Not Recommended for New Designs.

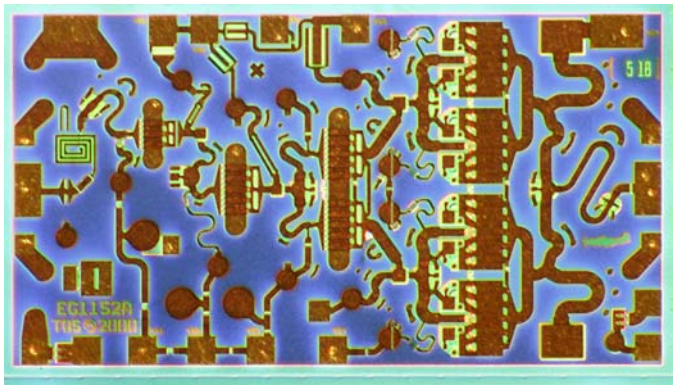
TriQuint SEMICONDUCTOR

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



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

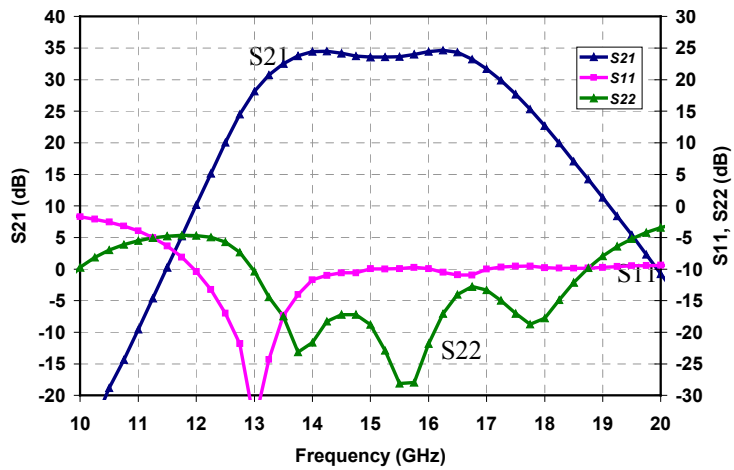
Primary Applications

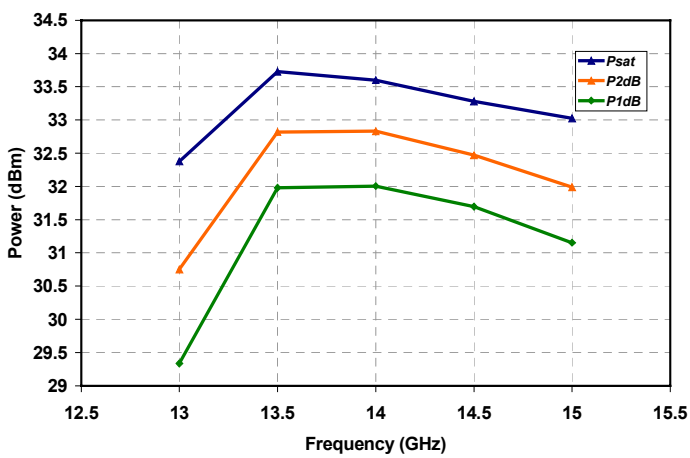
- Ku Band Sat-Com
- Point-to-Point Radio

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^2) 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.





MAXIMUM RATINGS

SYMBOL	PARAMETER 5/	VALUE	NOTES
V^+	POSITIVE SUPPLY VOLTAGE	8 V	4/
V^-	NEGATIVE SUPPLY VOLTAGE RANGE	-5V TO 0V	
I^+	POSITIVE SUPPLY CURRENT (QUIESCENT)	1.023 A	4/
$\mid I_G \mid$	GATE SUPPLY CURRENT	35.2 mA	
P_{IN}	INPUT CONTINUOUS WAVE POWER	21.4 dBm	
P_D	POWER DISSIPATION	9.404 W	3/ 4/
T_{CH}	OPERATING CHANNEL TEMPERATURE	150 ^{0}C	1/ 2/
T_M	MOUNTING TEMPERATURE (30 SECONDS)	320 ^{0}C	
T_{STG}	STORAGE TEMPERATURE	-65 to 150 ^{0}C	

1/ These ratings apply to each individual FET.

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.

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} (^{o}C)**	**$R_{\theta JC}$ (°C/W)**	**T_M (HRS)**
$R_{\theta JC}$ Thermal Resistance (channel to backside of carrier)	Vd = 7V I_D = 682 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.

DC SPECIFICATIONS (100%)

(T_A = 25 °C ± 5 °C)

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

1/ V_P, V_{BVGD}, and V_{BVGS} are negative.

2/ The measurement conditions are subject to change at the manufacture's discretion

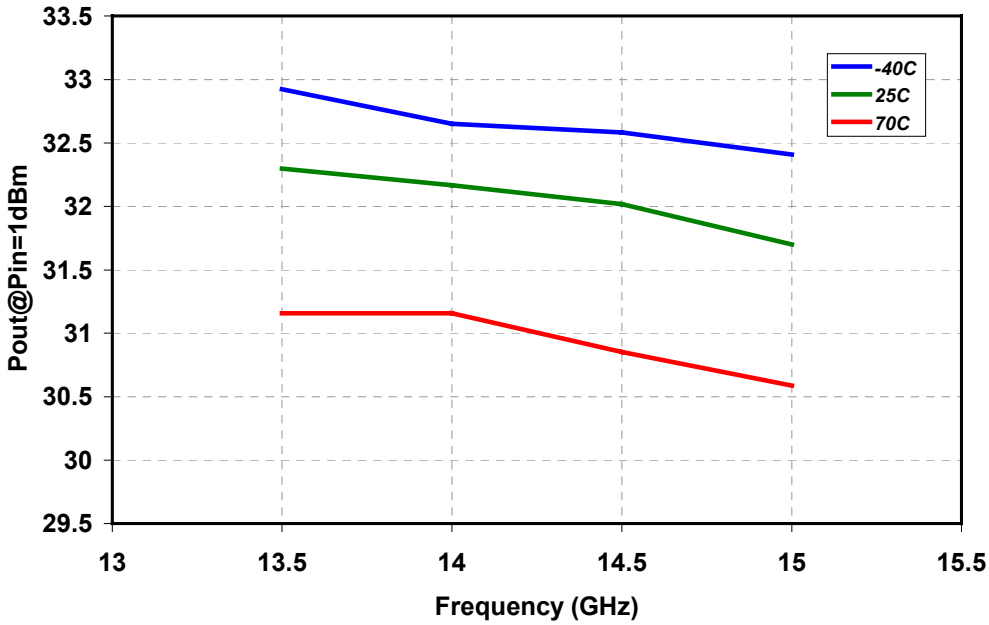
RF SPECIFICATIONS

(T_A = 25°C ± 5°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	-	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 FREQ = 13.5 – 14.5 GHz	-	+/- 0.25 +/- 1.0	-	dB dB
IMD3@SCL = P1dB – 10dB	FREQ = 13.5 – 15 GHz	-	35	-	dBc
OIP3 (P1dB – 10dB)	FREQ = 13.5 – 15 GHz	-	39	-	dBc

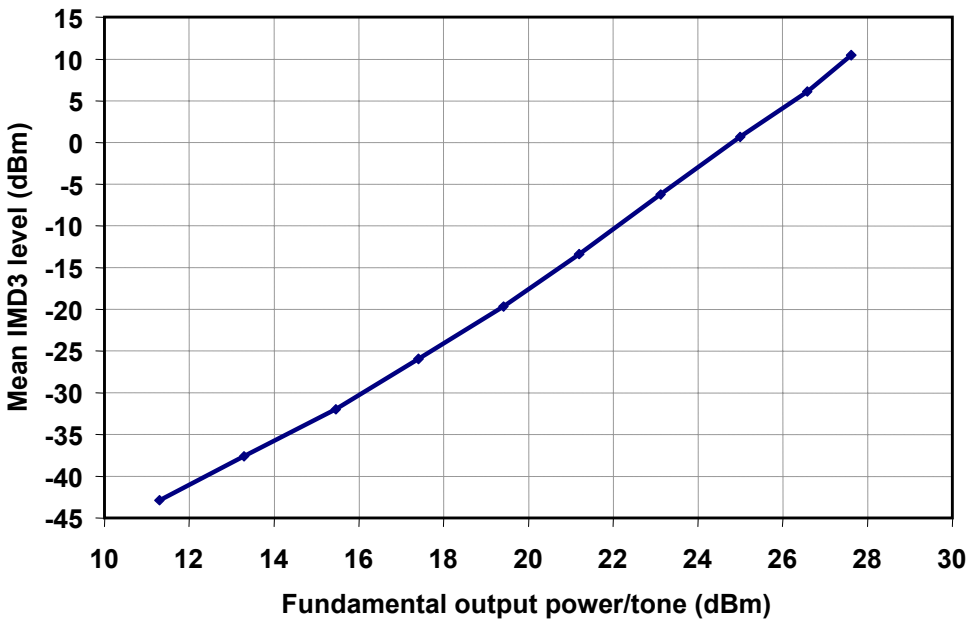
TGA1152-SCC Over Temperature Measured Performance

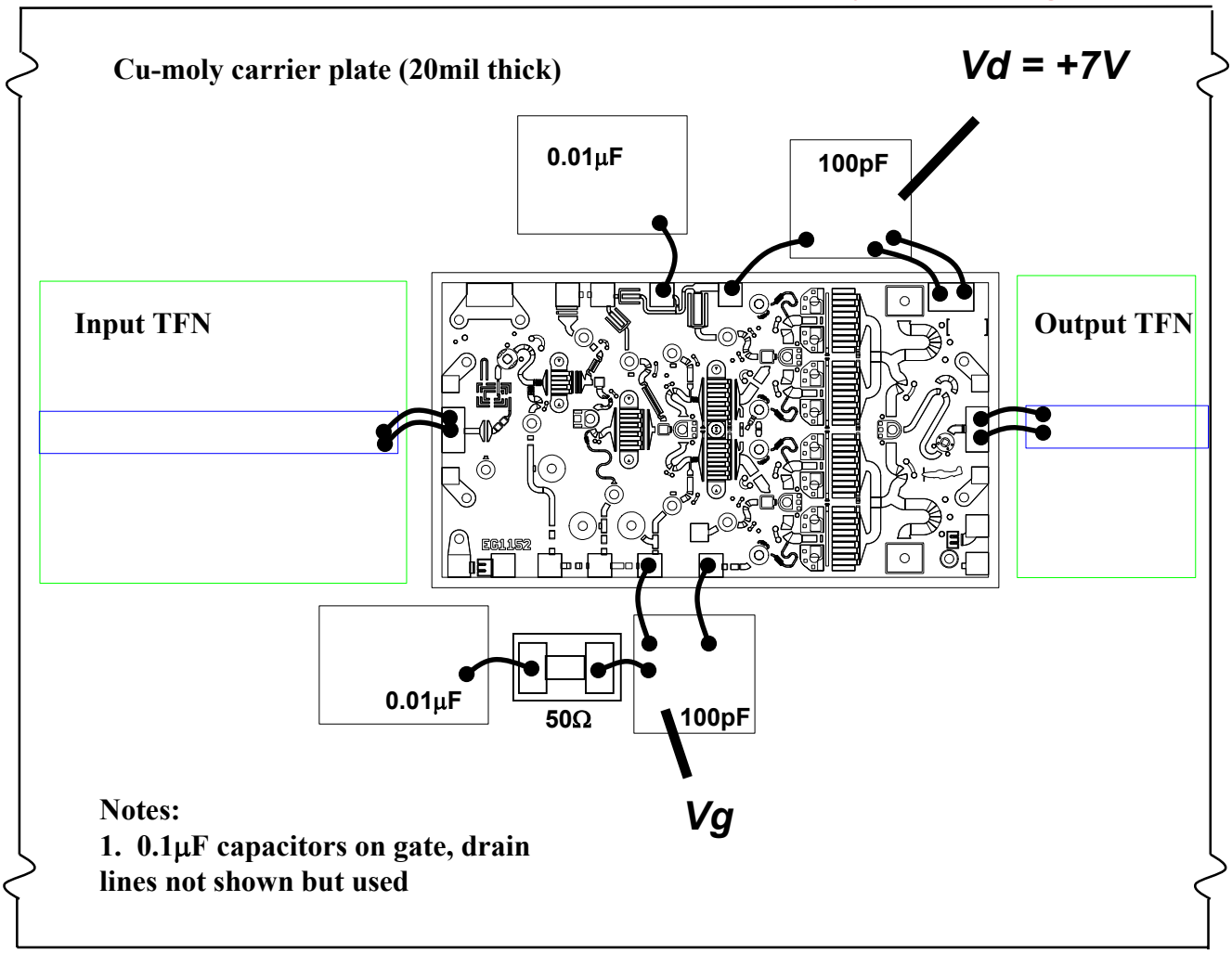
6V @ 680mA



TGA1152-SCC IMD3 Performance

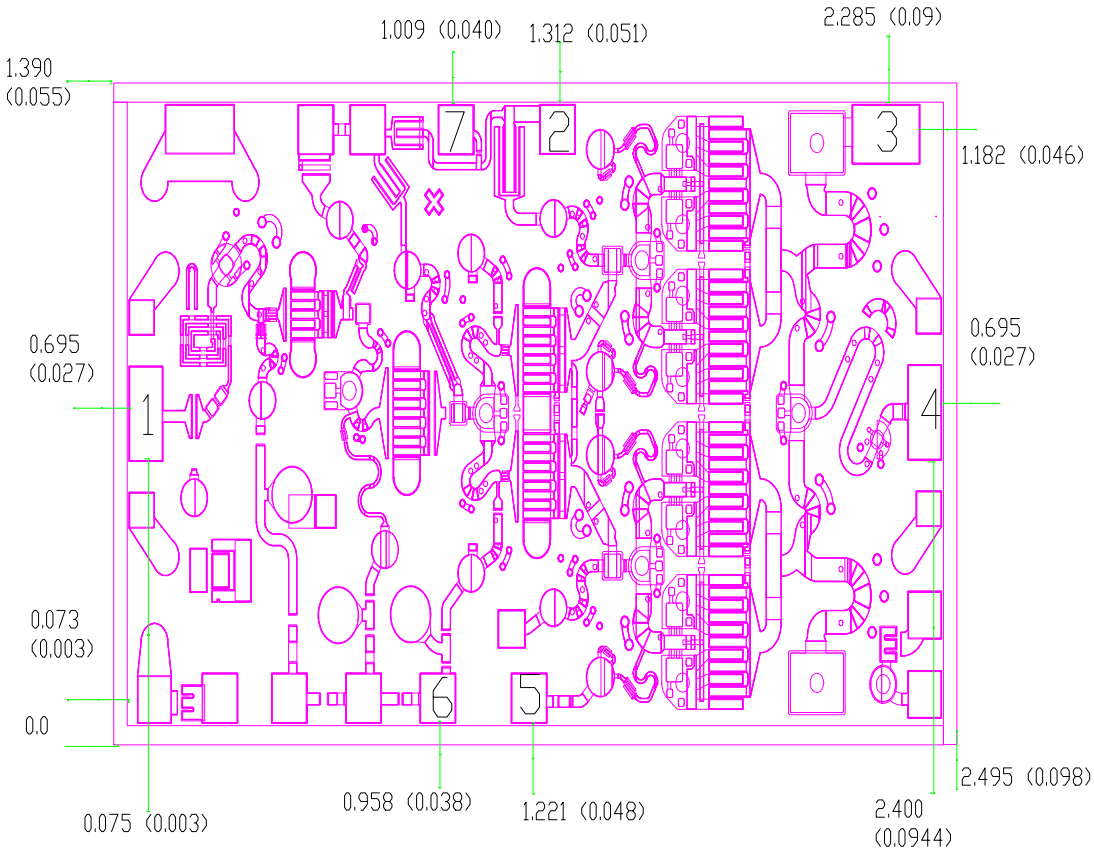
F=14GHz, Vd=7V/680mA, tone separation=10MHz





Recommended Assembly Diagram

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



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 x 0.200 (0.004 x 0.008)
Bond pad #2 (Vd)	0.100 x 0.100 (0.004 x 0.004)
Bond pad #3 (Vd)	0.125 x 0.200 (0.005 x 0.008)
Bond pad #4 (RF Output)	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)

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.

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