



TGA2621-SM

16–18.5 GHz 1 W GaAs Power Amplifier

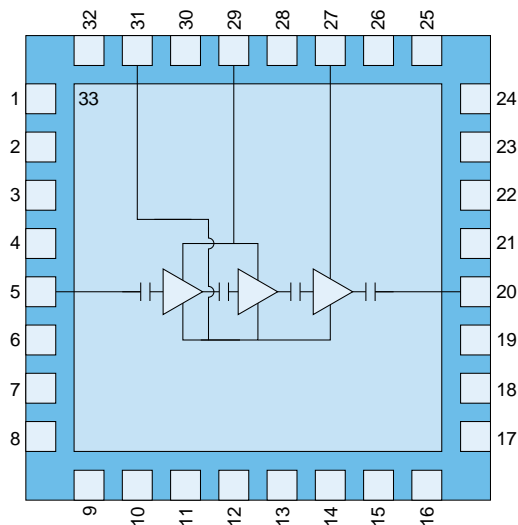
General Description

Qorvo’s TGA2621-SM is a packaged Ku-band Power Amplifier fabricated on Qorvo’s TQPHT15 0.15 μm GaAs pHEMT process. The TGA2621-SM operates from 16 to 18.5 GHz and typically provides greater than 1 W of saturated output power with greater than 23% PAE and greater than 24.5 dB of small signal gain.

The TGA2621-SM is available in a low cost, surface mount 32 lead 5x5 mm air-cavity ceramic QFN. It is ideally suited to support both radar and satellite communications as a driver or low power amplifier.

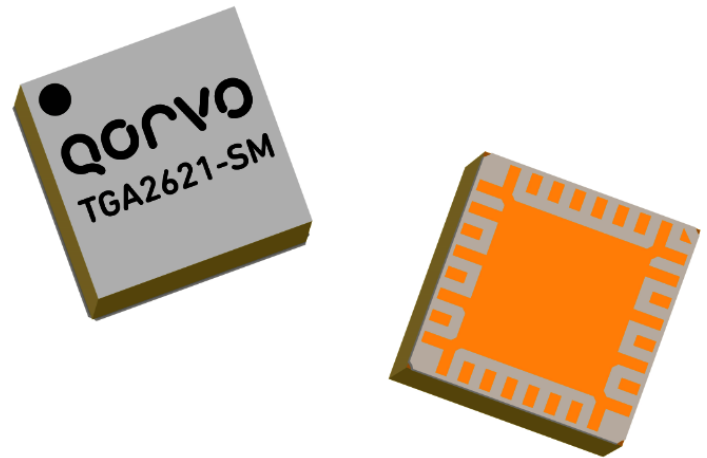
Both RF ports have integrated DC blocking caps and are fully matched to 50 ohms allowing for simple system integration.

Functional Block Diagram



Applications

- Commercial and Military Radar
- Satellite Communications



Product Features

- Frequency Range: 16–18.5 GHz
- P_{SAT} : >30 dBm at $P_{in} = 10$ dBm
- PAE: >23 % at $P_{in} = 10$ dBm
- Small Signal Gain: >24.5 dB
- Input Return Loss: >10 dB
- Bias: $V_D = 6$ V, $I_{DQ} = 500$ mA, $V_G = -0.6$ V Typical
- Package Dimensions: 5.0 x 5.0 x 1.625 mm

Pad Configuration

| Pad no. | Symbol |
|--|------------|
| 1, 2, 4, 6, 8-9, 16-17, 19, 21, 23-25, 32-33 | Gnd |
| 3, 7, 10-15, 18, 22, 26, 28, 30 | N/C |
| 5 | RF_{IN} |
| 20 | RF_{OUT} |
| 27 | V_{D2} |
| 29 | V_{D1} |
| 31 | V_G |

Ordering Information

| Part | Description |
|------------|--------------------------------------|
| TGA2621-SM | 16–18.5 GHz 1 W GaAs Power Amplifier |

Absolute Maximum Ratings

| Parameter | Value/Range |
|--|---------------|
| Drain Voltage (V_D) | 6.25 V |
| Gate Voltage Range (V_G) | -2 to 0 V |
| Drain Current (I_D) | 1300 mA |
| Gate Current (I_G) | -5 to 5 mA |
| Power Dissipation, CW, 85 °C (P_{DISS}) | 3.0 W |
| Input Power, CW, 85 °C, 50 Ω , (P_{IN}) | 17 dBm |
| Input Power, CW, 85 °C, (3:1 V_{SWR}), (P_{IN}) | 17 dBm |
| Channel temperature (T_{CH}) | 200 °C |
| Mounting Temperature (30 Seconds) | 260 °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/Range |
|----------------------------|----------------|
| Drain Voltage (V_D) | 6 V |
| Drain Current (I_{DQ}) | 500 mA |
| Gate Voltage (V_G) | -0.6 V Typical |
| Temperature (T_{BASE}) | -40 to 85 °C |

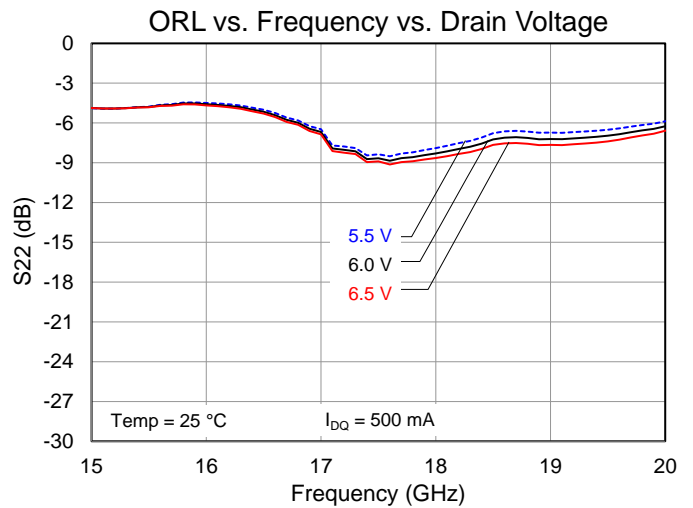
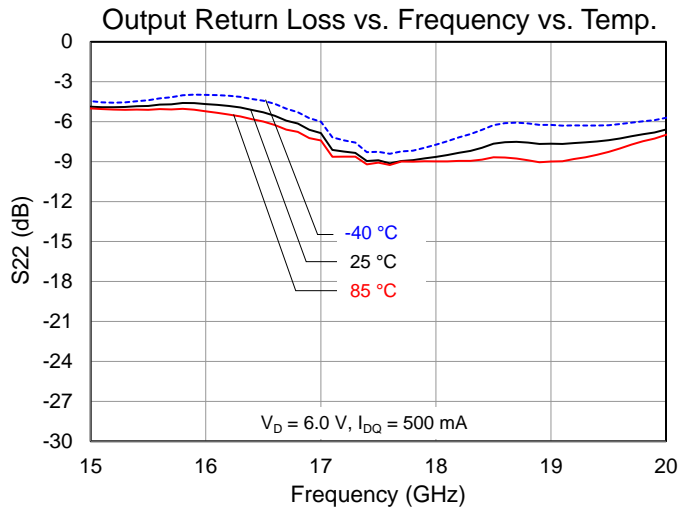
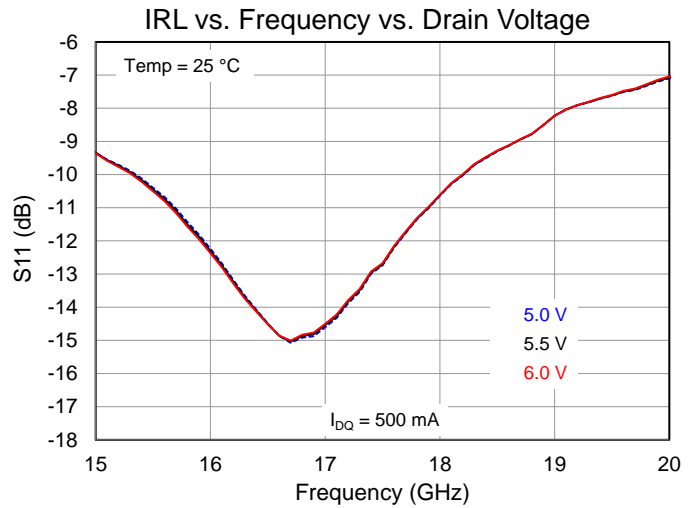
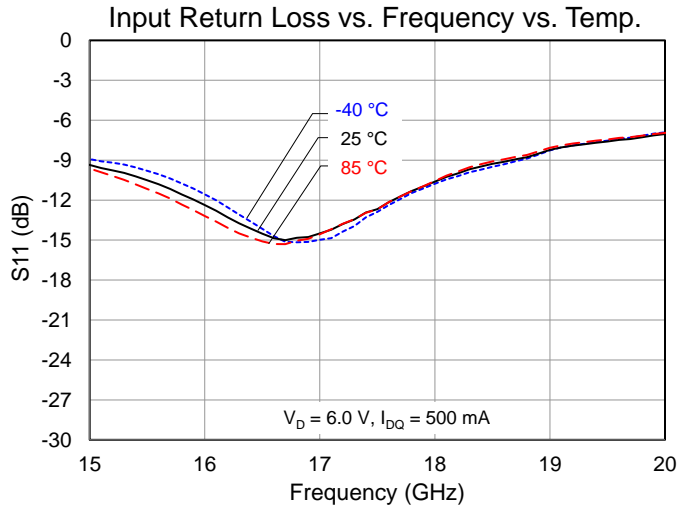
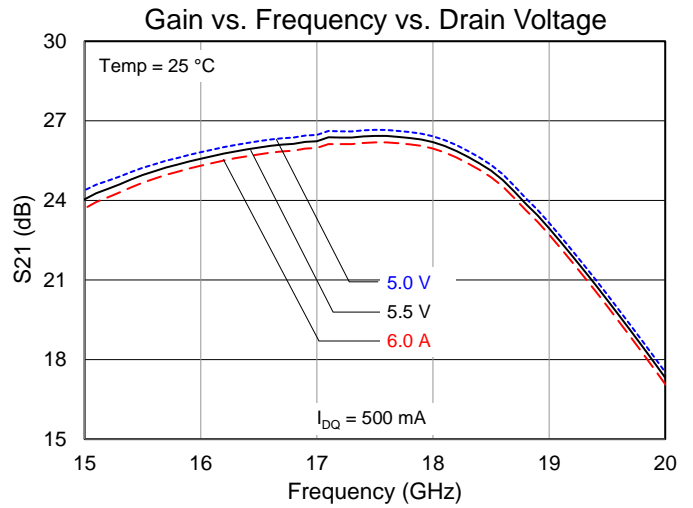
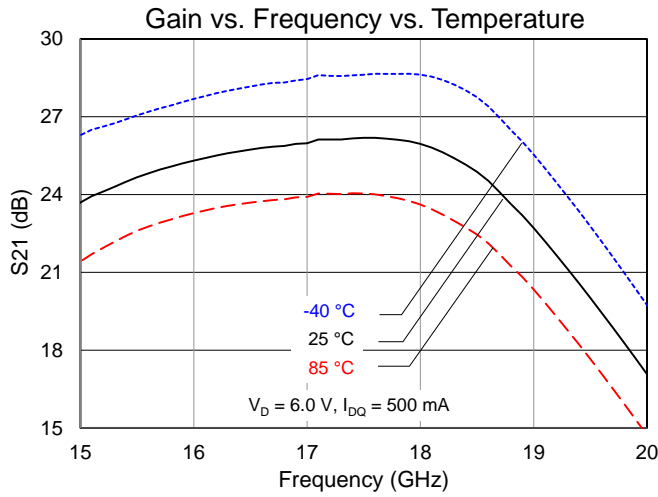
Electrical specifications are measured at specified test conditions. Specifications are not guaranteed overall operating conditions.

Electrical Specifications

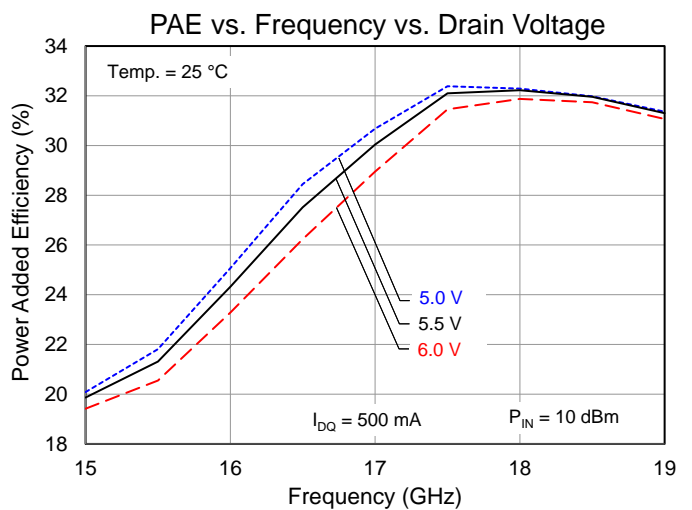
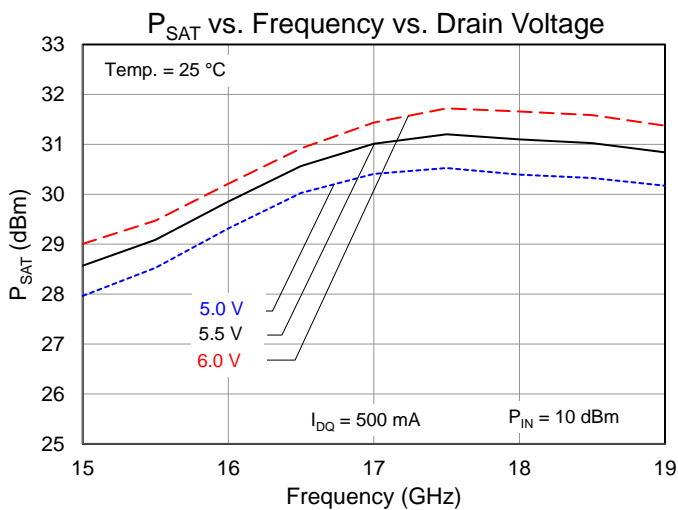
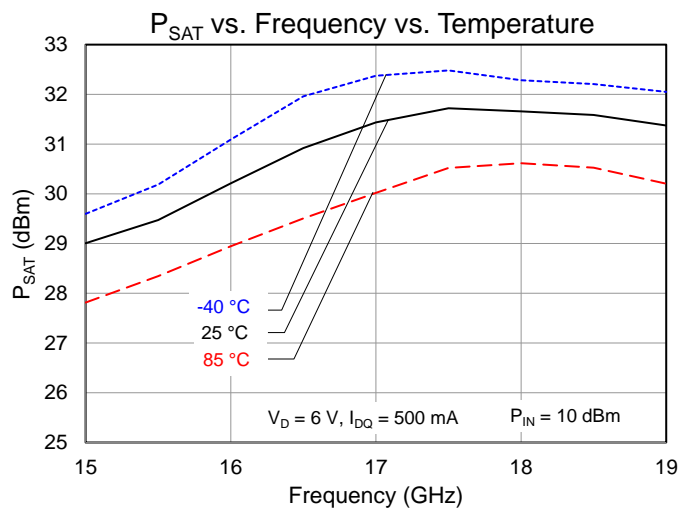
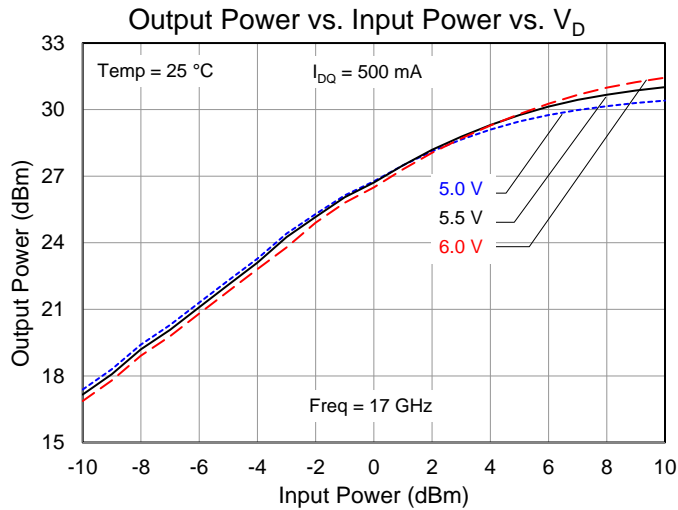
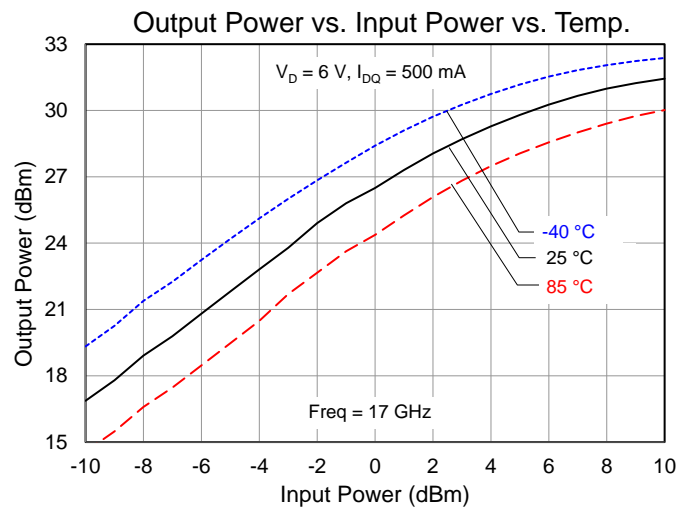
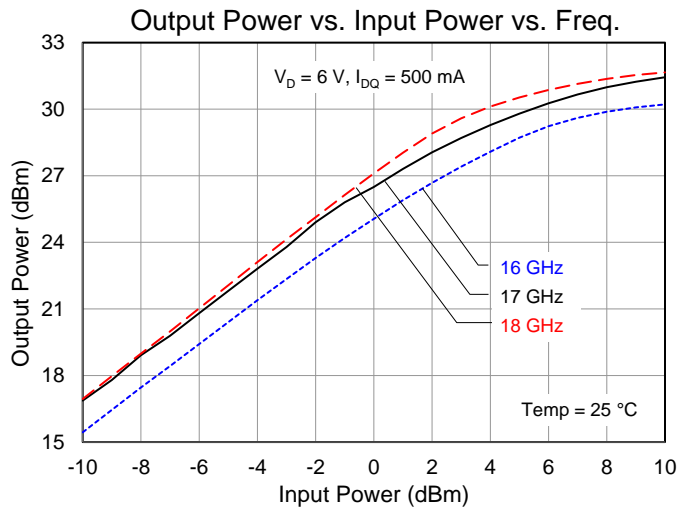
Test conditions unless otherwise noted: 25 °C, $V_D = 6$ V, $I_{DQ} = 500$ mA, $V_G = -0.6$ V typical, CW

| Parameter | Min | Typical | Max | Units |
|---|-----|---------|------|-------|
| Operational Frequency Range | 16 | | 18.5 | GHz |
| Small Signal Gain | | >24.5 | | dB |
| Input Return Loss | | >10 | | dB |
| Output Return Loss | | 6 | | dB |
| Output Power ($P_{in} = 10$ dBm) | | >30 | | dBm |
| Power Added Efficiency ($P_{in} = 10$ dBm) | | >23 | | % |
| Small Signal Gain Temperature Coefficient | | -0.036 | | dB/°C |
| Output Power Temperature Coefficient | | -0.02 | | dB/°C |

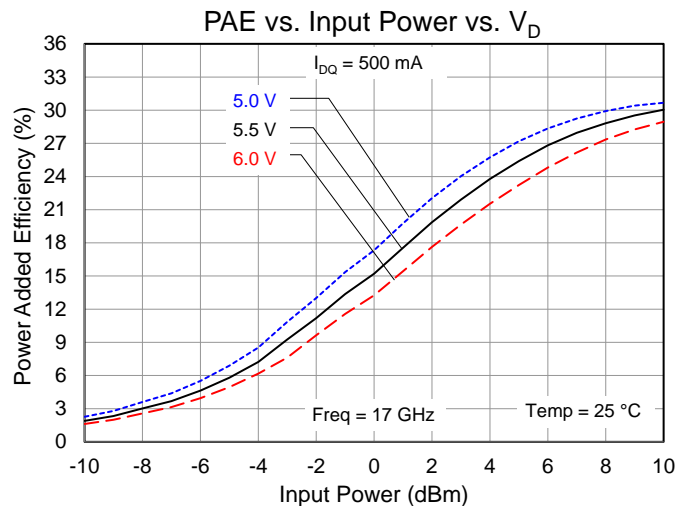
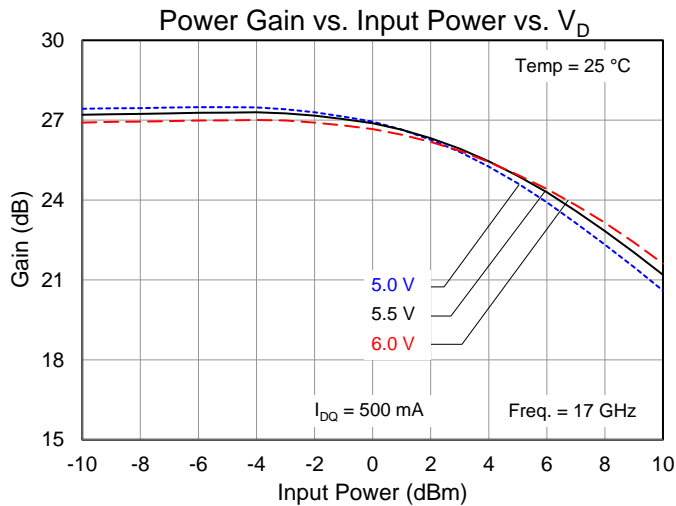
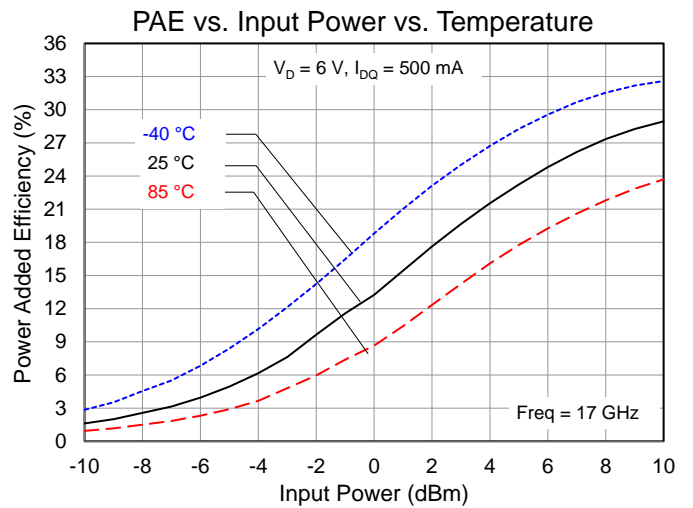
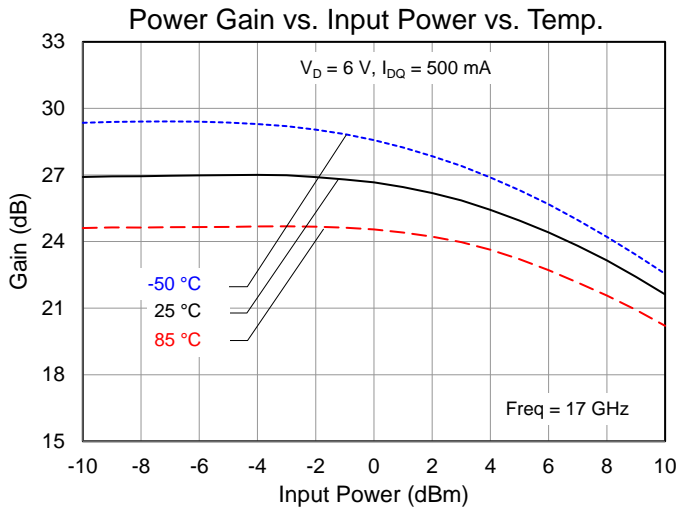
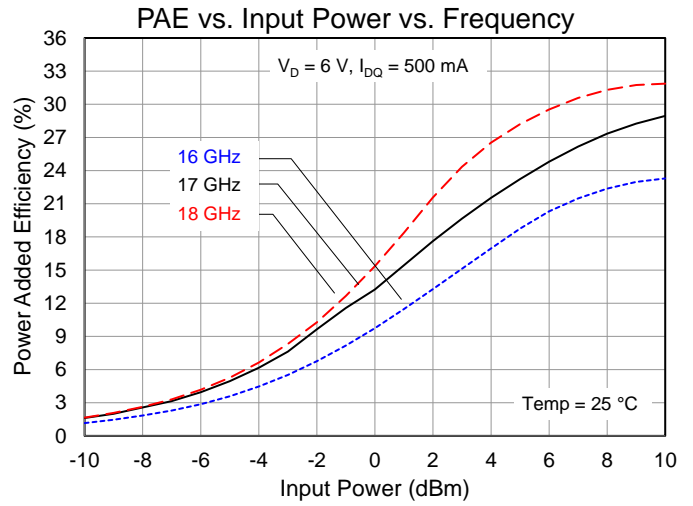
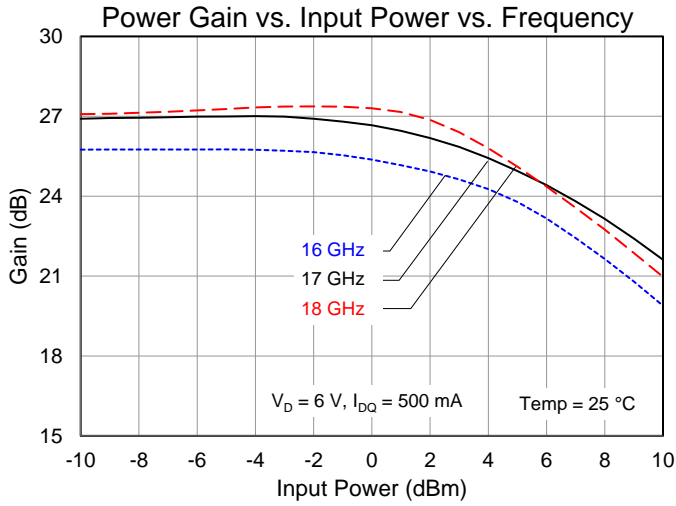
Typical Performance, Small Signal



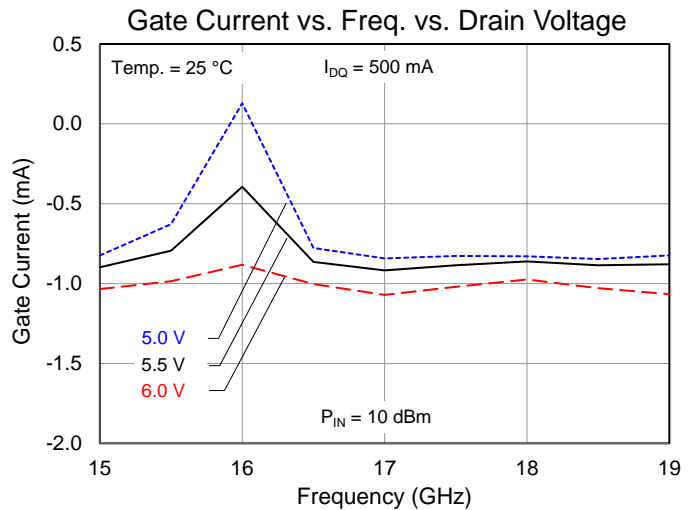
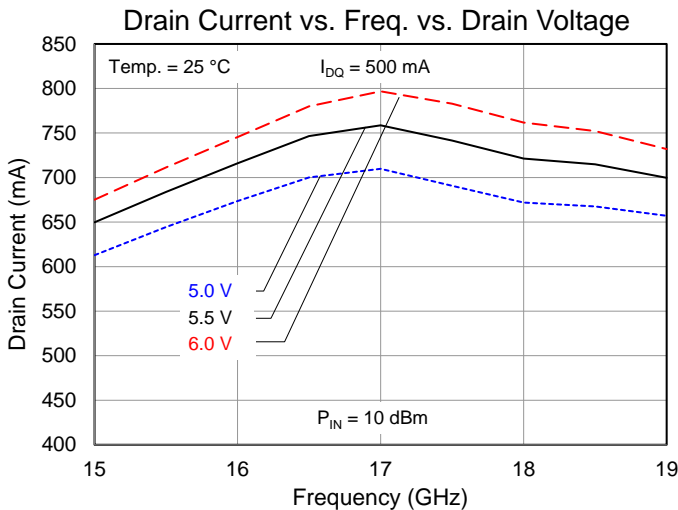
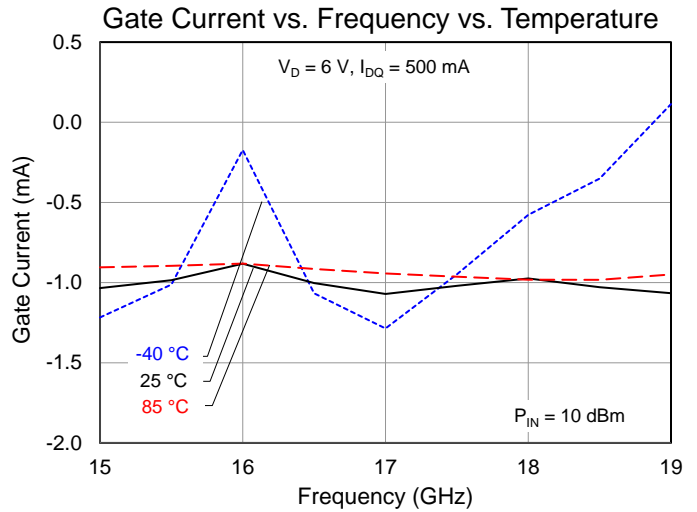
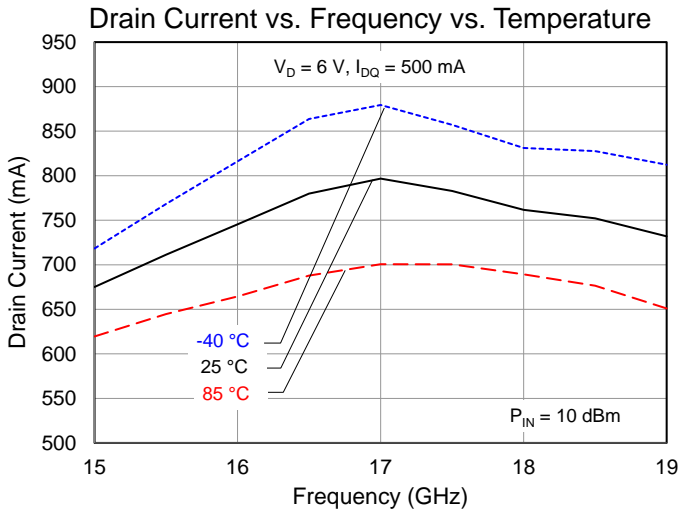
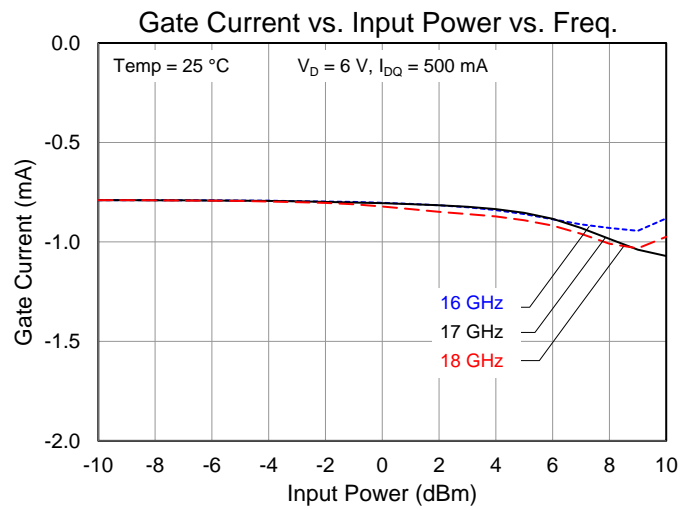
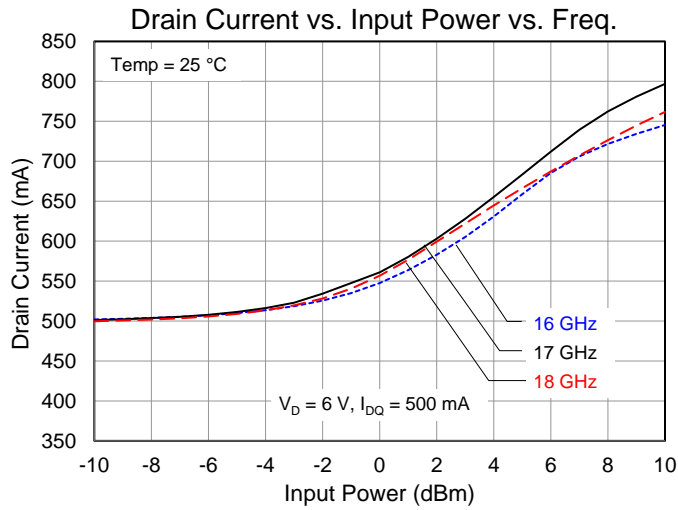
Typical Performance, Large Signal



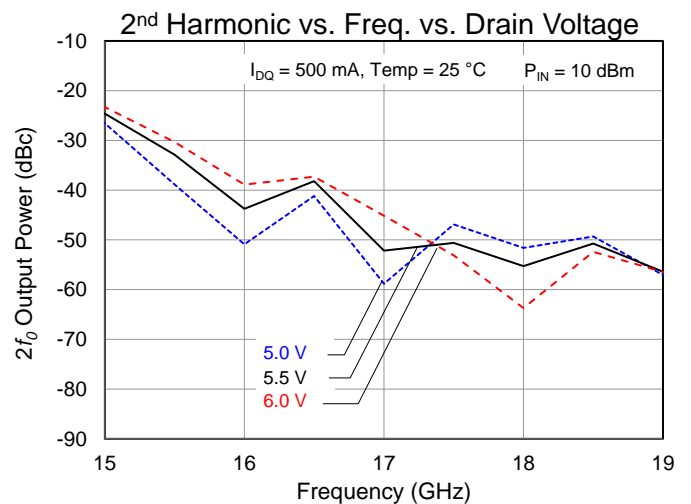
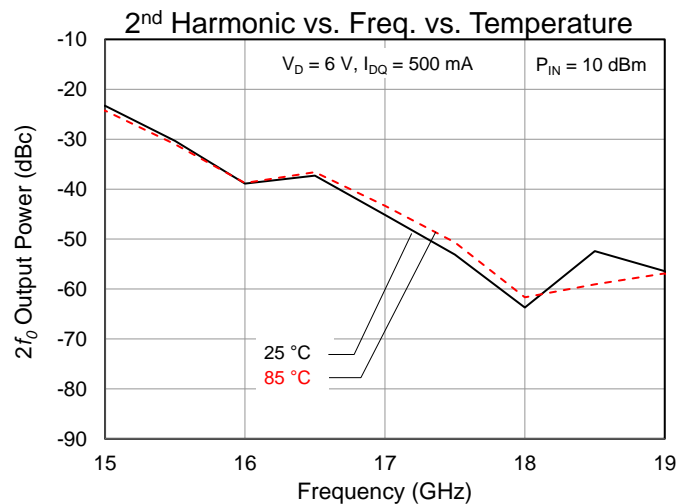
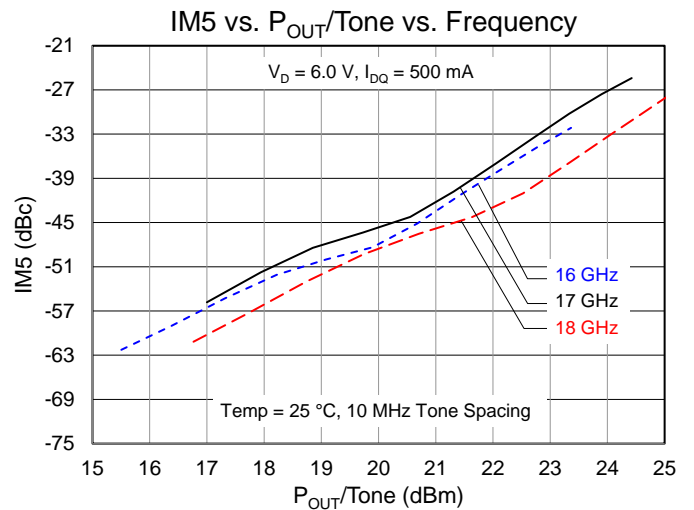
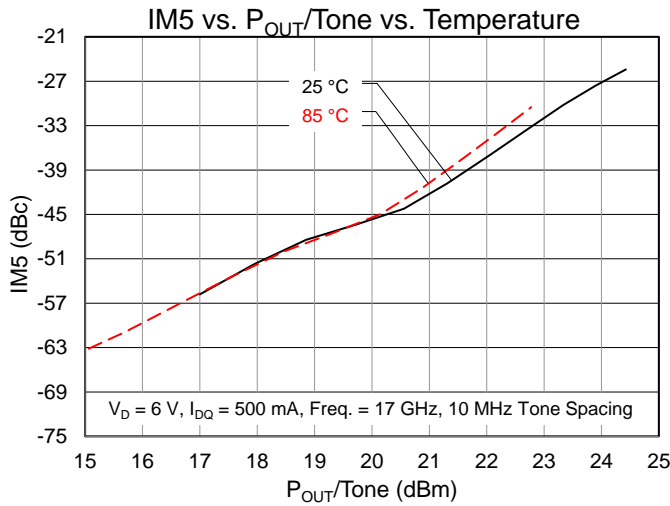
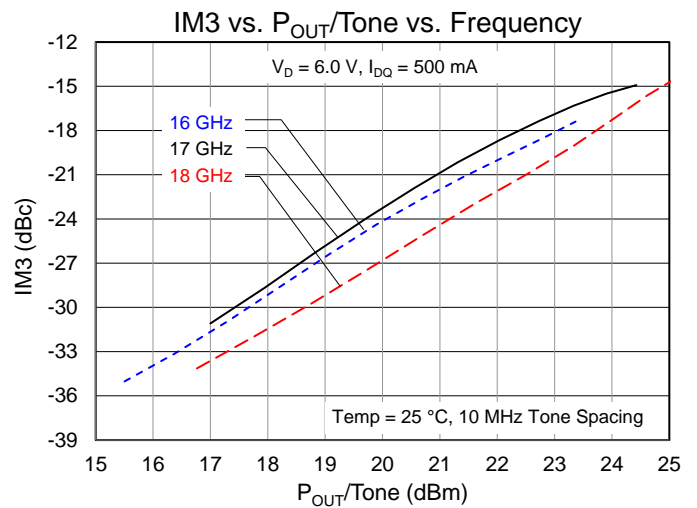
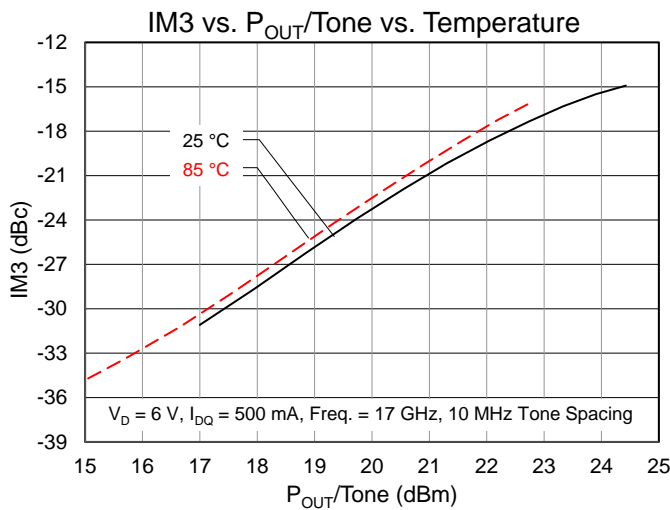
Typical Performance, Large Signal



Typical Performance: (Large Signal)



Typical Performance: Linearity



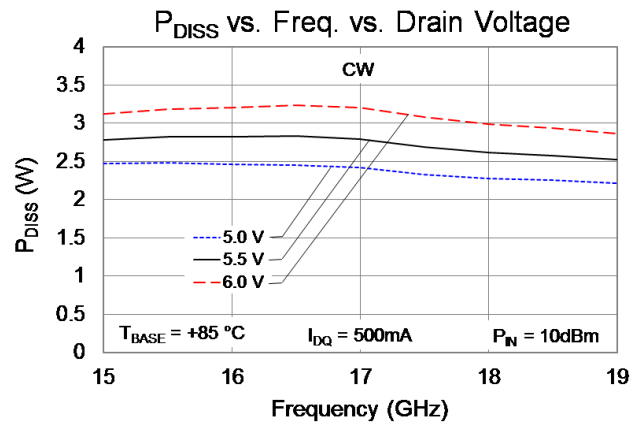
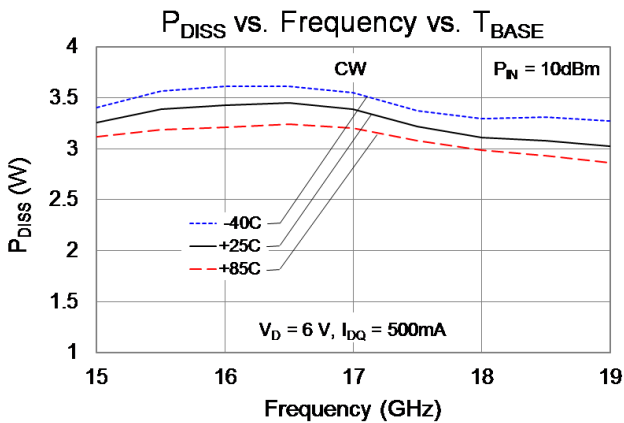
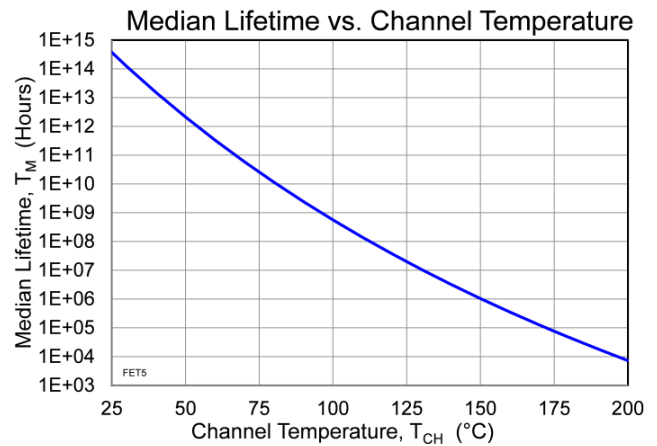
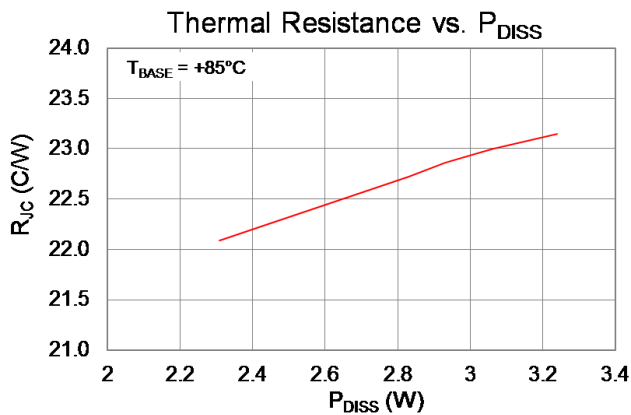
Thermal and Reliability Information

| Parameter | Test Conditions | Value | Units |
|---|--|-------------------|--------------------|
| Thermal Resistance (θ_{JC}) ⁽¹⁾ | $T_{BASE} = 85\text{ }^\circ\text{C}$, $V_D = 5\text{ V}$ | 22.28 | $^\circ\text{C/W}$ |
| Channel Temperature (T_{CH}) (Under RF drive) | $I_{DQ} = 500\text{ mA}$, $I_{D_Drive} = 644\text{ mA}$ $P_{IN} = 10\text{ dBm}$, $P_{OUT} = 28.9\text{ dBm}$, $Freq = 16.5\text{ GHz}$, $P_{DISS} = 2.46\text{ W}$ | 140 | $^\circ\text{C}$ |
| Median Lifetime (T_M) | | 3.2×10^6 | Hrs |
| Thermal Resistance (θ_{JC}) ⁽¹⁾ | $T_{BASE} = 85\text{ }^\circ\text{C}$, $V_D = 5.5\text{ V}$ | 22.72 | $^\circ\text{C/W}$ |
| Channel Temperature (T_{CH}) (Under RF drive) | $I_{DQ} = 500\text{ mA}$, $I_{D_Drive} = 665\text{ mA}$ $P_{IN} = 10\text{ dBm}$, $P_{OUT} = 29.2\text{ dBm}$, $Freq = 16.5\text{ GHz}$, $P_{DISS} = 2.83\text{ W}$ | 149 | $^\circ\text{C}$ |
| Median Lifetime (T_M) | | 1.2×10^6 | Hrs |
| Thermal Resistance (θ_{JC}) ⁽¹⁾ | $T_{BASE} = 85\text{ }^\circ\text{C}$, $V_D = 6\text{ V}$ | 23.14 | $^\circ\text{C/W}$ |
| Channel Temperature (T_{CH}) (Under RF drive) | $I_{DQ} = 500\text{ mA}$, $I_{D_Drive} = 780\text{ mA}$ $P_{IN} = 10\text{ dBm}$, $P_{OUT} = 29.5\text{ dBm}$, $Freq = 16.5\text{ GHz}$, $P_{DISS} = 3.24\text{ W}$ | 160 | $^\circ\text{C}$ |
| Median Lifetime (T_M) | | 3.5×10^5 | Hrs |

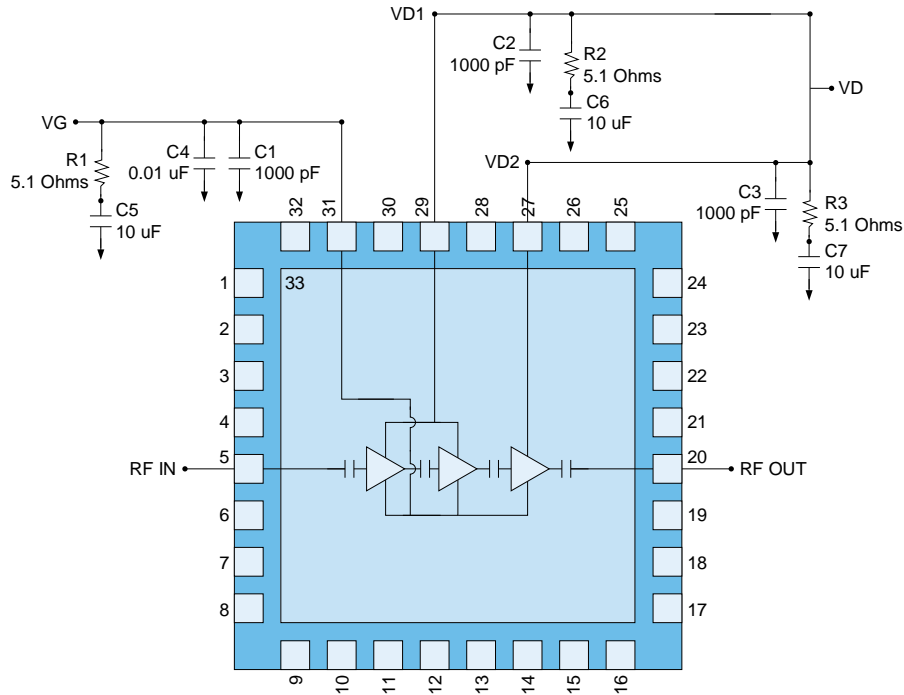
Notes:

- Resistance measured at back of the package.

Conditions: $V_D = 6\text{ V}$; Failure Criteria is 10% reduction in I_{D_MAX}



Application Information



Bias-up Procedure

- Set I_D limit to 1000 mA, I_G limit to 4 mA

- Apply -2 V to V_G for pinch off

- Apply +6 V to V_D

- Adjust V_G more positive until $I_{DQ} = 500$ mA ($V_G \sim -0.6$ V Typical)

- Apply RF signal

Bias-down Procedure

- Turn off RF signal

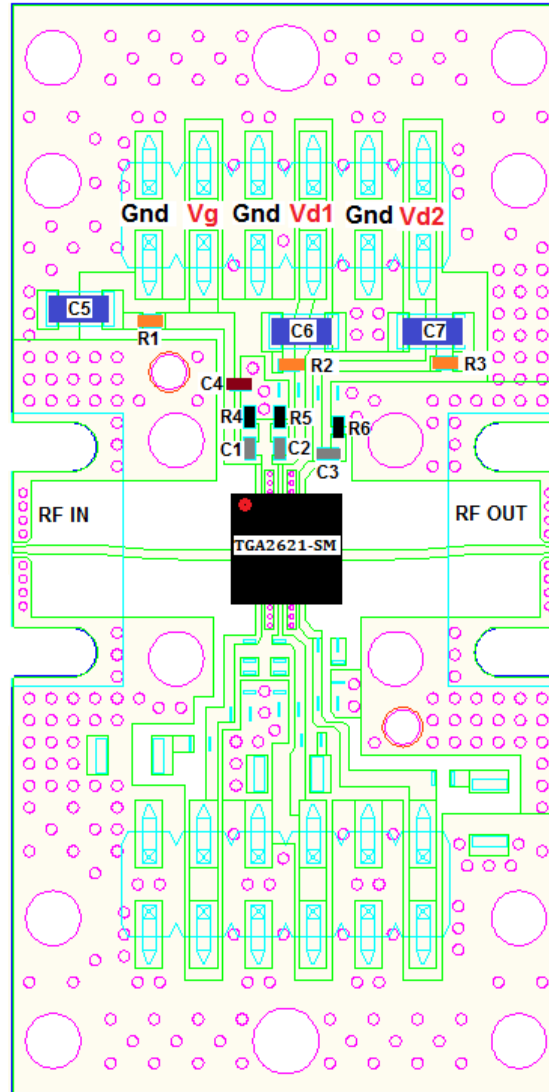
- Reduce V_G to -2 V. Ensure $I_{DQ} \sim 0$ mA

- Set V_D to 0 V

- Turn off V_D supply

- Turn off V_G supply

Evaluation Board and Assembly

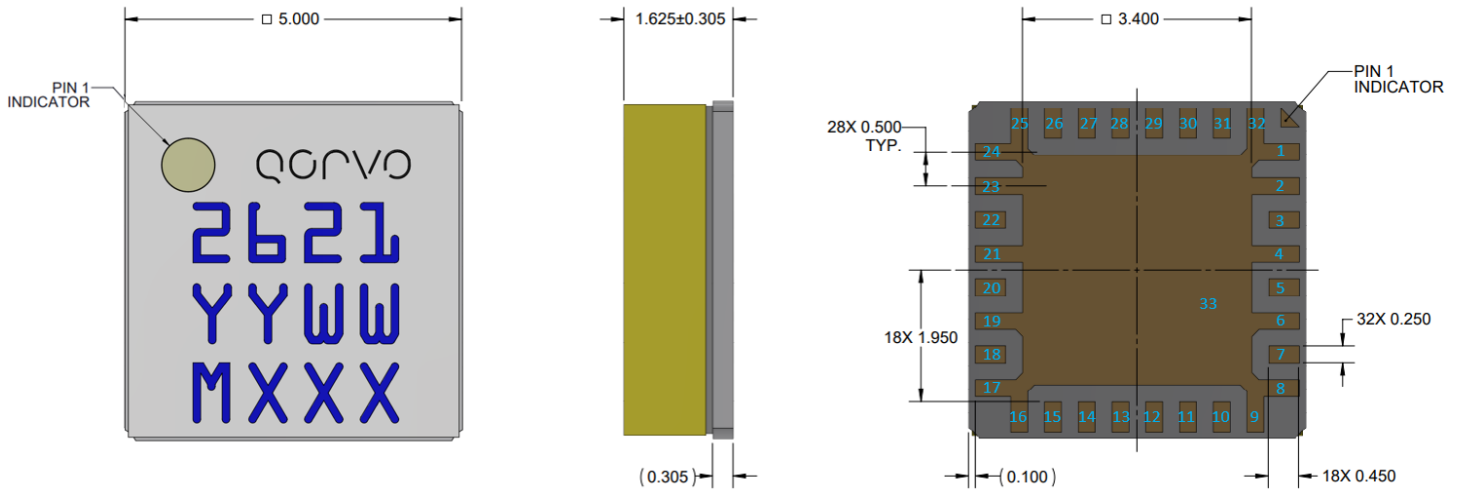


RF Layer is 0.008” thick Rogers Corp. RO4003C ($\epsilon_r = 3.35$). Metal layers are 0.5 oz. copper. The microstrip line at the connector interface is optimized for the Southwest Microwave end launch connector 1092-01A-5.

Bill of Materials

| Ref. Des. | Value | Description | Manuf. | Part Number |
|-----------|------------|------------------------------|---------|-------------|
| C1 – C3 | 1000 pF | Cap, 0402, X7R | Various | |
| C4 | 0.01 uF | Cap, 0402, X7R | Various | |
| C5 – C7 | 10 μ F | Cap, 1206, X5R | Various | |
| R1 – R3 | 5.1 Ohms | Res, 0402 | Various | |
| R4 – R6 | 0 Ohms | Res, 0402 (Jumper, required) | Various | |

Mechanical Information



Units: millimeter. Tolerance: .xx +/- 0.25 ; .xxx +/- 0.127; .xxxx +/- 0.0254

Materials: Base: Ceramic, Lid: Laminate, All metalized features are Au plated, Part is epoxy sealed

Marking: 2621: Part number, YY: Part Assembly year, WW: Part Assembly week, MXXX: Lot ID

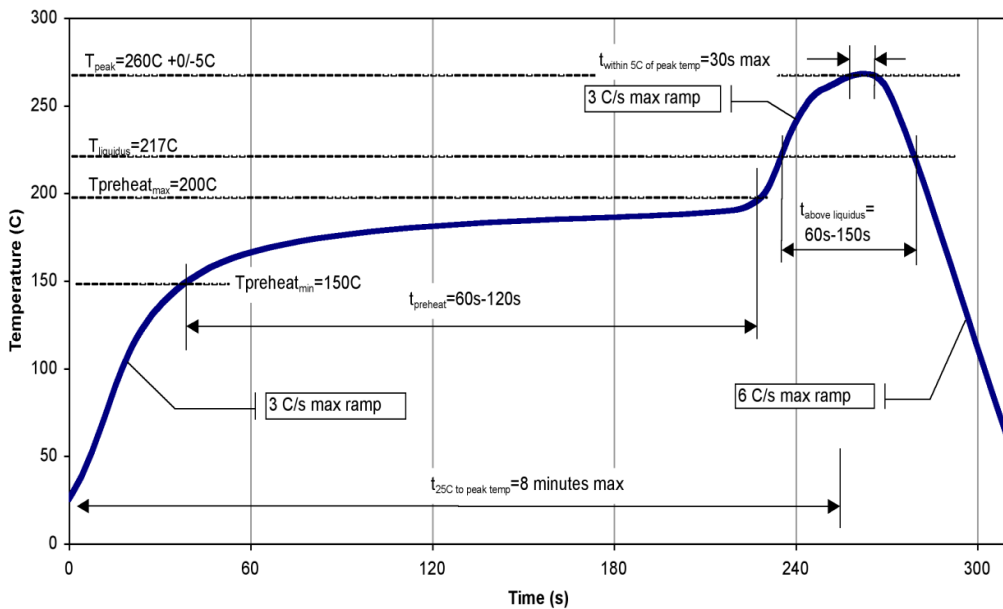
Pin Description

| Pin No. | Symbol | Description |
|---|-----------------------------------|--|
| 1, 2, 4, 6, 8-9, 16-17, 19, 21, 23-25, 32 | G _{ND} | Recommend grounding on PCB |
| 3, 7, 10-15, 18, 22, 26, 28, 30 | N/C | No Internal Connection |
| 5 | RF _{IN} | Input; matched to 50 Ω; DC blocked |
| 20 | RF _{OUT} | Output; matched to 50 Ω; DC blocked |
| 27, 29 | V _{D1} , V _{D2} | Drain voltage; bias network is required; see recommended Application Information above. |
| 31 | V _G | Gate voltage; bias network is required; see recommended Application Information above. |
| 33 | G _{ND} | Ground Paddle. Multiple vias should be employed to minimize inductance and thermal resistance. |

Solderability

1. Compatible with the latest version of J-STD-020, Lead-free soldering process with 260°C peak reflow temperature.
2. This package is non-hermetic, and therefore cannot be subjected to aqueous washing. The use of no-clean solder to avoid washing is highly recommended.

Recommended Soldering Temperature Profile



Handling Precautions

| Parameter | Rating | Standard |
|----------------------------------|--------|------------------------------------|
| ESD – Human Body Model (HBM) | 1A | ESDA / JEDEC JS-001-2017 |
| ESD – Charged Device Model (CDM) | C0b | ESDA / JEDEC JS-002-2014 |
| MSL – Convection Reflow 260 °C | 3 | JEDEC standard IPC/JEDEC J-STD-020 |



Caution!
 ESD-Sensitive Device

RoHS Compliance

This part is compliant with EU 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) as amended by Directive 2015/863/EU.

This product also has the following attributes:

- Lead Free
- 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 Qorvo:

Web: www.qorvo.com

Tel: 1-844-890-8163

Email: customer.support@qorvo.com

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