

Applications

- Communications
- Electronic Warfare
- Test Instrumentation
- EMC Amplifier

Product Features

- Frequency Range: 2 – 6 GHz
- Psat: 45 dBm CW
- PAE: 40% CW
- Small Signal Gain: 27 dB
- Input Return Loss: >20 dB
- IM3: -30 dBc @ 40 dBm Pout/Tone
- Bias: $V_D = 28\text{ V}$, $I_{DQ} = 400\text{ mA}$, $V_G = -2.8\text{ V}$ Typical
- Chip Dimensions: 6.4 x 5.0 x 0.10 mm

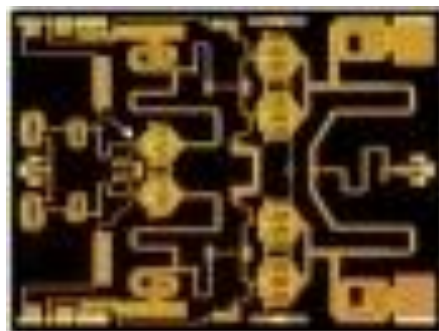
General Description

TriQuint's TGA2578 is a wideband power amplifier fabricated on TriQuint's 0.25um GaN on SiC process. Operating from 2 to 6 GHz, it achieves 30 W saturated output power with high efficiency of 40% PAE, and 27 dB small signal gain.

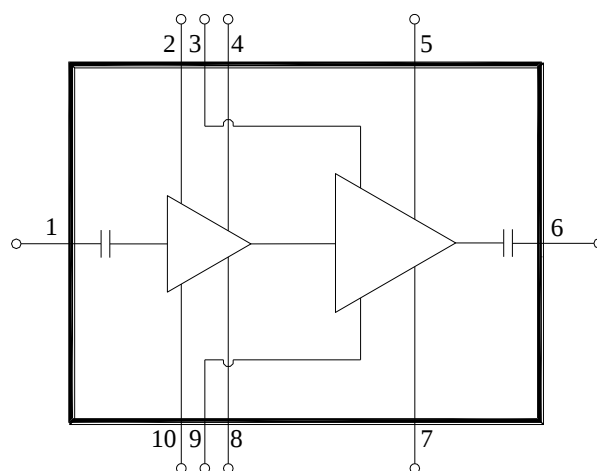
Fully matched to 50 ohms with integrated DC blocking caps on both I/O ports, the TGA2578 is ideally suited to support both commercial and defense related applications.

The TGA2578 is 100% DC and RF tested on-wafer to ensure compliance to power and PAE specifications.

Lead-free and RoHS compliant.



Functional Block Diagram



Pad Configuration

Pad No.	Symbol
1	RF In
2, 10	V_{G1}
3, 9	V_{G2}
4, 8	V_{D1}
5, 7	V_{D2}
6	RF Out

Ordering Information

Part	ECCN	Description
TGA2578	3A001.b.2.a	2-6 GHz 30 W Power Amplifier

Absolute Maximum Ratings

Parameter	Value
Drain Voltage (V_D)	40 V
Gate Voltage Range (V_G)	-8 to 0 V
Drain Current (I_D)	5 A
Gate Current (I_G)	-15 to 30 mA
Power Dissipation, 85 °C (P_{DISS})	92.5 W
Input Power, CW, 50 Ω , (P_{IN})	27 dBm
Input Power, CW, VSWR 3:1, V_D = 30 V, 85 °C, (P_{IN})	27 dBm
Input Power, CW, VSWR 10:1, V_D = 28 V, 85 °C (P_{IN})	25 dBm
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)	28 V
Drain Current (I_{DQ})	400 mA
Drain Current Under RF Drive (I_{D_Drive})	3800 mA
Gate Voltage (V_G)	-2.8 V

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

Electrical Specifications

Test conditions unless otherwise noted: 25 °C, V_D = 28 V, I_D = 400 mA, V_G = -2.8 V Typical

Parameter	Min	Typical	Max	Units
Operational Frequency Range	2		6	GHz
Small Signal Gain		27		dB
Input Return Loss		20		dB
Output Return Loss		5		dB
Output Power @ P_{in} = 23 dBm		45		dBm
Power Added Efficiency @ P_{in} = 23 dBm		40		%
IM3 @ $P_{out}/Tone$ = 40 dBm		-30		dBc
IM5 @ $P_{out}/Tone$ = 40 dBm		-40		dBc
Small Signal Gain Temperature Coefficient		-0.05		dB/°C
Output Power Temperature Coefficient		-0.02		dBm/°C

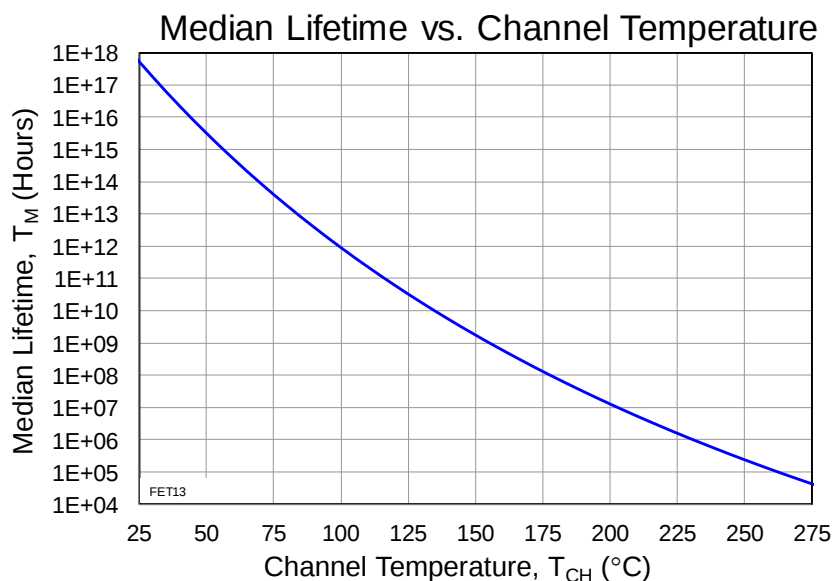
Thermal and Reliability Information

Parameter	Test Conditions	Value	Units
Thermal Resistance (θ_{JC}) ⁽¹⁾	$T_{base} = 85^\circ\text{C}$, $V_D = 28\text{ V}$, $I_{D Drive} = 3.5\text{ A}$, $P_{out} = 45\text{ dBm}$, $P_{DISS} = 67\text{ W}$	2.05	$^\circ\text{C/W}$
Channel Temperature (T_{CH})		222	$^\circ\text{C}$
Median Lifetime (T_M)		1.99+6	Hrs

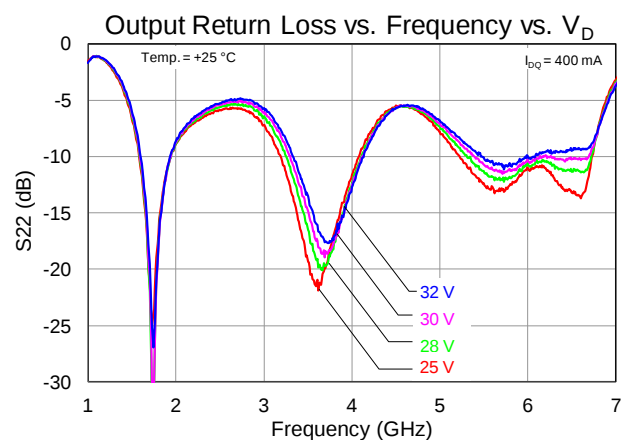
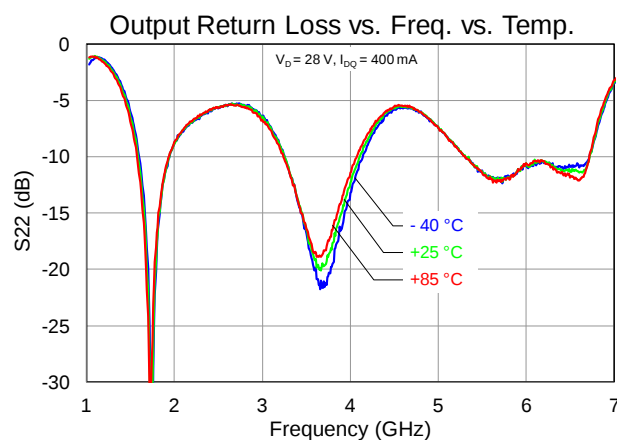
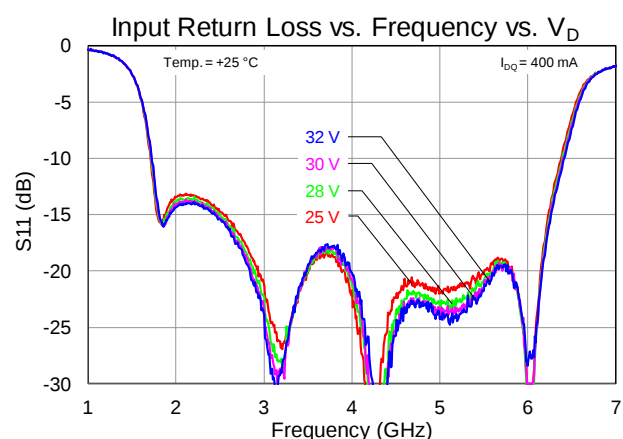
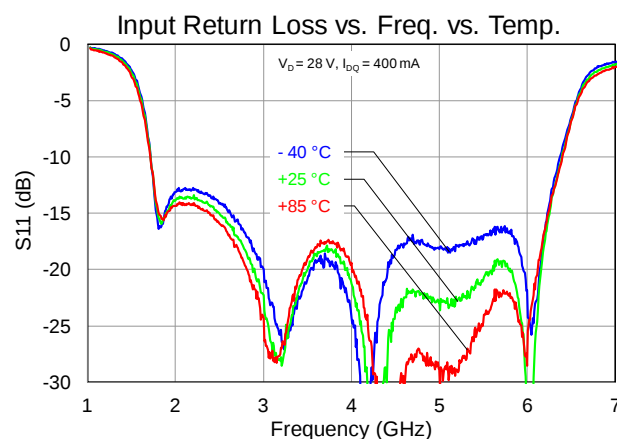
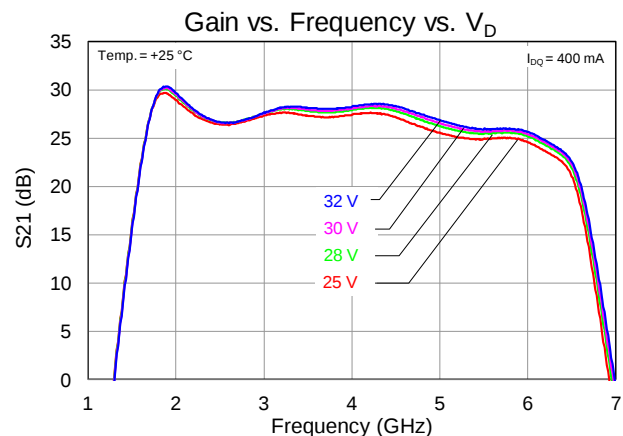
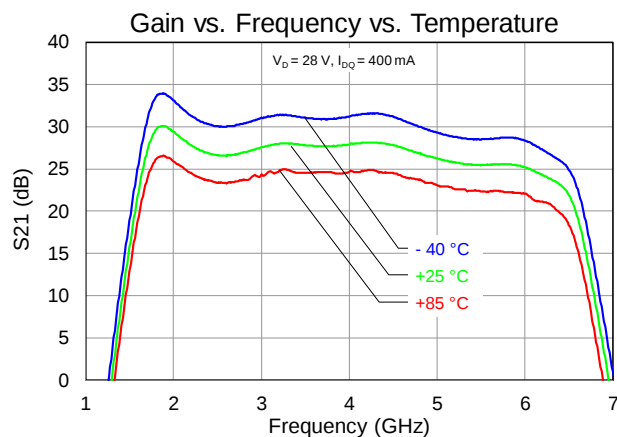
Notes:

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

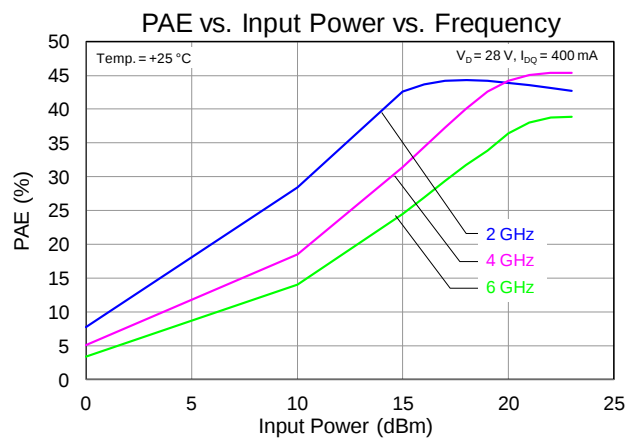
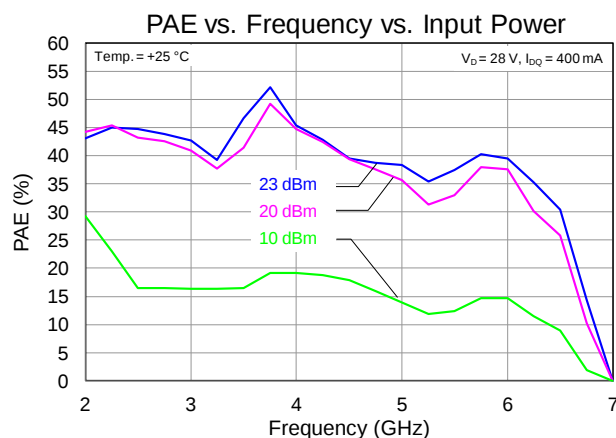
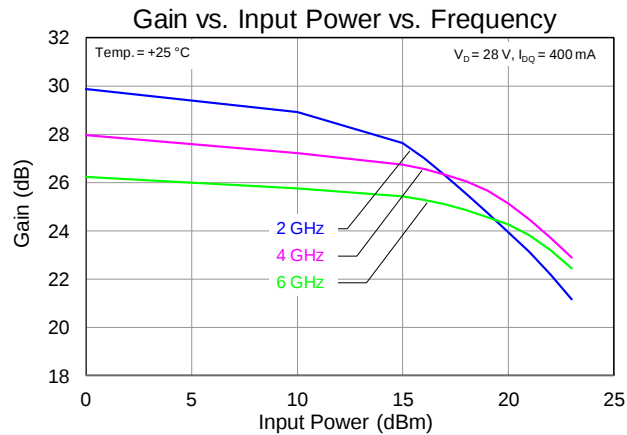
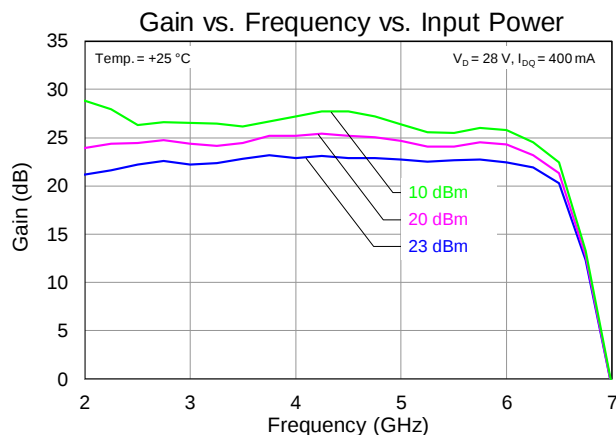
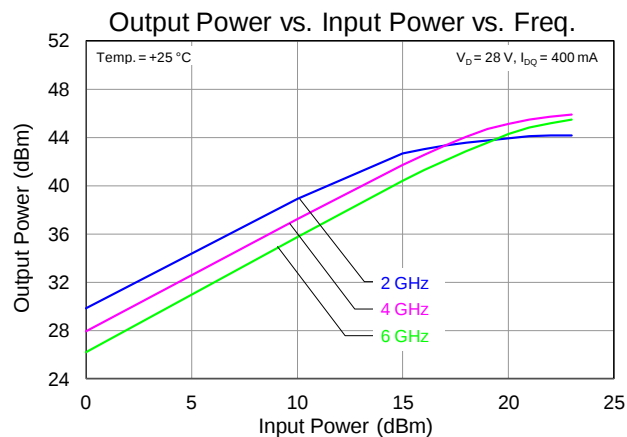
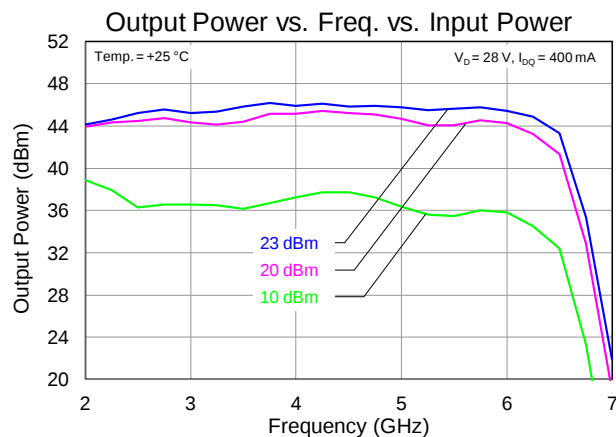
Median Lifetime



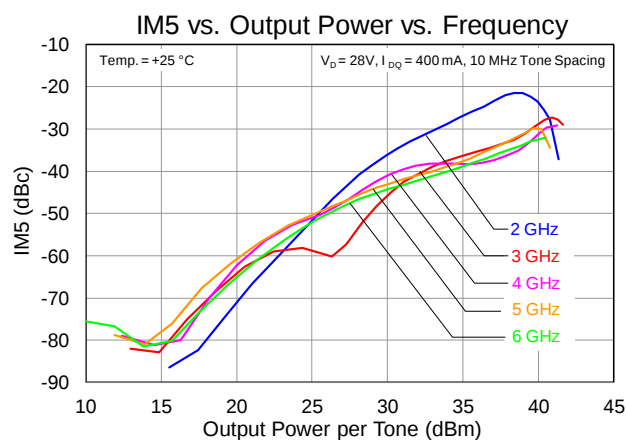
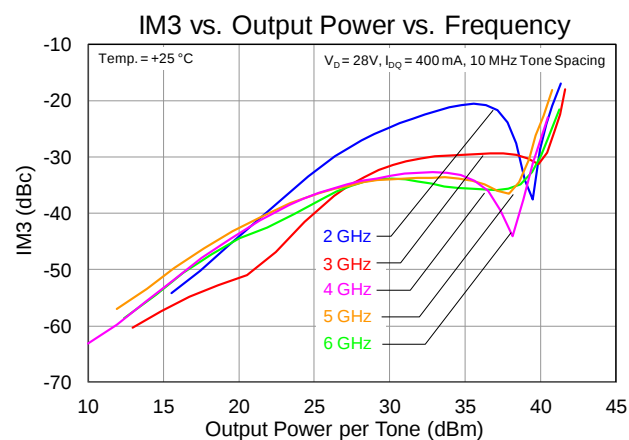
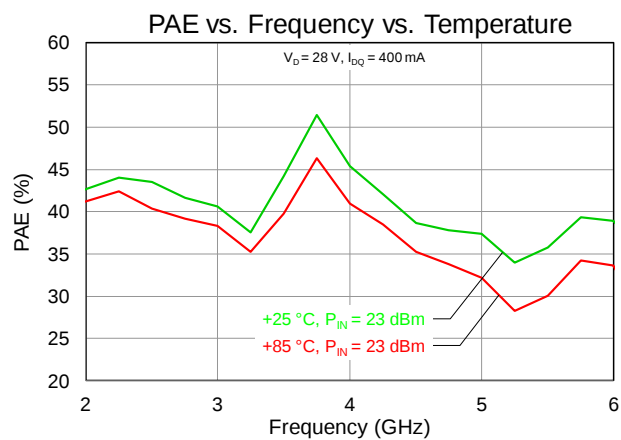
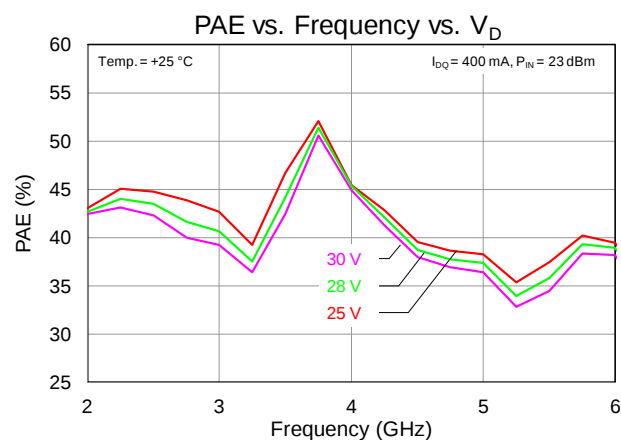
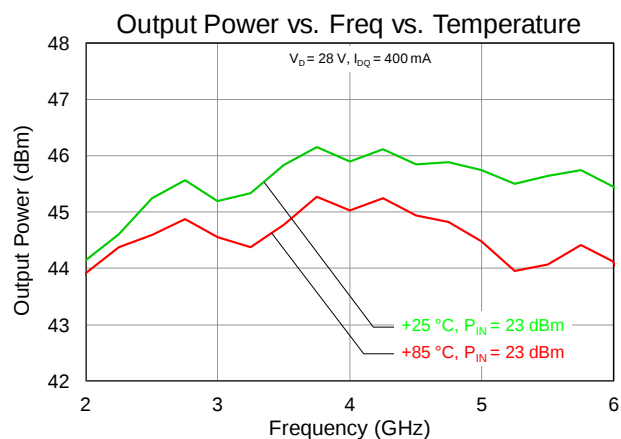
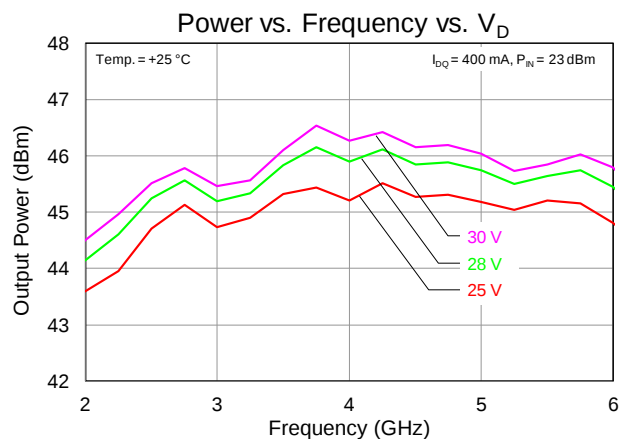
Typical Performance



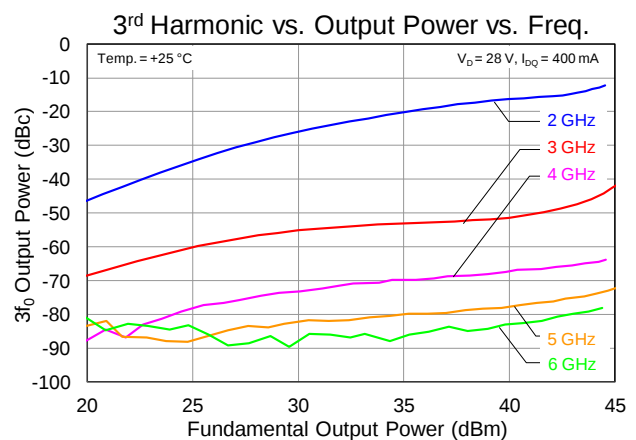
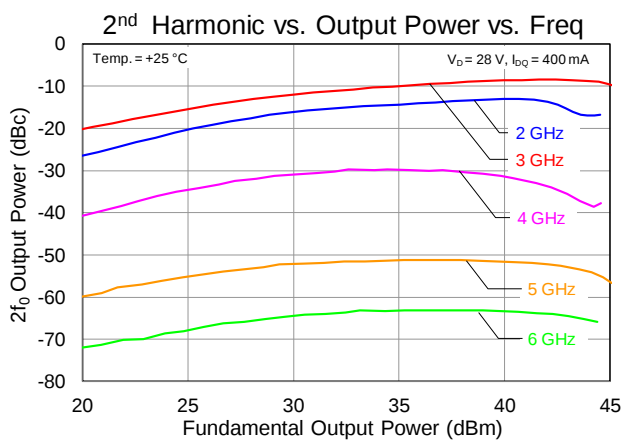
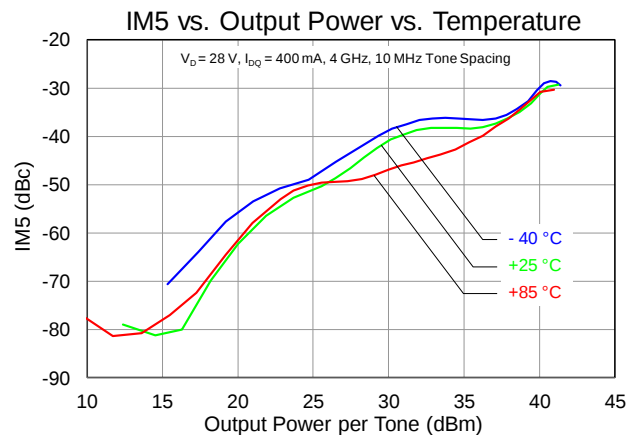
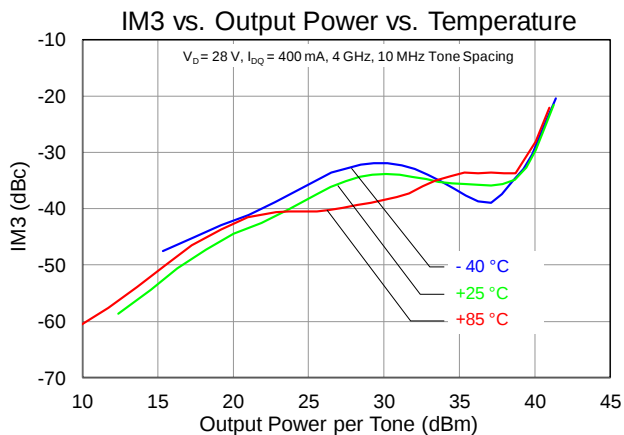
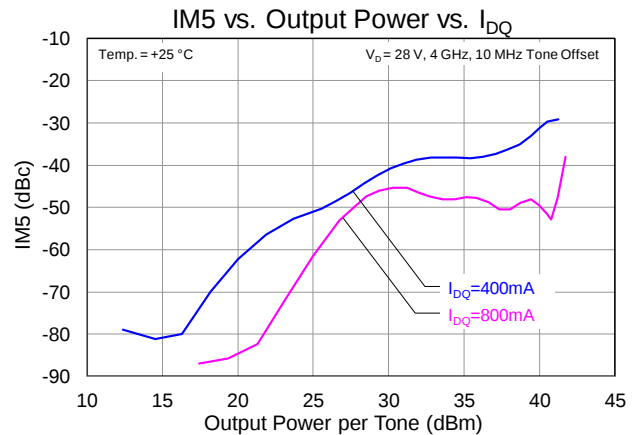
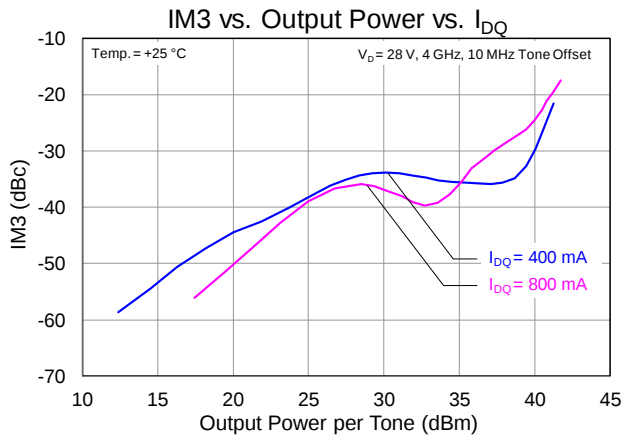
Typical Performance



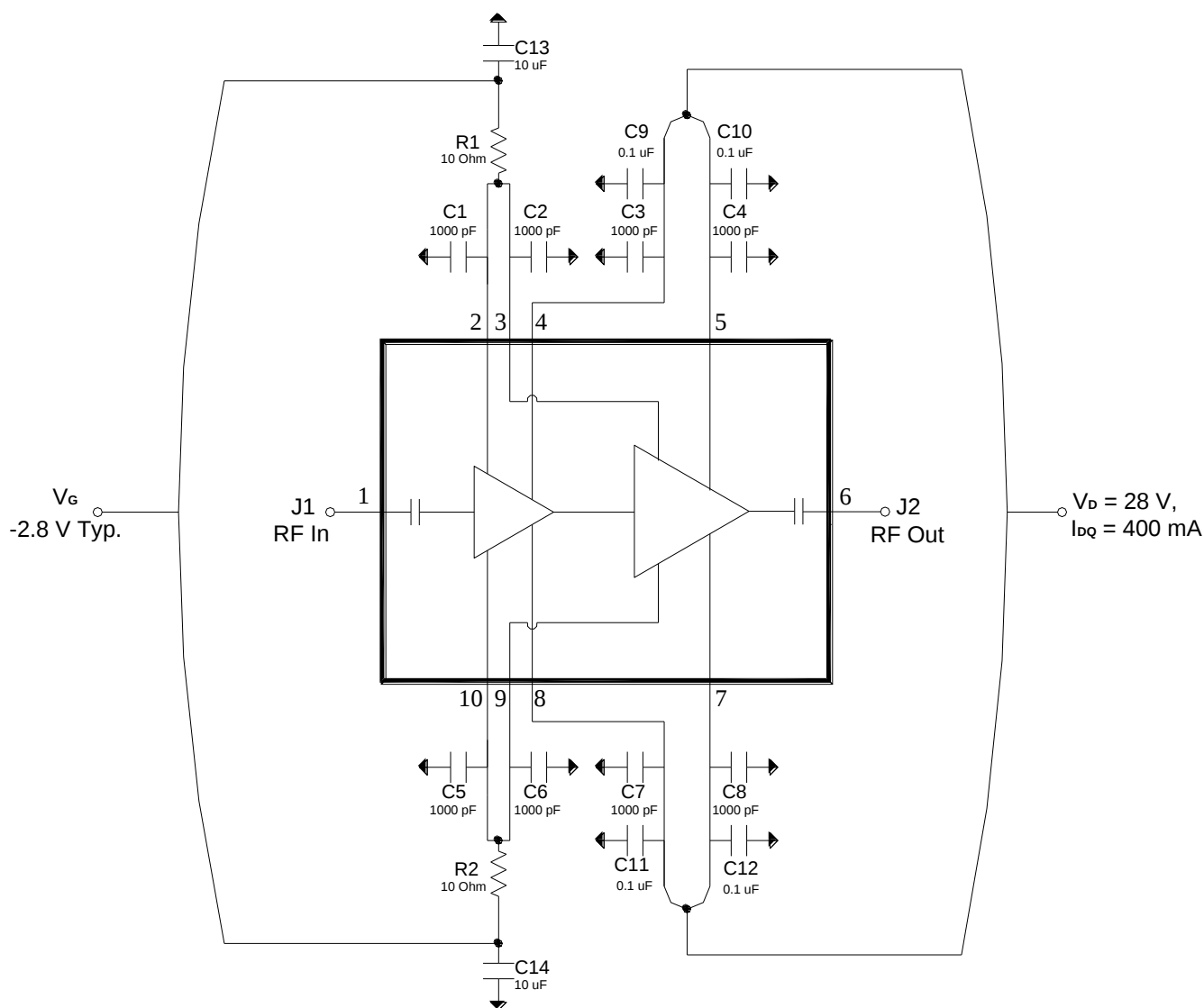
Typical Performance



Typical Performance



Application Circuit



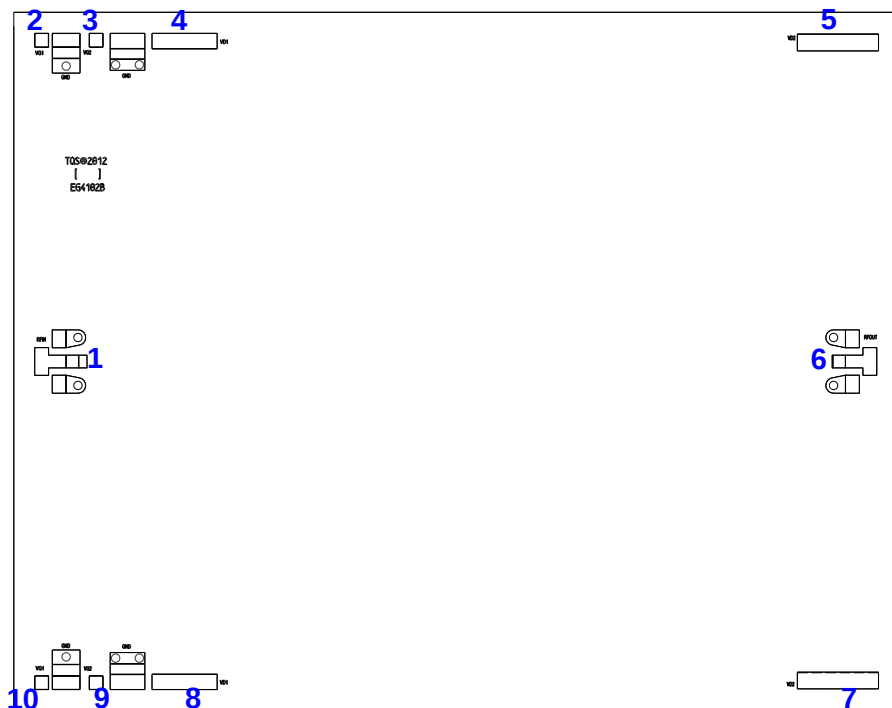
Bias-up Procedure

1. Set I_D limit to 4.5 A, I_G limit to 25 mA
2. Apply -5.0 V to V_G
3. Apply +28 V to V_D
4. Adjust V_G more positive until $I_{DQ} = 400$ mA ($V_G \sim -2.8$ V Typical)
5. Apply RF signal

Bias-down Procedure

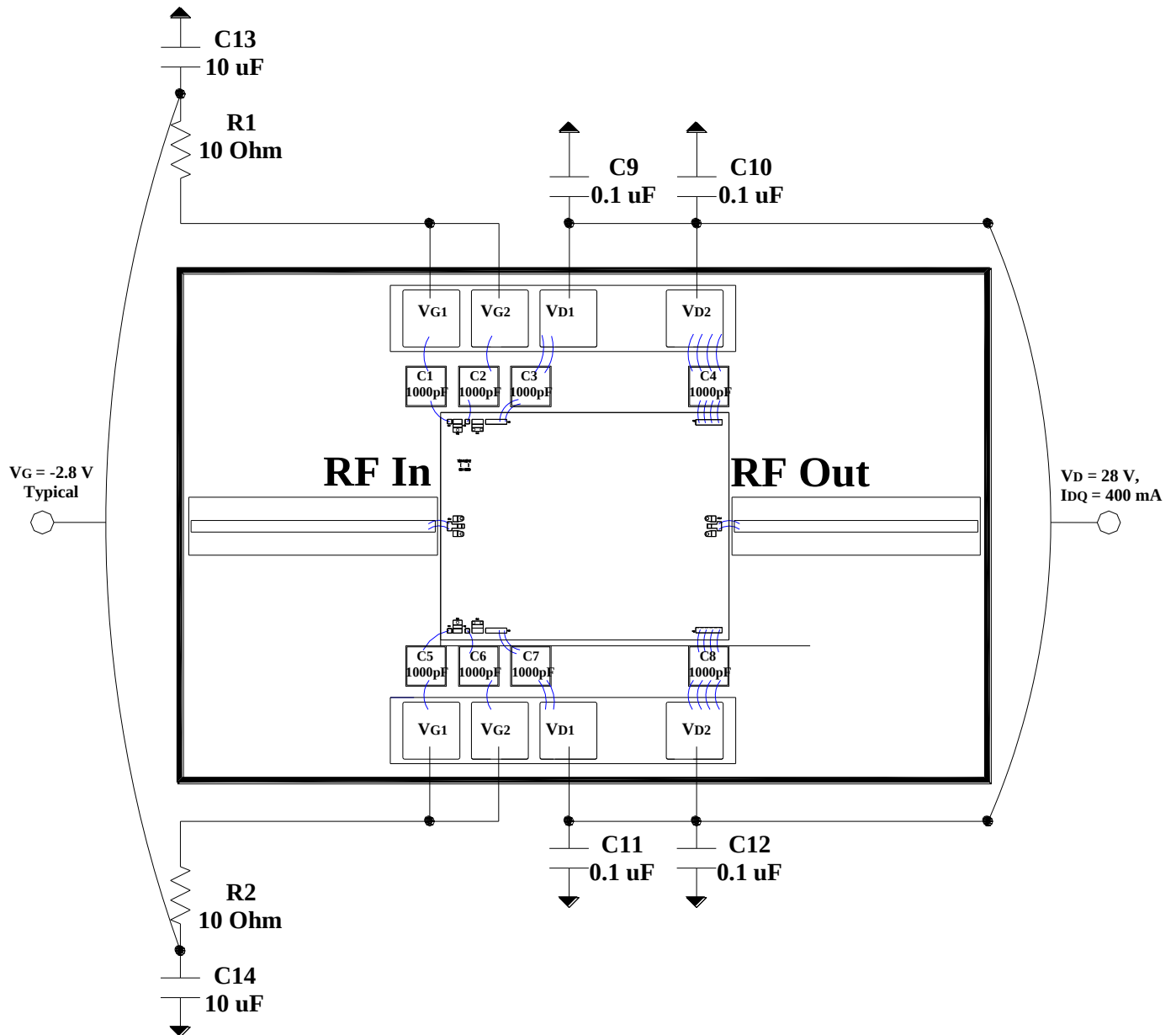
1. Turn off RF signal
2. Reduce V_G to -5.0 V. Ensure $I_{DQ} \sim 0$ mA
3. Set V_D to 0 V
4. Turn off V_D supply
5. Turn off V_G supply

Bond Pad Description



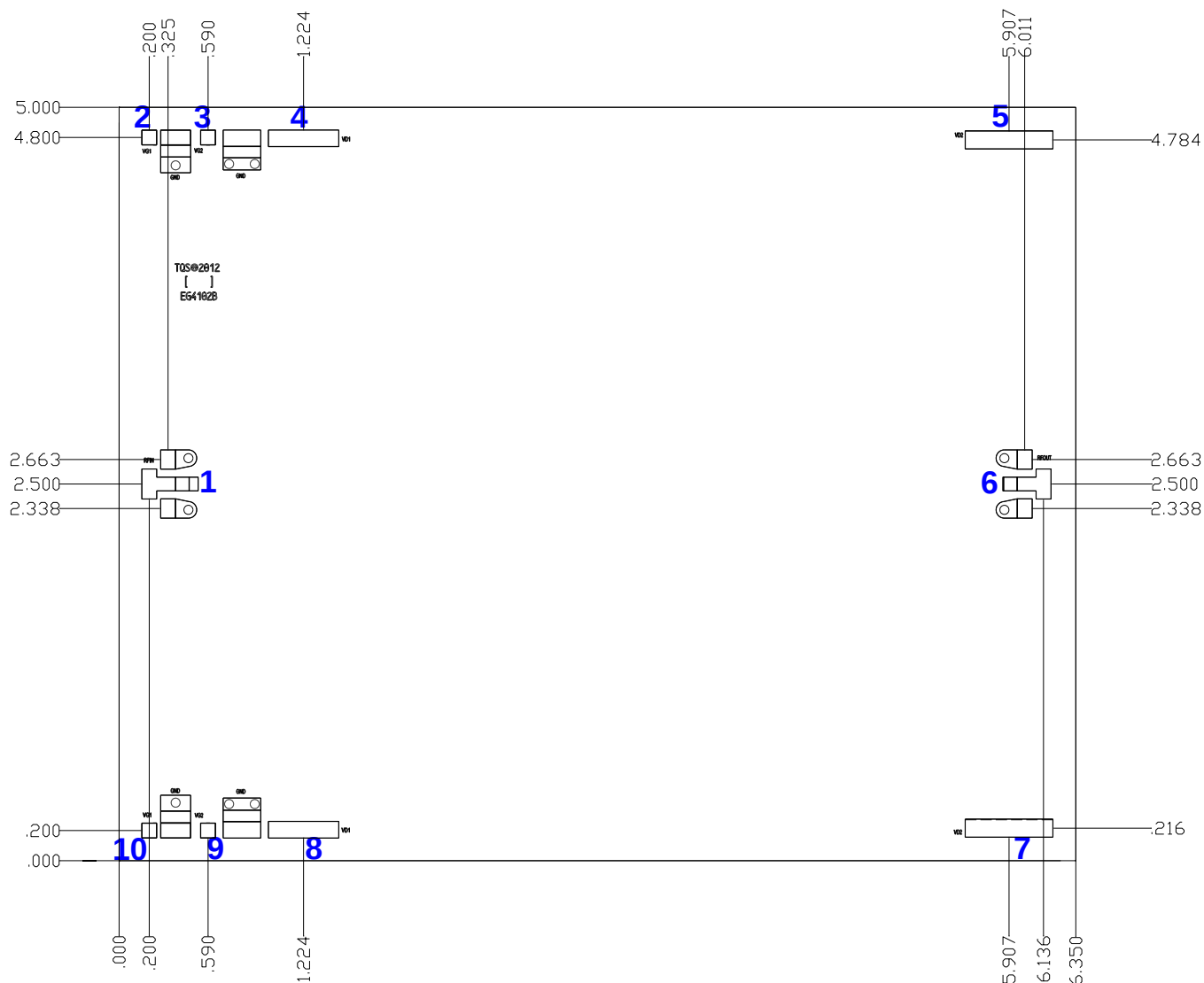
Bond Pad	Symbol	Description
1	RF In	Input; matched to 50 ohms; AC coupled.
2, 10	V_{G1}	Gate voltage, V_{G1} top and bottom. Bias network is required; must be biased from both sides; see Application Circuit on page 9 as an example.
3, 9	V_{G2}	Gate voltage, V_{G1} top and bottom. Bias network is required; must be biased from both sides; see Application Circuit on page 9 as an example.
4, 8	V_{D1}	Drain voltage, V_{D1} top and bottom. Bias network is required; must be biased from both sides; see Application Circuit on page 9 as an example.
5, 7	V_{D2}	Drain voltage, V_{D2} top and bottom. Bias network is required; must be biased from both sides; see Application Circuit on page 9 as an example.
6	RF Out	Input; matched to 50 ohms; AC coupled.

Assembly Drawing



DC bias must be applied from both sides as shown

Mechanical Drawing



Bond Pad	Symbol	Pad Size	Bond Pad	Symbol	Pad Size
1	RF In	0.100 x 0.200	4, 8	V _{D1}	0.450 x 0.100
2, 10	V _{G1}	0.100 x 0.100	5, 7	V _{D2}	0.580 x 0.125
3, 9	V _{G2}	0.100 x 0.100	6	RF Out	0.100 x 0.200

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 ultrasonics 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 (C₁₅H₁₂Br₄O₂) Free
- PFOS Free
- SVHC Free

ECCN

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

Contact Information

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

Web: www.triquint.com
Email: 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

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.