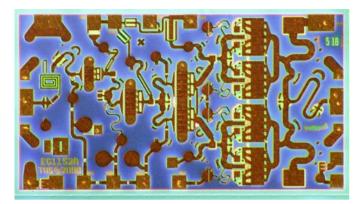


**Product Data Sheet** 

March 19, 2001

# *TriQuint Recommends the TGA2503-EPU be used for New Designs.* 13.75 - 15 GHz 2 Watt Power Amplifier TGA1152-SCC



# **Product Description**

The TriQuint TGA1152-SCC MMIC is a 34dB gain, 2W, 13.75 – 15 GHz HPA, which is ideally suited for current Ku-Band satellite ground terminal applications. Utilizing TriQuint's robust 0.5um power pHEMT process coupled with the latest High Density Interconnect (HDI) technology. The TGA1152-SCC provides the high power transmit function in an extremely compact (< 3.5mm<sup>2</sup>) chip footprint.

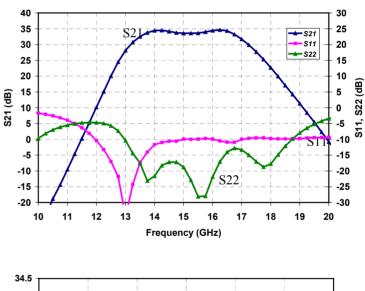
The combination of a high-yield process, electrical performance, and compact die size is exactly what is required to support the aggressive pricing targets required for low-cost transmit modules. Each device is 100% DC and RF tested on –wafer to ensure performance compliance. The device is available in chip form.

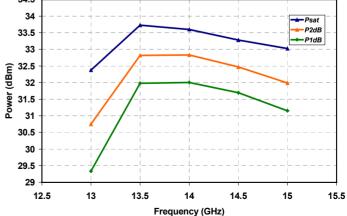
# **Key Features**

- 0.5 um pHEMT Technology
- 34 dB Nominal Gain
- 33 dBm Nominal Pout @ Pin = 3 dBm
- OTOI 39dBm Typical
- Bias 7V @ 682 mA
- Chip Dimensions 1.390mm x 2.495mm

# **Primary Applications**

- Ku Band Sat-Com
- Point-to-Point Radio





1



Product Data Sheet TGA1152-SCC

2

# TriQuint Recommends the TGA2503-EPU be used for New Designs.

SYMBOL	PARAMETER <u>5</u> /	VALUE	NOTES
$V^+$	POSITIVE SUPPLY VOLTAGE	8 V	<u>4/</u>
V	NEGATIVE SUPPLY VOLTAGE RANGE	-5V TO 0V	
$I^+$	POSITIVE SUPPLY CURRENT (QUIESCENT)	1.023 A	<u>4/</u>
$\mid I_{G} \mid$	GATE SUPPLY CURRENT	35.2 mA	
P <sub>IN</sub>	INPUT CONTINUOUS WAVE POWER	21.4 dBm	
P <sub>D</sub>	POWER DISSIPATION	9.404 W	<u>3/ 4/</u>
T <sub>CH</sub>	OPERATING CHANNEL TEMPERATURE	150 °C	<u>1/ 2</u> /
T <sub>M</sub>	MOUNTING TEMPERATURE (30 SECONDS)	320 °C	
T <sub>STG</sub>	STORAGE TEMPERATURE	-65 to 150 °C	

 $\underline{1}$ / These ratings apply to each individual FET.

- $\underline{2}$ / Junction operating temperature will directly affect the device median time to failure (T<sub>M</sub>). For maximum life, it is recommended that junction temperatures be maintained at the lowest possible levels.
- $\underline{3}$ / When operated at this bias condition with a base plate temperature of 70  $^{0}$ C, the median life is reduced from 8.9E+6 to 4.2 E+4 hours.
- $\underline{4}$  Combinations of supply voltage, supply current, input power, and output power shall not exceed P<sub>D</sub>.
- 5/ These ratings represent the maximum operable values for this device.

#### THERMAL INFORMATION\*

Parameter	Test Conditions	Т <sub>СН</sub> (°С)	R <sub>θJC</sub> (°C/W)	T <sub>M</sub> (HRS)
$R_{\theta JC}$ Thermal Resistance (channel to backside of carrier)	Vd = 7V $I_D = 682 \text{ mA}$ Pdiss = 4.774  W	125.74	11.67	8.9E+6

Note: Assumes eutectic attach using 1.5 mil 80/20 AuSn mounted to a 20 mil CuMo Carrier at 70°C baseplate temperature. Worst case condition with no RF applied, 100% of DC power is dissipated.

\* The thermal information is a result of a detailed thermal model.



**Product Data Sheet** 

TGA1152-SCC

#### TriQuint Recommends the TGA2503-EPU be used for New Designs. DC SPECIFICATIONS (100%)

NOTES	SYMBOL	TEST CONDITIONS <u>2</u> /	LIMITS		UNITS
			MIN	MAX	
	I <sub>DSS</sub>	STD	Info only	200	mA
	Gm	STD	Info only	252	mS
<u>1</u> /	$ V_{P1} $	STD	0.5	1.5	V
<u>1</u> /	$ V_{P2} $	STD	0.5	1.5	V
<u>1</u> /	V <sub>P3</sub>	STD	0.5	1.5	V
<u>1</u> /	V <sub>BVGD1-3</sub>	STD	11	30	V
<u>1</u> /	$ V_{BVGD4} $	STD	11	30	V
<u>1</u> /	V <sub>BVGS</sub>	STD	11	30	V

 $(T_A = 25 \circ C \pm 5 \circ C)$ 

 $\underline{1}$ / V<sub>P</sub>, V<sub>BVGD</sub>, and V<sub>BVGS</sub> are negative.

 $\underline{2}$ / The measurement conditions are subject to change at the manufacture's discretion

### **RF SPECIFICATIONS**

 $(T_A = 25^{\circ}C \pm 5^{\circ}C)$ 

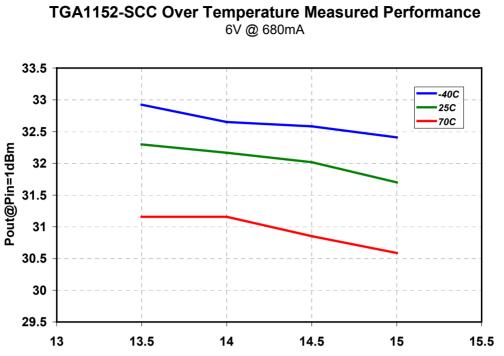
TEST	MEASUREMENT CONDITIONS 7V @ 682mA +/- 5%	VALUE			UNITS
		MIN	ТҮР	MAX	
SMALL-SIGNAL GAIN MAGNITUDE	FREQ = 13.75 – 15 GHz	29	34	-	dB
POWER OUTPUT at PIN= +3 dBm	FREQ = 13.75 – 14.5 GHz	31.5	33	-	dBm
INPUT RETURN LOSS MAGNITUDE	FREQ = 13.75 – 15 GHz	-	-12	-	dB
OUTPUT RETURN LOSS MAGNITUDE	FREQ = 13.75 – 15 GHz	-	-12	-	dB
GAIN FLATNESS	FREQ = 14 – 14.5 GHz	-	+/- 0.25	-	dB
	FREQ = 13.5 – 14.5 GHz		+/- 1.0		dB
IMD3@SCL = $P1dB - 10dB$	FREQ = 13.5 – 15 GHz	-	35	-	dBc
OIP3 (P1dB – 10dB)	FREQ = 13.5 – 15 GHz	-	39	-	dBc

TriQuint (

**Product Data Sheet** 

4

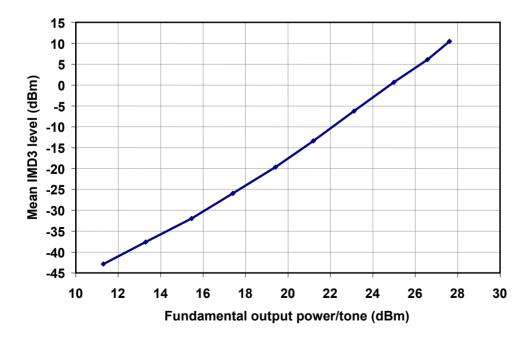
SEMICONDUCTOR<sub>®</sub> TGA1152-EPU TriQuint Recommends the TGA2503-EPU be used for New Designs.



Frequency (GHz)

### TGA1152-SCC IMD3 Performance

F=14GHz, Vd=7V/680mA, tone separation=10MHz



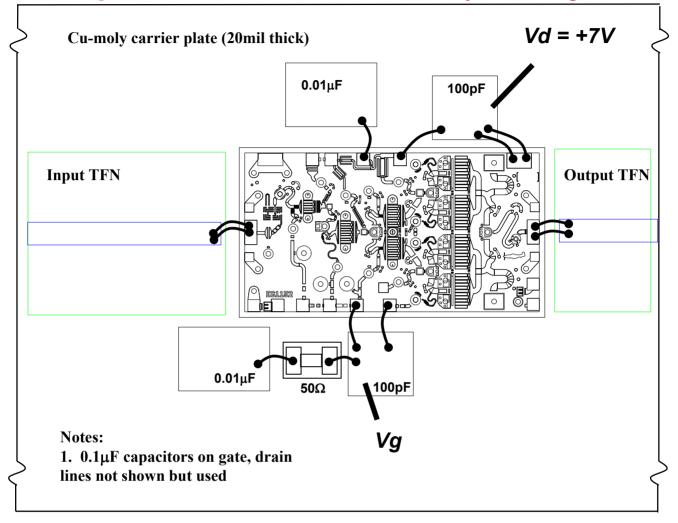


# **Product Data Sheet**

TGA1152-SCC

5

TriQuint Recommends the TGA2503-EPU be used for New Designs.



# Recommended Assembly Diagram

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

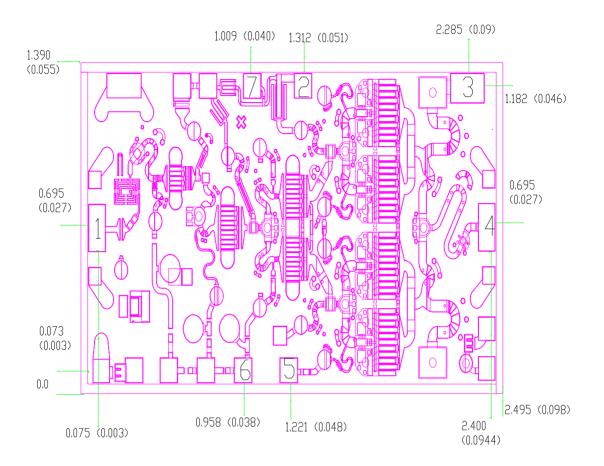


**Product Data Sheet** 

TGA1152-SCC

6

TriQuint Recommends the TGA2503-EPU be used for New Designs.



Units: millimeters (inches) Thickness: 0.1016 (0.004) Chip edge to bond pad dimensions are shown to center of bond pad Chip size tolerance: +/- 0.051 (0.002) Bond pad #1 (RF Input) 0.100 × 0.200 (0.004 × 0.008) Bond pad #2 (Vd) 0.100 × 0.100 (0.004 × 0.004) Bond pad #3 (Vd) 0.125 × 0.200 (0.005 × 0.008)

Bond pad #3 (Vd)	0.125 × 0.200 (0.005 × 0.008)
Bond pad #4 (RF Output)	0.100 × 0.200 (0.004 × 0.008)
Bond pad #5, #6 (Vg)	0.100 × 0.100 (0.004 × 0.004)
Bond pad #7 (Bypass)	0.100 × 0.100 (0.004 × 0.004)



Product Data Sheet TGA1152-SCC

TriQuint Recommends the TGA2503-EPU be used for New Designs.

Reflow process assembly notes:

- Use AuSn (80/20) solder with limited exposure to temperatures at or above 300 °C.
- An alloy station or conveyor furnace with reducing atmosphere should be used.
- No fluxes should be utilized.
- Coefficient of thermal expansion matching is critical for long-term reliability.
- Devices must be stored in a dry nitrogen atmosphere.

Component placement and adhesive attachment assembly notes:

- Vacuum pencils and/or vacuum collets are the preferred method of pick up.
- Air bridges must be avoided during placement.
- The force impact is critical during auto placement.
- Organic attachment can be used in low-power applications.
- Curing should be done in a convection oven; proper exhaust is a safety concern.
- Microwave or radiant curing should not be used because of differential heating.
- Coefficient of thermal expansion matching is critical.

Interconnect process assembly notes:

- Thermosonic ball bonding is the preferred interconnect technique.
- Force, time, and ultrasonics are critical parameters.
- Aluminum wire should not be used.
- Discrete FET devices with small pad sizes should be bonded with 0.0007-inch wire.
- Maximum stage temperature is  $200 \,^{\circ}$ C.

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