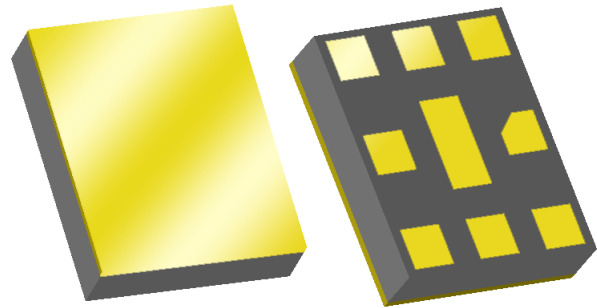


856979

806/847 MHz Duplexer

Applications

- For Band 20 LTE applications
- LTE Band 20 handsets, data cards, mobile routers

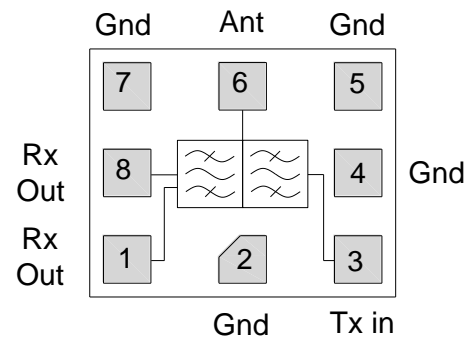


Product Features

- Usable bandwidth 30 MHz (each band)
- Low loss
- High attenuation
- High Tx-Rx isolation
- Single-ended-Balanced Rx operation
- Ceramic chip-scale Package (CSP)
- Small Size 2.5 x 2.00 x 0.56 mm
- Hermetic **RoHS** compliant, **Pb**-free

Functional Block Diagram

Top View



General Description

856979 is a high-performance Temperature Compensated Surface Acoustic Wave (TC SAW) duplexer designed to meet the strict LTE requirements for use in Band 20.

The 856979 is specifically designed to meet the high performance expectations of insertion loss, isolation and linearity in LTE systems operating in Band 20 applications under all operating conditions. The use of TC SAW technology enables stable performance over the entire temperature range.

The 856979 uses common module packaging techniques to achieve the industry standard 2.5 x 2.0 footprint. The duplexer exhibits excellent power handling capabilities.

Pin Configuration

Pin #	SE-Balanced	Description
1,8		Rx output
3		Tx input
6		Antenna/Phasing inductor
2,4,5,7,9		Ground

Ordering Information

Part No.	Description
856979	packaged part
856979-EVB	evaluation board

Standard T/R size = 10,000 units/reel.

TX – Electrical Specifications ⁽¹⁾

Specified Temperature Range: ⁽²⁾ -20 to +85 °C

Parameter ⁽³⁾	Conditions	Min	Typical ⁽⁴⁾	Max	Units
Ant-Tx Specification					
Center Frequency		-	847	-	MHz
Maximum Insertion Loss ⁽⁵⁾	832 – 862 MHz	-	2.5	3.0	dB
Amplitude Variation ⁽⁹⁾	832 – 862 MHz	-	0.6	1.5	dB p-p
Absolute Attenuation ⁽⁶⁾	10 – 771 MHz	30	35	-	dB
	771 – 791 MHz	33	37	-	dB
	791 – 821 MHz	43	48	-	dB
	821 – 825 MHz	3	15	-	dB
	925 – 960 MHz	28	33	-	dB
	1565.420 – 1573.374 MHz	38	43	-	dB
	1573.374 – 1577.466 MHz	40	45	-	dB
	1577.466 – 1585.420 MHz	40	45	-	dB
	1597.5515 – 1605.886 MHz	43	48	-	dB
	1664 - 1724	35	47	-	dB
	1805 – 1880 MHz	30	45	-	dB
	1884.5 – 1919.6 MHz	30	43	-	dB
	2110 – 2170 MHz	30	40	-	dB
	2400 – 2500 MHz	35	42	-	dB
	2500 – 2586 MHz	35	40	-	dB
	2586– 2620	35	40	-	dB
2620– 2690	30	38	-	dB	
3328– 4310	20	31	-	dB	
4992– 6000	15	22	-	dB	
Return Loss at Tx	832 – 862 MHz	8	10	-	dB
Return Loss at Antenna	832 – 862 MHz	8	10	-	dB
Tx-Rx Specification					
Isolation	791 – 821 MHz (Differential)	50	53	-	dB
	832.5 – 862 MHz (Differential) ⁽⁸⁾	54	56	-	dB
	791 – 821 MHz (Common-mode)	45	50	-	dB
	832.5 – 862 MHz (Common-mode)	50	55	-	dB
	1574 – 1577 MHz	40	45	-	dB
	1664 – 1724 MHz	20	48	-	dB
	2496 – 2586 MHz	20	45	-	dB
Tx Impedance (single-ended) ⁽⁷⁾		-	50	-	Ω
Ant Impedance (single-ended) ⁽⁷⁾		-	50	-	Ω

Notes:

- All specifications are based on the TriQuint schematic for the main reference design shown on page 4
- In production, devices will be tested at room temperature to a guardbanded specification to ensure electrical compliance over temperature
- Electrical margin has been built into the design to account for the variations due to temperature drift and manufacturing tolerances
- Typical values are based on average measurements at room temperature
- Design goal is to meet 3.0 dB Max. Need SPC data to determine actual performance
- Relative to zero dB
- This is the optimum impedance in order to achieve the performance shown
- Target minimum is based on future design revision goals
- Over any 5 MHz in-band

RX – Electrical Specifications ⁽¹⁾

Specified Temperature Range: ⁽²⁾ -20 to +85 °C

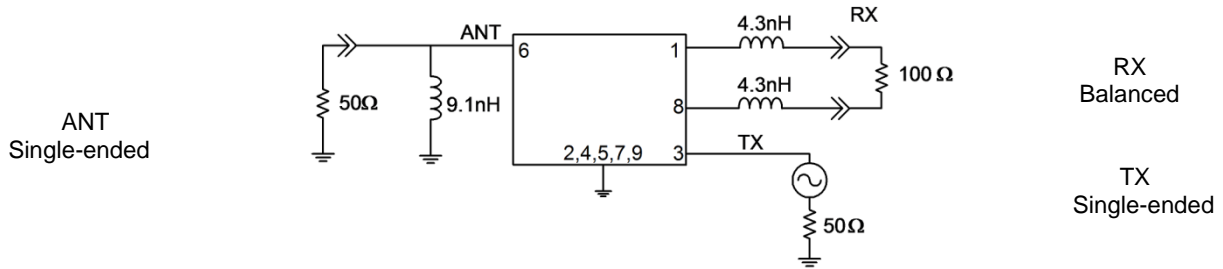
Parameter ⁽³⁾	Conditions	Min	Typical ⁽⁴⁾	Max	Units
Ant-Rx Specification					
Center Frequency		-	806	-	MHz
Maximum Insertion Loss	791–821 MHz	-	3.0	3.5	dB
Amplitude Variation ⁽⁸⁾	791–821 MHz	-	0.6	1.5	dB p-p
Absolute Attenuation ⁽⁵⁾	10 – 760 MHz	45	50	-	dB
	760 – 770 MHz	25	40	-	dB
	832 – 862 MHz	45	51	-	dB
	862 – 890 MHz	40	44	-	dB
	890 – 910 MHz	35	40	-	dB
	910 – 2500 MHz	40	44	-	dB
	2500 – 6000 MHz	30	35	-	dB
Return Loss at Rx	791–821 MHz	7.5	9	-	dB
Return Loss at Antenna	791–821 MHz	8	9.5	-	dB
Output phase balance	791–821 MHz	-7.0	-	8.0	degree
Output amplitude balance ⁽⁸⁾	791–821 MHz	-2.3	-	0.5	dB
IM2 product ^{(6) (a,b)}		-	-106	-104	dBm
IM3 product ^{(6) (c,d)}		-	-101	-100	dBm
ANT Impedance (single-ended) ⁽⁷⁾		-	50	-	Ω
Rx Impedance (balanced) ⁽⁷⁾		-	100	-	Ω

Notes:

- All specifications are based on the TriQuint schematic for the main reference design shown on page 4
- In production, devices will be tested at room temperature to a guardbanded specification to ensure electrical compliance over temperature
- Electrical margin has been built into the design to account for the variations due to temperature drift and manufacturing tolerances
- Typical values are based on average measurements at room temperature
- Relative to zero dB
- All power levels are referenced to the antenna port. Two CW tones are applied at frequencies f1 and f2, and the resultant intermodulation product in the Rx band is measured. The first tone is applied to the Tx port, in the range f1 = 832 to 862 MHz, at +21.5 dBm (referenced to the antenna port). The second tone is -15 dBm, applied to the antenna port at f2, with the following four cases:
 - f2 = 41 MHz
 - f2 = 2 * f1 - 41 MHz
 - f2 = f1 + 41 MHz
 - f2 = 3 * f1 - 41 MHz
 The intermodulation product is measured at f1 - 41 MHz.
- This is the optimum impedance in order to achieve the performance shown
- Over any 5 MHz in-band

Reference Design – Ant- 50Ω SE In, Tx-50Ω SE Out , Rx-100Ω Bal Out

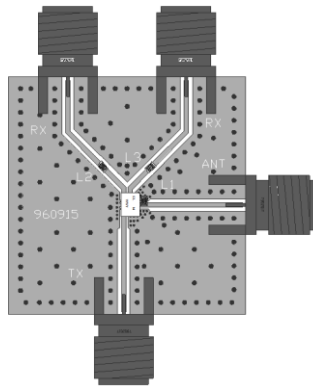
Schematic



Notes:

1. Actual matching values may vary due to PCB layout and parasitic

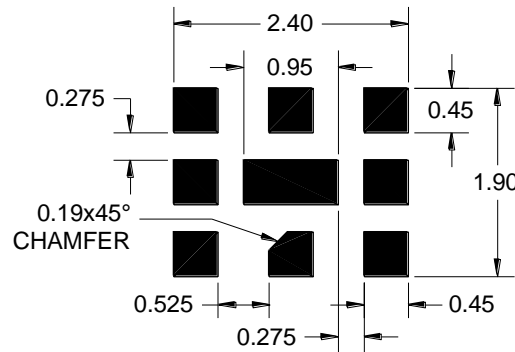
PC Board



Notes:

- Top, middle & bottom layers: 1 oz copper
- Substrates: FR4 dielectric, .031" thick
- Finish plating: Nickel: 3-8μm thick, Gold: .03-.2μm thick
- Hole plating: Copper min .0008μm thick

Mounting Configuration



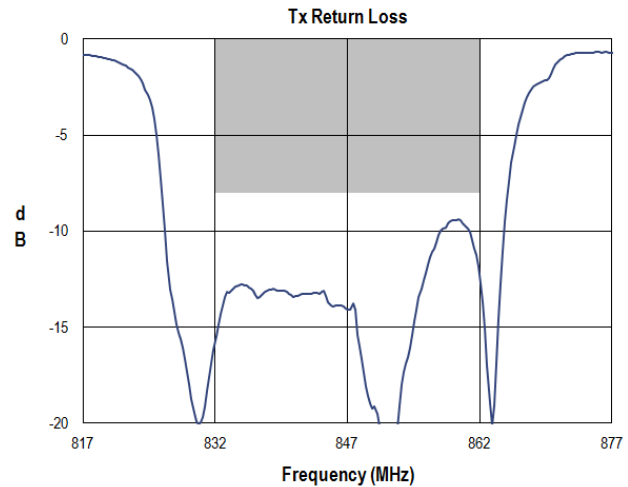
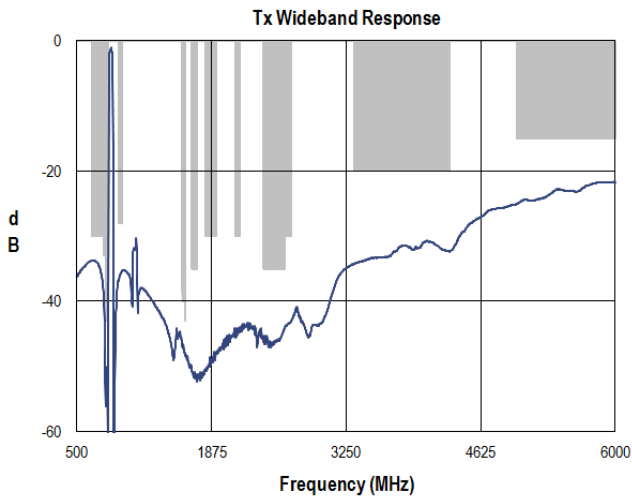
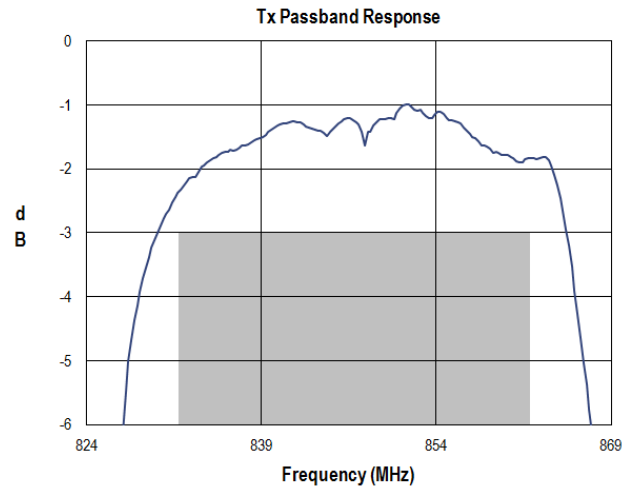
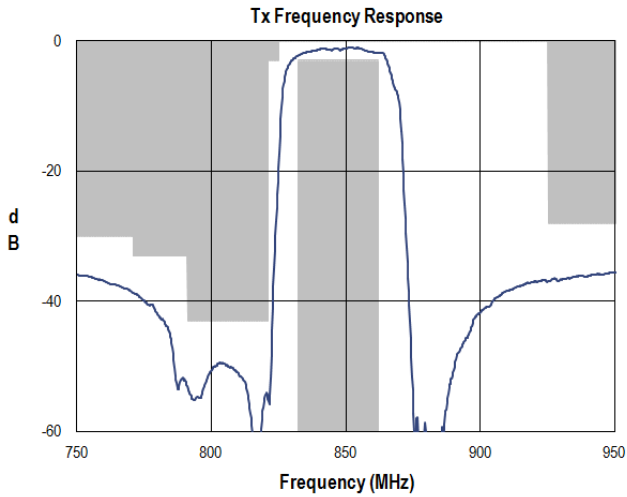
Notes:

1. All dimensions are in millimeters.
2. This footprint represents a recommendation only.

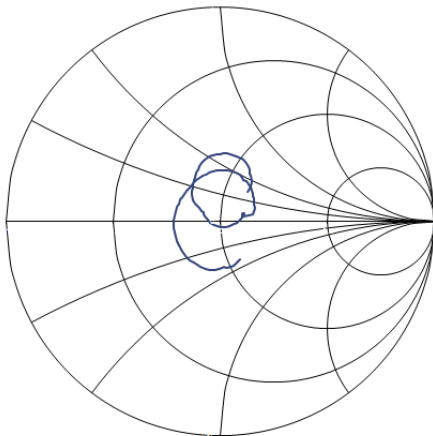
Bill of Material

Reference Design	Value	Description	Manufactur	Part Number
L1_ANT	9.1 nH	Chip inductor, Wire wound, 0402, ±2%	MuRata	LQW15AN9N1G00
L2 and L2 at Rx	4.3 nH	Chip inductor, Wire-wound, 0402, ±3%	MuRata	LQW15AN4N3C00
SMA	N/A	SMA connector	Radiall USA Inc.	9602-1111-018
PCB	N/A	3-layer	Multiple	N/A

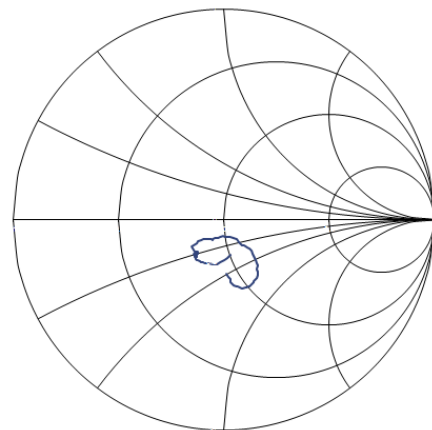
Tx - Typical Performance (at room temperature)



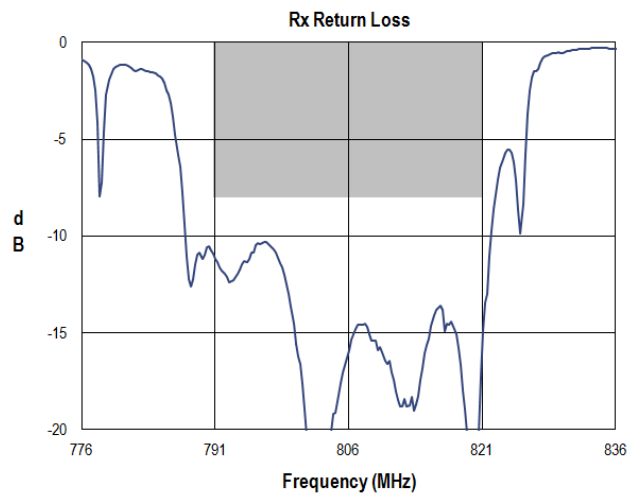
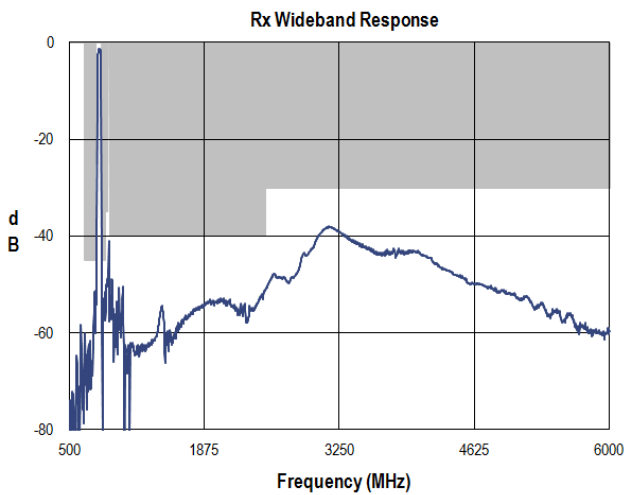
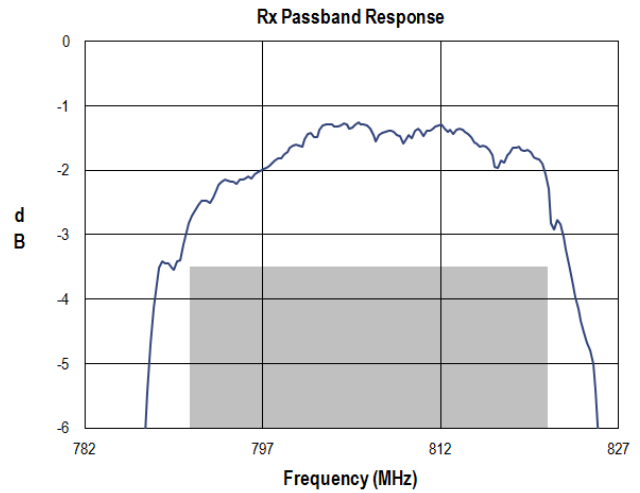
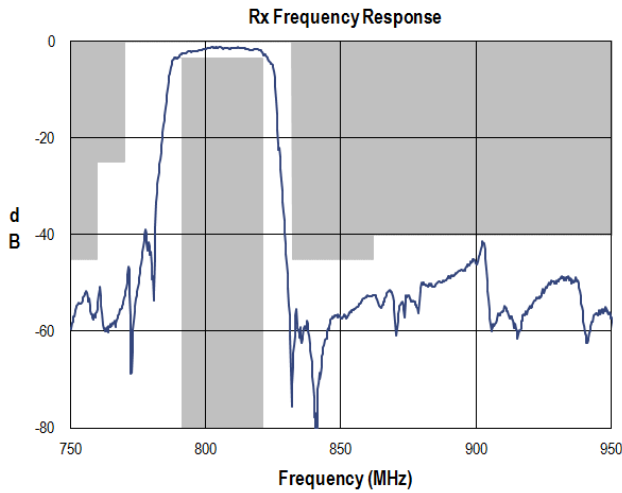
Tx Path - Ant Port Impedance



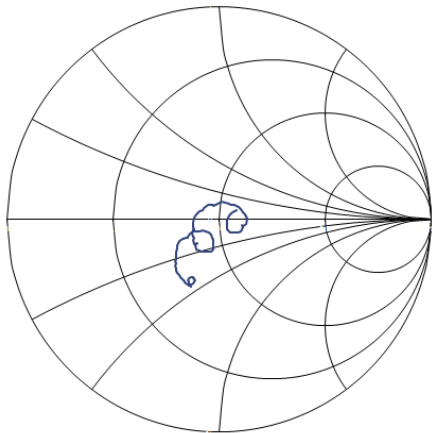
Tx Port Impedance



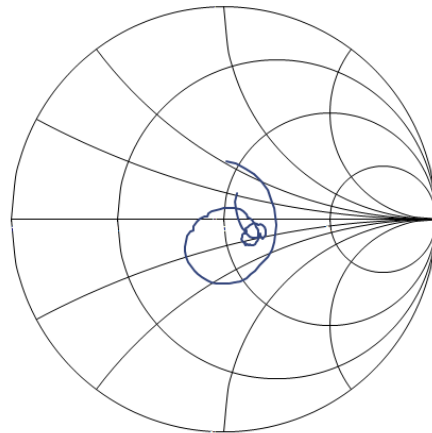
Rx - Typical Performance (at room temperature)



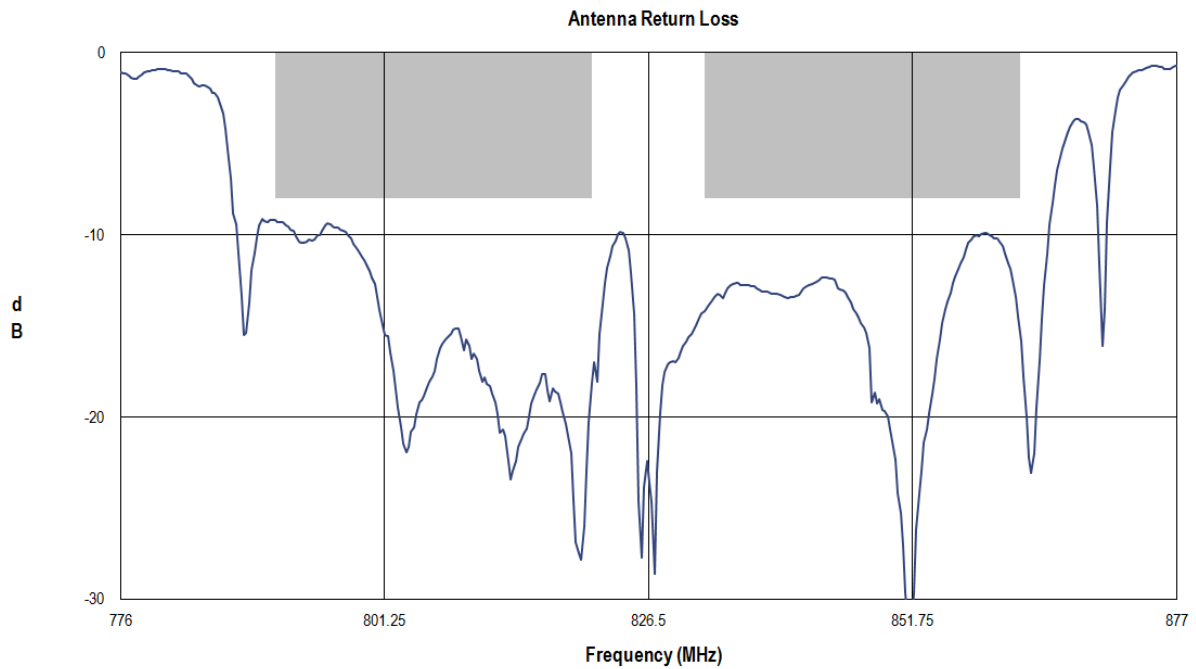
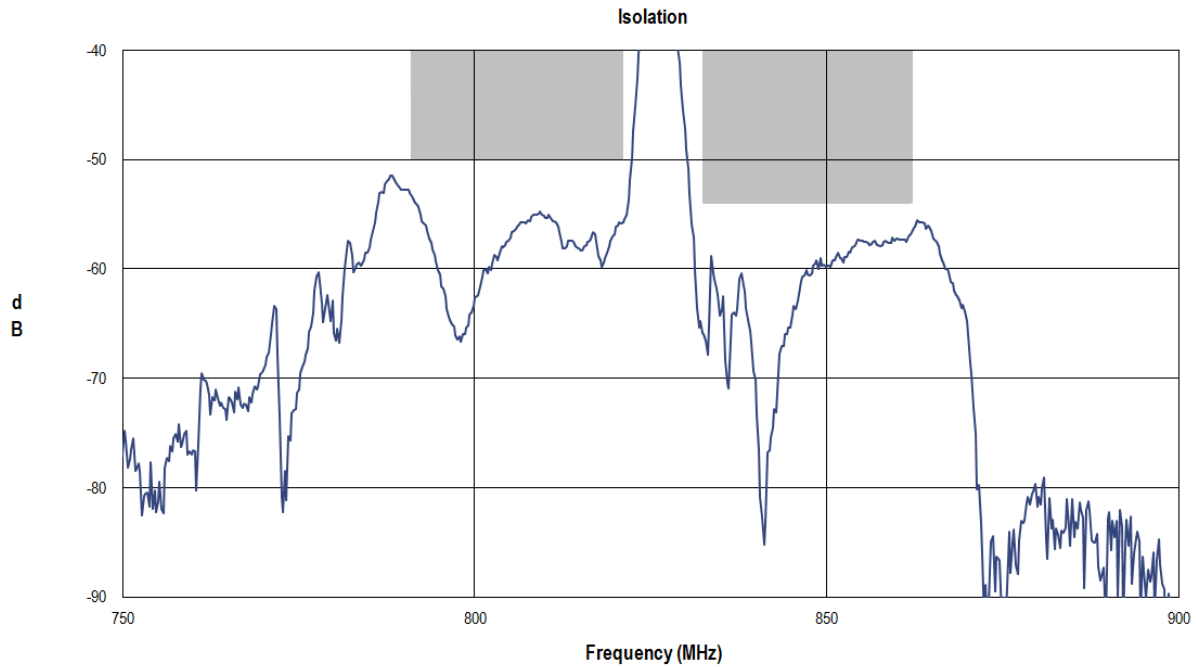
Rx Path - Ant Port Impedance



Rx Port Impedance

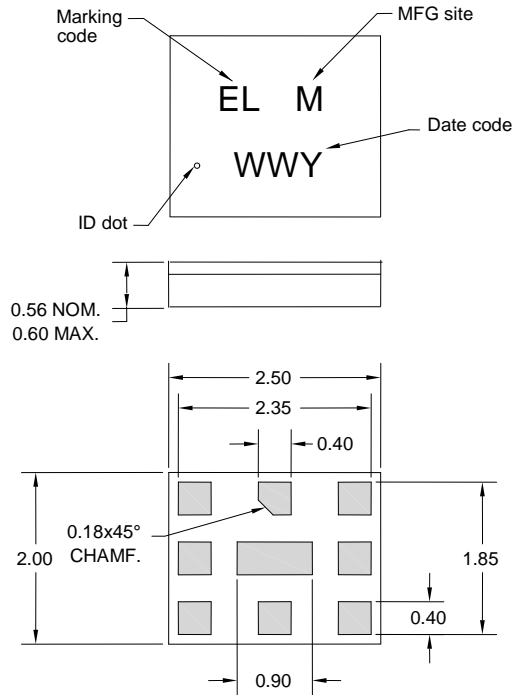


TX – RX Isolation & Antenna RL Typical Performance (at room temperature)



Mechanical Information

Package Information, Dimensions and Marking



Package Style: CSP-10KT
 Dimensions: 2.5 x 2.00 x 0.56 mm

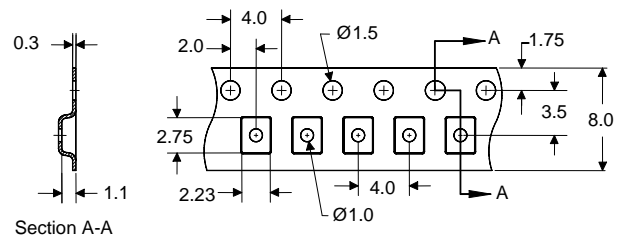
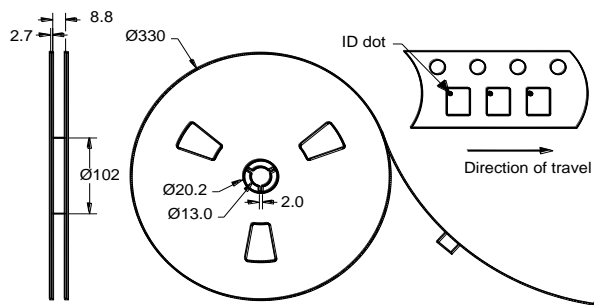
Body: Al_2O_3 ceramic
 Lid: Kovar or Alloy 42, Au over Ni plated
 Terminations: Au plating 0.5 - 1.0 μ m, over a 2-6 μ m Ni plating

All dimensions shown are nominal in millimeters
 All tolerances are ± 0.15 mm except overall length and width ± 0.10 mm

The date code consists of: WW = 2 digit week,
 Y = last digit of year, M = manufacturing site code

Tape and Reel Information

Standard T/R size = 10,000 units/reel. All dimensions are in millimeters



Absolute Maximum Ratings

Parameter	Rating
Operating Temperature	-20 to +90 °C
Storage Temperature	-40 to +90 °C
Input Power ⁽¹⁾ at TX	+29 dBm

(1) 55°C equivalent 5000 hours. All ports matched to 50 Ohms.

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

Product Compliance Information

ESD Information



Caution! ESD-Sensitive Device

ESD Rating: Class 0

Value: Passes ≤ 150 V

Test: Human Body Model (HBM)

Standard: JEDEC Standard JESD22-A114

ESD Rating: Class N/A

Value: Passes ≤ 100 V

Test: Machine Model (MM)

Standard: JEDEC Standard JESD22-A115

MSL Rating

Devices are Hermetic, therefore MSL is not applicable.

Solderability

Compatible with the latest version of J-STD-020, lead free solder, 260°C

Refer to [Soldering Profile](#) for recommended guidelines.

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:

- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A (C₁₅H₁₂Br₄O₂) Free
- PFOS Free
- SVHC Free

Contact Information

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

Web: www.triquint.com

Email: info-sales@tqs.com

Tel: +1.407.886.8860

Fax: +1.407.886.7061

For technical questions and application information:

Email: fl.product.engineering@tqs.com

Important Notice

The information contained herein is believed to be reliable. TriQuint makes no warranties regarding the information contained herein. TriQuint assumes no responsibility or liability whatsoever for any of the information contained herein. TriQuint assumes no responsibility or liability whatsoever for the use of the information contained herein. The information contained herein is provided "AS IS, WHERE IS" and with all faults, and the entire risk associated with such information is entirely with the user. All information contained herein is subject to change without notice. Customers should obtain and verify the latest relevant information before placing orders for TriQuint products. The information contained herein or any use of such information does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other intellectual property rights, whether with regard to such information itself or anything described by such information.

TriQuint products are not warranted or authorized for use as critical components in medical, life-saving, or life-sustaining applications, or other applications where a failure would reasonably be expected to cause severe personal injury or death.