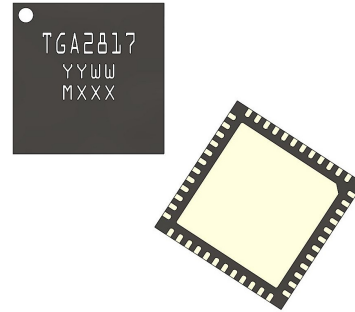


### Applications

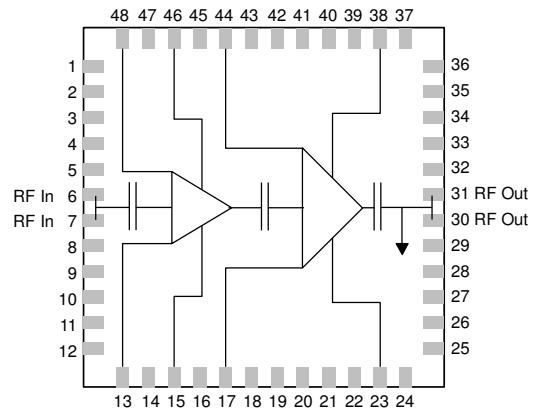
- Military Radar
- Commercial Radar
- Wideband Amplifiers



### Product Features

- Frequency Range: 2.9 – 3.5 GHz
- Pout: > 48 dBm (at Pin = 24 dBm)
- Large Signal Gain: > 24 dB (at Pin = 24 dBm)
- PAE: > 54 % (at Pin = 24 dBm)
- Bias:  $V_D = 28\text{ V}$ ,  $I_{DQ} = 200\text{ mA}$ ,  $V_G = -2.8\text{ V}$  (Typ)
- Package Dimensions: 7.00 x 7.00 x 0.85 mm

### Functional Block Diagram



### General Description

TriQuint's TGA2817-SM is a high-power, S-band amplifier fabricated on TriQuint's TQGaN25 0.25um GaN on SiC production process. Covering 2.9-3.5 GHz, the TGA2817-SM provides > 48 dBm of saturated output power and > 24 dB of large-signal gain while achieving > 54 % power added efficiency.

The TGA2817-SM can also support a variety of operating conditions to best support system requirements. With good thermal properties, it can support a range of bias voltages and will perform well under pulse applications. The TGA2817-SM is matched to 50 ohms with integrated DC blocking caps on both I/O ports. It is ideal for use in both commercial and military radar systems.

Lead-free and RoHS compliant.

Evaluation board available on request.

### Pad Configuration

Pad Number	Symbol
6, 7	RF Input
13, 48	$V_{G1}$
15, 46	$V_{D1}$
17, 44	$V_{G2}$
23, 38	$V_{D2}$
30, 31	RF Output
1-5, 8-12, 14, 16, 18-22, 24-29, 32-37, 39-43, 45, 47, 49	GND

### Ordering Information

Part	ECCN	Description
TGA2817-SM	3A001.b.2.a	S-Band 60 W GaN Power Amplifier
TGA2817-SM_EVB	EAR99	TGA2817-SM Evaluation Board

### Absolute Maximum Ratings

Parameter	Value
Drain Voltage ( $V_D$ )	40 V
Drain Current ( $I_{D1}/I_{D2}$ )	1.4/5.8 A
Gate Current ( $I_G$ )	See graph
Dissipated Power ( $P_{DISS}$ )	92 W
Input Power: 50 $\Omega$ , 85 °C <sup>1</sup>	30 dBm
Input Power: 3:1 VSWR, 85 °C <sup>1</sup>	28 dBm
Channel Temperature, $T_{CH}$	275 °C
Storage Temperature	-55 to 150 °C

<sup>1</sup> Based on die performance

Operation of this device outside the parameter ranges given above may cause permanent damage.

### Recommended Operating Conditions

Parameter	Value
Drain Voltage	28 V
Drain Current (quiescent, $I_{DQ}$ )	200 mA
Drain Current (under drive, $I_D$ )	4.6 A
Gate Voltage	-2.8 V
Operating Temperature	-40 to 85 °C

Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

### Electrical Specifications

Test conditions, unless otherwise noted: 25 °C,  $V_D = 28$  V,  $I_{DQ} = 200$  mA, Pulse Width = 100 us, Duty Cycle = 10%

Parameter	Min	Typical	Max	Units
Frequency	2.9		3.5	GHz
Output Power ( $P_{IN} = 24$ dBm)		> 48.0		dBm
Large Signal Gain ( $P_{IN} = 24$ dBm)		> 24.2		dB
Power Added Efficiency ( $P_{IN} = 24$ dBm)		> 54.0		%
Input Return Loss		> 8.3		dB
Output Power Temperature Coefficient		-0.006		dBm/°C

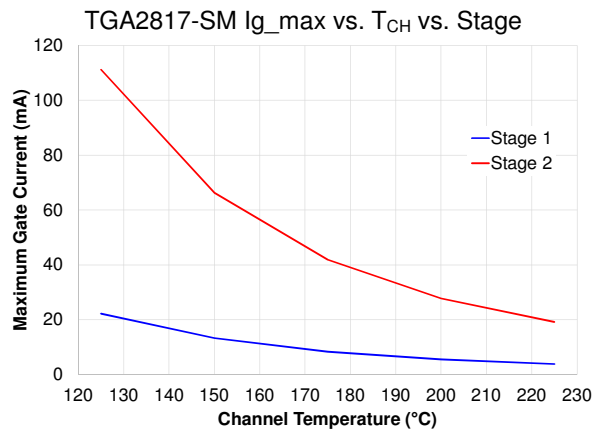
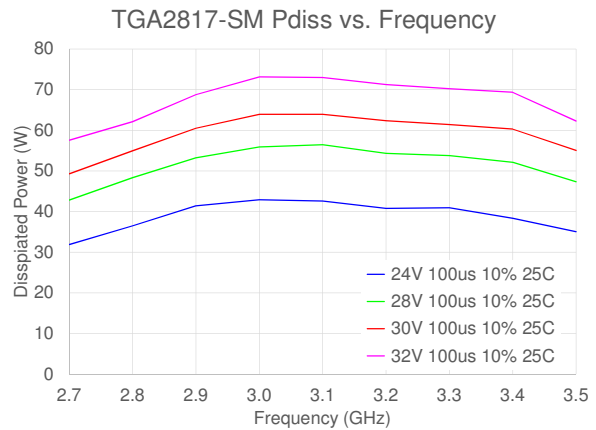
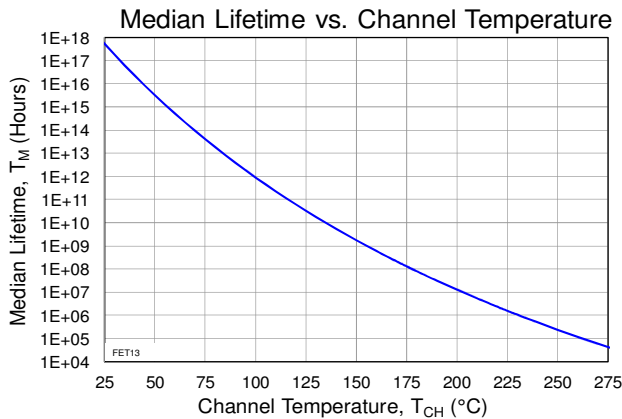
### Specifications

#### Thermal and Reliability Information

Parameter	Conditions	Value	Units
Thermal Resistance ( $\theta_{JC}$ ) <sup>(1)</sup>	$T_{BASE} = 85^\circ\text{C}$ , $V_D = 28\text{ V}$ , $I_D = 200\text{ mA}$ (quiescent DC, small signal), $P_{DISS} = 6.4\text{ W}$	1.094	$^\circ\text{C/W}$
Channel Temperature ( $T_{CH}$ )		92.0	$^\circ\text{C}$
Median Lifetime ( $T_M$ )		2.90E+12	Hrs
Thermal Resistance ( $\theta_{JC}$ ) <sup>(1)</sup>	$T_{BASE} = 85^\circ\text{C}$ , $V_D = 28\text{ V}$ , $I_D = 4.5\text{ A}$ , $P_{IN} = 24\text{ dBm}$ , $P_{OUT} = 48.5\text{ dBm}$ , $PW = 100\text{ }\mu\text{s}$ , DC = 10%, $P_{DISS} = 53\text{ W}$	0.698	$^\circ\text{C/W}$
Channel Temperature ( $T_{CH}$ )		122.0	$^\circ\text{C}$
Median Lifetime ( $T_M$ )		4.79E+10	Hrs
Thermal Resistance ( $\theta_{JC}$ ) <sup>(1)</sup>	$T_{BASE} = 85^\circ\text{C}$ , $V_D = 32\text{ V}$ , $I_D = 5.1\text{ A}$ , $P_{IN} = 24\text{ dBm}$ , $P_{OUT} = 49.4\text{ dBm}$ , $PW = 100\text{ }\mu\text{s}$ , DC = 10%, $P_{DISS} = 74\text{ W}$	0.716	$^\circ\text{C/W}$
Channel Temperature ( $T_{CH}$ )		138.0	$^\circ\text{C}$
Median Lifetime ( $T_M$ )		6.85E+09	Hrs

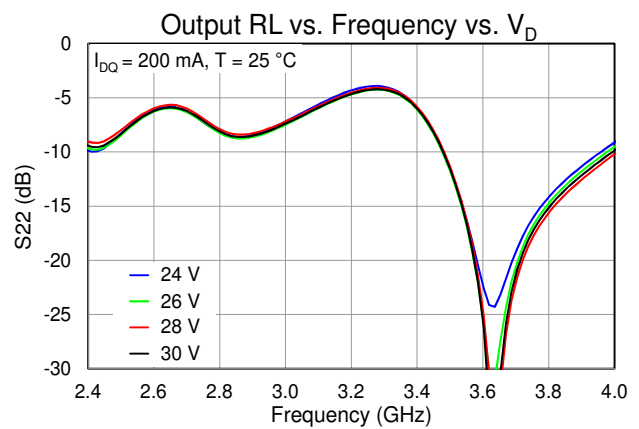
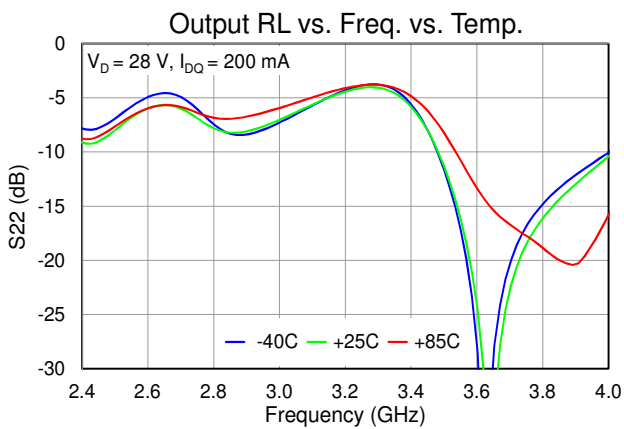
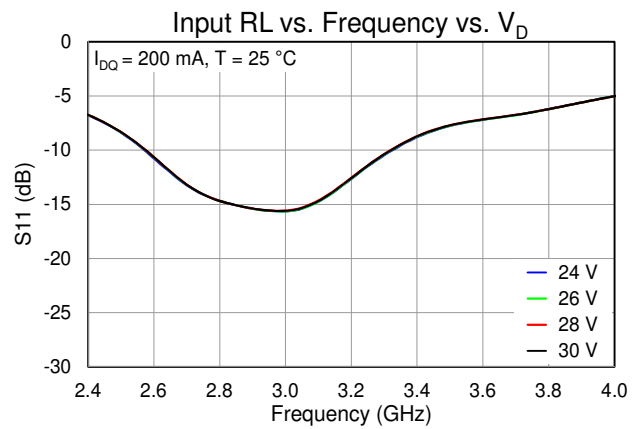
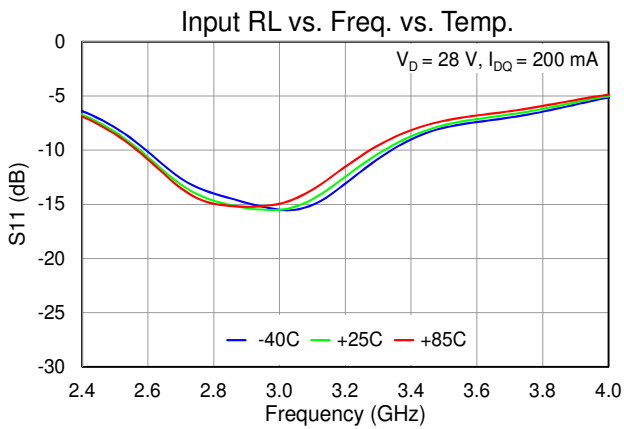
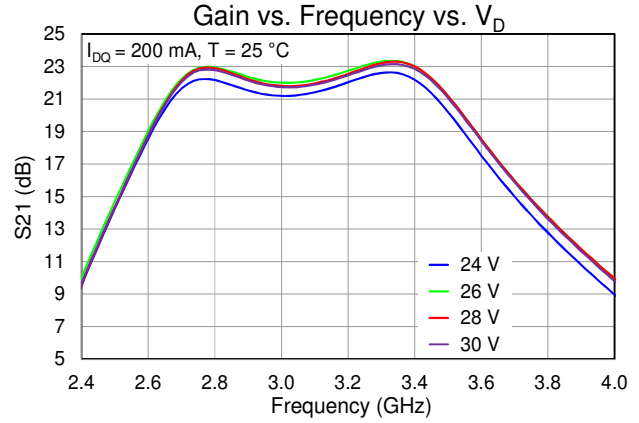
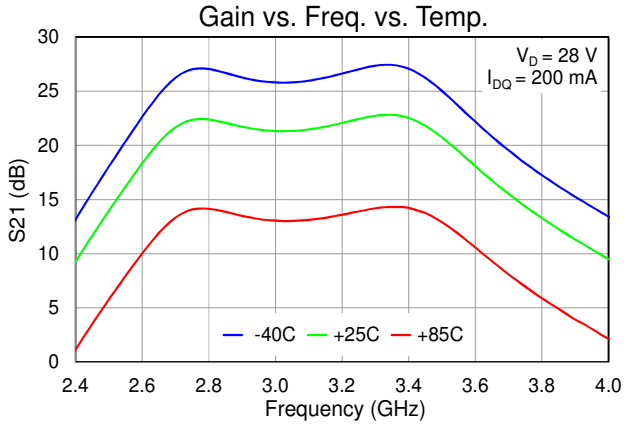
### Median Lifetime

Test Conditions: 40 V  
Failure Criterion = 10% reduction in  $I_{D\text{ MAX}}$



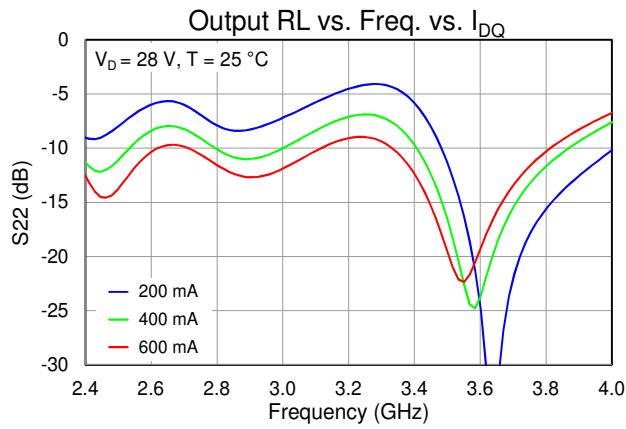
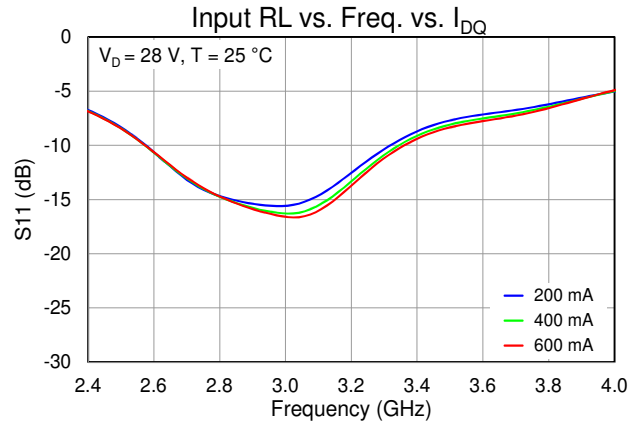
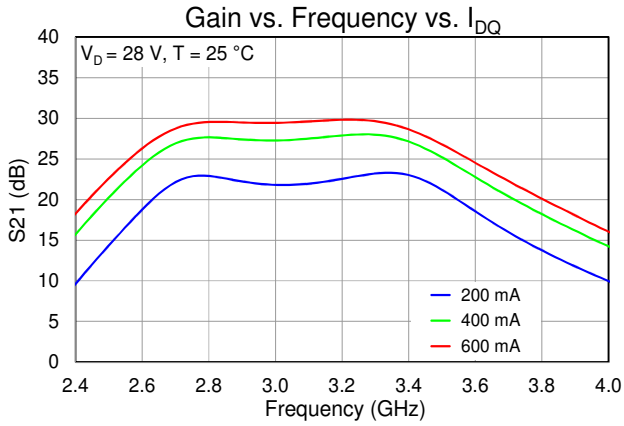
**Typical Performance**

Test conditions unless otherwise noted: Temp. = 25 °C



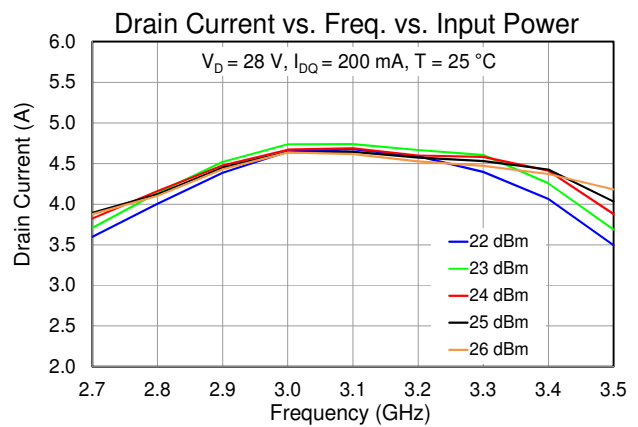
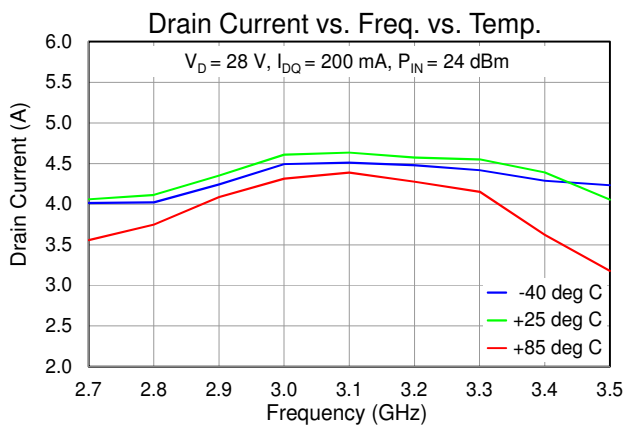
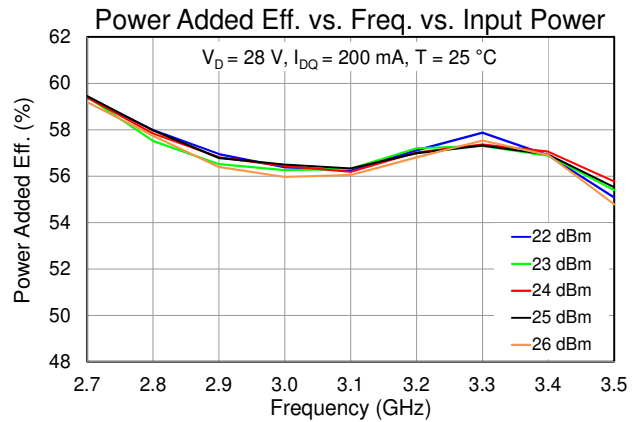
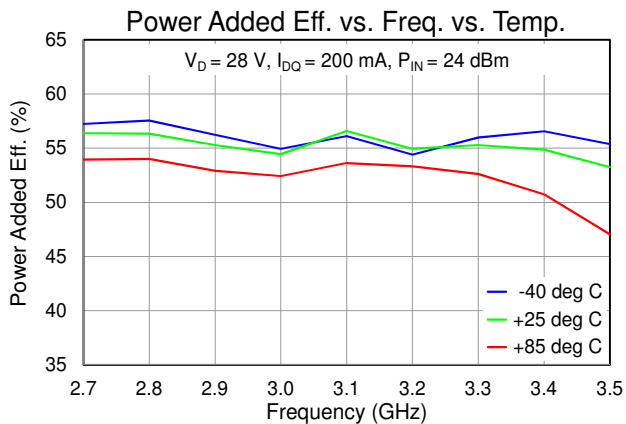
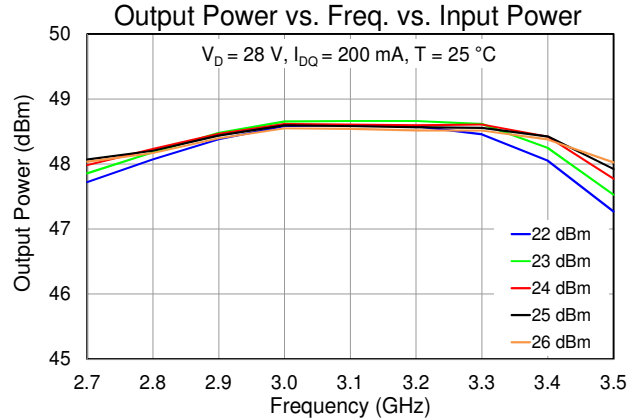
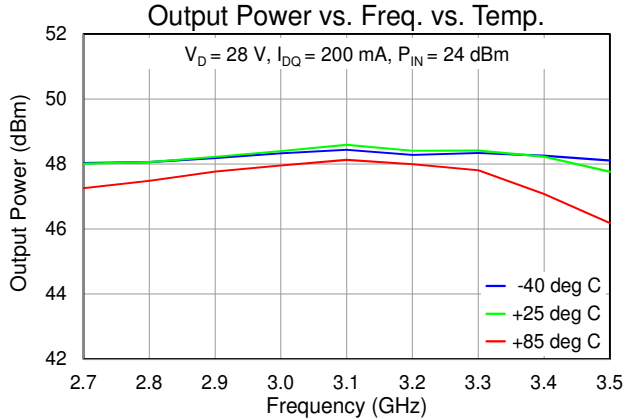
**Typical Performance**

Test conditions unless otherwise noted: Temp. = 25 °C



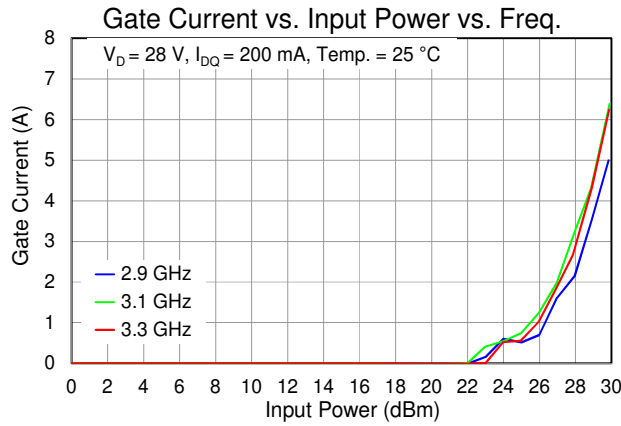
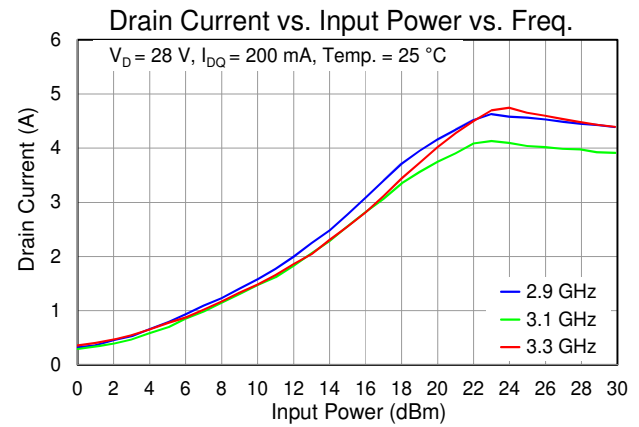
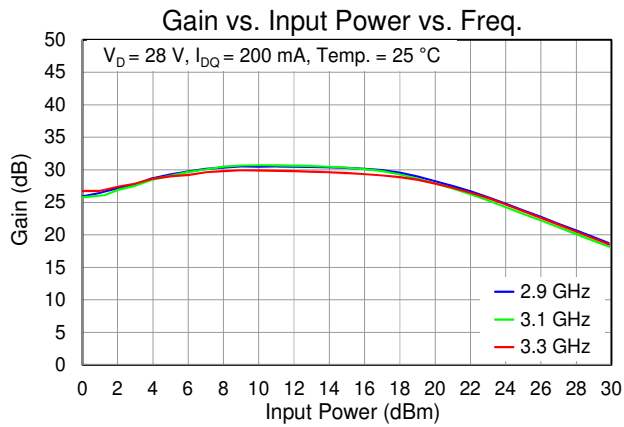
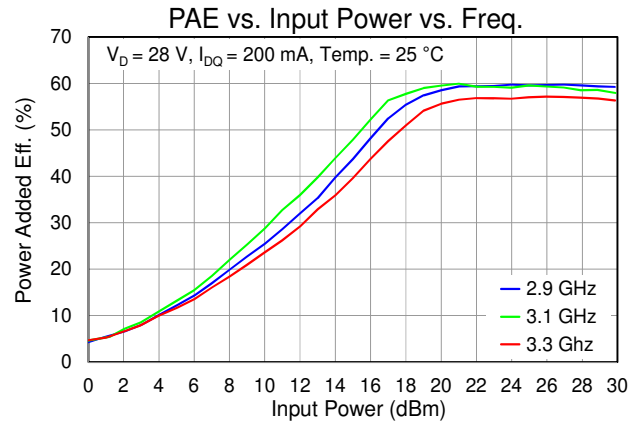
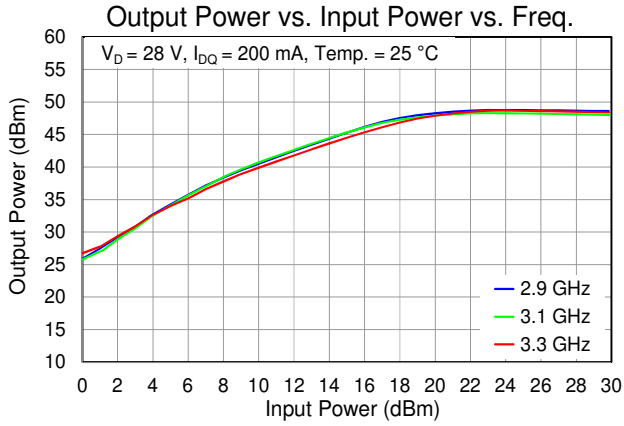
### Typical Performance

Test conditions unless otherwise noted: Temp. = 25 °C, Pulsed input power PW = 100 us, Duty Cycle = 10%



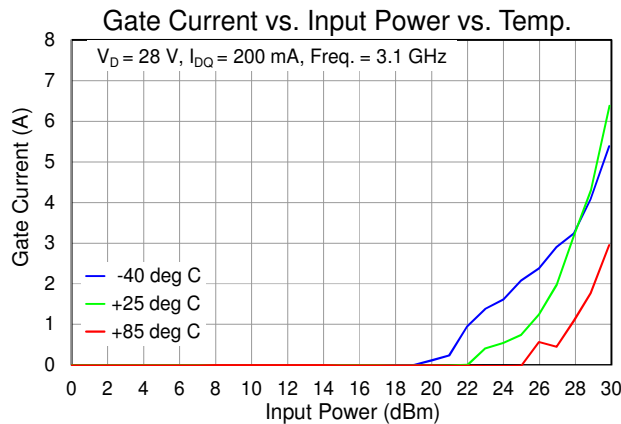
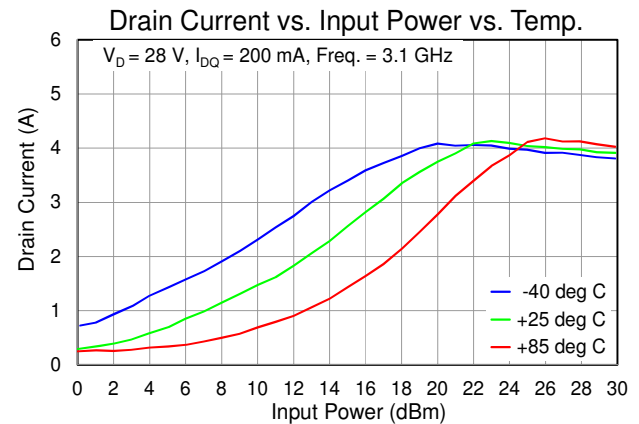
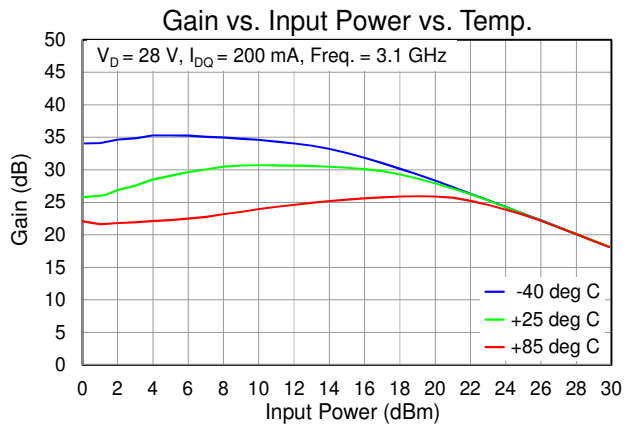
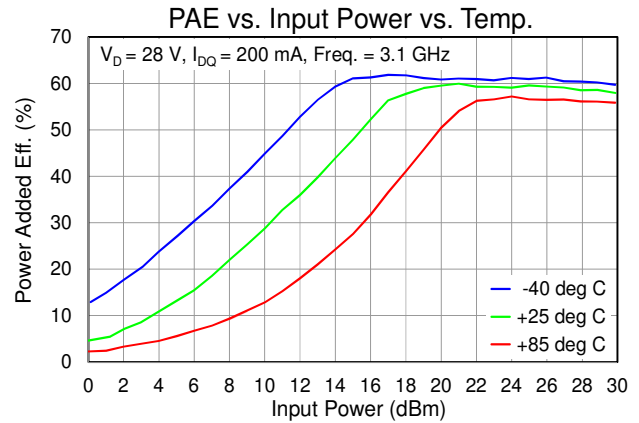
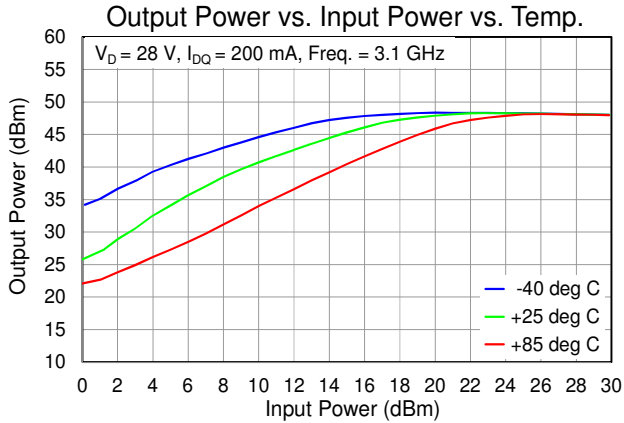
**Typical Performance**

Test conditions unless otherwise noted: Pulsed input power PW = 100 us, Duty Cycle = 10%



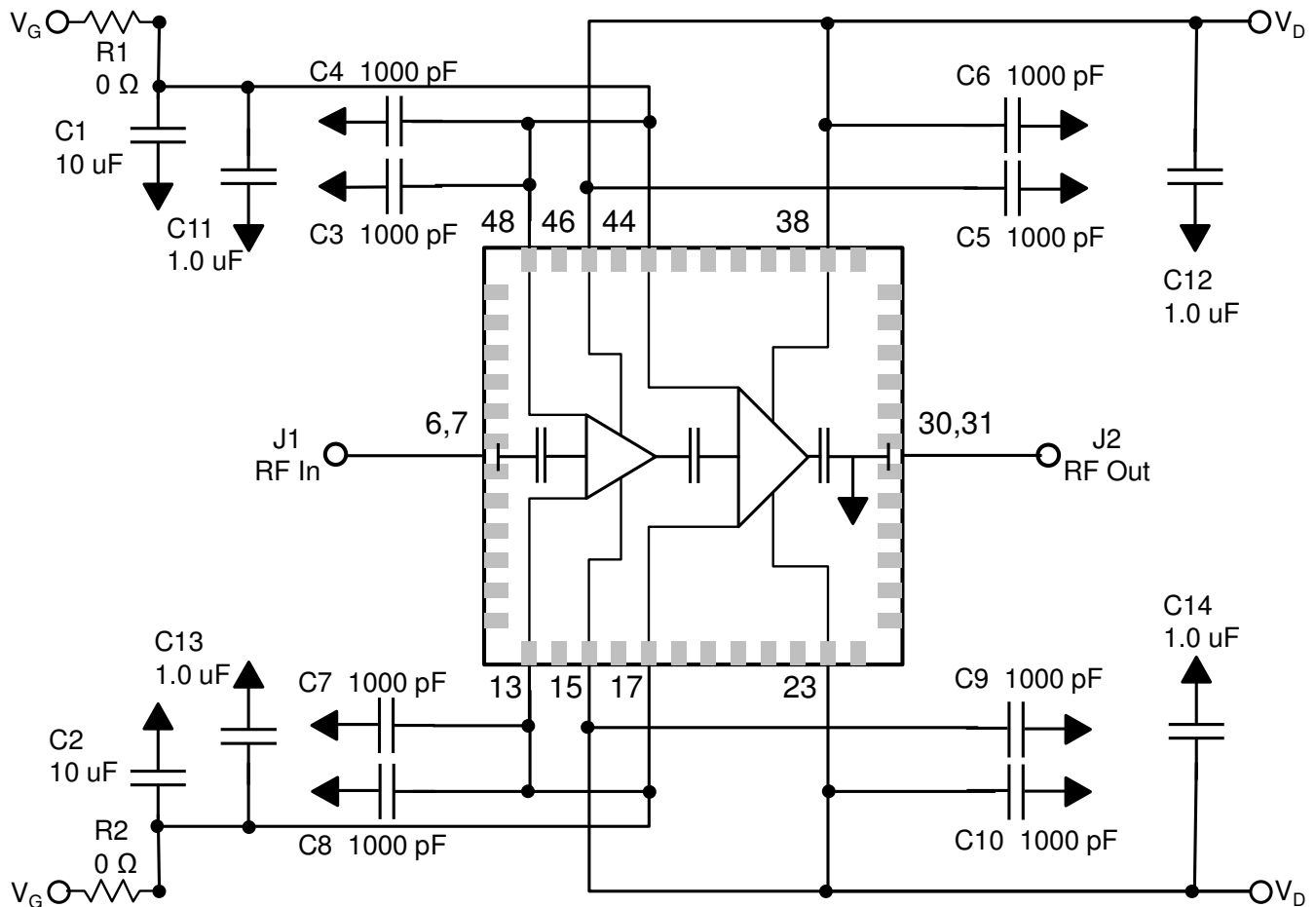
**Typical Performance**

Test conditions unless otherwise noted: Pulsed input power PW = 100 us, Duty Cycle = 10%





**Application Circuit**



**Notes:**

1.  $V_G$  and  $V_D$  must be biased from both sides (top and bottom).

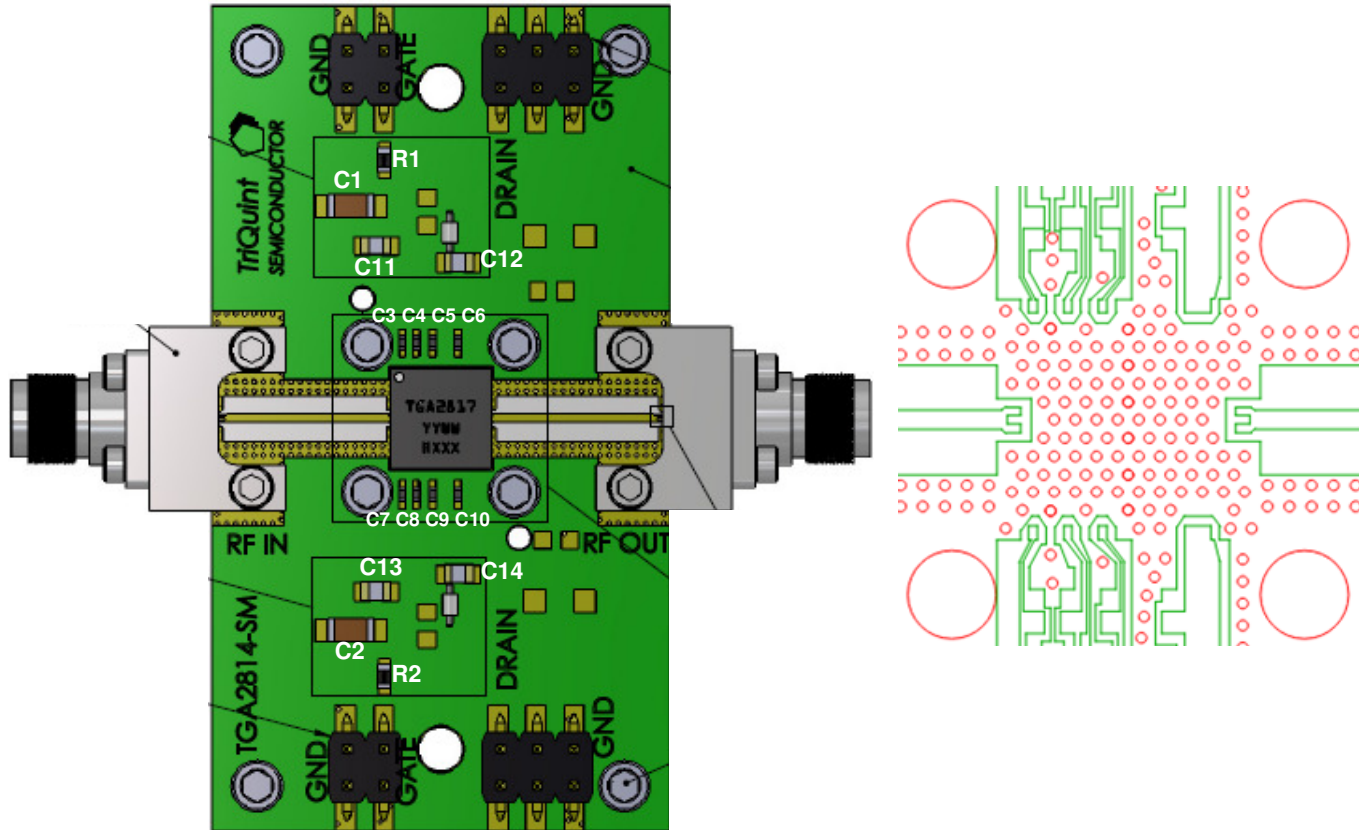
**Bias-up Procedure**

1. Set  $I_D$  limit to 6000mA,  $I_G$  limit to 40mA
2. Set  $V_G$  to -6.0 V
3. Set  $V_D$  +28 V
4. Adjust  $V_G$  more positive until  $I_{DQ} = 200mA$  ( $V_G \sim -2.8$  V Typical)
5. Apply RF signal

**Bias-down Procedure**

1. Turn off RF signal
2. Reduce  $V_G$  to -6.0V. Ensure  $I_{DQ} \sim 0mA$
3. Set  $V_D$  to 0V
4. Turn off  $V_D$  supply
5. Turn off  $V_G$  supply

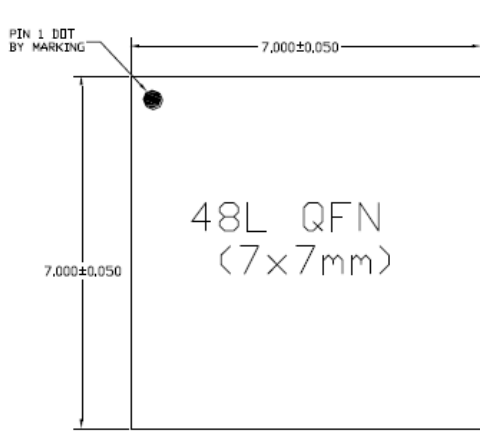
**Evaluation Board and Mounting Detail**



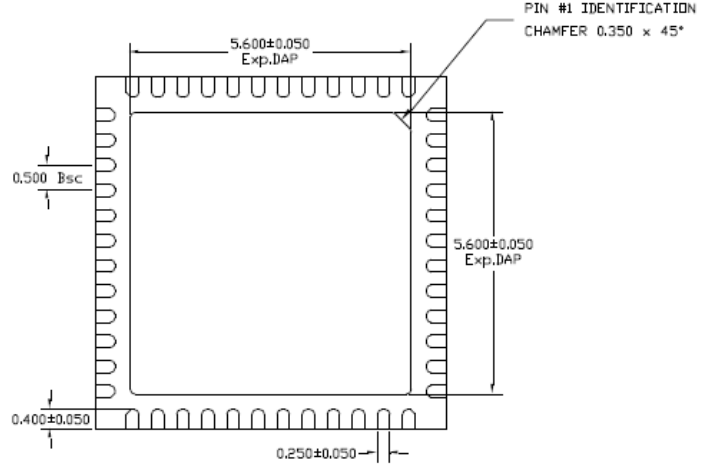
RF Layer is 0.008" thick Rogers Corp. RO40003C ( $\epsilon_r = 3.35$ ). Metal layers are 0.5 oz. copper. The microstrip line at the connector interface is optimized for the Southwest Microwave end launch connector 1092-02A-5.

Reference	Des.	Component	Value	Manuf.	Part Number
C1, C2		Surface Mount Cap	10 uF, 20 %, 50 V (1206), X5R	Various	
C3 – C10		Surface Mount Cap	1000 pF, 10 %, 50 V (0402), X7R	Various	
C11 – C14		Surface Mount Cap	1.0 uF, 10 %, 25 V (0402), X7R	Various	
R1, R2		Surface Mount Res	0 Ohm, 5 % (0603)	Various	

## Mechanical Drawing and Pad Description

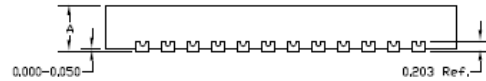


TOP VIEW



BOTTOM VIEW

A	QFN	
	MAX.	0.900
	NOM.	0.850
	MIN.	0.800



SIDE VIEW

Dimensions are in mm.

Pad No.	Symbol	Description
1-5, 8-12, 14, 16, 18-22, 24-29, 32-37, 39-43, 45, 47, 49	GND	Ground connection.
6, 7	RF Input	50 Ohm RF input. Pad is capacitively coupled to block on-chip DC voltages.
13, 48	V <sub>G1</sub>	1 <sup>st</sup> Stage Gate Voltage; bias network is required; must be biased from both sides (V <sub>G1</sub> and V <sub>G2</sub> can be tied together in application)
15, 46	V <sub>D1</sub>	1 <sup>st</sup> Stage Drain Voltage; bias network is required; must be biased from both sides (V <sub>D1</sub> and V <sub>D2</sub> can be tied together in application)
17, 44	V <sub>G2</sub>	2 <sup>nd</sup> Stage Gate Voltage; bias network is required; must be biased from both sides (V <sub>G1</sub> and V <sub>G2</sub> can be tied together in application)
23, 38	V <sub>D2</sub>	2 <sup>nd</sup> Stage Drain Voltage; bias network is required; must be biased from both sides (V <sub>D1</sub> and V <sub>D2</sub> can be tied together in application)
30, 31	RF Output	50 Ohm RF output. Pad is capacitively coupled to block on-chip DC voltages. Pad is DC grounded.

### 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

#### MSL Rating

MSL Rating: Level 3  
 Test: 260 °C convection reflow  
 Standard: JEDEC Standard IPC/JEDEC J-STD-020

#### ECCN

US Department of Commerce: 3A001.b.2.a

#### Solderability

Compatible with the latest version of J-STD-020 Lead free solder, 260 °C.

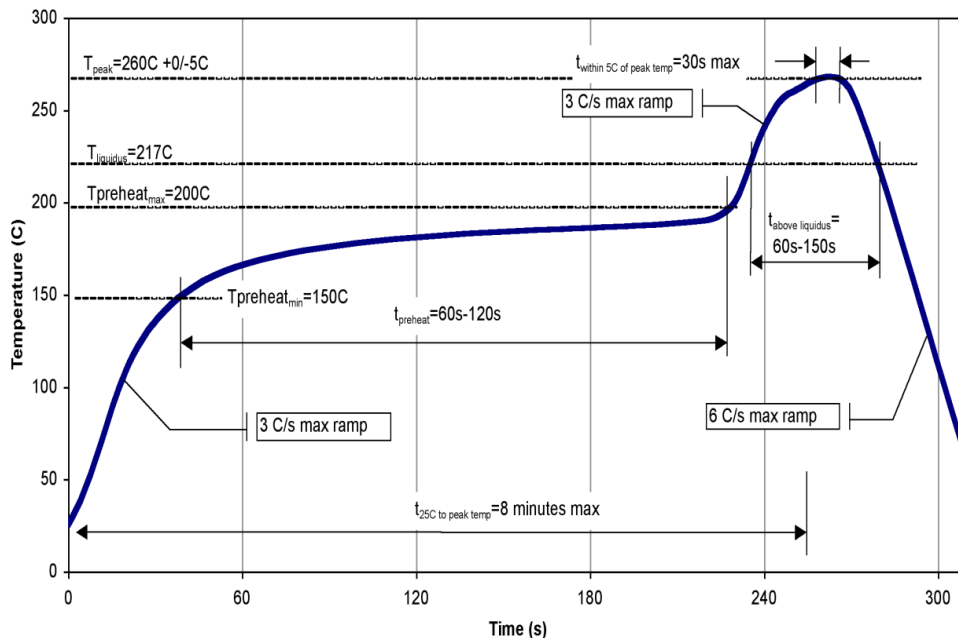
#### RoHS-Compliance

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 (C15H12Br4O2) Free
- PFOS Free
- SVHC Free

### Recommended Soldering Temperature Profile



## Contact Information

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

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**Email:** [info-sales@tqs.com](mailto:info-sales@tqs.com)      **Fax:** +1.972.994.8504

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

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