

K Band Packaged Low Noise Amplifier



Key Features

- 21-27 GHz Bandwidth
- 21 dB Nominal Gain
- 2.5 dB Nominal Noise Figure
- 10 dBm Nominal P1dB
- Bias: 3.5 V, 60 mA
- Package Dimensions:
4.0 x 4.0 x 1.1 mm
(0.157 x 0.157 x 0.043 in)

Primary Applications

- Point-to-Point Radio
- Point-to-MultiPoint Radio

Product Description

The TriQuint TGA4506-SM is a K-Band Packaged low noise amplifier. The TGA4506-SM operates from 21-27 GHz and is designed using TriQuint's power pHEMT production process.

The TGA4506-SM typically provides 2.5 dB noise figure and 21 dB small signal gain.

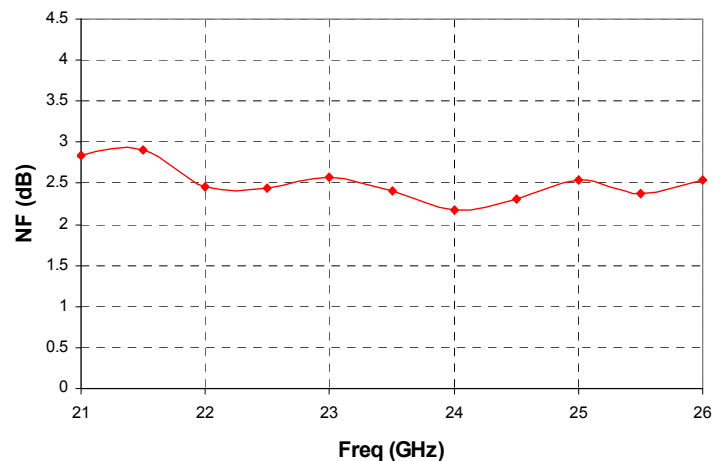
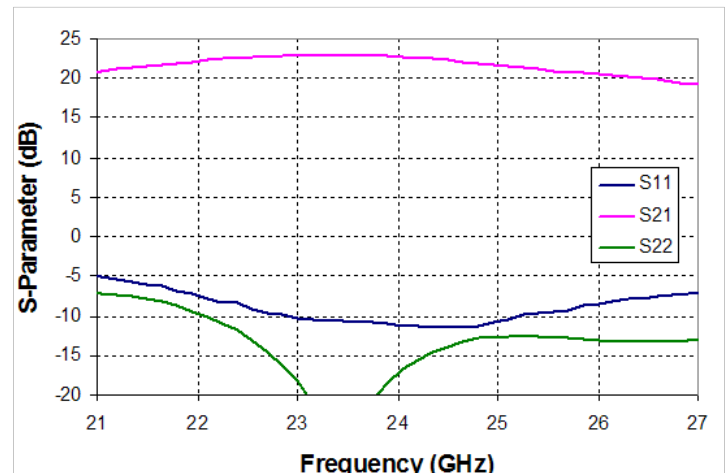
The TGA4506-SM is ideally suited for Point-to-Point Radio and Point-to-Multipoint Radio Communications.

Evaluation Boards are available upon request.

Lead-Free & RoHS compliant.

Measured Data

Bias Conditions: $V_d = 3.5\text{ V}$, $I_d = 60\text{ mA}$



**TABLE I
MAXIMUM RATINGS 1/**

SYMBOL	PARAMETER	VALUE	NOTES
V _d	Drain Voltage	5 V	<u>2/</u>
V _g	Gate Voltage Range	-1.5 TO 0V	
I _d	Drain Current	190 mA	<u>2/</u>
I _g	Gate Current	6 mA	
P _{IN}	Input Continuous Wave Power	9 dBm	
P _D	Power Dissipation	0.86 W	<u>2/ 3/</u>
T _{CH}	Operating Channel Temperature	200 °C	<u>4/</u>
	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/ When operated at this bias condition with a package base plate temperature of 85 °C, the median life is 1.5E+3 hrs.
- 4/ 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.

TABLE II
ELECTRICAL CHARACTERISTICS

(Ta = 25 °C Nominal)

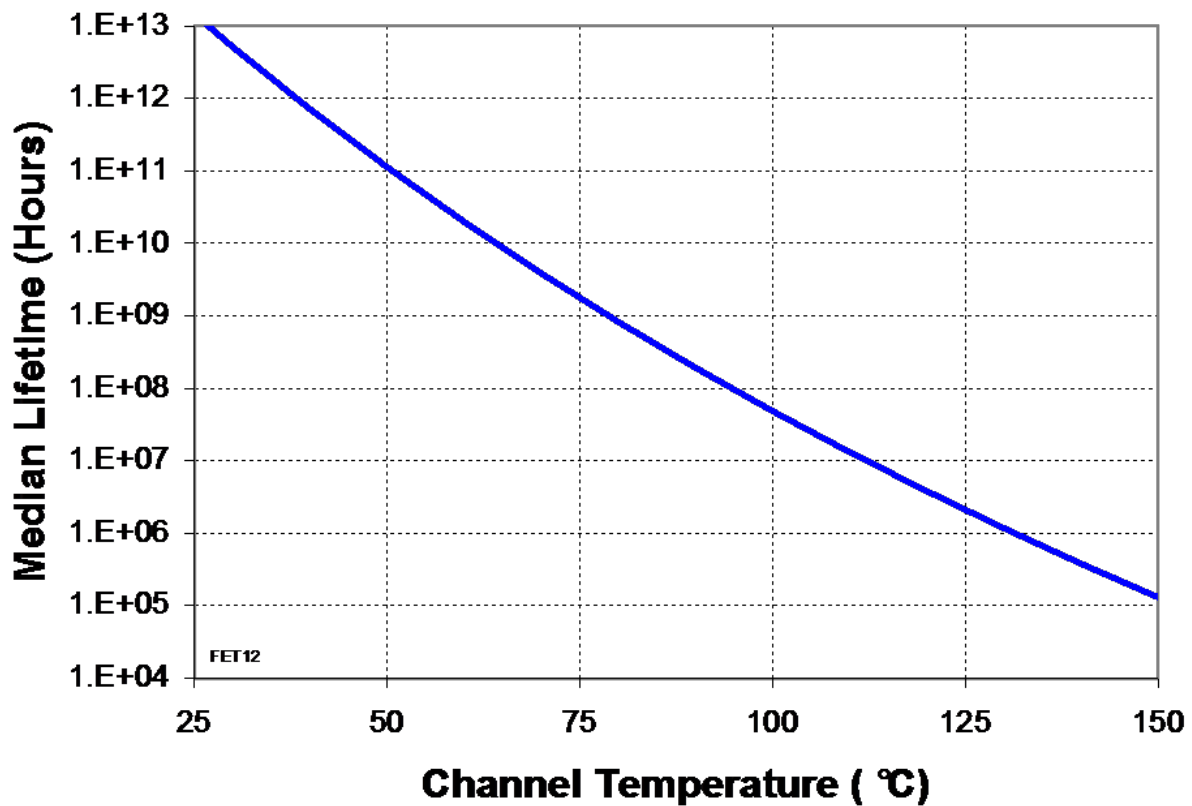
PARAMETER	TYPICAL	UNITS
Drain Voltage, Vd	3.5	V
Drain Current, Id	60	mA
Gate Voltage, Vg	-0.5 to 0.0	V
Small Signal Gain, S21	21	dB
Input Return Loss, S11	11	dB
Output Return Loss, S22	15	dB
Noise Figure, NF	2.5	dB
Output Power @ 1 dB Compression Gain, P1dB	10	dBm

**TABLE III
THERMAL INFORMATION**

Parameter	Test Conditions	T _{CH} (°C)	θ _{JC} (°C/W)	T _m (HRS)
θ _{JC} Thermal Resistance (channel to backside of package)	V _d = 3.5V I _D = 0.06 A P _{diss} = 0.21 W	113	133	1.5E+6

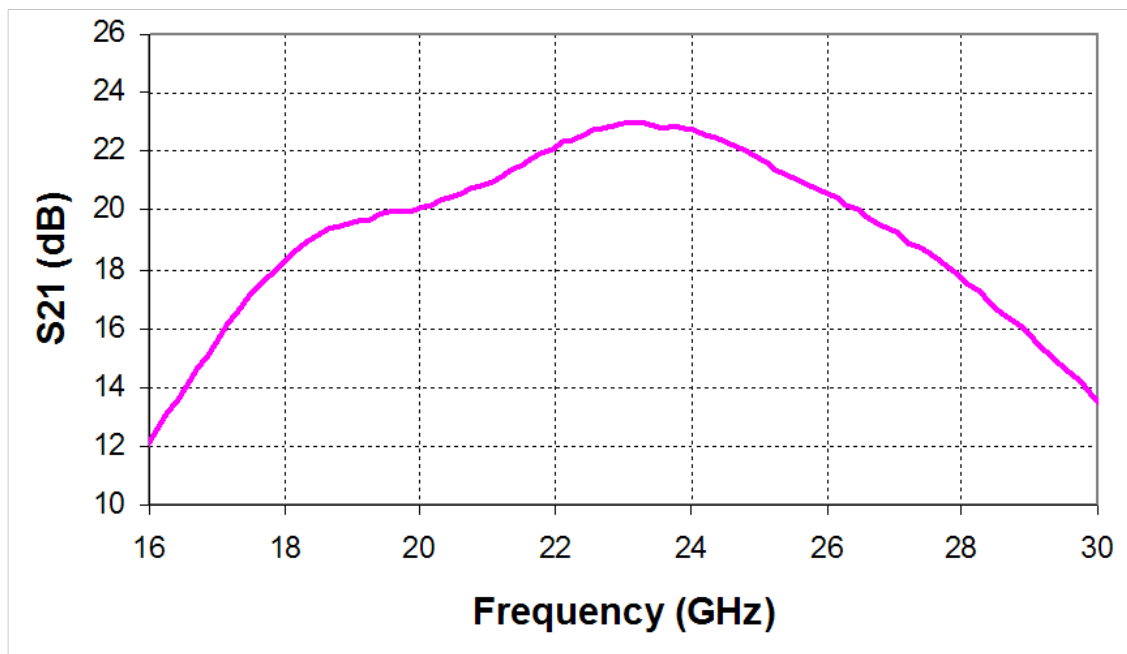
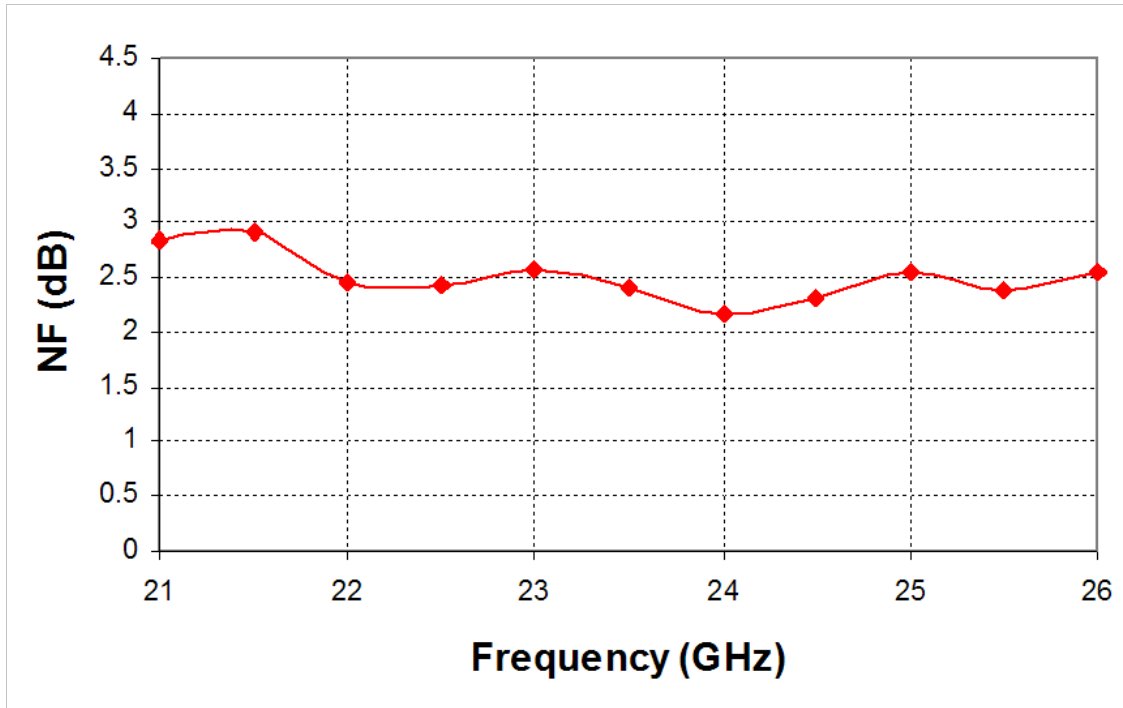
Note: Package backside on board at 85 °C.

Median Lifetime (T_m) vs. Channel Temperature



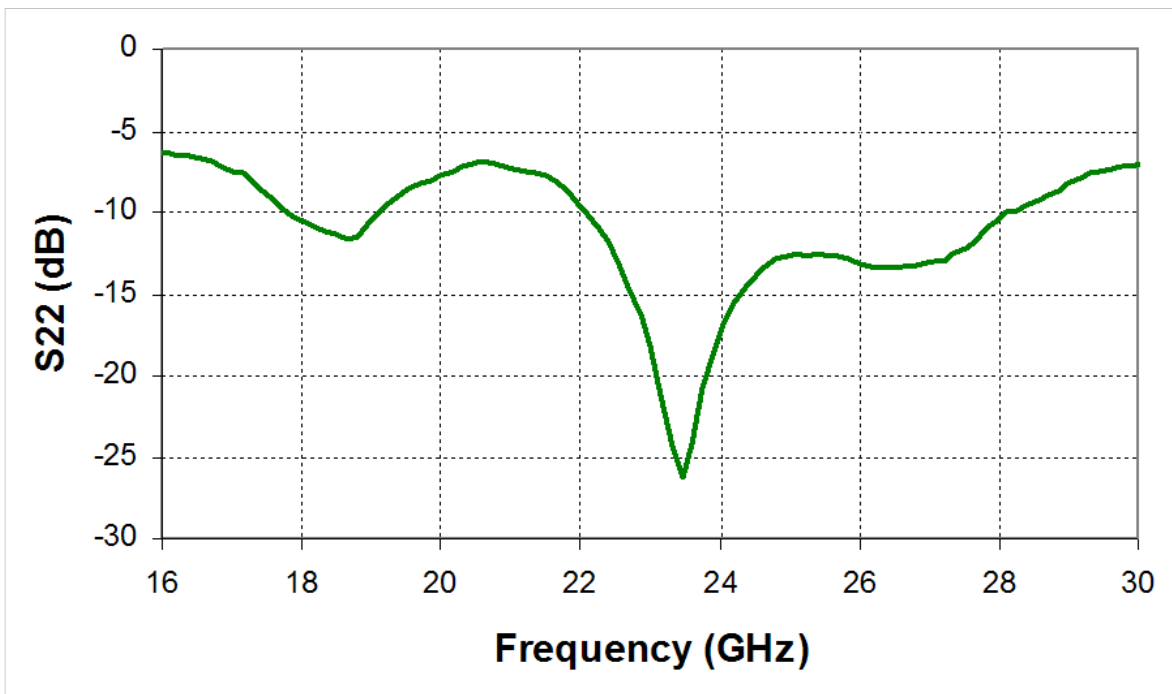
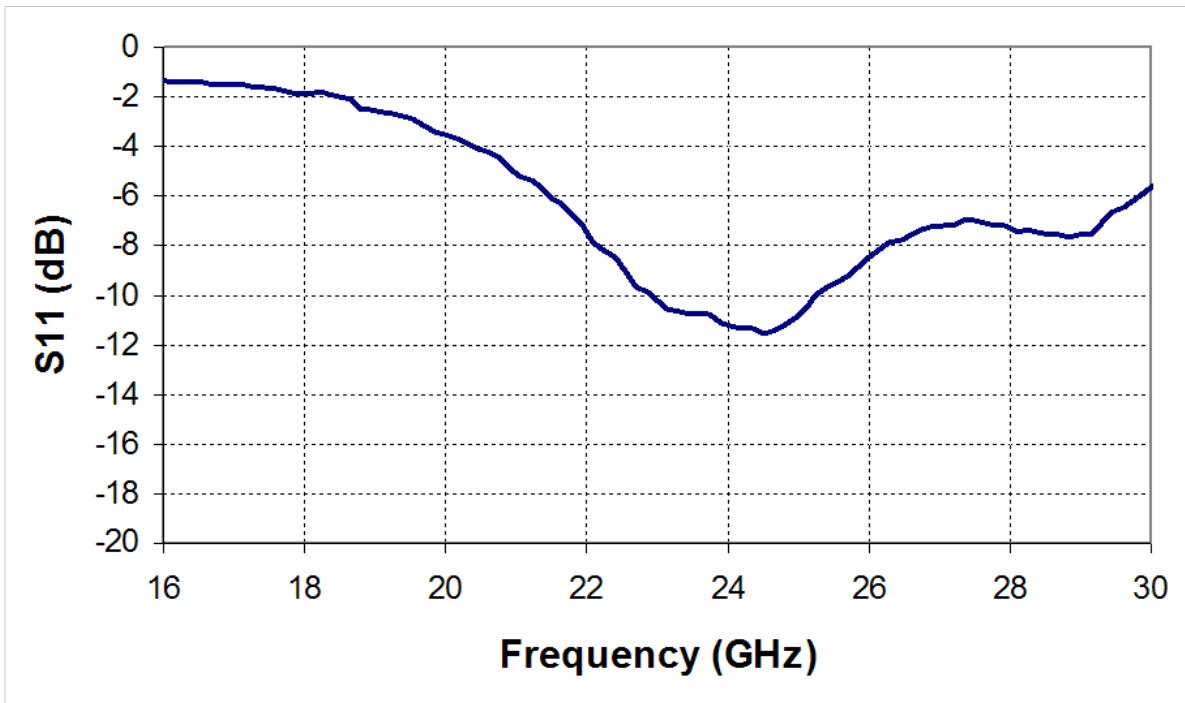
Measured Data

Bias Conditions: $V_d = 3.5\text{ V}$, $I_d = 60\text{ mA}$



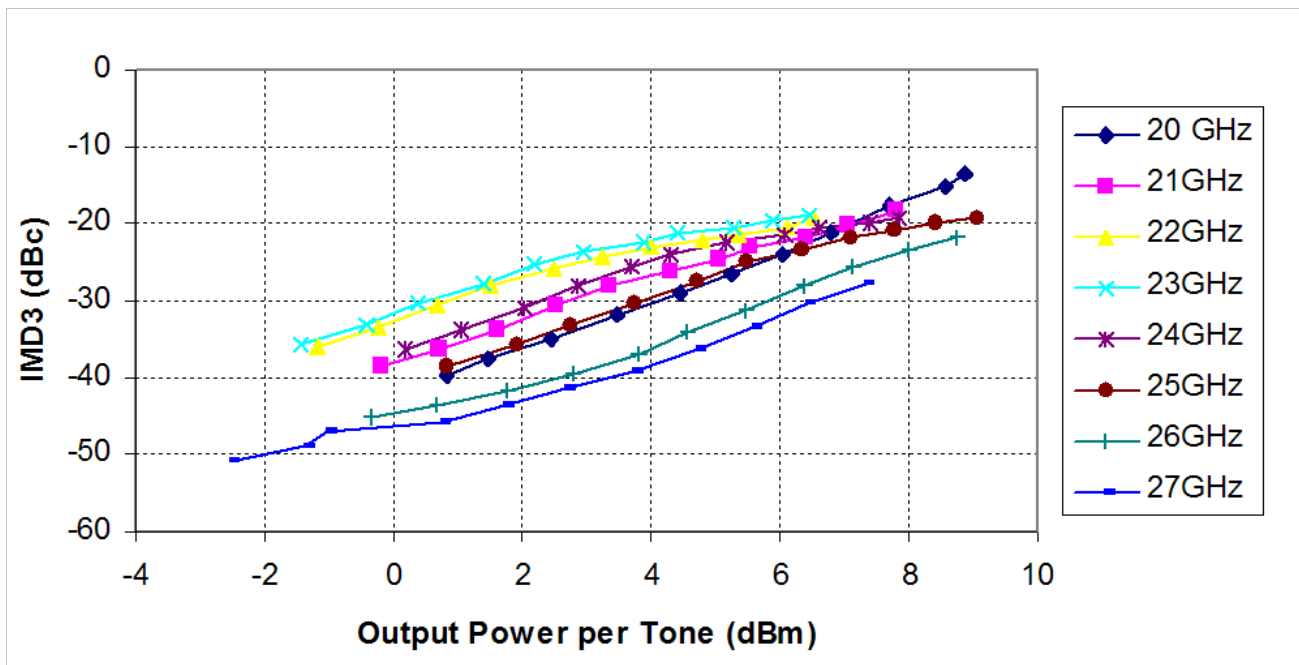
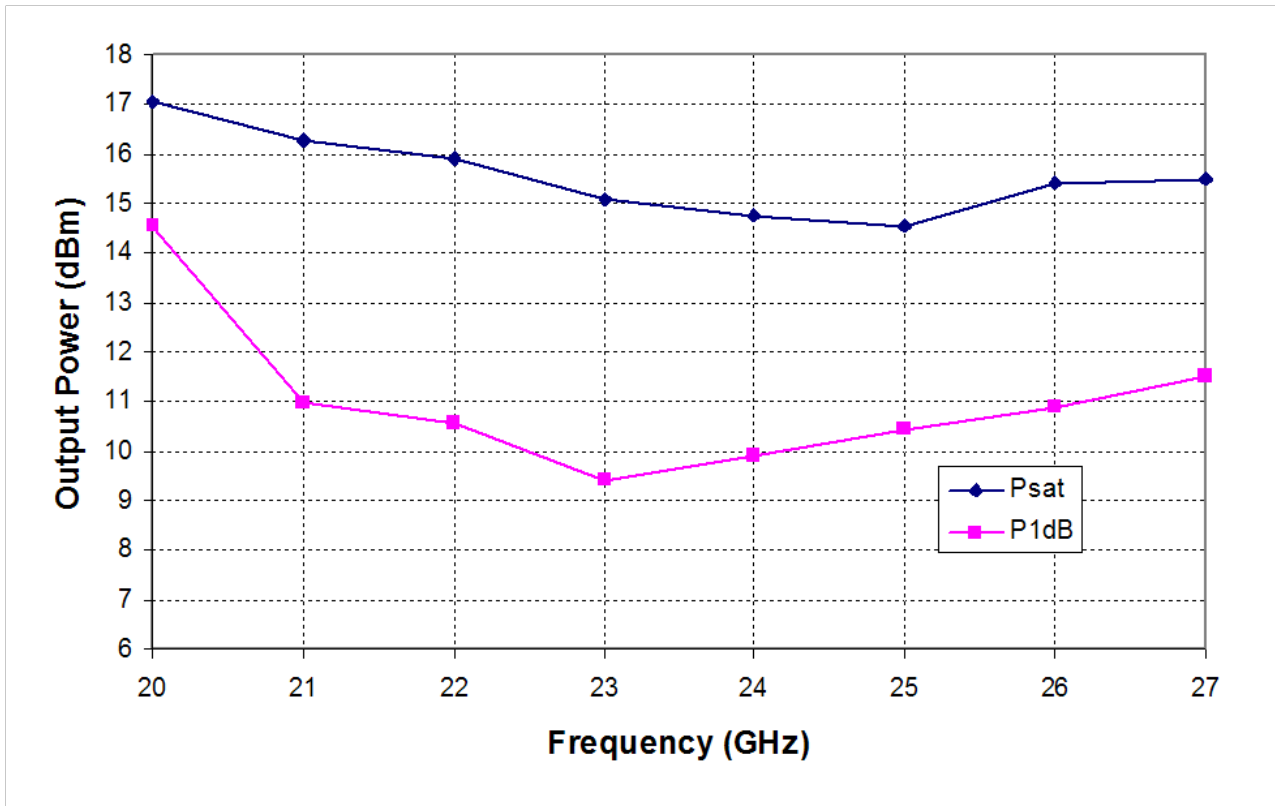
Measured Data

Bias Conditions: $V_d = 3.5\text{ V}$, $I_d = 60\text{ mA}$

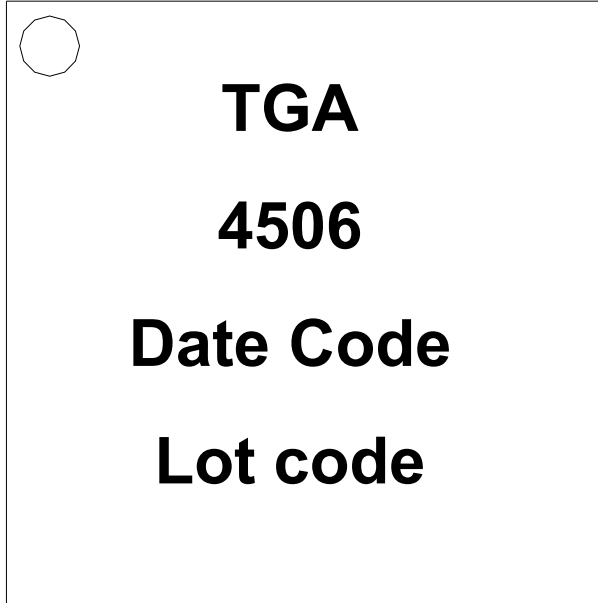


Measured Data

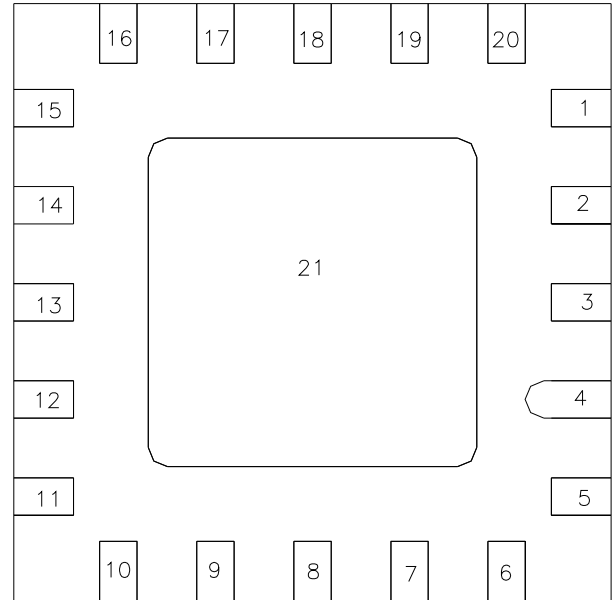
Bias Conditions: Vd = 3.5 V, Id =60 mA



Package Pinout Diagram



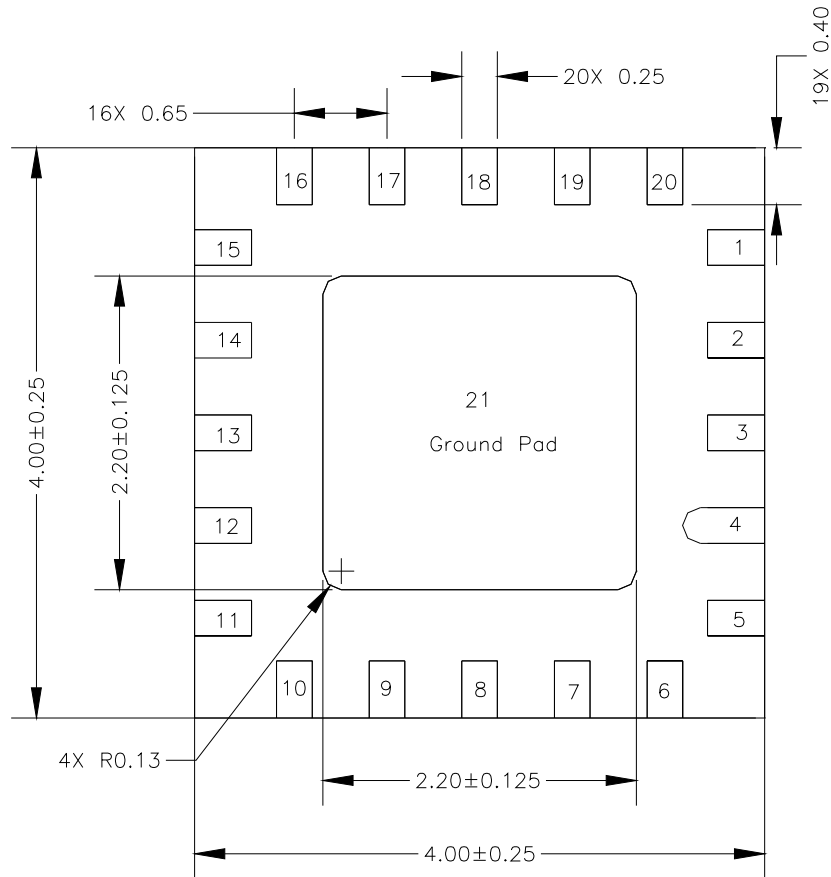
Top View
Dot indicates Pin 1



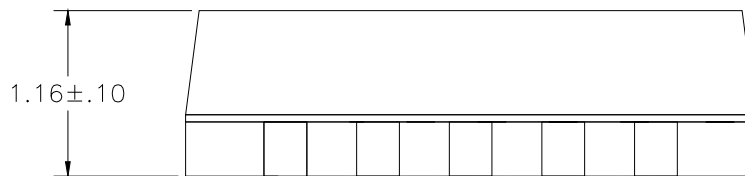
Bottom View

P i n	D e s c r i p t i o n
1, 5, 6, 10, 11, 15, 16, 20, 21	G N D
2, 4, 8, 9, 12, 14, 17, 18	N C
3	R F I n p u t
19	V g 1
13	R F O u t p u t
7	V d 1

Mechanical Drawing
(Bottom Side)



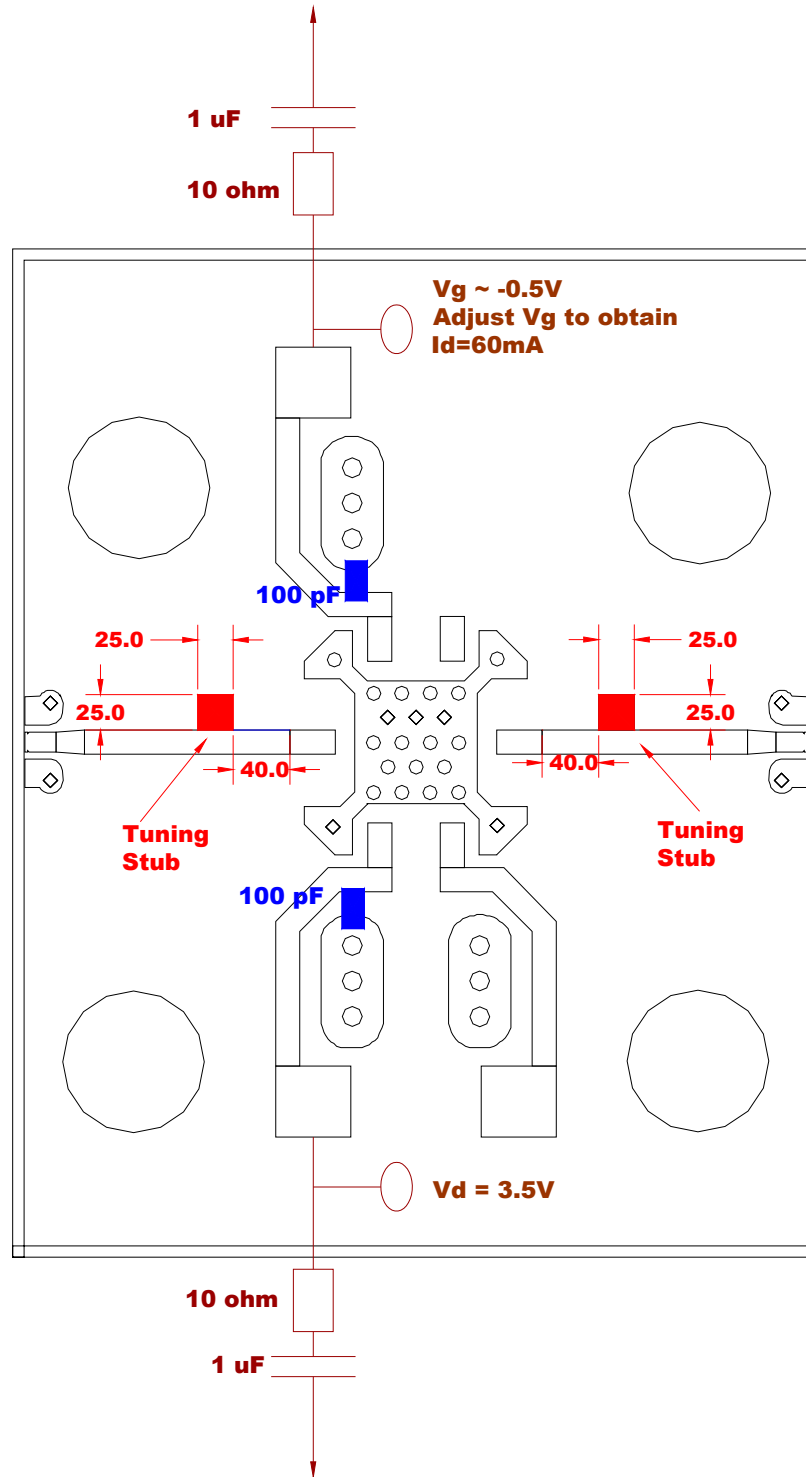
BOTTOM VIEW



SIDE VIEW

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

Recommended Board Layout Assembly



All measurements were made with the part soldered to 0.008 in thick RO4003

Recommended Surface Mount Package Assembly

Proper ESD precautions must be followed while handling packages.

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.

Solder attach process requires the use of no clean flux.

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
TGA4506-SM	QFN 4x4 Surface Mount