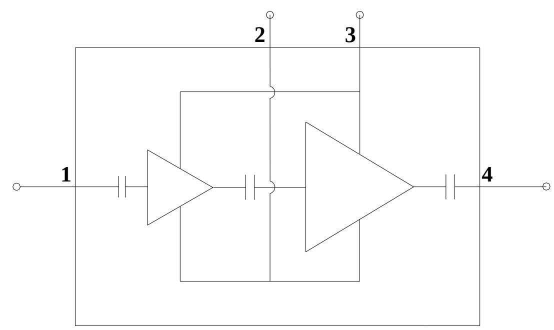
## Applications

- Commercial and military radar
- Communications

## Product Features

- Frequency Range: 16 – 18GHz
- $P_{SAT}$: 19dBm
- P1dB: 18dBm
- Small Signal Gain: 20dB
- Input Return Loss: 20dB
- Output Return Loss: 25dB
- Bias: $V_D$ = 6V, $I_{DQ}$ = 30mA, $V_G$ = -0.6V Typical
- Chip Dimensions: 1.14 x 1.24 x 0.10 mm

## Functional Block Diagram




## General Description

TriQuint's TGA2620 is a Ku-band MMIC driver amplifier fabricated on TriQuint's 0.15um GaAs pHEMT production process. Operating from 16-18GHz, the TGA2620 provides more than 19dBm saturated output power, 18dBm P1dB and more than 20dB small signal gain.

Fully matched to 50 ohms with integrated DC blocking capacitors on both I/O ports allows for simple system integration. The TGA2620 is an ideal choice for general purpose amplification across both commercial and military Ku-band platforms.

Lead-free and RoHS compliant.

Evaluation boards are available upon request.

## Pad Configuration

| Pad No. | Symbol |
|---|---|
| 1 | RF In |
| 2 | $V_G$ |
| 3 | $V_D$ |
| 4 | RF Out |

## Ordering Information

| Part | ECCN | Description |
|---|---|---|
| TGA2620 | EAR99 | 16 – 18GHz Driver Amplifier |

## Absolute Maximum Ratings

| Parameter | Value |
|---|---|
| Drain Voltage ($V_D$) | 6.5V |
| Gate Voltage Range ($V_G$) | -2 to 0V |
| Drain Current ($I_D$) | 65mA |
| Gate Current ($I_G$) | -0.5 to 5mA |
| Power Dissipation ($P_{DISS}$), 85°C | 0.3W |
| Input Power ($P_{IN}$), CW, 50Ω, VD=6V, IDQ=30mA. | 15dBm |
| Channel Temperature ($T_{CH}$) | 150°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 ($V_D$) | 6V |
| Drain Current ($I_{DQ}$) | 30mA |
| Gate Voltage ($V_G$) | -0.6V (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, $V_D$ = 6V, $I_{DQ}$ = 30mA, $V_G$ = -0.6V Typical, CW

| Parameter | Min | Typical | Max | Units |
|---|---|---|---|---|
| Operational Frequency Range | 16 | | 18 | GHz |
| Small Signal Gain | | 20 | | dB |
| Input Return Loss | | 20 | | dB |
| Output Return Loss | | 25 | | dB |
| Output Power ( $P_{SAT}$ ) | | 19 | | dBm |
| Power Added Efficiency ( $P_{SAT}$ ) | | 26 | | % |
| Small Signal Gain Temperature Coefficient | | -0.02 | | dB/°C |

## Thermal and Reliability Information

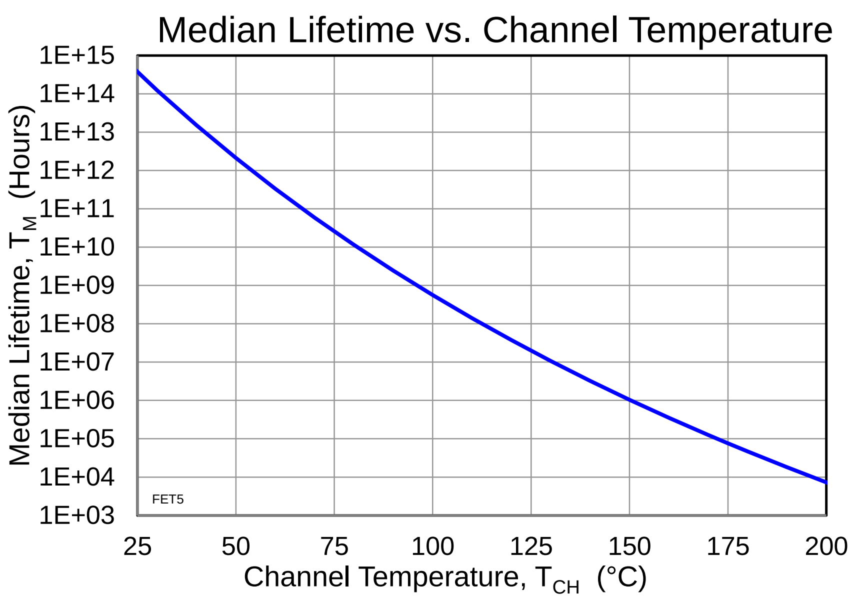
| Parameter | Test Conditions | Value | Units |
|---|---|---|---|
| Thermal Resistance ($\theta_{JC}$) [1] | $T_{base}$ = 85°C | 204 | ºC/W |
| Channel Temperature ($T_{CH}$) (Under RF drive) | $V_D$ = 6V, $I_{DQ}$ = 30mA, $I_{D\ Drive}$ = 55mA, CW | 138 | °C |
| Median Lifetime ($T_M$) | $P_{IN}$ = 5dBm, $P_{OUT}$ = 18.5dBm, $P_{DISS}$ = 260mW | 4.1 x 10^6 | Hrs |

Notes:

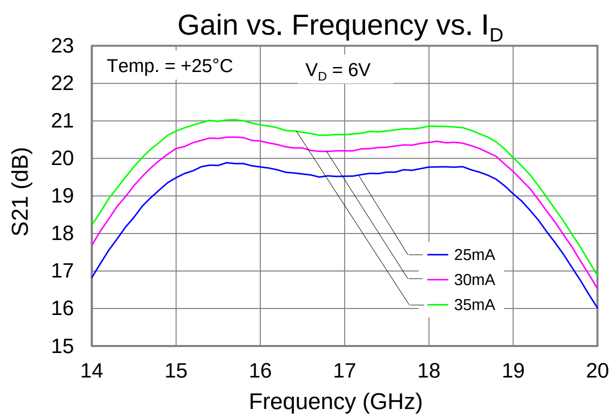
1. Thermal resistance measured to back of carrier plate. MMIC mounted on 20 mils CuMo carrier using 0.8mil Diemat 6030 or AuSn.

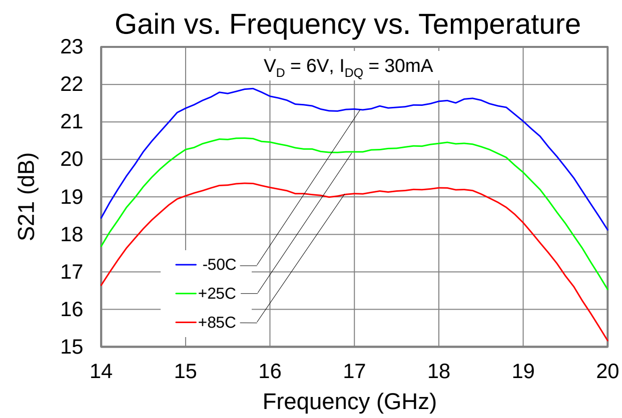
## Median Lifetime

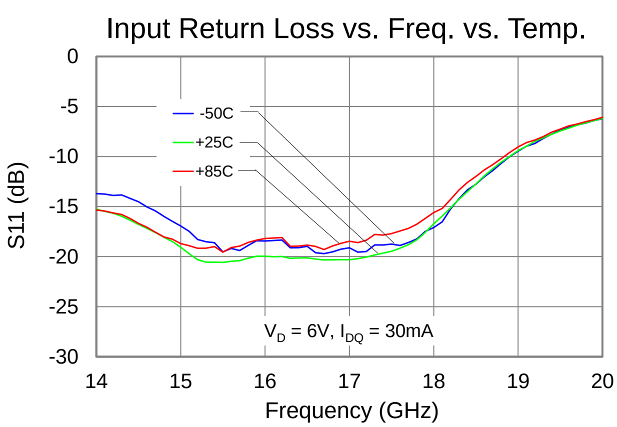
Test Conditions: $V_D$ = 6.5V; Failure Criteria = 10% reduction in $I_{D\_MAX}$

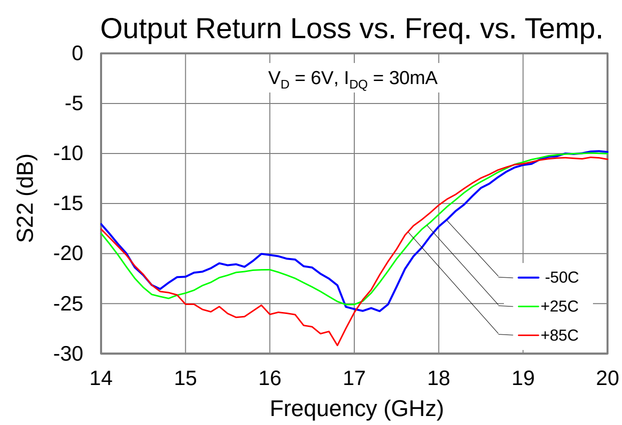


## Typical Performance (Small Signal)



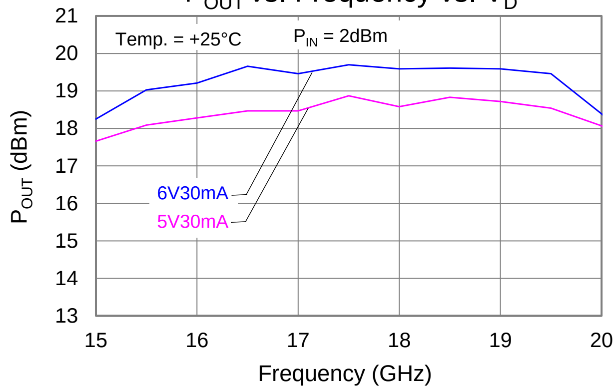



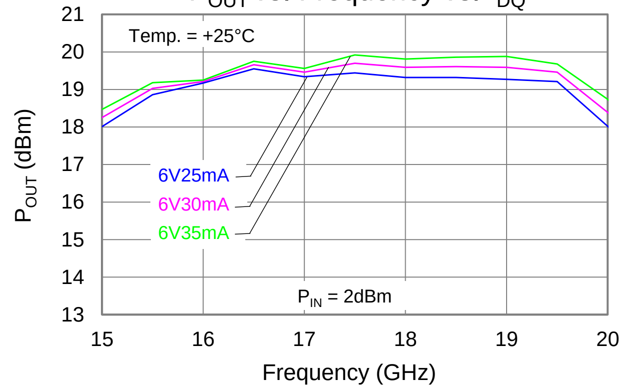



## Typical Performance (Large Signal)

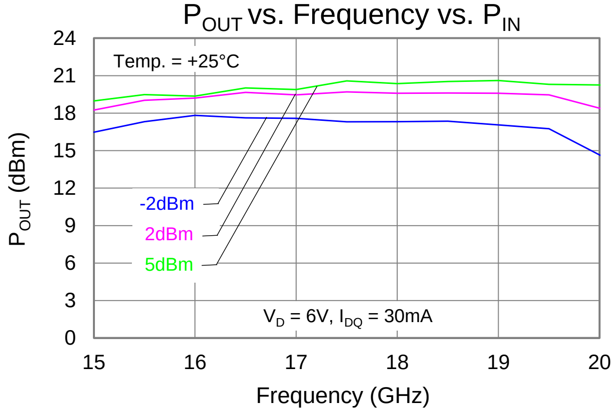
$P_{OUT}$ vs. Frequency vs. $V_D$



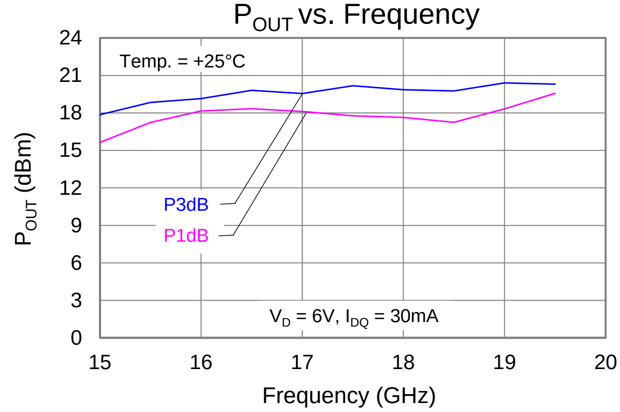

$P_{OUT}$ vs. Frequency vs. $I_{DQ}$



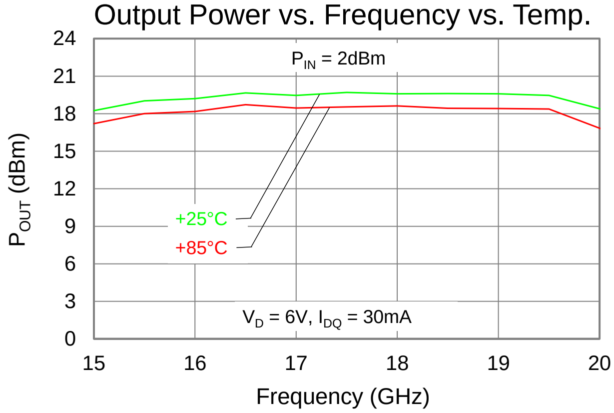

$P_{OUT}$ vs. Frequency vs. $P_{IN}$



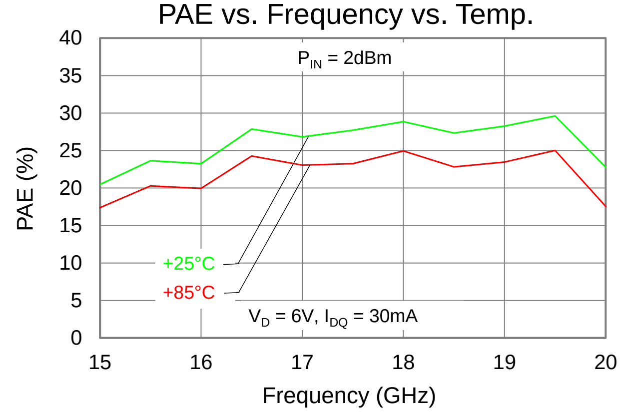

$P_{OUT}$ vs. Frequency



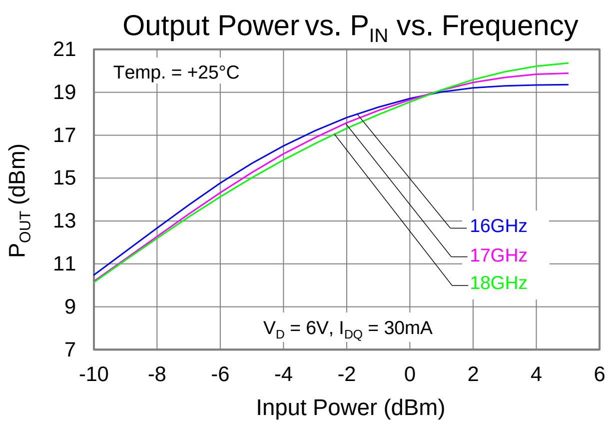

Output Power vs. Frequency vs. Temp.

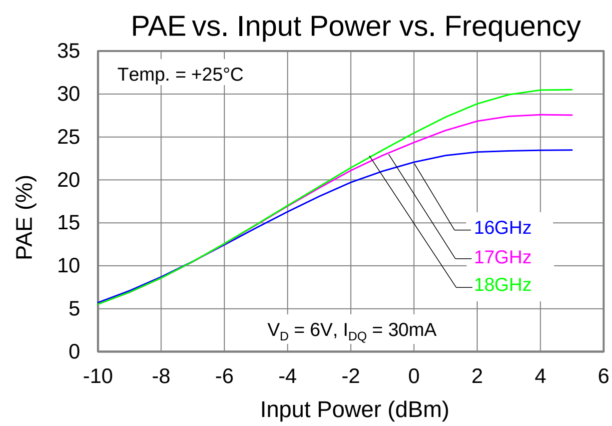


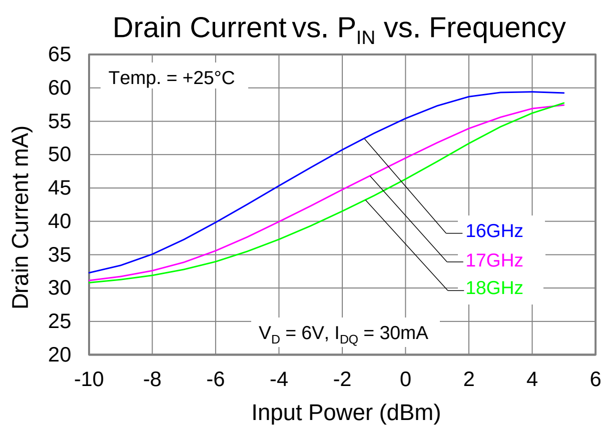

PAE vs. Frequency vs. Temp.

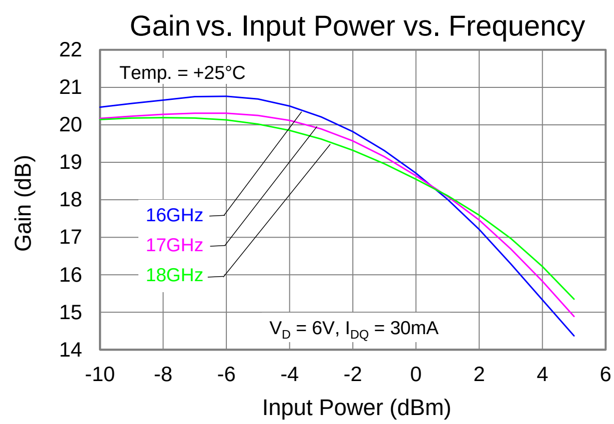


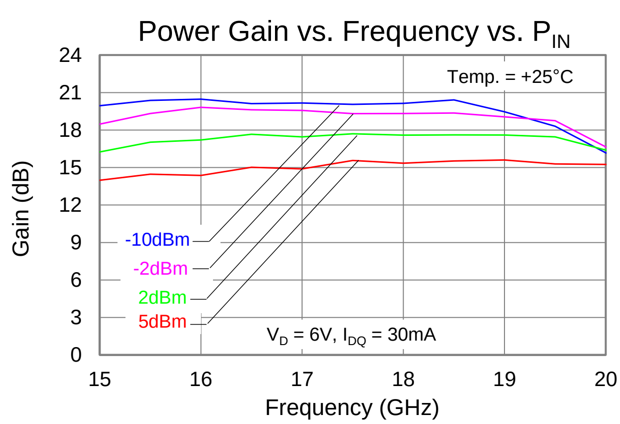
## *Typical Performance (Large Signal)*



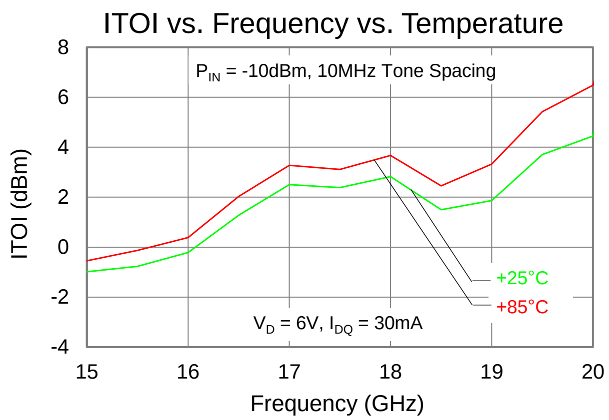



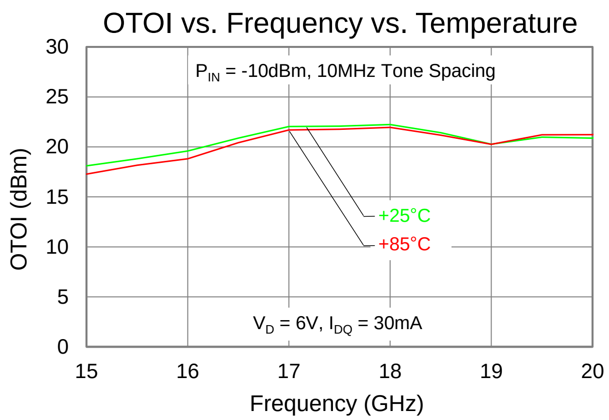



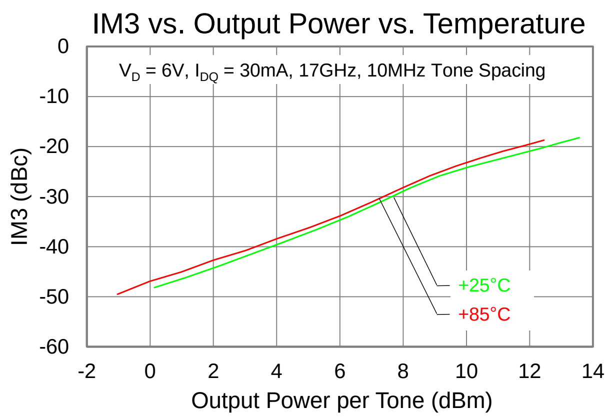



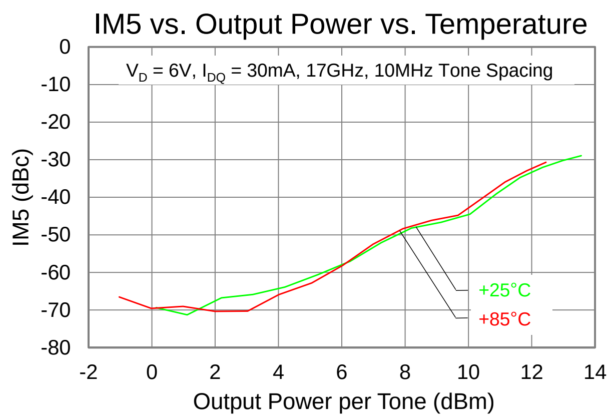



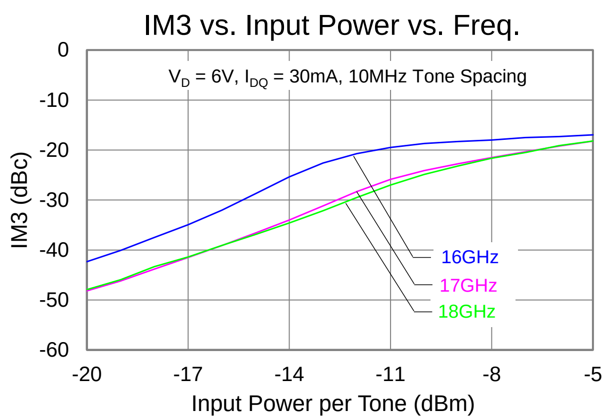
## Typical Performance (Linearity)

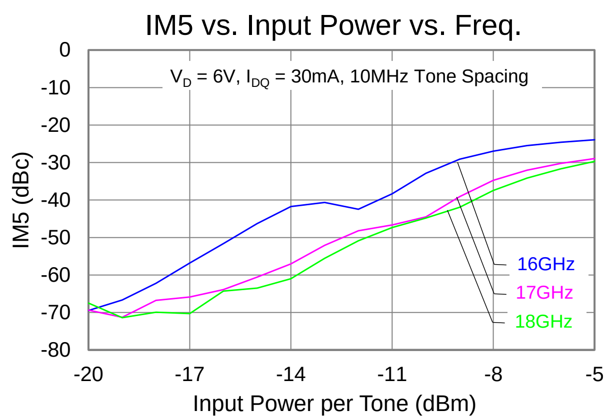


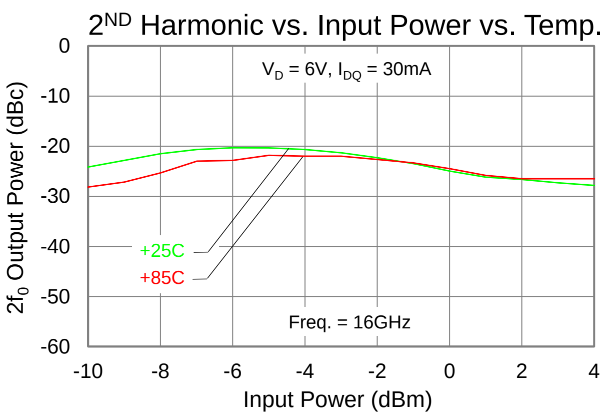



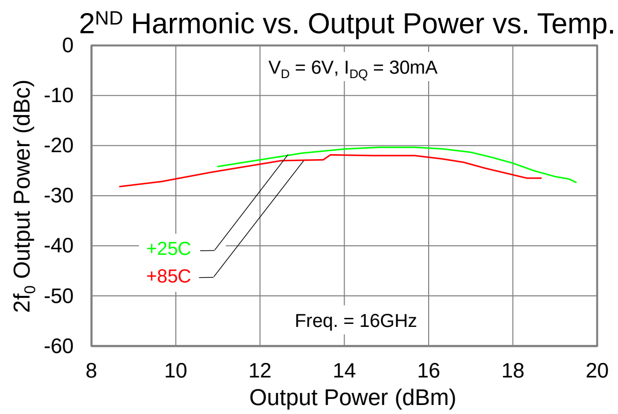



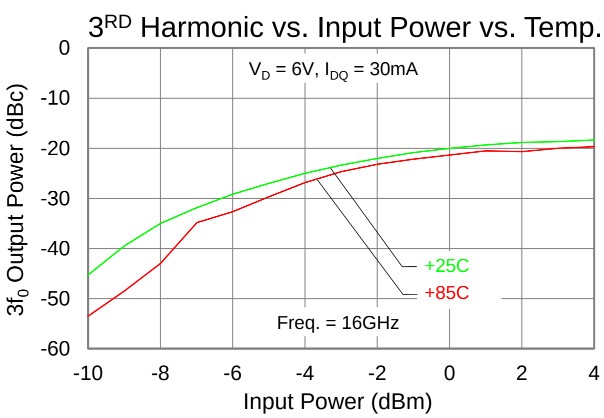



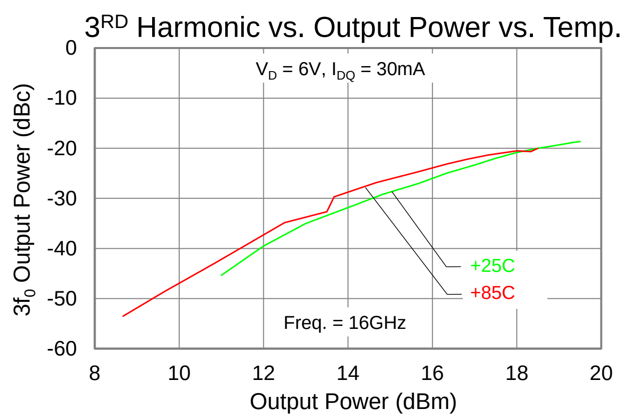



## Typical Performance (Harmonics)

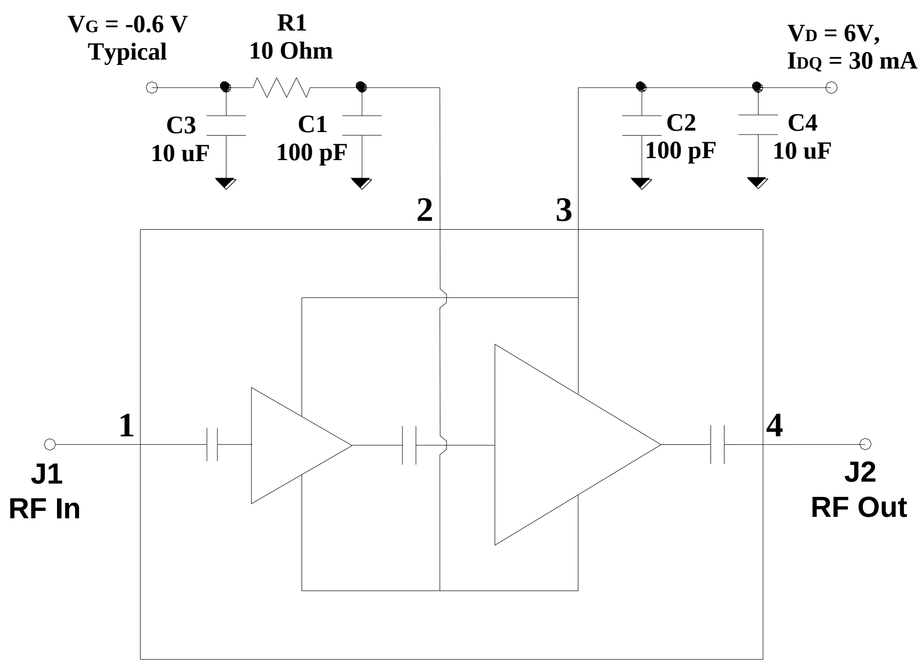


## Application Circuit



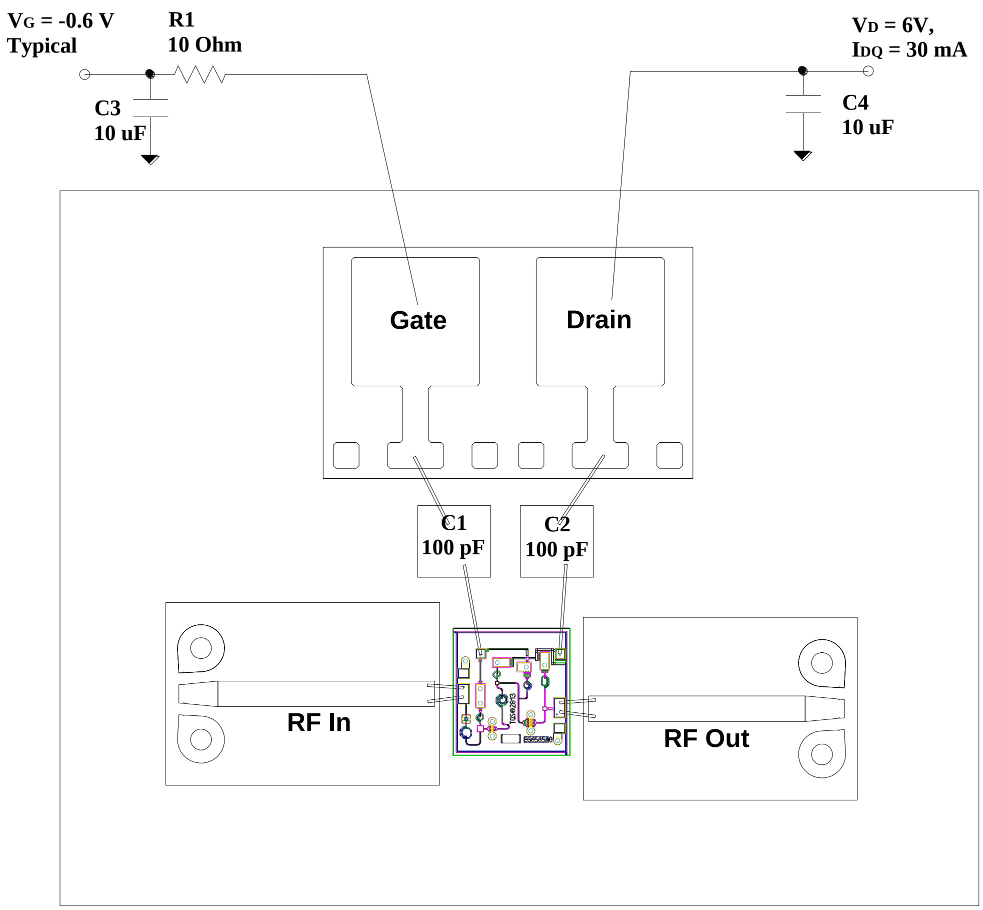

## Bias-up Procedure

| |
|---|
| 1. Set $I_D$ limit to 60mA, $I_G$ limit to 4mA |
| 2. Apply -1.5V to $V_G$ |
| 3. Apply +6V to $V_D$ |
| 4. Adjust $V_G$ more positive until $I_{DQ}$ = 30mA ($V_G$ ~ -0.6 V Typical) |
| 5. Apply RF signal |

## Bias-down Procedure

| |
|---|
| 1. Turn off RF signal |
| 2. Reduce $V_G$ to -1.5V. Ensure $I_{DQ}$ ~ 0mA |
| 3. Set $V_D$ to 0V |
| 4. Turn off $V_D$ supply |
| 5. Turn off $V_G$ supply |

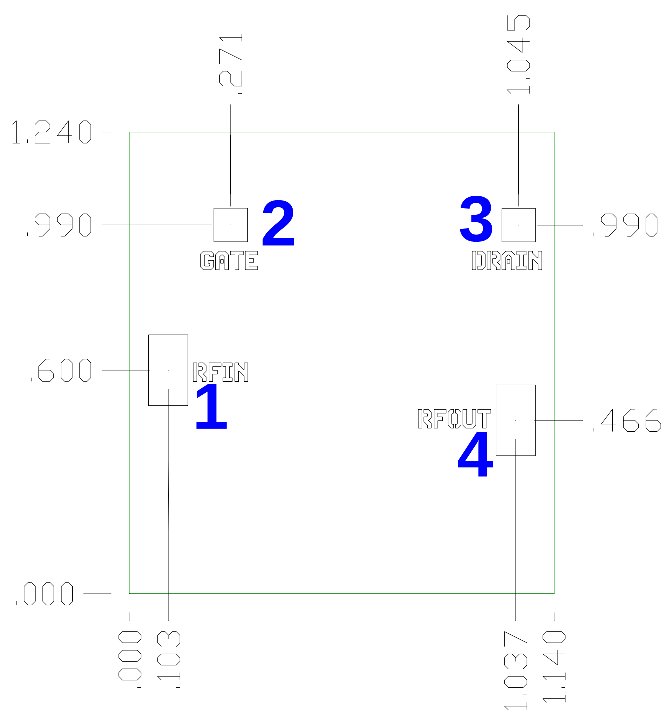
## Assembly Drawing




## Bill of Material

| Reference Des. | Value | Description | Manuf. | Part Number |
|---|---|---|---|---|
| C1 – C2 | 100pF | Cap, 50V, 25%, Single Layer Cap | Various | |
| C3 – C4 | 10µF | Cap, 1206, 50V, 20%, X5R | Various | |
| R1 | 10Ω | Res, 0603, 5% | 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 | 0.106 x 0.190 | Input; matched to 50 ohms; DC blocked. |
| 2 | $V_G$ | 0.090 x 0.090 | Gate voltage, bias network is required; see Application Circuit on page 9 as an example. |
| 3 | $V_D$ | 0.090 x 0.090 | Drain voltage, bias network is required; see Application Circuit on page 9 as an example. |
| 4 | RF Out | 0.106 x 0.190 | Output; matched to 50 ohms; DC blocked. |

## 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: EAR99

### Solderability

Use AuSn (80/20) solder and limit exposure to temperature above 300°C to 3-4 minutes, maximum.

### 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 ($C_{15}H_{12}Br_40_2$) Free
- PFOS Free
- SVHC Free

## Contact Information

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

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**Email:** info-sales@triquint.com **Fax:** **+1.972.994.8504**

For technical questions and application information: **Email:** info-products@triquint.com

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