

4 Watt Ka-Band Packaged HPA



Measured Performance

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

38 37 Psat & P1dB (dBm) 36 35 34 33 32 Psat 31 P1dB 30 28.5 28 29 29.5 30 30.5 31 Frequency (GHz) 24 0 22 -2 20 18 -6 Gain (dB) 16 -8 14 -10 12 -12 -14 ਹੋ -16 2 10 Gain 8 IRL 6 -18 ORL -20

28

28.5

29

29.5

Frequency (GHz)

30

30.5

31

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

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 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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Loss

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Table IAbsolute 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	
ld	Drain Current	3.7 A	2/
lg	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 IIRecommended Operating Conditions

Symbol	Parameter 1/	Value
Vd	Drain Voltage	6 V
ldq	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.





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/ºC





Table IV

Power Dissipation and Thermal Properties

Parameter	Test Conditions	Value	Notes
Maximum Power Dissipation	Tbaseplate = 85 °C	Pd = 18.5 W Tchannel = 150 °C Tm = 1.0E+6 Hrs	1/ 2/
Thermal Resistance, θjc	Vd = 6 V Id = 1600 mA Pd = 9.6 W Tbaseplate = 85 °C	θjc = 3.5 (°C/W) Tchannel = 119 °C 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 °C	θjc = 3.5 (°C/W) Tchannel = 134 °C Tm = 6.4E+6 Hrs	
Mounting Temperature	30 Seconds	260 °C	
Storage Temperature		-65 to 150 °C	

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

 $Pd(max) = (150 °C - Tbase °C)/\theta jc.$

- 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



Measured Data

TGA4906-SM





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Measured Data

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





Measured Data

TGA4906-SM

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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





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



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.



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)



All units are in mils





Recommended Surface Mount Package Assembly

Proper ESD precautions must be followed while handling packages.

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.

Compatible with high volume surface mount assembly processes using no-clean flux

Recommended for operation in controlled humidity environments.

Reflow Profile SnPb Pb Free 3 °C/sec Ramp-up Rate 3 °C/sec 60 - 180 sec @ 150 - 200 °C Activation Time and Temperature 60 - 120 sec @ 140 - 160 °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

Typical Solder Reflow Profiles

Ordering Information

Part	Package Style
TGA4906-SM	QFN 5x5 Surface Mount

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