

November 15, 2005

**TGA4902-SM** 

# Ka-Band Packaged MPA



# **Product Description**

The TriQuint TGA4902-SM is a Ka-Band packaged medium Power Amplifier. The TGA4902-SM operates from 25-35 GHz and is designed using TriQuint's proven standard 0.25 um power pHEMT production process.

The TGA4902-SM typically provides 25 dBm of output power at 1 dB gain compression, with small signal gain of 18 dB.

The TGA4902-SM is ideally suited for VSAT ground terminal market, Point-to-Point Radio, Point-to-Multipoint Communications.

Evaluation Boards are available.

Lead-free and RoHS compliant.

## **Key Features**

- Typical Frequency Range: 25 35 GHz
- 25 dBm Nominal P1dB
- 18 dB Nominal Gain
- Bias 6 V, 220 mA
- Package Dimensions:

4.0 x 4.0 x 0.9 mm

# **Primary Applications**

- Ka-Band VSAT
- Point-to-Point Radio
- Point-to-Multipoint Communications





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| SYMBOL            | PARAMETER                         | VALUE               | NOTES                 |
|-------------------|-----------------------------------|---------------------|-----------------------|
| Vd                | Drain Voltage                     | 8 V                 | <u>2/</u>             |
| Vg                | Gate Voltage Range                | -5 TO 0 V           |                       |
| ld                | Drain Current                     | 296 mA              | <u>2</u> / <u>3</u> / |
| Ig                | Gate Current                      | 8.8 mA              | <u>3</u> /            |
| P <sub>IN</sub>   | Input Continuous Wave Power       | 20 dBm              |                       |
| P <sub>D</sub>    | Power Dissipation                 | See note <u>4</u> / | <u>2</u> /            |
| Т <sub>сн</sub>   | Operating Channel Temperature     | 150 <sup>0</sup> C  | <u>5</u> / <u>6</u> / |
| Τ <sub>M</sub>    | Mounting Temperature (30 Seconds) | 260 <sup>0</sup> C  |                       |
| T <sub>STG</sub>  | Storage Temperature               | -65 to 150 °C       |                       |
| T <sub>CASE</sub> | Package Operating Temperature     | -40 to 110 °C       |                       |

#### TABLE I MAXIMUM RATINGS <u>1</u>/

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

<u>2</u>/ Combinations of supply voltage, supply current, input power, and output power shall not exceed P<sub>D</sub>.

- <u>3/</u> Total current for the entire MMIC.
- 4/ For a median life time of 1E+6 hrs, Power dissipation is limited to:

 $P_{D}(max) = (150 \ {}^{0}C - T_{BASE} \ {}^{0}C) / 60.71 \ ({}^{0}C/W)$ 

Where  $T_{BASE}$  is the base plate temperature.

- 5/ Junction operating temperature will directly affect the device median time to failure (MTTF). For maximum life, it is recommended that junction temperatures be maintained at the lowest possible levels.
- 6/ These ratings apply to each individual FET.



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TABLE II

#### **ELECTRICAL CHARACTERISTICS**

 $(Ta = 25 \ ^{0}C, Nominal)$ 

| PARAMETER                            | TYPICAL | UNITS |
|--------------------------------------|---------|-------|
| Frequency Range                      | 25 - 35 | GHz   |
| Drain Operating                      | 6       | V     |
| Quiescent Current                    | 220     | mA    |
| Small Signal Gain                    | 18      | dB    |
| Input Return Loss                    | 15      | dB    |
| Output Return Loss                   | 10      | dB    |
| Output Power @ 1 dB Compression Gain | 25      | dBm   |
| Temperature Coefficient              | -0.017  | dB/ºC |

#### TABLE III THERMAL INFORMATION

| PARAMETER   | TEST   | Т <sub>сн</sub>   | R <sub>θJC</sub> | T <sub>M</sub> |
|---|--|-------------------|------------------|----------------|
|   | CONDITIONS                                   | ( <sup>о</sup> С) | (°C/W)           | (HRS)          |
| R <sub>θJC</sub> Thermal Resistance<br>(channel case) | Vd = 6 V<br>$I_D = 220 mA$<br>Pdiss = 1.32 W | 150               | 60.71            | 1.0E+6         |

Note: Worst case condition with no RF applied, 100% of DC power is dissipated, Case Temperature @ 70  $^{\rm o}{\rm C}$ 

Note: This device is early in the characterization process prior to finalizing all electrical specifications. Specifications are subject to change without notice.

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\* As build performance without tuning stubs



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# Package Pinout Diagram



**Bottom View** 

Top View Dot indicates Pin 1

| Pin                             | Description |
|---------------------------------|-------------|
| 1, 5, 6, 10, 11, 15, 16, 20, 21 | GND         |
| 2, 4, 7, 12, 14, 19             | NC          |
| 3                               | RF Input    |
| 8                               | Vg1         |
| 9                               | Vg2         |
| 13                              | RF Output   |
| 17                              | Vd1         |
| 18                              | Vd2         |



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Units: millimeters. Tolerance is  $\pm 0.076$ mm unless otherwise specified

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



# **Recommended Board Layout Assembly**





# **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.

| Reflow Profile                          | SnPb                        | Pb Free                     |
|---|-----------------------------|-----------------------------|
| Ramp-up Rate                            | 3 °C/sec                    | 3 °C/sec                    |
| Activation Time and<br>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<br>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         |
|------------|-----------------------|
| TGA4902-SM | QFN 4x4 Surface Mount |