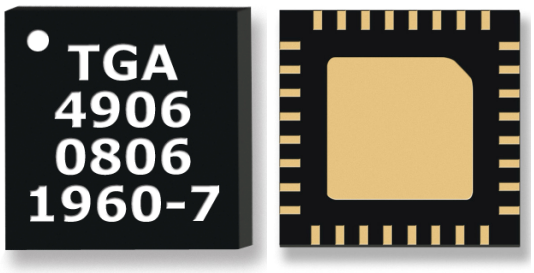
TGA4906-SM

4 Watt Ka-Band Packaged HPA

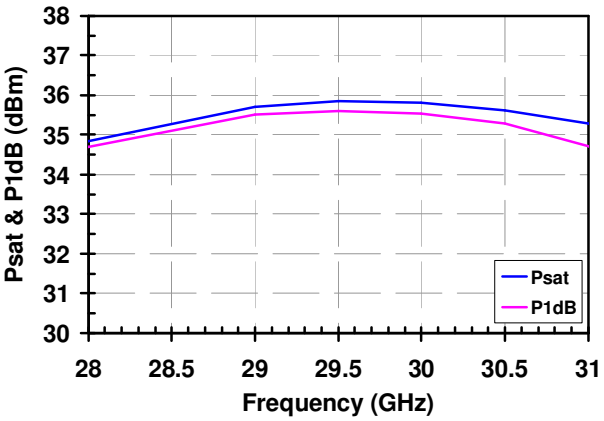


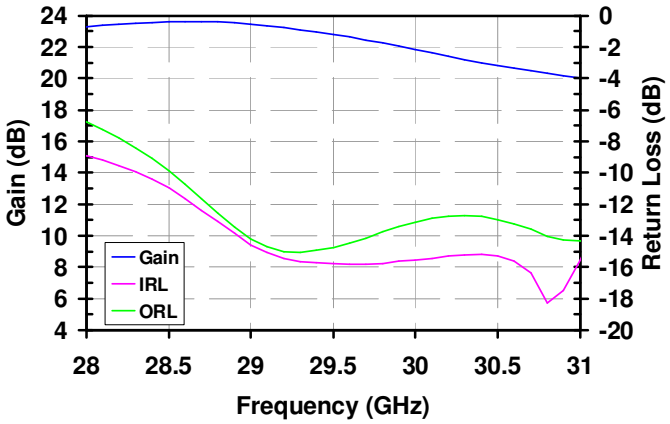
Key Features

- Frequency Range: 28 - 31 GHz
- Psat: 36 dBm
- Gain: 23 dB
- Return Loss: -12 dB
- Bias: Vd = 6 V, Idq = 1.6 A, Vg = -0.75 V Typical
- Package Dimensions: 5 x 5 x 1.19 mm

Measured Performance

Bias conditions: Vd = 6 V, Idq = 1.6 A, Vg = -0.75 V Typical





Primary Applications

- Ka-Band VSAT

Product Description

The TriQuint TGA4906-SM is a compact 4 Watt High Power Amplifier for Ka-band applications. The part is designed using TriQuint's proven standard 0.15 um gate Power pHEMT production process. The TGA4906-SM provides a nominal 36 dBm of output power at an input power level of 14 dBm with a small signal gain of 23 dB.

The TGA4906-SM is a QFN 5x5 mm surface mount packaged. It is ideally suited for low cost emerging markets such as base station transmitters for satellite ground terminals and point to point radio.

Lead-Free & RoHS compliant.

Evaluation boards are available upon request.

Datasheet subject to change without notice.

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Table I
Absolute Maximum Ratings 1/

Symbol	Parameter	Value	Notes
Vd-Vg	Drain to Gate Voltage	11 V	
Vd	Drain Voltage	6 V	2/
Vg	Gate Voltage Range	-5 to 0 V	
Id	Drain Current	3.7 A	2/
Ig	Gate Current Range	-15 to 202 mA	
Pin	Input Continuous Wave Power	26 dBm	2/

1/ These ratings represent the maximum operable values for this device. Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device and / or affect device lifetime. These are stress ratings only, and functional operation of the device at these conditions is not implied.

2/ Combinations of supply voltage, supply current, input power, and output power shall not exceed Pd (as listed in "Thermal Information").

Table II
Recommended Operating Conditions

Symbol	Parameter 1/	Value
Vd	Drain Voltage	6 V
Idq	Drain Current	1.6 A
Id_Drive	Drain Current under RF Drive	3.0 A
Vg	Gate Voltage	-0.75 V

1/ See assembly diagram for bias instructions.

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Table III
RF Characterization Table

Bias: Vd = 6 V, Idq = 1.6 A, Vg = -0.75 V Typical

SYMBOL	PARAMETER	TEST CONDITIONS	NOMINAL	UNITS
Gain	Small Signal Gain	f = 28 - 31 GHz	23	dB
IRL	Input Return Loss	f = 28 - 31 GHz	-12	dB
ORL	Output Return Loss	f = 28 - 31 GHz	-12	dB
Psat	Saturated Output Power	f = 28 - 31 GHz	36	dBm
	Gain Temp Coefficient	f = 28 - 31 GHz	-0.04	dB/^{0}C

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Table IV
Power Dissipation and Thermal Properties

Parameter	Test Conditions	Value	Notes
Maximum Power Dissipation	Tbaseplate = 85 ºC	Pd = 18.5 W Tchannel = 150 ºC Tm = 1.0E+6 Hrs	1/ 2/
Thermal Resistance, θjc	Vd = 6 V Id = 1600 mA Pd = 9.6 W Tbaseplate = 85 ºC	θjc = 3.5 (ºC/W) Tchannel = 119 ºC Tm = 4.1E+7 Hrs	
Thermal Resistance, θjc Under RF Drive	Vd = 6 V Id = 3 A Pout = 4 W (36 dBm) Pd = 14 W Tbaseplate = 85 ºC	θjc = 3.5 (ºC/W) Tchannel = 134 ºC Tm = 6.4E+6 Hrs	
Mounting Temperature	30 Seconds	260 ºC	
Storage Temperature		-65 to 150 ºC	

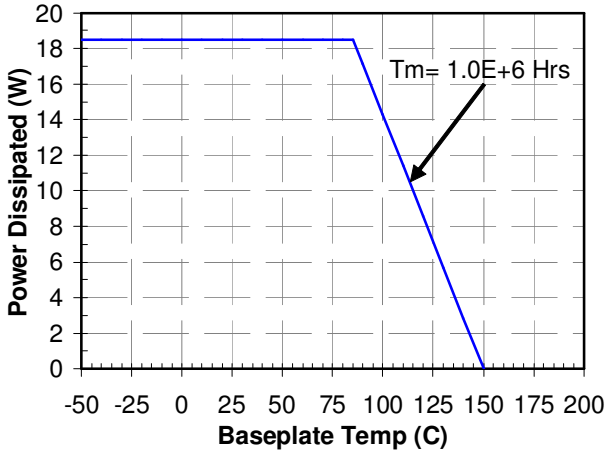
1/ For a median life of 1E+6 hours, Power Dissipation is limited to

Pd(max) = (150 ºC – Tbase ºC)/θjc.

2/ Channel operating temperature will directly affect the device median time to failure (MTTF). For maximum life, it is recommended that channel temperatures be maintained at the lowest possible levels.

3/ Tbase is defined @ package pin # 33 (ground)

Power De-rating Curve



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Measured Data

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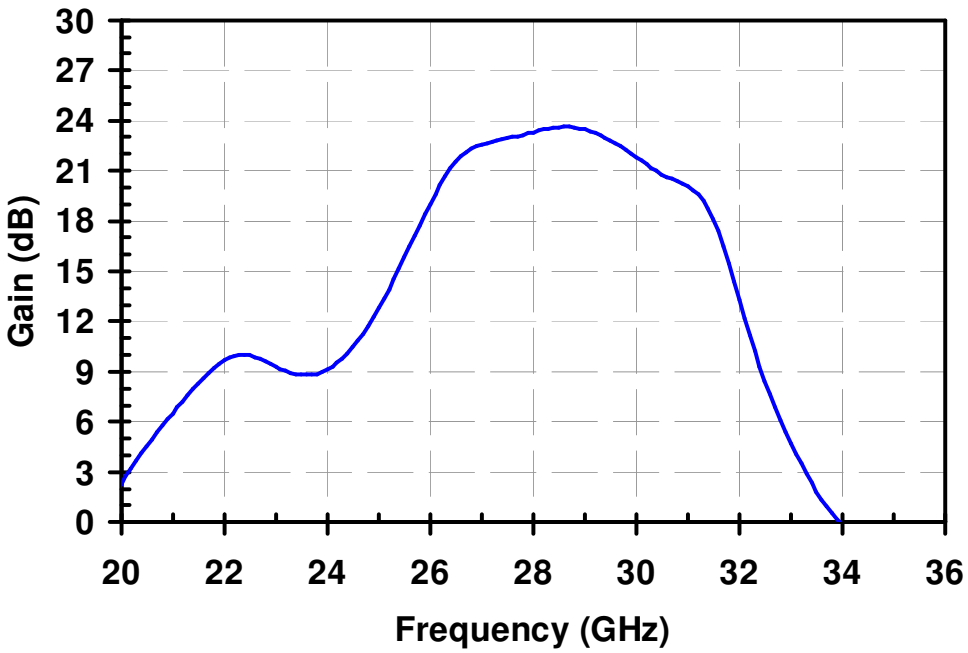

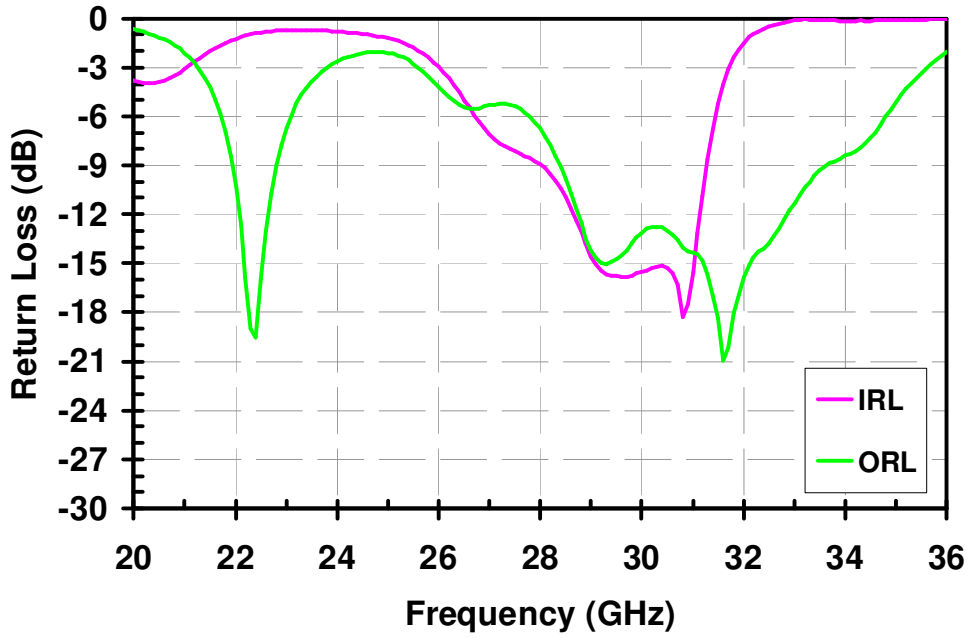

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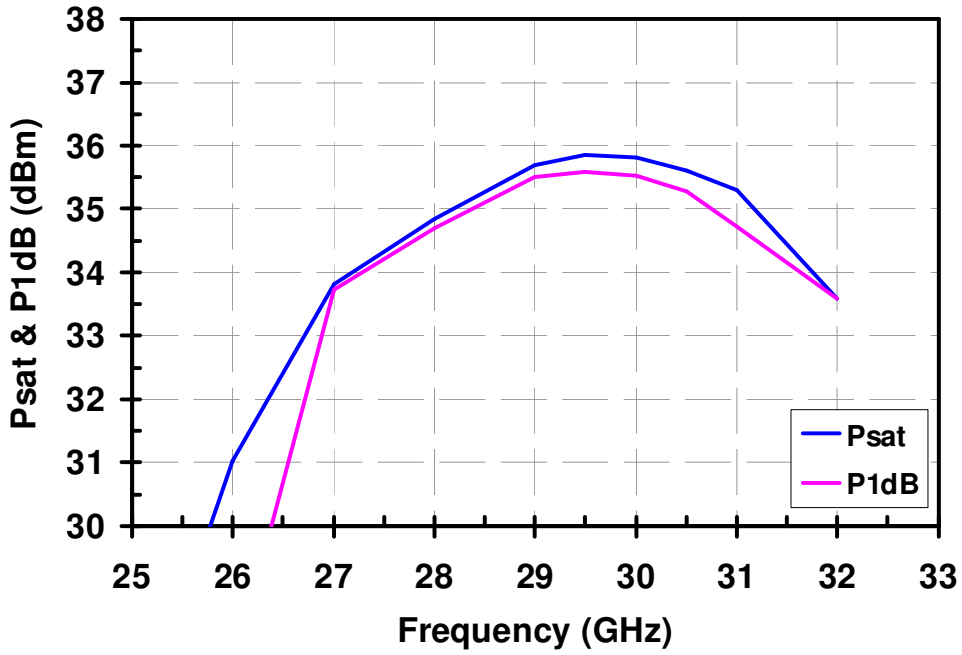

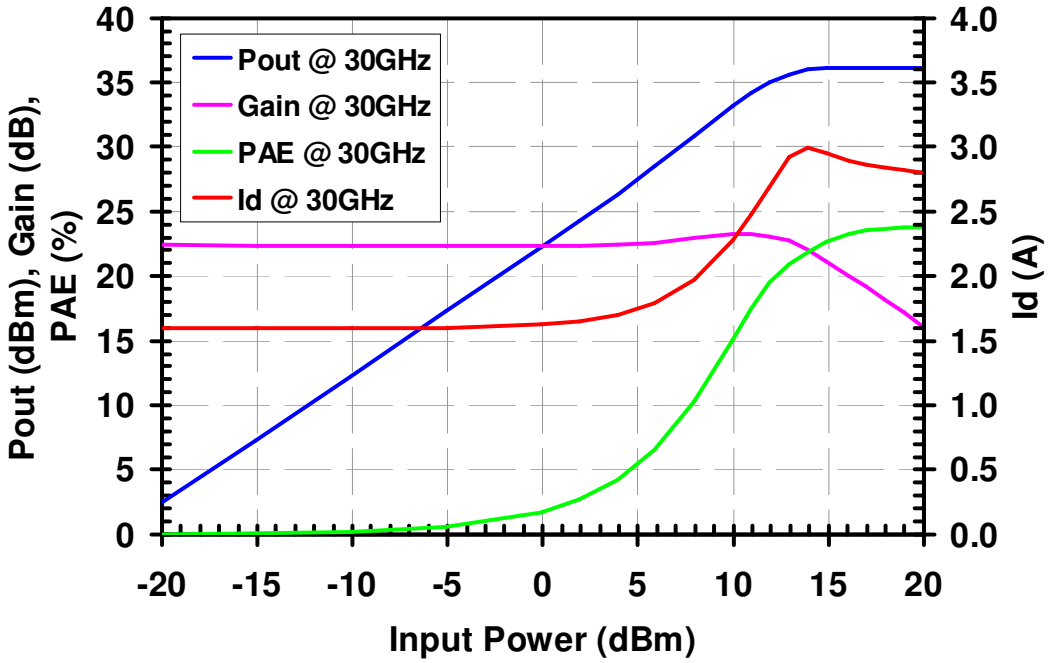

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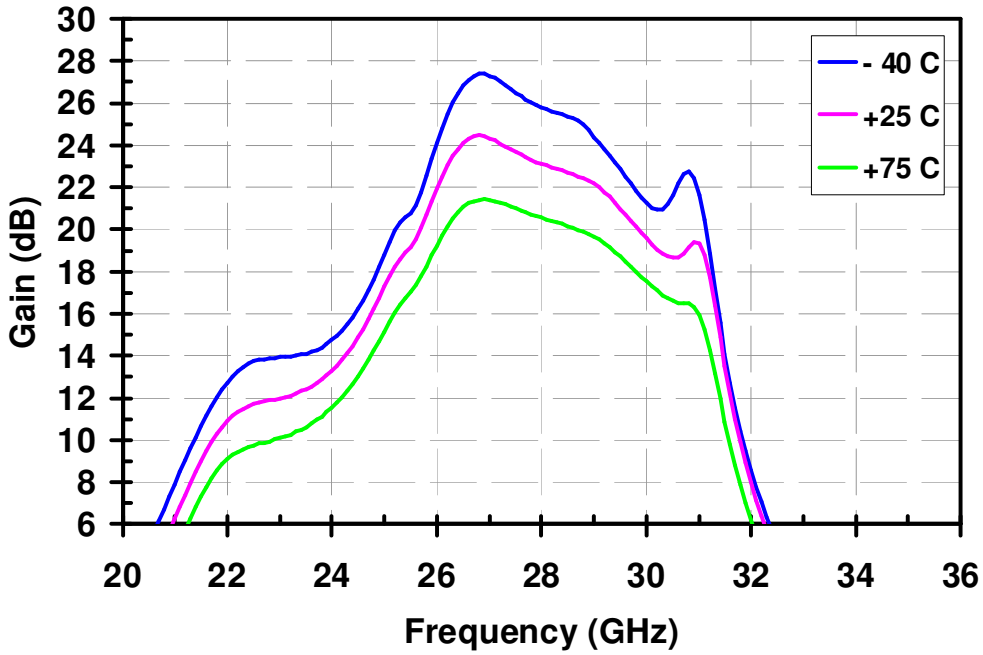

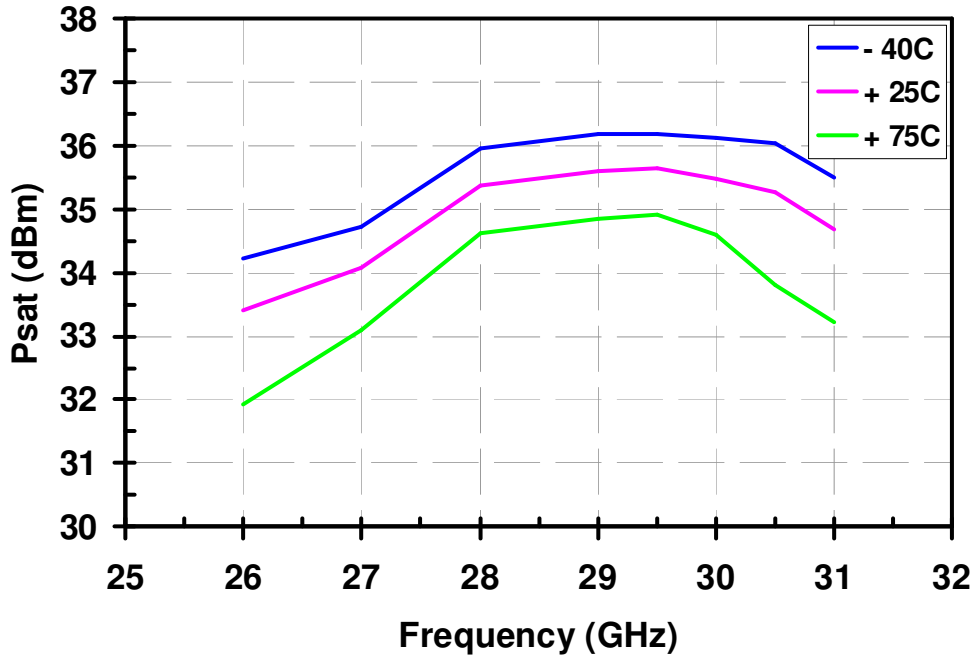

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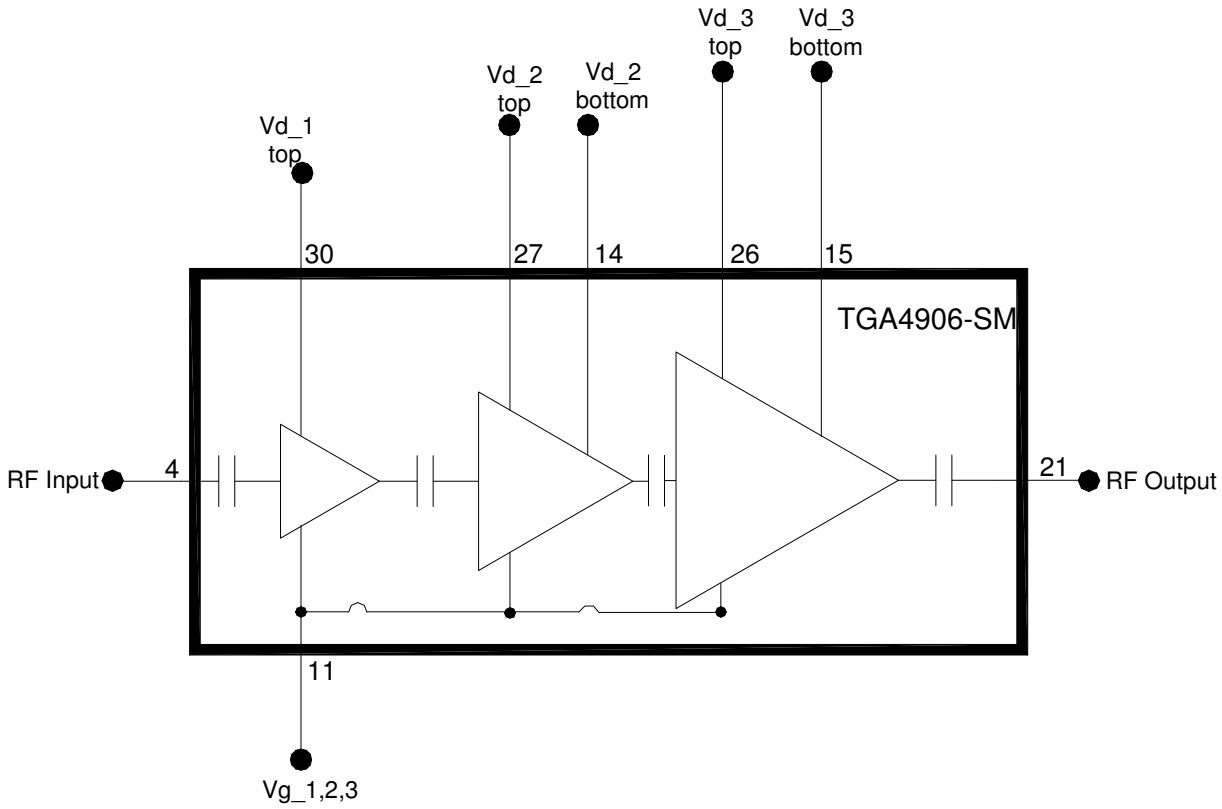
Electrical Schematic



Bias Procedures

Bias-up Procedure

Vg set to -1.5 V

Vd_set to +6 V

Adjust Vg more positive until Idq is 1.6 A.
This will be ~ Vg = -0.75 V

Apply RF signal to input

Bias-down Procedure

Turn off RF supply

Reduce Vg to -1.5V. Ensure Idq ~ 0 mA

Turn Vd to 0 V

Turn Vg to 0 V

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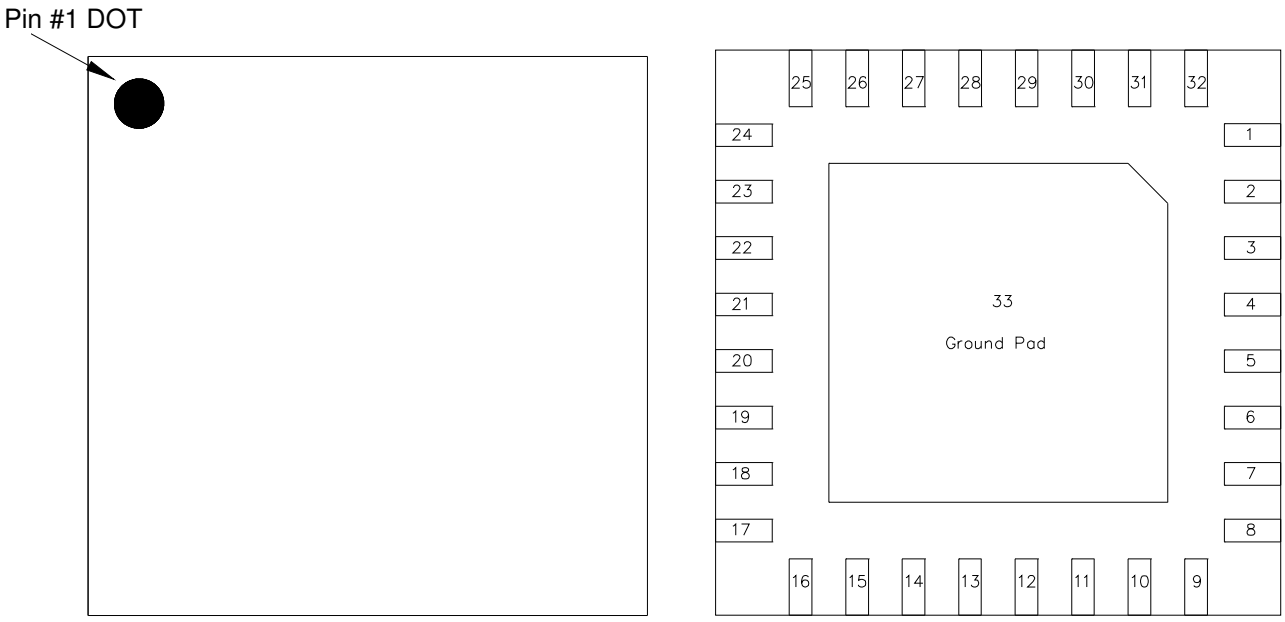
Package Pinout



Pin	Description
4	RF Input
21	RF Output
14, 15, 26, 27, 30	Vd
11	Vg
1, 8, 9, 16, 17, 24, 25, 32, 33	Ground
2, 3, 5, 6, 7, 10, 12, 13, 18, 19, 20, 22, 23, 28, 29, 31	N/C

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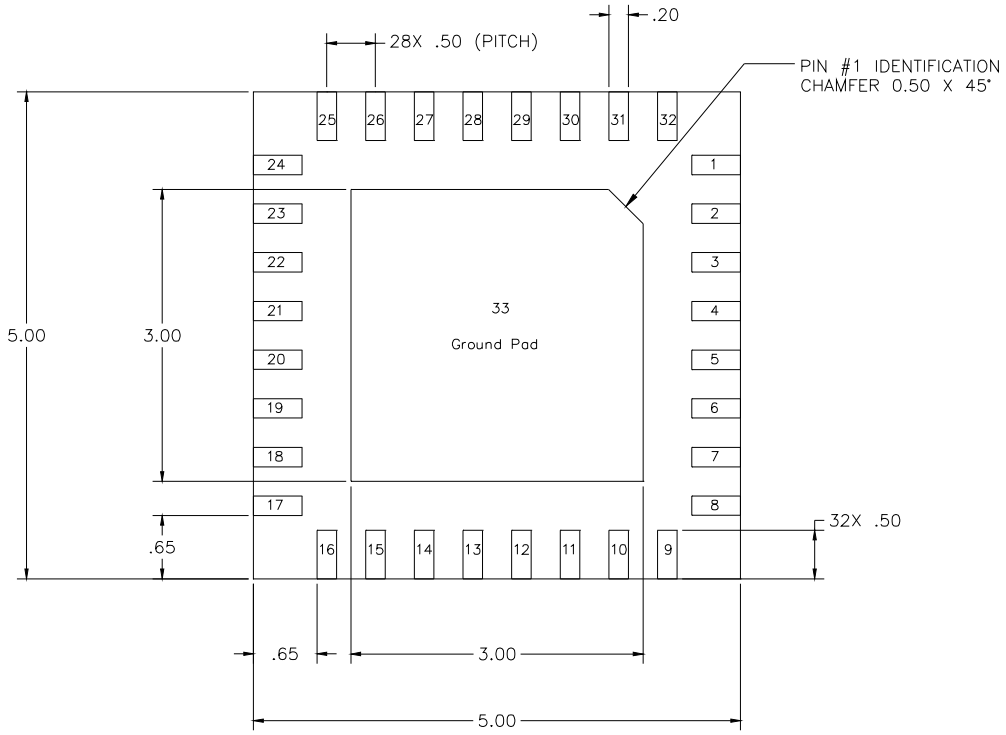
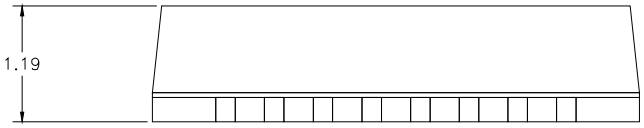
Mechanical Drawing



BOTTOM VIEW



SIDE VIEW

Units: millimeters

Pkg x, y, z size tolerance: +/- 0.050

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

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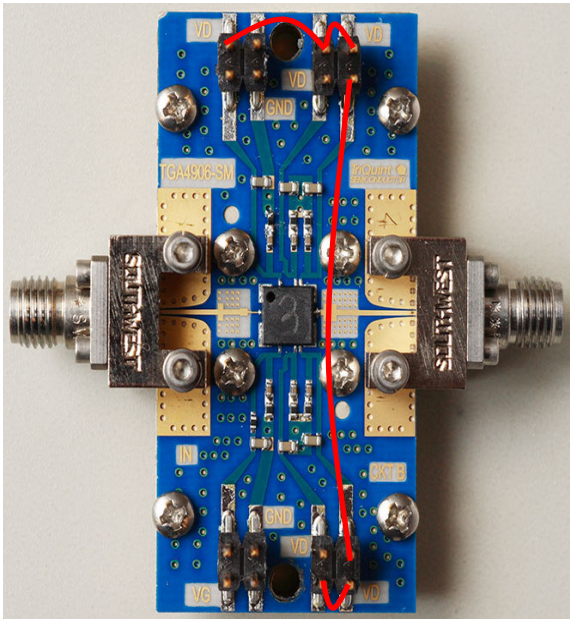
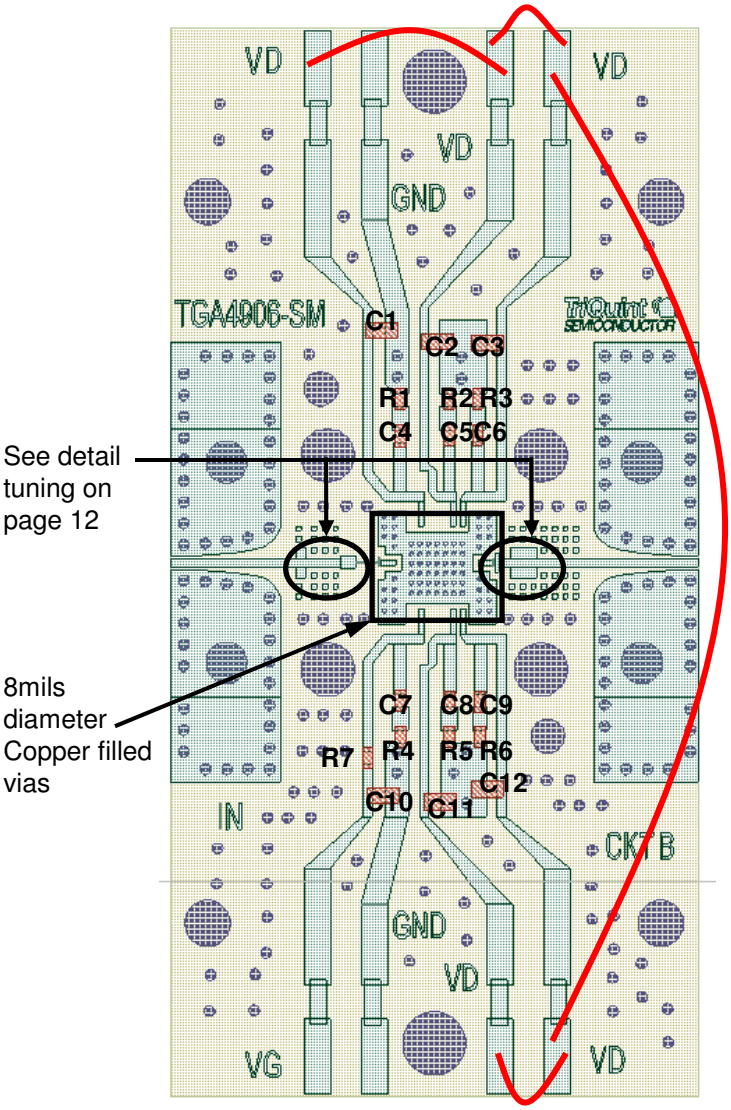
Recommended Assembly Board



Board is 8mil thick RO4003 with 0.5oz copper cladding.

Board is soldered on metal block and adequate heatsinking is required for 14 W power dissipation.



Part	Description
C1, C2, C3, C10, C11, C12	1 uF Capacitor (0603)
C4, C5, C6, C7, C8, C9	0.01 uF Capacitor (0402)
R1, R2, R3, R4, R5, R6	10 ohm Resistor (0402)
R7	22 ohm Resistor (0402)

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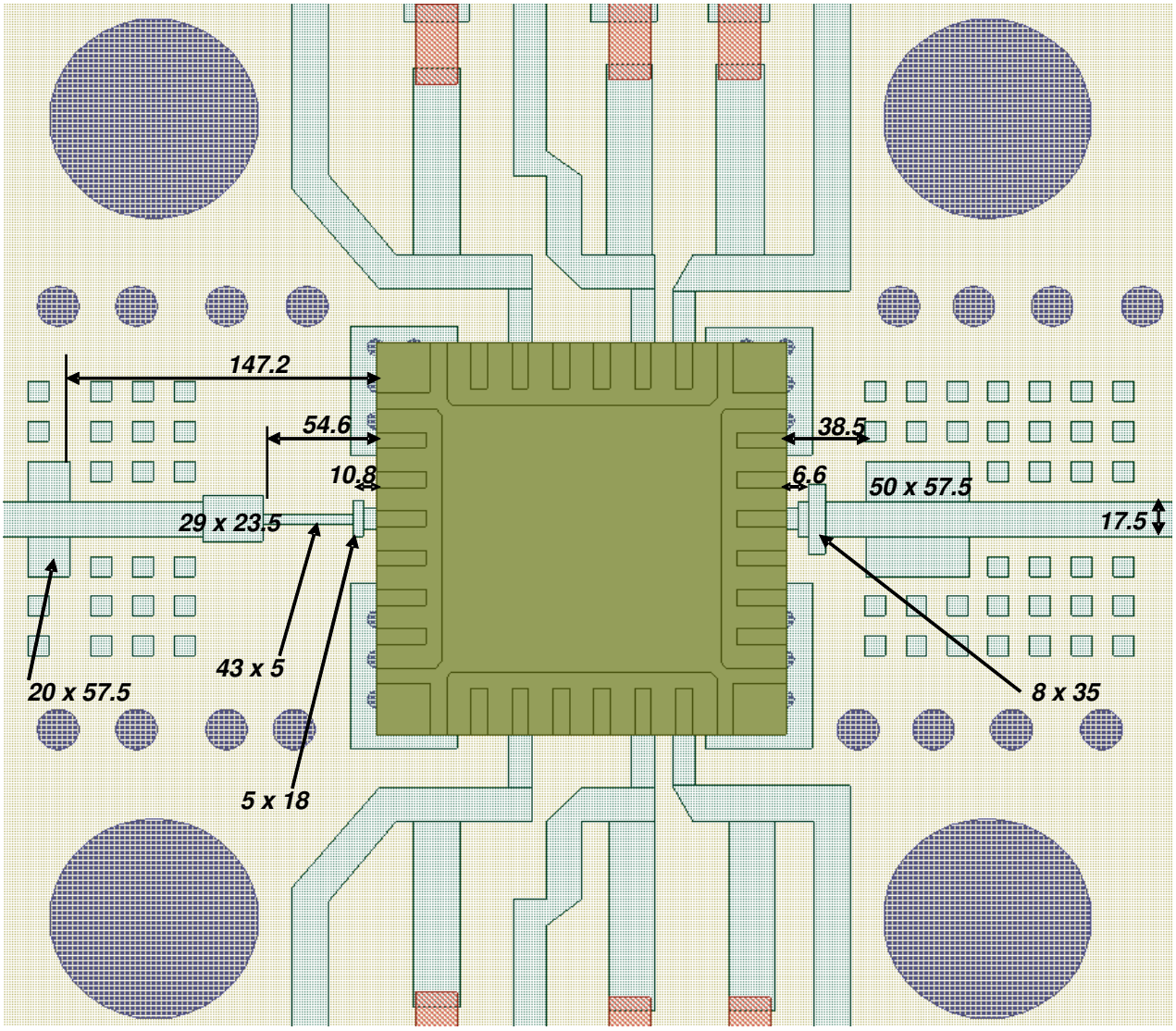
Recommended Assembly Board (Con't)

Detail of PCB Tuning



All units are in mils

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Assembly Notes

Recommended Surface Mount Package Assembly

- Proper ESD precautions must be followed while handling packages.
- Clean the board with acetone. Rinse with alcohol. Allow the circuit to fully dry.
- TriQuint recommends using a conductive solder paste for attachment. Follow solder paste and reflow oven vendors' recommendations when developing a solder reflow profile. Typical solder reflow profiles are listed in the table below.
- Hand soldering is not recommended. Solder paste can be applied using a stencil printer or dot placement. The volume of solder paste depends on PCB and component layout and should be well controlled to ensure consistent mechanical and electrical performance.
- Clean the assembly with alcohol.

Typical Solder Reflow Profiles

Reflow Profile	SnPb	Pb Free
Ramp-up Rate	3 °C/sec	3 °C/sec
Activation Time and Temperature	60 – 120 sec @ 140 – 160 °C	60 – 180 sec @ 150 – 200 °C
Time above Melting Point	60 – 150 sec	60 – 150 sec
Max Peak Temperature	240 °C	260 °C
Time within 5 °C of Peak Temperature	10 – 20 sec	10 – 20 sec
Ramp-down Rate	4 – 6 °C/sec	4 – 6 °C/sec

Ordering Information

Part	Package Style
TGA4906-SM	QFN 5x5 Surface Mount

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