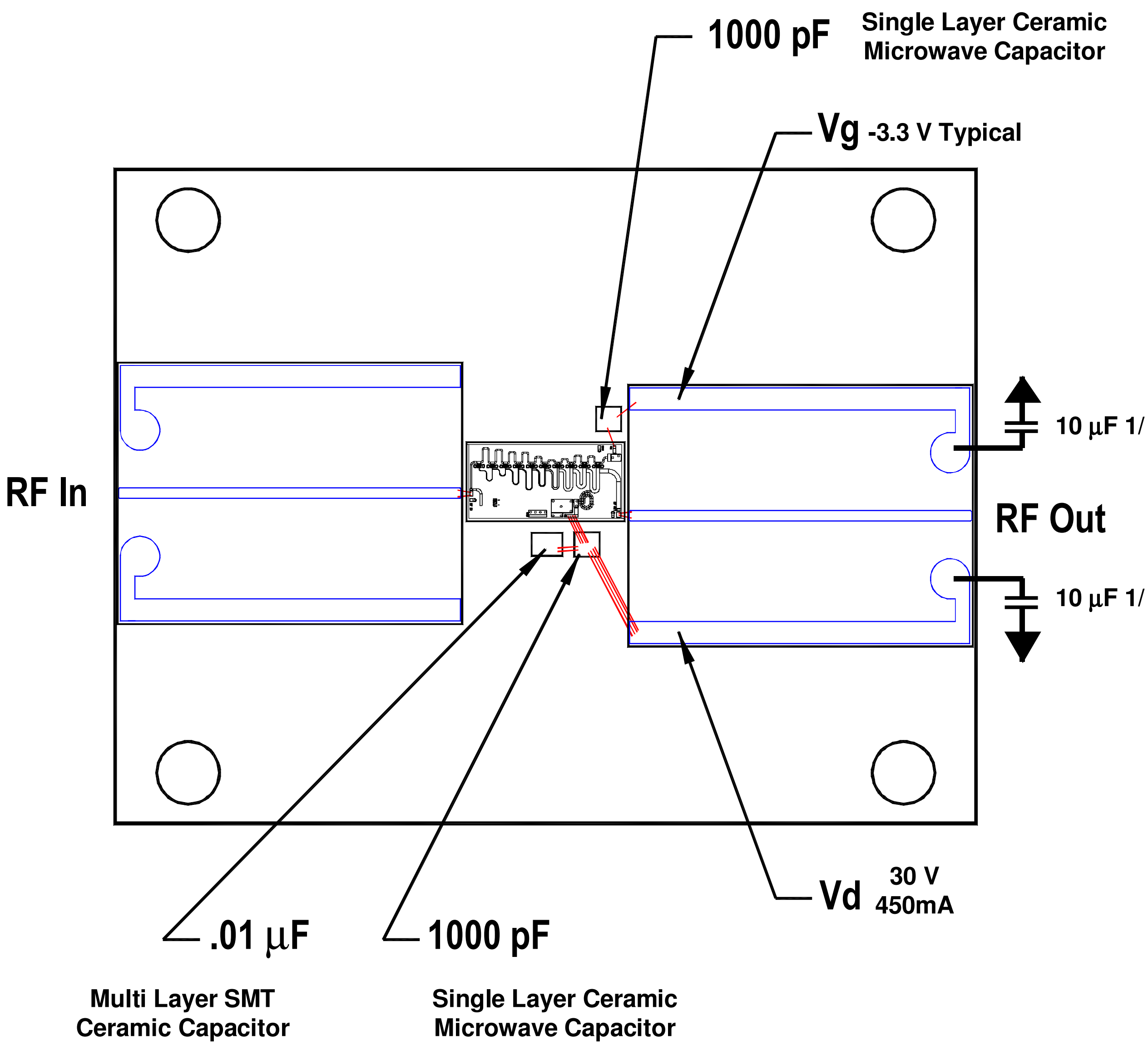


Units: millimeters
Thickness: 0.10
Die x,y size tolerance: +/- 0.050
Chip edge to bond pad dimensions are shown to center of pad
Ground is backside of die

Bond Pad #1	RF In	0.100 x 0.200	Bond Pad #4	Vg	0.096 x 0.106
Bond Pad #2	RF Out	0.140 x 0.200	Bond Pad #5	Gnd	0.100 x 0.625
Bond Pad #3	Vd	0.100 x 0.400	Bond Pad #6	Gnd	0.070 x 0.094

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

Recommended Assembly Diagram



1/ Additional bypass capacitors may be required at this location. The presence and value of these capacitors varies by application. Variables include power supply impedance, power supply stability with reactive loads, and the inductance from the power supply to this assembly. 1 to 47 uF tantalum capacitors are commonly used here.

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Assembly Notes

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 (i.e. epoxy) can be used in low-power applications.
- Curing should be done in a convection oven; proper exhaust is a safety concern.

Reflow process assembly notes:

- Use AuSn (80/20) solder and limit exposure to temperatures above 300°C to 3-4 minutes, maximum.
- An alloy station or conveyor furnace with reducing atmosphere should be used.
- Do not use any kind of flux.
- Coefficient of thermal expansion matching is critical for long-term reliability.
- Devices must be stored in a dry nitrogen atmosphere.

Interconnect process assembly notes:

- Ball bonding is the preferred interconnect technique, except where noted on the assembly diagram.
- Force, time, and ultrasonics are critical bonding parameters.
- Aluminum wire should not be used.
- Devices with small pad sizes should be bonded with 0.0007-inch wire.

Ordering Information

Part	ECCN	Package Style
TGA2570	XI(c)	GaN on SiC Die

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