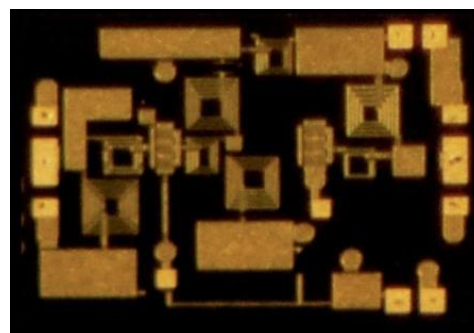


### Applications

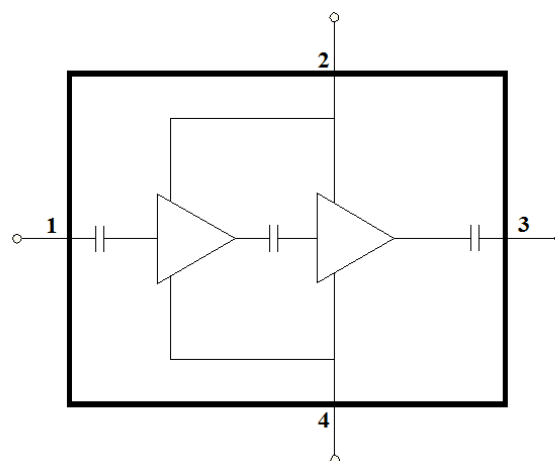
- Commercial and Military Radar
- Satellite Communications



### Product Features

- Frequency Range: 2–6GHz
- NF: 1.5dB
- OTOI: 32dBm
- Small Signal Gain: 25dB
- Return Loss: >10dB
- P1dB: 22dBm
- Bias:  $V_D = 10V$ ,  $I_{DQ} = 110mA$ ,  $V_G = -2.3V$  Typical
- Chip Dimensions: 2.1 x 1.5 x 0.10mm

### Functional Block Diagram



### General Description

TriQuint's TGA2611 is a broadband Low Noise Amplifier fabricated on TriQuint's production 0.25um GaN on SiC process (TQGaN25). Covering 2–6GHz, the TGA2611 typically provides 22dBm P1dB, 25dB of small signal gain, 1.5dB of noise figure and 32dBm of OTOI. In addition to the high overall electrical performance, this GaN amplifier also provides a high level of input power robustness. Able to survive up to 2W of input power without performance degradation, TriQuint's TGA2611 provides flexibility regarding receive chain protection never before seen with GaAs technology.

Fully matched to 50 ohms with integrated DC blocking caps on both I/O ports, the TGA2611 is ideally suited for radar and satellite communications.

Lead-free and RoHS compliant  
Evaluation Boards are available upon request.

### Pad Configuration

Pad No.	Symbol
1	RF In
2	$V_D$
3	RF Out
4	$V_G$

### Ordering Information

Part	ECCN	Description
TGA2611	EAR99	2 – 6 GHz GaN LNA

### Absolute Maximum Ratings

Parameter	Value
Drain Voltage ( $V_D$ )	40V
Gate Voltage Range ( $V_G$ )	-5 to 0V
Drain Current ( $I_D$ )	200mA
Gate Current ( $I_G$ )	-1 to 4.2mA
Power Dissipation, 85 °C ( $P_{DISS}$ )	6W
Input Power, CW, 50 $\Omega$ , ( $P_{IN}$ )	33dBm
Channel temperature ( $T_{CH}$ )	275°C
Mounting Temperature (30 Seconds)	320°C
Storage Temperature	-55 to 150°C

Operation of this device outside the parameter ranges given above may cause permanent damage. These are stress ratings only, and functional operation of the device at these conditions is not implied.

### Recommended Operating Conditions

Parameter	Value
Drain Voltage ( $V_D$ )	10V
Drain Current ( $I_{DQ}$ )	110mA
Gate Voltage ( $V_G$ )	-2.3V Typical

Electrical specifications are measured at specified test conditions. Specifications are not guaranteed overall operating conditions.

### Electrical Specifications

Test conditions unless otherwise noted: 25 °C,  $V_D$  = 10V,  $I_{DQ}$  = 110mA,  $V_G$  = -2.3V Typical

Parameter	Min	Typical	Max	Units
Operational Frequency Range	2.0		6.0	GHz
Small Signal Gain		25		dB
Input Return Loss		>10		dB
Output Return Loss		>10		dB
Noise Figure		1.5		dB
Output Power at 1 dB Gain Compression		22		dBm
Output TOI		32		dBm
Gain Temperature Coefficient		-0.03		dB/°C
Noise Figure Temperature Coefficient		0.007		dB/°C

### Thermal and Reliability Information

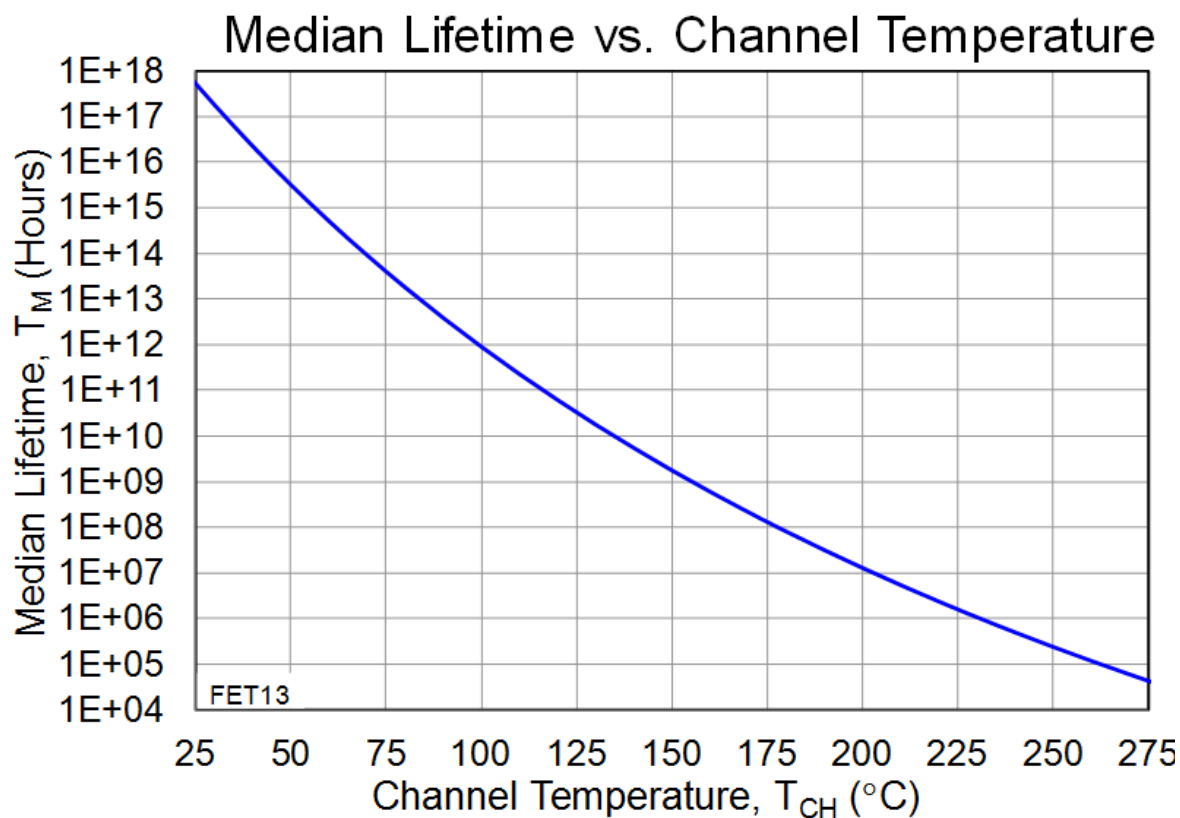
Parameter	Test Conditions	Value	Units
Thermal Resistance ( $\theta_{JC}$ ) <sup>(1)</sup>	$V_D = 10V$ , $I_{DQ} = 110mA$ , $P_{DISS} = 1.1W$ , $T_{baseplate} = 85^\circ C$	18.6	$^\circ C/W$
Channel Temperature ( $T_{CH}$ )		105	$^\circ C$
Median Lifetime ( $T_M$ )		$4.52 \times 10^{11}$	Hrs

Notes:

1. Thermal resistance measured to back of carrier plate. MMIC mounted on 40 mils CuMo carrier using 1.5 mil 80/20 AuSn.

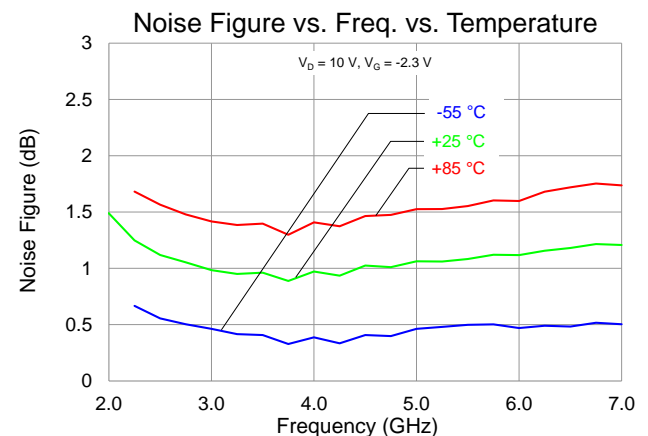
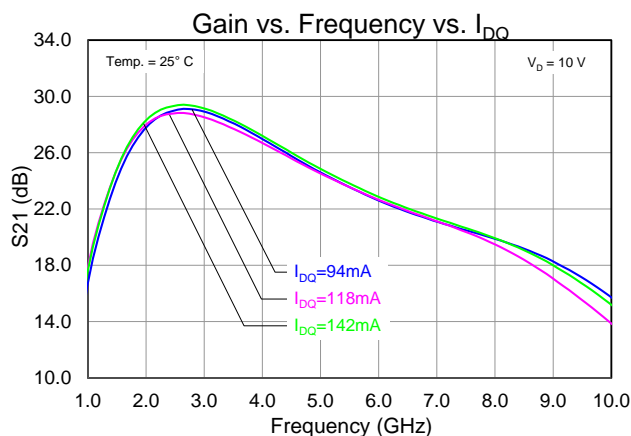
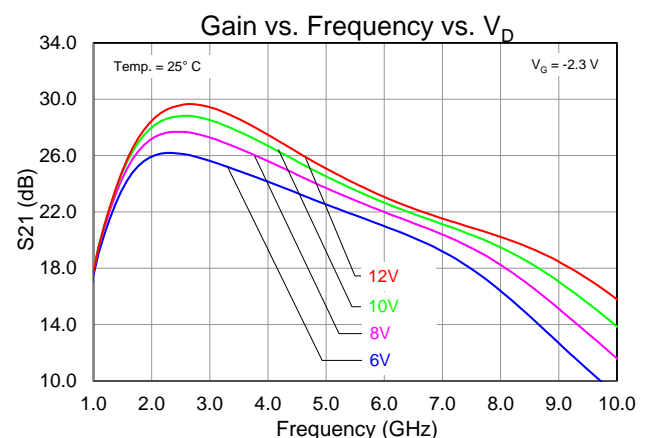
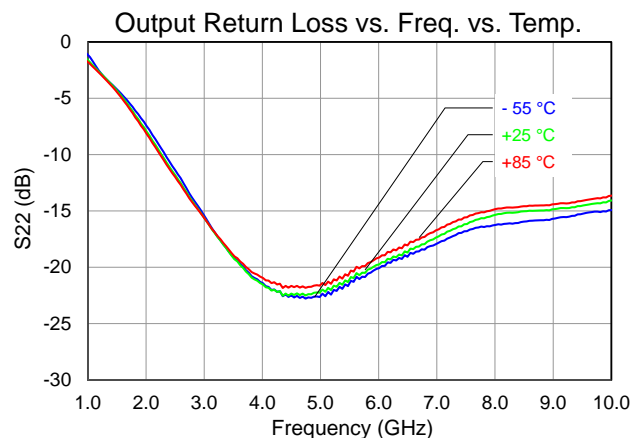
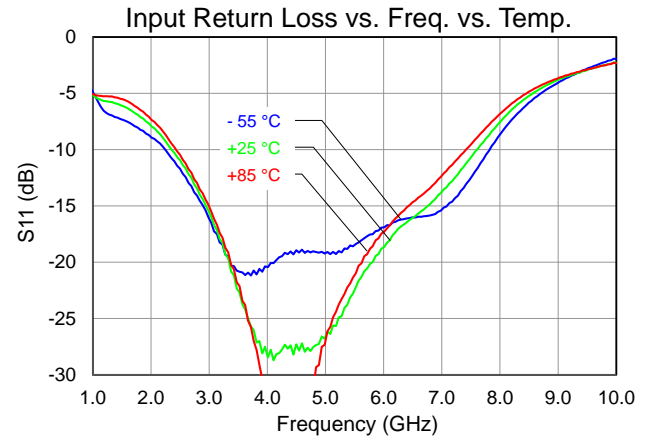
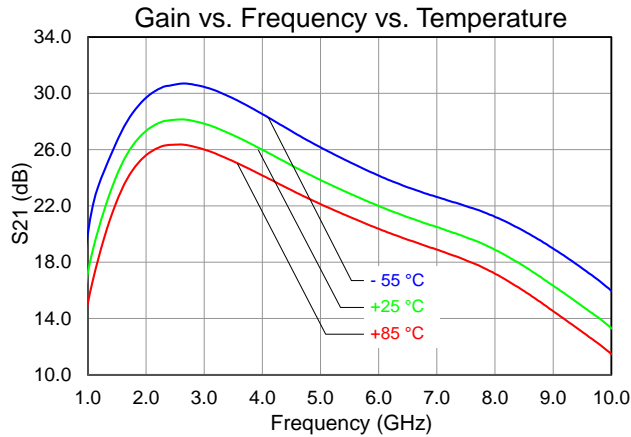
### Median Lifetime

Test Conditions:  $V_D = 40V$ ; Failure Criteria is 10% reduction in  $I_{D\_MAX}$



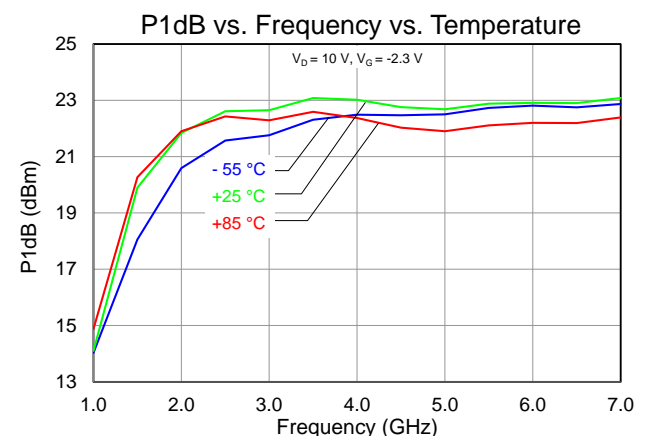
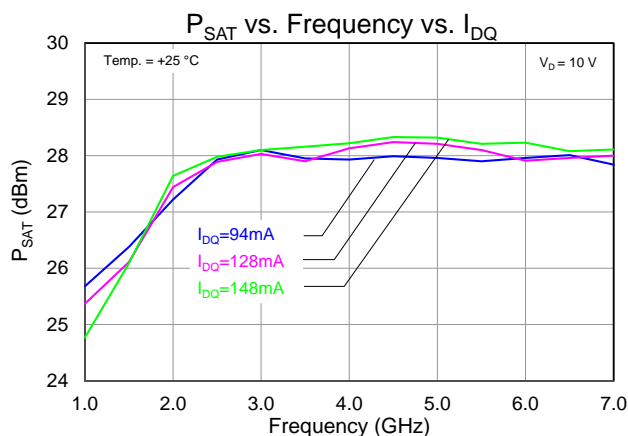
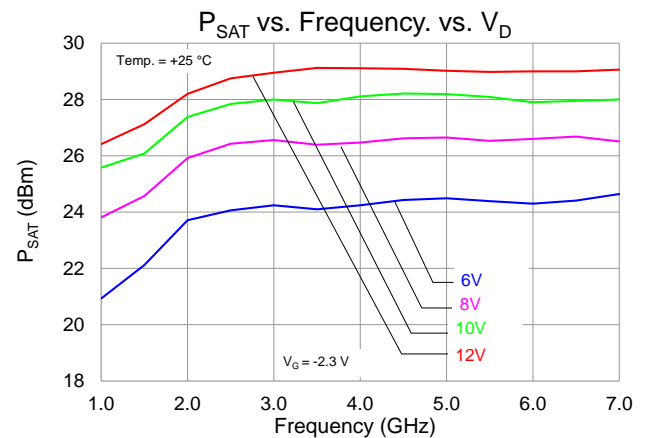
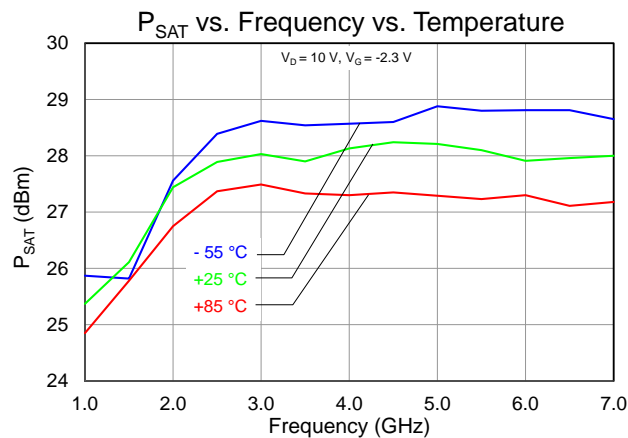
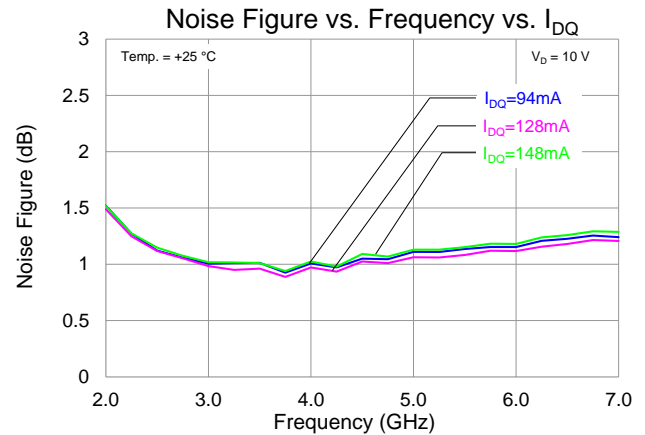
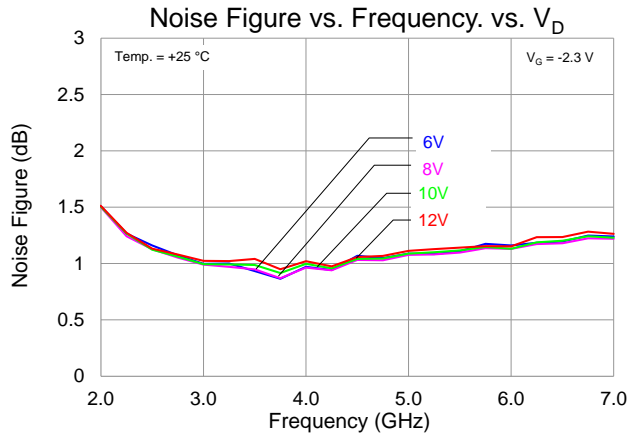
## Typical Performance

Conditions unless otherwise specified:  $V_D = 10V$ ,  $I_{DQ} = 110mA$ ,  $V_G = -2.3V$  Typical



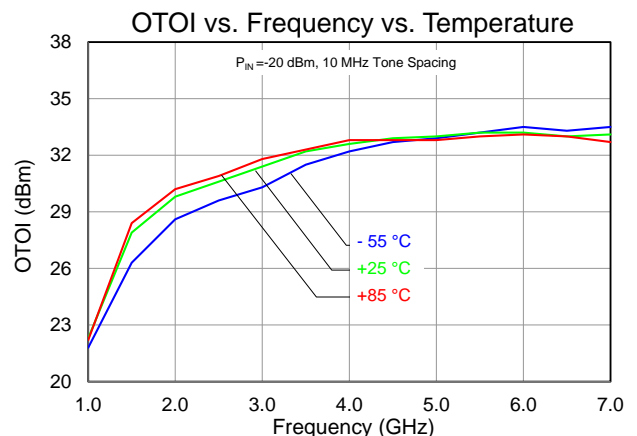
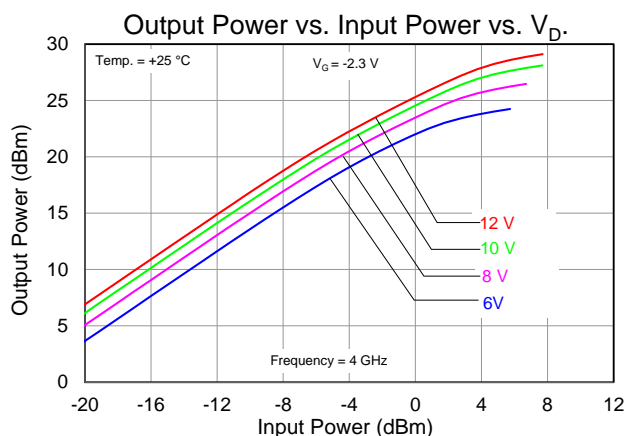
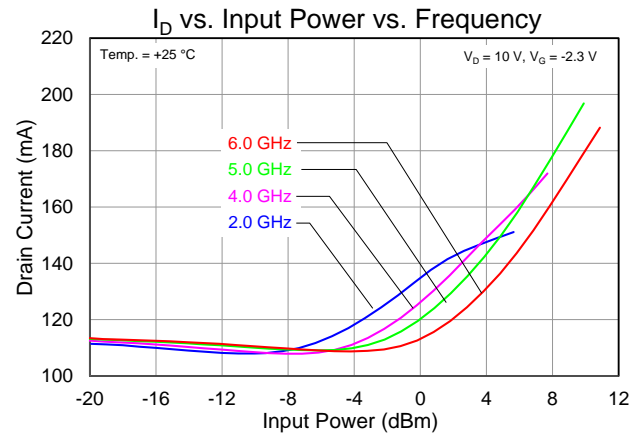
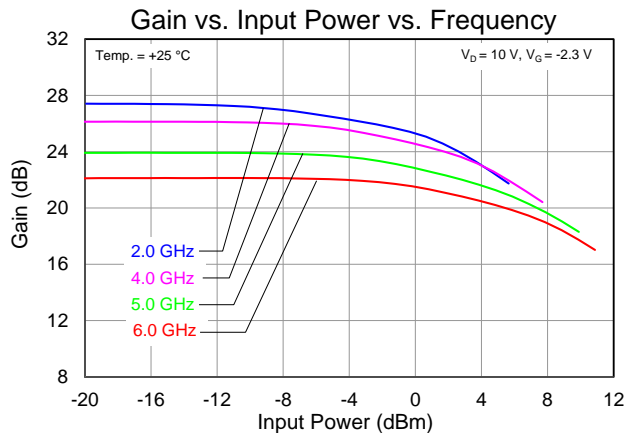
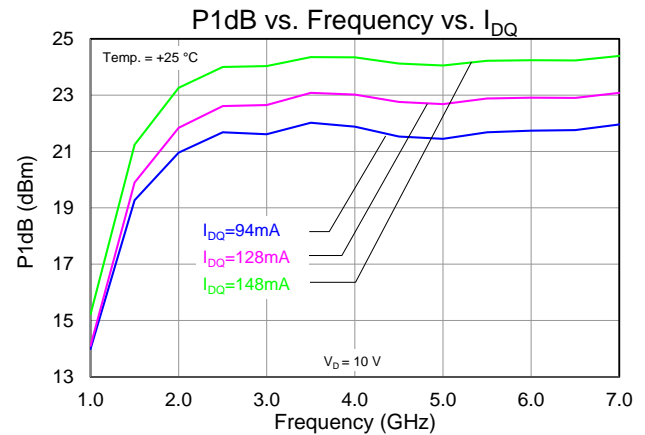
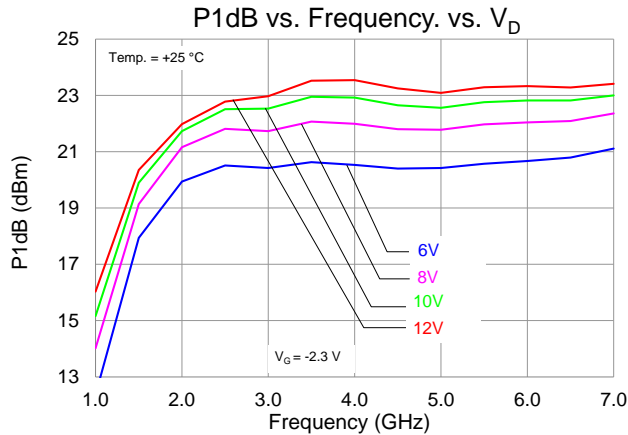
## Typical Performance

Conditions unless otherwise specified:  $V_D = 10V$ ,  $I_{DQ} = 110mA$ ,  $V_G = -2.3V$  Typical



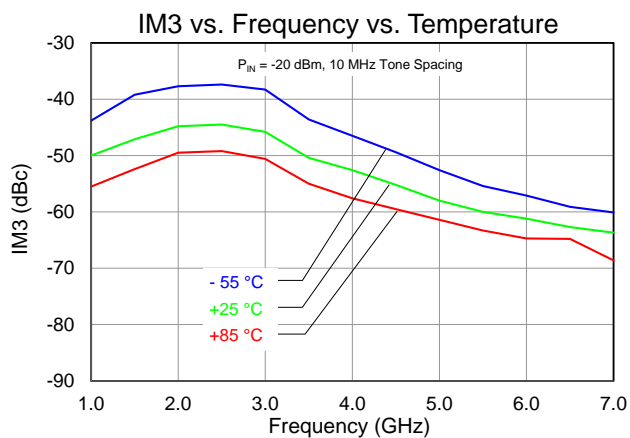
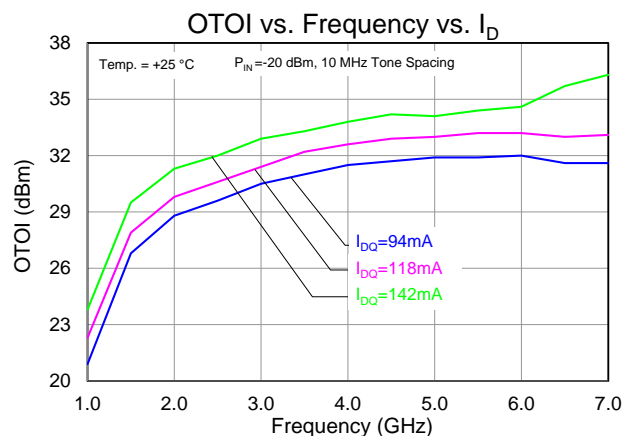
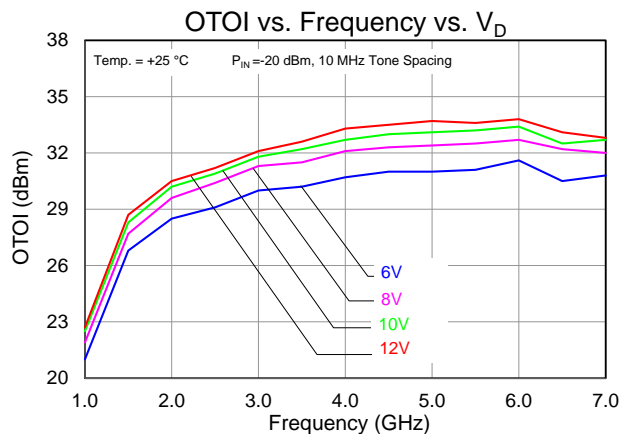
## Typical Performance

Conditions unless otherwise specified:  $V_D = 10V$ ,  $I_{DQ} = 110mA$ ,  $V_G = -2.3V$  Typical

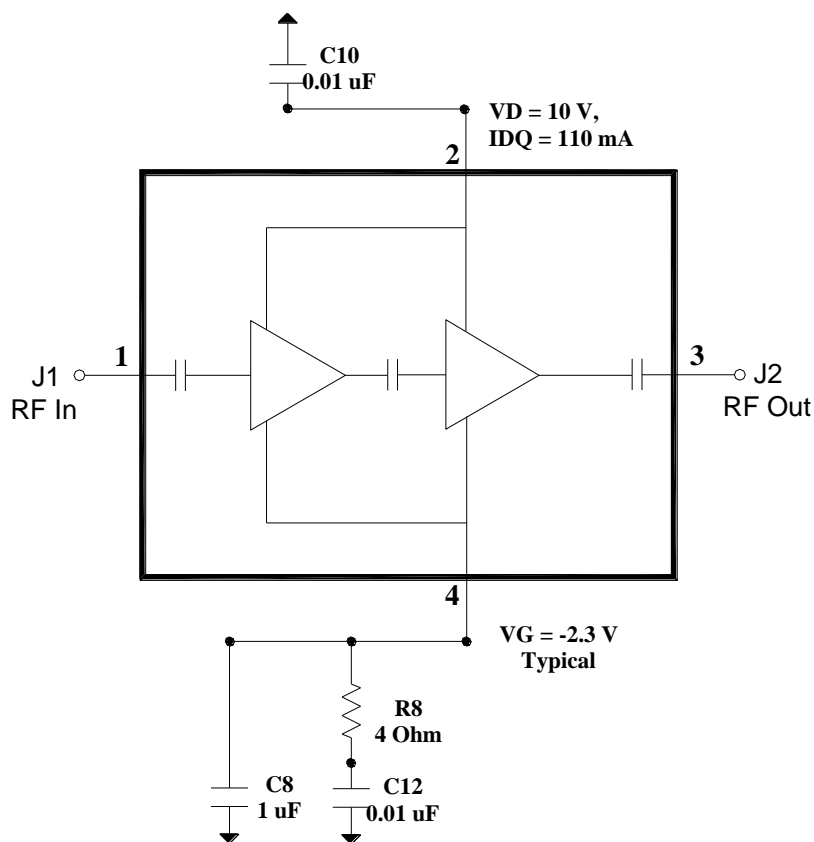


## Typical Performance

Conditions unless otherwise specified:  $V_D = 10V$ ,  $I_{DQ} = 110mA$ ,  $V_G = -2.3V$  Typical



## Application Circuit



### Bias-up Procedure

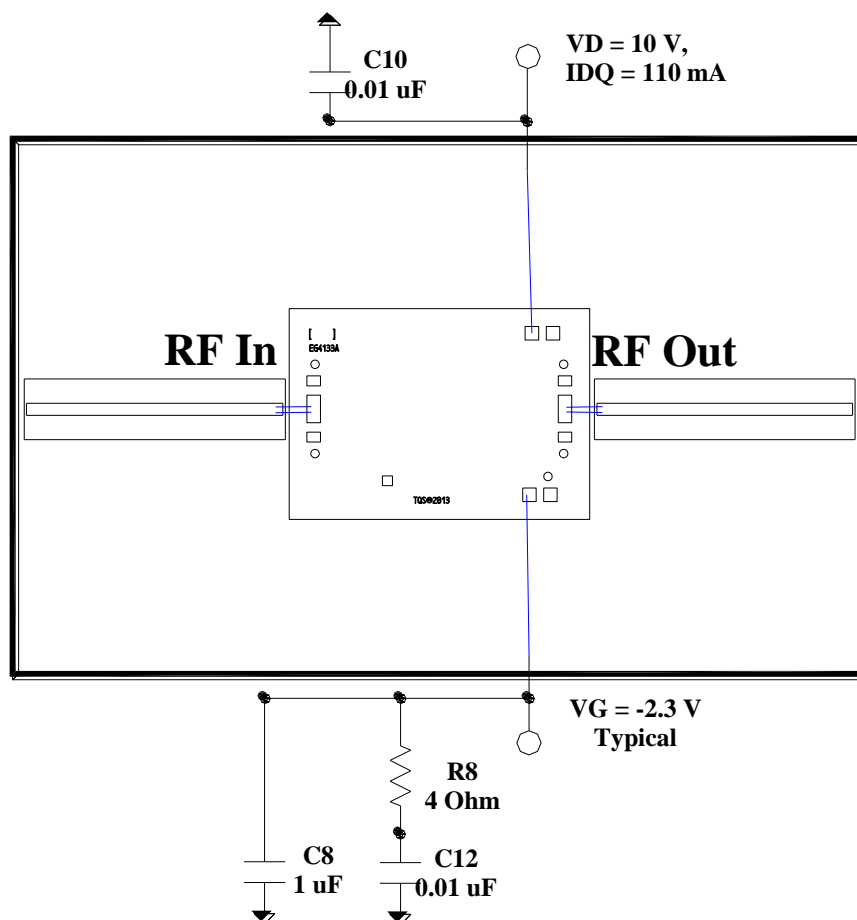
1. Set  $I_D$  limit to 175mA,  $I_G$  limit to 1mA
2. Apply -5V to  $V_G$  for pinch off
3. Apply +10V to  $V_D$
4. Adjust  $V_G$  more positive until  $I_{DQ} = 110\text{mA}$  ( $V_G \sim -2.3\text{ V Typical}$ )
5. Apply RF signal

### Bias-down Procedure

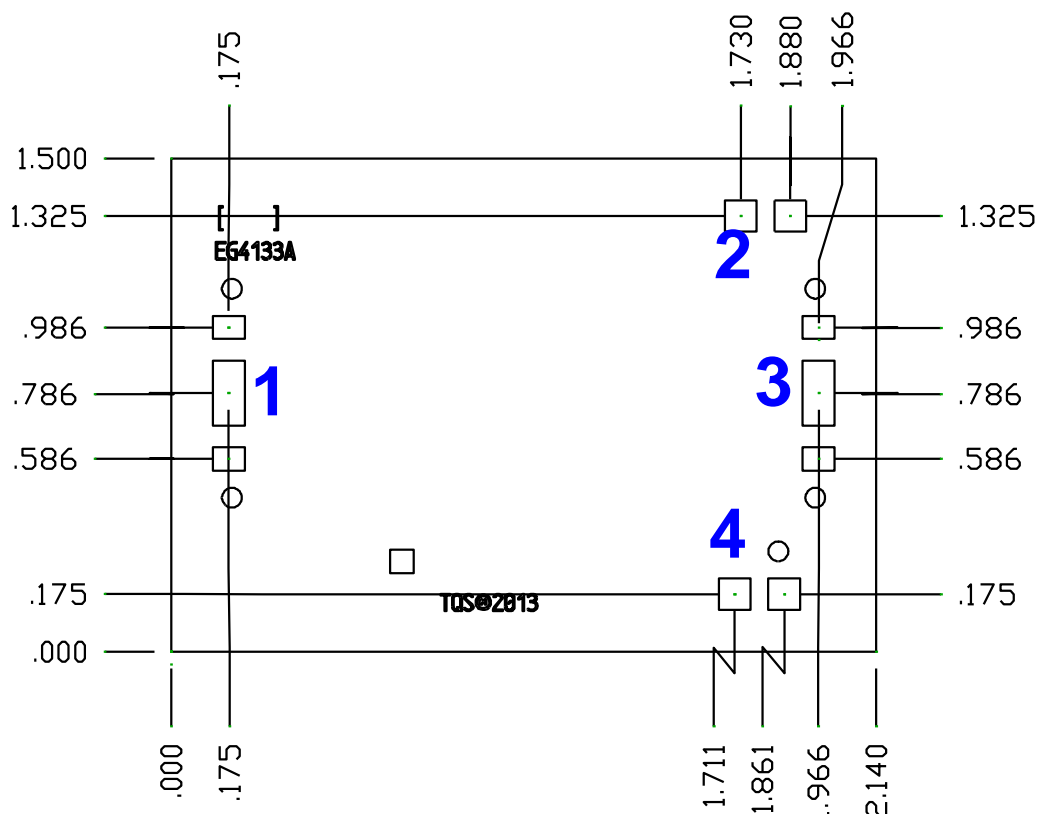
1. Turn off RF signal
2. Reduce  $V_G$  to -5V. Ensure  $I_{DQ} \sim 0\text{mA}$
3. Set  $V_D$  to 0V
4. Turn off  $V_D$  supply
5. Turn off  $V_G$  supply



**Assembly Drawing**



## Mechanical Drawing & Bond Pad Description



Unit: 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	Symbol	Pad Size	Description
1	RF In	0.096 x 0.196	Input; matched to 50 ohms
2	V <sub>D</sub>	0.096 x 0.096	Drain voltage, V <sub>D</sub> . Bias network is required; see Application Circuit on page 8 as an example.
3	RF Out	0.096 x 0.196	Output; matched to 50 ohms
4	V <sub>G</sub>	0.096 x 0.096	Gate voltage, V <sub>G</sub> . Bias network is required; see Application Circuit on page 8 as an example.

## 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:

- Thermosonic ball bonding is the preferred interconnect technique.
- Force, time, and ultrasonic are critical parameters.
- Aluminum wire should not be used.
- Devices with small pad sizes should be bonded with 0.0007-inch wire.

## Product Compliance Information

### ESD Sensitivity Ratings



Caution! ESD-Sensitive Device

ESD Rating: TBD  
Value: TBD  
Test: Human Body Model (HBM)  
Standard: JEDEC Standard JESD22-A114

### Solderability

This part is compliant with EU 2002/95/EC RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).

This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A (C<sub>15</sub>H<sub>12</sub>Br<sub>4</sub>O<sub>2</sub>) Free
- PFOS Free
- SVHC Free

### ECCN

US Department of Commerce: EAR99

## Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations, and information about TriQuint:

Web: [www.triquint.com](http://www.triquint.com)  
Email: [info-sales@triquint.com](mailto:info-sales@triquint.com)

Tel: +1.972.994.8465  
Fax: +1.972.994.8504

For technical questions and application information: Email: [info-products@triquint.com](mailto:info-products@triquint.com)

## Important Notice

The information contained herein is believed to be reliable. TriQuint makes no warranties regarding the information contained herein. TriQuint assumes no responsibility or liability whatsoever for any of the information contained herein. TriQuint assumes no responsibility or liability whatsoever for the use of the information contained herein. The information contained herein is provided "AS IS, WHERE IS" and with all faults, and the entire risk associated with such information is entirely with the user. All information contained herein is subject to change without notice. Customers should obtain and verify the latest relevant information before placing orders for TriQuint products. The information contained herein or any use of such information does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other intellectual property rights, whether with regard to such information itself or anything described by such information.

TriQuint products are not warranted or authorized for use as critical components in medical, life-saving, or life-sustaining applications, or other applications where a failure would reasonably be expected to cause severe personal injury or death.