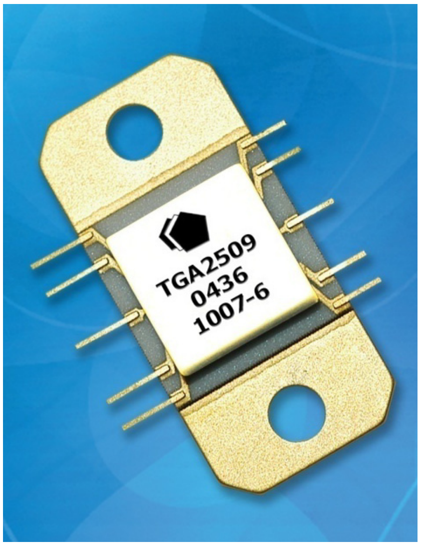
Wideband 1 W HPA with AGC

TGA2509-FL



Key Features

- Frequency Range: 2-20 GHz
- > 29 dBm Nominal P1dB
- 15 dB Nominal Gain, Midband
- 25dB AGC Range
- 10 lead flange package style
- Bias Conditions: Vd = 12 V, Idq = 1.1 A
- Package Dimensions: 0.7 x 0.3 x 0.1 in.

Primary Applications

- Wideband Gain Block
- Military EW and ECM
- Test Equipment
- Millimeter Radio
- VSAT
- Space

Product Description

The TriQuint TGA2509-FL is a Wideband High Power Amplifier with 25 dB AGC range. The HPA operates from 2-20 GHz and is designed using TriQuint's power pHEMT production process.

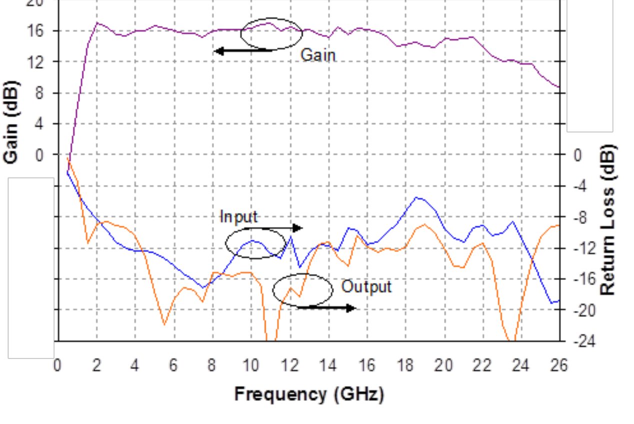
The TGA2509-FL provides typical 29dBm of output power at 1 dB gain compression with small signal gain of 15 dB.

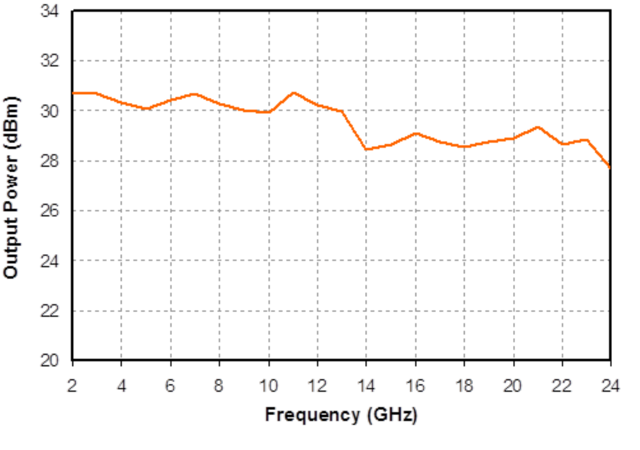
The TGA2509-FL is suitable for a variety of wideband electronic warfare systems such as radar warning receivers, electronic counter measures,decoys, jammers and phased array systems. The flange lead package has a high thermal conductivity copper alloy base.

Evaluation Boards are available.

Measured Fixtured Data

Bias Conditions: Vd =12 V, Id= 1.1 A





Note: Datasheet is subject to change without notice.

TABLE I
MAXIMUM RATINGS 1/

SYMBOL	PARAMETER	VALUE	NOTES
V^+	Positive Supply Voltage	12.5 V	2/
V_{g1}	Gate 1 Supply Voltage Range	-2V TO 0 V	
V_{g2}	Gate 2 Supply Voltage Range	-2V TO 0 V	
V_c	AGC Control Voltage Range	V_c < +5 V $V^+ - V_c$ < 14V	
I^+	Positive Supply Current	1.4 A	2/
$\| I_G \|$	Gate Supply Current	70 mA	
P_{IN}	Input Continuous Wave Power	30 dBm	2/
P_D	Power Dissipation (without using AGC)	13.2 W	2/, 3/
P_D	Power Dissipation (when Vc < +2V)	10.6 W	2/, 3/
T_{CH}	Operating Channel Temperature	200 °C	4/
T_M	Mounting Temperature (30 Seconds)	230 °C	
T_{STG}	Storage Temperature	-65 to 150 °C	

1/ These ratings represent the maximum operable values for this device.

2/ Current is defined under no RF drive conditions. Combinations of supply voltage, supply current, input power, and output power shall not exceed P_D.

3/ When operated at this power dissipation with a base plate temperature of 60 °C, the median life is 1 E+6 hours.

4/ Junction operating temperature will directly affect the device median time to failure (T_M). For maximum life, it is recommended that junction temperatures be maintained at the lowest possible levels.

TABLE II
RF CHARACTERIZATION TABLE
(T_A = 25 °C, Nominal)
Vd = 12 V, Id = 1.08 A

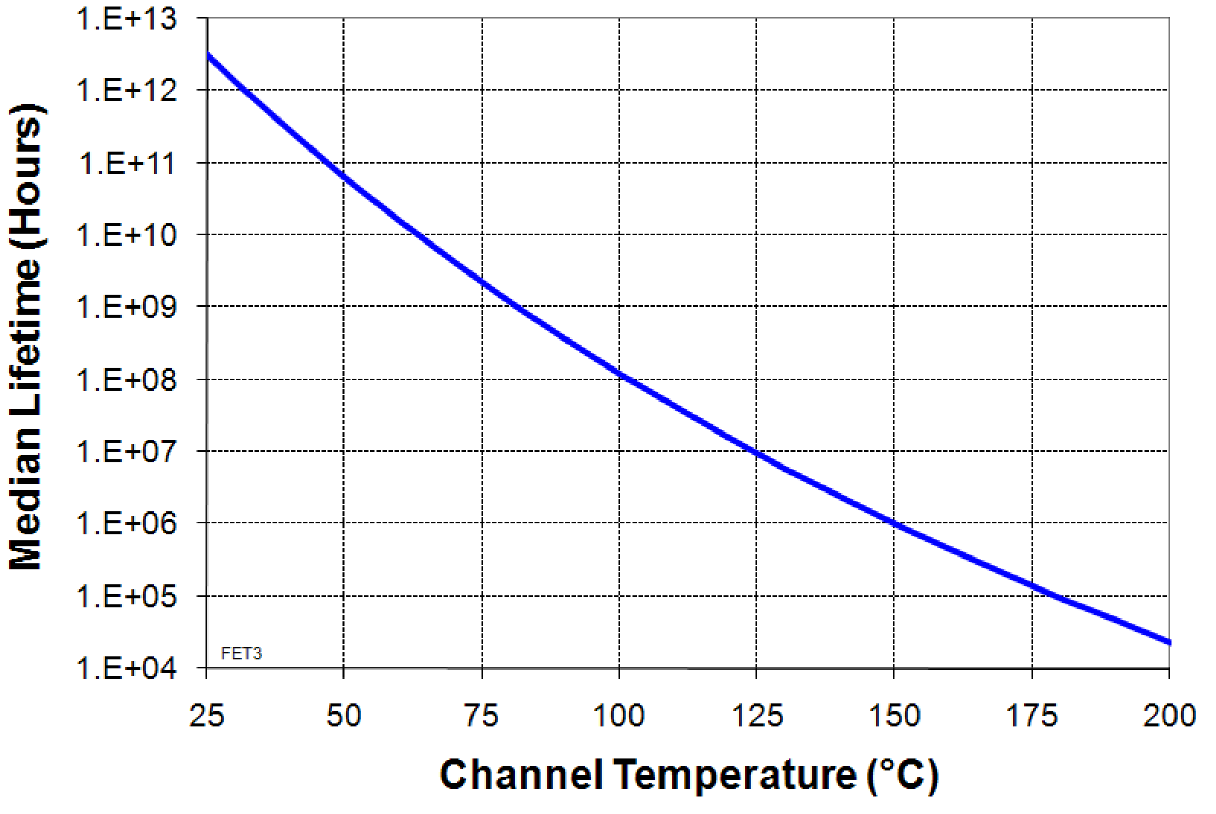
SYMBOL	PARAMETER	TEST CONDITION	NOMINAL	UNITS
Gain	Small Signal Gain	f = 2-20 GHz	15	dB
IRL	Input Return Loss	f = 2-20 GHz	10	dB
ORL	Output Return Loss	f = 2-20 GHz	12	dB
P_{1dB}	Output Power @ 1dB Gain Compression	f = 2-20 GHz	29	dBm

TABLE III
THERMAL INFORMATION

Parameter	Test Conditions	T_{CH} (°C)	$R_{\theta JC}$ (°C/W)	T_M (HRS)
$R_{\theta JC}$ Thermal Resistance (channel to backside of package)	Vd = 12 V I_D = 1.08 A Pdiss = 13.2 W (without using AGC)	150	6.4	1 E+6
$R_{\theta JC}$ Thermal Resistance (channel to backside of package)	Vd = 12 V I_D = 0.88 A Pdiss = 10.6 W (when using AGC)	150	8.3	1 E+6

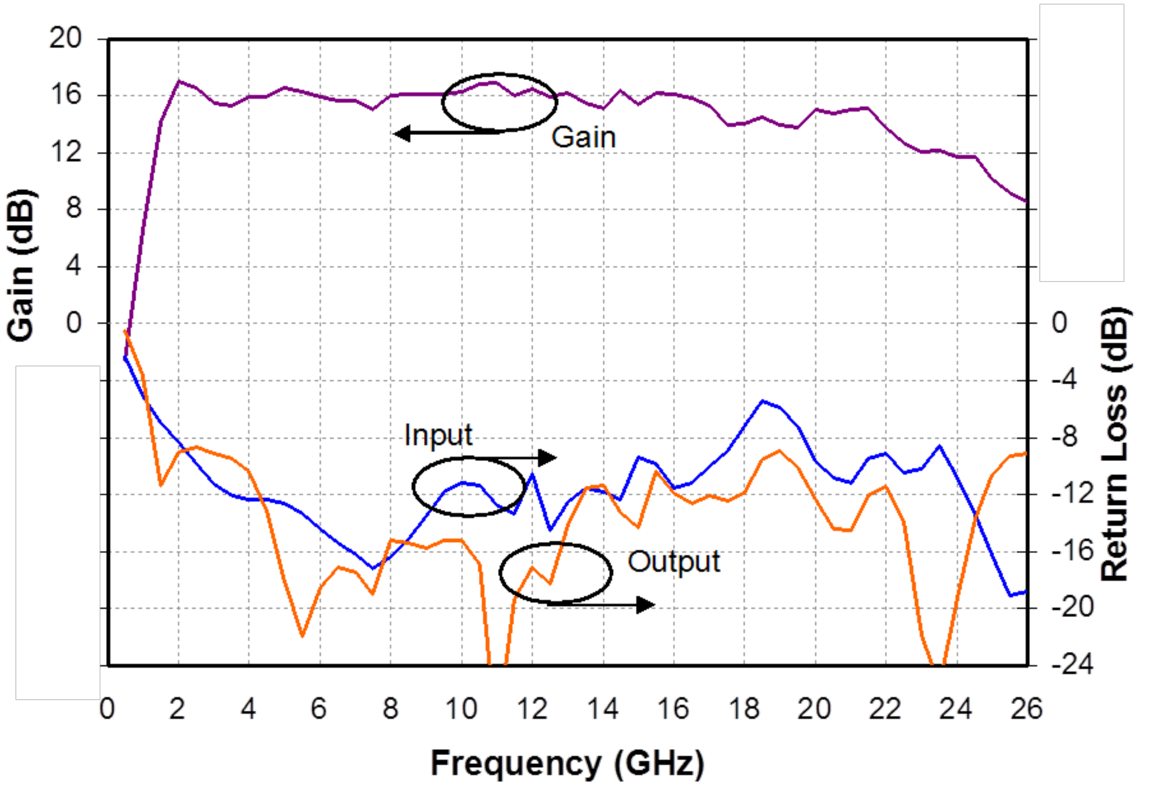
Note: Package attached with mounting hardware and metal shim (Al or In) to carrier at 65°C baseplate temperature. Worst case is at saturated output power when DC power consumption rises to 15 W with 1 W RF power delivered to load. Power dissipated is 14 W and the temperature rise in the channel is 90 °C. Baseplate temperature must be reduced to 60 °C to remain below the 150 °C maximum channel temperature.

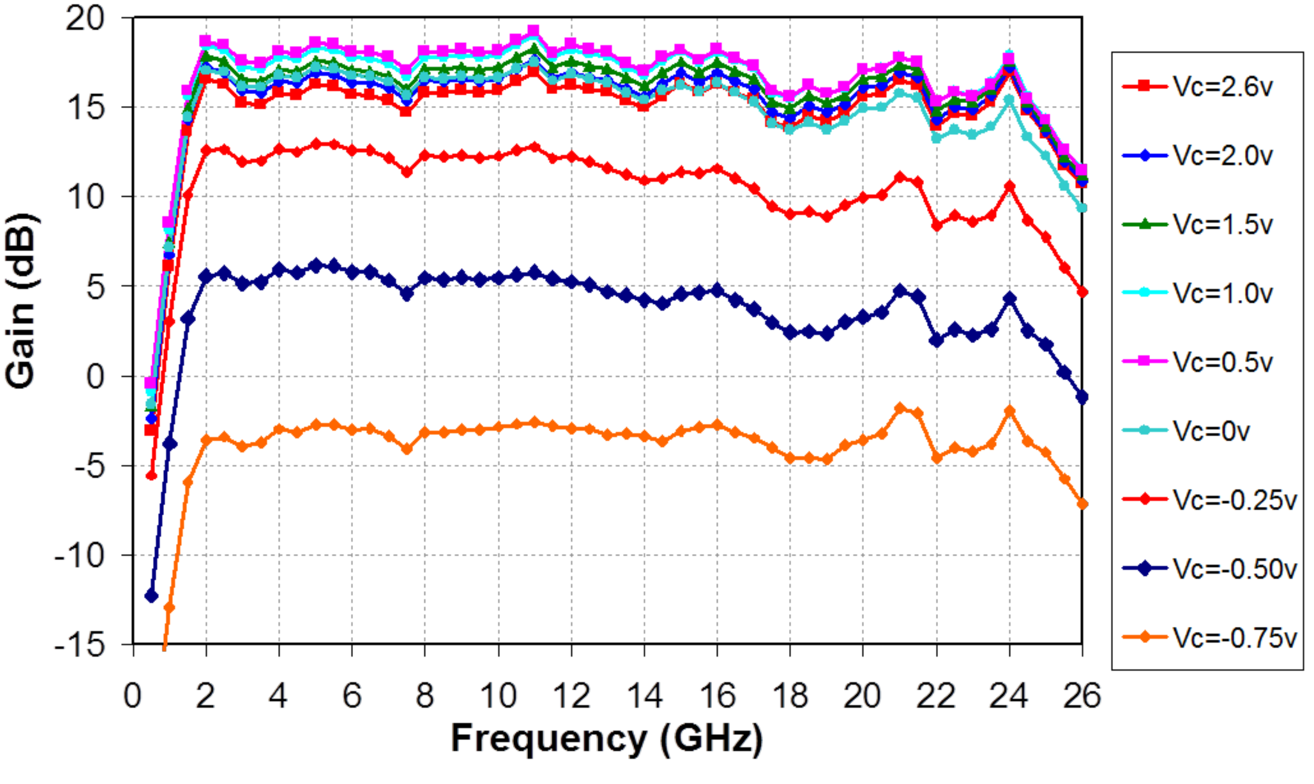
Median Lifetime vs Channel Temperature



Typical Fixtured Performance

Bias Conditions: Vd = 12V, Id = 1.08A, Vg1 = -0.28V Typical, Vg2 = -0.35V Typical, Vc (optional) = 2.6V Typical





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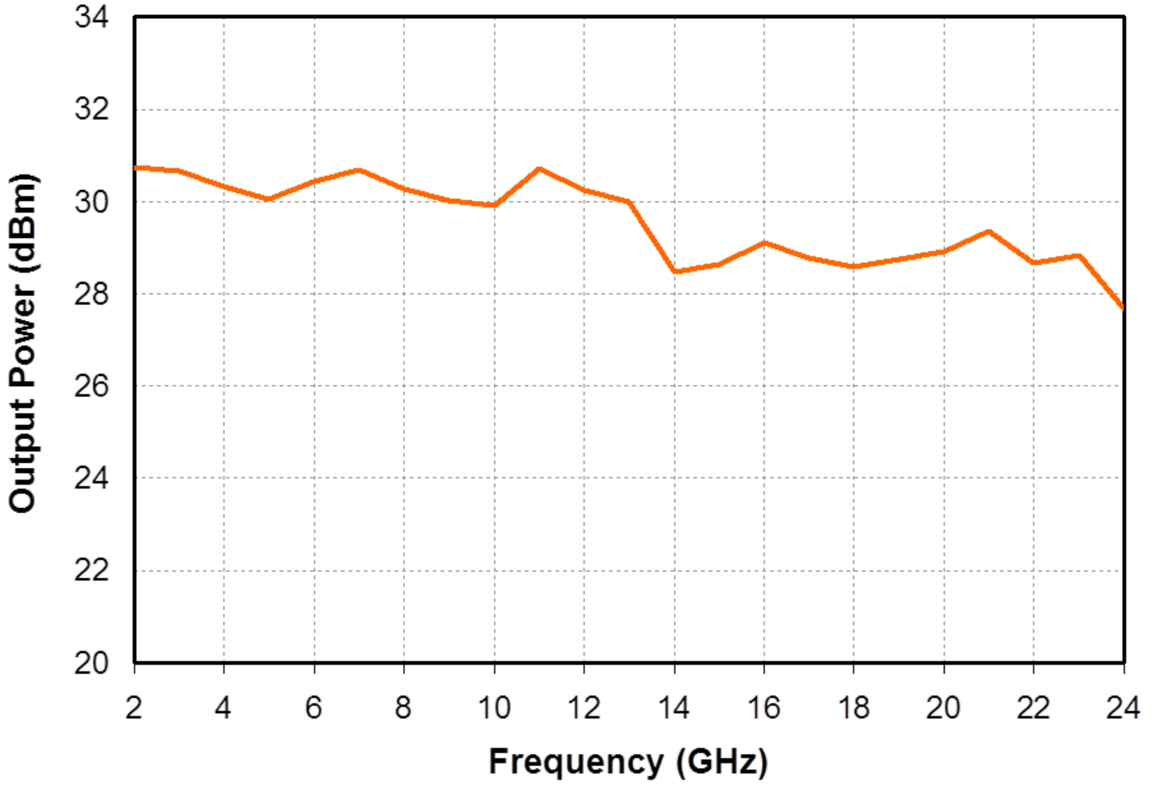
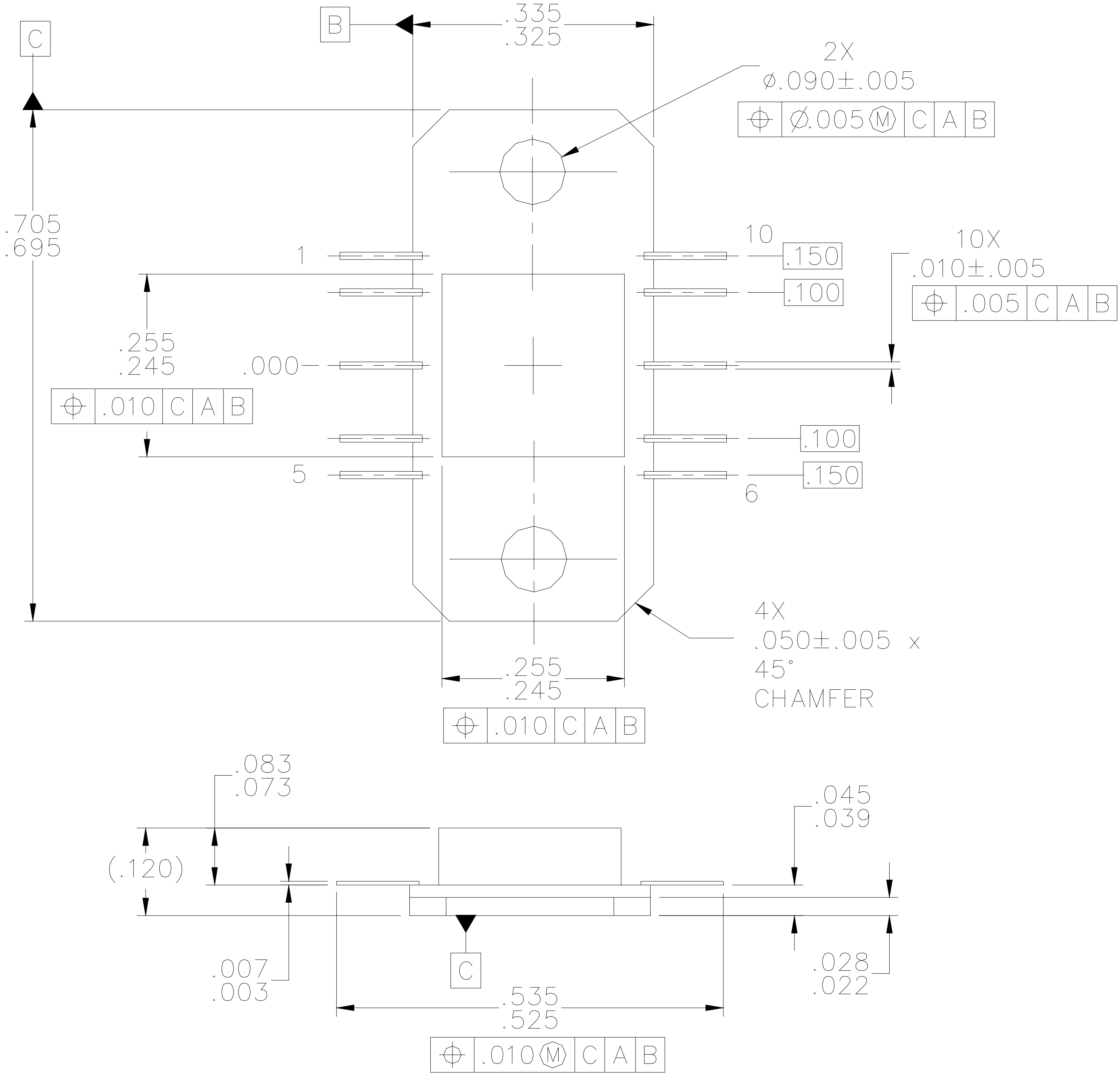


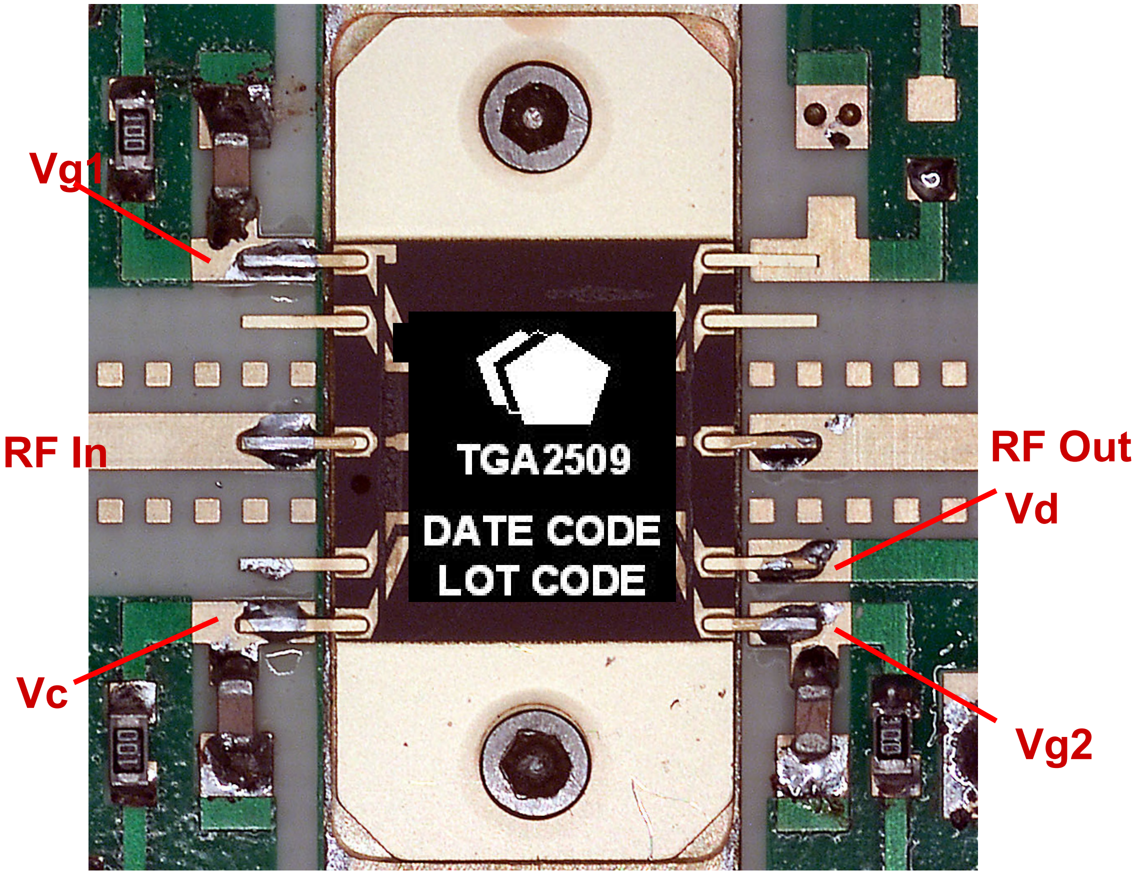
Package Dimensional Drawing

Units: Inches



GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.

Evaluation Board Drawing



Bias Procedures:
Vc **bias** connection is optional, but the 0.1uF cap always needs to be connected.

For biasing without AGC control:
1. Apply -1.2V to Vg1, and -1.2V to Vg2.
2. Apply +12V to Vd.
4. Adjust Vg1 to attain 580 mA drain current (Id)
4. Adjust Vg2 to attain 1080 mA total drain current (Id).

For biasing with AGC control:
1. Apply -1.2V to Vg1 and -1.2V to Vg2
2. Apply +12V to Vd
3. Apply +2.6V to Vc
4. Adjust Vg1 to attain 580 mA drain current (Id)
5. Adjust Vg2 to attain 1080 mA total drain current (Id).
6. Adjust Vc as needed to control gain level.

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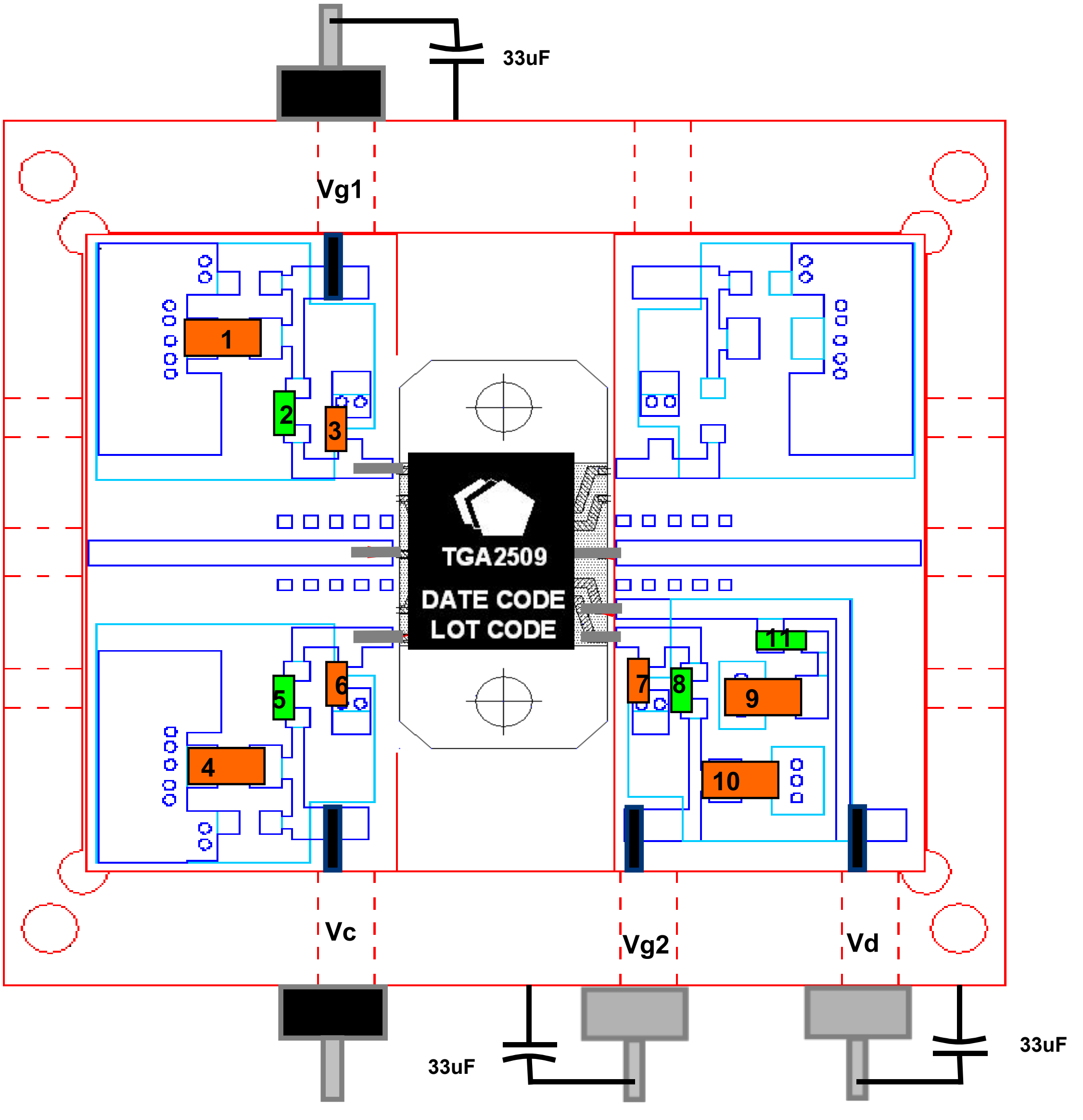
Typical Evaluation Board Layout



COMPONENT	VALUE
1, 4, 9,10	1 uF
2, 5, 9	10 Ω
3, 6, 7	0.01 uF
11	100 Ω

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Assembly of a TGA2509-FL Flange Mount Package onto a Motherboard

Manual Assembly for Prototypes

1. Clean the motherboard or the similar module with Acetone. Rinse with alcohol and DI water. Allow the circuit to fully dry.

2. To improve the thermal and RF performance, TriQuint recommends a heat sink attached to the bottom of the package with an indium alloy preform, or equivalent, between the two.

3. Apply Tin/Lead solder, or equivalent, to each active pin of the TGA2509-FL.

4 Clean the assembly with alcohol.

Ordering Information

Part	Package Style
TG2509-FL	Flange (Leads bolted down)

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