

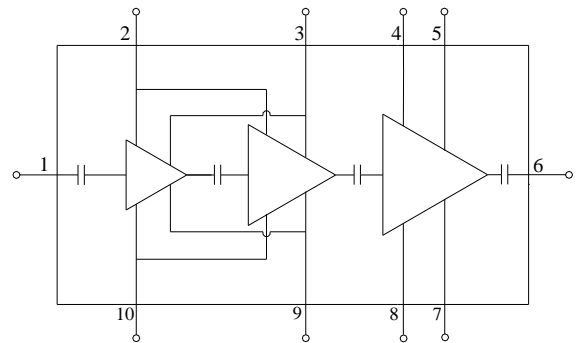
Applications

- X-band radar

Product Features

- Frequency Range: 10 – 11GHz
- P_{SAT} : 45.5dBm @ PIN = 18dBm
- P1dB: 41dBm @ Midband
- PAE: >47% @ PIN = 18dBm
- Large Signal Gain: 27.5dB
- Small Signal Gain: 35dB
- Bias: $V_D = 28V$, $I_{DQ} = 290mA$, $V_G = -2.7V$ Typical
- Pulsed V_D : PW = 100us and DC = 10%
- Chip Dimensions: 5.0 x 4.86 x 0.10 mm

Functional Block Diagram



General Description

TriQuint's TGA2623 is an x-band, high power MMIC amplifier fabricated on TriQuint's production 0.25um GaN on SiC process. The TGA2623 operates from 10 – 11GHz and provides a superior combination of power, gain and efficiency. Achieving 35W of saturated output power with 27.5dB of large signal gain and 47% power-added efficiency, the TGA2623 provides the level of performance demanded by today's system architectures. Depending on the system requirements, the TGA2623 can support cost saving initiatives on existing systems while supporting next generation systems with increased performance.

Lead-free and RoHS compliant.

Evaluation boards are available upon request.

Pad Configuration

| Pad No. | Symbol |
|---------|------------|
| 1 | RF In |
| 2, 10 | V_{G1-2} |
| 4, 8 | V_{G3} |
| 3, 9 | V_{D1-2} |
| 5, 7 | V_{D3} |
| 6 | RF Out |

Ordering Information

| Part | ECCN | Description |
|---------|-------------|------------------------------------|
| TGA2623 | 3A001.b.2.b | 10 – 11GHz 35W GaN Power Amplifier |

Absolute Maximum Ratings

| Parameter | Value |
|--|----------------|
| Drain Voltage (V_D) | 40V |
| Gate Voltage Range (V_G) | -10 to -2V |
| Drain Current (I_{D1-2}) | 2.3A |
| Drain Current (I_{D3}) | 4.3A |
| Gate Current (I_{G1-2}) | -3.5 to 17.5mA |
| Gate Current (I_{G3}) | -11 to 28mA |
| Power Dissipation (P_{DISS}), 85°C, CW | 96W |
| Input Power (P_{IN}), CW, 50Ω, $V_D = 28V$, 85°C | 24dBm |
| Input Power (P_{IN}), CW, VSWR 6:1, $V_D = 28V$, 85°C | 20dBm |
| 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) | 28V |
| Drain Current (I_{DQ}) | 290mA (Total) |
| Gate Voltage (V_G) | -2.7V (Typ.) |

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, $V_D = 28V$, $I_{DQ} = 290mA$, $V_G = -2.7V$ Typical, Pulsed V_D . PW = 100us, DC = 10%

| Parameter | Min | Typical | Max | Units |
|---|-----|--------------|-----|-------|
| Operational Frequency Range | 10 | | 11 | GHz |
| Small Signal Gain | | 35 | | dB |
| Input Return Loss | | >15 | | dB |
| Output Return Loss | | >10 | | dB |
| Power Gain ($P_{in} = 18dBm$) | | 27.5 | | dB |
| Output Power ($P_{in} = 18dBm$) | | 45.5 | | dBm |
| Power Added Efficiency ($P_{in} = 18dBm$) | | >47 | | % |
| Power @ 1dB Compression (P_{1dB}) | | 41 @ Midband | | dB |
| Small Signal Gain Temperature Coefficient | | -0.075 | | dB/°C |
| Recommended Operating Voltage: | 20 | 28 | 32 | V |

Thermal and Reliability Information

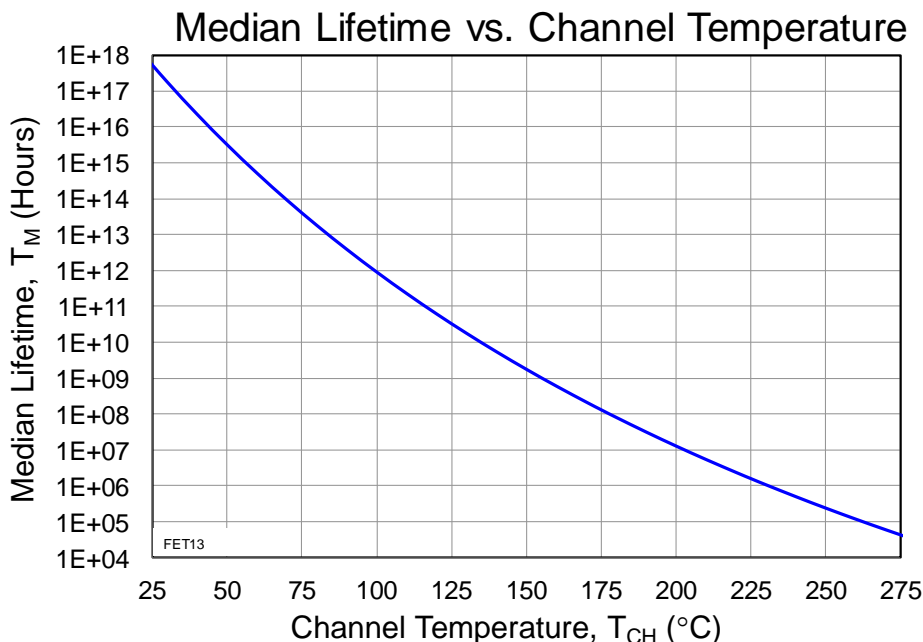
| Parameter | Test Conditions | Value | Units |
|---|--|-----------------------|----------------------|
| Thermal Resistance (θ_{JC}) ⁽¹⁾ | $T_{base} = 85^{\circ}\text{C}$, Pulsed V_D : PW = 100us, DC = 10% | 1.14 | $^{\circ}\text{C/W}$ |
| Channel Temperature (T_{CH}) (Under RF drive) | $T_{base} = 85^{\circ}\text{C}$, $V_D = 28\text{V}$, $I_{D_Drive} = 3\text{A}$, | 143 | $^{\circ}\text{C}$ |
| Median Lifetime (T_M) | $P_{IN} = 22\text{dBm}$, $P_{OUT} = 45.3\text{dBm}$, $P_{DISS} = 51\text{W}$ | 3.85×10^{10} | Hrs |
| Thermal Resistance (θ_{JC}) ⁽¹⁾ | $T_{base} = 85^{\circ}\text{C}$, CW | 1.97 | $^{\circ}\text{C/W}$ |
| Channel Temperature (T_{CH}) (Under RF drive) | $T_{base} = 85^{\circ}\text{C}$, $V_D = 28\text{V}$, $I_{D_Drive} = 2.94\text{A}$, | 187 | $^{\circ}\text{C}$ |
| Median Lifetime (T_M) | $P_{IN} = 22\text{dBm}$, $P_{OUT} = 44.9\text{dBm}$, $P_{DISS} = 52\text{W}$ | 4.12×10^7 | Hrs |

Notes:

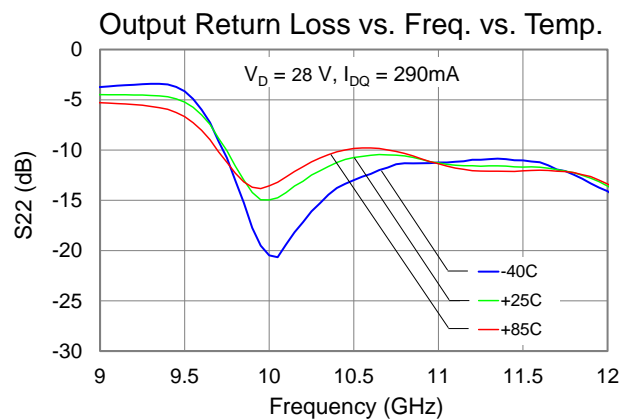
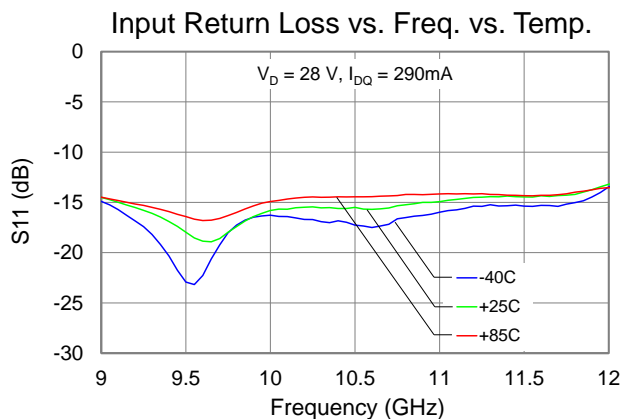
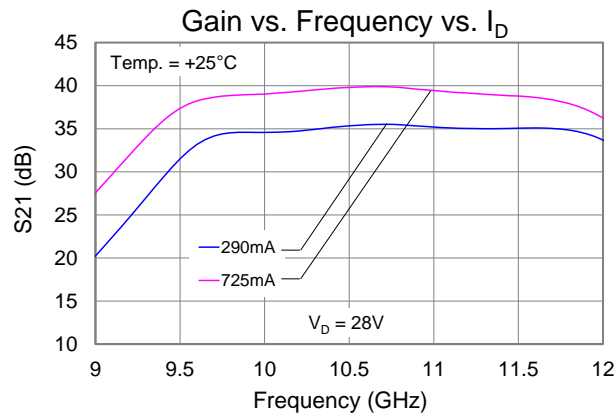
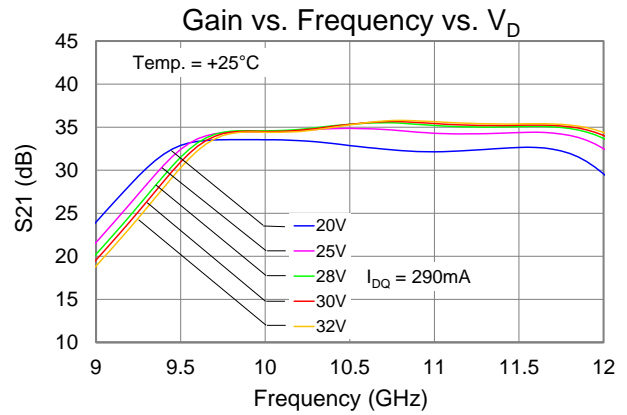
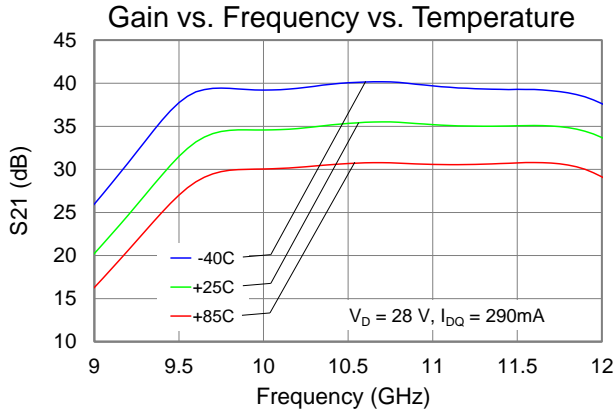
- Thermal resistance measured to back of carrier plate. MMIC mounted on 40 mils CuM0 (80/20) carrier using 1.5 mil AuSn.

Median Lifetime

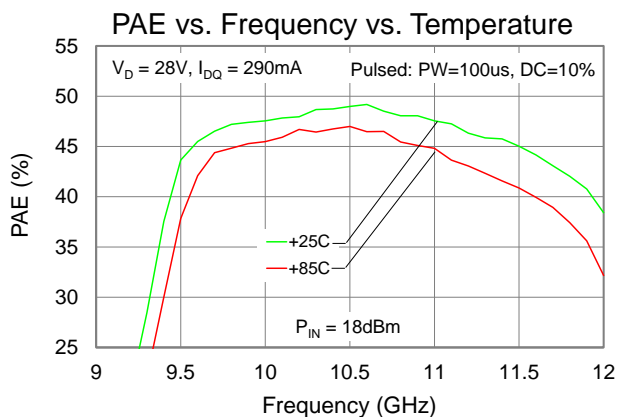
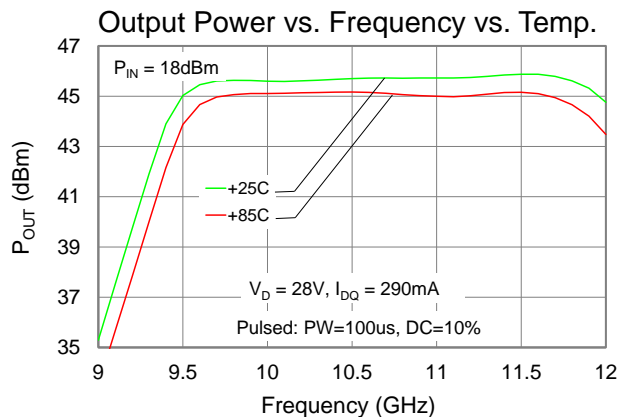
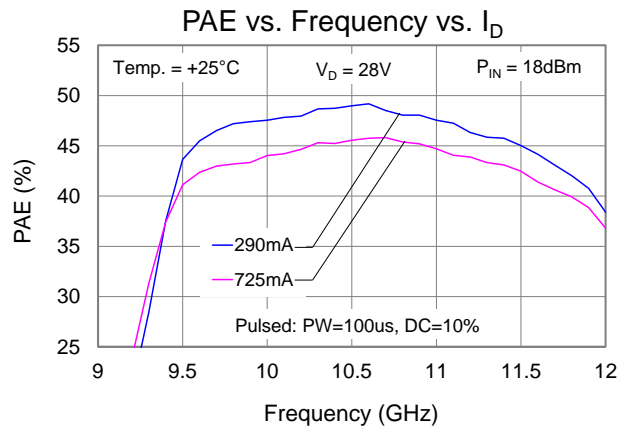
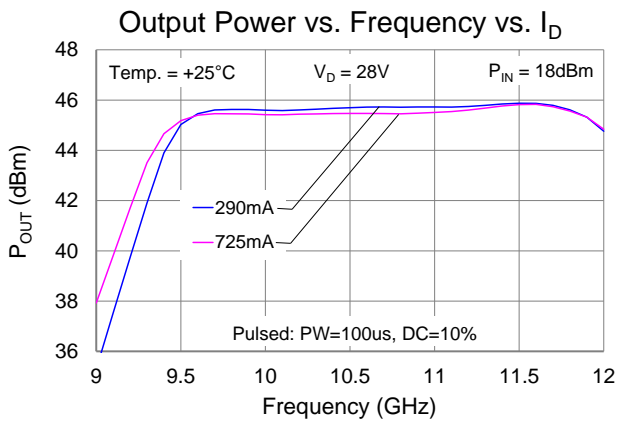
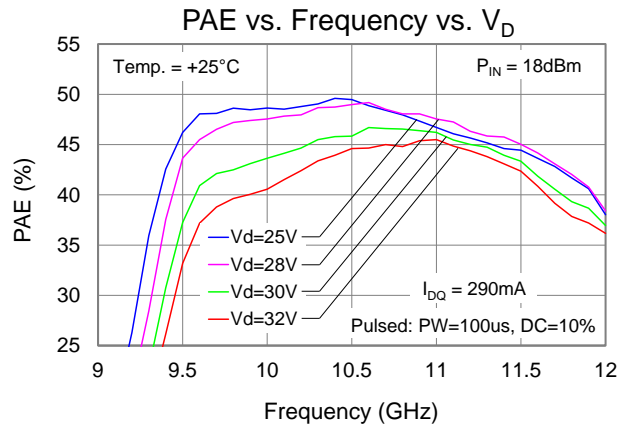
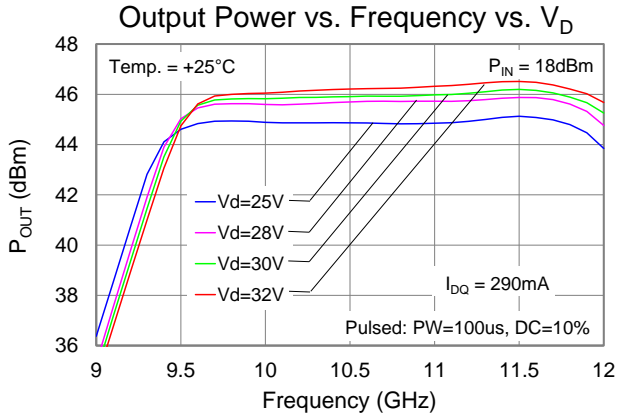
Test Conditions: $V_D = 40\text{V}$; Failure Criteria = 10% reduction in I_{D_MAX}



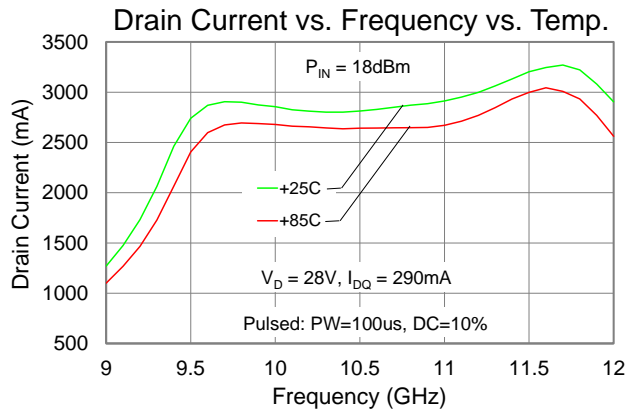
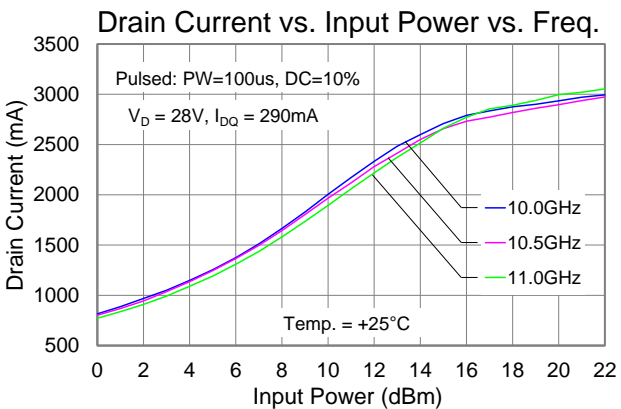
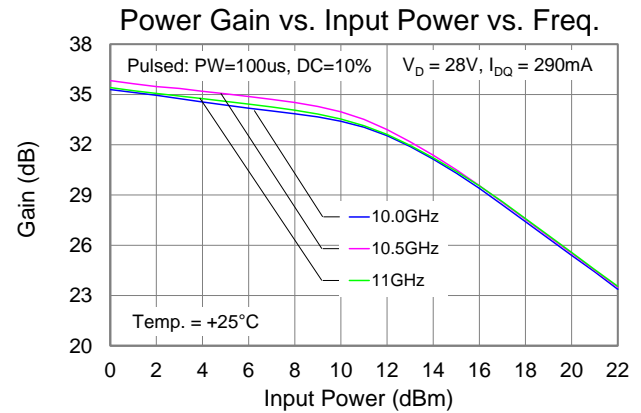
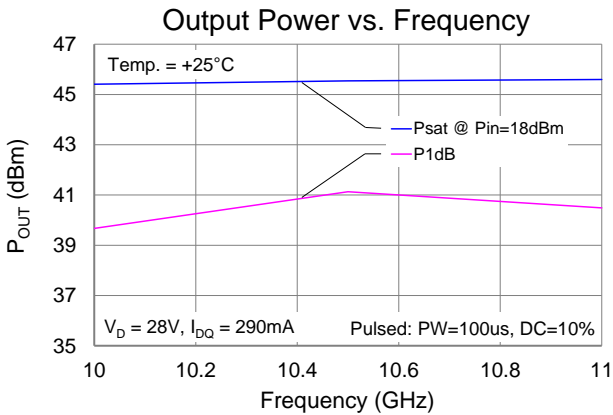
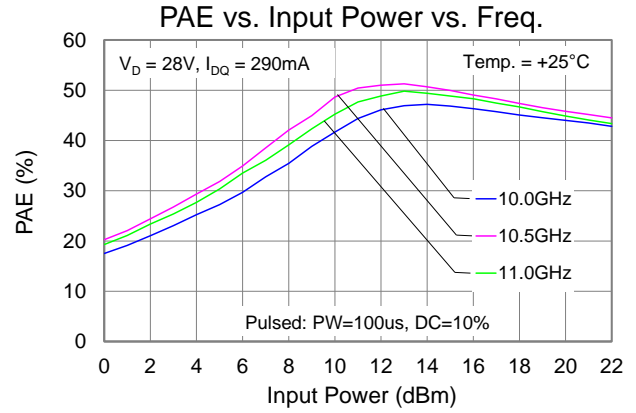
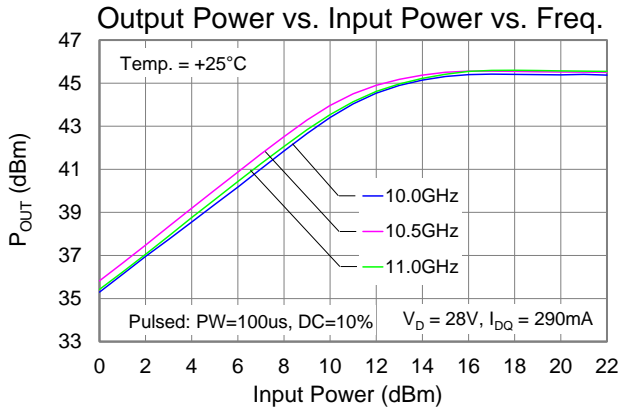
Typical Performance (Small Signal)



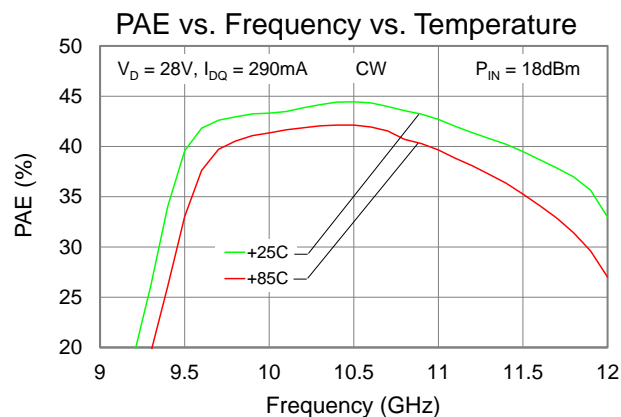
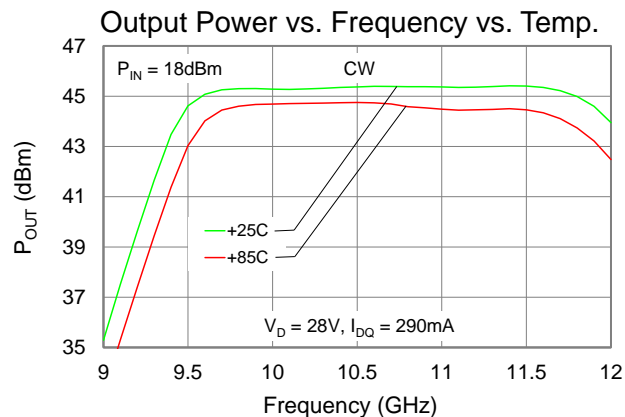
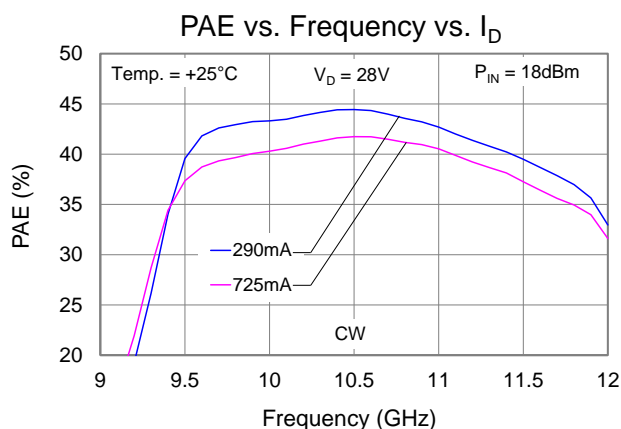
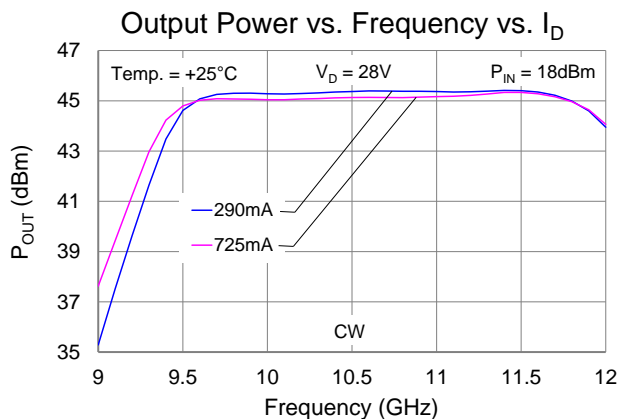
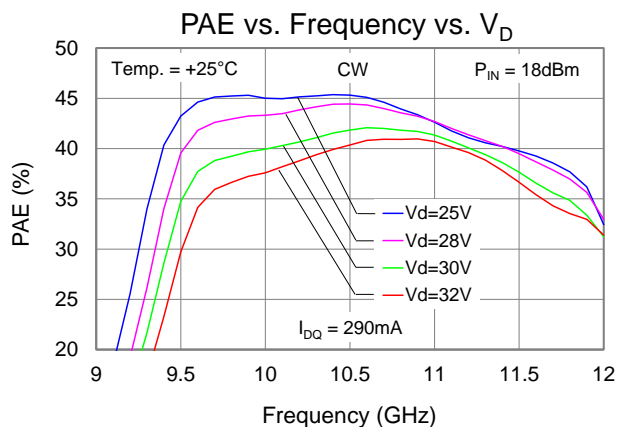
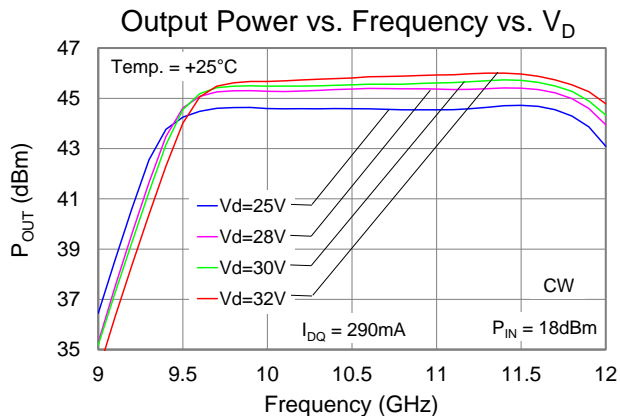
Typical Performance (Pulsed Operation)



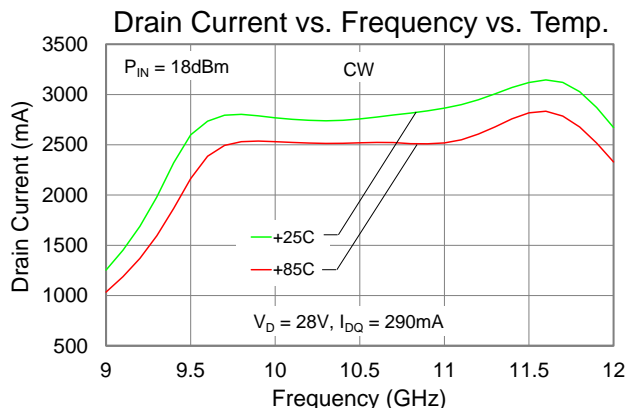
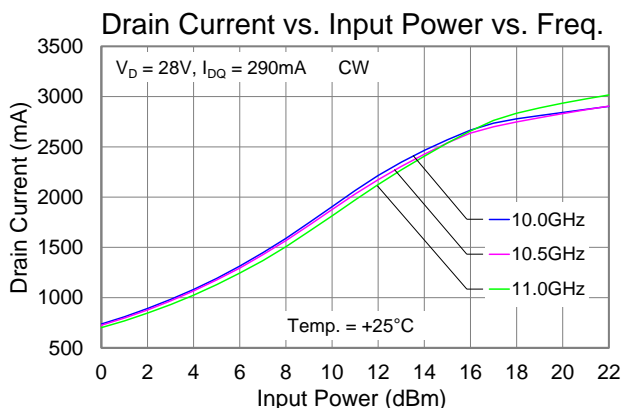
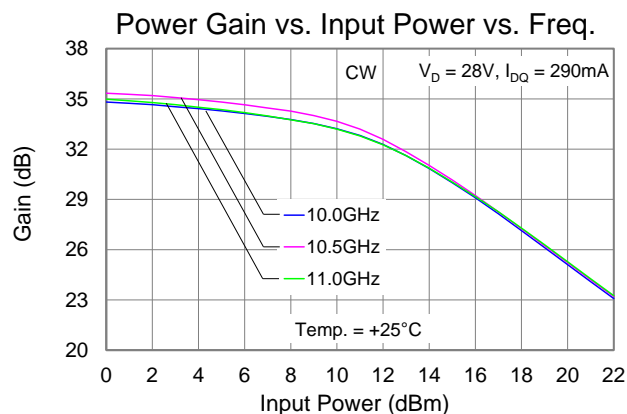
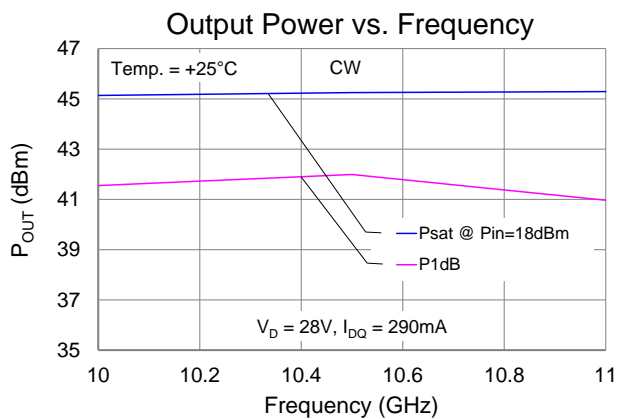
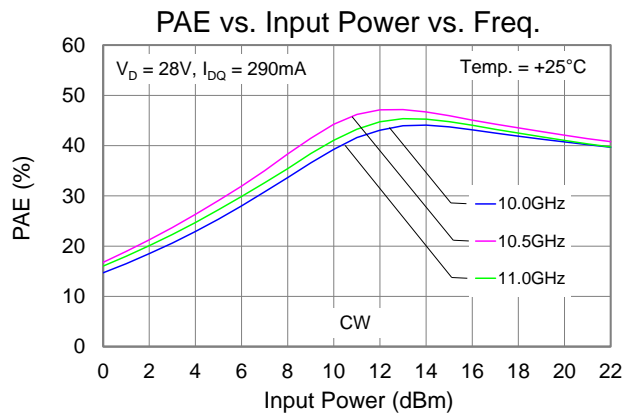
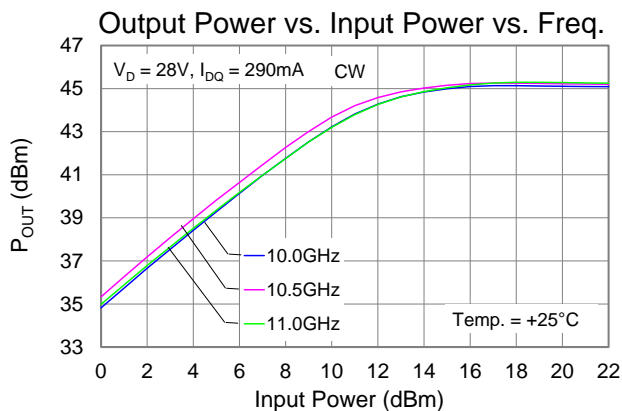
Typical Performance (Pulsed Operation)



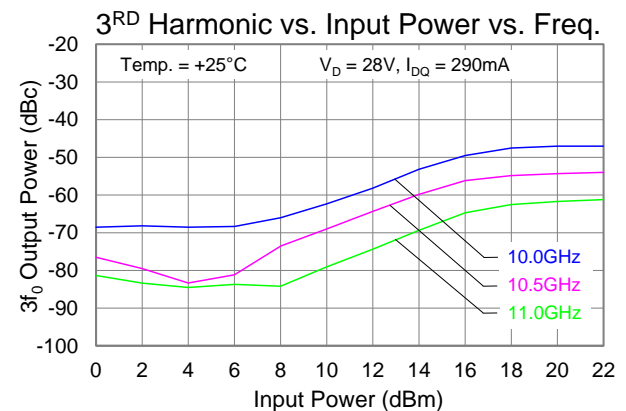
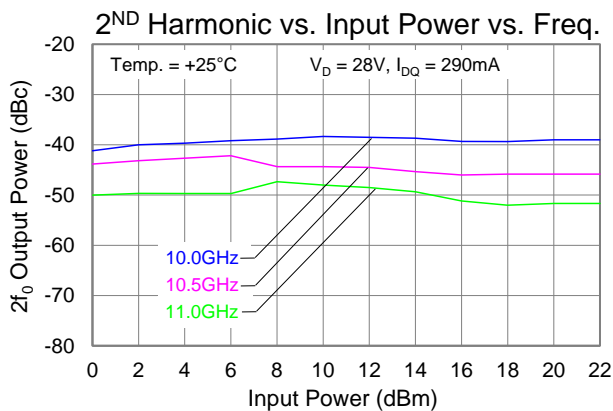
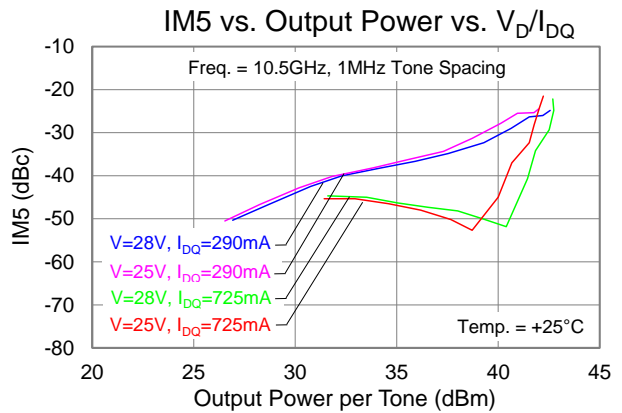
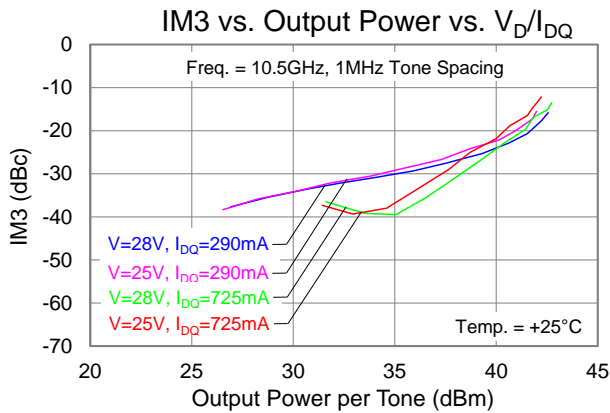
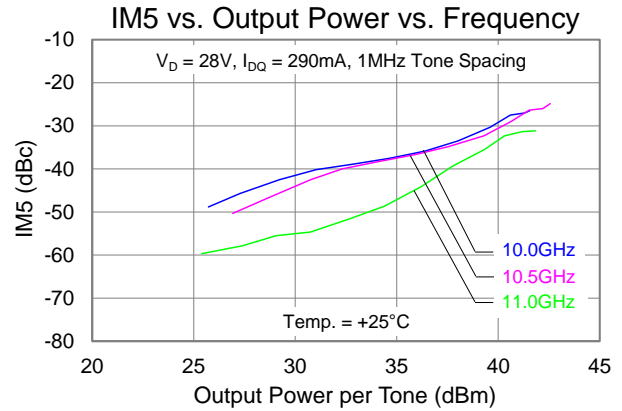
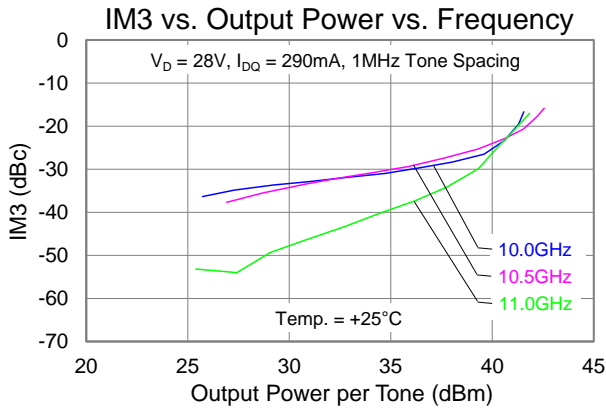
Typical Performance (CW Operation)



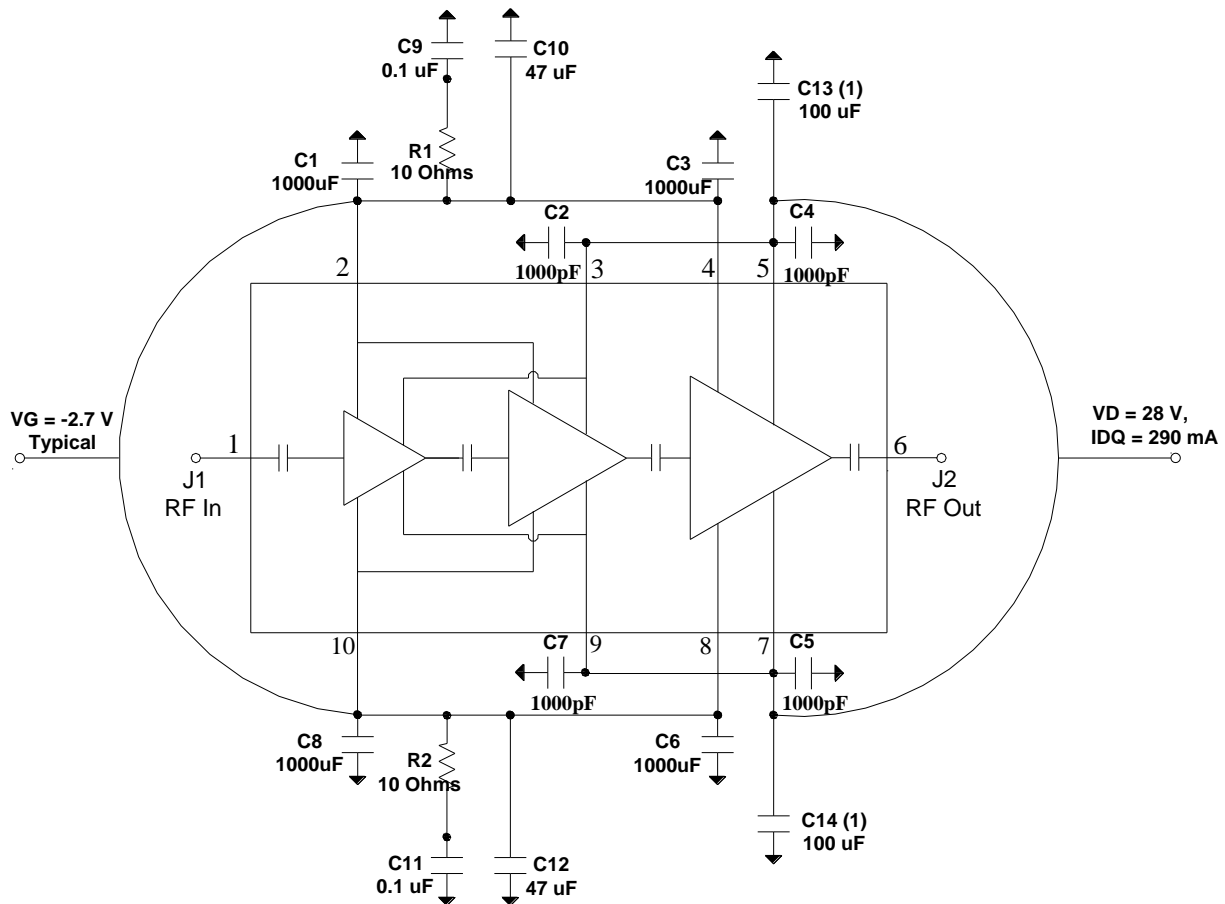
Typical Performance (CW Operation)



Typical Performance (Linearity)



Application Circuit



Notes:

1. Remove caps for pulse operation. These caps are part of the cable harness for CW operation.

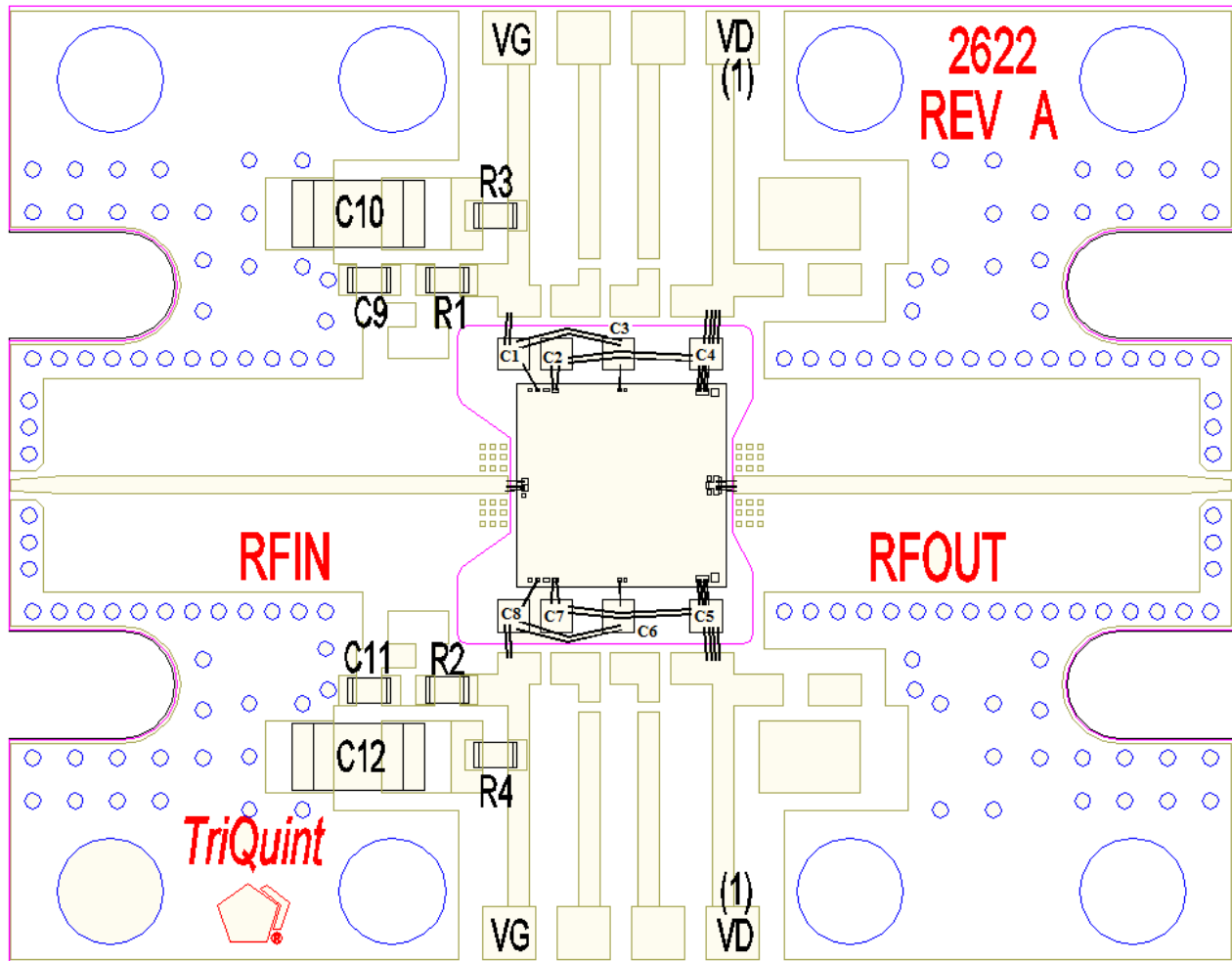
Bias-up Procedure

1. Set I_D limit to 3.5A, I_G limit to 10mA
2. Set V_G to -5.0V
3. Set V_D +28V
4. Adjust V_G more positive until $I_{DQ} = 290mA$ ($V_G \sim -2.7V$ Typical)
5. Apply RF signal

Bias-down Procedure

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

Evaluation Board (EVB) Layout Assembly



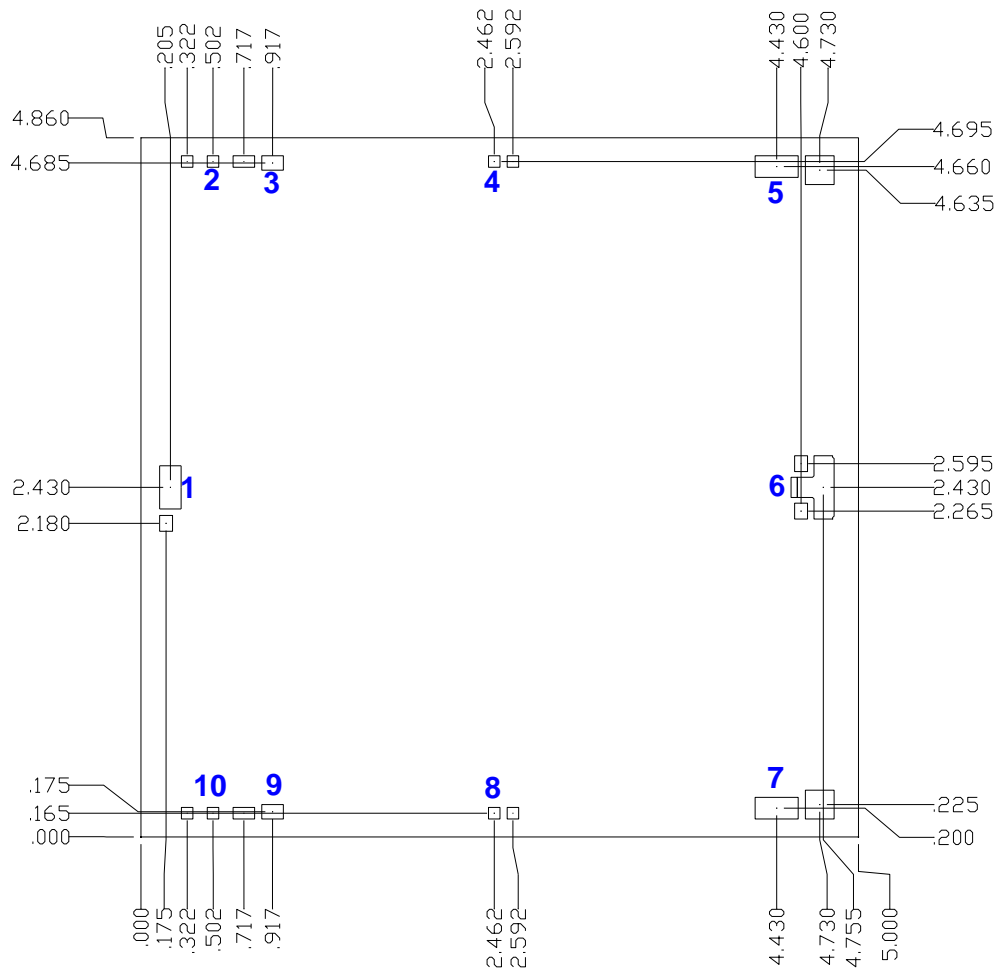
Notes:

1. 100uF/100V charge storage cap is needed on the drain. For pulsed operation this cap must be on the supply-side of the pulse-modulator.

Bill of Materials

| Reference Design | Value | Description | Manufacturer | Part Number |
|------------------|--------|--------------------------|--------------|-------------|
| C1 – C8 | 1000pF | SLC, 50V | Various | |
| C9, C11 | 0.1uF | Cap, 0402, 50V, 10%, X7R | Various | |
| C10, C12 | 47uF | Cap, 1206, 50V, 10%, X7R | Various | |
| R1 – R2 | 10Ω | Res, 0402 | Various | |
| R3 – R4 | 0Ω | Res, 0402 | Various | |

Mechanical Drawing & Bond Pad Description



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 | Description |
|----------|--------|---------------|--|
| 1 | RF In | 0.150 x 0.300 | RF Input; matched to 50Ω |
| 2, 8 | VG1-2 | 0.080 x 0.080 | Gate voltage 1, bias network is required; see Application Circuit on page 10 as an example. |
| 4, 10 | VG3 | 0.080 x 0.080 | Gate voltage 3, bias network is required; see Application Circuit on page 10 as an example. |
| 3, 9 | VD1-2 | 0.150 x 0.100 | Drain voltage 1, bias network is required; see Application Circuit on page 10 as an example. |
| 5, 7 | VD3 | 0.300 x 0.150 | Drain voltage 3, bias network is required; see Application Circuit on page 10 as an example. |
| 6 | RF Out | 0.140 x 0.400 | RF Output; matched to 50Ω |

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 ultrasonic 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

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 (C₁₅H₁₂Br₄O₂) Free
- PFOS Free
- SVHC Free

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

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Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.