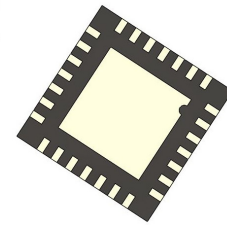


Applications

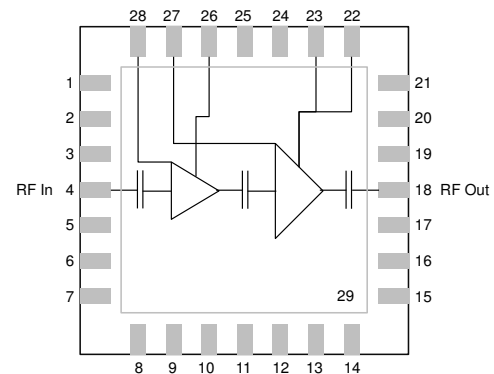
- Military Radar
- Civilian Radar
- Wideband Amplifiers



Product Features

- Frequency Range: 2.8 - 3.7 GHz
- Pout: > 45.5 dBm (Pin=27 dBm)
- Large Signal Gain: > 18.0 dB (Pin=27 dBm)
- PAE: > 47 % (Pin=27 dBm)
- Bias: $V_D=28$ V, $I_{DQ}=200$ mA, $V_G=-2.65$ V (Typ)
- Package Dimensions: 6.0 x 6.0 x 0.85 mm

Functional Block Diagram



General Description

TriQuint's TGA2818-SM is a high-power, S-band amplifier fabricated on TriQuint's TQGaN25 0.25um GaN on SiC production process. Covering 2.8-3.7 GHz, the TGA2818-SM provides greater than 45.5 dBm of saturated output power and greater than 18.0 dB of large-signal gain while achieving greater than 47 % power added efficiency.

The TGA2818-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 TGA2818-SM is matched to 50 ohms. It is ideal for use in both commercial and military radar systems.

Lead-free and RoHS compliant.

Evaluation boards available on request.

Pad Configuration

Pad Number	Symbol
4	RF Input
18	RF Output
22, 23	V_{D2}
26	V_{D1}
27	V_{G2}
28	V_{G1}

Ordering Information

Part	ECCN	Description
TGA2818-SM	EAR99	S-Band 30 W GaN Power Amplifier
TGA2818-SM_EVB	EAR99	TGA2818-SM Evaluation Board

Absolute Maximum Ratings

Parameter	Value
Drain Voltage (V_D)	40 V
Drain Current (I_{D1}/I_{D2})	0.6 / 2.7A
Gate Current (I_{G_MAX})	See graph
Dissipated Power (P_{DISS})	60 W
Input Power: 50 Ω , 85 °C	33 dBm
Input Power: 3:1 VSWR, 85 °C	33 dBm
Channel Temperature, T_{CH}	275 °C
Storage Temperature	-55 to 150 °C

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)	3.0 A
Gate Voltage	-2.65 V

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	2.8		3.7	GHz
Output Power (@ 27 dBm P_{IN})		> 45.5		dBm
Large Signal Gain (@ 27 dBm P_{IN})		> 18.0		dB
Power Added Efficiency (@ 27 dBm P_{IN})		> 47.0		%
Input Return Loss		> 15.0		dB
Output Return Loss		> 9.0		dB
Output Power Temperature Coefficient		-0.004		dBm/°C

Specifications

Thermal and Reliability Information

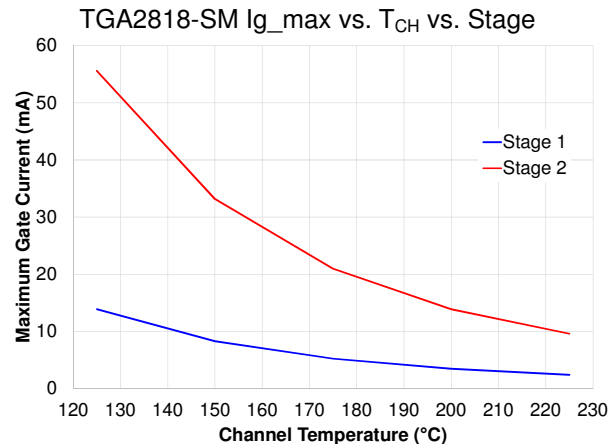
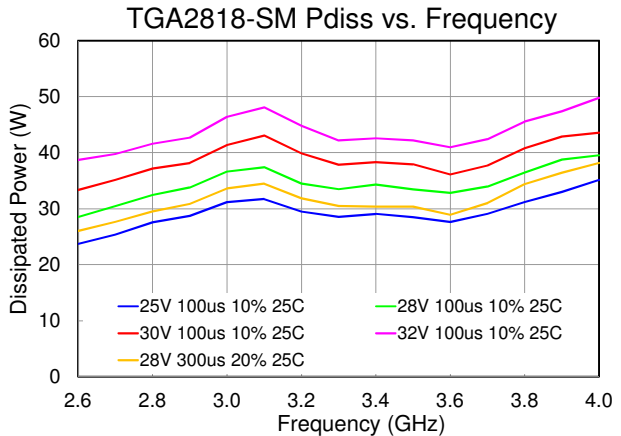
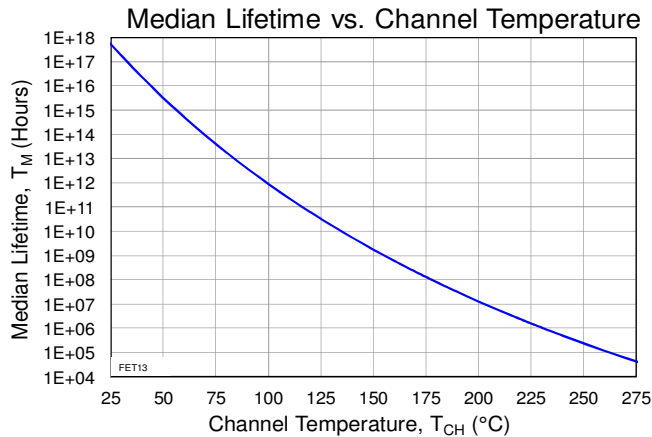
Parameter	Conditions	Value	Units
Thermal Resistance (θ_{JC}) ⁽¹⁾	$T_{BASE} = 85^{\circ}C$, $V_D = 28 V$, $I_{DQ} = 0.20 A$, no RF applied, $P_{DISS} = 5.6 W$ (quiescent)	3.57	$^{\circ}C/W$
Channel Temperature (T_{CH})		105	$^{\circ}C$
Median Lifetime (T_M)		$4.52E+11$	Hrs
Thermal Resistance (θ_{JC}) ⁽¹⁾	$T_{BASE} = 85^{\circ}C$, $V_D = 28 V$, $I_D = 2.40 A$, $P_{IN} = 27 dBm$, $P_{OUT} = 45.0 dBm$, $PW = 100 \mu s$, $DC = 10\%$, $P_{DISS} = 35.6 W$	1.26	$^{\circ}C/W$
Channel Temperature (T_{CH})		130	$^{\circ}C$
Median Lifetime (T_M)		$178E+10$	Hrs
Thermal Resistance (θ_{JC}) ⁽¹⁾	$T_{BASE} = 85^{\circ}C$, $V_D = 28 V$, $I_D = 2.28 A$, $P_{IN} = 27 dBm$, $P_{OUT} = 44.9 dBm$, $PW = 300 \mu s$, $DC = 20\%$, $P_{DISS} = 33.2 W$	1.62	$^{\circ}C/W$
Channel Temperature (T_{CH})		139	$^{\circ}C$
Median Lifetime (T_M)		$6.09E+09$	Hrs

Notes:

1. Thermal resistance is determined from the channel to the back of the package (fixed 85 $^{\circ}C$).

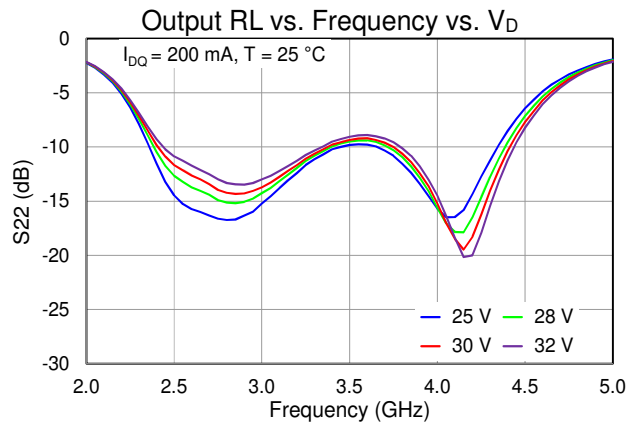
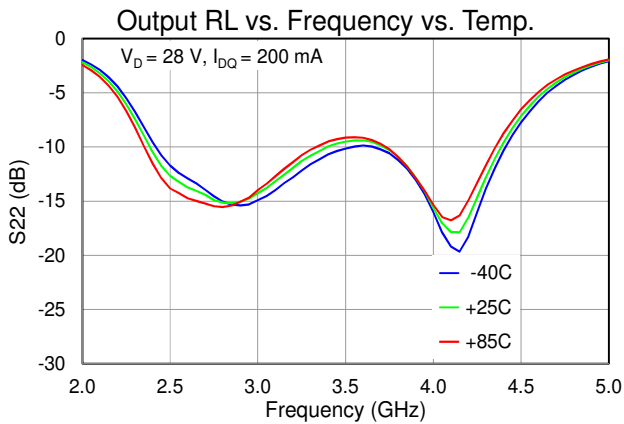
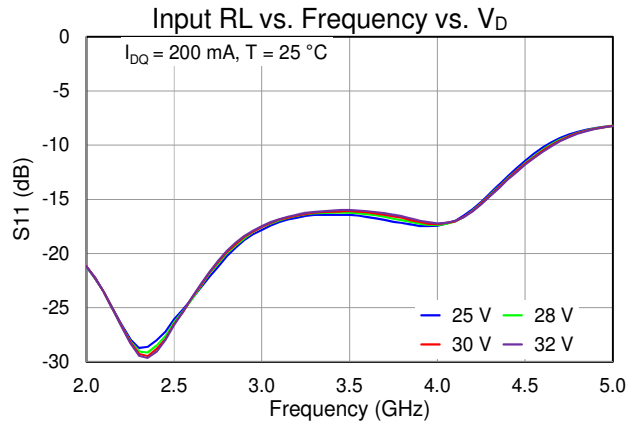
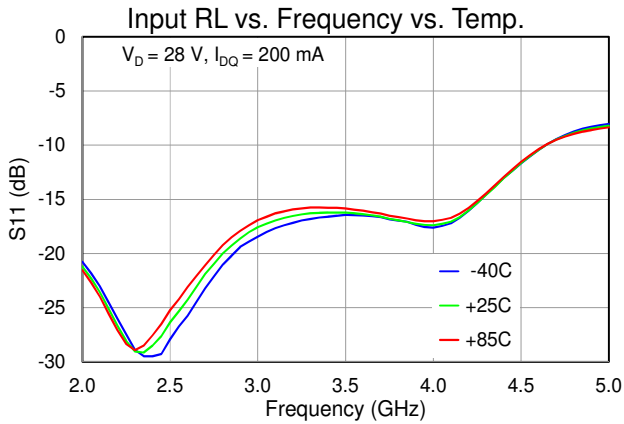
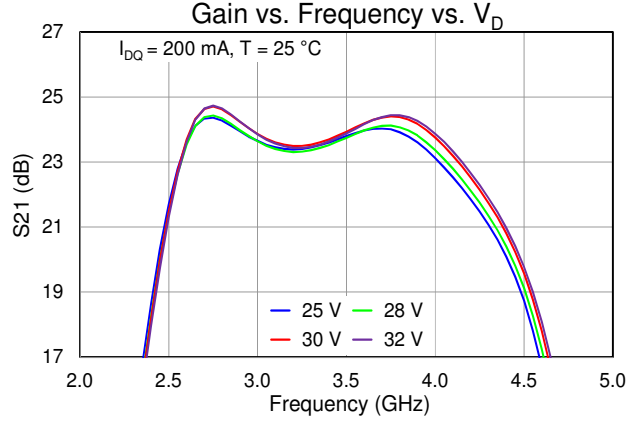
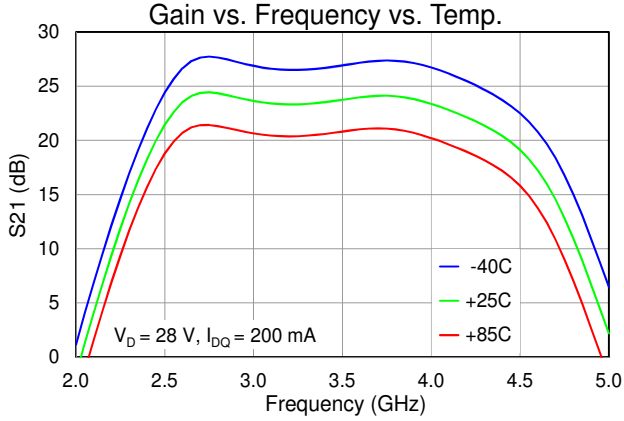
Median Lifetime

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



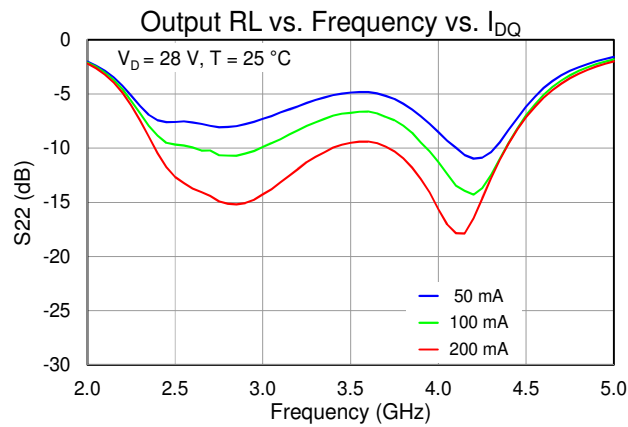
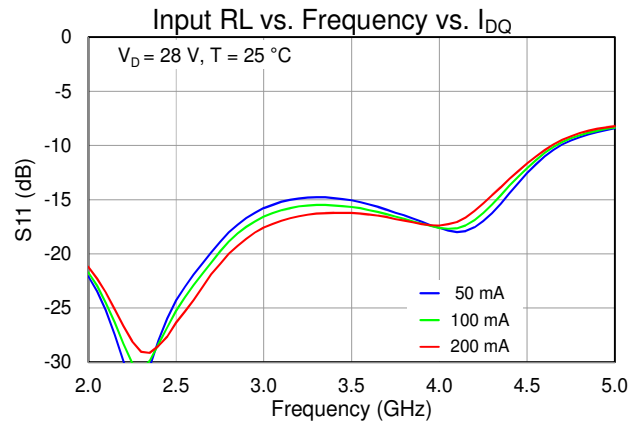
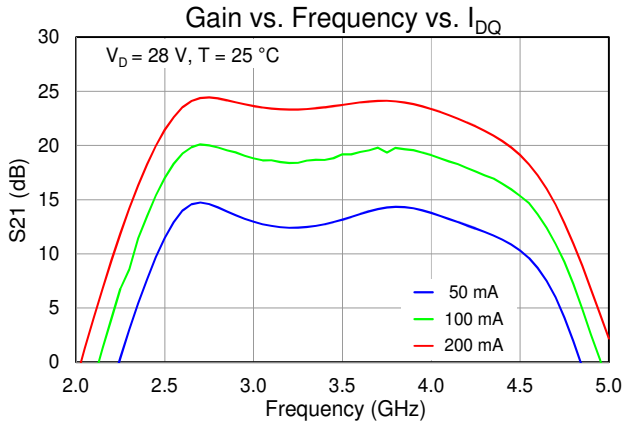
Typical Performance – Small Signal

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



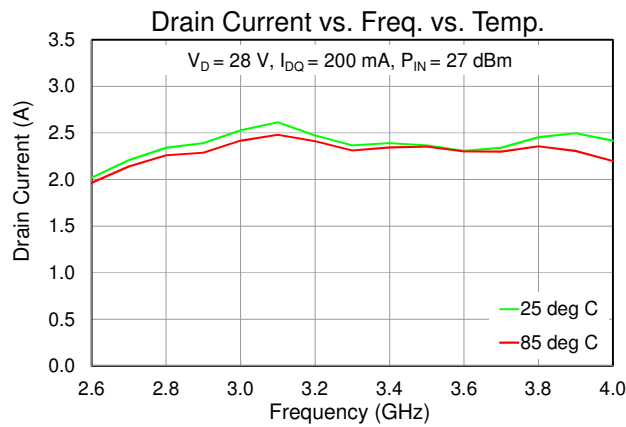
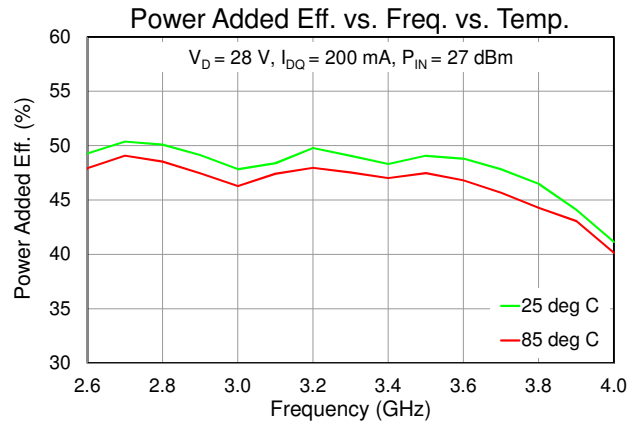
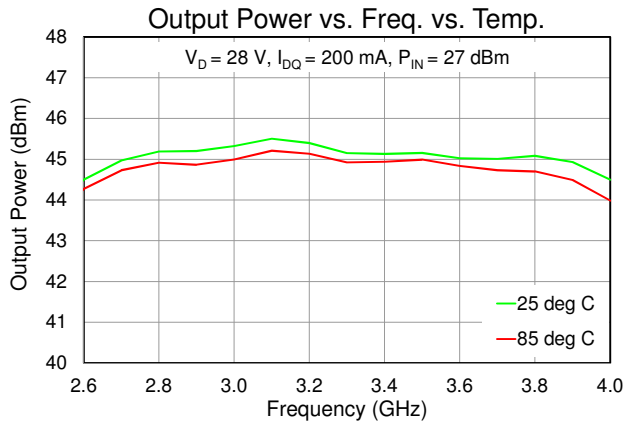
Typical Performance – Small Signal

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



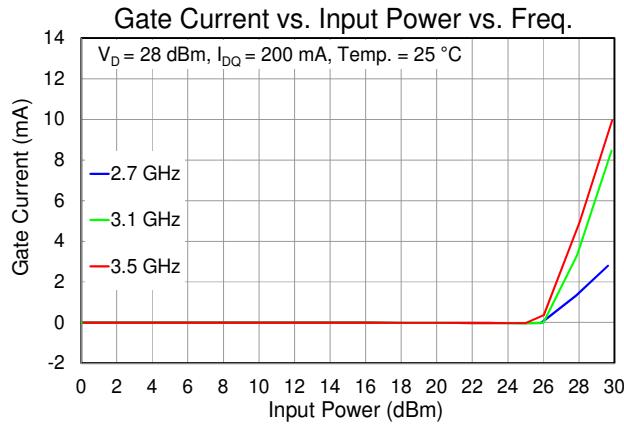
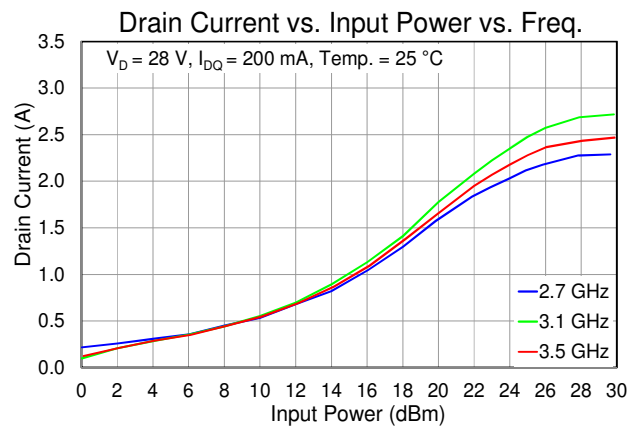
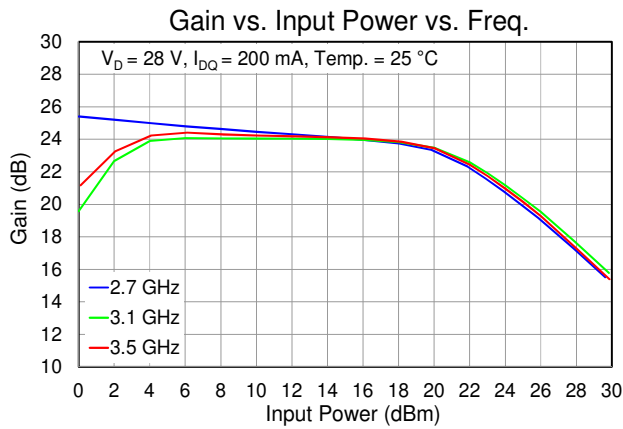
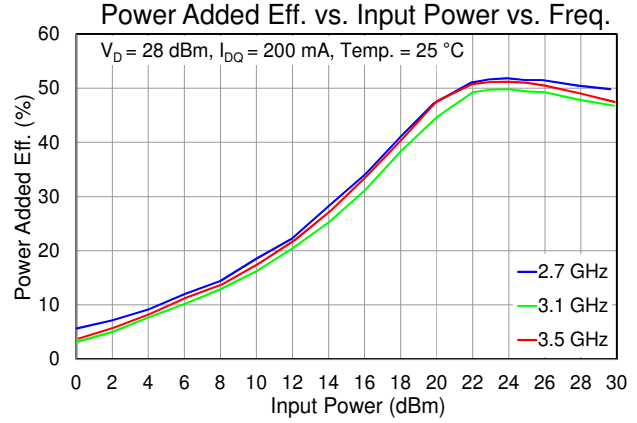
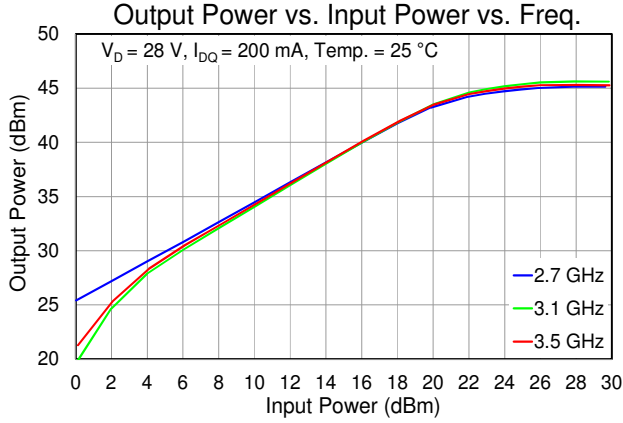
Typical Performance – Large Signal

Test conditions unless otherwise noted: Pulse parameters: PW = 100 us, Duty Cycle = 10%



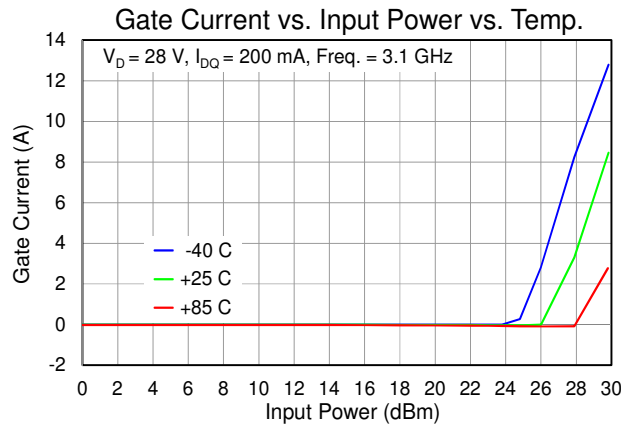
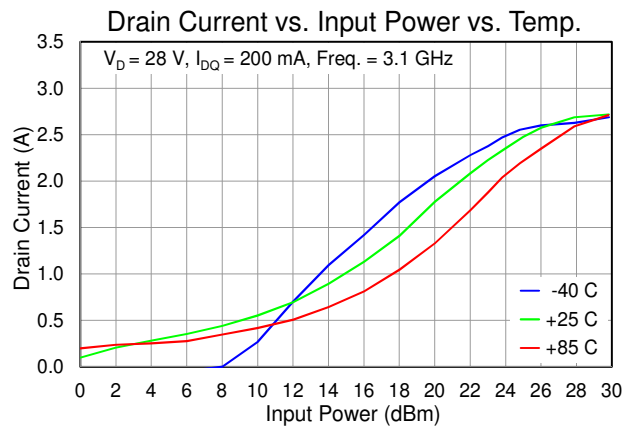
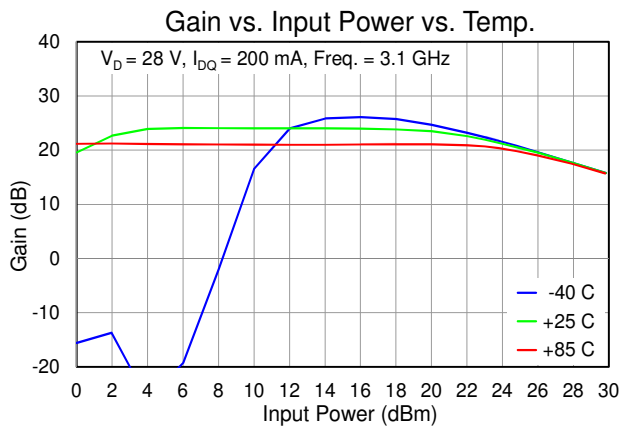
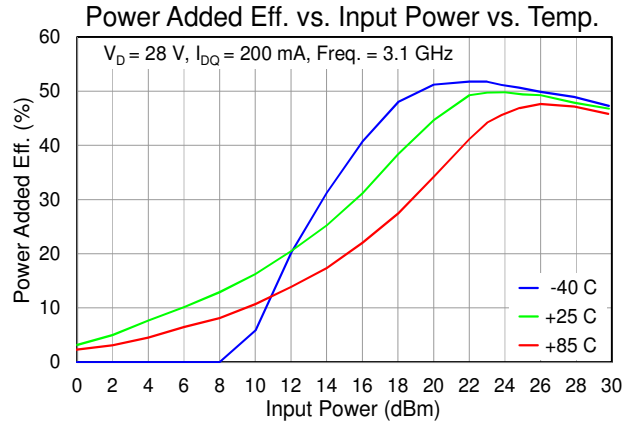
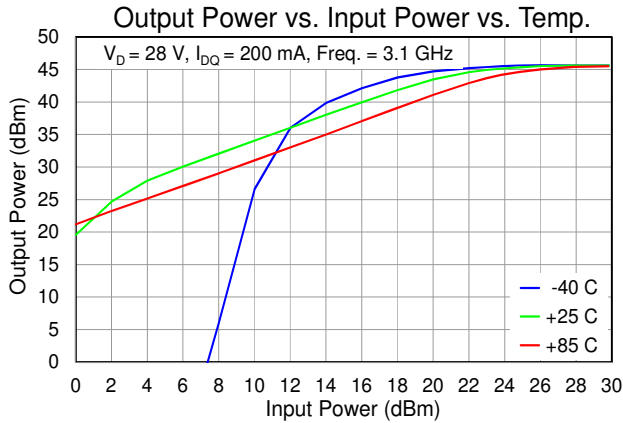
Typical Performance – Large Signal

Test conditions unless otherwise noted: Pulse parameters: PW = 100 us, Duty Cycle = 10%



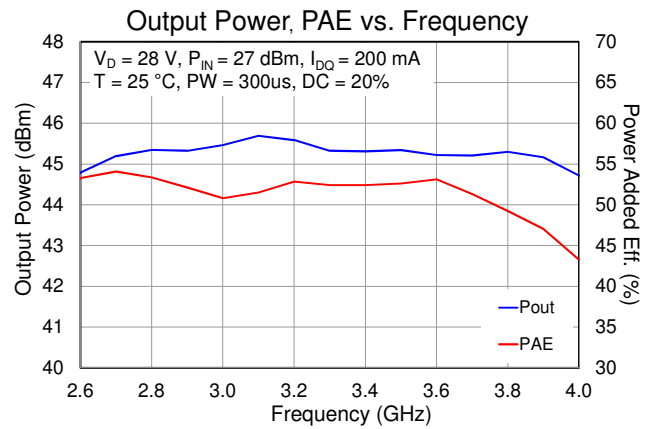
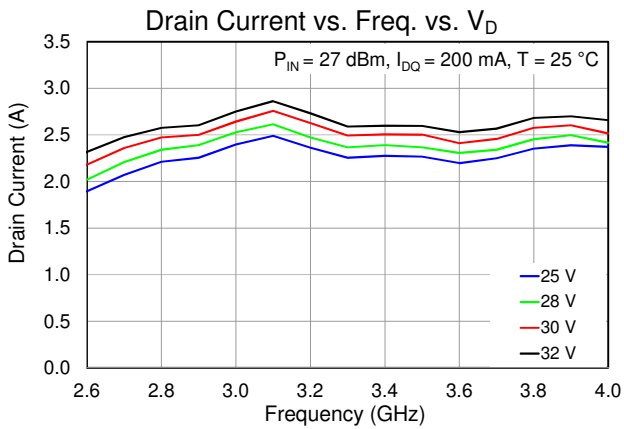
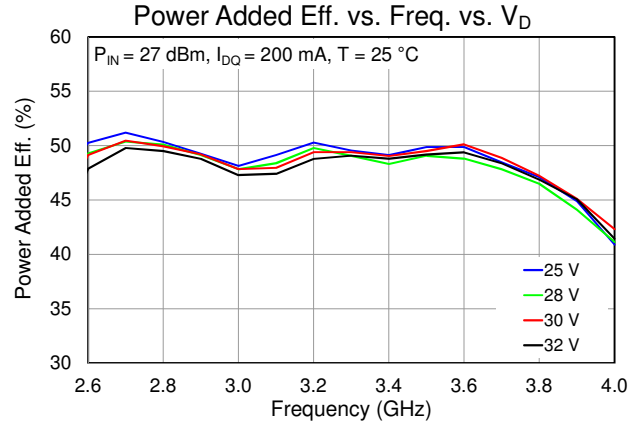
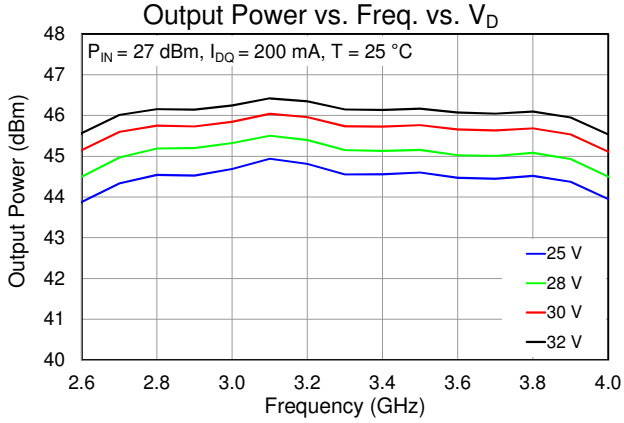
Typical Performance – Large Signal

Test conditions unless otherwise noted: Pulse parameters: PW = 100 us, Duty Cycle = 10%

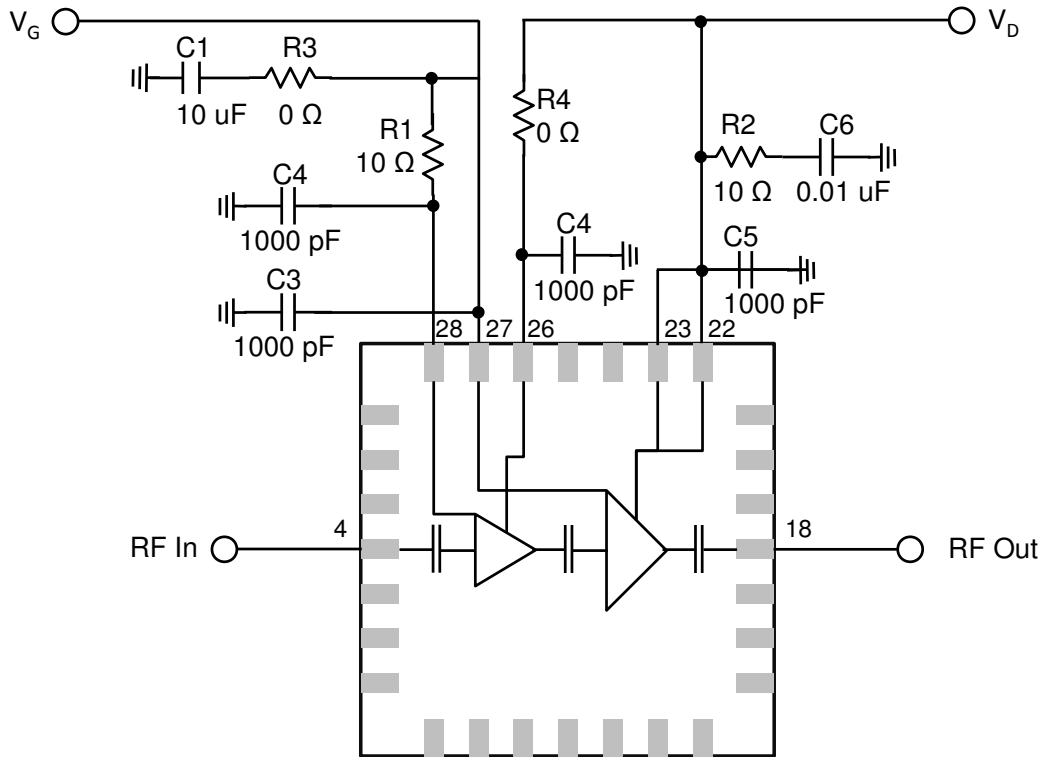


Typical Performance – Large Signal

Test conditions unless otherwise noted: Pulse parameters: PW = 100 us, Duty Cycle = 10%



Application Circuit



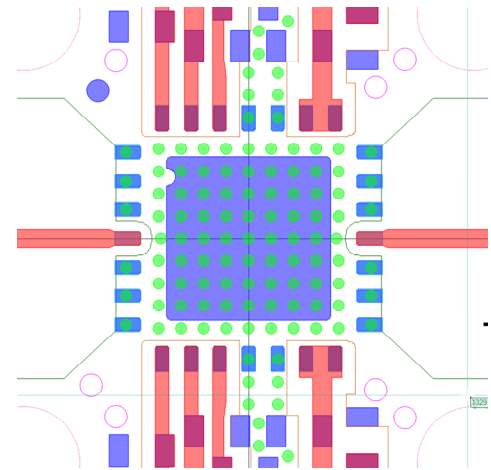
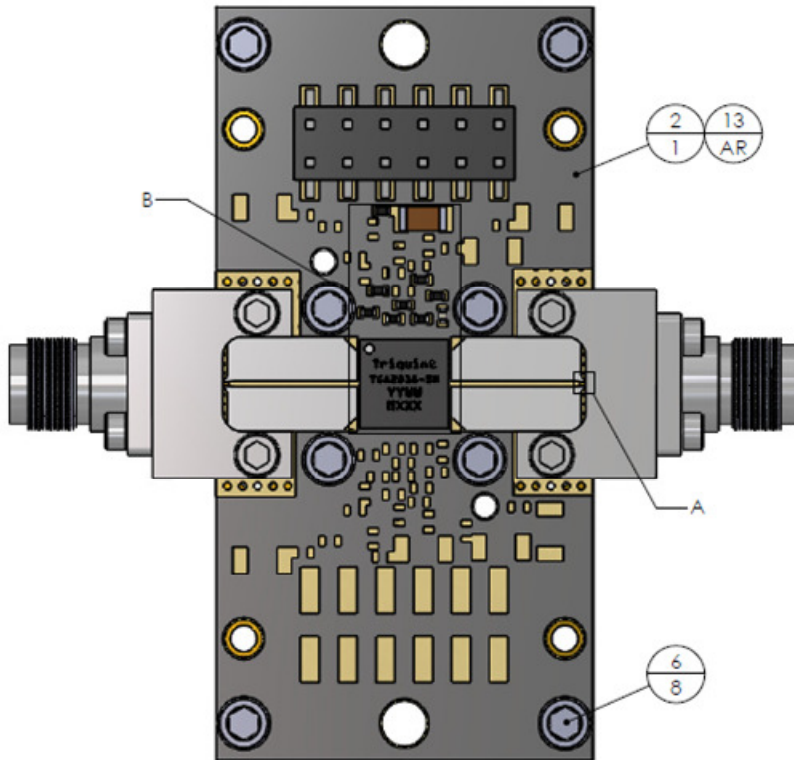
Bias-up Procedure

1. Set I_D limit to 3000 mA, I_G limit to 18 mA
2. Set V_G to -5.0 V
3. Set V_D +28 V
4. Adjust V_G more positive until $I_{DQ} = 200\text{mA}$ ($V_G \sim -2.65\text{ V Typical}$)
5. Apply RF signal

Bias-down Procedure

1. Turn off RF signal
2. Reduce V_G to -5.0V. 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

Evaluation Board and Mounting Detail

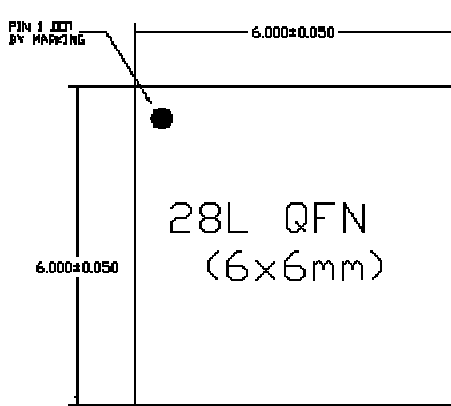


Mounting Detail

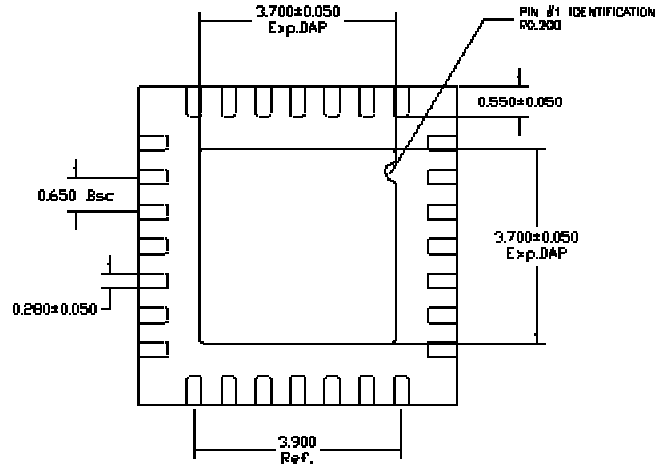
RF Layer is 0.008" thick Rogers Corp. RO40003C ($\epsilon_r = 3.35$). Metal layers are 0.5 oz. copper. The microstrip line at the connector interface is optimized for the Southwest Microwave end launch connector 1092-02A-5.

Reference Des.	Component	Value	Manuf.	Part Number
C1	Surface Mount Cap	10 uF, 20%, 50 V, X5R (1206)	Various	
C2-C5	Surface Mount Cap	1000 pF, 10%, 100 V, X7R (0402)	Various	
C6	Surface Mount Cap	0.01 uF, 10%, 50 V, X7R, (0402)	Various	
R1 – R2	Surface Mount Res	10 Ohms, 5% (0402)	Various	
R3 – R4	Surface Mount Res	0 Ohms, 5% (0402)	Various	

Mechanical Drawing and Bond Pad Description

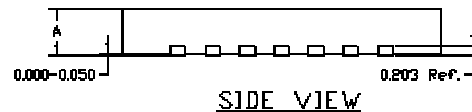


TOP VIEW



BOTTOM VIEW

A	QFN	
	MAX.	0.900
	MIN.	0.850



SIDE VIEW

Pin No.	Symbol	Description
1-3,5-7,11-12,15-17, 19-21, 24-25, 29	GND	Pads grounded on EVB; center pad connected to GND, no connection in package to GND for other pads
4	RF Input	50 Ohm RF input. Pad is capacitively coupled to block on-chip DC voltages.
8-10, 13-14	NC	No connection in package to GND; connect pads to GND for general PCB layout
18	RF Output	50 Ohm RF output. Pad is capacitively coupled to block on-chip DC voltages. Pad is DC grounded.
22, 23	V _{D2}	2 nd Stage Drain Voltage; bias network is required (see recommended Application Circuit)
26	V _{D1}	1 st Stage Drain Voltage; bias network is required (see recommended Application Circuit)
27	V _{G2}	2 nd Stage Gate Voltage; bias network is required (see recommended Application Circuit)
28	V _{G1}	1 st Stage Gate Voltage; bias network is required (see recommended Application Circuit)

Product Compliance Information

ESD Sensitivity Ratings



Caution! ESD-Sensitive Device

ESD Rating: Class 1C
 Value: 1100 V
 Test: Human Body Model (HBM)
 Standard: JEDEC Standard JS-001-2014

ESD Rating: Class C3
 Value: 100 V
 Test: Charged Device Model (CDM)
 Standard: JEDEC Standard JS-002-2014

MSL Rating

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

ECCN

US Department of Commerce: EAR99

Solderability

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

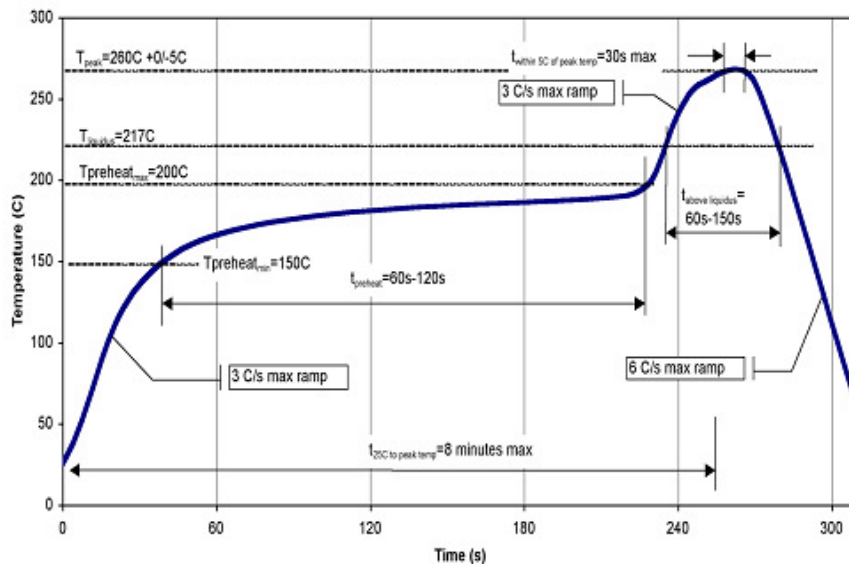
RoHS-Compliance

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

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Fax: +1.972.994.8504

For technical questions and application information:

Email: info-products@tqs.com

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