

## Applications

- Point to Point Radio / VSAT
- Millimeter-wave Communications
- Test Equipment



32-pin 5x5mm package

## Product Features

- Frequency range: 10.7 – 11.5 GHz
- Tune Voltage: 2 – 13 V
- Output power: 10 dBm Typical
- Phase Noise: -111 dBc/Hz@100 KHz Typical  
     -135 dBc/Hz@1 MHz Typical
- RFout/2 Frequency Range: 5.35 – 5.75 GHz
- RFout/2 Output Power: 9 dBm Typical
- Bias: Vcc = 5V, Icc = 185 mA Typical
- Technology: TriQuint HBT
- Dimension: 5 x 5 x 0.85 mm

## General Description

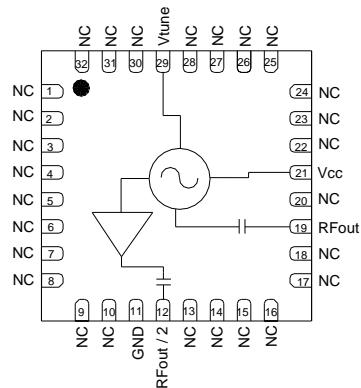
The TriQuint TGV2539-SM is a monolithic voltage controlled oscillator (VCO) designed to operate at frequencies that target the Point to Point, VSAT, and millimeter-wave communication markets.

The TGV2539-SM is manufactured on TriQuint's GaAs InGaP production process and typically provides 10 dBm output power at 11 GHz with a -111dBc/Hz phase noise at 100 KHz offset. A divide-by-2 output is provided for the PLL function.

Lead-free and RoHS compliant.

Evaluation Boards are available upon request.

## Functional Block Diagram



## Pin Configuration

Pin #	Function Label
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 14, 15, 16, 17, 18, 20, 22, 23, 24, 25, 26, 27, 28, 30, 31, 32	NC
11	GND
12	RFout/2
19	RFout
21	Vcc
29	Vtune

## Ordering Information

Part No.	ECCN	Description
TGV2539-SM	EAR99	10.7 – 11.5 GHz VCO with Divide by 2

Standard T/R size = 500 pieces on a 7.0" reel.

## Specifications

### Absolute Maximum Ratings

Parameter	Rating
Supply Voltage, Vcc	+5.5V
Tuning Voltage, Vtune	+14V
Power Dissipation, Pdiss	1.2W
Junction Temperature	200°C
Storage Temperature	-65 to 125°C

Operation of this device outside the parameter ranges given above may cause permanent damage.

### Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
Operating Temp. Range	-40	+25	+85	°C
Supply Voltage, Vcc	4.8	5.0	5.2	V
Supply Current, Icc		185		mA
Tuning Voltage, Vtune	1.5		13	V

Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

### Electrical Specifications

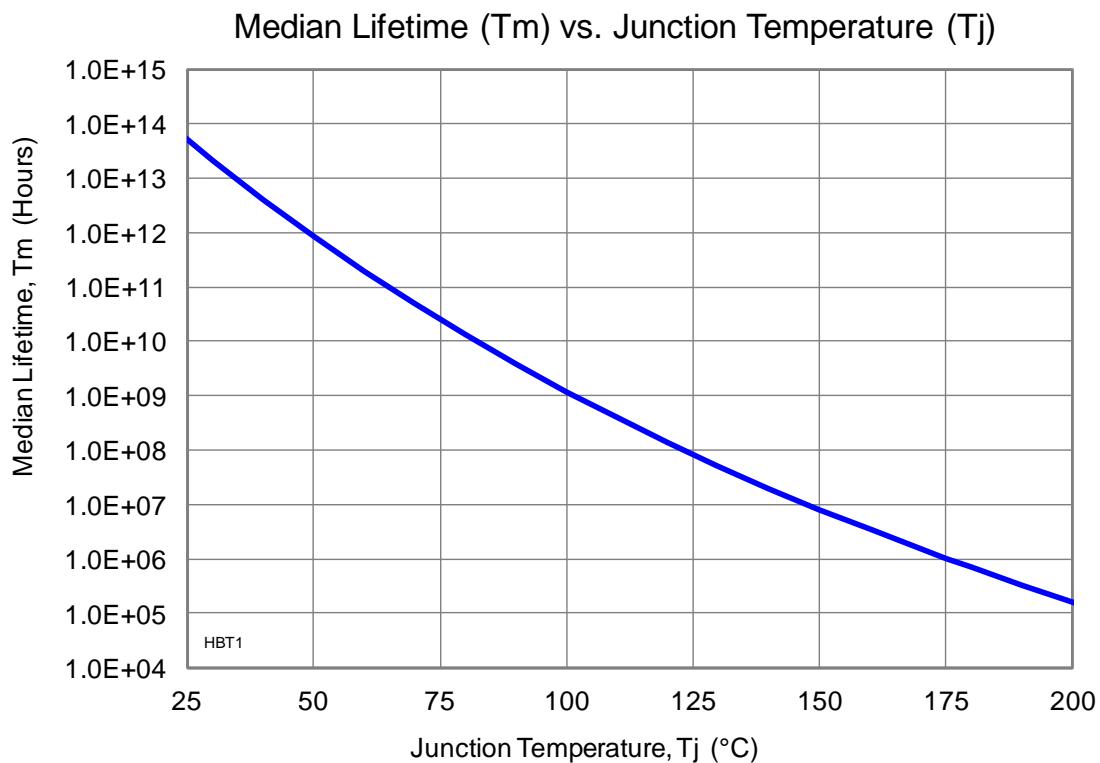
Test conditions unless otherwise noted: Temp = +25 °C, Vcc = 5 V, Icc = 185mA

Parameter	Conditions	Min	Typ	Max	Units
Operational Frequency		10.7		11.5	GHz
RFout/2 Output Frequency		5.35		5.75	GHz
Supply Voltage, Vcc			5		V
Supply Current, Icc			185		mA
Output Power			10		dBm
RFout/2 Output Power			9		dBm
Tuning Sensitivity	Vtune = 5V		155		MHz/V
Output Return Loss			7		dB
RFout/2 Output Return Loss			8		dB
Tuning Voltage		1.5		13	V
Pushing	Vtune = 5V		5		MHz/V
Pulling	VSWR 2:1		5		MHz (p-p)
Harmonics					
Freq/2			22		
3*Freq/2			29		
2*Freq			16		
dBc					
Phase Noise @ 10KHz Offset	Vtune = 5V		-83		dBc/Hz
Phase Noise @ 100KHz Offset	Vtune = 5V		-111		dBc/Hz
Phase Noise @ 1MHz Offset	Vtune = 5V		-135		dBc/Hz
Frequency Drift Rate			-1		MHz/°C
Vtune Leakage	Vtune = 13V			8	µA

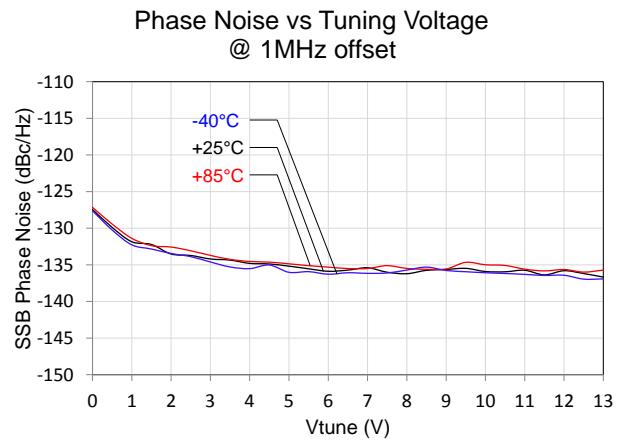
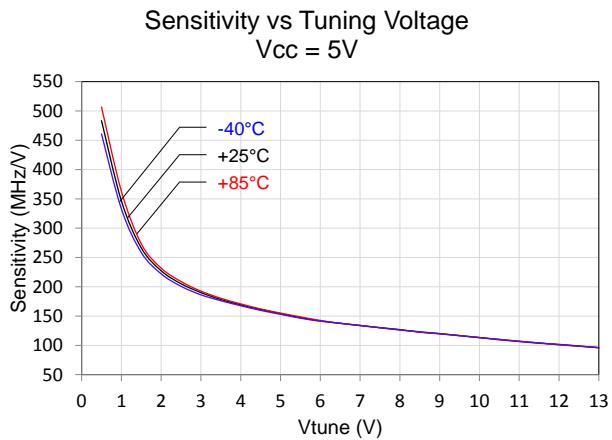
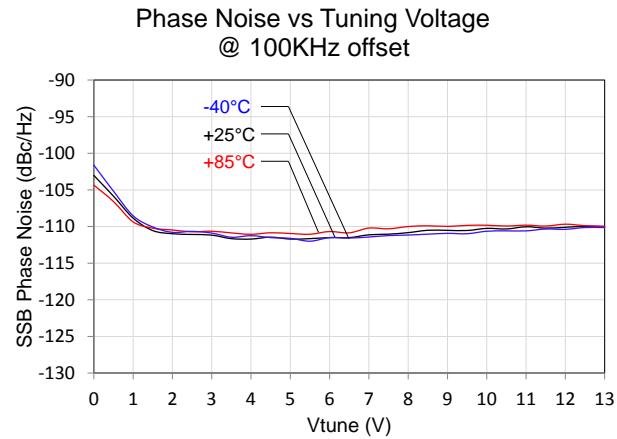
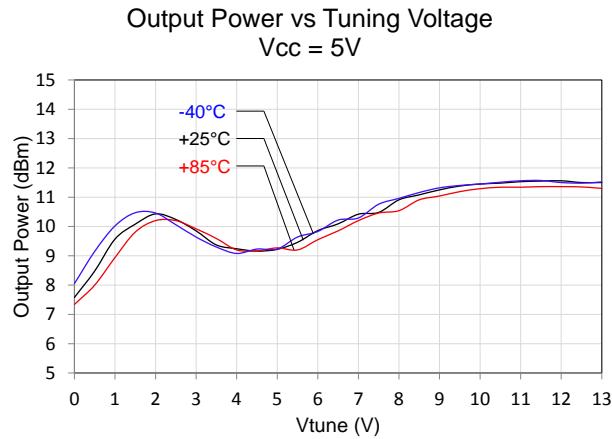
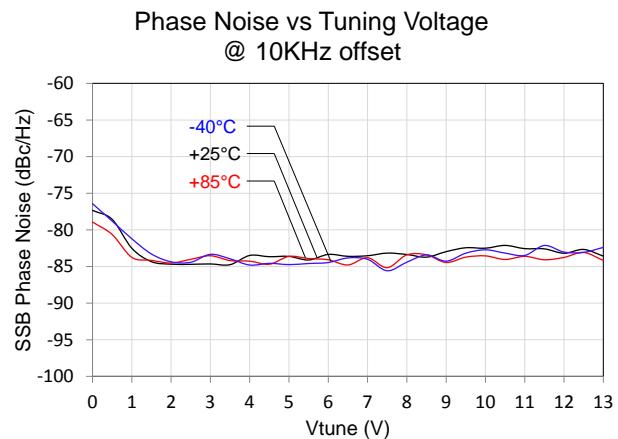
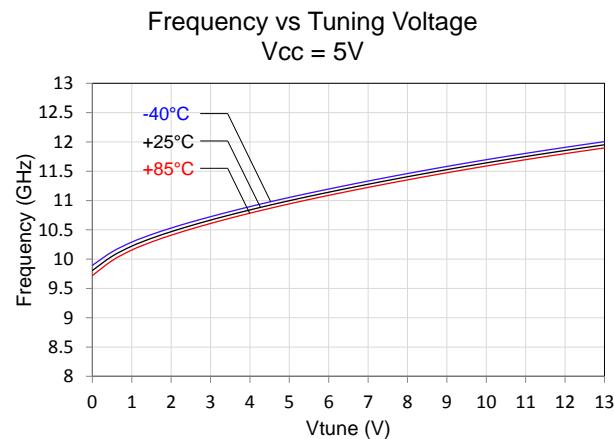
## Specifications

### Thermal and Reliability Information

Parameter	Condition	Rating
Thermal Resistance, $\theta_{JC}$ , measured to back of package	$T_{base} = 85 \text{ }^{\circ}\text{C}$	$\theta_{JC} = 48 \text{ }^{\circ}\text{C/W}$
Junction Temperature (Tj), and Median Lifetime (Tm)	$T_{base} = 85 \text{ }^{\circ}\text{C}$ $V_{cc} = 5\text{V}$ $I_{cc} = 185\text{mA}$	$T_{ch} = 131 \text{ }^{\circ}\text{C}$ $T_m = 6.9 \text{ E+7 Hours}$

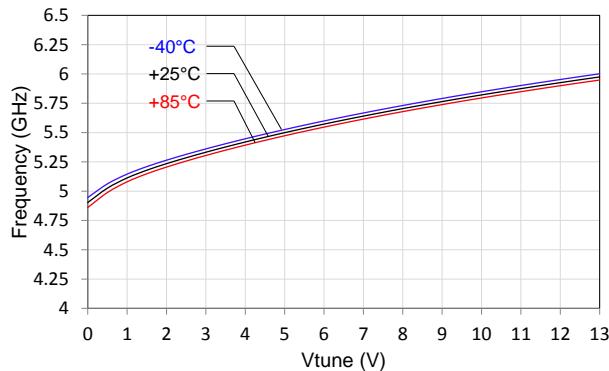


## Typical Performance

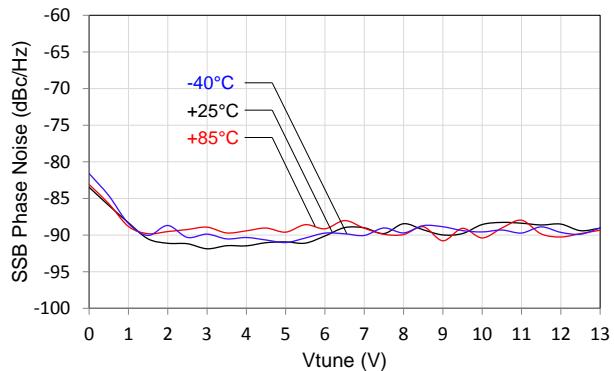


## Typical Performance

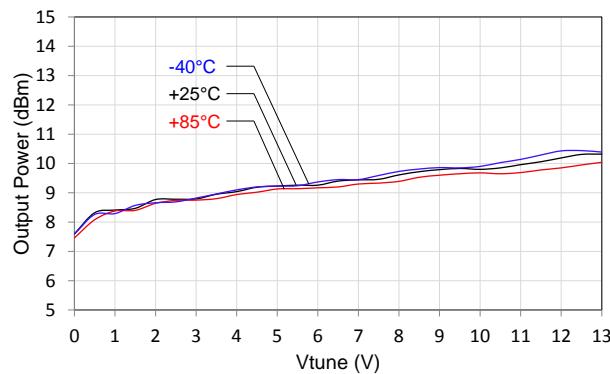
RFout/2 Frequency vs Tuning Voltage  
Vcc = 5V



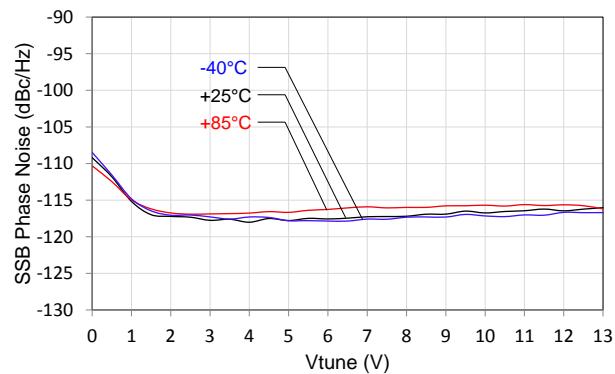
RFout/2 Phase Noise vs Tuning Voltage  
@ 10KHz offset



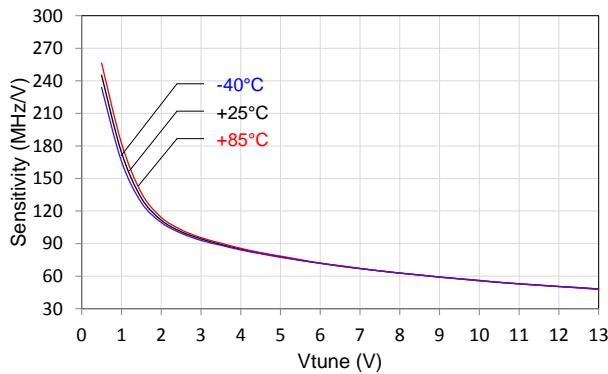
RFout/2 Output Power vs Tuning Voltage  
Vcc = 5V



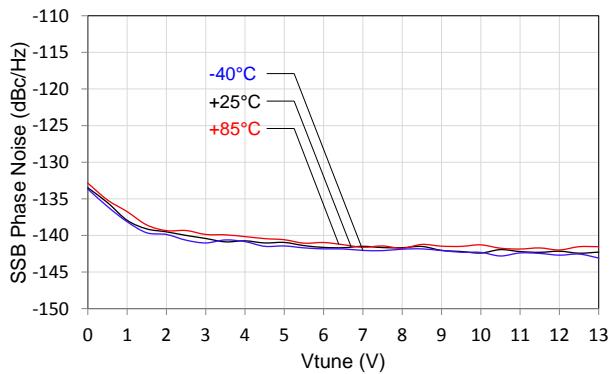
RFout/2 Phase Noise vs Tuning Voltage  
@ 100KHz offset

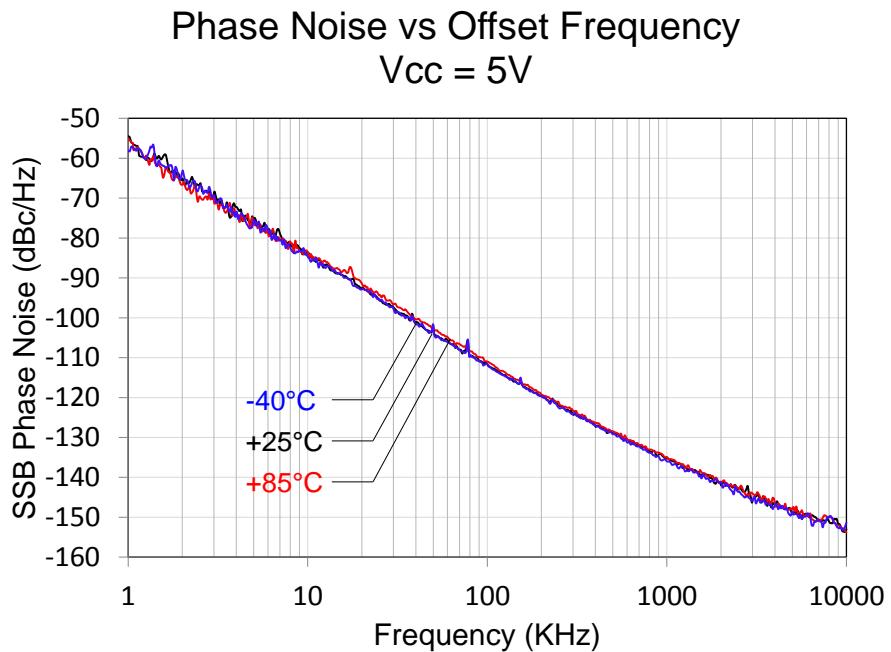


RFout/2 Sensitivity vs Tuning Voltage  
Vcc = 5V

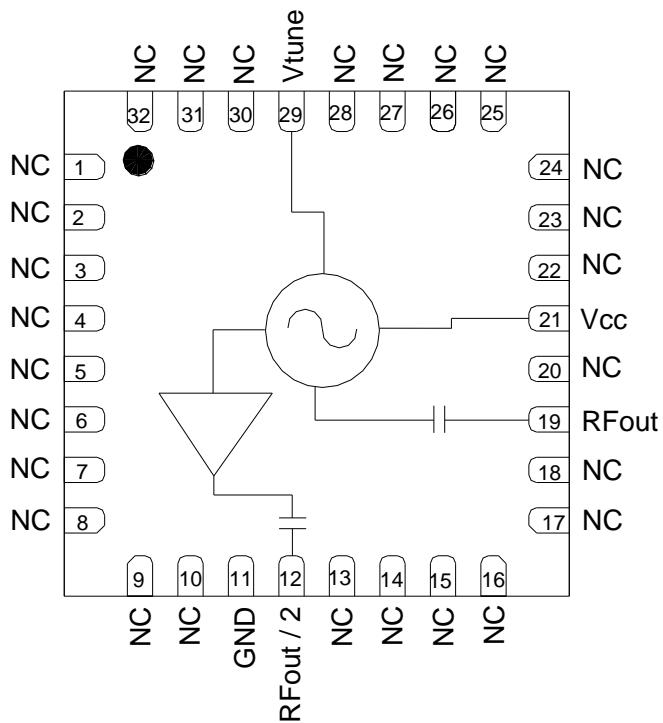


RFout/2 Phase Noise vs Tuning Voltage  
@ 1MHz offset



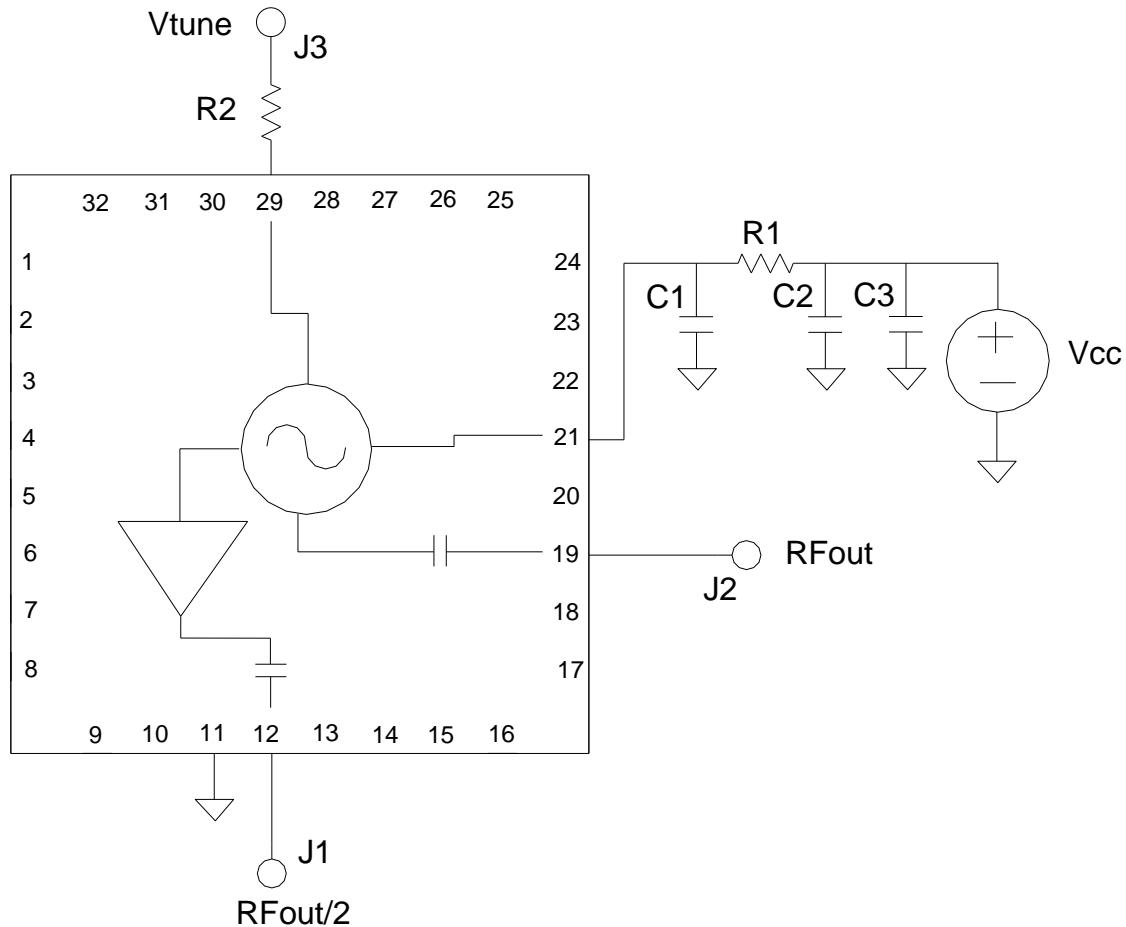
**Typical Performance**

## Pin Configuration and Description



Pin	Symbol	Description
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 14, 15, 16, 17, 18, 20, 22, 23, 24, 25, 26, 27, 28, 30, 31, 32	NC	No internal connection.
11	GND	Backside Paddle. Multiple vias should be employed to minimize inductance and thermal resistance.
12	RFout/2	Frequency/2 Output match to 50 ohms, AC coupled.
19	RFout	Output, matched to 50 ohms, AC coupled.
21	Vcc	Supply voltage. Bias network is required; see Application Circuit on page 8 as an example.
29	Vtune	VCO tuning voltage.

**Application Circuit**

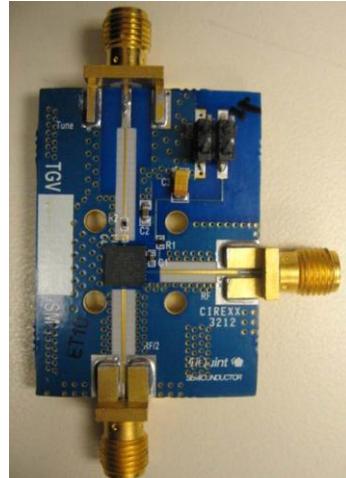
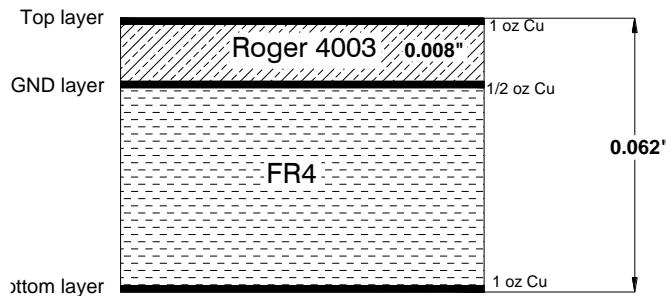
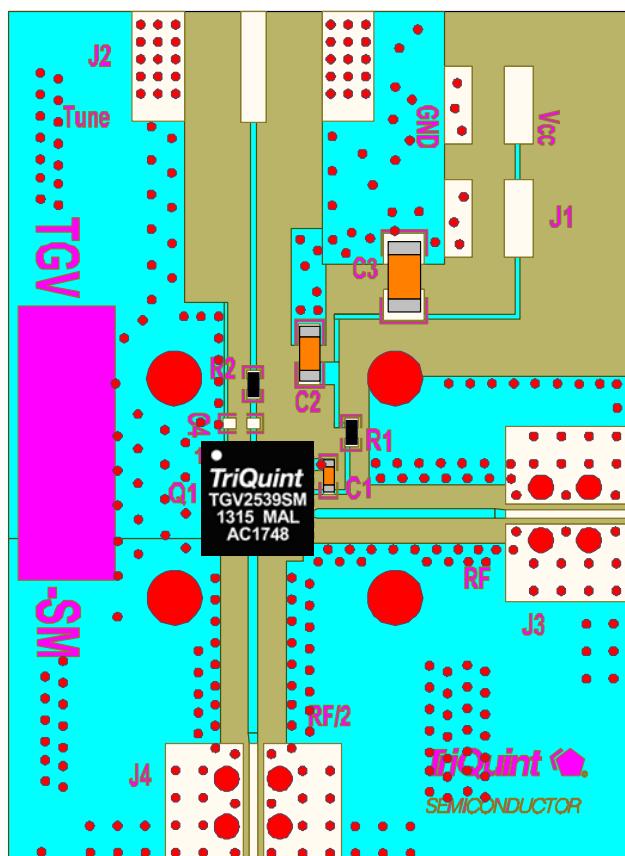


## Application Circuit

### PC Board Layout

Top RF layer is 0.008" thick Roger RO4003,  $\epsilon_r = 3.38$ . Microstrip 50 $\Omega$  line detail: width = 0.0175". For further technical information, refer to the [TGV2539-SM Product Information page](#).

The pad pattern shown has been developed and tested for optimized assembly at Triquint Semiconductor. The PCB land pattern has been developed to accommodate lead and package tolerance. Since surface mount processes vary from company to company, careful process development is recommended.



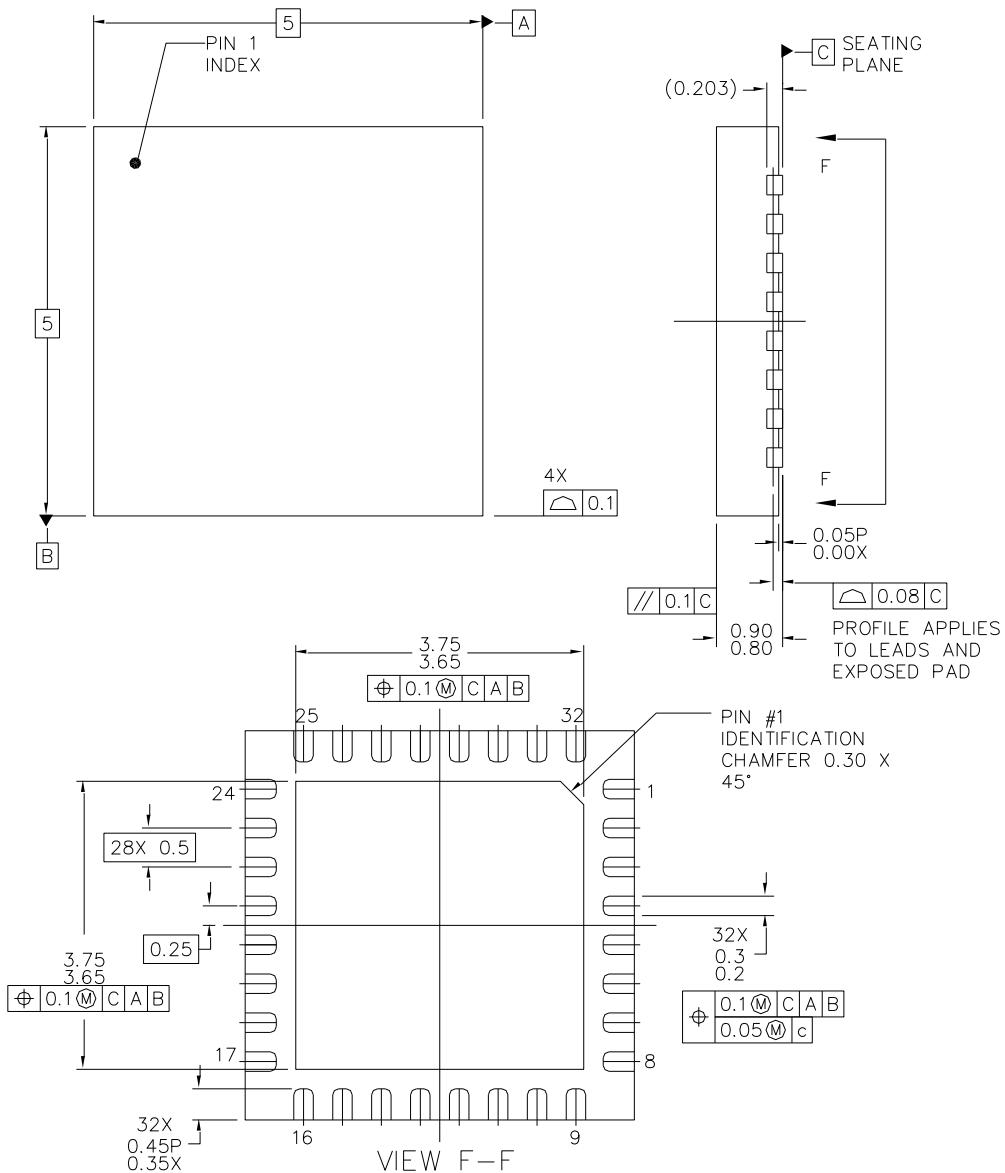
### Bill of Material

Ref Des	Value	Description	Manufacturer	Part Number
C1	100 pF	Ceramic Cap, 0402	various	
C2	1 $\mu$ F	Ceramic Cap, 0603	various	
C3	10 $\mu$ F	Tantalum Cap, 0805/1206	various	
R1, R2	0 ohm	Chip Res, 0402	various	

## Mechanical Information

## Package Marking and Dimensions

All dimensions are in millimeters.



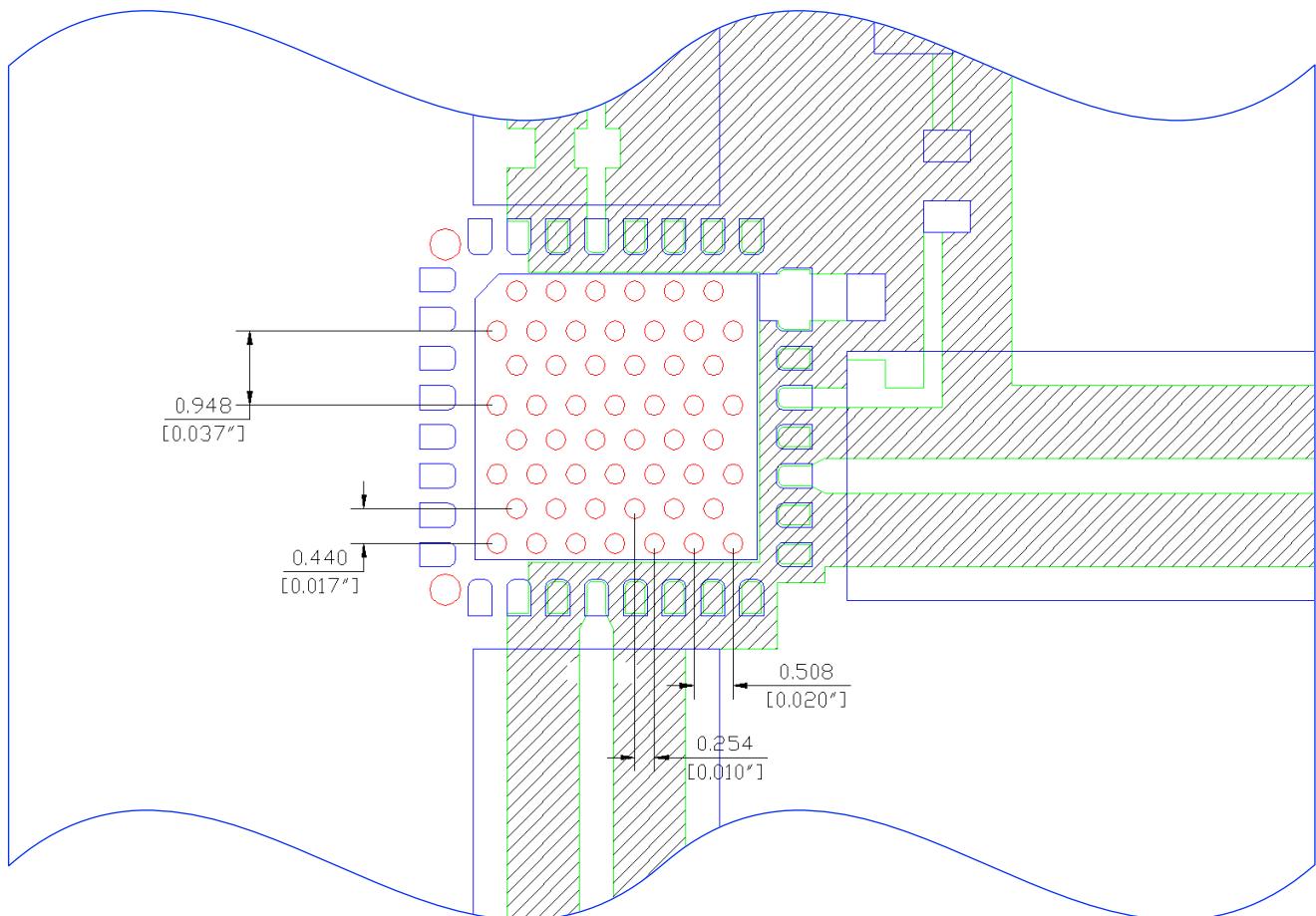
This package is lead-free/RoHS-compliant. The package base is copper alloy and the plating material on the leads is 100% matte Sn. It is compatible with both lead-free (maximum 260 °C reflow temperature) and tin-lead (maximum 245 °C reflow temperature) soldering processes.

The TGV2539-SM will be marked with the “TGV2539SM” designator and date code is marked below the part designator. The first two digits represent the last two digits of the year the part was manufactured, and the next two digits represent the work week.

## Mechanical Information

### PCB Mounting Pattern

All dimensions are in millimeters [inches].



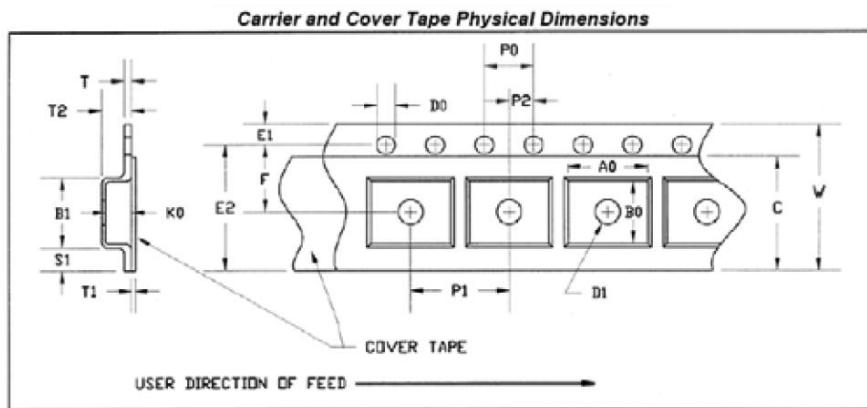
#### Notes:

1. The pad pattern shown has been developed and tested for optimized assembly at TriQuint Semiconductor. The PCB land pattern has been developed to accommodate lead and package tolerances. Since surface mount processes vary from company to company, careful process development is recommended.
2. Ground / thermal vias are critical for the proper performance of this device. Vias have a final plated thru diameter of .25 mm (.010").

## Tape and Reel Information

Tape and reel specifications for this part are also available on the TriQuint website in the “Application Notes” section.

Standard T/R size = 500 pieces on a 7.0” reel.



## CARRIER AND COVER TAPE DIMENSIONS

Part	Feature	Symbol	Size (in)	Size (mm)
Cavity	Length	A0	0.207	5.25
	Width	B0	0.207	5.25
	Depth	K0	0.043	1.1
	Pitch	P1	0.315	8.00
Distance Between Centerline	Cavity to Perforation Length Direction	P2	0.079	2.00
	Cavity to Perforation Width Direction	F	0.217	5.50
Cover Tape	Width	C	0.374	9.50
Carrier Tape	Width	W	0.472	12.00

## Product Compliance Information

### ESD Information



Caution! ESD-Sensitive Device

ESD Rating: Class 1A  
 Value: Passes  $\geq 250V$  min  
 Test: Human Body Model (HBM)  
 Standard: JEDEC Standard JESD22-A114

### MSL Rating

Moisture Sensitivity Level (MSL) 3 at 260°C convection reflow per JEDEC standard IPC/JEDEC J-STD-020.

### Solderability

Compatible with both lead-free (260 °C max. reflow temp.) and tin/lead (245 °C max. reflow temp.) soldering processes.

Package lead plating: matte Sn

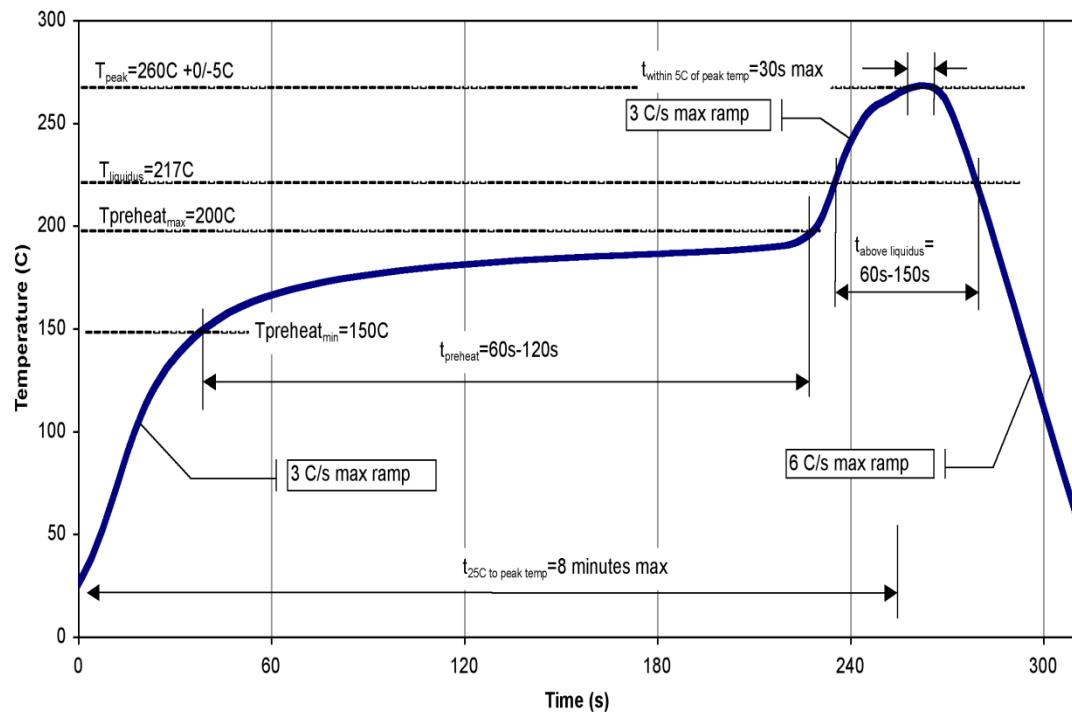
### RoHS Compliance

This part is compliant with EU 2002/95/EC RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).

This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A ( $C_{15}H_{12}Br_4O_2$ ) Free
- PFOS Free
- SVHC Free

## Recommended Soldering Temperature Profile



## Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations, and information about TriQuint:

**Web:** [www.triquint.com](http://www.triquint.com)  
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For technical questions and application information:

**Email:** [info-networks@tqs.com](mailto:info-networks@tqs.com)

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