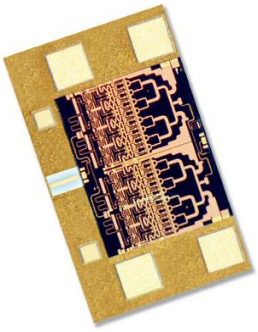
TGA2575-TS

Ka-Band 3 Watt Power Amplifier

Applications

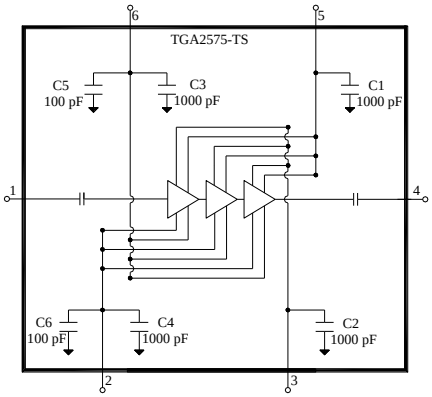
- Military Radar
- Communications



Product Features

- Frequency Range: 32.0 – 38.0 GHz
- Power: 35.5 dBm Psat
- PAE: 22%
- Gain: 19 dB
- Return Loss: 12 dB
- Bias: Vd = 6 V, Id = 2.1 A, Vg = -0.60 V Typical
- Dimensions: 5.31 x 8.92 x 0.49 mm

Functional Block Diagram



General Description

TriQuint's TGA2575-TS is a wideband power amplifier fabricated on TriQuint's production-released 0.15um pwr-pHEMT process. Operating from 32 GHz to 38 GHz, it achieves 35.5 dBm saturated output power, 22% PAE and 19 dB small signal gain over most of the band.

The TGA2575-TS is a 2 mil thick GaAs die mounted on a 10 mil thick CuMoCu carrier. This provides the customer a known good die attach to assist in thermal management and provide easier handling.

Fully matched to 50 ohms, ROHS compliant and with integrated DC blocking caps on both I/O ports, the TGA2575-TS is ideally suited to support both commercial and defense related opportunities.

The TGA2575-TS is 100% DC and RF tested on-wafer to ensure compliance to performance specifications.

Lead-free and RoHS compliant

Bond Pad Configuration

Pin #	Symbol
1	RF In
2, 6	Vg
3, 5	Vd
4	RF Out

Ordering Information

Part No.	ECCN	Description
TGA2575-TS	3A001.b.2.d	Ka-band Power Amplifier

Specifications

Absolute Maximum Ratings

Parameter	Rating
Drain Voltage,Vd	+6.5 V
Gate Voltage,Vg	-5 to 0 V
Drain to Gate Voltage, Vd-Vg	10
Drain Current, Id	3.8 A
Gate Current, Ig	-14 to 4.8 mA
Power Dissipation, Pdiss	21 W
RF Input Power, CW, 50Ω,T = 25ºC	23 dBm
Channel Temperature, Tch	200 °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		6		V
Id		2.1		A
Id_drive (Under RF Drive)		3.3		A
Vg		-0.60		V

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

Electrical Specifications

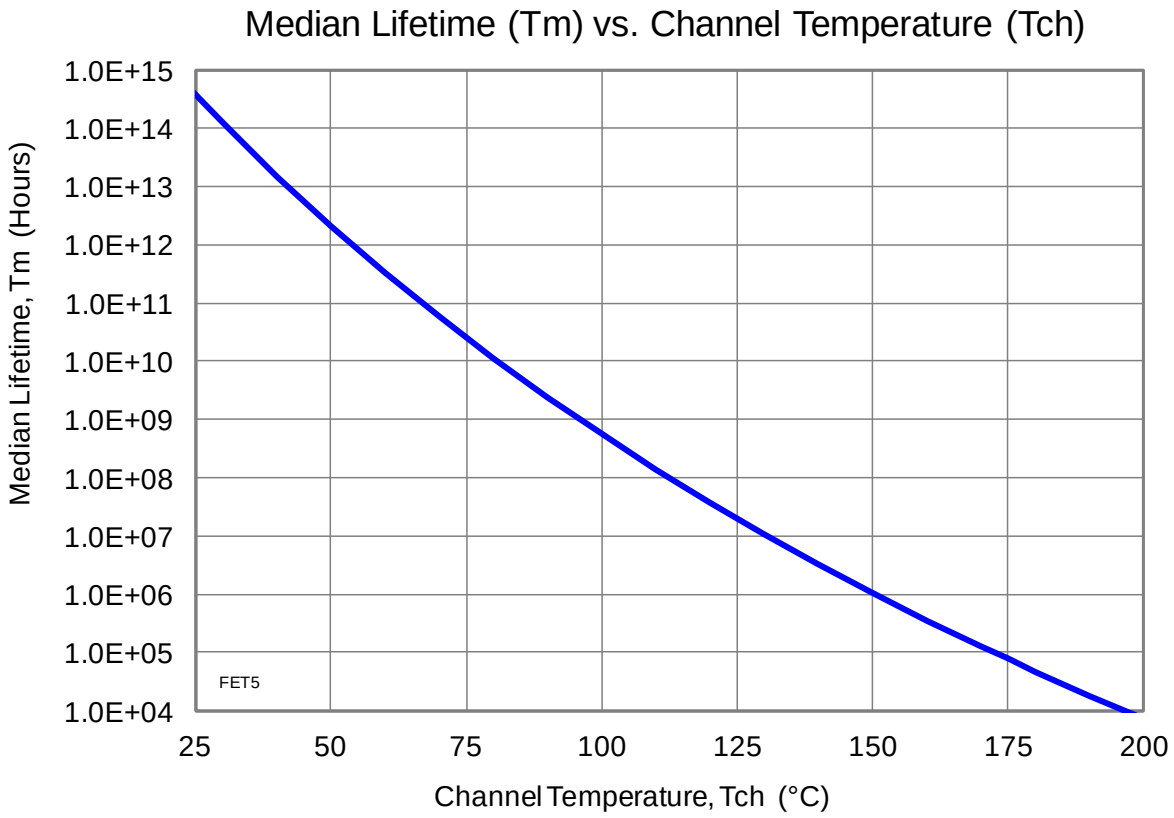
Test conditions unless otherwise noted: 25ºC, Vd = 6 V, Id = 2.1 A, Vg = -0.60 V Typical.

Parameter	Min	Typical	Max	Units
Operational Frequency Range	32		38	GHz
Gain: 32 – 35 GHz	17	19		dB
Gain: 36 – 85 GHz	15	17		
Input Return Loss		12		dB
Output Return Loss		12		dB
Output Power @ Saturation: 32 – 35 GHz	34.5	35.5		dBm
Output Power @ Saturation: 36 – 38 GHz	33	34.5		
PAE @ Saturation		22		%

Specifications (cont.)

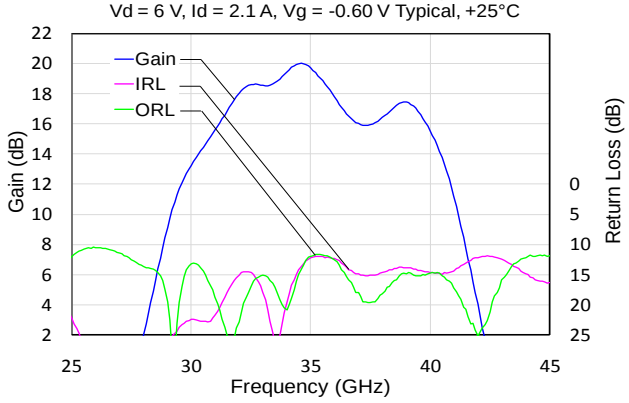
Thermal and Reliability Information

Parameter	Condition	Rating
Thermal Resistance, θ_{JC}, measured to back of package	Tbase = 70 °C	θ_{JC} = 6.2°C/W
Channel Temperature (Tch), and Median Lifetime (Tm)	Tbase = 70 °C, Vd = 6 V, Id = 2.1 A, Pdiss = 12.6 W	Tch = 148°C Tm = 1.3 E+6 Hours
Channel Temperature (Tch), and Median Lifetime (Tm) Under RF Drive	Tbase = 70 °C, Vd = 6 V, Id = 3.3 A, Pout = 36 dBm, Pdiss = 15.8 W	Tch = 168°C Tm = 1.5E+5 Hours

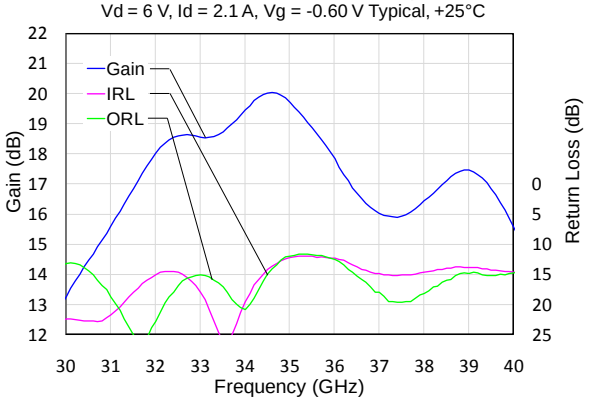


Typical Performance

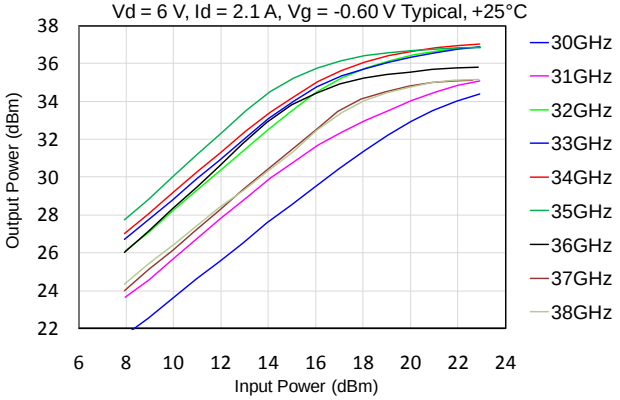
S-Parameters vs. Freq.
Vd = 6 V, Id = 2.1 A, Vg = -0.60 V Typical, +25°C



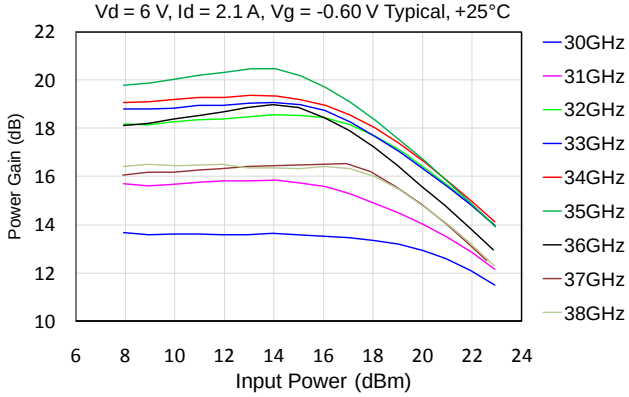
S-Parameters vs. Freq.
Vd = 6 V, Id = 2.1 A, Vg = -0.60 V Typical, +25°C



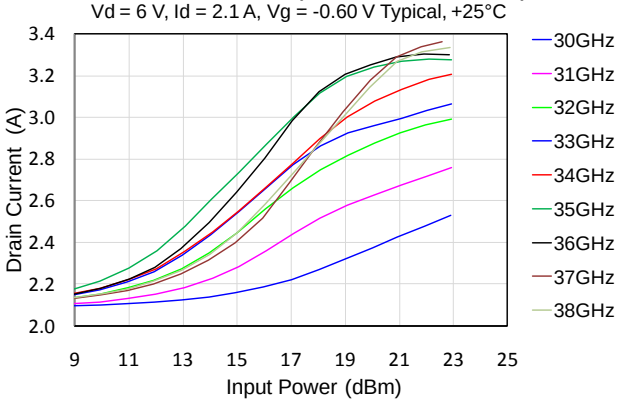
Output Power vs. Input Power vs. Freq.
Vd = 6 V, Id = 2.1 A, Vg = -0.60 V Typical, +25°C



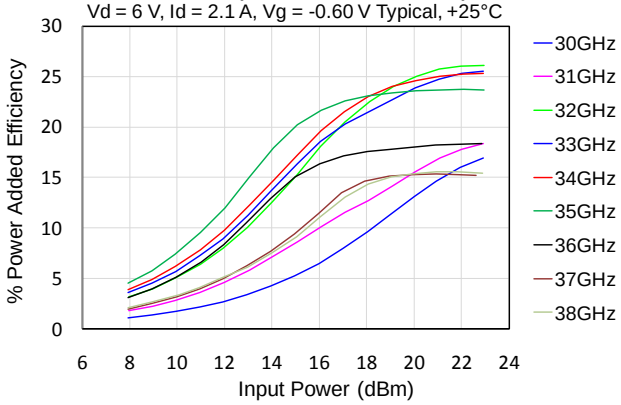
Power Gain vs. Input Power vs. Freq.
Vd = 6 V, Id = 2.1 A, Vg = -0.60 V Typical, +25°C



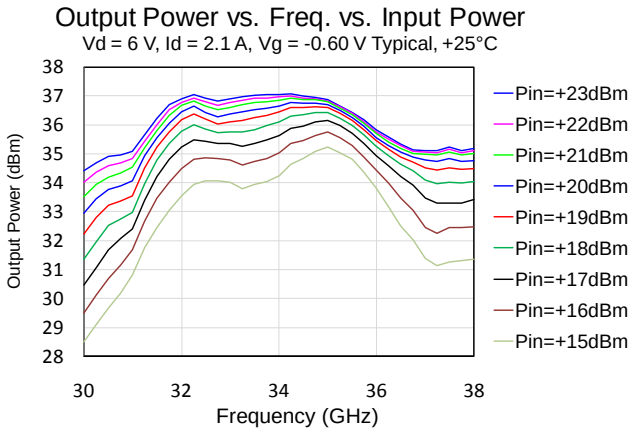
Drain Current vs. Input Power vs. Freq.
Vd = 6 V, Id = 2.1 A, Vg = -0.60 V Typical, +25°C

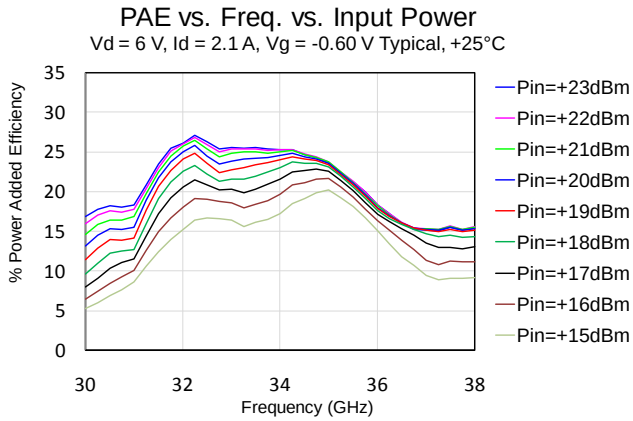


PAE vs. Input Power vs. Freq.
Vd = 6 V, Id = 2.1 A, Vg = -0.60 V Typical, +25°C

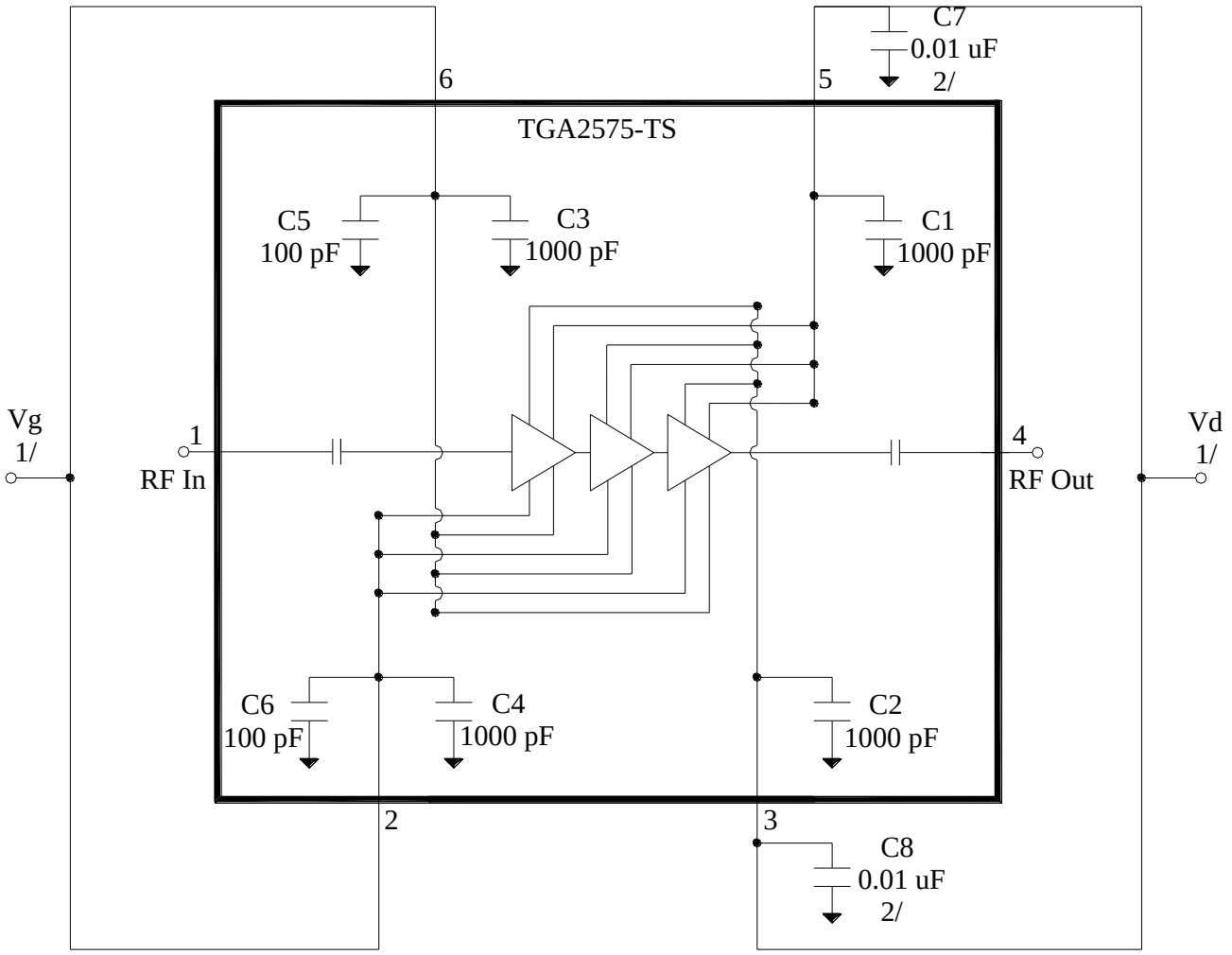


Typical Performance (cont.)





Application Circuit

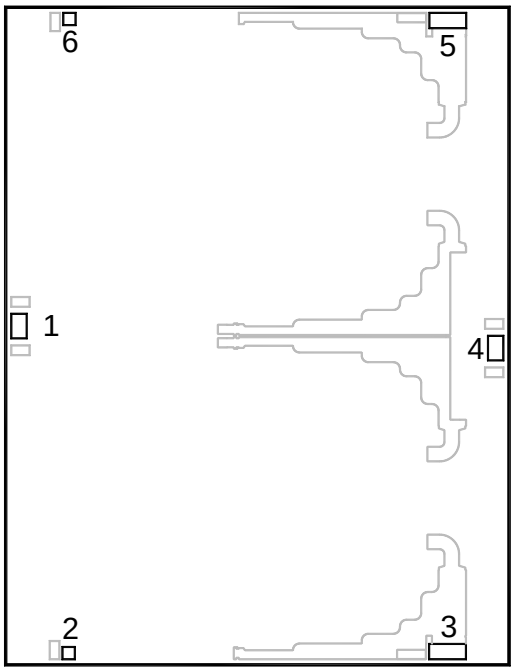


Vg must be biased from both sides (pins 2 and 6)
Vd must be biased from both sides (pins 3 and 5)

Bias-up Procedure	Bias-down Procedure
Vg set to -1.5 V	Turn off RF supply
Vd set to +6 V	Reduce Vg to -1.5V. Ensure Id ~ 0 mA
Adjust Vg more positive until quiescent Id is 2.1 A. This will be ~ Vg = -0.60 V	Turn Vd to 0 V
Apply RF signal to RF Input	Turn Vg to 0 V

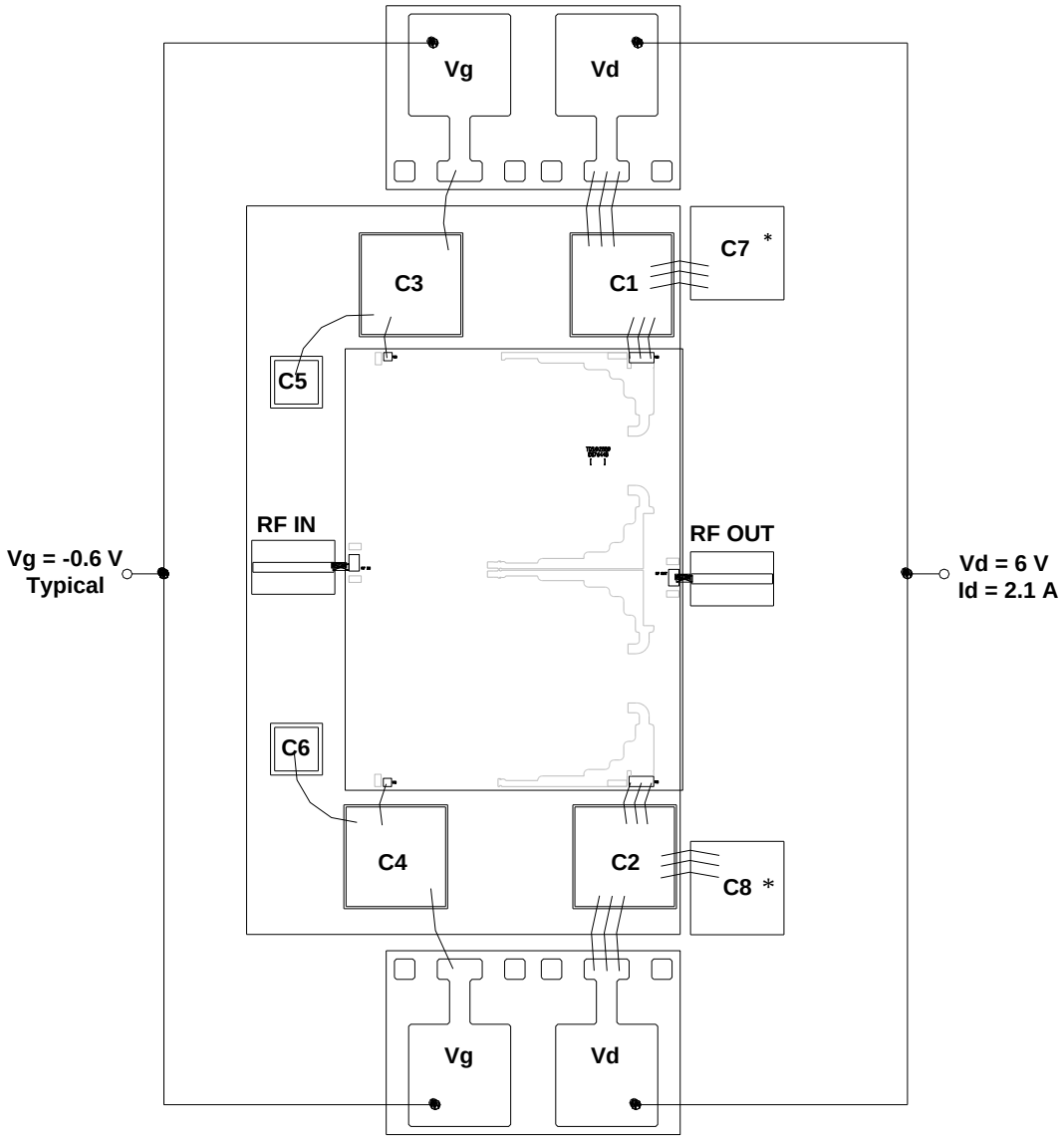
1/ Additional bypass capacitors may be required at this location. The presence and value of these capacitors varies by application. Variables include power supply impedance, power supply stability with reactive loads, and the inductance from the power supply to this assembly. 1 to 47 uF tantalum capacitors are commonly used here.

Bond Pad Description TGA2575 MMIC



Bond Pad	Symbol	Description
1	RF In	Input, matched to 50 ohms.
2, 6	Vg	Gate voltage. Bias network is required; must be biased from each pad; see Application Circuit on page 8 as an example.
3, 5	Vd	Drain voltage. Bias network is required; must be biased from each pad; see Application Circuit on page 8 as an example.
4	RF Out	Output, matched to 50 ohms.
	GND	Backside of die.

Assembly Drawing

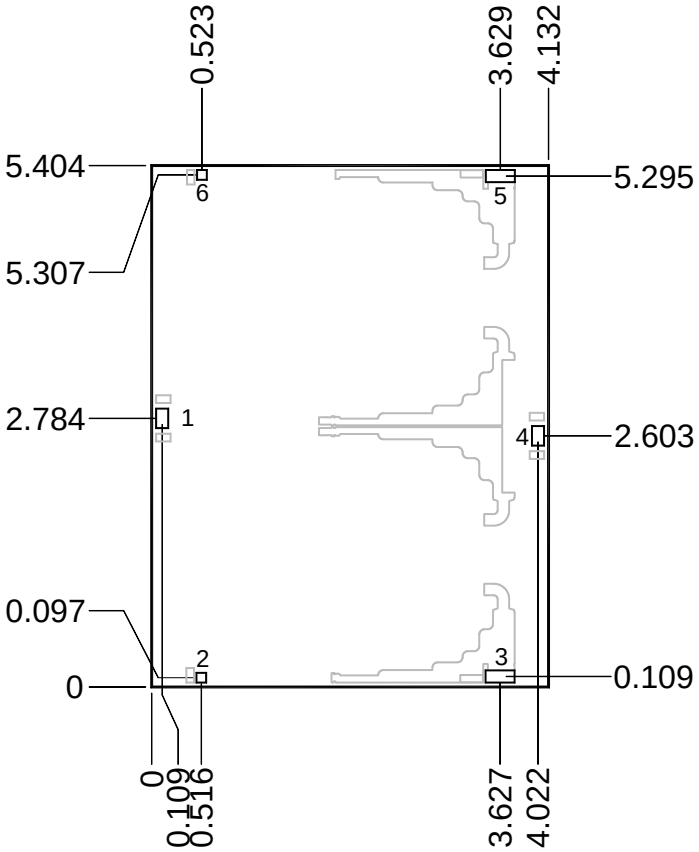


Use one 3 mil gold ribbon or two 1 mil Gold wires for RF bonds; keep ribbon straight or wires as minimum as possible
Use 1 mil gold wire for wire bonding to Capacitors
TFN In (50 Ω line, see mechanical details on page 10), C1 to C6 are included in TGA2575-TS
* Must be removed for pulse operation

Bill of Material

Ref Des	Value	Description	Manufacturer	Part Number
C1, C2, C3,C4	1000 pF	Cap, 100 V, 20%, Single Layer Cap	Included in TGA2575-TS	
C5, C6	100 pF	Cap, 100 V, 10%, Single Layer Cap	Included in TGA2575-TS	
C7, C8	0.01 uF	Cap, 100 V, 10%, SMD	Various	

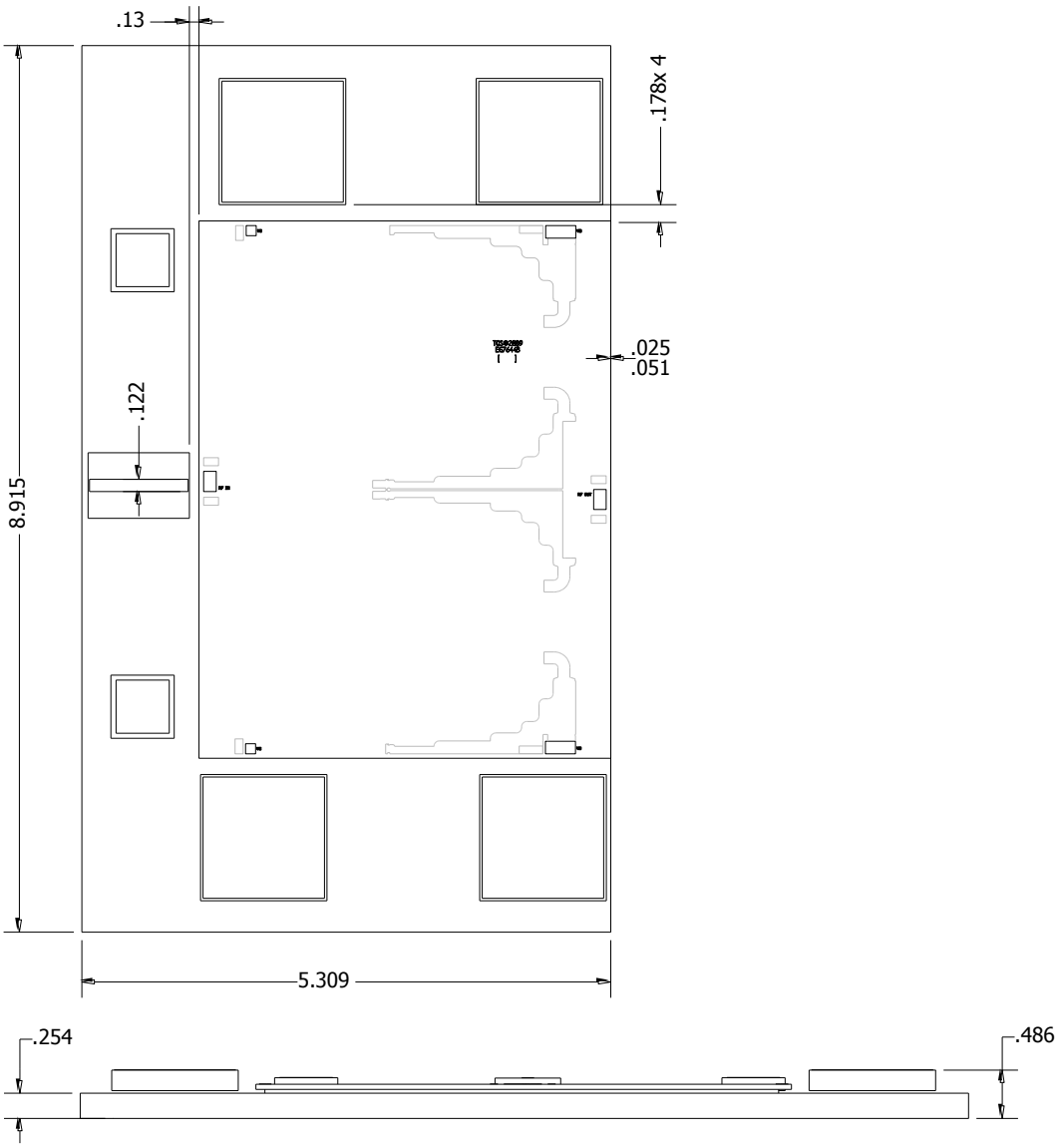
Mechanical Information TGA2575 MMIC



Unit: millimeters
Thickness: 0.05
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	0.126 x 0.202
2, 6	Vg	0.101 x 0.101
3, 5	Vd	0.126 x 0.302
4	RF Out	0.126 x 0.202

Mechanical Information TGA2575-TS (MMIC on Thermal Spreader)



Unit: millimeters
Tolerance: +/- 0.125
Material for Thermal Spreader: Cu13/Mo74/Cu13. Thickness: 0.254 ± 0.025
Plating for Thermal Spreader:
Electrolytic Gold (Au) 2.5-5.72 µm per ASTM B 488, Type III, Grade A
Over Electrolytic Nickel (Ni) 2.5-7.5 µm per QQ-N-290, Class 1.
Material for TFN: White Alumina (AI203) 99.6% pure; Dielectric constant 9.7
Size: .039 x .026 x .005 inches
Plating for TFN: Top and bottom pattern
Titanium-Tungsten (TiW): 0.04 – 0.08 um
Sputtered or plated Gold (Au): 4 um min
MMIC is attached to Thermal Spreader using 80/20 AuSn solder.
TFN and Capacitors are attached to Thermal Spreader can be use epoxy

Product Compliance Information

ESD Information

Caution! ESD-Sensitive Device

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

ECCN

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

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 ($C_{15}H_{12}Br_40_2$) 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.

Reflow process assembly notes:

- Attachment of the carrier should use solder for optimum thermal management.
- An alloy station or conveyor furnace with reducing atmosphere should be used.
- No fluxes should be utilized.
- 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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