Ka-band Compact Driver Amplifier TGA4510-SM

Key Features

- Typical Frequency Range: 29-31 GHz
- 17 dBm Nominal Psat
- 15 dB Nominal Gain
- Bias Conditions: Vd = 6V, Id = 60 mA
- Compact 4 x 4 QFN with 20 leads
- Package Dimensions: 4.0 x 4.0 x 0.9 mm

Primary Applications

- Ka-band VSAT Ground Terminal
- Point-to-Point Radio
- Base Stations

Product Description

The TriQuint TGA4510-SM is a Ka-Band Packaged Driver Amplifier. The TGA4510-SM operates from 29-31 GHz and is designed using TriQuint's proven standard 0.25-um power pHEMT production process.

The TGA4510-SM typically provides 17 dBm of saturated output power with small signal gain of 15 dB.

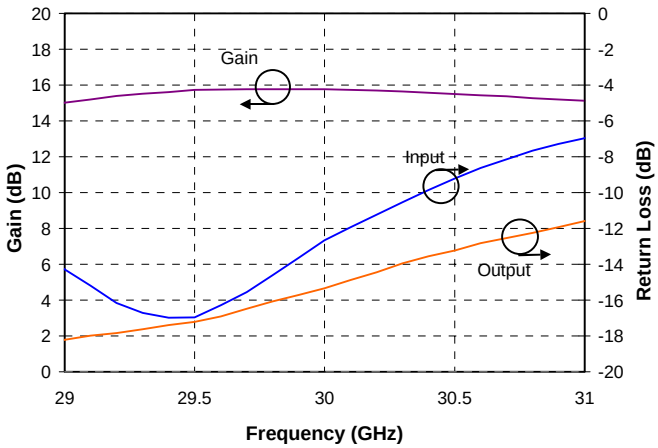
The TGA4510-SM is available in a low-cost, surface mount 4x4 QFN style package and is ideally suited for Ka-band VSAT Ground Terminal, Point-to-Point Radio and Base Station applications.

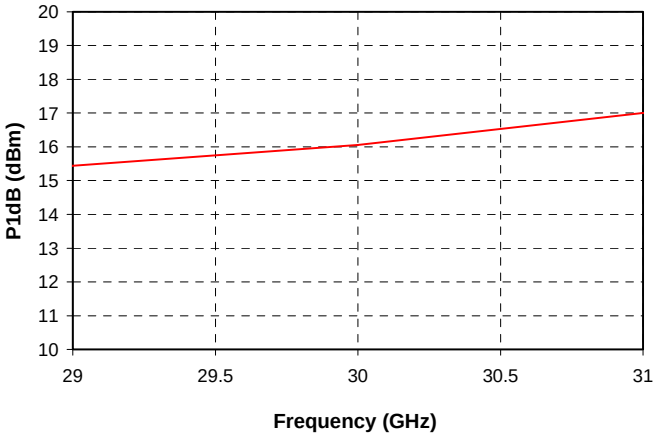
Evaluation Boards are available upon request.

Lead-free and RoHS compliant.

Measured Performance

Bias Conditions: Vd = 6V, Idq = 60mA





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

TriQuint Semiconductor Texas: Phone (972)994-8465 Fax (972)994-8504 Email: Info-mmw@tqs.com Web: www.triquint.com

TABLE I
MAXIMUM RATINGS

Symbol	Parameter 1/	Value	Notes
V^+	Positive Supply Voltage	8 V	2/
V^-	Negative Supply Voltage Range	-5V to 0V	
I^+	Positive Supply Current (Quiescent)	81 mA	2/
$\| I_G \|$	Gate Supply Current	3.5 mA	
P_{IN}	Input Continuous Wave Power	18 dBm	2/
P_D	Power Dissipation	0.65 W	2/ 3/
T_{CH}	Operating Channel Temperature	150 °C	4/ 5/
T_M	Mounting Temperature (30 Seconds)	260 °C	
T_{STG}	Storage Temperature	-65 to 150 °C	

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

2/ Combinations of supply voltage, supply current, input power, and output power shall not exceed P_D.

3/ For a median life time of 1E+6 hrs, Power dissipation is limited to:
PD(max) = (150 °C – TBASE °C) / 117.5 (°C/W)

4/ These ratings apply to each individual FET.

5/ 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.

TriQuint Semiconductor Texas: Phone (972)994-8465 Fax (972)994-8504 Email: Info-mmw@tqs.com Web: www.triquint.com

TABLE II
RF CHARACTERIZATION TABLE
(T_A = 25°C, Nominal)
Bias Conditions: Vd = 6V, Idq = 60mA

SYMBOL	PARAMETER	TEST CONDITION	NOMINAL	UNITS
Gain	Small Signal Gain	f = 29-31 GHz	15	dB
IRL	Input Return Loss	f = 29-31 GHz	10	dB
ORL	Output Return Loss	f = 29-31 GHz	12	dB
Psat	Saturated Output Power	f = 29-31 GHz	17	dBm
P1dB	Output Power @ 1dB Compression	f = 29-31 GHz	16	dBm

TABLE III
THERMAL INFORMATION

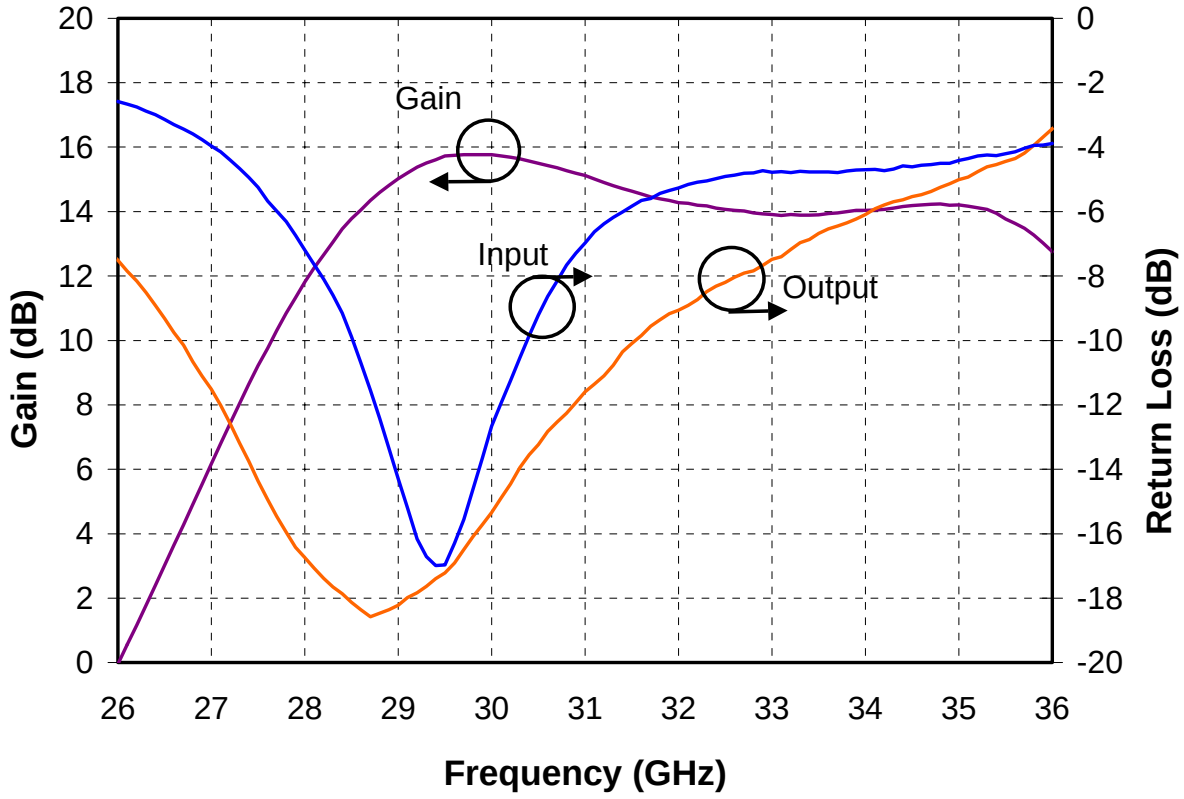
PARAMETER	TEST CONDITION	T_{CH} (°C)	$R_{\theta jc}$ (°C/W)	MTTF (HRS)
$R_{\theta jc}$ Thermal Resistance (Channel to package)	V_D = 6V I_{Dq} = 60mA P_{Diss} = 0.36 W	127	117.5	7.9 E+6

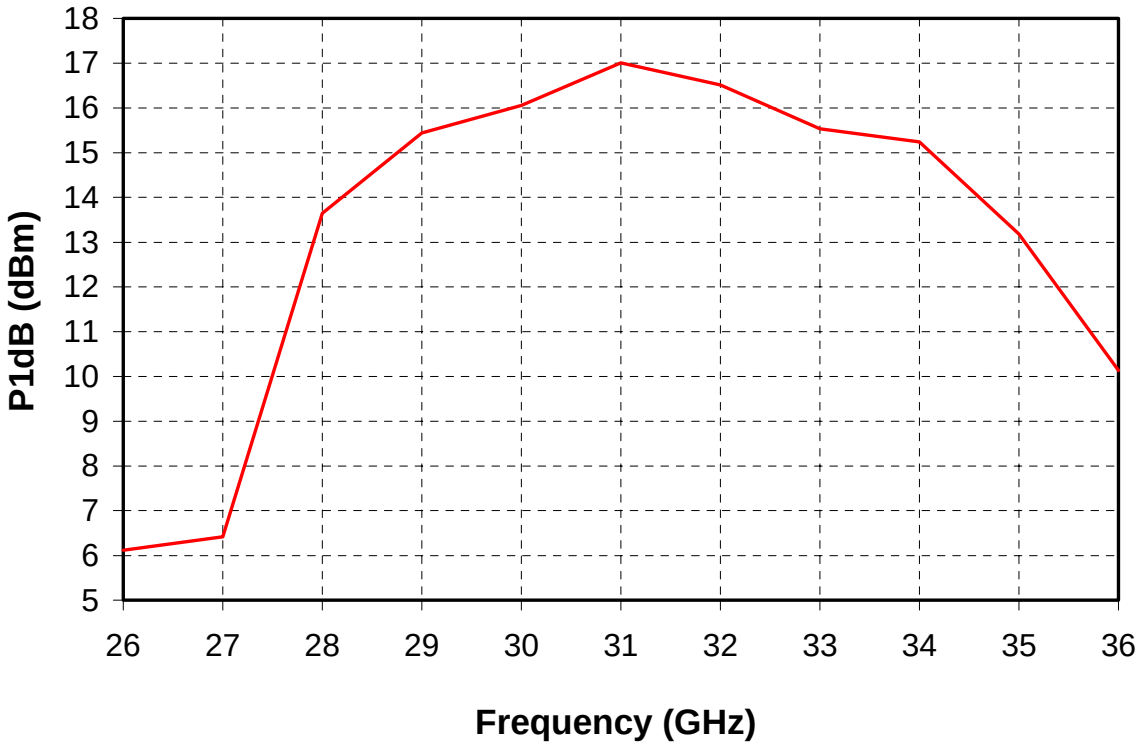
Note: Worst case condition with no RF applied, 100% of DC power is dissipated.
Package temperature @ 85 °C

TriQuint Semiconductor Texas: Phone (972)994-8465 Fax (972)994-8504 Email: Info-mmw@tqs.com Web: www.triquint.com

Measured Performance

Bias Conditions: Vd = 6 V, Idq =60 mA

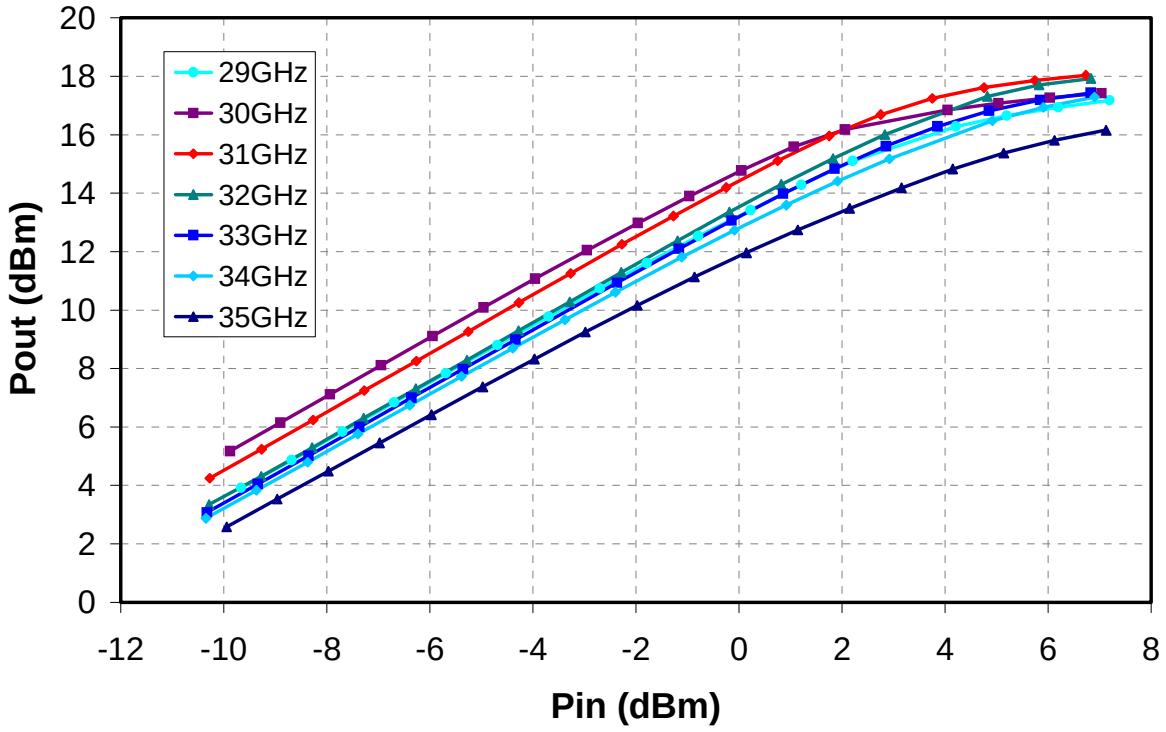


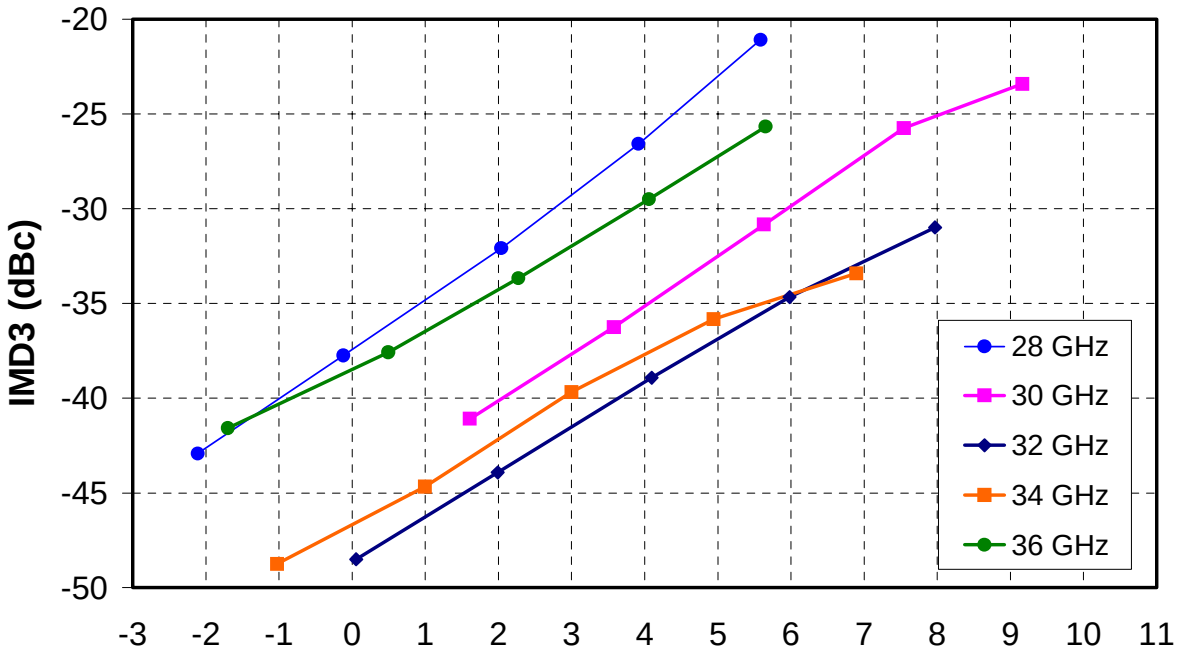


TriQuint Semiconductor Texas: Phone (972)994-8465 Fax (972)994-8504 Email: Info-mmw@tqs.com Web: www.triquint.com

Measured Performance

Bias Conditions: Vd = 6 V, Idq =60 mA

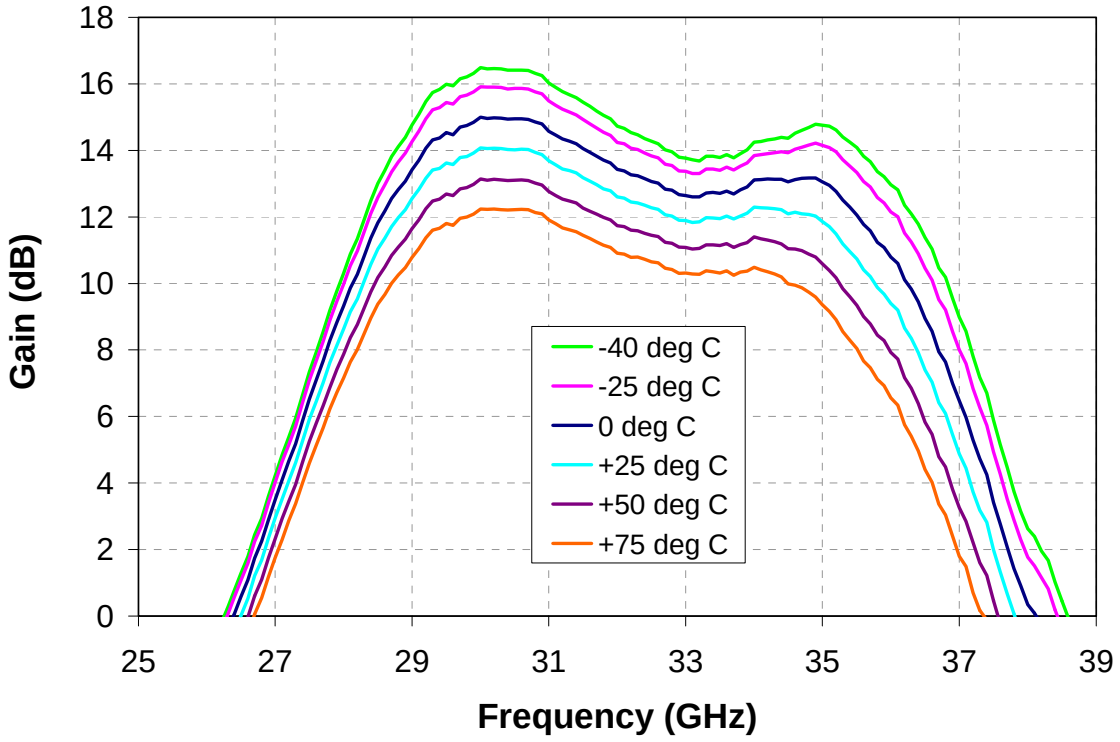


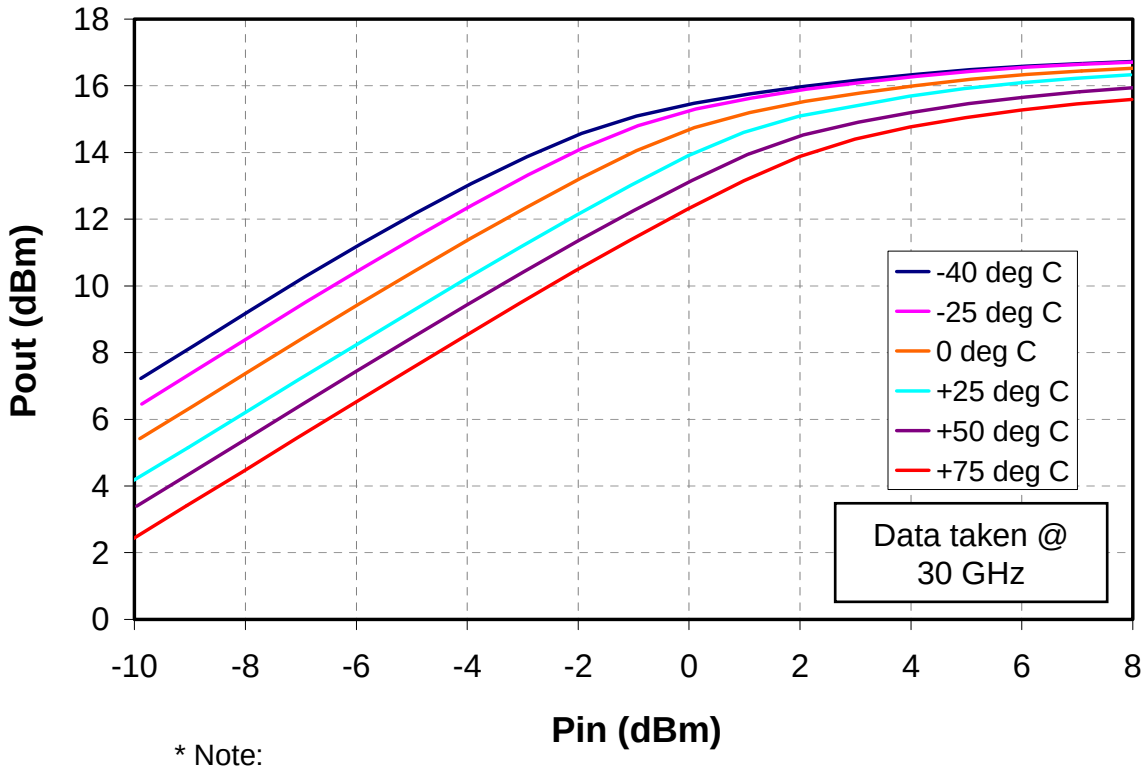


TriQuint Semiconductor Texas: Phone (972)994-8465 Fax (972)994-8504 Email: Info-mmw@tqs.com Web: www.triquint.com

Measured Performance*

Bias Conditions: Vd = 6 V, Idq =60 mA

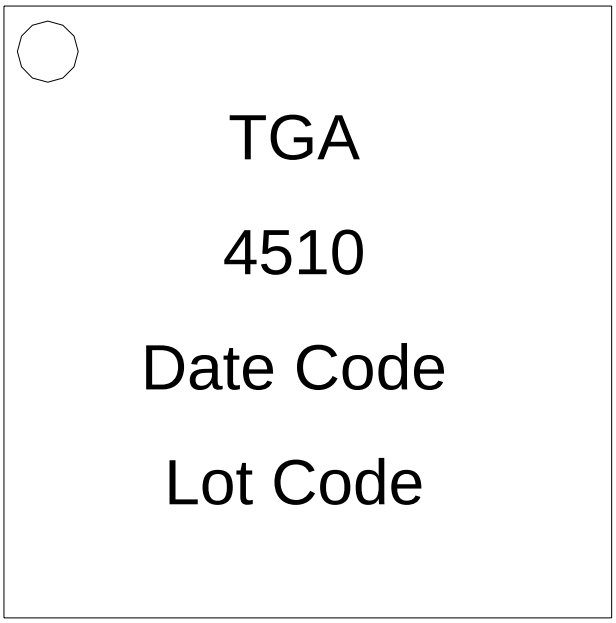




* Note:
Temperature data is taken using connectorized evaluation boards. The reference plane is at RF connectors, and hence connector and board loss has not been de-embedded.

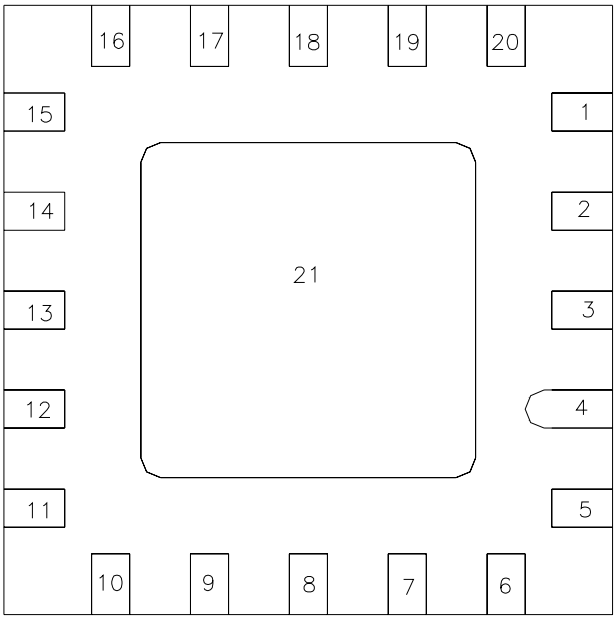
TriQuint Semiconductor Texas: Phone (972)994-8465 Fax (972)994-8504 Email: Info-mmw@tqs.com Web: www.triquint.com

Package Pinout Diagram



Top View

Dot indicates Pin 1

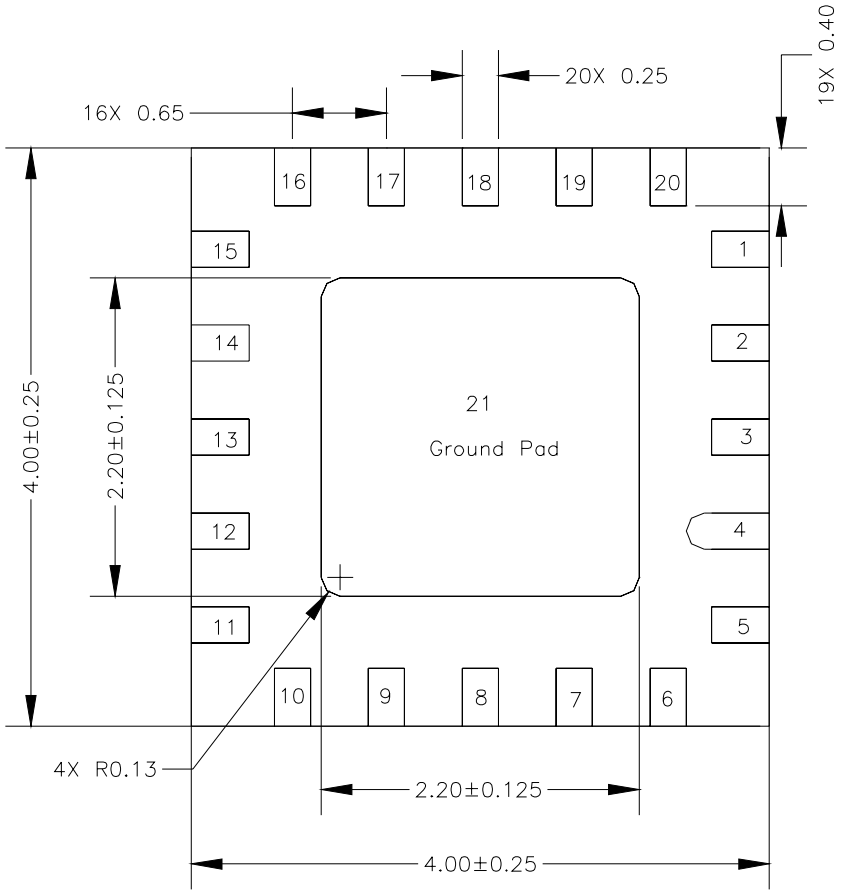


Bottom View

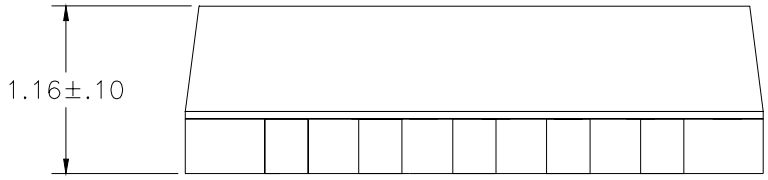
Pin	Description
1, 5, 6, 10, 11, 15, 16, 20, 21	GND
2, 4, 7, 8, 12, 14, 18, 19	NC
3	RF Input
9	Vd
13	RF Output
17	Vg

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

Mechanical Drawing
(Bottom Side)



BOTTOM VIEW

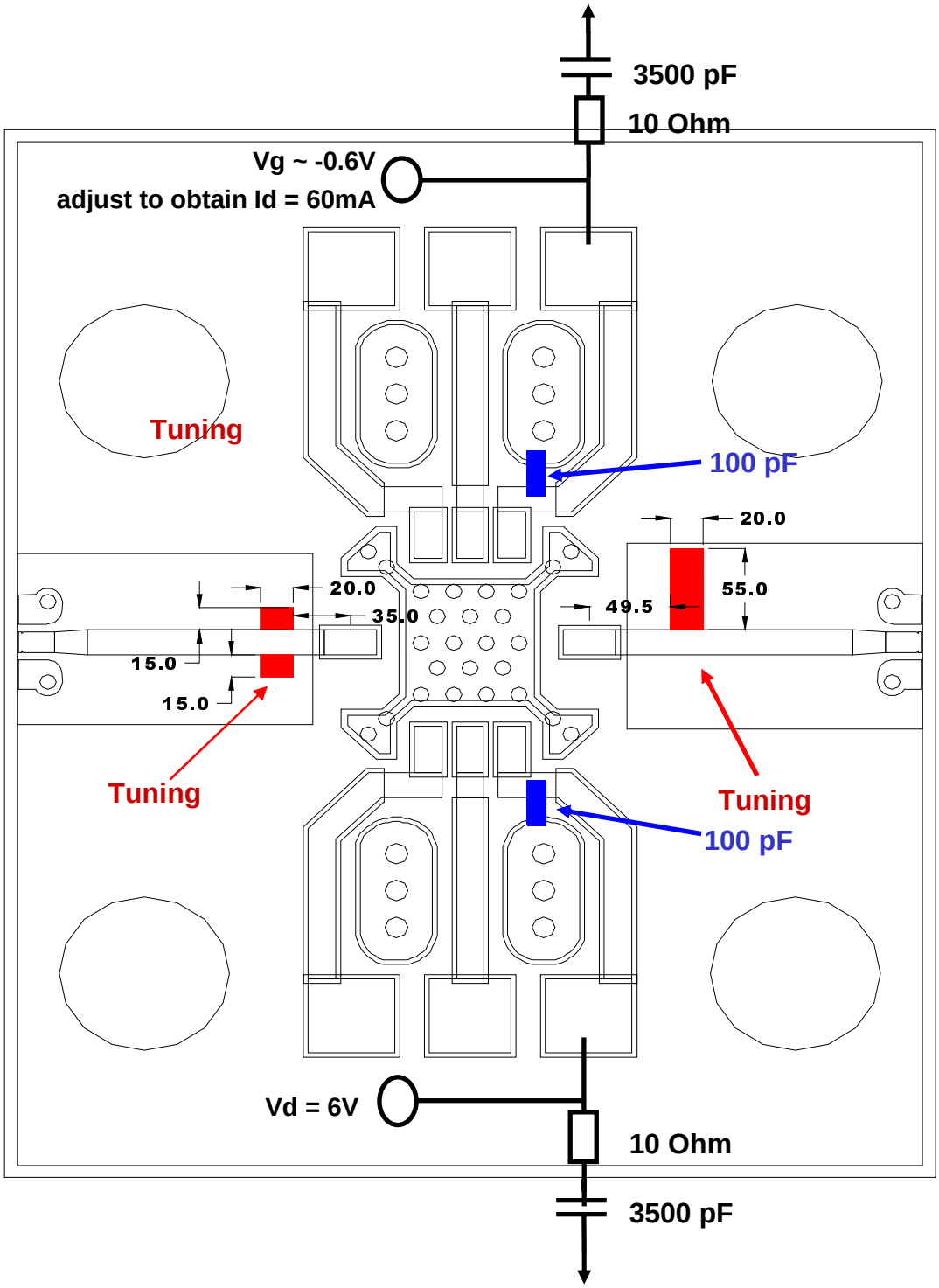


SIDE VIEW

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

TriQuint Semiconductor Texas: Phone (972)994-8465 Fax (972)994-8504 Email: Info-mmw@tqs.com Web: www.triquint.com

Recommended Board Layout Assembly *



Units: mils

* The layout is a general purpose drawing that needs to be tuned for the specific application. PCB is RO4003 8 mil thickness, 0.5 oz standard copper cladding, with Er = 3.38.

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

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.

Typical Solder Reflow Profiles

Reflow Profile	SnPb	Pb Free
Ramp-up Rate	3 °C/sec	3 °C/sec
Activation Time and 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 Temperature	10 – 20 sec	10 – 20 sec
Ramp-down Rate	4 – 6 °C/sec	4 – 6 °C/sec

Ordering Information

Part	Package Style
TGA4510-SM	QFN 4x4 Surface Mount

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

TriQuint Semiconductor Texas: Phone (972)994-8465 Fax (972)994-8504 Email: Info-mmw@tqs.com Web: www.triquint.com