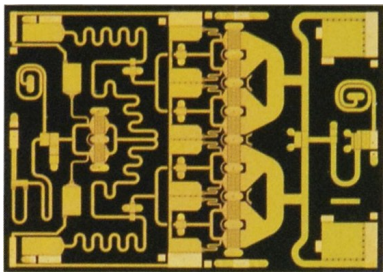
TGA2576

2.5 to 6 GHz GaN HEMT Power Amplifier

Applications

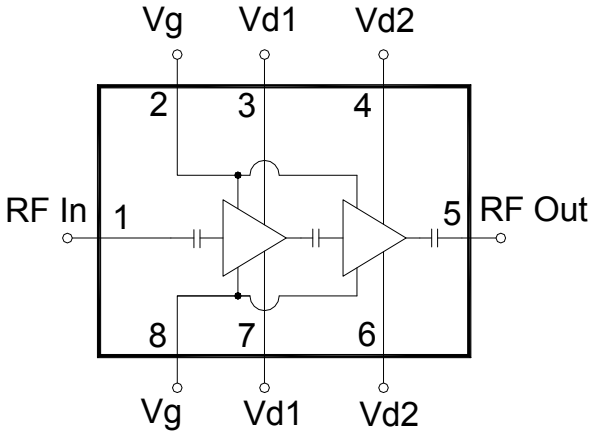
- Communications
- Electronic Warfare
- Test Instrumentation
- EMC Amplifier



Product Features

- Frequency Range: 2.5 – 6 GHz
- Power: 46 dBm Psat @ Pin 26 dBm
- 35 % Power-added efficiency
- Small Signal Gain: 25 dB
- Bias: Vd = 30 V, Id = 1.4 A, Vg = -3.5 V Typical
- Dimensions: 4.4 x 6.2 x 0.1 mm

Functional Block Diagram



General Description

TriQuint's TGA2576 is a wideband power amplifier fabricated on TriQuint's production-released 0.25um GaN on SiC process. Operating from 2.5 GHz to 6 GHz, it achieves 46 dBm saturated output power, 35% PAE and 25 dB small signal gain.

Fully matched to 50 ohms, RoHS compliant and with integrated DC blocking caps on both I/O ports, the TGA2576 is ideally suited to support both commercial and defense related opportunities.

The TGA2576 is 100% DC and RF tested on-wafer to ensure compliance to performance specifications.

Bond Pad Configuration

Bond Pad #	Symbol
1	RF In
2, 8	Vg
3, 7	Vd1
4, 6	Vd2
5	RF Out

Ordering Information

Part No.	ECCN	Description
TGA2576	3A001.b.2.b	2.5-6 GHz Power Amplifier

Specifications

Absolute Maximum Ratings

Parameter	Rating
Drain to Gate Voltage, Vd - Vg	80 V
Drain Voltage,Vd	40 V
Gate Voltage,Vg	-10 to 0 V
Drain Current, Id	4500 mA
Gate Current, Ig	-18 to 50 mA
Power Dissipation, Pdiss	84 W
RF Input Power, CW, 50Ω,T = 25ºC	28 dBm
Channel Temperature, Tch	275 °C
Mounting Temperature (30 Seconds)	320 °C
Storage Temperature	-40 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	Min	Typical	Max	Units
Vd		30		V
Id		1400		mA
Id_drive (Under RF Drive)		4000		mA
Vg		-3.5		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 ºC, Vd = 30 V, Idq = 1400 mA, Vg = -3.5 V Typical.

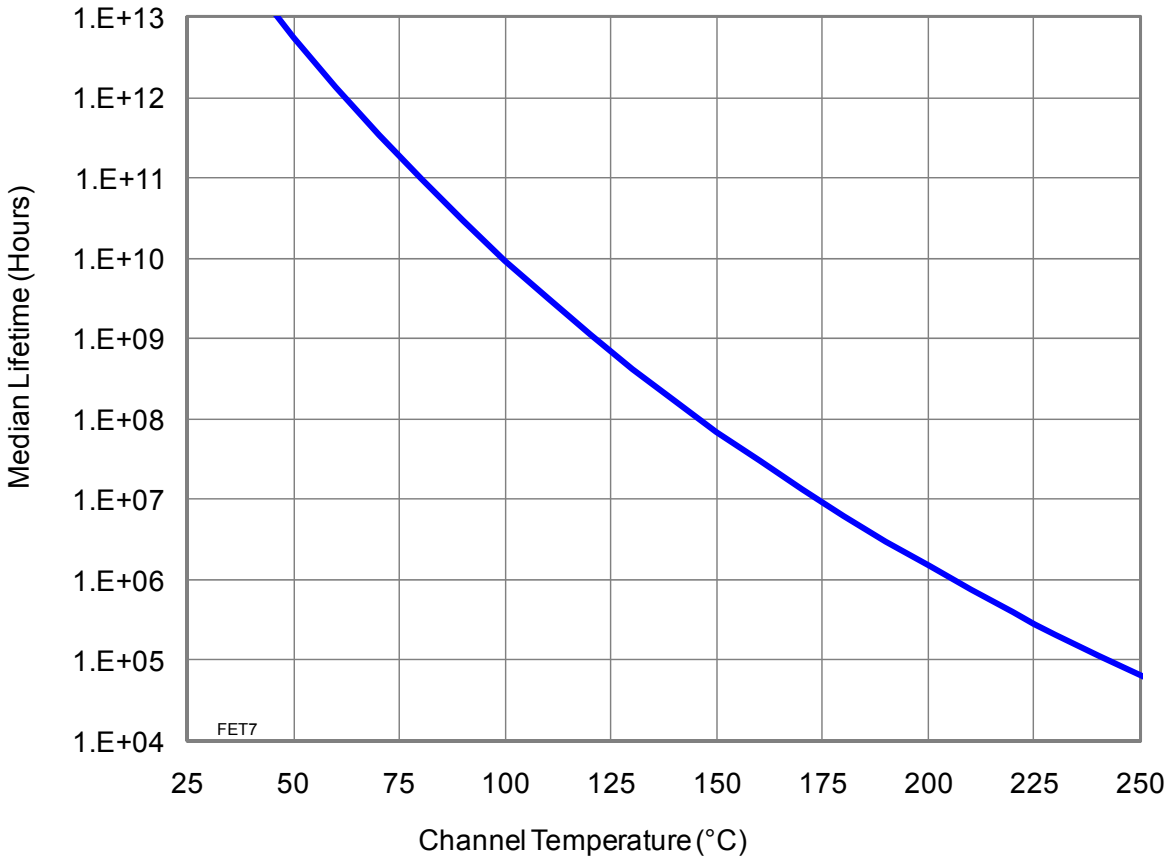
Parameter	Min	Typical	Max	Units
Operational Frequency Range	2.5		6	GHz
Small Signal Gain		25		dB
Output Power @ Saturation		46		dBm
Power-added efficiency		35		%
Gain Temperature Coefficient		- 0.04		dB/°C
Power Temperature Coefficient		- 0.013		dBm/°C

Specifications (cont.)

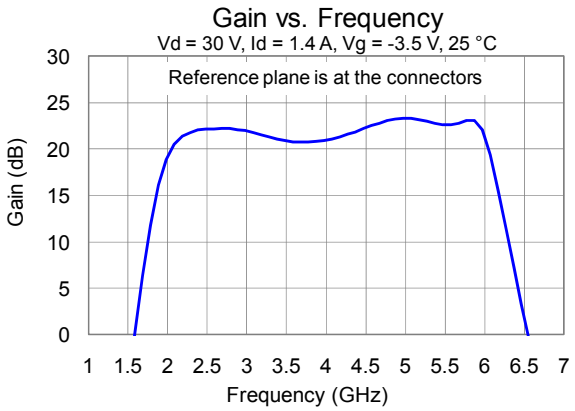
Thermal and Reliability Information

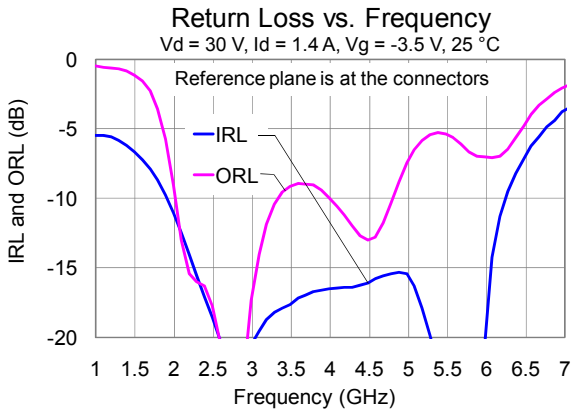
Parameter	Condition	Rating
Thermal Resistance, θ_{JC}, measured to back of package	Tbase = 85 °C	θ_{JC} = 1.47 °C/W
Channel Temperature (Tch), and Median Lifetime (Tm)	Tbase = 85 °C, Vd = 30 V, Id = 1400 mA, Pdiss = 42 W	Tch = 147 °C Tm = 1.0 E+8 Hours
Channel Temperature (Tch), and Median Lifetime (Tm) Under RF Drive	Tbase = 85 °C, Vd = 30 V, Id = 4000 mA, Pout = 46 dBm, Pdiss = 80 W	Tch = 203 °C Tm = 1.2 E+6 Hours

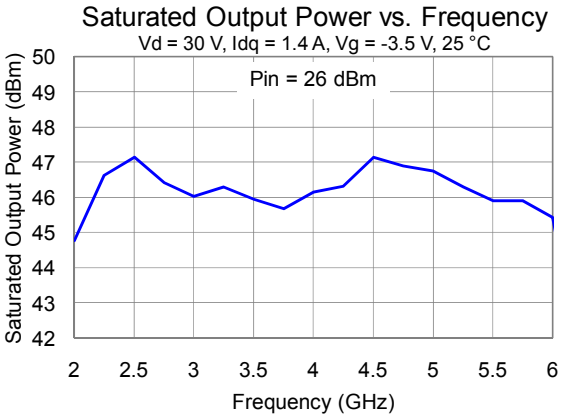
Note: Thermal model includes 37 µm thick AuSn solder, and 635 µm thick CuMo thermal spreader.

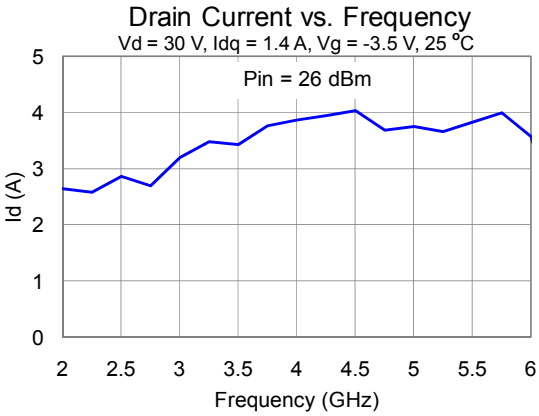


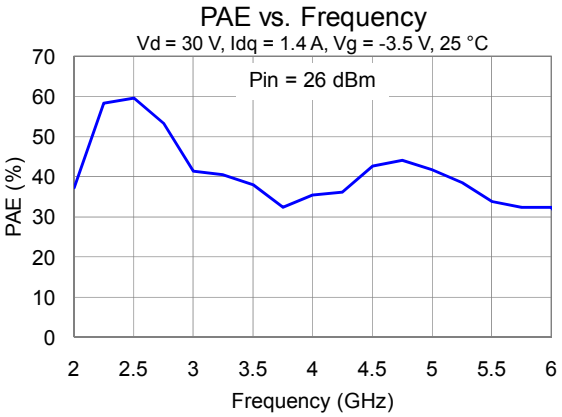
Typical Performance

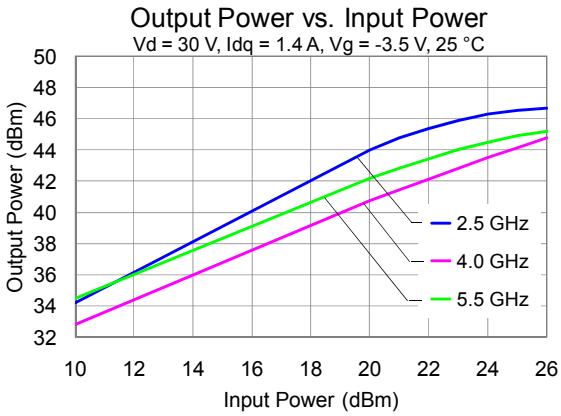




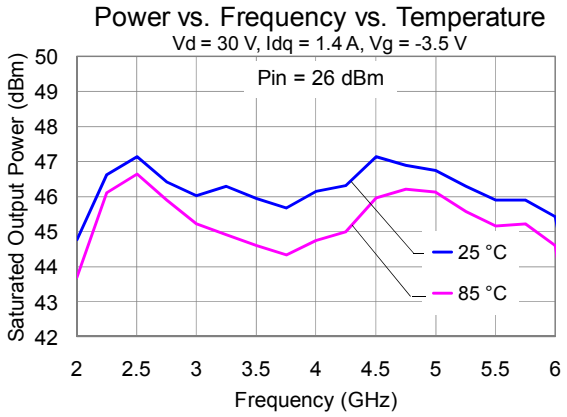


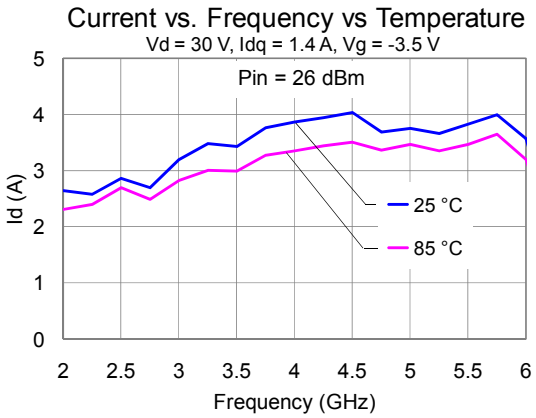


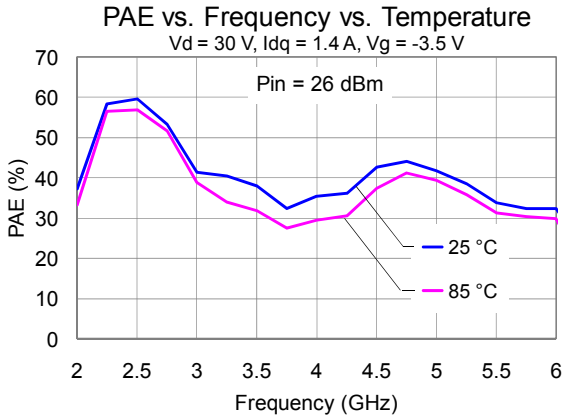


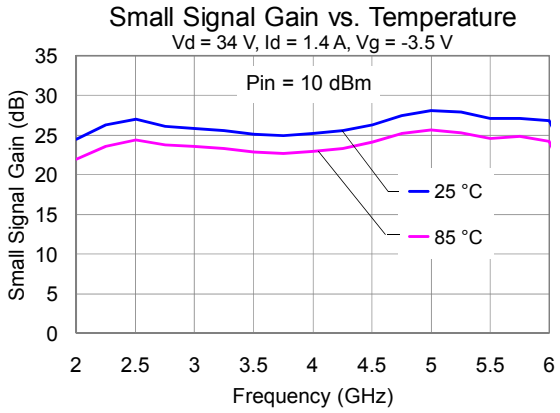


Typical Performance (cont.)

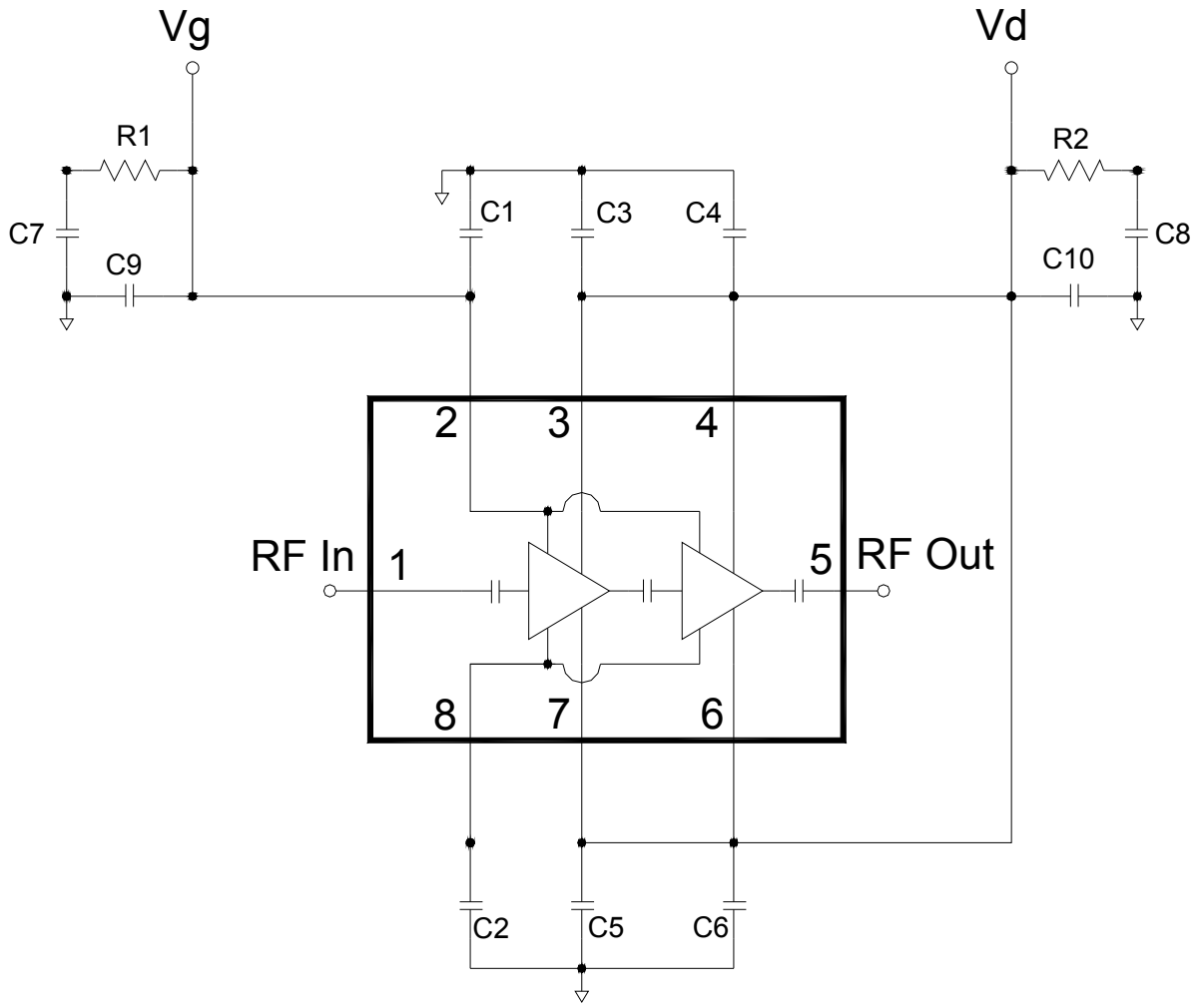








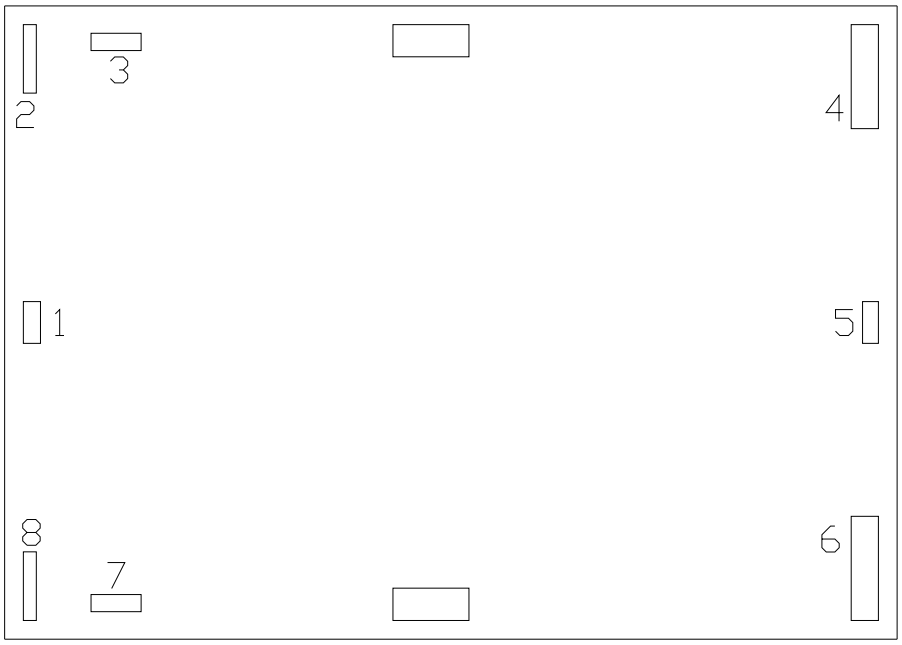
Application Circuit



Vg can be biased from either side (pin 2 or pin 8).
Vd must be biased from both sides (pins 3, 4 and pins 6, 7).

Bias-up Procedure	Bias-down Procedure
Vg set to -5.0 V	Turn off RF signal
Vd set to +30 V	Reduce Vg to -5.0 V. Ensure Id ~ 0 mA
Adjust Vg more positive until quiescent Id is 1400 mA. This will be ~ Vg = -3.5 V typical	Set Vd to 0 V
Apply RF signal	Set Vg to 0 V

Bond Pad Description

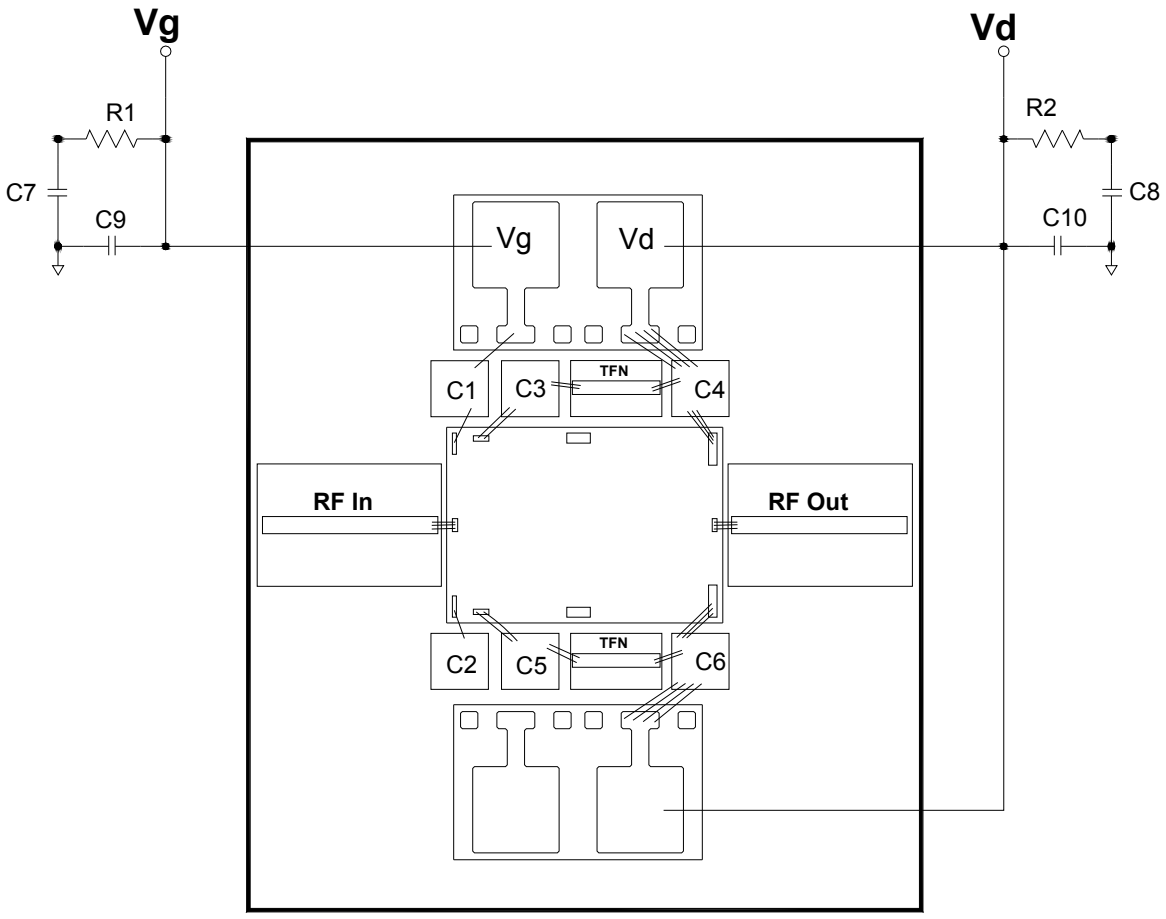


Bond Pad	Symbol	Description
1	RF In	Input, matched to 50 ohms.
2	Vg	Top side Gate voltage. See Note 1.
3, 4	Vd1, 2	Top side Drain voltage. See Note 2.
5	RF Out	Output, matched to 50 ohms.
6, 7	Vd1, 2	Bottom side Drain voltage. See Note 2.
8	Vg	Bottom side Gate voltage. See Note 1.

Notes:

1. Bias network is required; can be biased from either side (pin 2 or pin 8); see Application Circuit on page 6 as an example.
2. Bias network is required; must be biased from both sides; see Application Circuit on page 6 as an example.

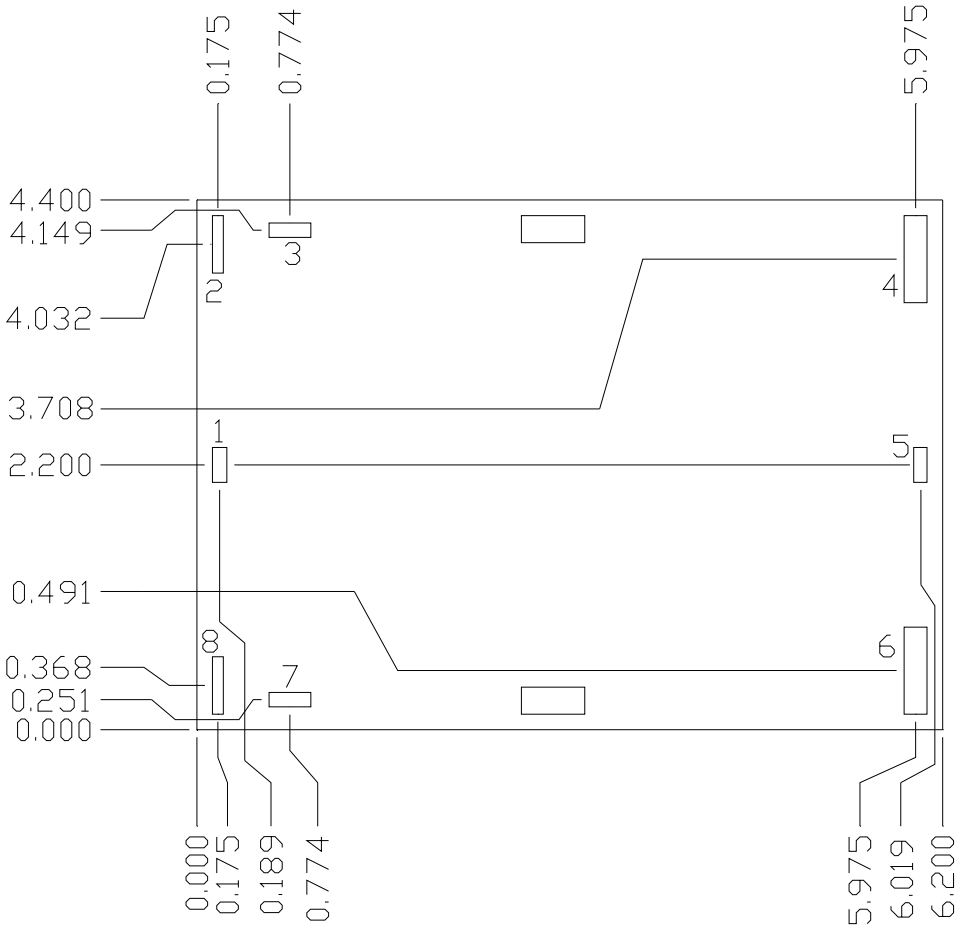
Assembly Drawing



Bill of Material

Ref Des	Value	Description	Manufacturer	Part Number
C1, C2	0.01 uF	Cap, 50V, 25%	various	
C3-C6	1000 pF	Cap, 50V, 25%, Single Layer Cap	various	
C7, C8	0.1 uF	Cap, 25V, 5%	various	
C9	47 uF	Cap, 25V, 5%	various	
C10	470 uF	Cap, 50V, 5%	various	
R1, R2	10 Ohms	Res, ¼ W, 10%	various	

Mechanical Information



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
1	RF In	0.290 x 0.120
2, 8	Vg1, 2	0.477 x 0.090
3, 7	Vd1	0.120 x 0.350
4, 6	Vd2	0.723 x 0.190
5	RF Out	0.290 x 0.110

Product Compliance Information

ESD Information

Caution! ESD-Sensitive Device

ESD Rating:	TBD
Value:	Passes ≥ TBD V min.
Test:	Human Body Model (HBM)
Standard:	JEDEC Standard JESD22-A114

ECCN

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

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 ($C_{15}H_{12}Br_4O_2$) Free
- PFOS Free
- SVHC Free

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.
- Do not use any kind of flux.
- Coefficient of thermal expansion matching is critical for long-term reliability.
- In order to achieve the advertised performance and to maintain reliability of the product, it is necessary for the solder attach to cover >90% for each of the active areas. An active area is defined as a single unit cell. This is critical given the high power dissipation associated with GaN power amplifiers. Total die area should not exceed 10% voiding.
- 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.

Contact Information

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

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