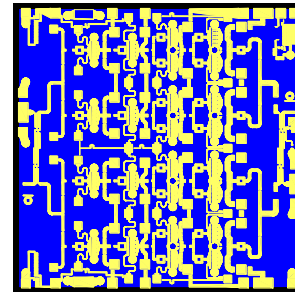


TGA4543

40.5 - 43.5 GHz Power Amplifier

Applications

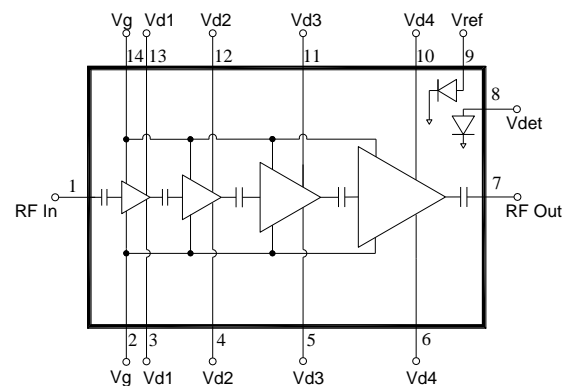
- Point to Point Radio
- Millimeter-wave Communications
- Military & Space



Product Features

- Frequency range: 40.5 - 43.5 GHz
- Output Power: 30 dBm Psat, 28.5 dBm P1dB
- Gain: 23 dBm Typical
- TOI: 38 dBm @ 18 dBm Output/Tone
- Integrated Power Detector
- Bias: Vcc = 6V, Icc = 900 mA Typical
- Dimension: 2.95 x 2.95 x 0.1 mm

Functional Block Diagram



General Description

The TriQuint TGA4543 is a 40.5 - 43.5 GHz Power Amplifier designed using TriQuint's power pHEMT production process.

The TGA4543 typically provides 28.5 dBm of output power at 1dB gain compression with small signal gain of 23 dB. Third Order Intercept is 38 dBm at 18 dBm Output/Tone.

The TGA4543 is ideally suited for Point-to-Point Radio, Ka-band communications, and Millimeter-wave communications.

Lead-free and RoHS compliant.

Evaluation Boards are available upon request.

Bond Pad Configuration

| Bond Pad # | Function Label |
|----------------------------|----------------|
| 1 | RF In |
| 2, 14 | Vg |
| 3, 4, 5, 6, 10, 11, 12, 13 | Vd |
| 7 | RF Out |
| 8 | Vdet |
| 9 | Vref |

Ordering Information

| Part No. | ECCN | Description |
|----------|-------------|---------------------------------|
| TGA4543 | 3A001.b.2.e | 40.5 - 43.5 GHz Power Amplifier |

Standard order qty = 50 pieces.

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Specifications

Absolute Maximum Ratings

| Parameter | Rating |
|--------------------------------------|----------------|
| Drain to Gate Voltage, Vd - Vg | 10V |
| Drain Voltage, Vd | +6.5 V |
| Gate Voltage, Vg | -4 to 0 V |
| Drain Current, Id | 2086 mA |
| Gate Current, Ig | -8.2 to 113 mA |
| Power Dissipation, P _{diss} | 13.6 W |
| RF Input Power, CW, 50Ω, T=25°C | 26 dBm |
| Channel Temperature, T _{ch} | 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.

Recommended Operating Conditions

| Parameter | Min | Typ | Max | Units |
|-----------------------|-----|------|-----|-------|
| Operating Temp. Range | -40 | +25 | +85 | °C |
| Vd | | 6.0 | | V |
| Id | | 900 | | mA |
| Id (Under RF Drive) | | 1500 | | mA |
| Vg | | -0.7 | | 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 = 900mA, Vg = -0.7 V Typical.

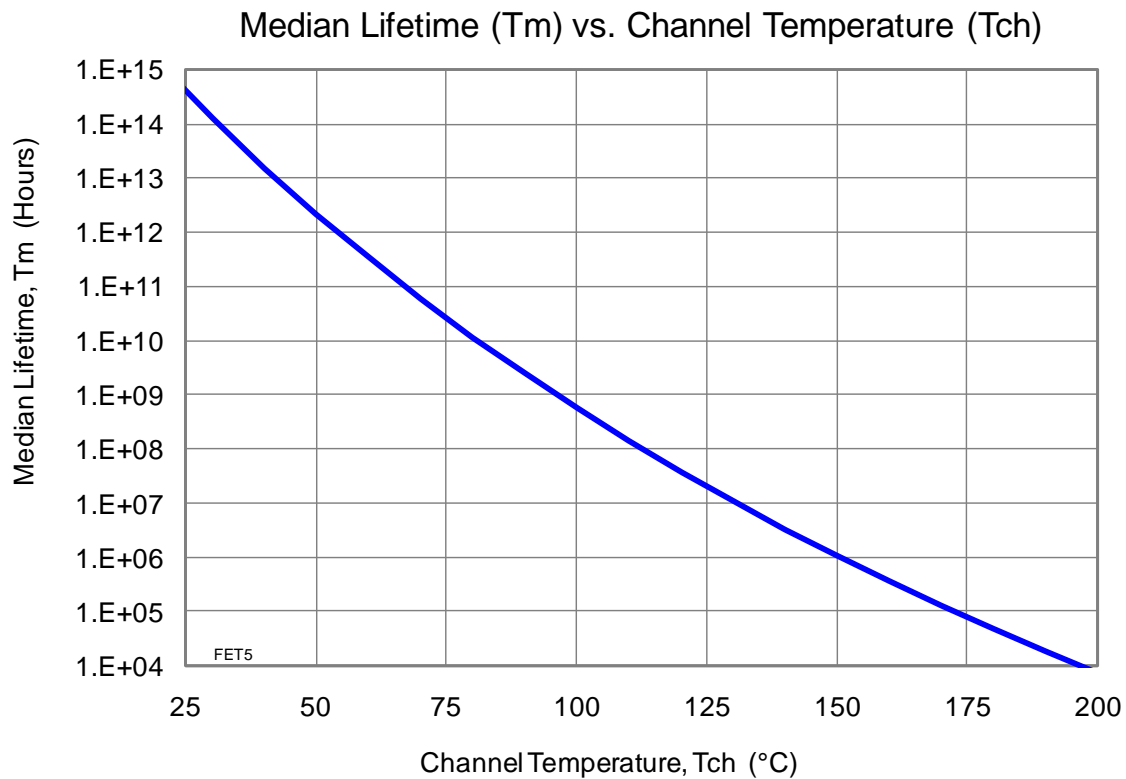
| Parameter | Conditions | Min | Typ | Max | Units |
|-------------------------------|----------------------|------|--------|------|-------|
| Operational Frequency Range | | 40.5 | | 43.5 | GHz |
| Gain | | | 23 | | dB |
| Input Return Loss | | | 8 | | dB |
| Output Return Loss | | | 10 | | dB |
| Output Power | Saturation | | 30 | | dBm |
| Output Power | 1dB Gain Compression | | 28.5 | | dBm |
| Output TOI | 18 dBm Output/Tone | | 38 | | dBm |
| Gain Temperature Coefficient | | | -0.04 | | dB/°C |
| Power Temperature Coefficient | 1dB Gain Compression | | -0.023 | | dB/°C |

Specifications

Thermal and Reliability Information

| Parameter | Condition | Rating |
|--|--|---|
| Thermal Resistance, θ_{JC} , measured to back of package, Small-Signal Under RF Drive | Tbase = 70 °C | $\theta_{JC} = 7.6 \text{ }^\circ\text{C/W}$ $\theta_{JC} = 10.4 \text{ }^\circ\text{C/W}$ |
| Channel Temperature (Tch), and Median Lifetime (Tm) | Tbase = 70 °C, Vd = 6 V, Id = 900 mA, Pdis = 5.4 W | Tch = 111 °C Tm = 2.2E+7 Hours |
| Channel Temperature (Tch), and Median Lifetime (Tm) Under RF Drive | Tbase = 70 °C, Vd = 6 V, Id = 1500 mA, Pout = 30.5 dBm, Pdis = 7.9 W | Tch = 152 °C Tm = 8.3 E+5 Hours |

Note: Thermal model includes 38um AuSn bondline and 500um CuMo thermal spreader

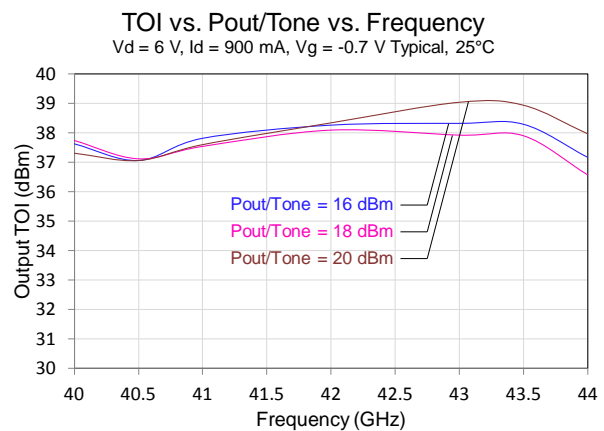
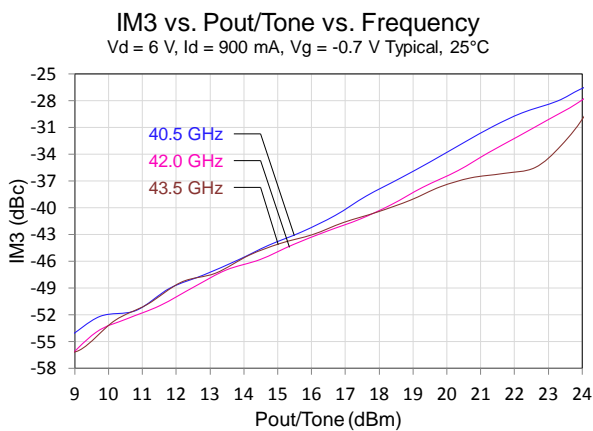
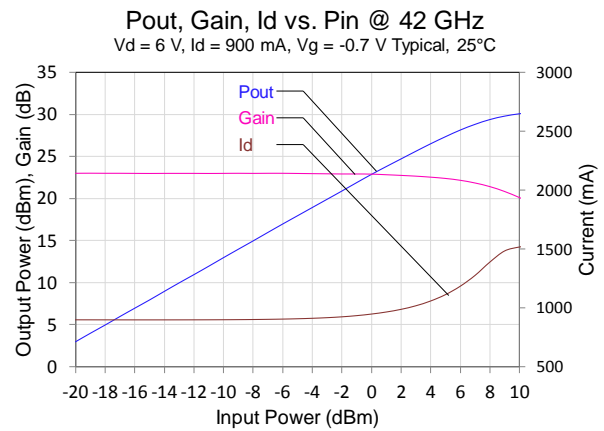
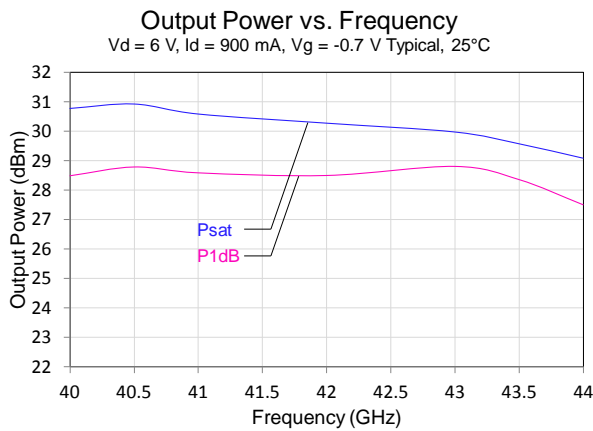
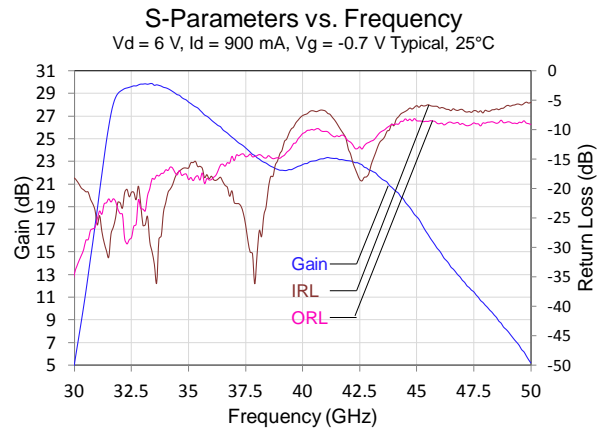
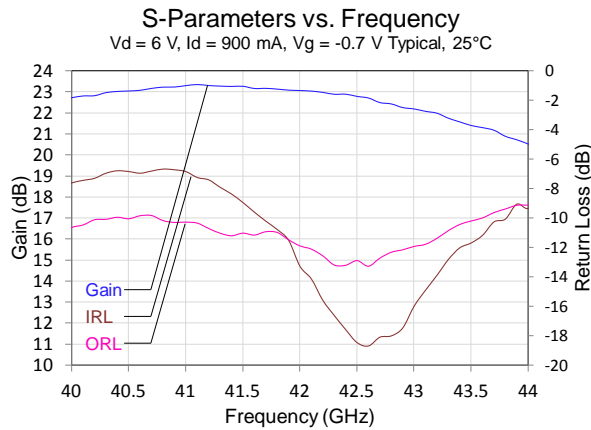


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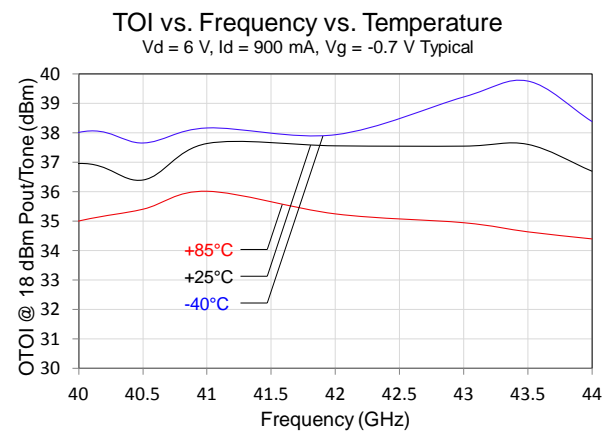
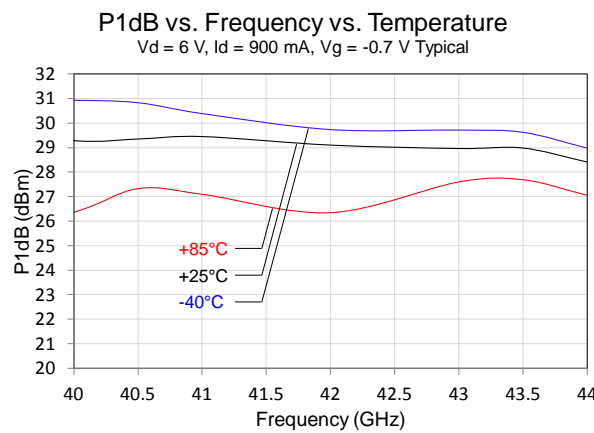
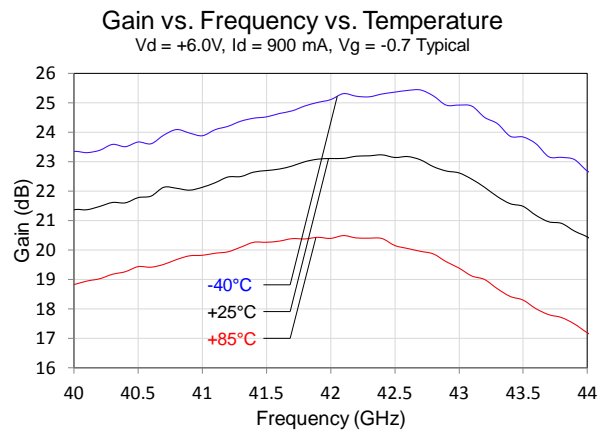
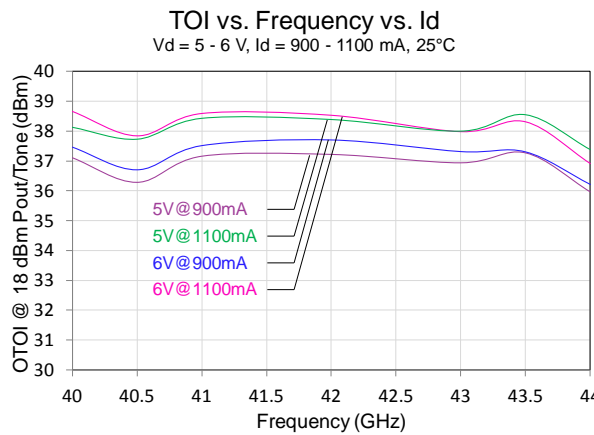
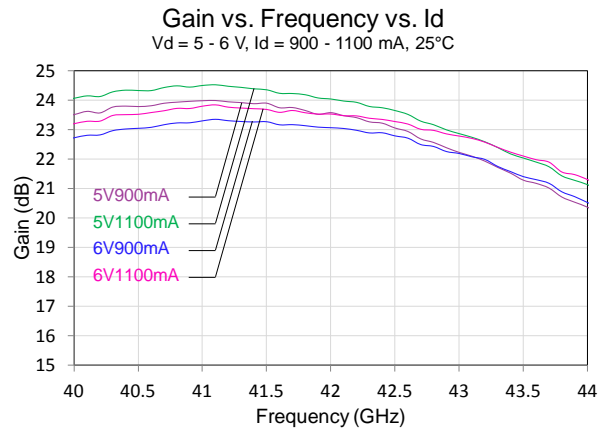
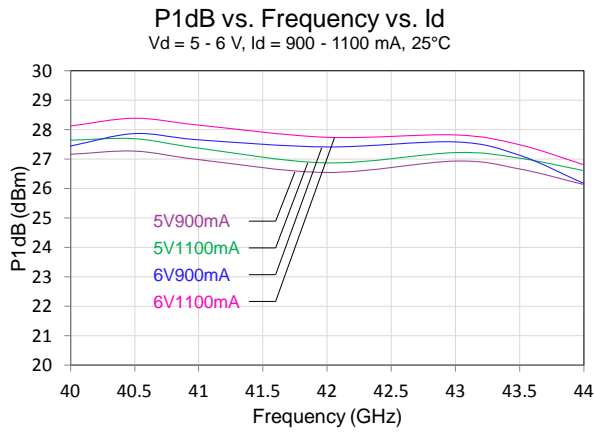
40.5 - 43.5 GHz Power Amplifier



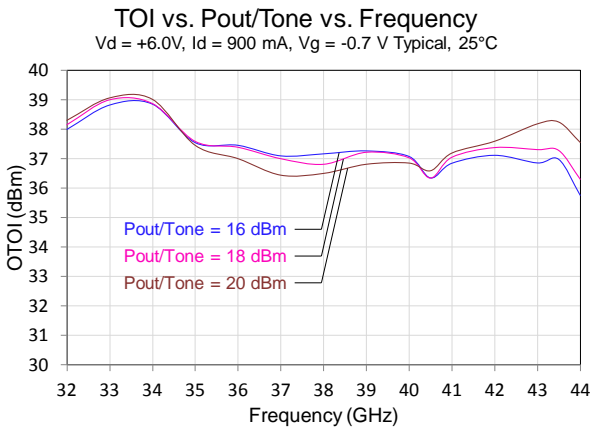
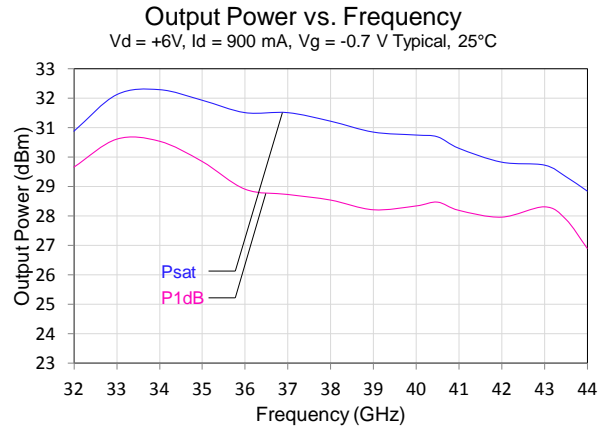
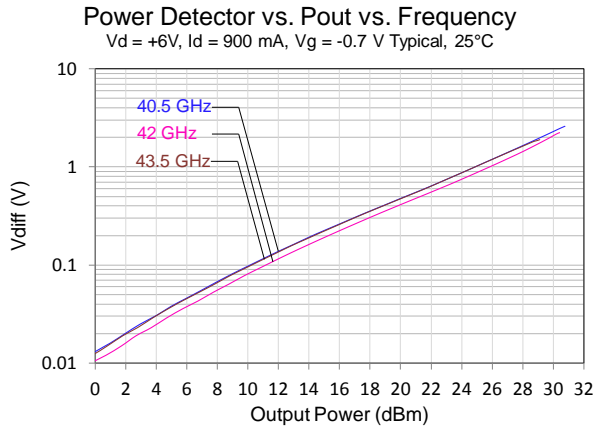
Typical Performance



Typical Performance



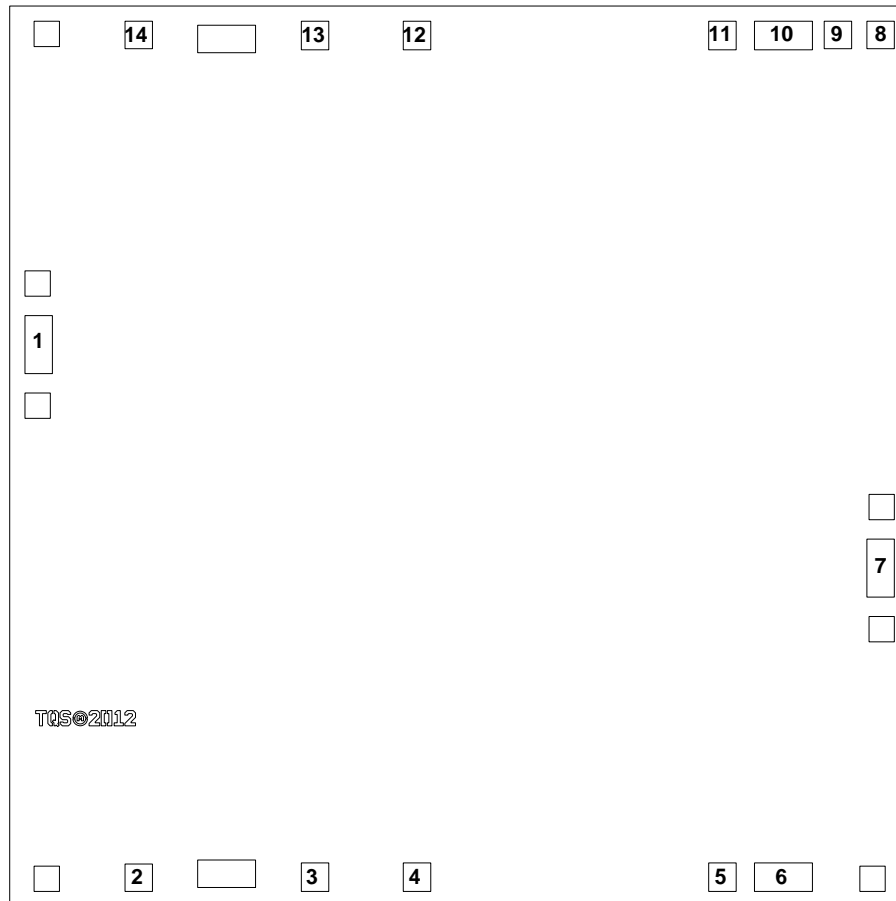
Typical Performance



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Bond Pad Description

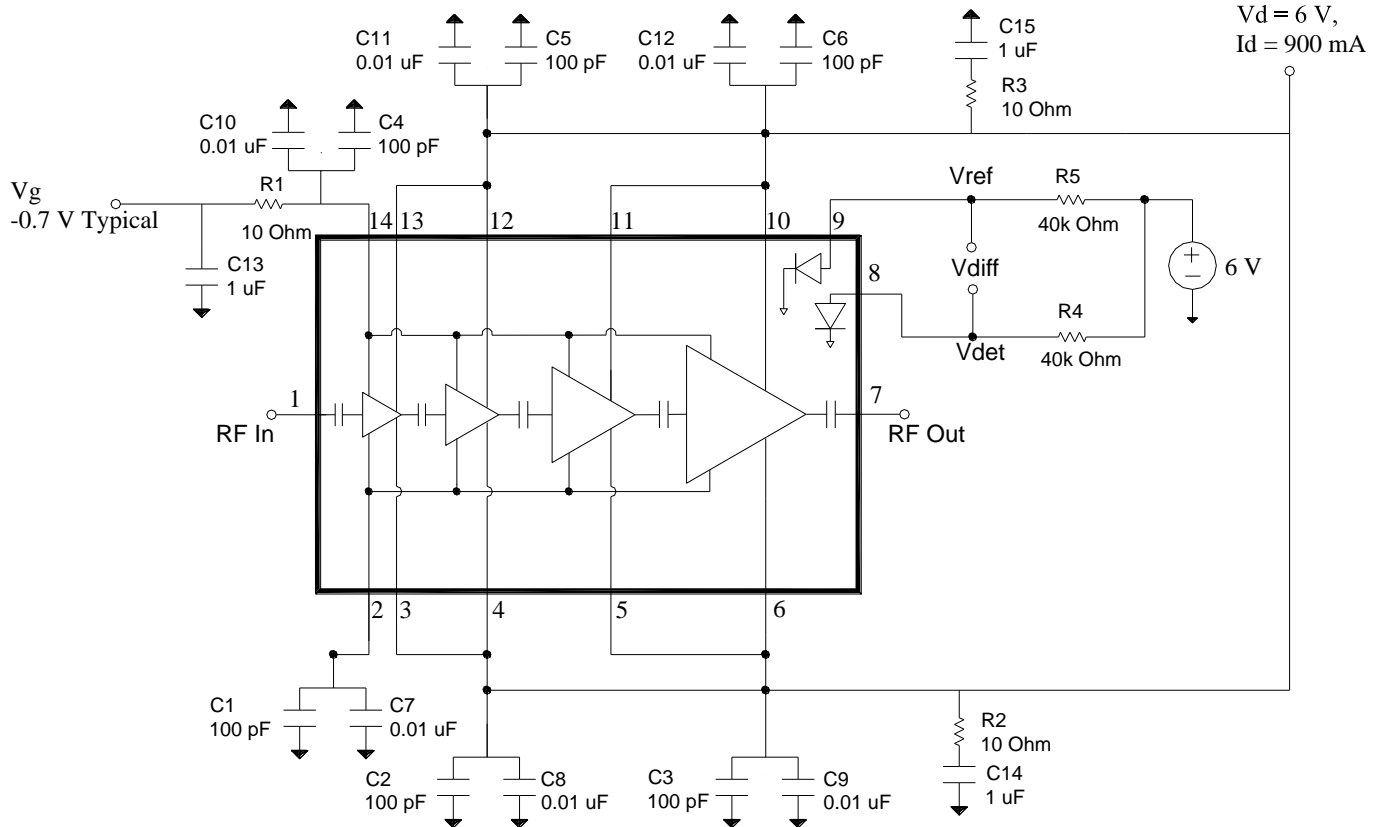


| Bond Pad | Symbol | Description |
|----------------------------|--------|---|
| 1 | RF In | Input, matched to 50 ohms |
| 2, 14 | Vg | Gate voltage. ESD protection included; Bias network is required; see Application Circuit on page 7 as an example. |
| 3, 4, 5, 6, 10, 11, 12, 13 | Vd | Drain voltage. Bias network is required; must be biased from both sides; see Application Circuit on page 7 as an example. |
| 7 | RF Out | Output, matched to 50 ohms. |
| 8 | Vdet | Detector diode output voltage. Varies with RF output power. |
| 9 | Vref | Reference diode output voltage. |

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40.5 - 43.5 GHz Power Amplifier

Application Circuit



Vd must be biased from both sides. Vg can be biased from either side.

Bias-up Procedure

Vg set to -1.5 V
 Vd set to +6 V
 Adjust Vg more positive until quiescent Id is 900 mA.
 This will be ~ Vg = -0.7 V
 Apply RF signal to RF Input

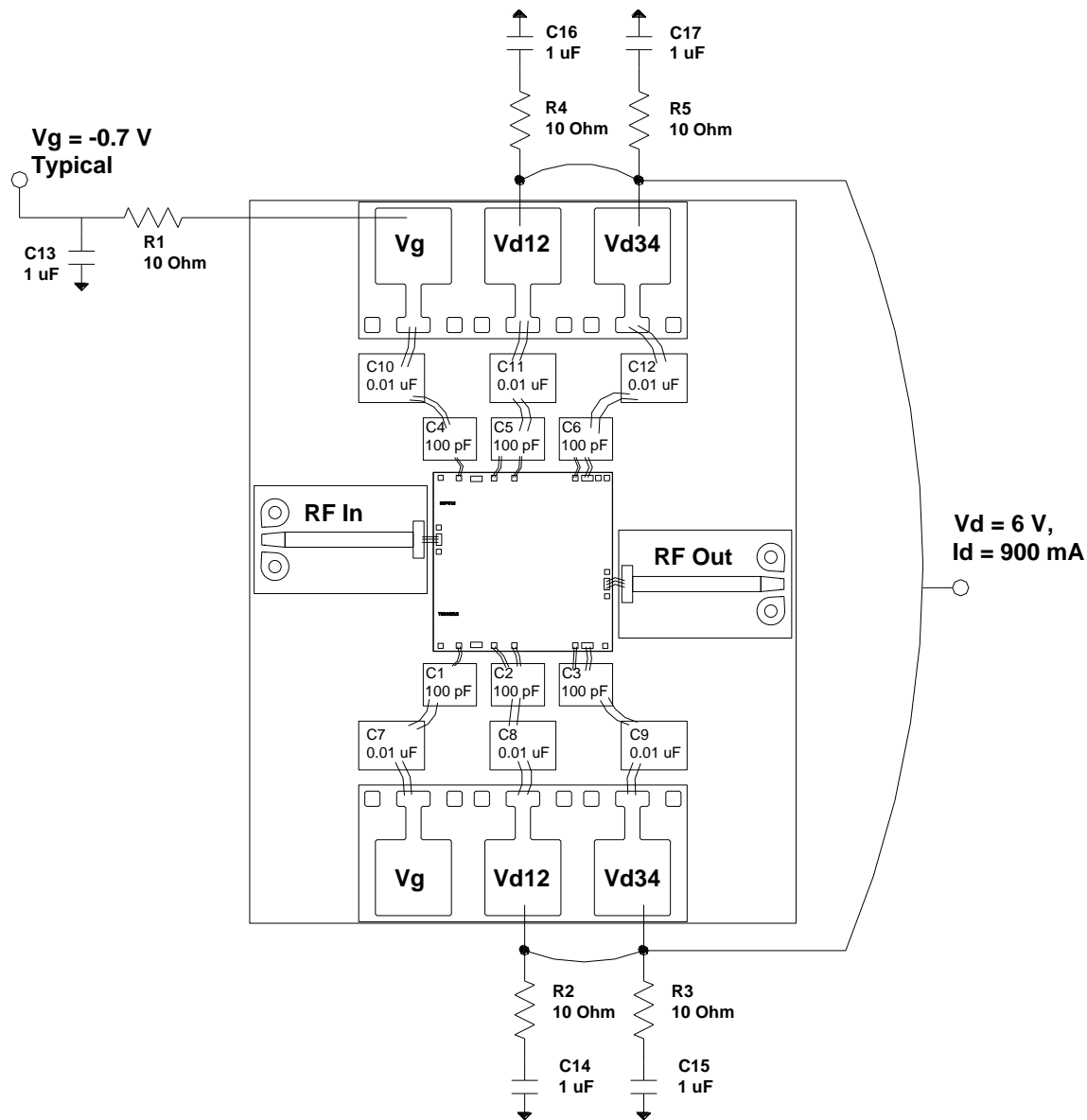
Bias-down Procedure

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

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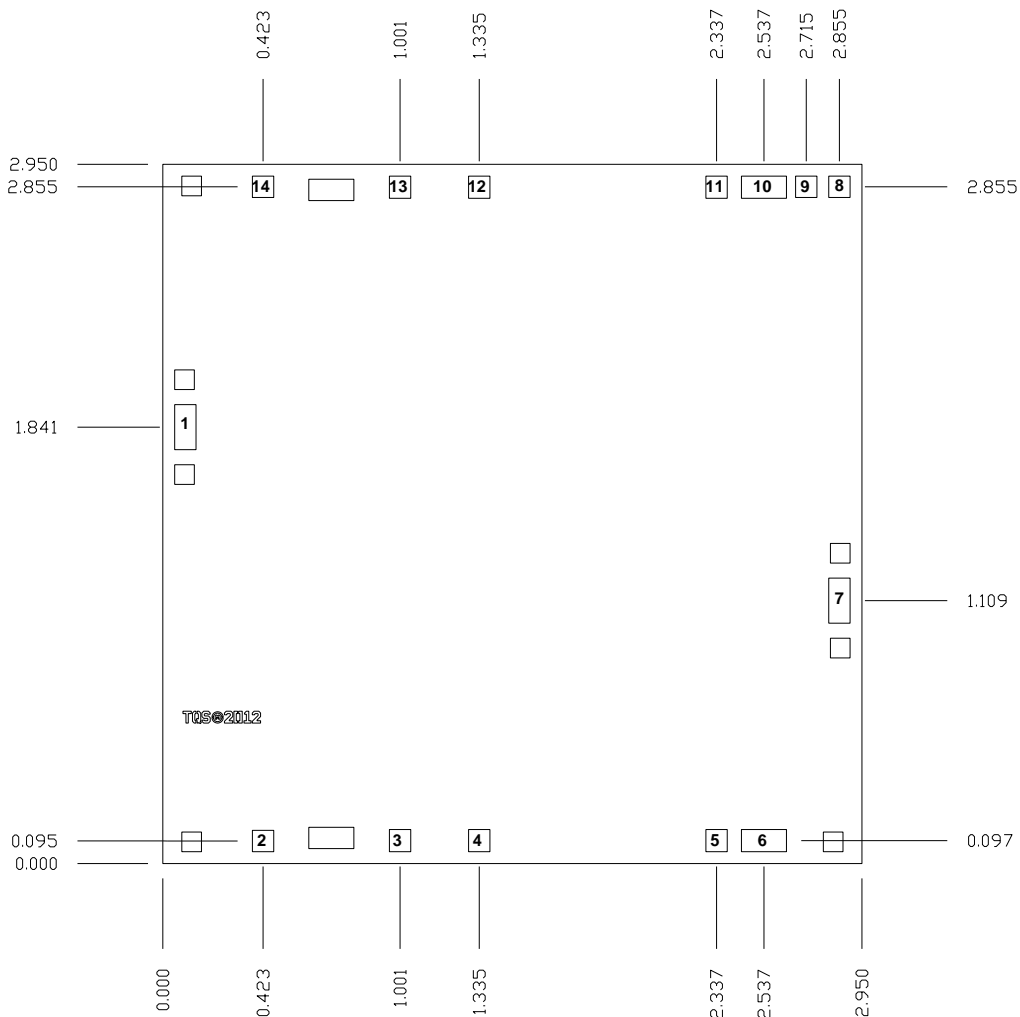
Application Circuit



Bill of Material

| Ref Des | Value | Description | Manufacturer | Part Number |
|---------------------------|---------|---------------------------------|--------------|-------------|
| C1, C2, C3, C4, C5, C6 | 100 pF | Cap, 50V, 10%, Single Layer Cap | various | |
| C7, C8, C9, C10, C11, C12 | 0.01 μF | Cap, 50V, 10%, SMD | 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 | 0.190 x 0.090 |
| 2, 14 | Vg | 0.090 x 0.090 |
| 3, 4, 5, 11, 12, 13 | Vd | 0.093 x 0.090 |
| 6, 10 | Vd | 0.093 x 0.190 |
| 7 | RF Out | 0.190 x 0.090 |
| 8 | Vdet | 0.090 x 0.090 |
| 9 | Vref | 0.090 x 0.090 |

Product Compliance Information

ESD Information



Caution! ESD-Sensitive Device

ESD Rating: Class 0
Value: Passes 150V
Test: Human Body Model (HBM)
Standard: JEDEC Standard JESD22-A114

Solderability

Compatible with both lead-free (260 °C max. reflow temp.) and tin/lead (245 °C max. reflow temp.) soldering processes.

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

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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40.5 - 43.5 GHz Power Amplifier



Contact Information

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

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JONHON

«JONHON» (основан в 1970 г.)

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«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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