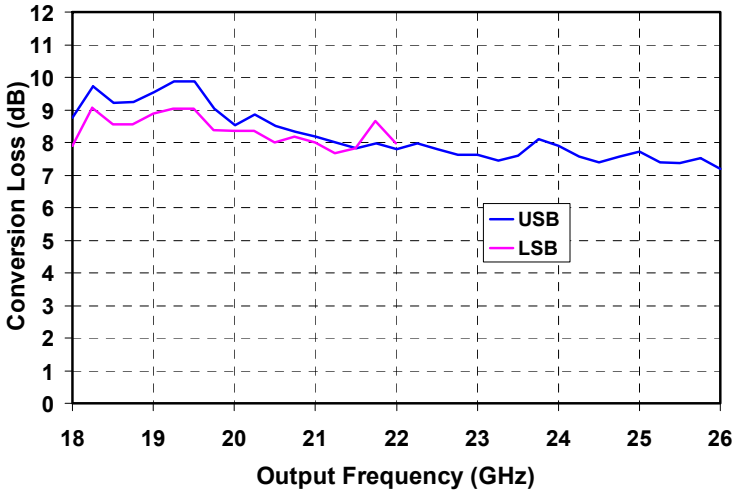
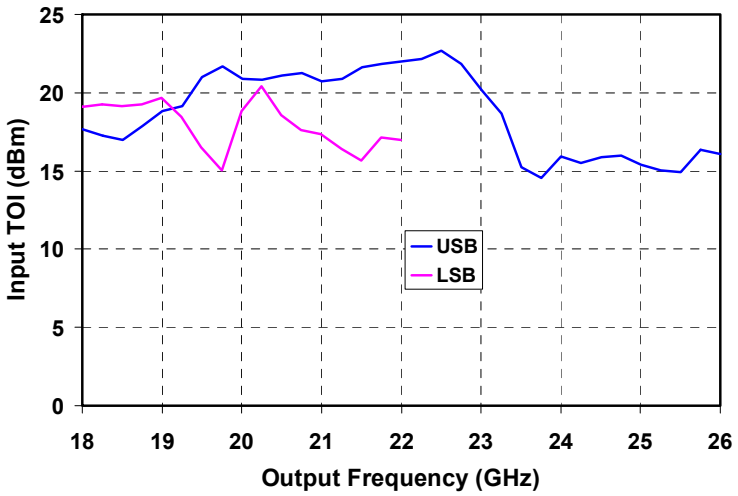
TGC4402-SM

18 – 26 GHz Packaged Upconverting Mixer

Measured Performance

Bias conditions: Vg = -0.9 V, LO Input @ 19 dBm, IF = 2GHz @ -5 dBm Typical





Key Features

- RF Output Frequency Range: 18 - 26 GHz
- IF Input Frequency Range: 0.5 – 3 GHz
- Conversion Loss: 9 dB
- Input TOI: 18 dBm
- LO Input Power: 19 dBm
- Bias: Vmxr = -0.9 V
- Package Dimensions: 4 x 4 x 0.9 mm

Primary Applications

- Point-to-Point Radio
- K Band Sat-Com

Product Description

The TGC4402-SM upconverting mixer is designed to support a variety of millimeter wave applications including point-to-point digital radio and K band Sat-Com.

The TGC4402-SM provides 9 dB nominal conversion loss across 18-26 GHz . Typical LO input drive is 19 dBm across the band. The input IF Frequency is 0.5 – 3 GHz.

The TGC4402-SM requires only 2 off-chip components. Each device is 100% DC and RF tested on-wafer to ensure performance compliance. The device is available in chip form.

The TGC4402-SM has a protective surface passivation layer providing environmental robustness.

Lead-free and RoHS compliant

Datasheet subject to change without notice.

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

Table I
Absolute Maximum Ratings 1/

Symbol	Parameter	Value	Notes
Vmxr	Gate Supply Voltage Range	-5 - 0 V	
Pin	LO Input Continuous Wave Power	25 dBm	

1/ These ratings represent the maximum operable values for this device. Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device and / or affect device lifetime. These are stress ratings only, and functional operation of the device at these conditions is not implied.

Table II
Recommended Operating Conditions

Symbol	Parameter	Value
Vmxr	Gate Voltage	-0.9 V

Table III
RF Characterization Table

Bias: Vmxr = -0.9 V, T_A= 25 °C ± 5°C

SYMBOL	PARAMETER	TEST CONDITIONS	NOMINAL	UNITS
F_{OUT}	RF Output Frequencies		18 - 26	GHz
F_{IF}	IF Input Frequency		0.5 - 3	GHz
F_{LO}	LO Input Frequency		16 - 26	GHz
P_{LO}	LO Input Power	f = 16 - 26 GHz	19	dBm
	Conversion Loss	f = 18 - 26 GHz	9	dB
ITOI	Input TOI	f = 18 - 26 GHz	18	dBm
	LO – RF Output Isolation	f = 16 - 26 GHz	40	dB
	Conversion Loss Temperature Coefficient	f = 16 - 26 GHz	-0.006	dB / °C

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Table IV
Power Dissipation and Thermal Properties

Parameter	Test Conditions	Value	Notes
Maximum Power Dissipation	Tbaseplate = 70 ºC	Pd = 0.45 W Tchannel = 138 ºC Tm = 1.0E+6 Hrs	1/ 2/
Thermal Resistance, θjc	LO input power is 17 dBm	θjc = 76 (ºC/W) Tchannel = 121 ºC Tm = >1E+6 Hrs	
Mounting Temperature	30 seconds	320 ºC Max	
Storage Temperature		-65 to 150 ºC	

1/ For a median life, Tm, of 1E+6 hours, power dissipation is limited to

Pd(max) = (TBD ºC – Tbase ºC)/θjc.

2/ Channel operating temperature will directly affect the device median time to failure (MTTF). For maximum life, it is recommended that channel temperatures be maintained at the lowest possible levels.

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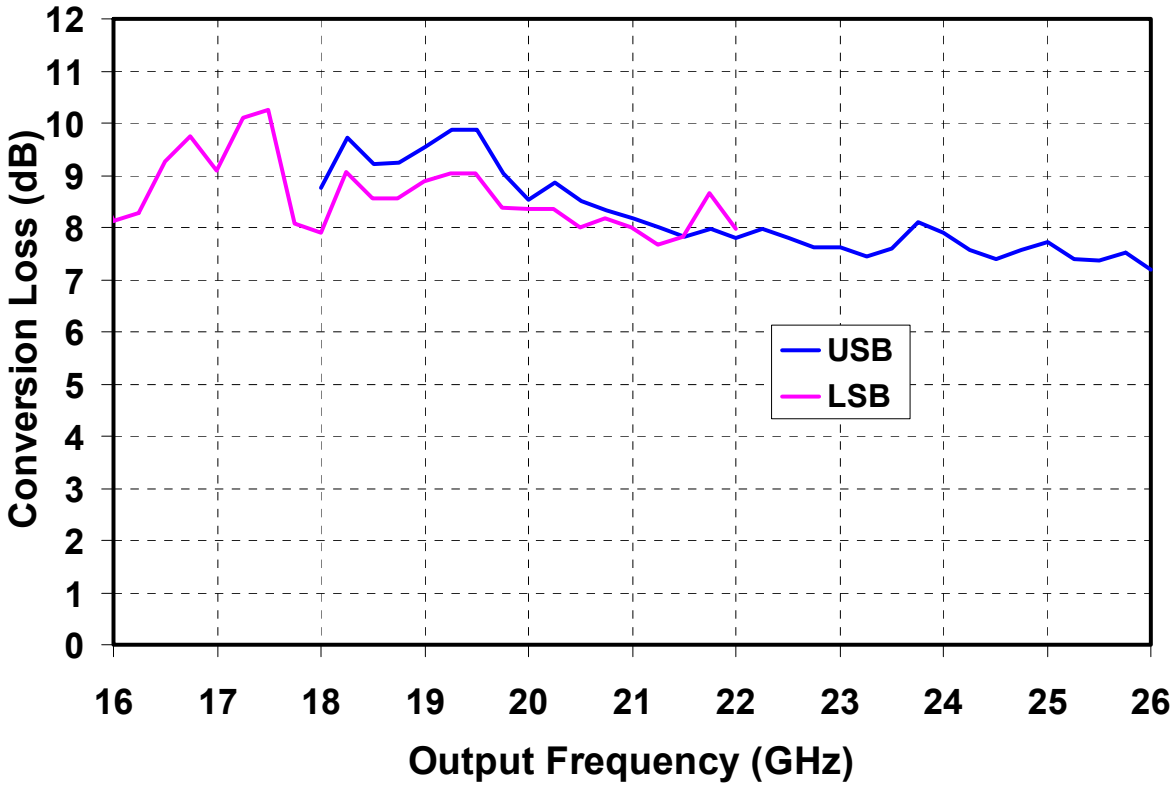
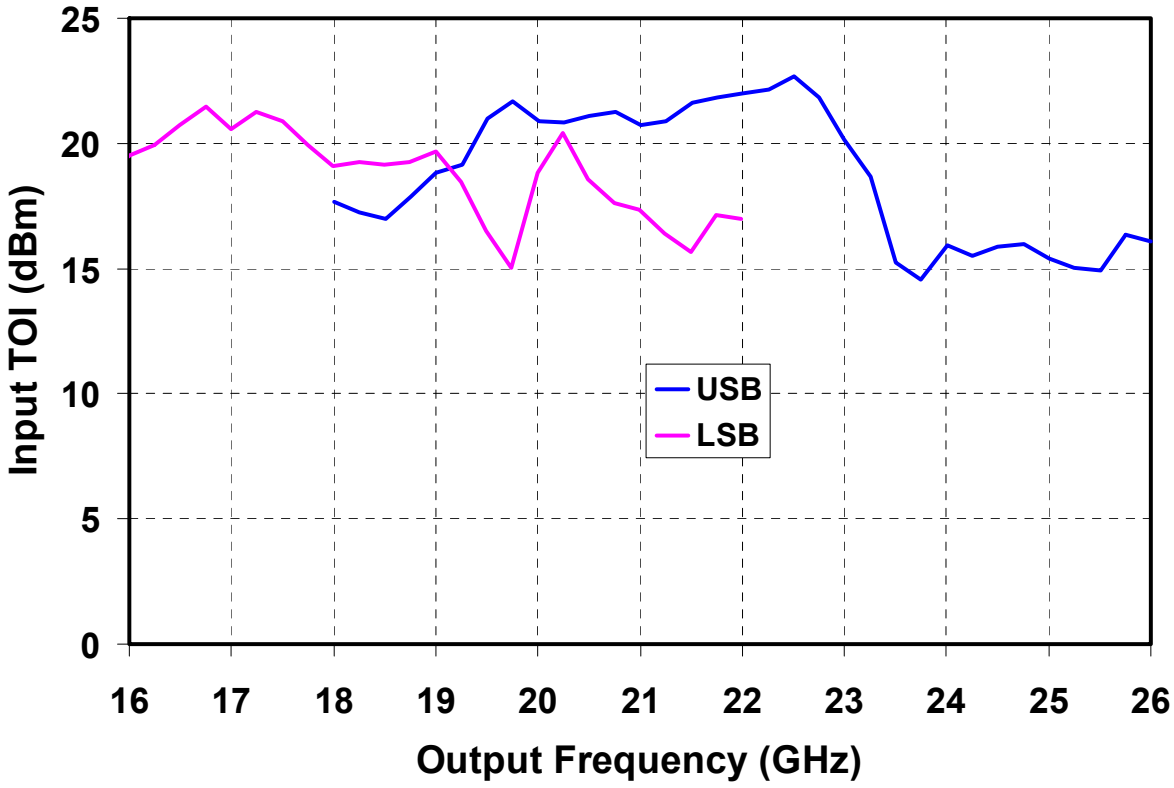
Measured Data

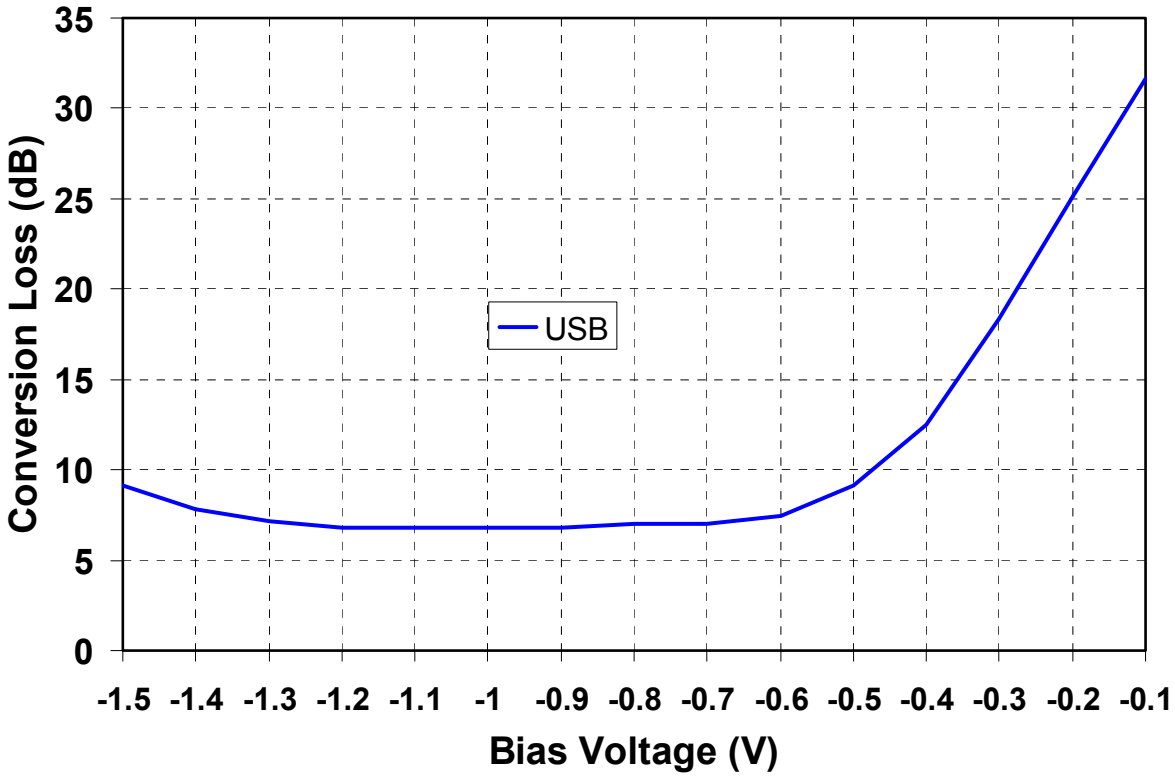
Bias conditions: Vg = -0.9 V, LO Input @ + 19 dBm, IF = 2 GHz @ -5 dBm Typical

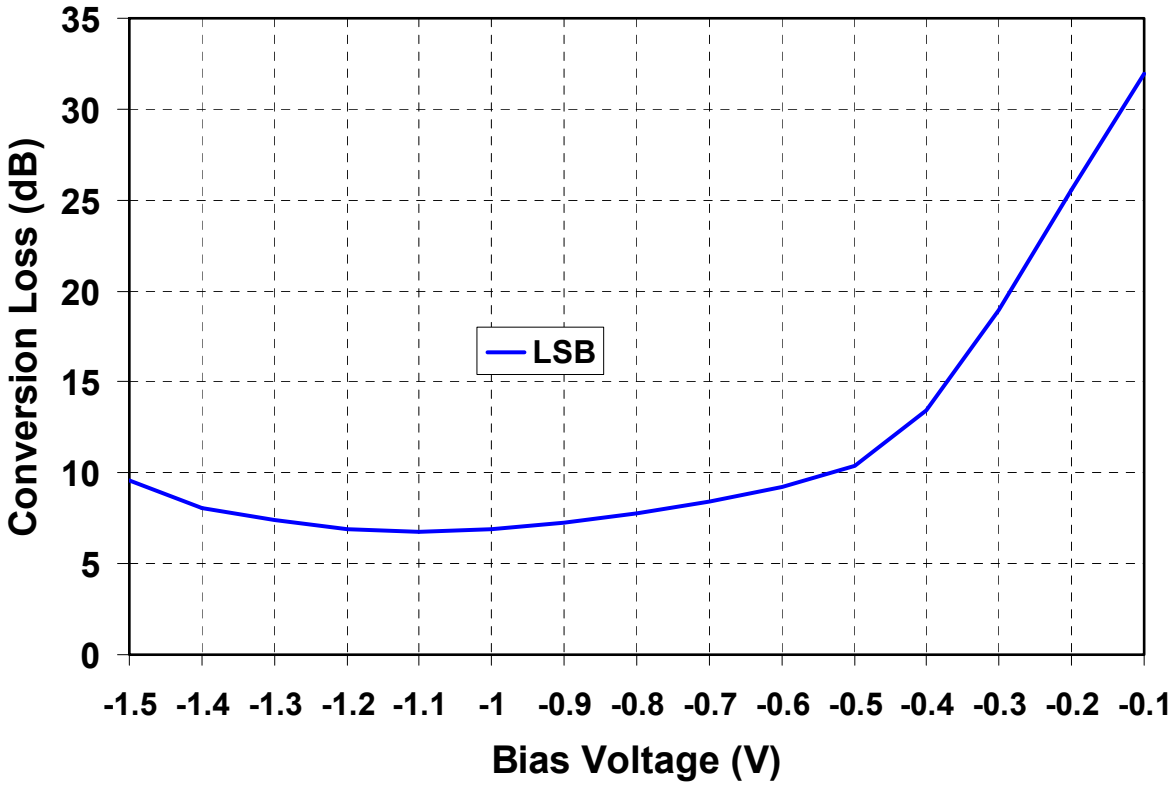




Measured Data

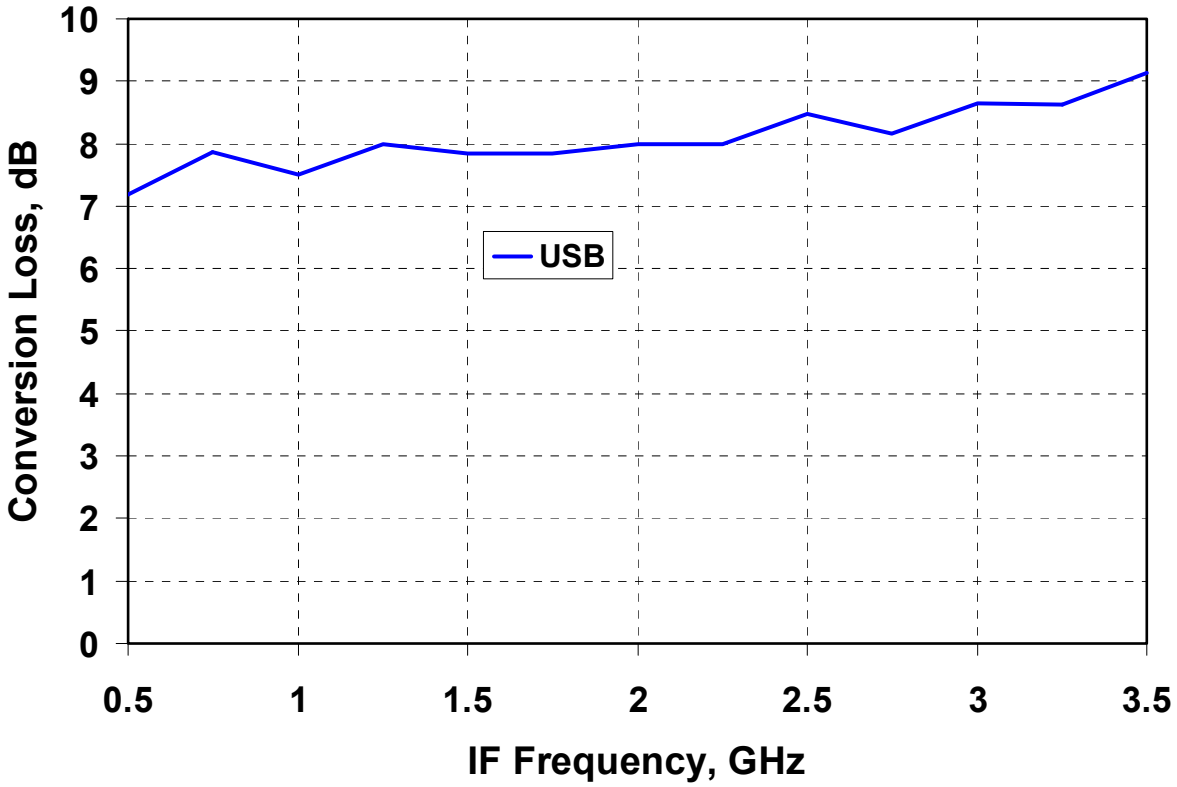
Bias conditions: Vg = -0.9 V, LO Input @ 20 GHz @ 19 dBm, IF = -5 dBm Typical

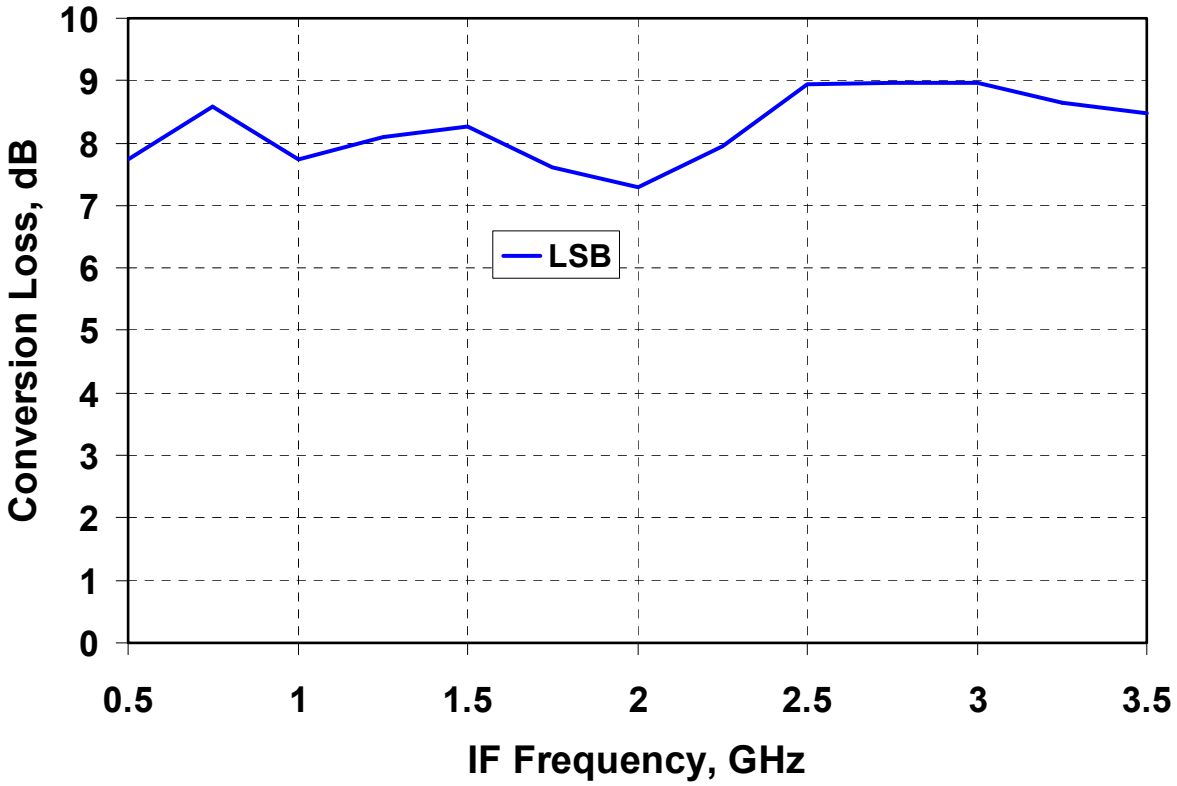




Measured Data

Bias conditions: Vg = -0.9 V, LO Input = 19 dBm, LO Freq = 20 GHz





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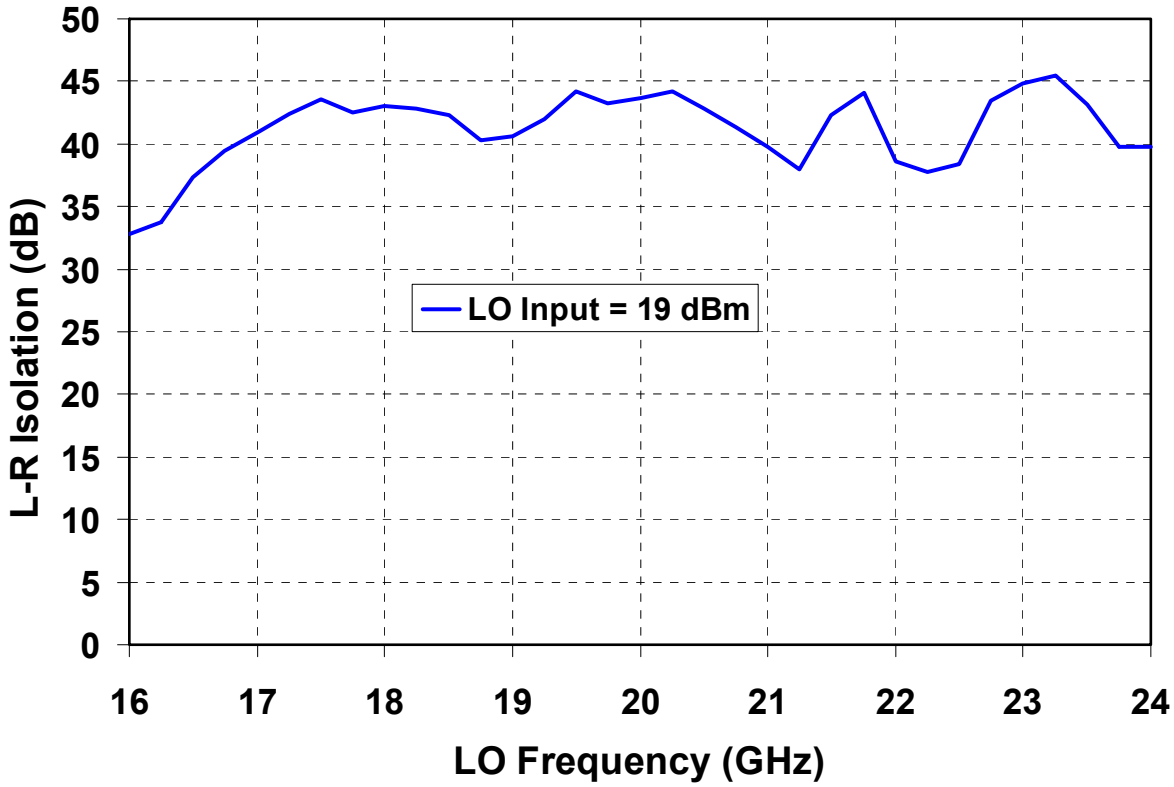
Measured Data

Bias conditions: Vg = -0.9 V, IF = 2 GHz @ -5 dBm Typical



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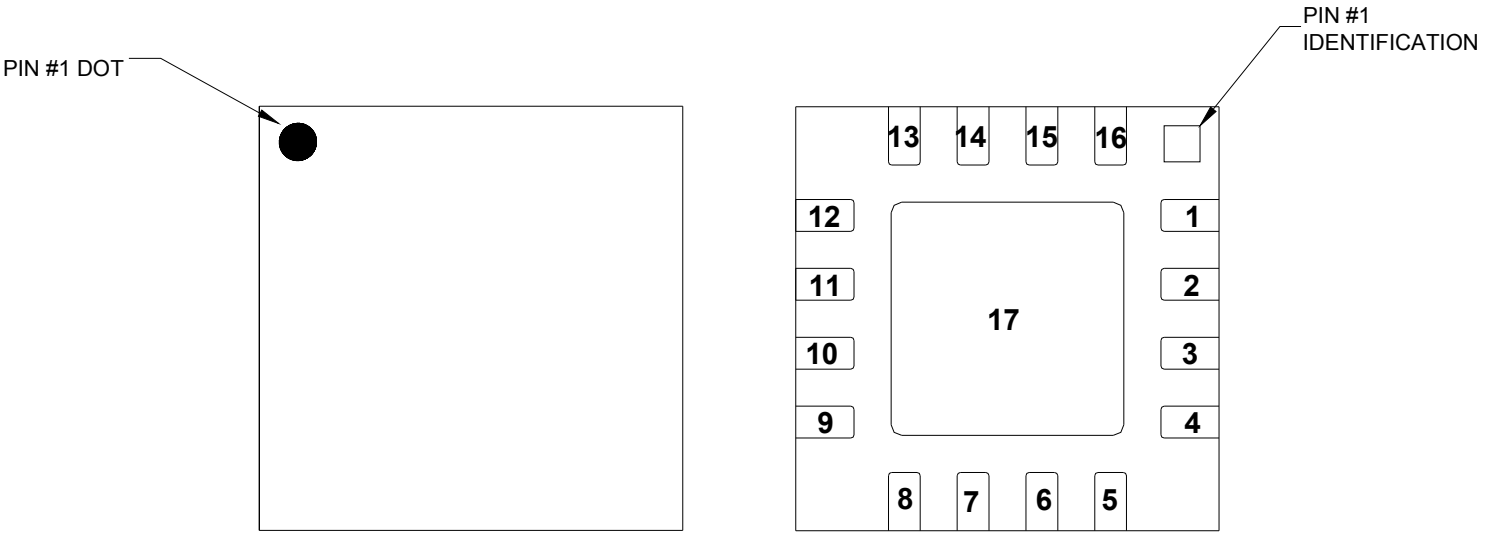
Package Pinout

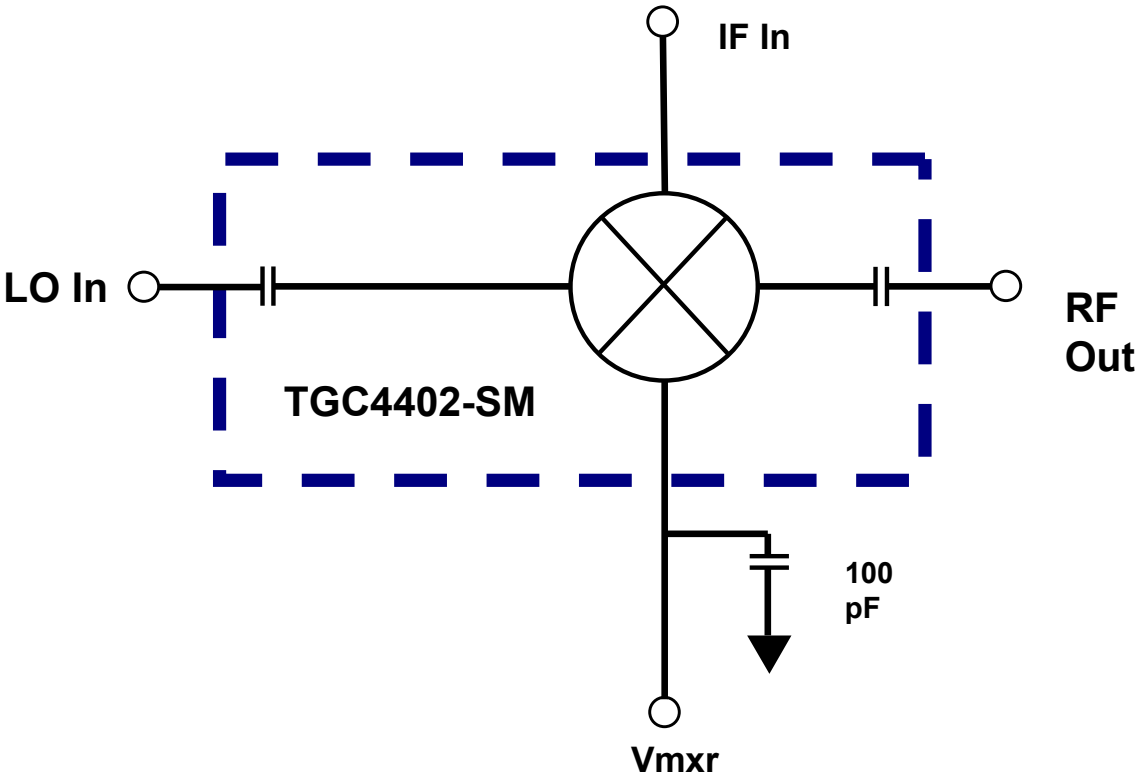


TOP VIEW

BOTTOM VIEW

Pin	Description
1, 3, 4, 6, 8, 9, 10, 11, 12, 14, 16	N/C
2	IF Input
5, 13	Vmxr
7	LO Input
15	RF Out
17	GND

Electrical Schematic



Bias Procedures

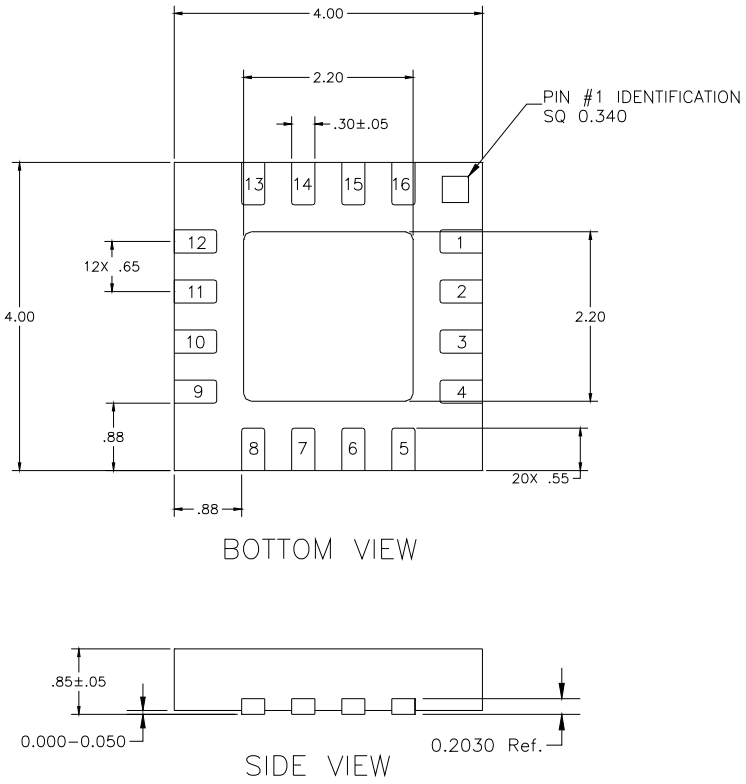
Bias-up Procedure

- Vmxr set to -0.9 V
- Apply signal to IF input
- Apply signal to LO input

Bias-down Procedure

- Turn off IF and LO signals
- Set Vmxr to 0 V

Mechanical Drawing



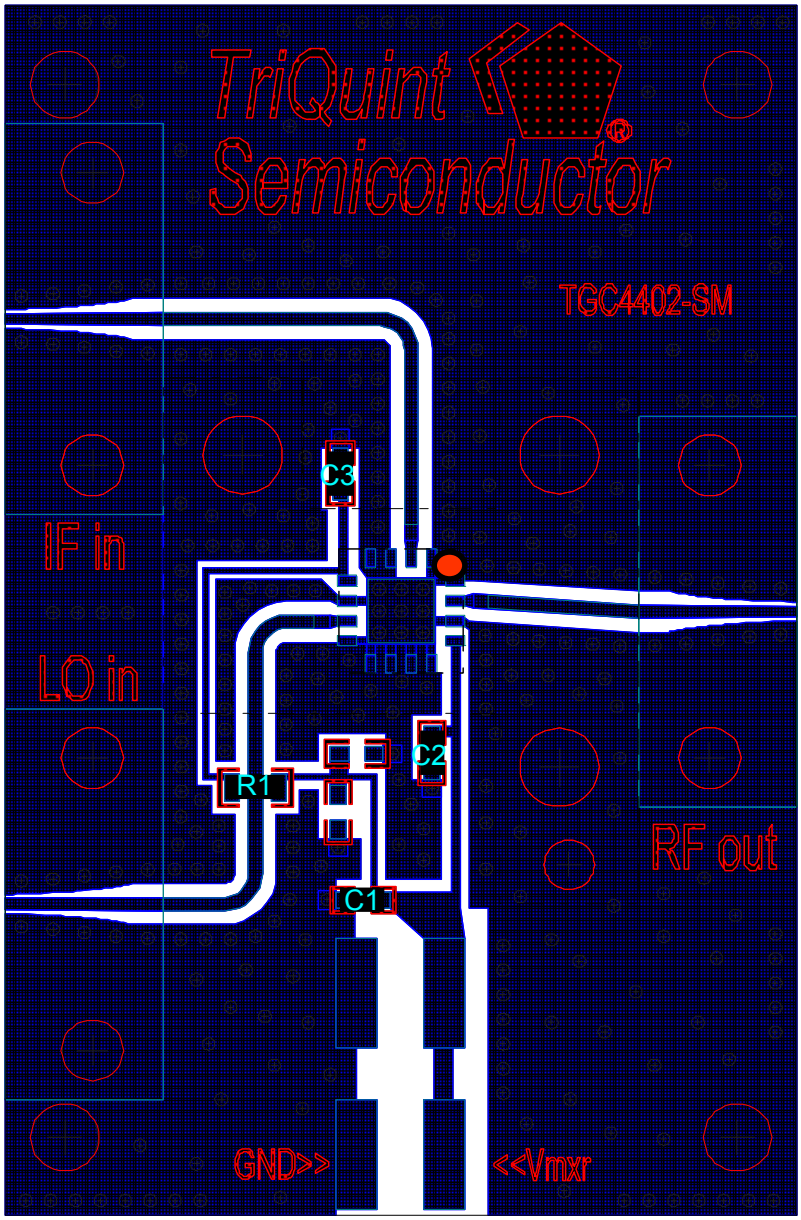
Units: millimeters

Thickness: 0.85

Pkg x,y size tolerance: +/- 0.050

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

Recommended Assembly Diagram



Part	Description
C1 (optional)	1 uF Capacitor (0402)
C2, C3	100 pF Capacitor (0402)
R1	0 ohm Resistor (0603)

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Assembly Notes

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
TGC4402-SM	QFN 4x4 Surface Mount

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