

TGF2021-08-SG

7 W, 12V, 20MHz - 4 GHz, pHEMT Wideband RF Transistor

Product Description

The TriQuint TGF2021-08-SG is a discrete 7 Watt (P1dB) Transistor operating at 12 volts. The device produces 7W P1dB RF output power at 4GHz. Both defense and commercial markets can take advantage of the flexibility offered by the TGF2021-08-SG. The device is an excellent pre-driver for applications operating between HF and 4GHz and can be used in both narrow-band, and wide-band, applications.

Figure 1. Available Packages



Features

- 12v Operating Voltage
- P1dB 7 Watts
- Small Foot Print, .160 x .210 inches
- Operation from HF-4GHz
- Excellent for narrow-band & wide-band applications

Table 1. Maximum Ratings

| Symbol | Parameter | Value |
|------------------|-----------------------------------|---------------|
| V ⁺ | Positive Supply Voltage | 12.5 V |
| V ⁻ | Negative Supply Voltage Range | -5V to 0V |
| I ⁺ | Positive Supply Current | 3.8 A |
| I _G | Gate Supply Current | 56 mA |
| P _{IN} | Input Continuous Wave Power | 34 dBm |
| P _D | Power Dissipation | See note 3 |
| T _{CH} | Operating Channel Temperature | 150 °C |
| T _M | Mounting Temperature (30 Seconds) | 320 °C |
| T _{STG} | Storage Temperature | -65 to 150 °C |

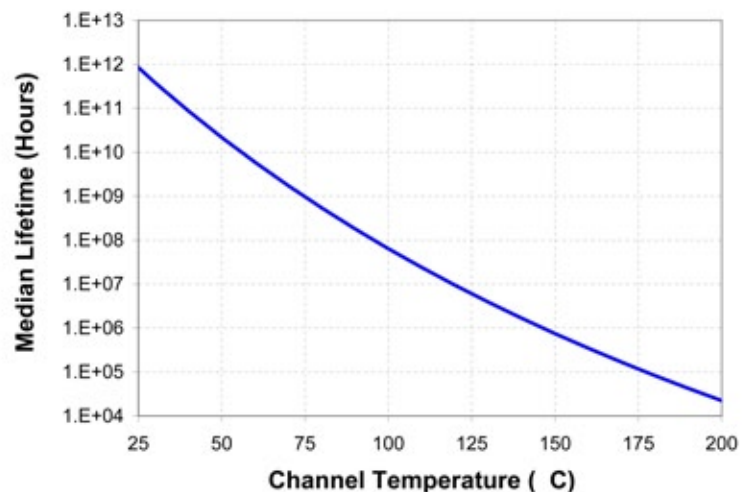
Table 2. Thermal Information

| Parameter | Test Conditions | T _{CH} (°C) | θ _{JC} (°C/W) | T _M (HRS) |
|---|-----------------|----------------------|------------------------|----------------------|
| θ _{JC} Thermal Resistance (channel to backside of carrier) | Pdiss = 12 W | 149 | 10.8 | 1.2 E+6 |

Table 3. ESD Rating

| Parameter | Test Conditions | Class |
|-----------|-----------------------|-------|
| ESD | JEDEC HBM SENSITIVITY | 1C |

Figure 2. Median Lifetime Curve



Preliminary Data Sheet: Subject to change without notice

For additional information and the latest specifications, see our website: www.triquint.com



TGF2021-08-SG

7 W, 12V, 20MHz - 4 GHz, pHEMT Wideband RF Transistor

Electrical Characteristics

Table 4: dc Characteristics

| Symbol | Parameter | Minimum | Typical | Maximum | Unit |
|-----------|-------------------------------|---------|---------|---------|------|
| I_{DSS} | Saturated Drain Current | - | 2400 | - | mA |
| G_m | Transconductance | - | 3000 | - | mS |
| V_P | Pinch-off Voltage | -1.35 | -1 | -0.65 | V |
| V_{BGS} | Breakdown Voltage Gate-Source | -30 | - | -8 | V |
| V_{BGD} | Breakdown Voltage Gate-Drain | -35 | - | -15 | V |

Table 5: RF Characteristics

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|--------|---------------------------------|-----|-----|------|
| Functional Tests, Instantaneous Band-Width (Tested in TriQuint's Wide-Band Test Fixture) | | | | | |
| Gain @ P1dB, 1 GHz - 3 GHz ($V_{DS} = 12V$, $P_{OUT} = 7W$, $I_{DD} = 200mA$) | G | — | TBD | — | dB |
| P1dB, 1 GHz - 3 GHz ($V_{DS} = 12V$, $P_{OUT} = 7W$, $I_{DD} = 200mA$) | P1dB | — | TBD | — | W |
| Power Added Efficiency, 1 GHz - 3 GHz ($V_{DS} = 12V$, $P_{OUT} = 7W$, $I_{DD} = 200mA$) | — | — | TBD | — | % |
| 12 Functional Tests, Narrow Band RF Performance (4 GHz) | | | | | |
| Gain, 4 GHz ($V_{DS} = 12V$, $P_{OUT} = 7W$, $I_{DQ} = 200mA$) | G | — | 11 | — | dB |
| Output Power, 4 GHz ($V_{DS} = 12V$, 1 dB compression, $I_{DQ} = 200mA$) | P1dB | — | 7 | — | W |
| Drain Efficiency, 4 GHz ($V_{DS} = 12V$, $P_{OUT} = P_{1dB}$, $I_{DQ} = 200mA$) | — | — | 40 | — | % |
| Ruggedness, 4 GHz ($V_{DS} = 12V$, $P_{OUT} = 7W$, $I_{DQ} = 200mA$, $f = 4GHz$ VSWR = TBD) | — | No degradation in output power. | | | |

Preliminary Data Sheet: Subject to change without notice

For additional information and the latest specifications, see our website: www.triquint.com

Revision A, June 2009



TGF2021-08-SG

7 W, 12V, 20MHz - 4 GHz, pHEMT Wideband RF Transistor

Narrow Band Performance Plots

Figure 3: P1dB & Gain versus Frequency

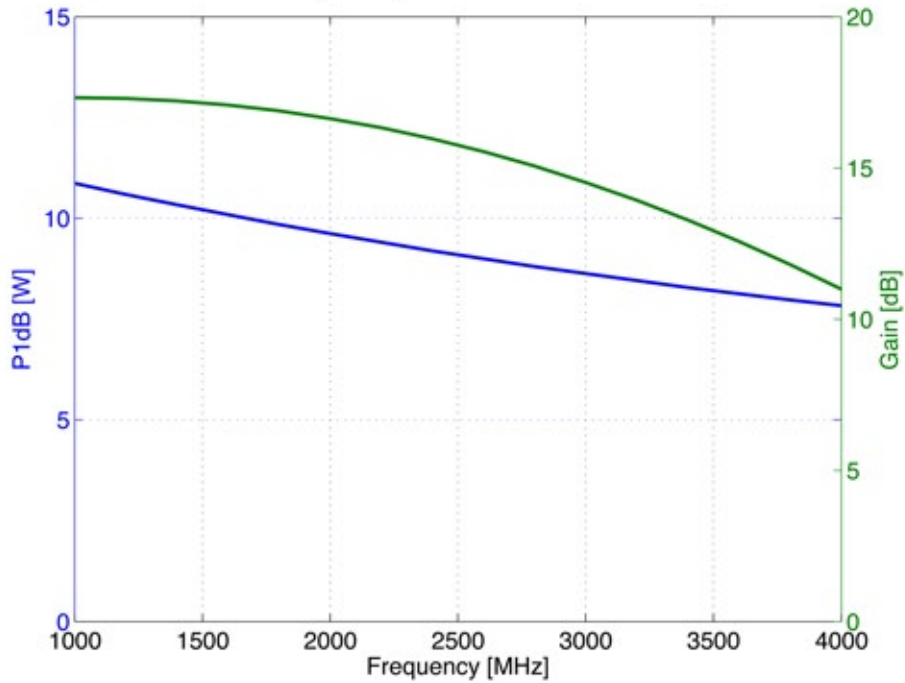
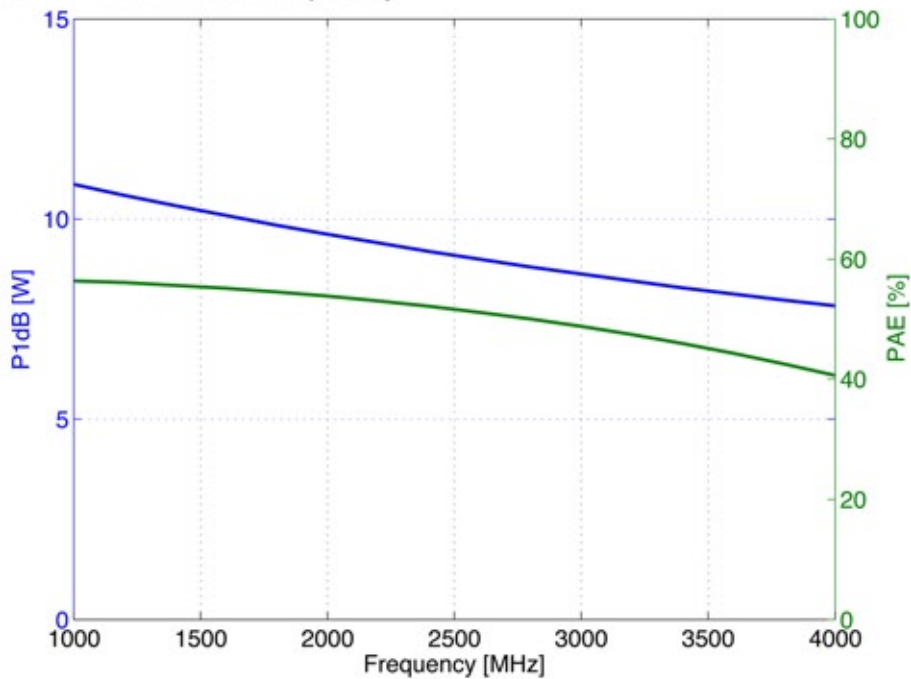


Figure 4: P1dB & PAE versus Frequency



Preliminary Data Sheet: Subject to change without notice

For additional information and the latest specifications, see our website: www.triquint.com

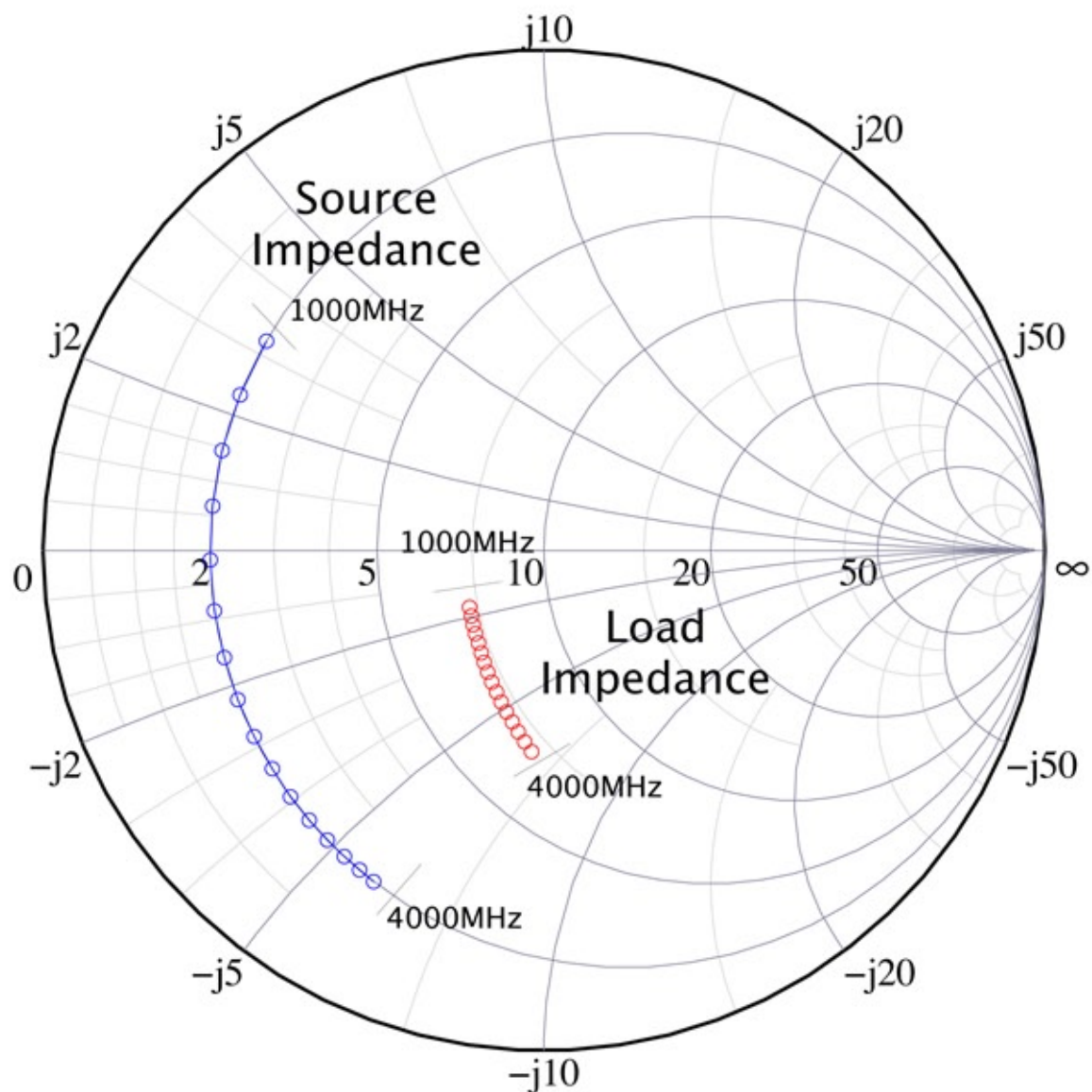


TGF2021-08-SG

7 W, 12V, 20MHz - 4 GHz, pHEMT Wideband RF Transistor

Impedance Data

Figure 5: Smith Chart



Preliminary Data Sheet: Subject to change without notice

For additional information and the latest specifications, see our website: www.triquint.com

Revision A, June 2009



TGF2021-08-SG

7 W, 12V, 20MHz - 4 GHz, pHEMT Wideband RF Transistor

The following table details RF performance typically exhibited by the device when placed in the specified impedance environment. The impedances are not the impedances of the device, they are the impedances presented to the device via an RF circuit or Load-Pull system. The data is representative of typical device performance.

Note: The TGF2021-08-SG is designed to operate at frequencies as low as HF. However, characterization is currently limited to 1 GHz. Tables will be updated in the near future.

Table 4: 12v, IDQ=200 mA

| Frequency [MHz] | real(Γ_{in}) | imag(Γ_{in}) | real(Z_{in}) | imag(Z_{in}) | real(Γ_{out}) | imag(Γ_{out}) | real(Z_{out}) | imag(Z_{out}) | Gain [dB] | P1dB [W] | P1dB [dBm] | PAE [%] |
|-----------------|-----------------------|-----------------------|------------------|------------------|------------------------|------------------------|-------------------|-------------------|-----------|----------|------------|---------|
| 1000 | -0.916 | 0.119 | 2 | 3.2 | -0.745 | -0.052 | 7.3 | -1.7 | 17.3 | 10.9 | 40.4 | 56 |
| 1200 | -0.919 | 0.086 | 2 | 2.3 | -0.745 | -0.06 | 7.2 | -2 | 17.3 | 10.6 | 40.3 | 56 |
| 1400 | -0.922 | 0.054 | 2 | 1.5 | -0.745 | -0.069 | 7.2 | -2.2 | 17.2 | 10.3 | 40.1 | 56 |
| 1600 | -0.923 | 0.024 | 2 | 0.6 | -0.744 | -0.077 | 7.2 | -2.5 | 17.1 | 10.1 | 40 | 55 |
| 1800 | -0.923 | -0.005 | 2 | -0.1 | -0.744 | -0.086 | 7.2 | -2.8 | 16.9 | 9.8 | 39.9 | 55 |
| 2000 | -0.923 | -0.032 | 2 | -0.9 | -0.743 | -0.095 | 7.2 | -3.1 | 16.6 | 9.6 | 39.8 | 54 |
| 2200 | -0.921 | -0.058 | 2 | -1.6 | -0.742 | -0.105 | 7.2 | -3.4 | 16.3 | 9.4 | 39.7 | 53 |
| 2400 | -0.92 | -0.082 | 2 | -2.2 | -0.742 | -0.115 | 7.2 | -3.8 | 16 | 9.2 | 39.6 | 52 |
| 2600 | -0.917 | -0.104 | 2 | -2.8 | -0.741 | -0.125 | 7.1 | -4.1 | 15.5 | 9 | 39.5 | 51 |
| 2800 | -0.915 | -0.125 | 2 | -3.4 | -0.74 | -0.135 | 7.1 | -4.4 | 15.1 | 8.8 | 39.4 | 50 |
| 3000 | -0.912 | -0.144 | 2 | -3.9 | -0.739 | -0.145 | 7.1 | -4.8 | 14.5 | 8.6 | 39.4 | 49 |
| 3200 | -0.909 | -0.162 | 2 | -4.4 | -0.738 | -0.156 | 7.1 | -5.1 | 13.9 | 8.5 | 39.3 | 47 |
| 3400 | -0.907 | -0.178 | 2 | -4.9 | -0.737 | -0.167 | 7 | -5.5 | 13.3 | 8.3 | 39.2 | 46 |
| 3600 | -0.904 | -0.192 | 2 | -5.3 | -0.736 | -0.179 | 7 | -5.9 | 12.6 | 8.1 | 39.1 | 44 |
| 3800 | -0.901 | -0.205 | 2 | -5.6 | -0.735 | -0.19 | 7 | -6.3 | 11.8 | 8 | 39 | 43 |
| 4000 | -0.898 | -0.216 | 2 | -5.9 | -0.734 | -0.202 | 6.9 | -6.6 | 11 | 7.8 | 38.9 | 41 |

Preliminary Data Sheet: Subject to change without notice

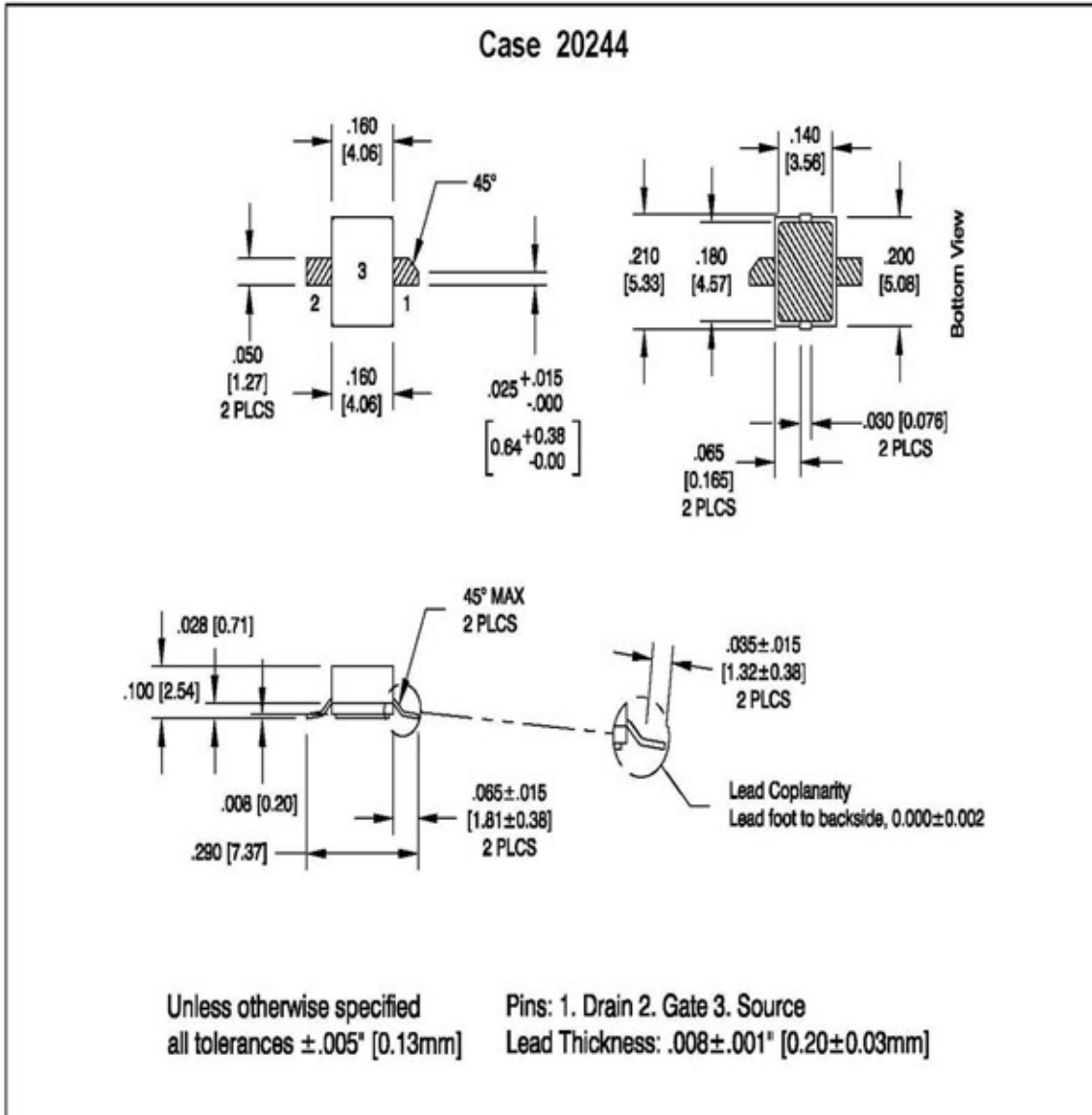
For additional information and the latest specifications, see our website: www.triquint.com



TGF2021-08-SG

7 W, 12V, 20MHz - 4 GHz, pHEMT Wideband RF Transistor

Figure 6. Case Outline Specifications



Preliminary Data Sheet: Subject to change without notice

For additional information and the latest specifications, see our website: www.triquint.com

Revision A, June 2009

