

TGF2021-04-SG

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

Product Description

The TriQuint TGF2021-04-SG is a 4 Watt (P1dB) discrete 4mm pHEMT RF Transistor operating at 12 volts. Both defense and commercial markets can take advantage of the flexibility offered by the TGF2021-04-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 4 Watts
- Small Foot Print, .160 x .210 inches
- Operation from HF-4GHz
- 1GHz - 3GHz Wide-band RF Evaluation Fixture Available
- Excellent for narrow-band & wide-band applications

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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	1.8 A
I _G	Gate Supply Current	28 mA
P _{IN}	Input Continuous Wave Power	31 dBm
P _D	Power Dissipation	TBD
T _{CH}	Operating Channel Temperature	150 °C
T _M	Mounting Temperature (30 Seconds)	320 °C
T _{STG}	Storage Temperature	-65 to 150 °C

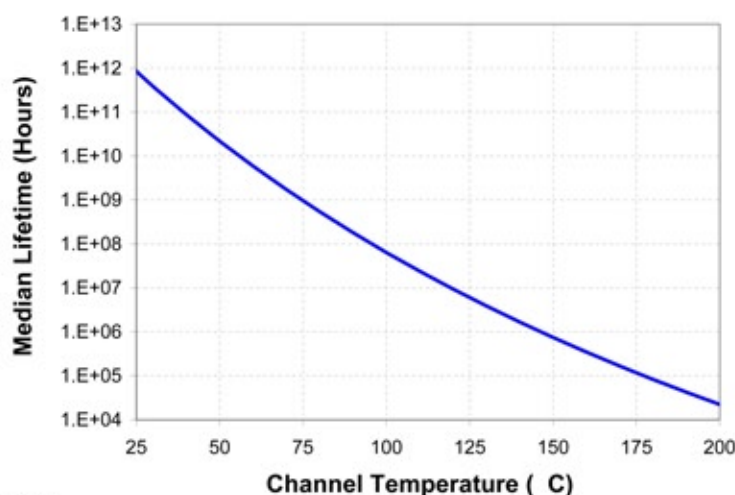
Table 2. Thermal Information

Parameter	Test Conditions	T _{CH} (°C)	θ _{JC} (°C/W)	T _M (HRS)
θ _{JC} Thermal Resistance (channel to backside of carrier)	P _{diss} =6.0 W	150	21.7	1.2 E+6

Table 3. ESD Rating

Parameter	Test Conditions	Class
ESD	JEDEC HBM SENSITIVITY	1C

Figure 2. Median Lifetime Curve



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Electrical Characteristics

Table 4: dc Characteristics

Symbol	Parameter	Minimum	Typical	Maximum	Unit
I_{DSS}	Saturated Drain Current	-	1200	-	mA
G_m	Transconductance	-	1500	-	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	-30	-	-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 @ P _{1dB} , 1 GHz - 3 GHz (V _{DS} = 12V, P _{OUT} = 4 W, I _{DD} = 100 mA)	G	—	10	—	dB
P _{1dB} , 1 GHz - 3 GHz (V _{DS} = 12V, P _{OUT} = 4 W, I _{DD} = 100 mA)	P _{1dB}	—	4	—	W
Power Added Efficiency, 1 GHz - 3 GHz (V _{DS} = 12V, P _{OUT} = 4 W, I _{DD} = 100 mA)	—	—	45	—	%
Functional Tests, Narrow Band RF Performance					
Gain, 4 GHz (V _{DS} = 12V, P _{OUT} = 4 W, I _{DQ} = 100 mA)	G	—	12	—	dB
Output Power, 4 GHz (V _{DS} = 12V, 1 dB compression, I _{DQ} = 100 mA)	P _{1dB}	—	4	—	W
Drain Efficiency, 4 GHz (V _{DS} = 12V, P _{OUT} = P _{1dB} , I _{DQ} = 100 mA)	—	—	55	—	%
Ruggedness (V _{DS} = 12V, P _{OUT} = 70 W, I _{DQ} = 100mA, f = 1 GHz VSWR = TBD)	—	No degradation in output power.			

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Fixture RF Performance at P1dB compression CW 12v 100ma class AB

Figure 3: P1dB & Drain Efficiency versus Frequency

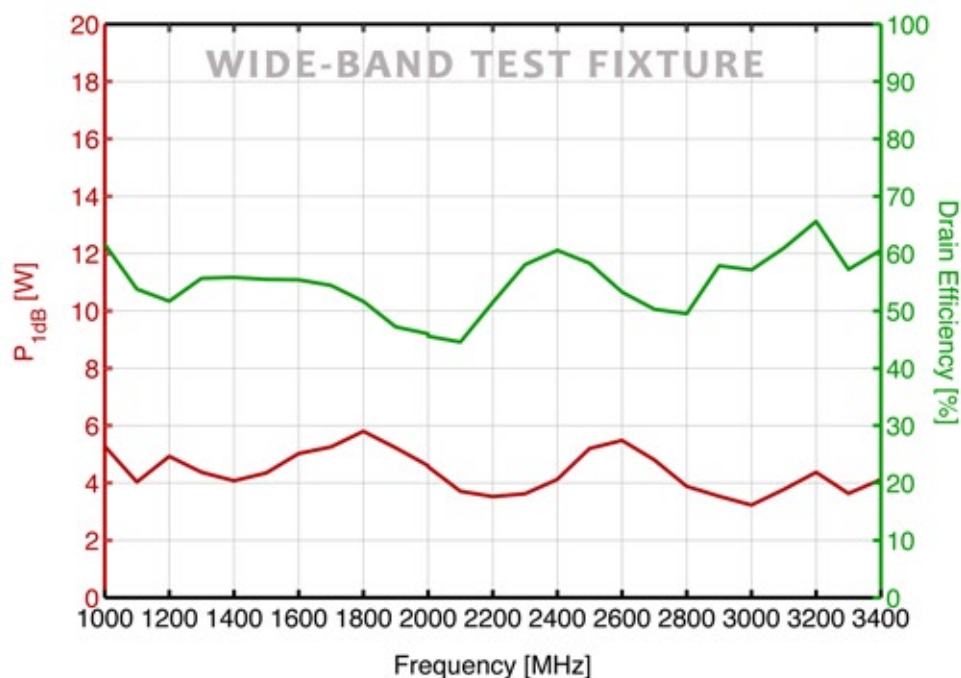
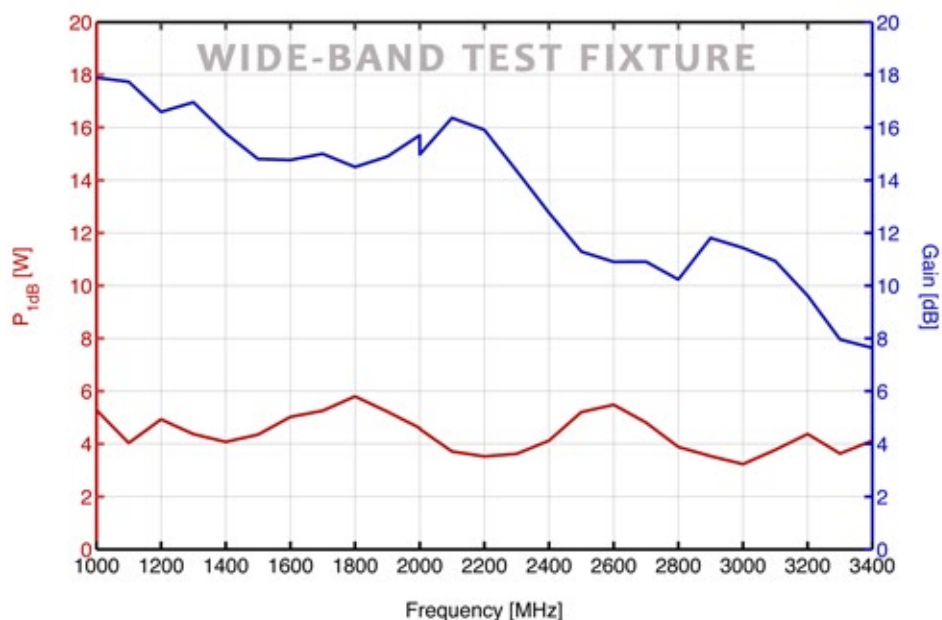


Figure 4: P1dB & Gain versus Frequency



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Narrow Band Performance Plots

Figure 5: P1dB & Gain versus Frequency

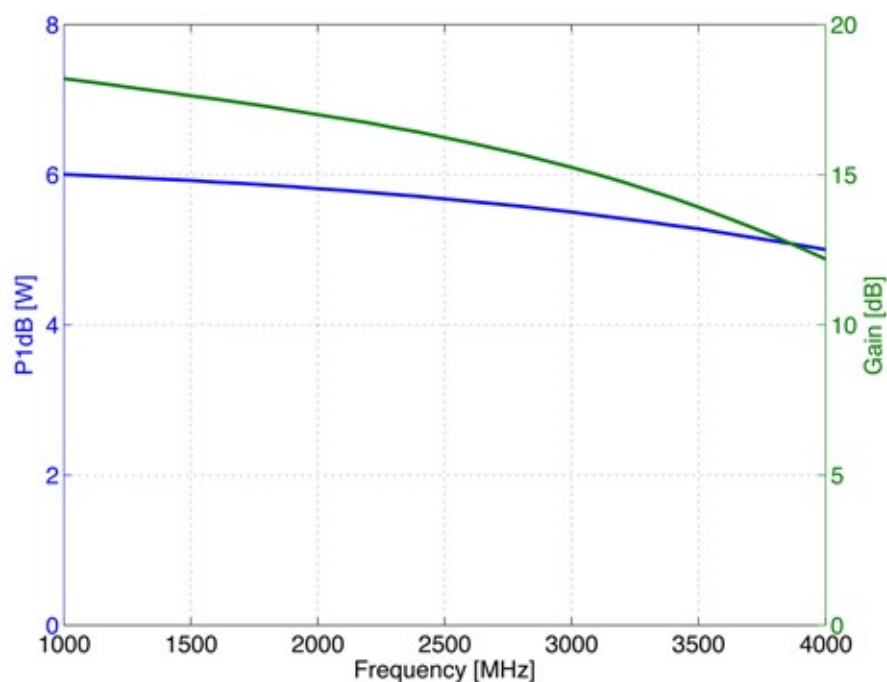
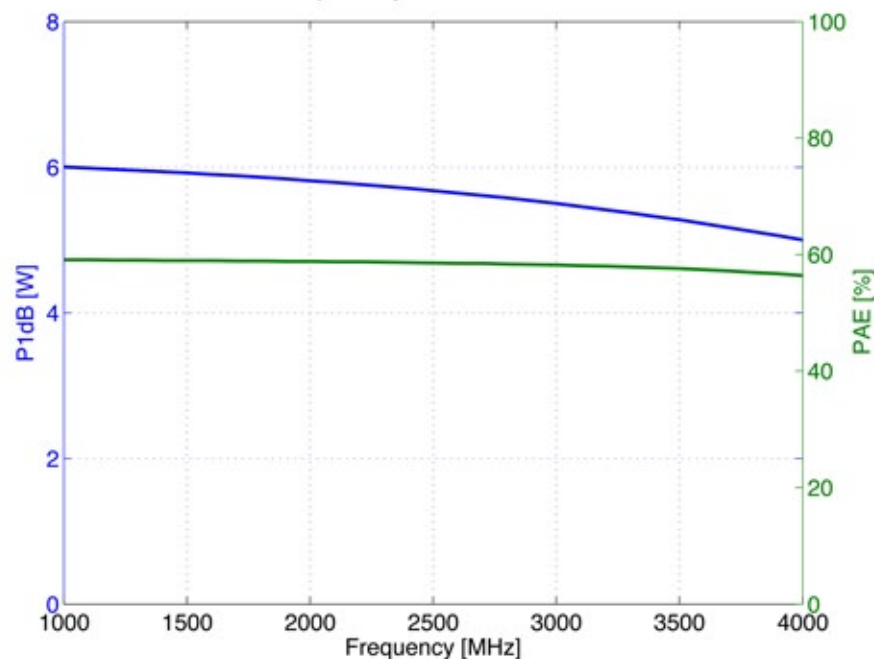


Figure 6: P1dB & PAE versus Frequency



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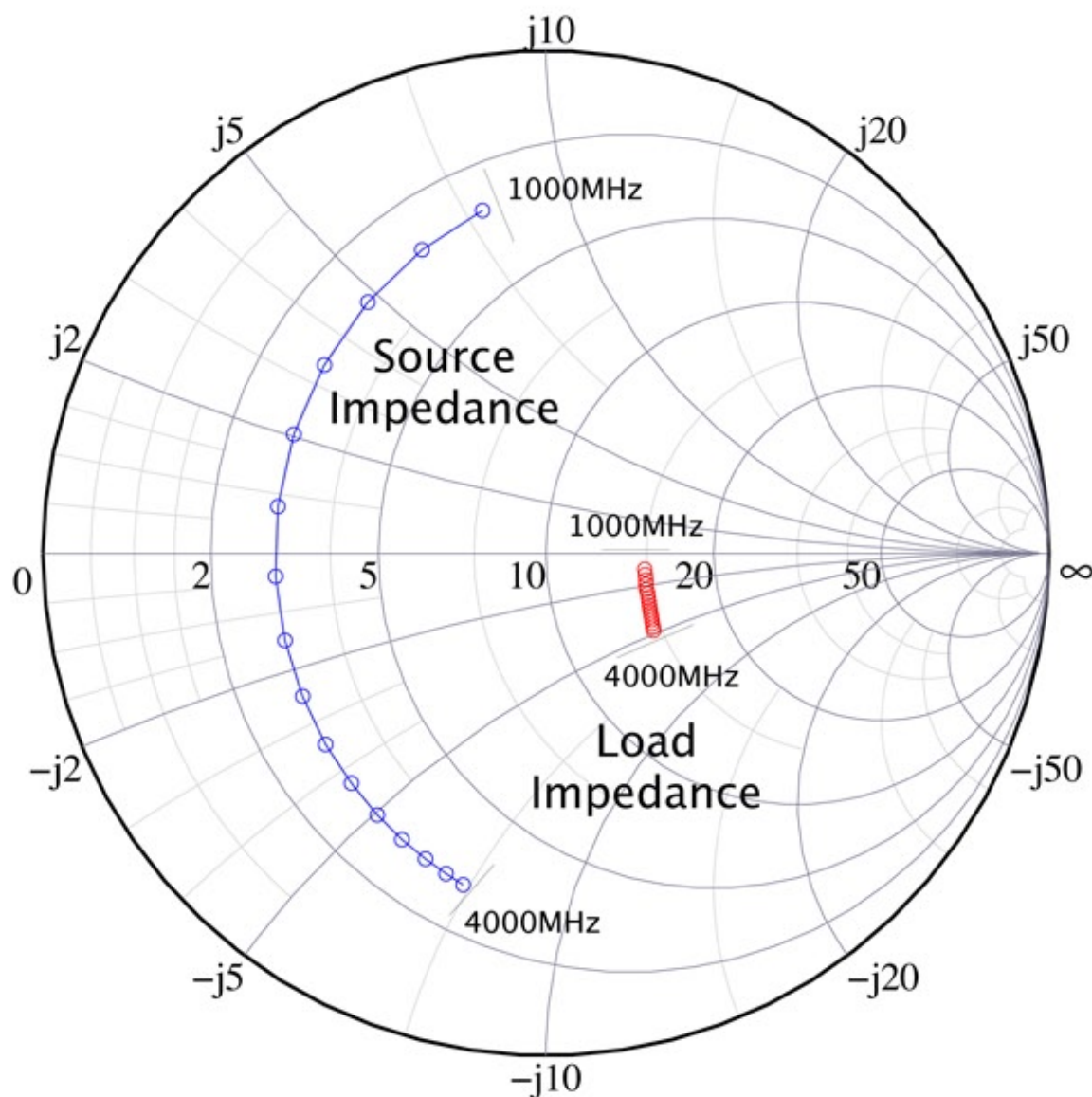


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Impedance Data

Figure 7: 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 TGF2021-04-SG is designed to operate at frequencies as low as HF. However, characterization is currently limited to 500MHz. Tables will be updated in the near future.

Table 6: 12v, IDQ =100 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]
1000	-0.846	0.274	3	7.9	-0.542	-0.024	14.9	-1.0	18.2	6.0	37.8
1200	-0.861	0.221	3	6.3	-0.542	-0.032	14.8	-1.3	18.0	6.0	37.8
1400	-0.872	0.169	3	4.8	-0.541	-0.039	14.8	-1.6	17.7	5.9	37.7
1600	-0.879	0.120	3	3.4	-0.541	-0.046	14.8	-1.9	17.5	5.9	37.7
1800	-0.884	0.073	3	2.0	-0.541	-0.053	14.8	-2.2	17.3	5.9	37.7
2000	-0.886	0.028	3	0.8	-0.541	-0.059	14.8	-2.5	17.0	5.8	37.6
2200	-0.887	-0.014	3	-0.4	-0.541	-0.066	14.8	-2.8	16.7	5.8	37.6
2400	-0.885	-0.053	3	-1.5	-0.541	-0.072	14.8	-3.0	16.4	5.7	37.6
2600	-0.883	-0.089	3	-2.5	-0.541	-0.077	14.7	-3.2	16.1	5.6	37.5
2800	-0.879	-0.122	3	-3.4	-0.541	-0.083	14.7	-3.5	15.7	5.6	37.5
3000	-0.875	-0.152	3	-4.3	-0.541	-0.088	14.7	-3.7	15.2	5.5	37.4
3200	-0.870	-0.179	3	-5.1	-0.541	-0.093	14.7	-3.9	14.8	5.4	37.3
3400	-0.865	-0.203	3	-5.8	-0.541	-0.099	14.6	-4.1	14.2	5.3	37.3
3600	-0.860	-0.224	3	-6.4	-0.541	-0.104	14.6	-4.4	13.6	5.2	37.2
3800	-0.855	-0.242	3	-6.9	-0.541	-0.109	14.6	-4.6	12.9	5.1	37.1
4000	-0.851	-0.257	3	-7.4	-0.542	-0.115	14.5	-4.8	12.2	5.0	37.0

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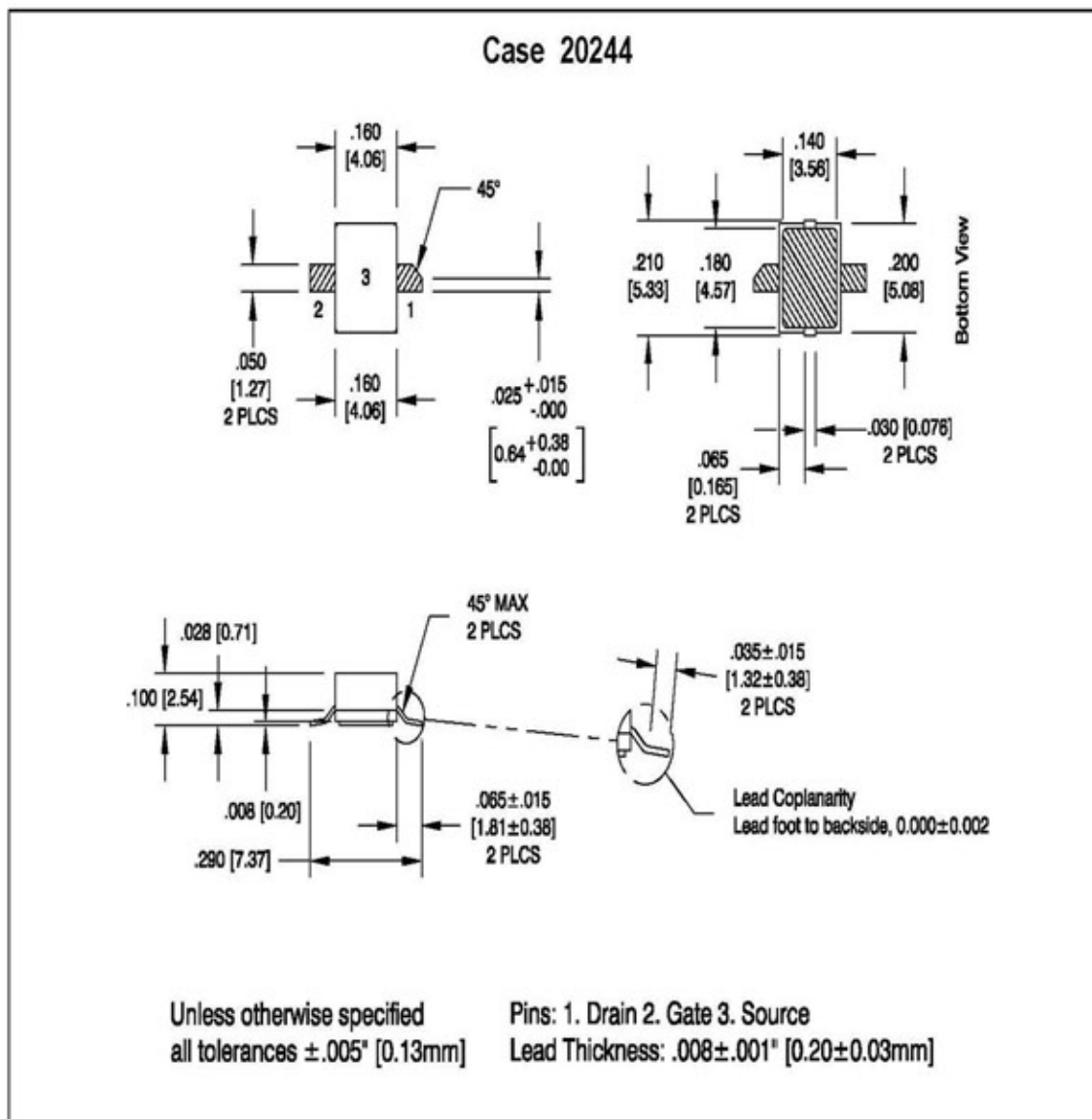
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Figure 8. Case Outline Specifications



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