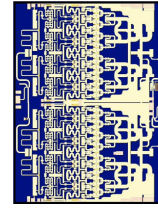


TGA2575

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: 5.4 x 4.1 x 0.05 mm

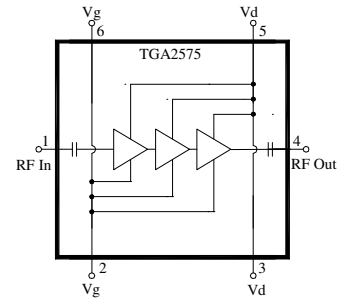
General Description

TriQuint's TGA2575 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.

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

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

Functional Block Diagram



Bond Pad Configuration

| Bond Pad # | Symbol |
|------------|--------|
| 1 | RF In |
| 2, 6 | Vg |
| 3, 5 | Vd |
| 4 | RF Out |

Ordering Information

| Part No. | ECCN | Description |
|----------|-------------|-------------------------|
| TGA2575 | 3A001.b.2.e | 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 | 4.0 A |
| Gate Current, Ig | -14 to 4.8 mA |
| Power Dissipation, Pdiss | 21 W |
| RF Input Power, CW, 50Ω, T = 25°C | 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

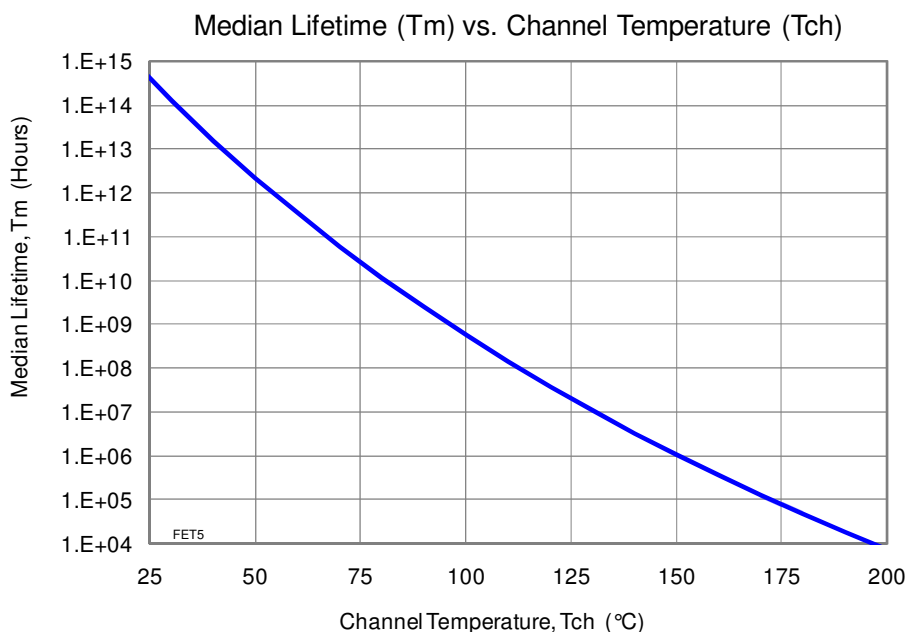
Test conditions unless otherwise noted: 25°C, Vd = 6 V, Id = 2.1 A, Vg = -0.60 V Typical.

| 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 | | % |

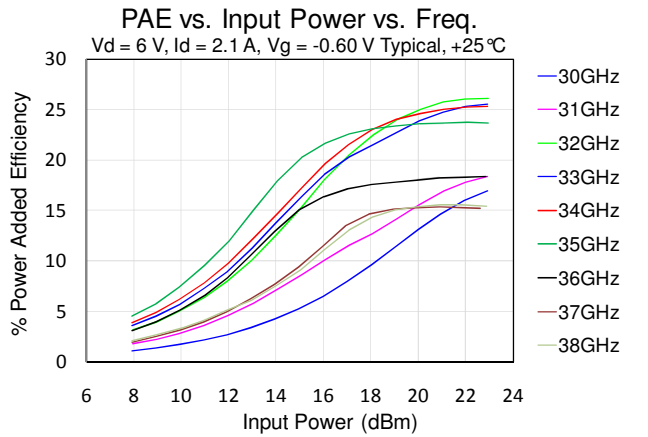
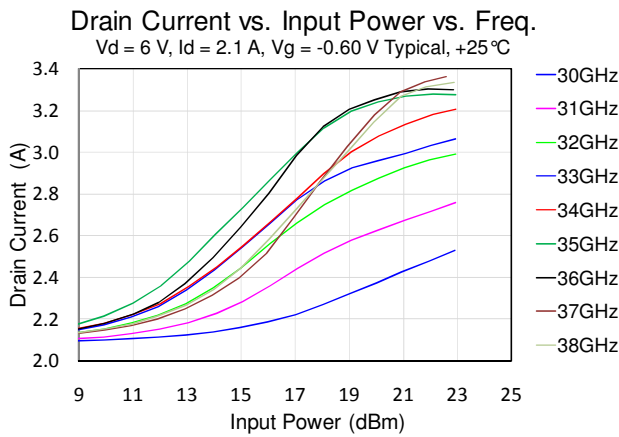
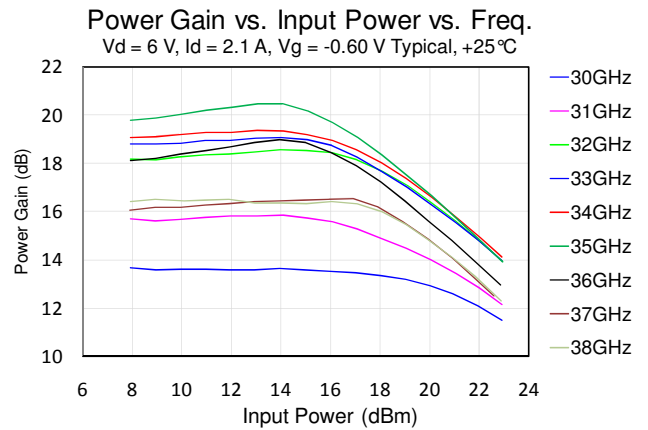
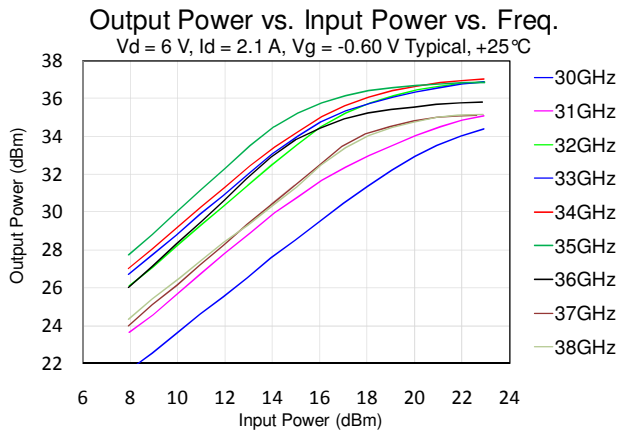
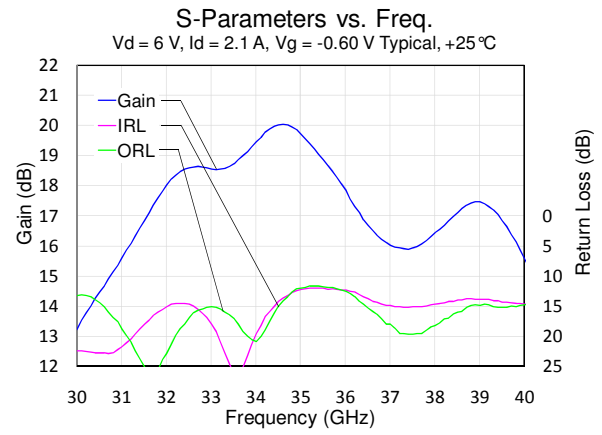
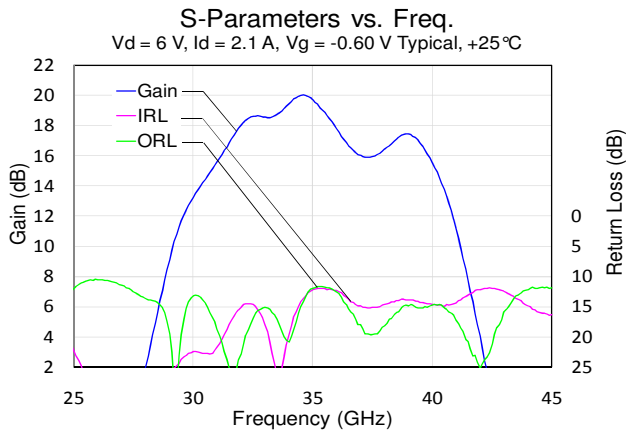
Specifications (cont.)

Thermal and Reliability Information

| Parameter | Condition | Rating |
|--|--|---------------------------------------|
| Thermal Resistance, θ_{JC} , measured to back of package | Tbase = 70 °C | $\theta_{JC} = 6.2^{\circ}\text{C/W}$ |
| 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 |

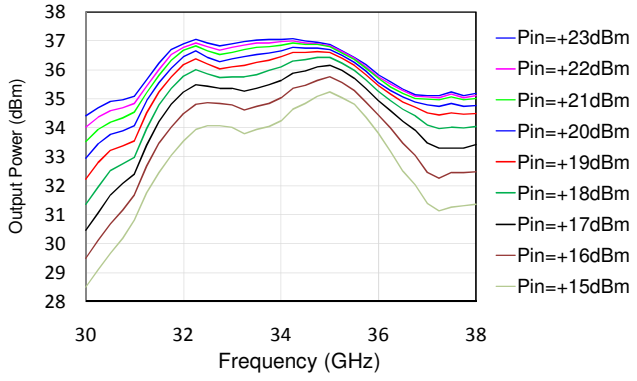


Typical Performance

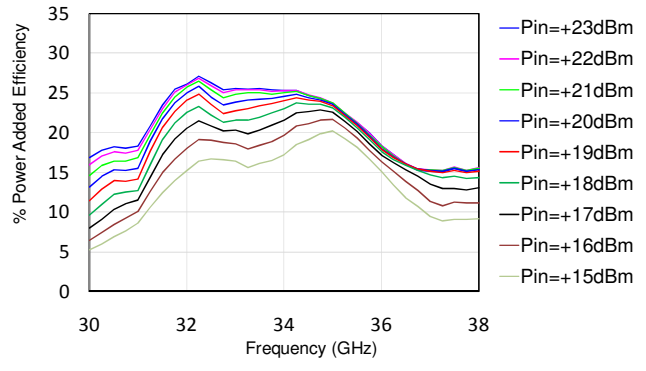


Typical Performance (cont.)

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



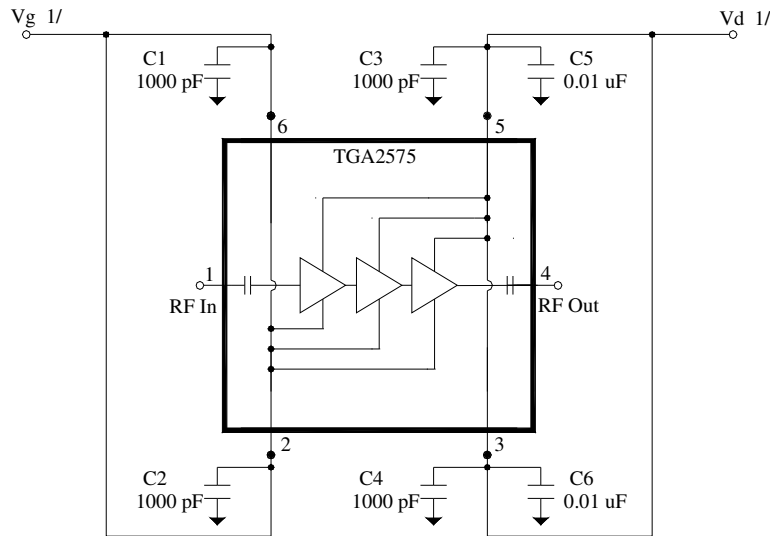
PAE vs. Freq. vs. Input Power
 Vd = 6 V, Id = 2.1 A, Vg = -0.60 V Typical, +25°C



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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

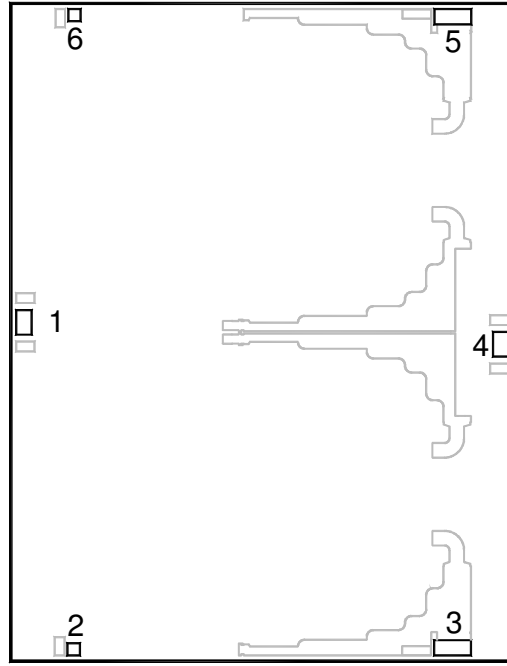
Vg set to -1.5 V
 Vd set to +6 V
 Adjust Vg more positive until quiescent Id is 2.1 A.
 This will be ~ Vg = -0.60 V
 Apply RF signal to RF Input

Bias-down Procedure

Turn off RF supply
 Reduce Vg to -1.5V. Ensure Id ~ 0 mA
 Turn Vd to 0 V
 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

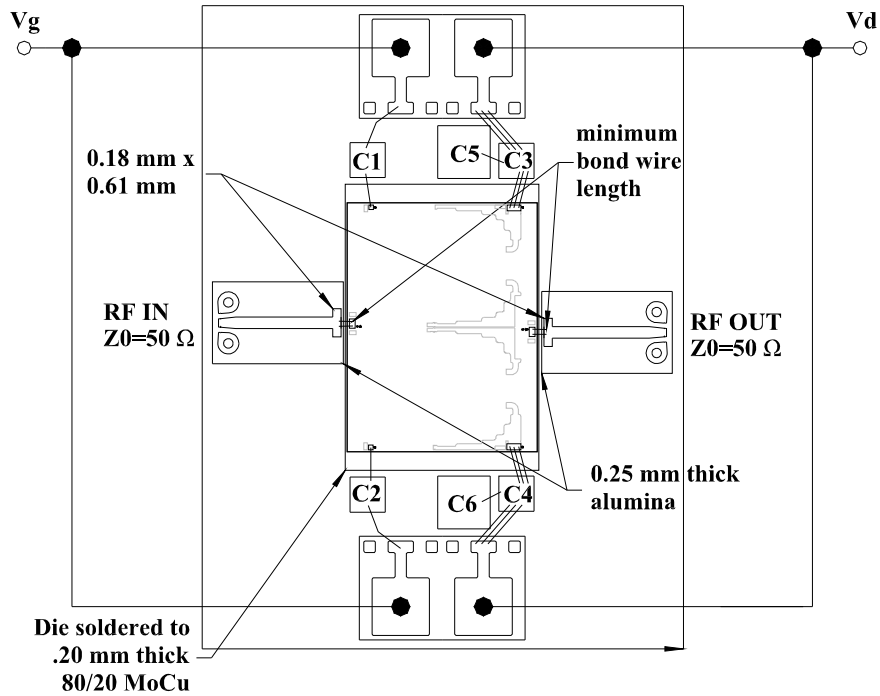


| Bond Pad | Symbol | Description |
|----------|--------|-----------------------------|
| 1 | RF In | Input, matched to 50 ohms. |
| 2, 6 | Vg | Gate voltage. |
| 3, 5 | Vd | Drain voltage. |
| 4 | RF Out | Output, matched to 50 ohms. |
| | GND | Backside of die. |

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Ka-Band 3 Watt Power Amplifier

Assembly Drawing



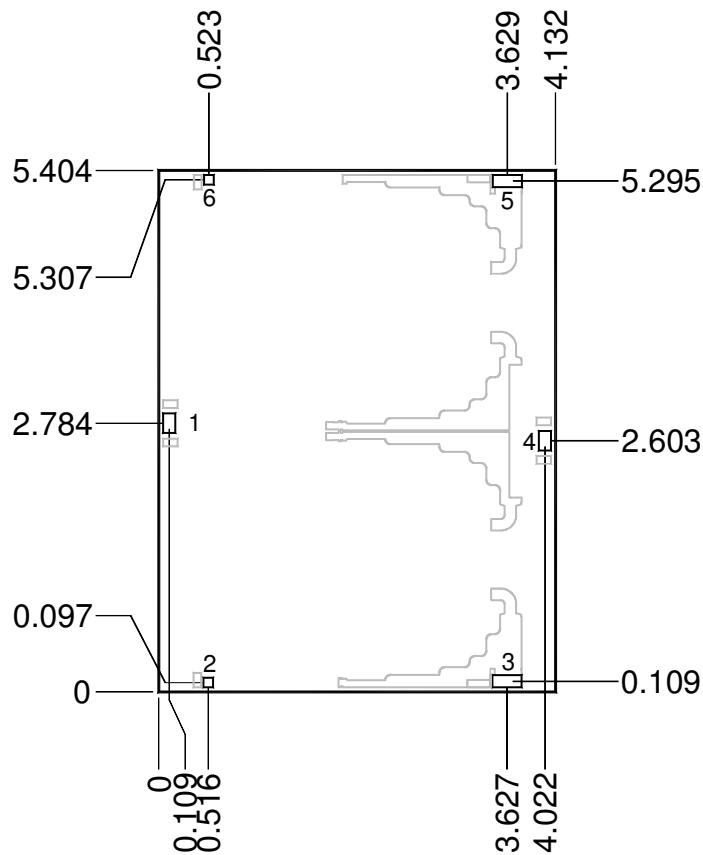
Bill of Material

| Ref Des | Value | Description | Manufacturer | Part Number |
|----------------|---------|---------------------------------|--------------|-------------|
| C1, C2, C3, C4 | 1000 pF | Cap, 50V, 25%, Single Layer Cap | various | |
| C5, C6 | 0.01 uF | Cap, 50V, 10%, SMD | various | |

TGA2575

Ka-Band 3 Watt Power Amplifier

Mechanical Information



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 |

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.e

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

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.

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Contact Information

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