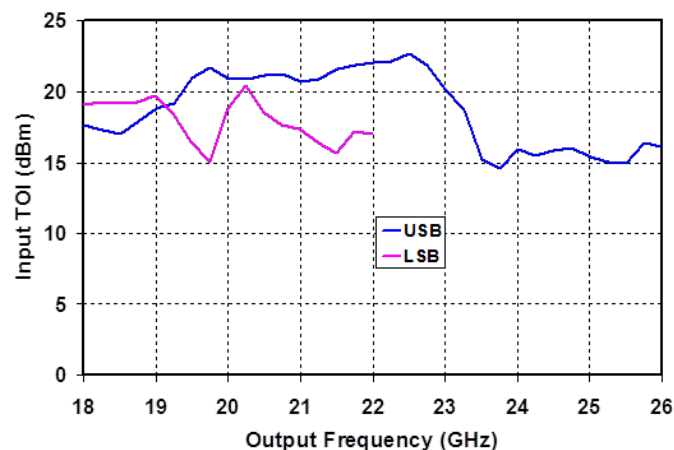
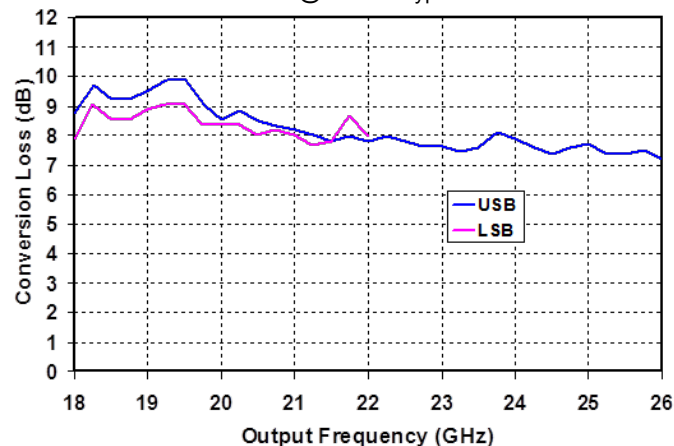


## 18 – 26 GHz Packaged Upconverting Mixer



### Measured Performance

Bias conditions:  $V_g = -0.9$  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:  $V_{mxr} = -0.9$  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.*

**Table I**  
**Absolute Maximum Ratings 1/**

Symbol	Parameter	Value	Notes
V <sub>mxr</sub>	Gate Supply Voltage Range	-5 - 0 V	
P <sub>in</sub>	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
V <sub>mxr</sub>	Gate Voltage	-0.9 V

**Table III**  
**RF Characterization Table**

Bias: V<sub>mxr</sub> = -0.9 V, T<sub>A</sub> = 25 °C ± 5°C

SYMBOL	PARAMETER	TEST CONDITIONS	NOMINAL	UNITS
F <sub>OUT</sub>	RF Output Frequencies		18 - 26	GHz
F <sub>IF</sub>	IF Input Frequency		0.5 - 3	GHz
F <sub>LO</sub>	LO Input Frequency		16 - 26	GHz
P <sub>LO</sub>	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

**Table IV**  
**Power Dissipation and Thermal Properties**

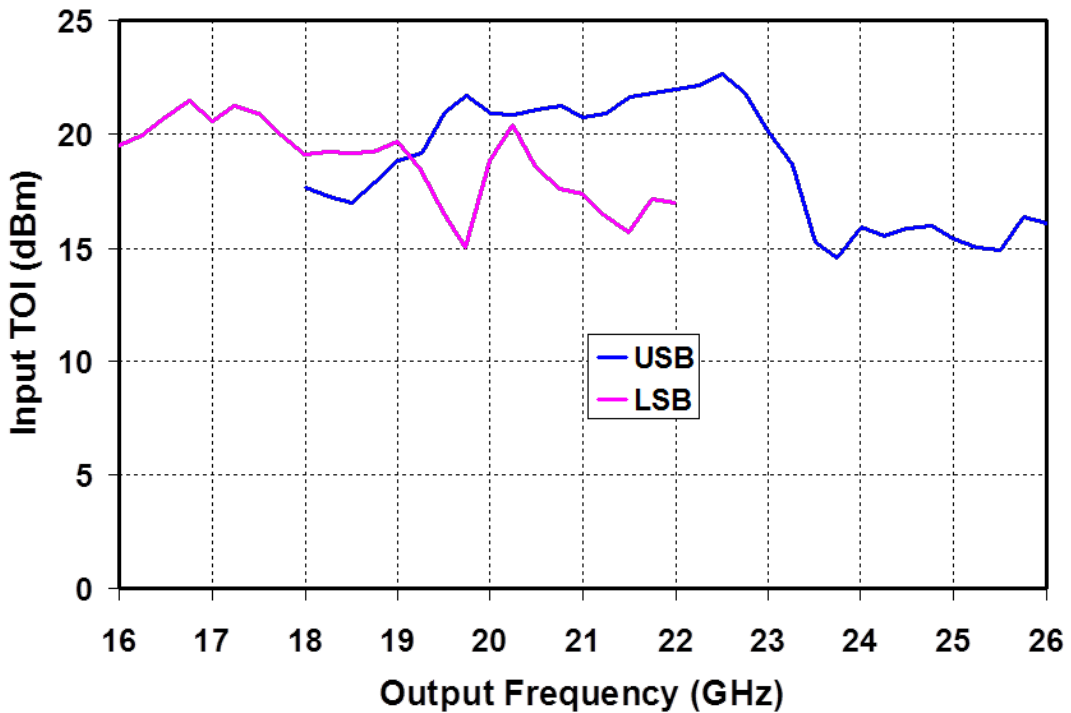
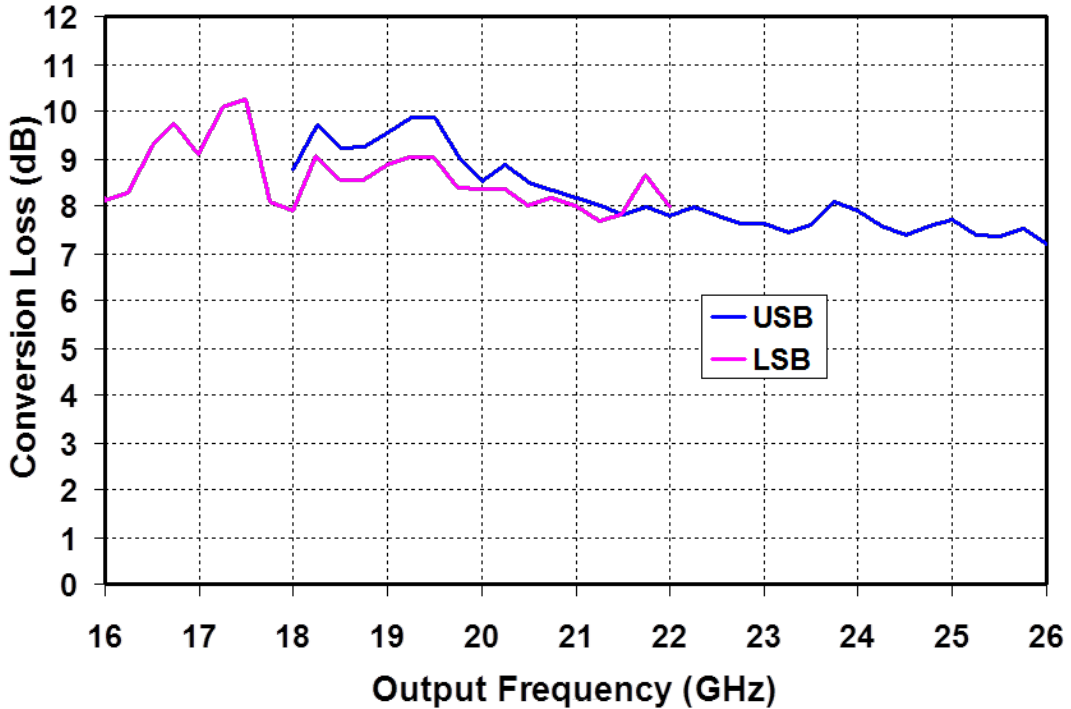
Parameter	Test Conditions	Value	Notes
Maximum Power Dissipation	Tbaseplate = 70 °C	Pd = 0.45 W Tchannel = 138 °C Tm = 1.0E+6 Hrs	1/ 2/
Thermal Resistance, $\theta_{jc}$	LO input power is 17 dBm	$\theta_{jc}$ = 76 (°C/W) Tchannel = 121 °C Tm = >1E+6 Hrs	
Mounting Temperature	30 seconds	320 °C Max	
Storage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

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

$$Pd(max) = (TBD\text{ }^{\circ}C - Tbase\text{ }^{\circ}C)/\theta_{jc}.$$
- 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.

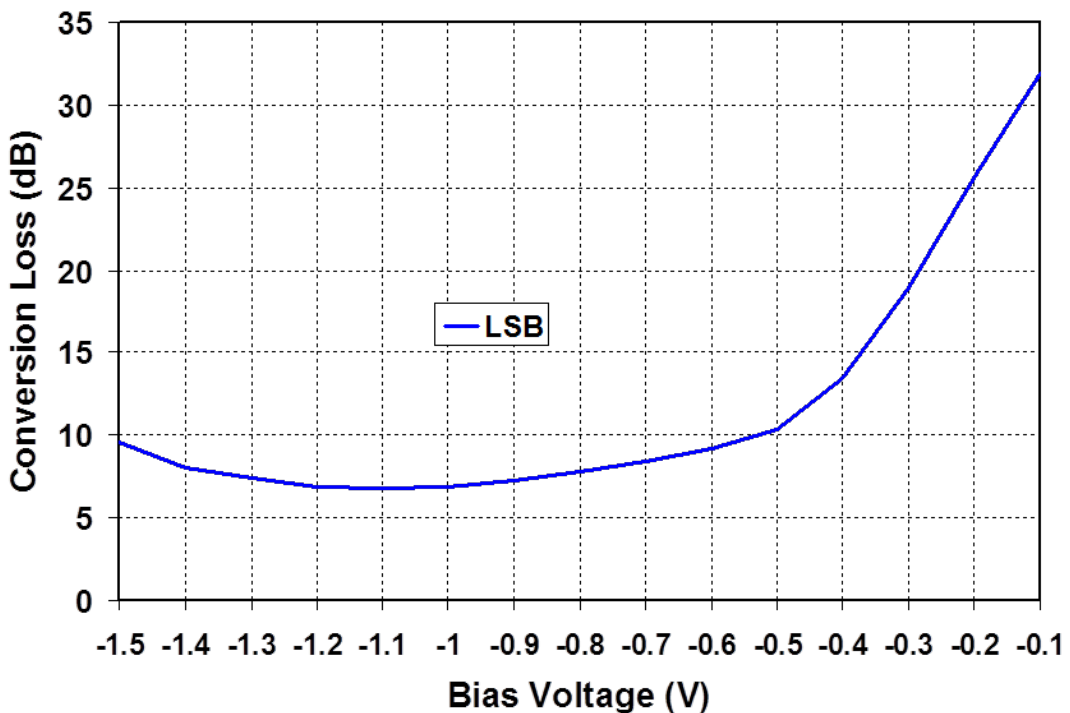
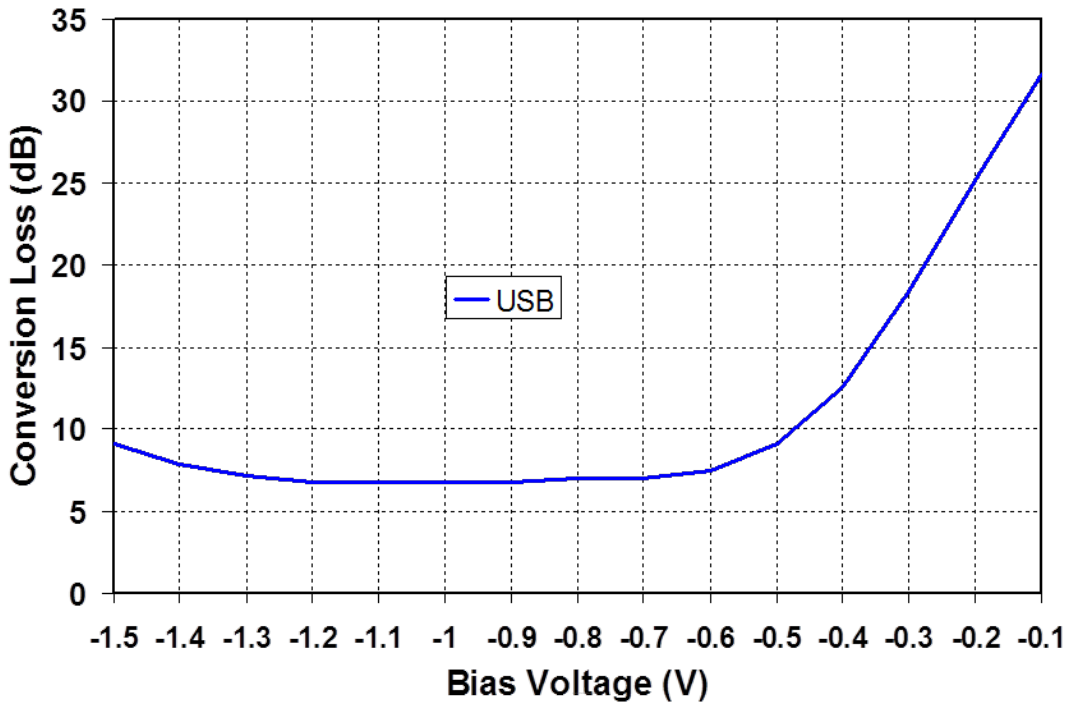
**Measured Data**

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



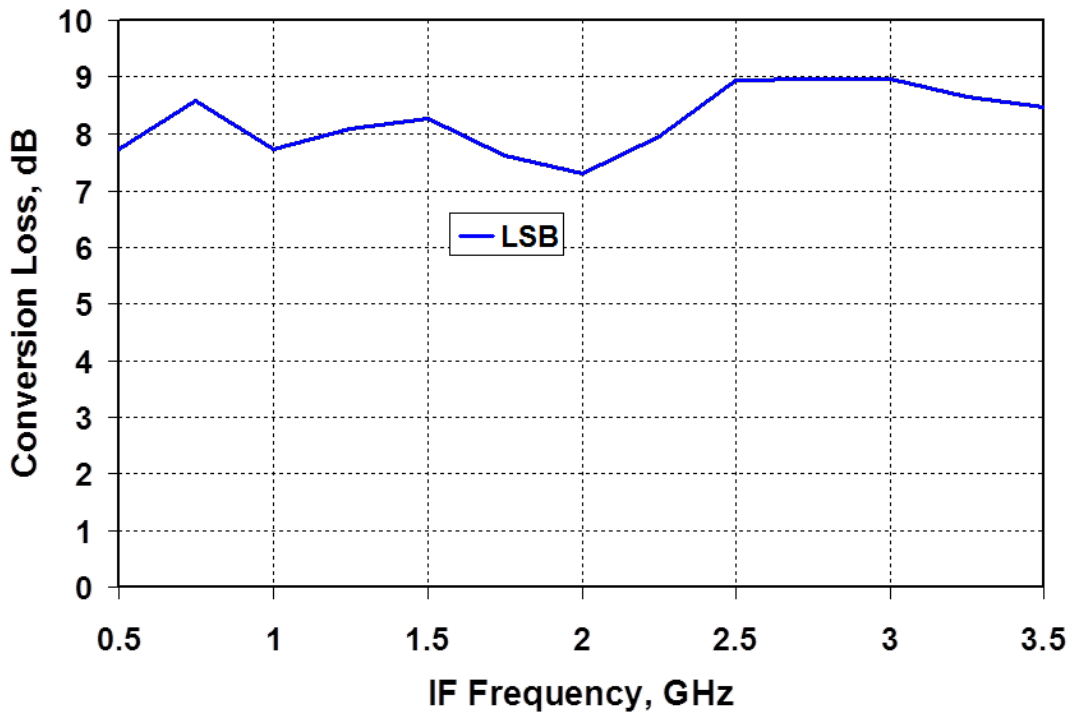
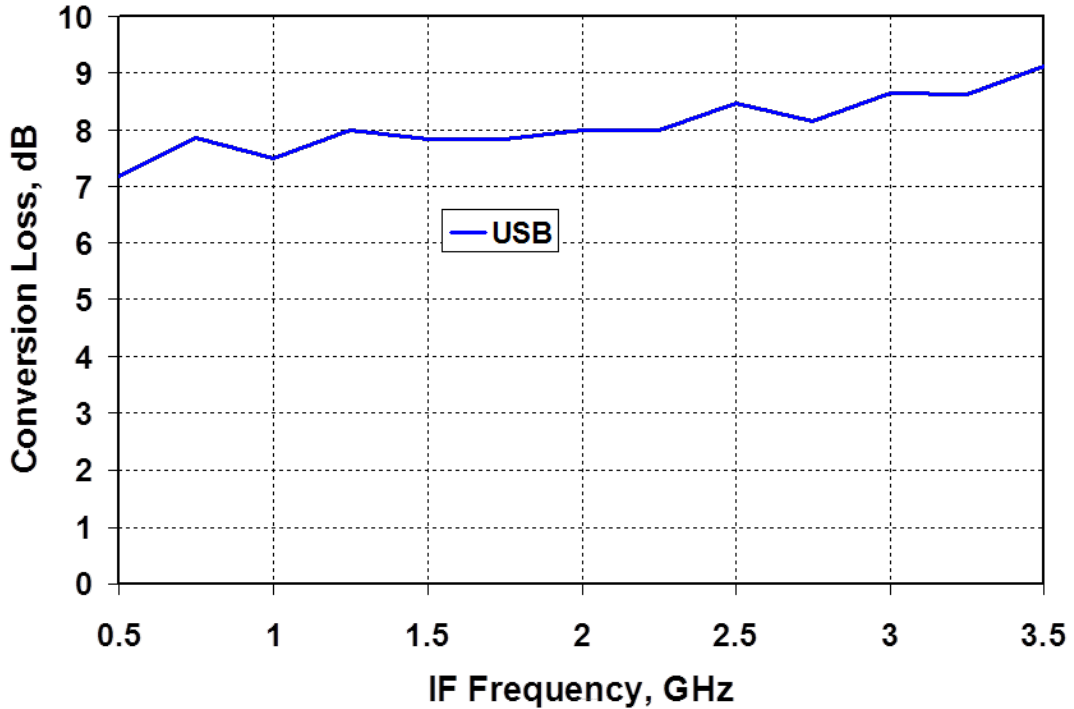
**Measured Data**

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



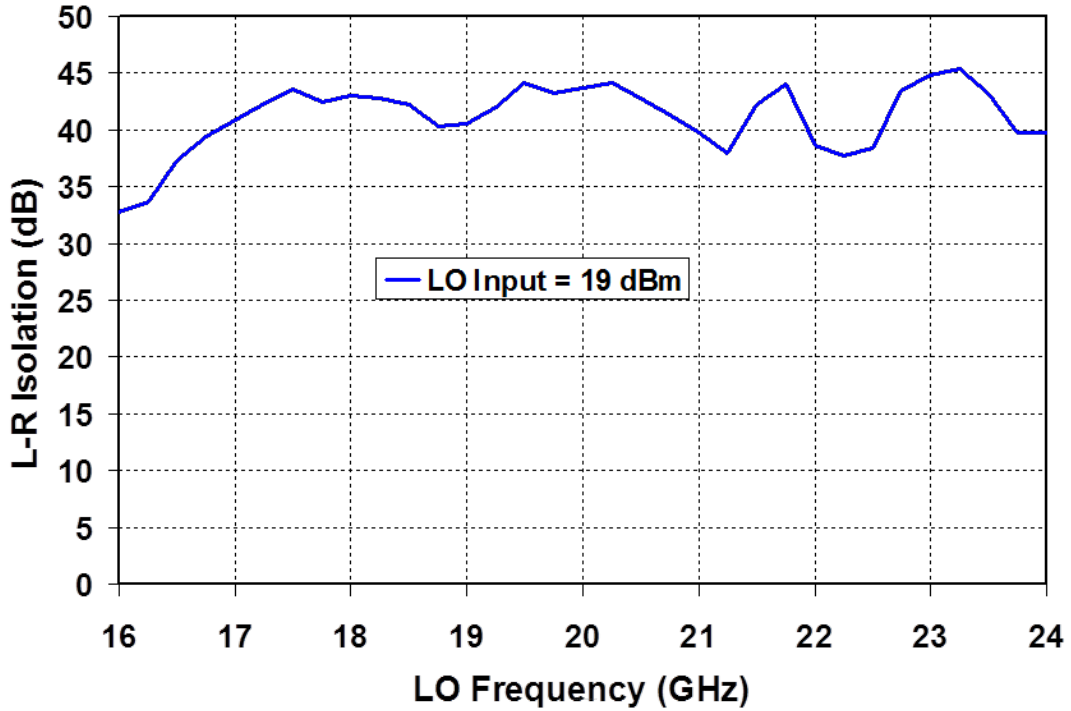
**Measured Data**

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

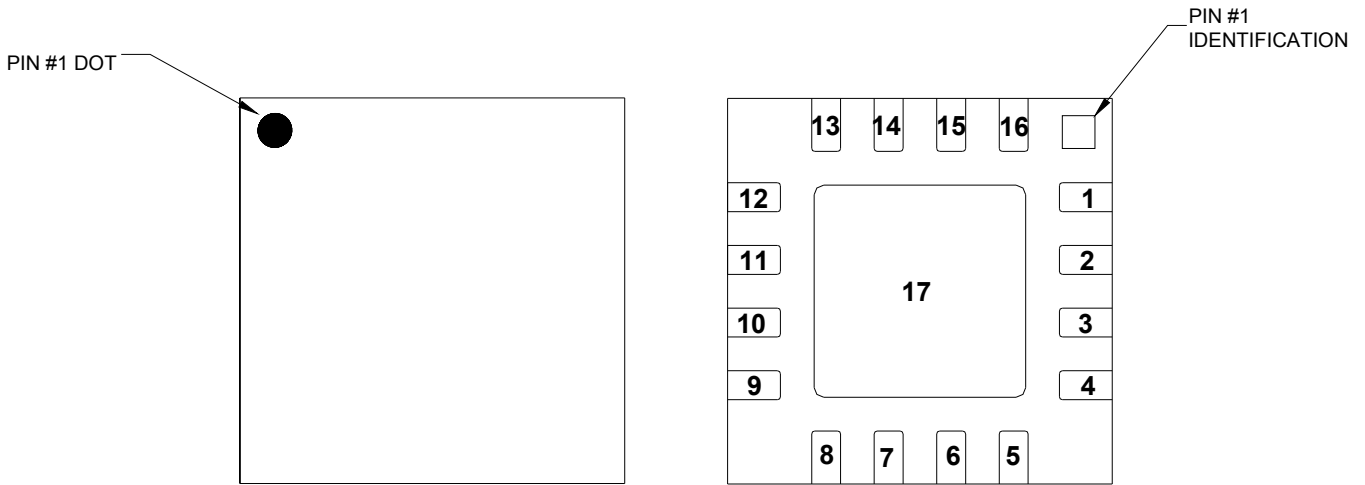


**Measured Data**

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



**Package Pinout**



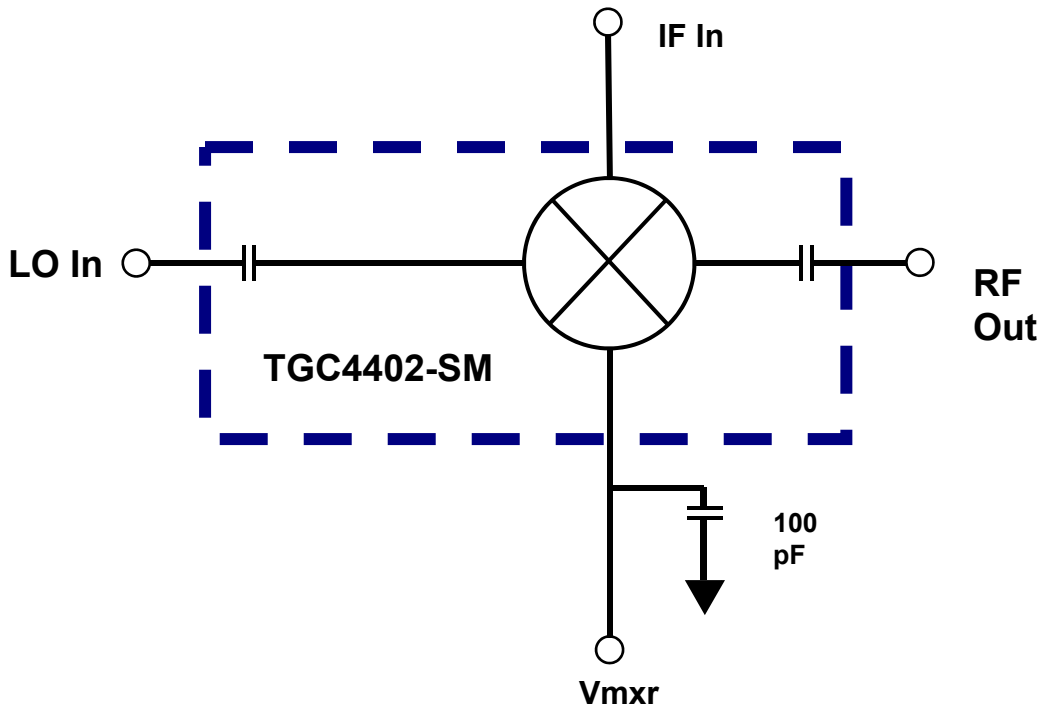
TOP VIEW

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



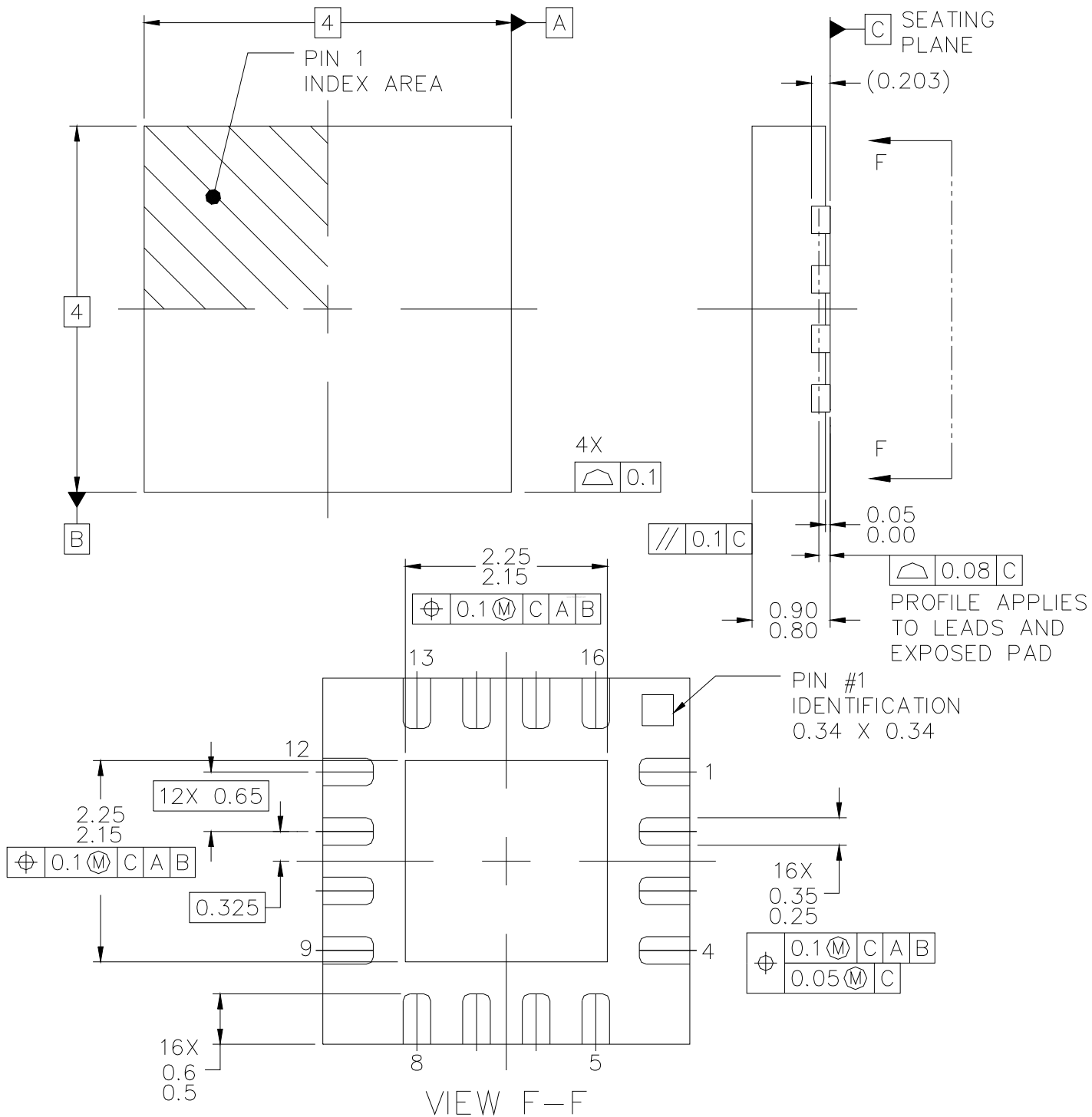
## Bias Procedures

### Bias-up Procedure

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

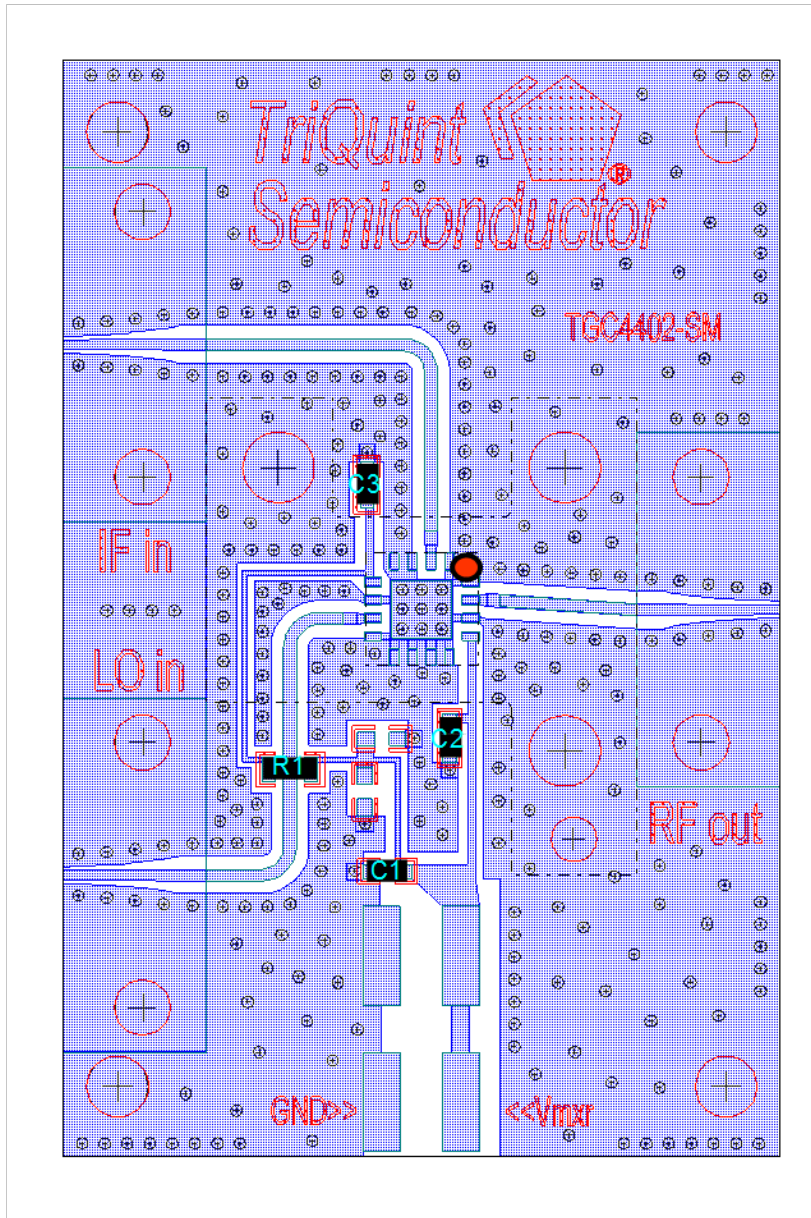
### Bias-down Procedure

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



**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)

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

## 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

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