

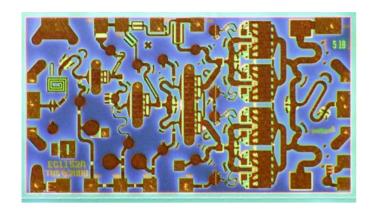
Product Data Sheet

March 19, 2001

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

13.75 - 15 GHz 2 Watt Power Amplifier





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

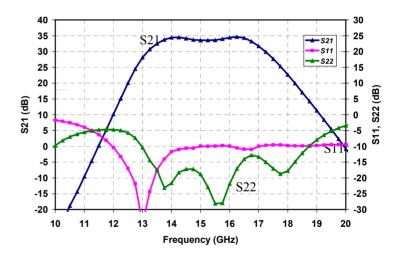
Product Description

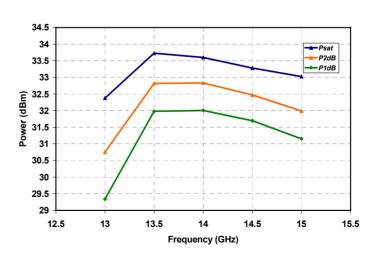
The TriQuint TGA1152-SCC MMIC is a 34dB gain, 2W, 13.75 – 15 GHz HPA, which is ideally suited for current Ku-Band satellite ground terminal applications. Utilizing TriQuint's robust 0.5um power pHEMT process coupled with the latest High Density Interconnect (HDI) technology. The TGA1152-SCC provides the high power transmit function in an extremely compact (< 3.5mm²) 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.

Primary Applications

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







Product Data Sheet TGA1152-SCC

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

MAXIMUM RATINGS

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>
$ I_G $	GATE SUPPLY CURRENT	35.2 mA	
$P_{\rm IN}$	INPUT CONTINUOUS WAVE POWER	21.4 dBm	
P_{D}	POWER DISSIPATION	9.404 W	<u>3</u> / <u>4/</u>
T _{CH}	OPERATING CHANNEL TEMPERATURE	150 °C	<u>1</u> / <u>2</u> /
T_{M}	MOUNTING TEMPERATURE	320 °C	
	(30 SECONDS)		
T_{STG}	STORAGE TEMPERATURE	-65 to 150 °C	

- 1/ These ratings apply to each individual FET.
- $\underline{2}$ / 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.
- $\underline{3}$ / 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.
- 4/ Combinations of supply voltage, supply current, input power, and output power shall not exceed P_D.
- 5/ These ratings represent the maximum operable values for this device.

THERMAL INFORMATION*

Parameter	Test Conditions	T _{CH} (°C)	R _{θJC} (°C/W)	T _M (HRS)
$R_{\theta JC}$ Thermal Resistance (channel to backside of carrier)	$Vd = 7V$ $I_D = 682 \text{ mA}$ $Pdiss = 4.774 \text{ W}$	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%)

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

NOTES	SYMBOL	TEST CONDITIONS <u>2</u> /	LIMITS		UNITS
			MIN	MAX	
	I_{DSS}	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
1/	$ V_{P3} $	STD	0.5	1.5	V
<u>1</u> /	$ V_{\mathrm{BVGD1-3}} $	STD	11	30	V
1/	$ V_{\mathrm{BVGD4}} $	STD	11	30	V
<u>1</u> /	$ V_{\mathrm{BVGS}} $	STD	11	30	V

- $\underline{1}$ / V_P , V_{BVGD} , and V_{BVGS} are negative.
- 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	TYP	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	1	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

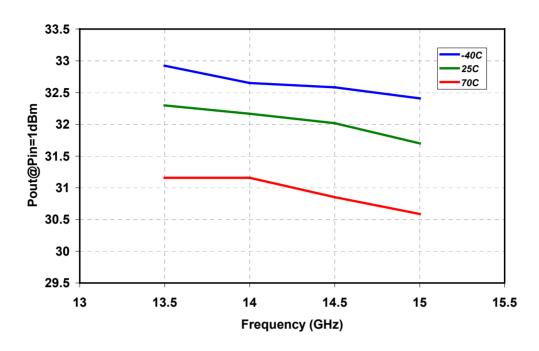


Product Data Sheet

TGA1152-EPU

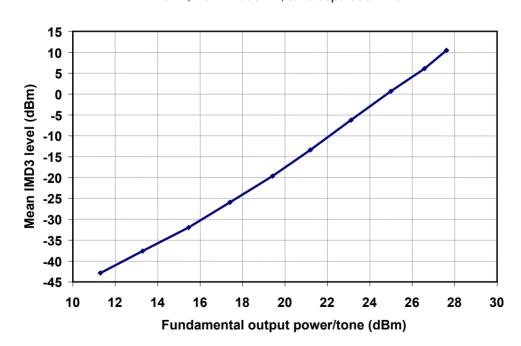
TriQuint Recommends the TGA2503-EPU be used for New Designs.

TGA1152-SCC Over Temperature Measured Performance 6V @ 680mA



TGA1152-SCC IMD3 Performance

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

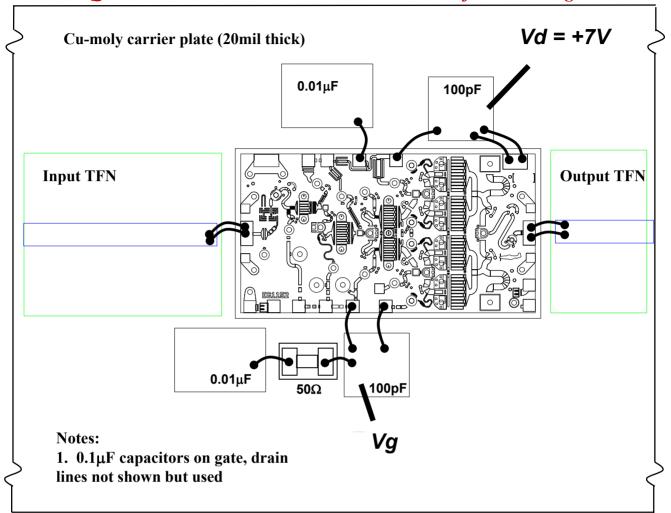




Product Data Sheet

TGA1152-SCC

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



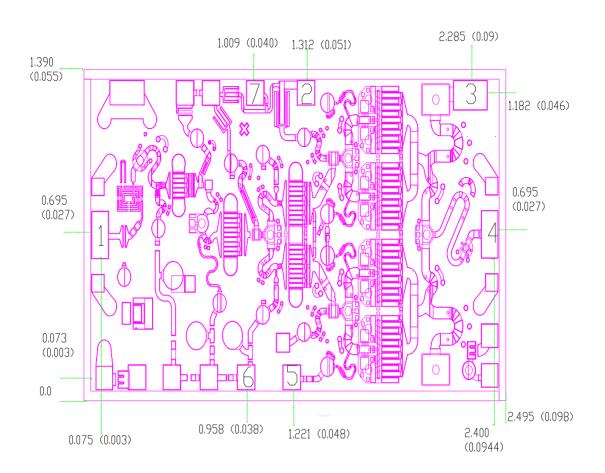
Recommended Assembly Diagram

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

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

Not Recommended for New Designs.



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 °C.

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