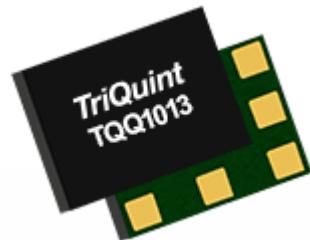


Applications

- LTE Handsets, Data Cards & Mobile Routers
- Band 13
 - 777–787 MHz Uplink
 - 746–756 MHz Downlink

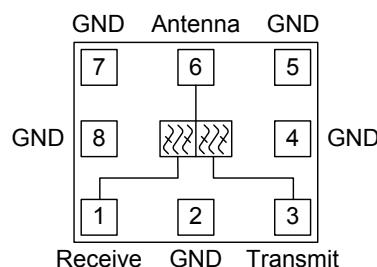


8 Pin 2.5 x 2.0 mm Package

Product Features

- NoDrift™ SAW Technology With Near Zero TCF
- Low Insertion Loss
- High Isolation
- Single-Ended (SE) 50 Ω Receive & Transmit Ports
- RoHS Compliant, Pb-Free Module Package

Functional Block Diagram



Top View

General Description

The TQQ1013 is a high-performance NoDrift™ Surface Acoustic Wave duplexer designed to meet the strict band 13 NS07 rejection requirements mitigating signal migration in the public safety frequency band.

The TQQ1013 is specifically designed to meet the high performance expectations of insertion loss, rejection, isolation, and linearity for LTE systems applications under all operating conditions.

The TQQ1013 uses common module packaging techniques to achieve the industry standard 2.5 x 2.0 x 0.9 mm footprint. This duplexer exhibits excellent power handling capabilities.

Pin Configuration

Pin #	Label
1	Receive
3	Transmit
6	Antenna
2, 4, 5, 7, 8	GND (Ground)
Backside Center Pad 9	GND (Ground)

Ordering Information

Part No.	Description
TQQ1013	B13 Duplexer
TQQ1013-EVB	Evaluation Board

Standard T/R size = 10000 pieces on a 7" reel.

Absolute Maximum Ratings

Parameter	Rating
Storage Temperature	-40 to +90°C
Peak Power rating for a max of 200msec at +90°C	+35dBm

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

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
T _{CASE}	-20		+90	°C

The duplexer will function over the recommended range without degradation in reliability or permanent change in performance.

Electrical Specifications: Antenna to Transmit ^(1,2,3)

Unless otherwise noted: Operating Temp= -20°C to +90°C

Parameter	Conditions	Min	Typ	Max	Units
Frequency		777.5	-	786.5	MHz
Insertion loss ⁽⁵⁾	777.5 – 786.5 MHz	-	2.2	3.5	dB
Amplitude variation ⁽⁴⁾ (over any 5 MHz in-band)	777.5 – 786.5 MHz	-	1.1	2.1	dB p-p
Attenuation	728 – 746 MHz	35	48	-	
	746 – 756 MHz	46	50	-	
	758 – 768 MHz	35	40	-	
	793 – 805 MHz	20	30	-	
	1554 – 1565 MHz	45	50	-	
	1565 – 1607 MHz	45	50	-	
	1805 – 1880MHz	30	45	-	
	1930 – 1990MHz	30	45	-	
	2110 – 5950MHz	20	30	-	
	Attenuation (NS07) ⁽⁶⁾	22	-		dB
VSWR at antenna	777.5 – 786.5 MHz	-	1.7:1	1.8:1	
VSWR at TX port	777.5 – 786.5 MHz	-	1.5:1	2.0:1	
Antenna Impedance (single-ended)		-	50	-	Ohms
TX Impedance (single-ended)		-	50	-	Ohms
Input Power	CW tone at 50°C	+29dBm (0.8W) > 5000h			

Notes:

1. In production devices will be tested at room temperature to a guardbanded specification to ensure electrical compliance over temperature.
2. Electrical margin has been built into the design to account for the variations due to temperature drift and manufacturing tolerances.
3. Typical values are based on average measurements at room temperature.
4. Amplitude variation/ripple is defined as the difference between the lowest loss and the highest loss within defined frequency points.
5. Integrated over 1RB
6. Relative to integrated insertion loss in 777.5 – 786.5MHz over 1RB

Electrical Specifications: Antenna to Receive^(1,2,3)

Unless otherwise noted: Operating Temp= -20°C to +90°C

Parameter	Conditions	Min	Typ	Max	Units
Frequency		746	-	756	MHz
Insertion loss	746 – 756 MHz	-	2.1	2.7	dB
Amplitude variation ⁽⁴⁾ (over any 5 MHz in-band)	746 – 756 MHz	-	0.4	1.0	dB p-p
Attenuation	771 – 772 MHz ⁽⁷⁾	18	22	-	dB
	771 – 772 MHz	10	22	-	
	777 – 787 MHz	54	58	-	
	1 – 686 MHz	40	44	-	
	686 – 728 MHz	25	30	-	
	2400 – 2500 MHz	40	55	-	
	4900 – 5162 MHz	20	25	-	
	5162 – 5950MHz	12	15	-	
	6714 – 6804 MHz	15	18	-	
VSWR at antenna	746 – 756 MHz	-	1.7:1	1.8:1	
VSWR at RX port	746 – 756 MHz	-	1.6:1	1.8:1	
Antenna Impedance (single-ended)		-	50	-	Ohms
Load Impedance (single-ended)		-	50//47nH	-	Ohms

Notes:

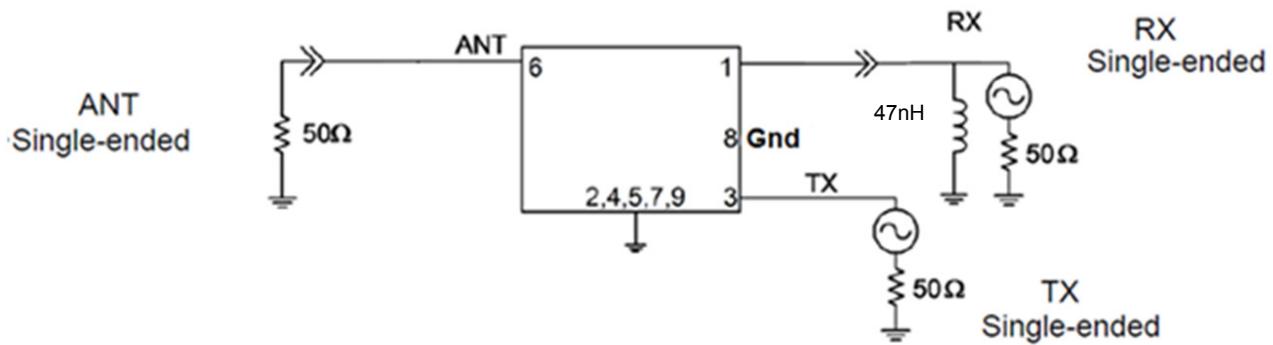
1. In production devices will be tested at room temperature to a guardbanded specification to ensure electrical compliance over temperature.
2. Electrical margin has been built into the design to account for the variations due to temperature drift and manufacturing tolerances.
3. Typical values are based on average measurements at room temperature.
4. Amplitude variation/ripple is defined as the difference between the lowest loss and the highest loss within defined frequency points.
5. Integrated over 1RB
6. Relative to integrated insertion loss in 777.5 – 786.5MHz over 1RB
7. At room temperature (+25°C)

Electrical Specifications: Transmit to Receive

Parameter	Conditions	Min	Typ	Max	Units
Tx to Rx Isolation	746 – 749 MHz	51	52	-	dB
	749 – 752 MHz	52	53	-	
	752 – 756 MHz	53	54	-	
	777 – 787 MHz	55	58	-	

Application Drawing

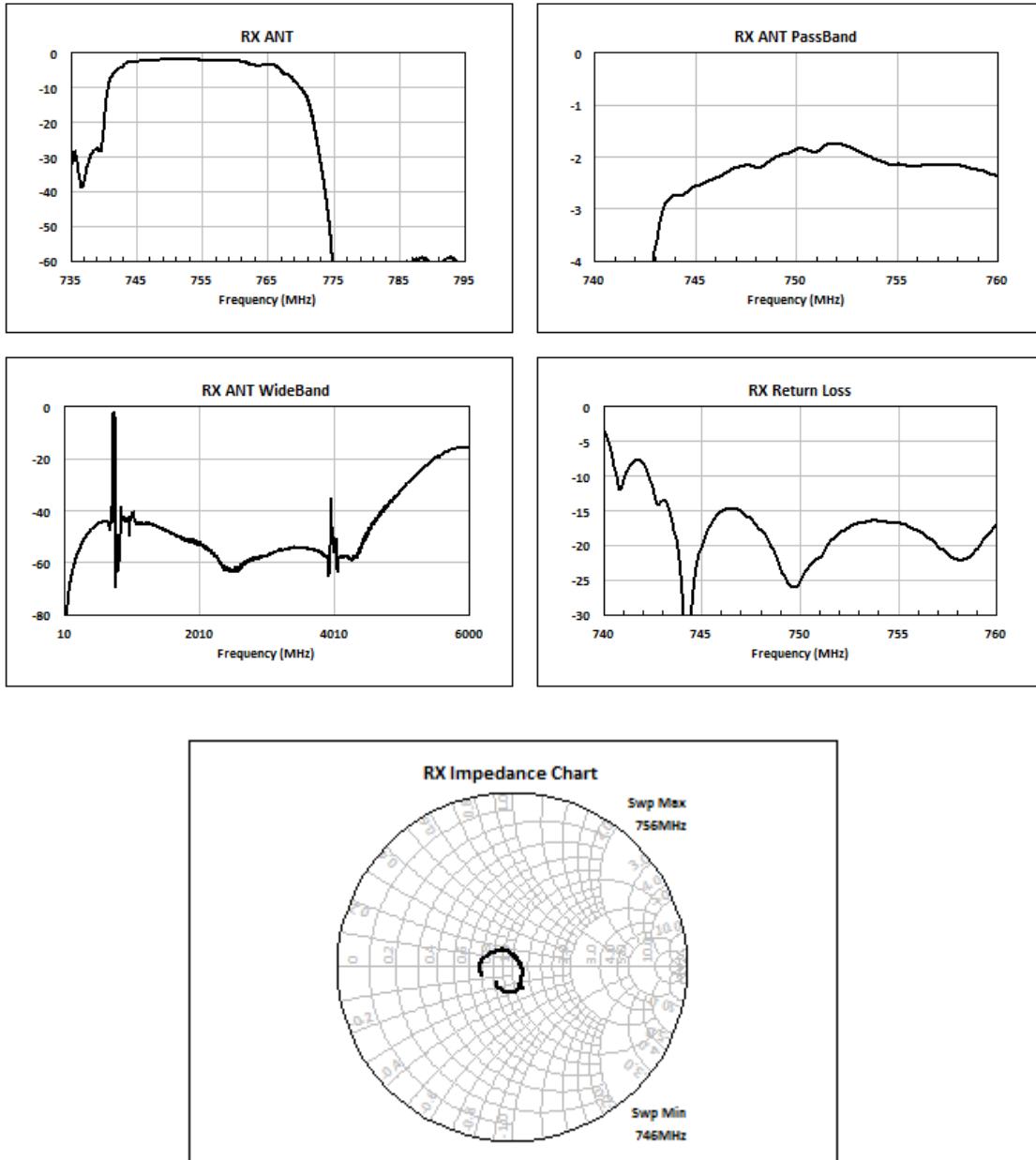
Schematic



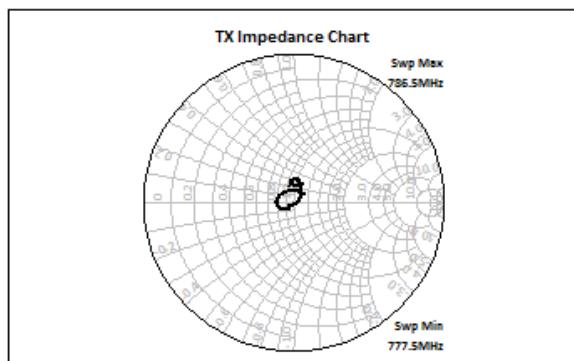
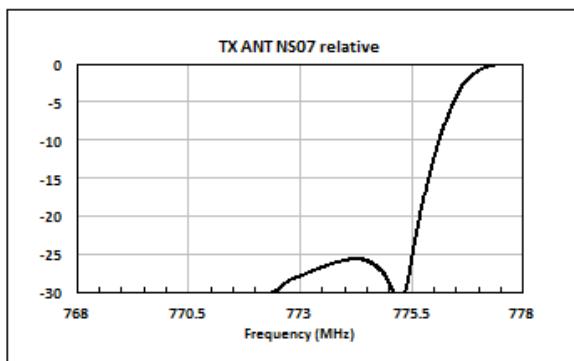
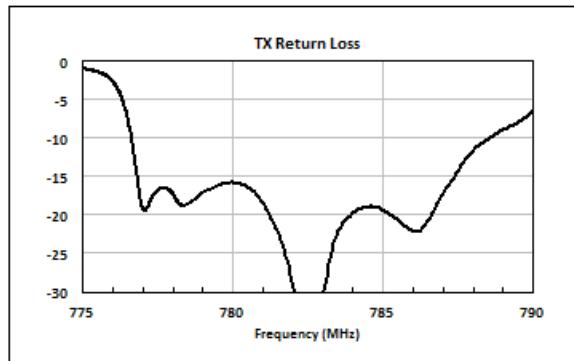
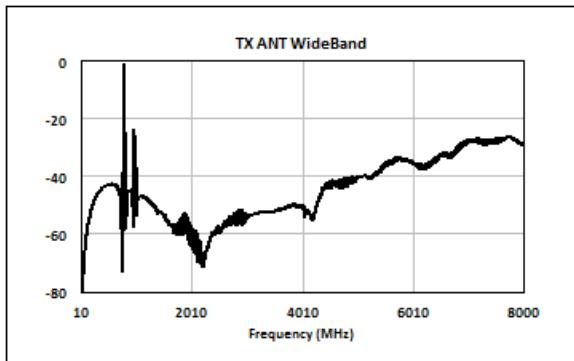
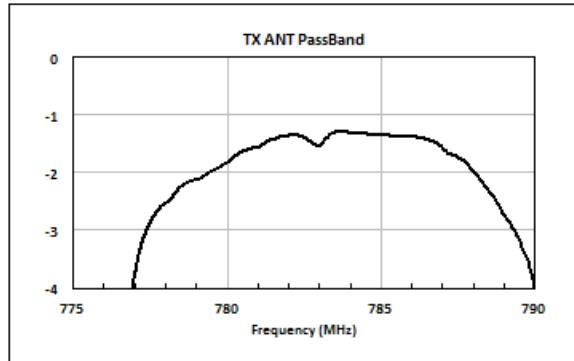
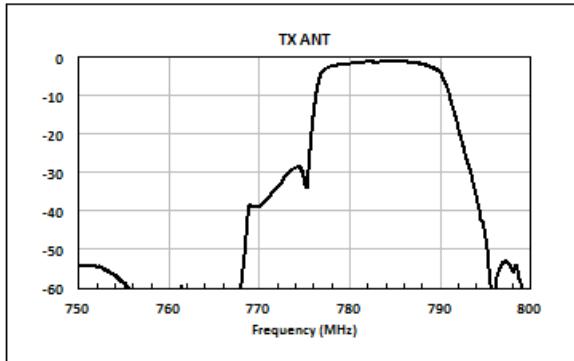
Notes:

- DC blocking required before pin 3 Tx

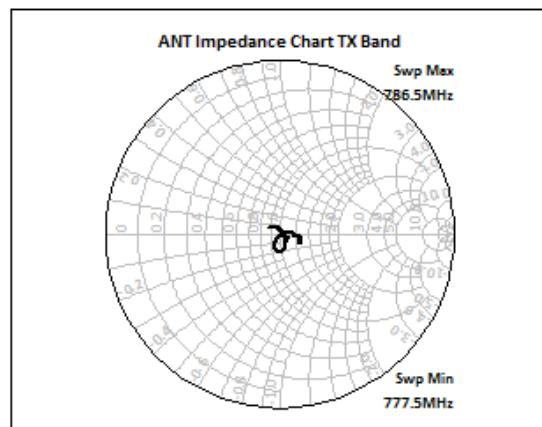
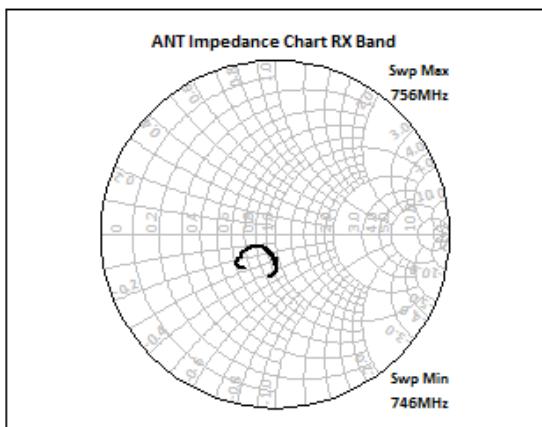
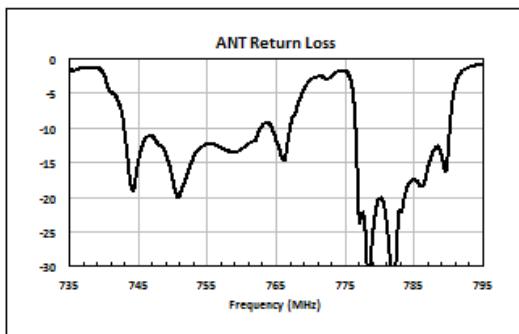
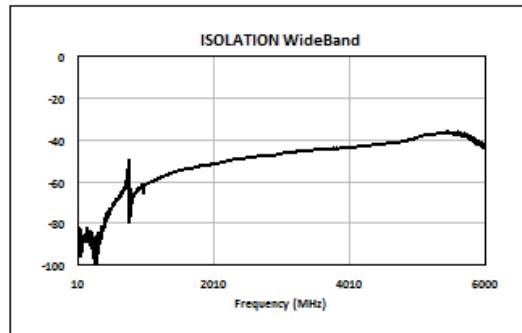
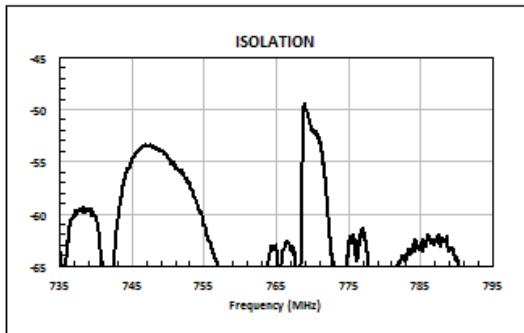
Receive Performance Plots – Temp=25°C



Transmit Performance Plots - Temp=25°C

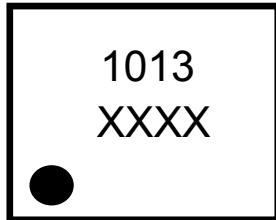


Isolation/Antenna Return Loss – Temp=25°C



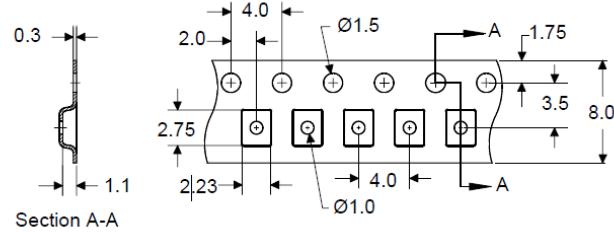
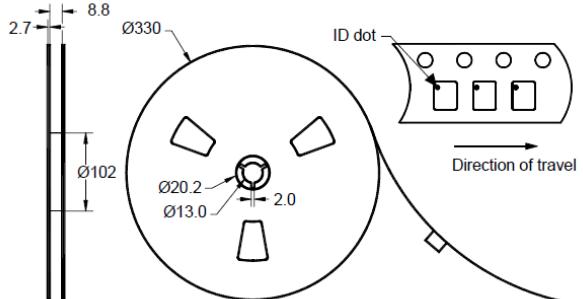
Mechanical Information

Marking



- Pin 1 indicator
- Line 1: Product Name: TQQ1013
- Line 2: Assembly Lot Code #: XXXX= TriQuint assembly number (4 characters only, starting from right side)

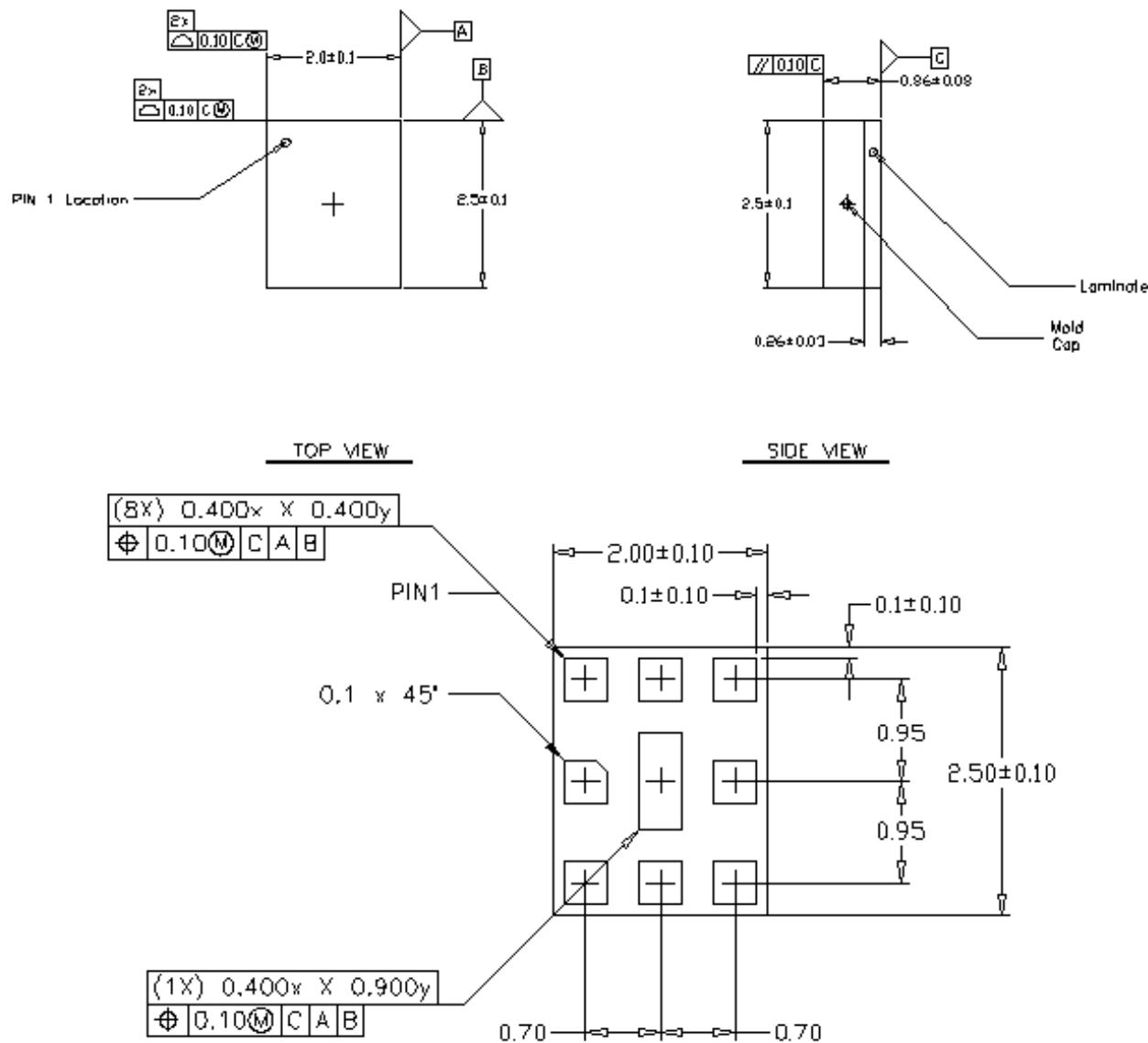
Tape and Reel



Dimensions shown are nominal in millimeters
Packaging quantity: 10000 units/reel

Mechanical Information

Package Dimensions



NOTES:

1. All dimensions are in millimeters. Angles are in degrees.
2. Dimension and tolerance formats conform to ASME Y14.4M-1994.
3. The terminal #1 identifier and terminal numbering conform to JESD 95-1 SPP-012.

Product Compliance Information

ESD Sensitivity Ratings



Caution! ESD-Sensitive Device

ESD Rating: Class 1A
Value: 350V
Test: Human Body Model (HBM)
Standard: JEDEC Standard JESD22-A114

ESD Rating: Class M3
Value: 250V
Test: Machine Model (MM)
Standard: JEDEC Standard JESD22-A115

MSL Rating

MSL Rating: Level 3
Test: 260°C convection reflow
Standard: JEDEC Standard IPC/JEDEC J-STD-020

Solderability

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

Package contact plating: TBD

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

Contact Information

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

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