TriQuint SEMICONDUCTOR

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
$\lvert I_G \rvert$	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

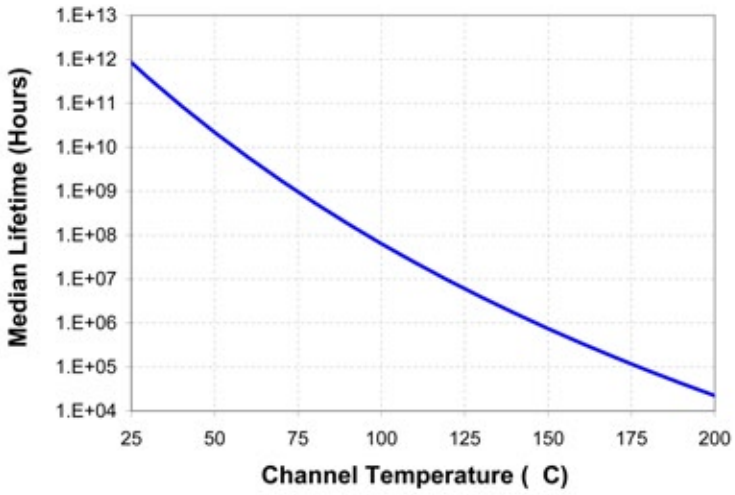
Table 2. Thermal Information

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

Revision A, June 2009

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Electrical Characteristics

Table 4: dc Characteristics

Symbol	Parameter	Minimum	Typical	Maximum	Unit
Idss	Saturated Drain Current	-	2400	-	mA
Gm	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 (VDS = 12 V, POUT = 7 W, IDD = 200 mA)	G	—	TBD	—	dB
P1dB, 1 GHz - 3 GHz (VDS = 12 V, POUT = 7 W, IDD = 200 mA)	P1dB	—	TBD	—	W
Power Added Efficiency, 1 GHz - 3 GHz (VDS = 12 V, POUT = 7 W, IDD = 200 mA)	—	—	TBD	—	%
12 **Functional Tests,** Narrow Band RF Performance (4 GHz)					
Gain, 4 GHz (VDS = 12 V, POUT = 7 W, IDQ = 200 mA)	G	—	11	—	dB
Output Power, 4 GHz (VDS = 12 V, 1 dB compression, IDQ = 200 mA)	P1dB	—	7	—	W
Drain Efficiency, 4 GHz (VDS = 12 V, POUT = P1dB, IDQ = 200 mA)	—	—	40	—	%
Ruggedness, 4 GHz (VDS = 12 V, POUT = 7 W, IDQ = 200 mA, f = 4 GHz VSWR = TBD	—	No degradation in output power.			

Narrow Band Performance Plots

Figure 3: P1dB & Gain versus Frequency

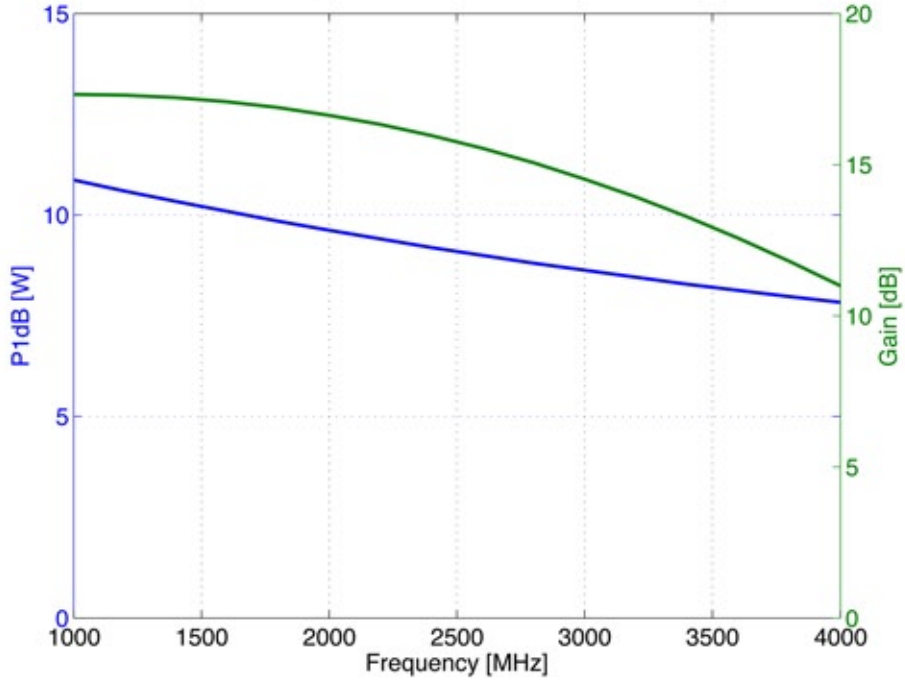
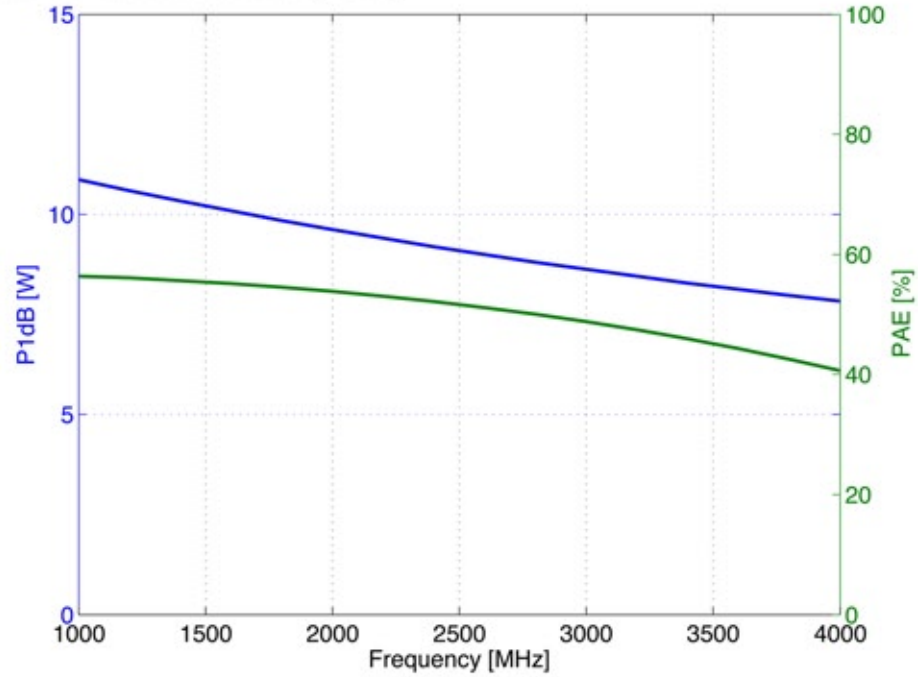
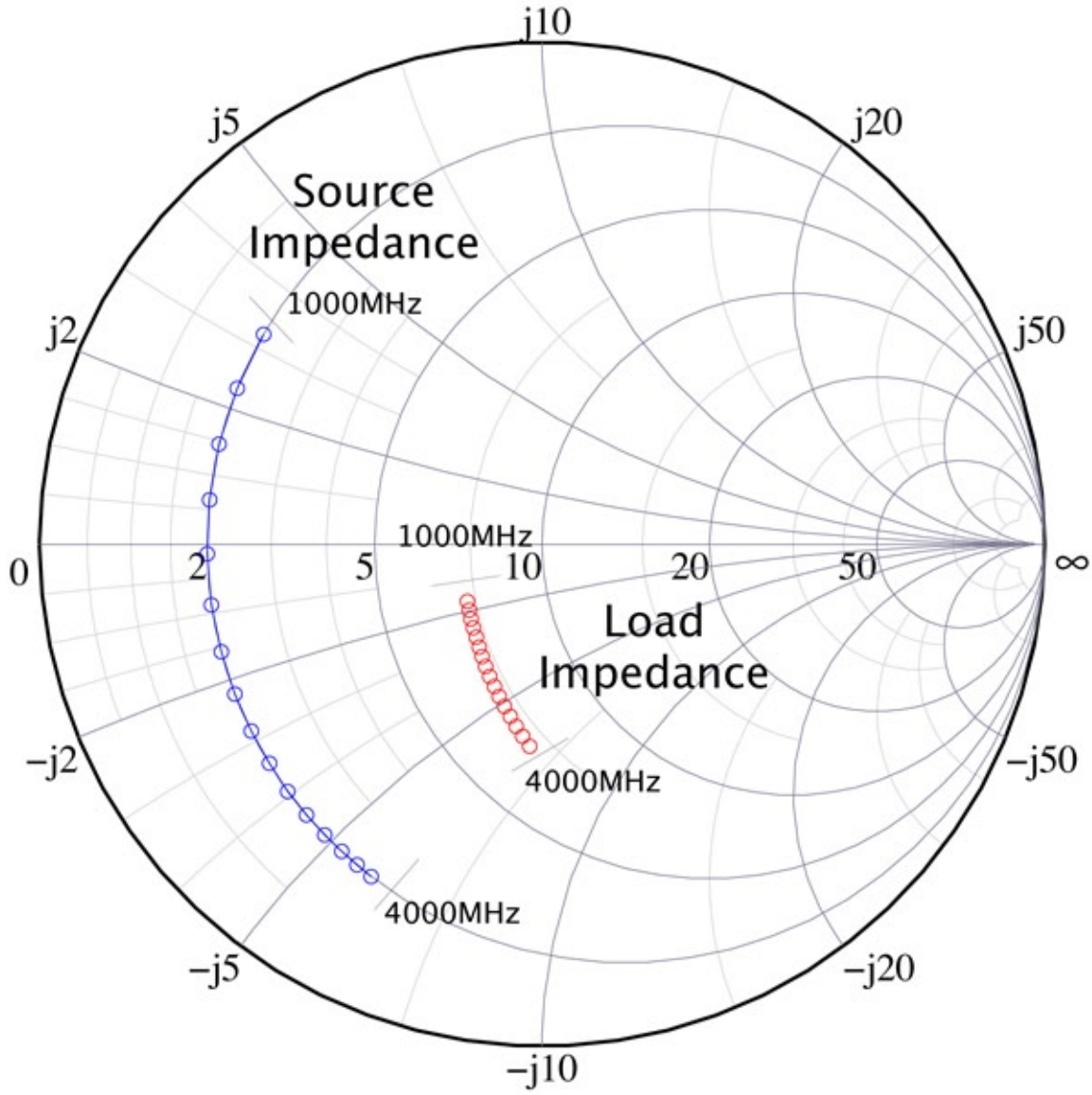


Figure 4: P1dB & PAE versus Frequency



Impedance Data

Figure 5: Smith Chart



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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(Γin)	imag(Γin)	real(Zin)	imag(Zin)	real(Γout)	imag(Γout)	real(Zout)	imag(Zout)	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

Figure 6. Case Outline Specifications