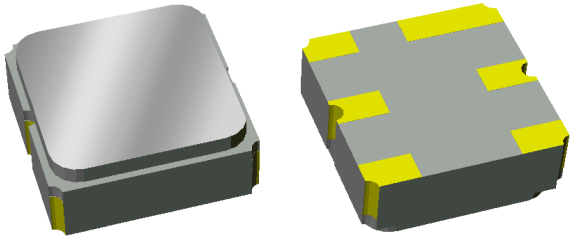
885009

2535 MHz BAW Filter

Applications

- General purpose wireless
- Wireless infrastructure
- 4G, Multi-standard
- Repeaters

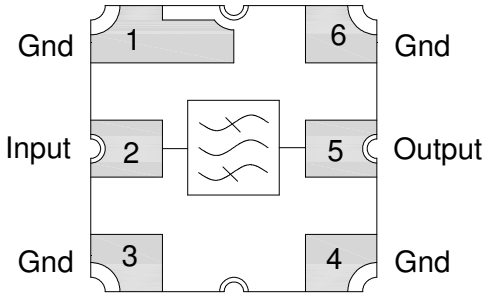


Product Features

- Usable bandwidth 70 MHz
- High attenuation
- Low Loss
- Excellent power handling
- Single-ended operation
- Matching is required for optimum performance at 50Ω
- Small Size: 3.00 x 3.00 x 1.22 mm
- Ceramic Surface Mount Package (SMP)
- Hermetically sealed
- **RoHS** compliant, **Pb**-free

Functional Block Diagram

Top view



General Description

885009 is a general purpose Uplink filter for band 7. This filter was specifically designed in a 3x3mm hermetic package for base station applications and is part of our wide portfolio of RF filters in the same package.

Low insertion loss, coupled with high attenuation and excellent power handling, makes this filter a natural choice for our customers Uplink RF filtering needs.

Pin Configuration

Pin # SE	Description
2	Input
5	Output
1,3,4,6	Case Ground

Ordering Information

Part No.	Description
885009	packaged part
885009-EVB	evaluation board

Standard T/R size = 5000 units/reel.

Specifications for Matched Condition

Electrical Specifications [1]

Specified Temperature Range: [2] -30 to +85 ºC

Parameter [3]	Conditions	Min	Typical [4]	Max	Units
Center Frequency		-	2535	-	MHz
Insertion Loss	At Center Frequency	-	1.3	2.5	dB
Maximum Insertion Loss	2500 – 2570 MHz	-	2.2	3.5	dB
3.5 dB Bandwidth [7]	2500 – 2570 MHz	70	91.5	-	MHz
Lower 3.5 dB Band edge [7]		-	2489	2500	MHz
Upper 3.5 dB Band edge [7]		2570	2580	-	MHz
Amplitude Variation [5]	2500 – 2570 MHz	-	0.92	1.6	dB
Amplitude Ripple [6]	2500 – 2570 MHz	-	0.41	1.4	dB p-p
Amplitude Ripple (any 5 MHz in passband) [6]	2500 – 2570 MHz	-	0.36	0.8	dB p-p
Phase Ripple	2500 – 2570 MHz	-	36	55	deg p-p
Group Delay Ripple	2500 – 2570 MHz	-	14	25	ns p-p
Absolute Group Delay	2500 – 2570 MHz	-	0.014	0.02	µs
Temperature Drift [8]	2500 – 2570 MHz	-	0.25	0.35	dB
EVM (Any 3.84 MHz Channel)	2502.5 to 2567.5 MHz	-	1.2	2	%
IIP3(Tones 5 MHz separated, power > 5 dBm per tone)	2500 – 2570 MHz	44	47	-	dBm
Stopband Attenuation[7]	70 – 120 MHz	25	56	-	dB
	300 – 500 MHz	30	45	-	dB
	1784 – 1854 MHz	45	54	-	dB
	2110 – 2170 MHz	34	41	-	dB
	2321 – 2391 MHz	15	32	-	dB
	2620 – 2673 MHz	20	41	-	dB
	2673 – 2695 MHz	30	40	-	dB
	3926 – 4782 MHz	20	27	-	dB
Input/Output VSWR	2500 – 2570 MHz	-	1.5	2.1	-
Source/Load Impedance [9]	Single-ended	-	50	-	Ω

Notes:
1. All specifications are based on the TriQuint schematic for the main reference design shown on page 4
2. In production, devices will be tested at room temperature to a guardbanded specification to ensure electrical compliance over temperature
3. Electrical margin has been built into the design to account for the variations due to temperature drift and manufacturing tolerances
4. Typical values are based on average measurements at room temperature
5. Describes the total variation over the defined frequency range
6. This is defined as the worst difference between a peak and adjacent valley within defined frequency points
7. Relative to zero dB
8. Temperature Drift specification is defined on Page 4 and is guaranteed by design and won't be measured in production.
9. This is the optimum impedance in order to achieve the performance shown

Absolute Maximum Ratings (Operation of this device outside the parameter ranges given above may cause permanent damage.)

Parameter	Rating
Operable Temperature	-40 to +125 ºC
Storage Temperature	-40 to +125 ºC
Input Power (10Khrs @ 55 ºC under CW signal) [10]	+30 dBm

10. This filter is also able to sustain an instantaneous 35 dBm signal without decay.

Specifications for Matched Condition

Electrical Specifications [1]

Specified Temperature Range: [2] -40 to +85 ºC

Parameter [3]	Conditions	Min	Typical [4]	Max	Units
Center Frequency		-	2535	-	MHz
Insertion Loss	At Center Frequency	-	1.3	2.75	dB
Maximum Insertion Loss	2500 – 2570 MHz	-	2.2	3.75	dB
3.75 dB Bandwidth [7]	2500 – 2570 MHz	70	92.2	-	MHz
Lower 3.75 dB Band edge [7] Upper 3.75 dB Band edge [7]		- 2570	2490 2582	2500 -	MHz MHz
Amplitude Variation [5]	2500 – 2570 MHz	-	0.92	1.7	dB
Amplitude Ripple [6]	2500 – 2570 MHz	-	0.41	1.5	dB p-p
Amplitude Ripple (any 5 MHz in passband) [6]	2500 – 2570 MHz	-	0.36	0.9	dB p-p
Phase Ripple	2500 – 2570 MHz	-	36	60	deg p-p
Group Delay Ripple	2500 – 2570 MHz	-	14	30	ns p-p
Absolute Group Delay	2500 – 2570 MHz	-	0.014	0.02	µs
Temperature Drift [8]	2500 – 2570 MHz	-	0.25	0.38	dB
EVM (Any 3.84 MHz Channel)	2502.5 to 2567.5 MHz	-	1.2	2.2	%
IIP3(Tones 5 MHz separated, power > 5 dBm per tone)	2500 – 2570 MHz	44	47	-	dBm
Stopband Attenuation[7]	70 – 120 MHz	25	56	-	dB
	300 – 500 MHz	30	45	-	dB
	1784 – 1854 MHz	45	54	-	dB
	2110 – 2170 MHz	34	41	-	dB
	2321 – 2391 MHz	15	32	-	dB
	2620 – 2673 MHz	20	41	-	dB
	2673 – 2695 MHz	30	40	-	dB
	3926 – 4782 MHz	20	27	-	dB
Input/Output VSWR	2500 – 2570 MHz	-	1.5	2.2	-
Source/Load Impedance [9]	Single-ended	-	50	-	Ω

Notes:
1. All specifications are based on the TriQuint schematic for the main reference design shown on page 4
2. In production, devices will be tested at room temperature to a guardbanded specification to ensure electrical compliance over temperature
3. Electrical margin has been built into the design to account for the variations due to temperature drift and manufacturing tolerances
4. Typical values are based on average measurements at room temperature
5. Describes the total variation over the defined frequency range
6. This is defined as the worst difference between a peak and adjacent valley within defined frequency points
7. Relative to zero dB
8. Temperature Drift specification is defined on Page 4 and is guaranteed by design and won't be measured in production.
9. This is the optimum impedance in order to achieve the performance shown

Temperature Drift Equations:

$$\text{Temp Drift}_{high} = \left| \frac{\max(T_{ambient} - T_{hot}) - \min(T_{ambient} - T_{hot})}{2} \right|$$

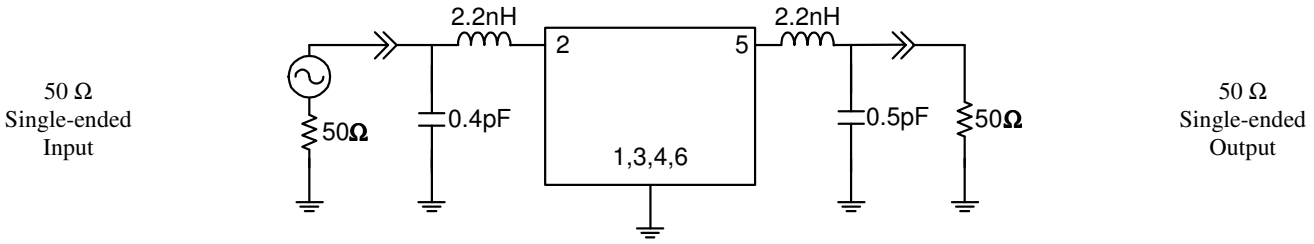
$$\text{Temp Drift}_{low} = \left| \frac{\max(T_{ambient} - T_{cold}) - \min(T_{ambient} - T_{cold})}{2} \right|$$

Temperature Drift Terms Defined:

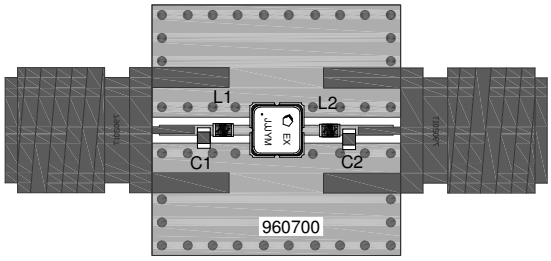
$T_{ambient}$ - Transmission power in dB measured at +25 degrees C.
T_{hot} - Transmission power in dB measured at +85 degrees C.
T_{cold} - Transmission power in dB measured at -40 degrees C.
Temperature Drift - Greater of Temp Drift_{high} vs Temp Drift_{low}

Reference Design

Schematic

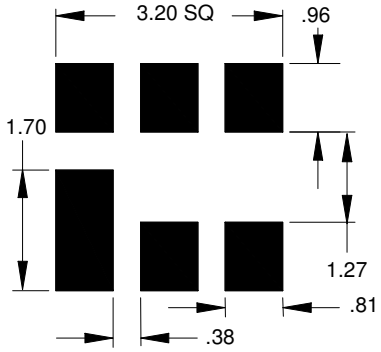


PC Board



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 Desg.	Value	Description	Manufacturer	Part Number
L1	2.2nH	Coil Wire-wound, 0402, 5%	Murata	LQW15AN2N2J00
L2	2.2nH	Coil Wire-wound, 0402, 5%	Murata	LQW15AN2N7J00
C1	0.4pF	Chip Capacitor, 0402, 5%	Murata	GRM1555C1HR40WA01
C2	0.5pF	Chip Capacitor, 0402, 5%	Murata	GRM1555C1HR50WA01
SMA	N/A	SMA connector	Radiall USA Inc.	9602-1111-018
PCB	N/A	3-layer	multiple	960700

Specifications for Unmatched Condition

Electrical Specifications [1]

Specified Temperature Range: (2) -30 to +85 ºC

Parameter [3]	Conditions	Min	Typical [4]	Max	Units
Center Frequency		-	2535	-	MHz
Insertion Loss	At Center Frequency	-	1.9	2.75	dB
Maximum Insertion Loss	2500 – 2570 MHz	-	2.4	3.5	dB
3.5 dB Bandwidth [7]	2500 – 2570 MHz	70	93.2	-	MHz
Lower 3.5 dB Band edge [7]		-	2489	2500	MHz
Upper 3.5 dB Band edge [7]		2570	2582	-	MHz
Amplitude Variation [5]	2500 – 2570 MHz	-	1.05	1.8	dB
Amplitude Ripple [6]	2500 – 2570 MHz	-	0.5	1.5	dB p-p
Amplitude Ripple (any 5 MHz in passband) [6]	2500 – 2570 MHz	-	0.4	0.9	dB p-p
Phase Ripple	2500 – 2570 MHz	-	36	65	deg p-p
Group Delay Ripple	2500 – 2570 MHz	-	14	30	ns p-p
Absolute Group Delay	2500 – 2570 MHz	-	0.014	0.02	µs
EVM (Any 3.84 MHz Channel)	2502.5 to 2567.5 MHz	-	1.3	2.5	%
Stopband Attenuation[7]	70 – 120 MHz	25	56	-	dB
	300 – 500 MHz	30	44	-	dB
	1784 – 1854 MHz	45	54	-	dB
	2110 – 2170 MHz	34	42	-	dB
	2321 – 2391 MHz	15	33	-	dB
	2391 – 2465 MHz	20	41	-	dB
	2620 – 2673 MHz	20	40	-	dB
	2673 – 2695 MHz	30	27	-	dB
	2695 – 5000 MHz	20	25	-	dB
Input/Output VSWR	2500 – 2570 MHz	-	2.4	-	-
Source/Load Impedance [8]	Single-ended	-	50	-	Ω

Notes:

1. All specifications are based on the TriQuint schematic for the main reference design shown below
2. In production, devices will be tested at room temperature to a guardbanded specification to ensure electrical compliance over temperature
3. Electrical margin has been built into the design to account for the variations due to temperature drift and manufacturing tolerances
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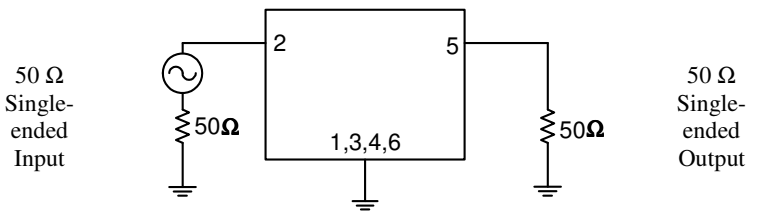
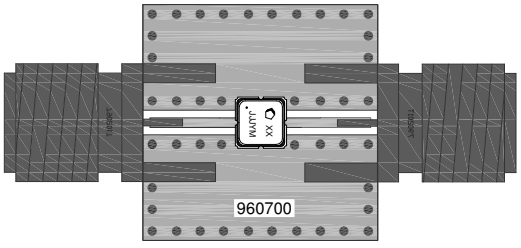
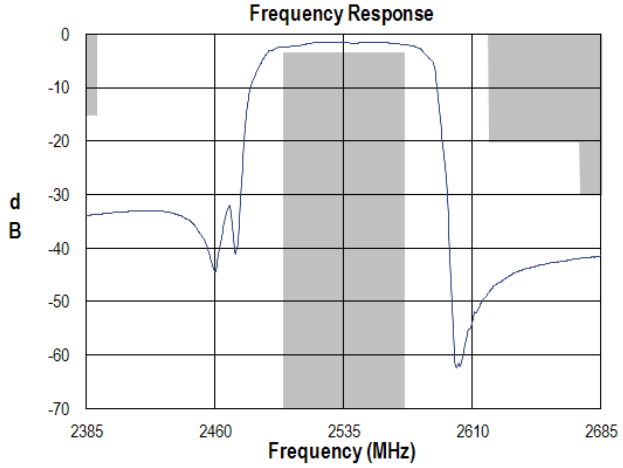
6. This is defined as the worst difference between a peak and adjacent valley within defined frequency points
7. Relative to zero dB
8. This is the optimum impedance in order to achieve the performance shown



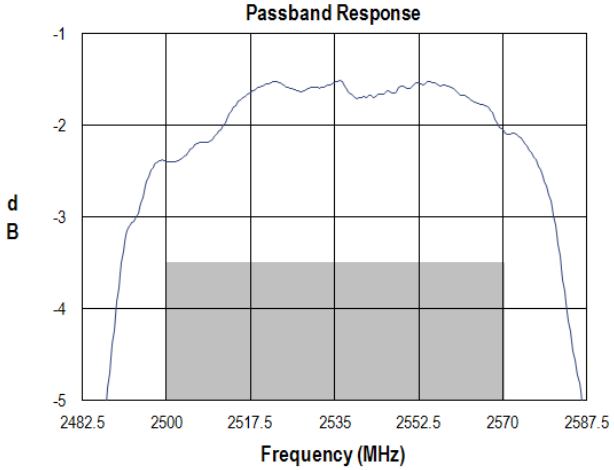


Typical Performance Matched (at room temperature)

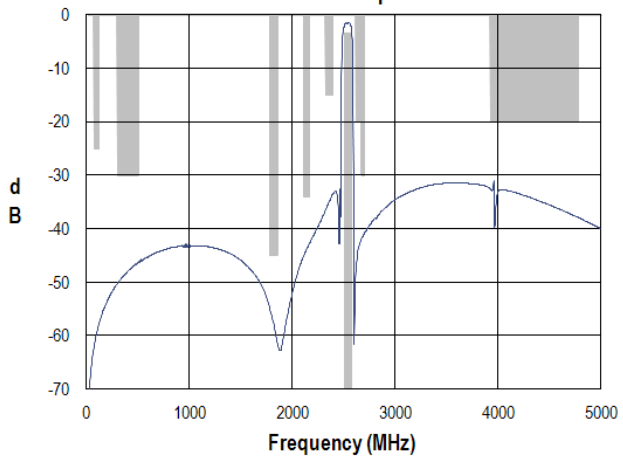
Frequency Response



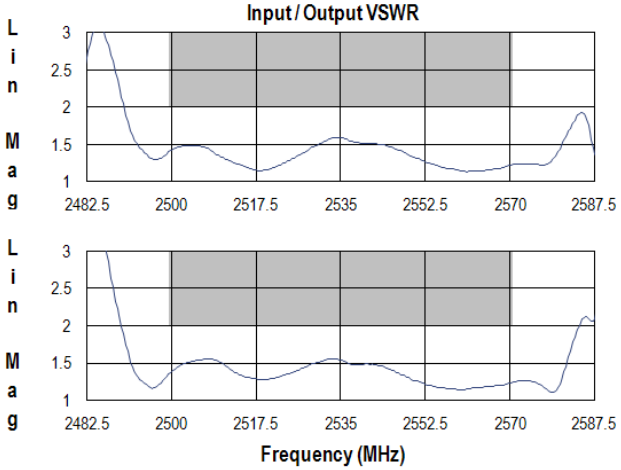
Passband Response



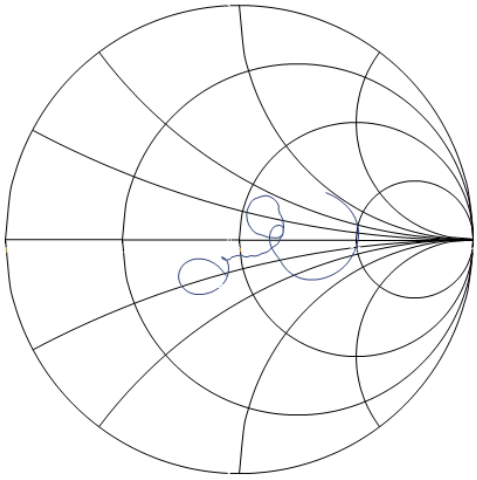
Wideband Response



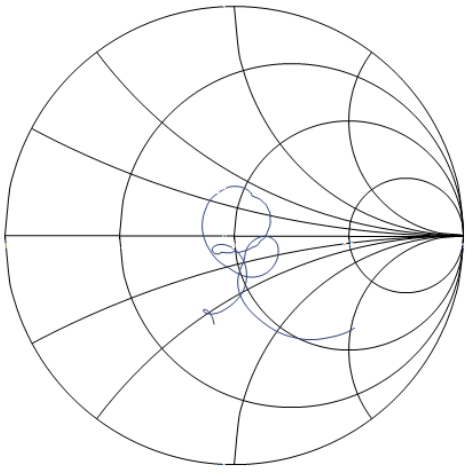
Input / Output VSWR



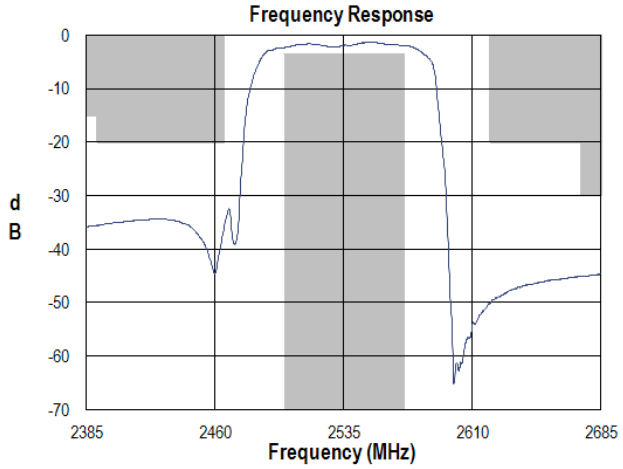
Input Smith Chart

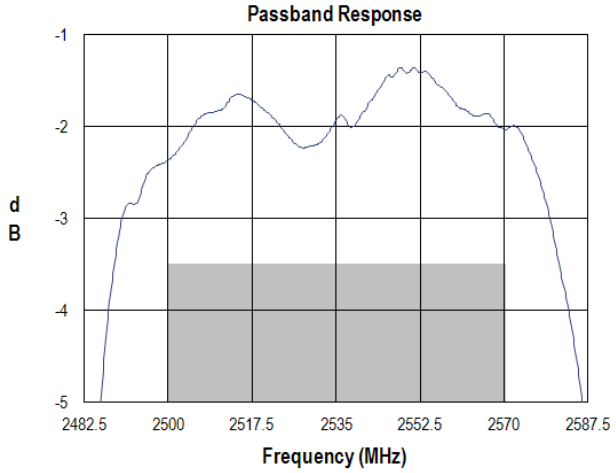


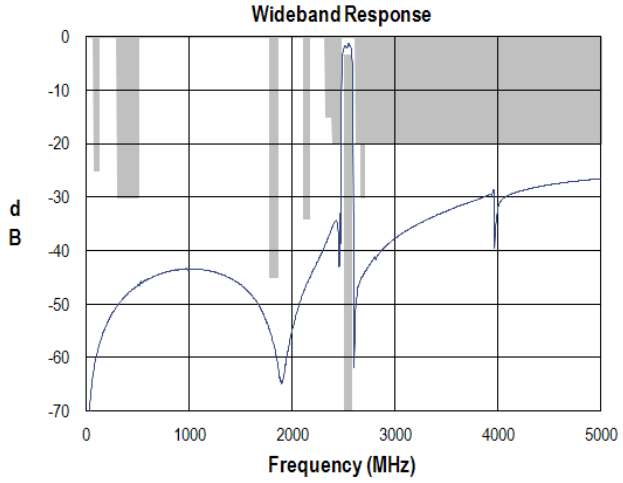
Output Smith Chart

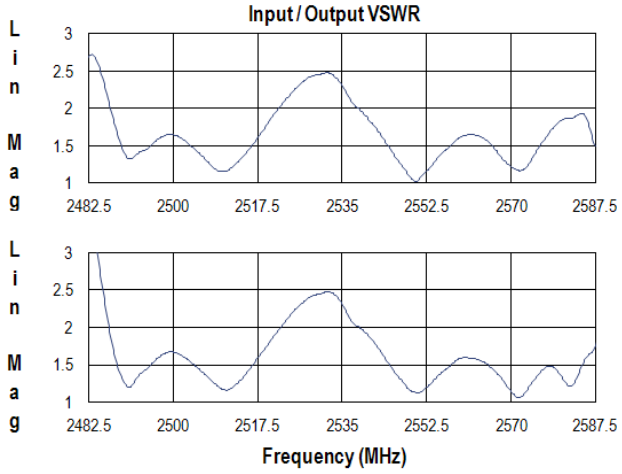


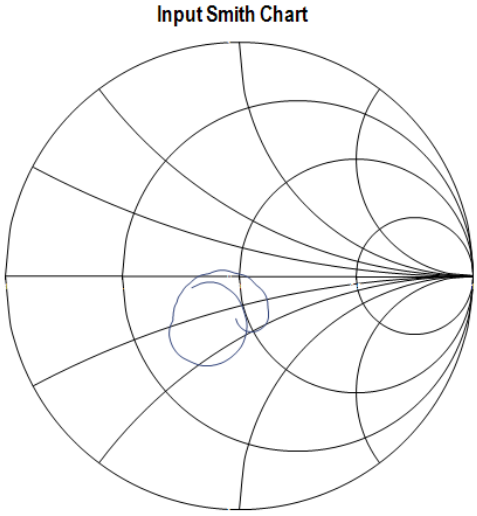
Typical Performance Unmatched (at room temperature)

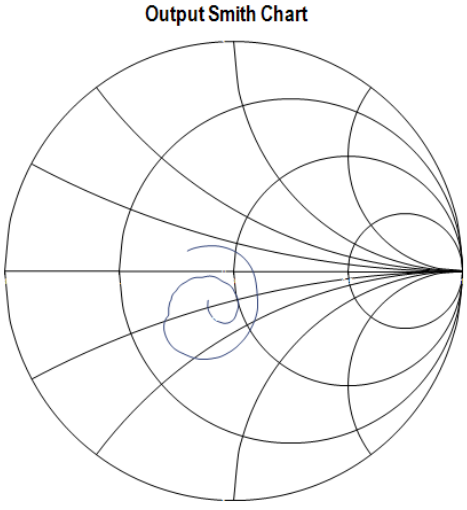






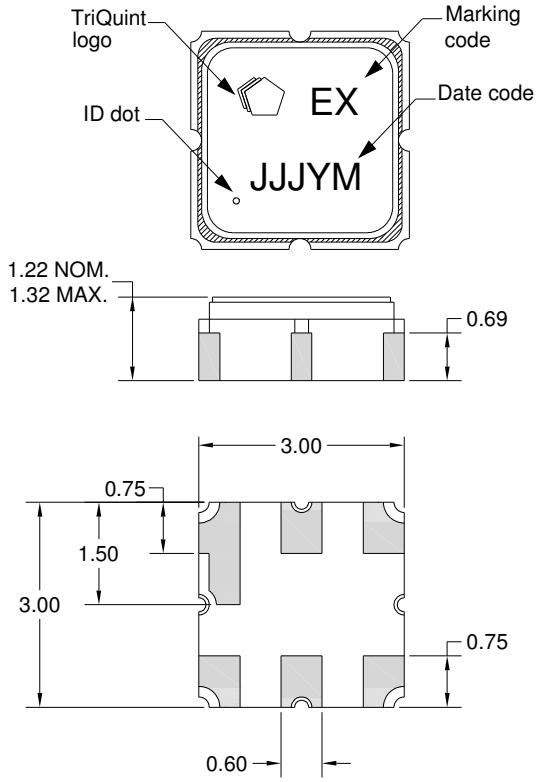






Mechanical Information

Package Information, Dimensions and Marking



Package Style: SMP-12A
Dimensions: 3.00 x 3.00 x 1.22 mm

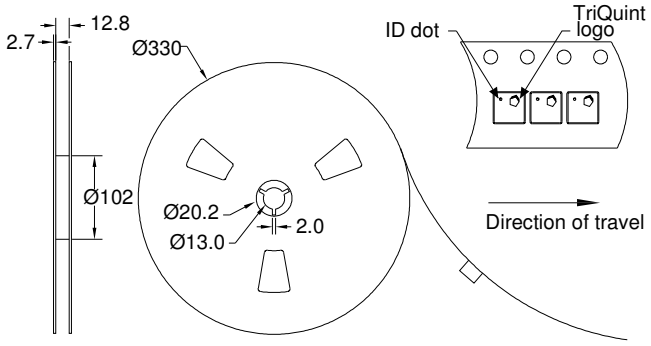
Body: Al_2O_3 ceramic
Lid: *Kovar*, *Ni* plated
Terminations: *Au* plating 0.5 - 1.0µm, over a 2-6µm *Ni* plating

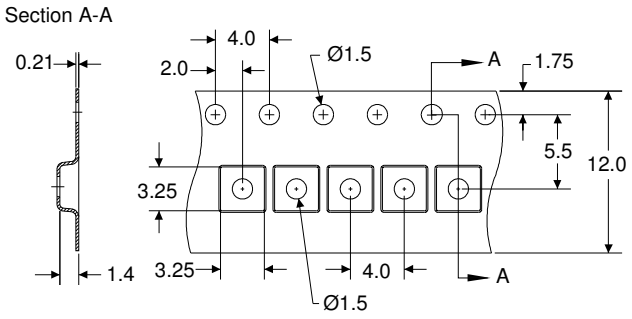
All dimensions shown are nominal in millimeters
All tolerances are ±0.15mm except overall length and width ±0.10mm

The date code consists of day of the current year (Julian, 3 digits), Y = last digit of the year, and M = manufacturing site code

Tape and Reel Information

Standard T/R size = 5000 units/reel. All dimensions are in millimeters





Product Compliance Information

ESD Information

Caution! ESD-Sensitive Device

ESD Rating: 0
Value: Passes ≥ 200 V min.
Test: Human Body Model (HBM)
Standard: JEDEC Standard JESD22-A114

ESD Rating: A
Value: Passes ≥ 150 V min.
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 ($C_{15}H_{12}Br_4O_2$) Free
- PFOS Free
- SVHC Free

Contact Information

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

Web: www.triquint.com **Tel:** +1.407.886.8860
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Email: flapplication.engineering@tqs.com

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