
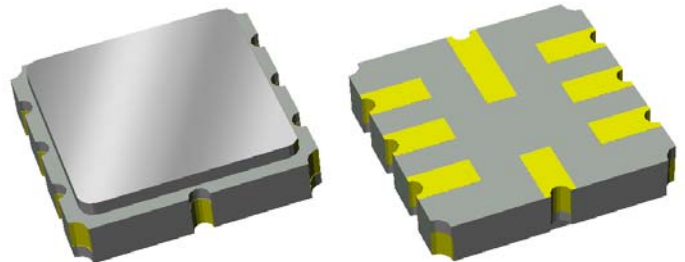


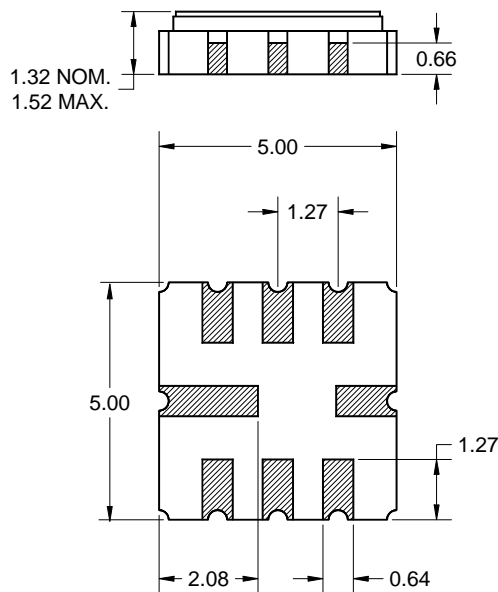
**Features**

- Usable 1 dB bandwidth of 20 MHz
- Small Size
- Low Loss
- Single Ended Operation at 50 Ω
- Single-ended input \ balanced output at 200 Ω
- Ceramic Surface Mount Package (SMP)
- Hermetic
- RoHS compliant (2002/95/EC), **Pb-free** 



**Package**

Surface Mount 5.00 x 5.00 x 1.32 mm  
SMP-20

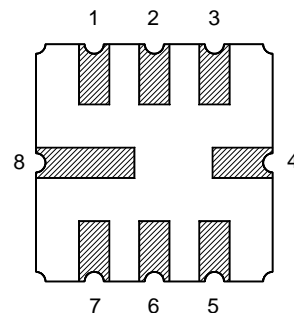


Dimensions shown are nominal in millimeters  
All tolerances are ±0.15mm except overall  
length and width ±0.10mm

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

**Pin Configuration**

Bottom View



**Single-Ended Configuration**

Pin No.	Description
3	Input
7	Output
1,2,5,6	Ground
5,4,8	Case Ground

**SE-Balanced Configuration**

Pin No.	Description
7	Input +
3	Output +
2	Output -
1,6,5	Ground
4,8	Case Ground

**Electrical Specifications <sup>(1)</sup>**

Operating Temperature Range: <sup>(2)</sup> -20 to +80 °C

Parameter <sup>(3)</sup>	Minimum	Typical <sup>(4)</sup>	Maximum	Unit
<b>Center Frequency</b>	-	172.8	-	MHz
<b>Minimum Insertion Loss</b> 162.80 – 182.80 MHz	-	8.0	9.0	dB
<b>1.0 dB Bandwidth <sup>(5)</sup></b>	20	25.9	-	MHz
<b>Amplitude Variation <sup>(6)</sup></b> 162.80 – 182.80 MHz	-	0.6	1.0	dB
<b>Group Delay Ripple <sup>(6, 7)</sup></b> 162.80 – 182.80 MHz	-	22	40	nsec
<b>Relative Attenuation <sup>(5, 6)</sup></b> 10 – 100.00 MHz	50	50	-	dB
100.00 – 153.30 MHz	33	39	-	dB
153.30 – 154.80 MHz	20	33	-	dB
154.80 – 157.80 MHz	3	6	-	dB
187.80 – 190.80 MHz	2	4	-	dB
190.80 – 194.30 MHz	19	28	-	dB
194.30 – 198.30 MHz	30	34	-	dB
198.30 – 250.00 MHz	33	40	-	dB
250.00 – 310.00 MHz	40	59	-	dB
310.00 – 410.00 MHz	50	60	-	dB
410.00 – 1000.0 MHz	55	60	-	dB
<b>Input /Output Return Loss</b> 162.8 – 182.8 MHz	10	14	-	dB
<b>EVM</b> 162.8 – 167.8 MHz	-	1.0	2.7	%
167.8 – 172.8 MHz	-	1.1	2.7	%
172.8 – 177.8 MHz	-	1.3	2.7	%
177.8 – 182.8 MHz	-	1.6	2.7	%
<b>Source Impedance (single-ended) <sup>(8)</sup></b>	-	50	-	Ω
<b>Load Impedance (single-ended) <sup>(8)</sup></b>	-	50	-	Ω
<b>Load Impedance (balanced) <sup>(8)</sup></b>	-	200	-	Ω

**Notes:**

1. All specifications are based on the TriQuint test circuit matching schematics 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. All attenuation measurements are referenced to Minimum Insertion Loss
6. Bandedge frequency points include manufacturing and temperature variation.
7. Describes the maximum peak to adjacent valley variation over the defined frequency range.
8. This is the optimum impedance in order to achieve the performance shown

**Electrical Specifications <sup>(1)</sup>**

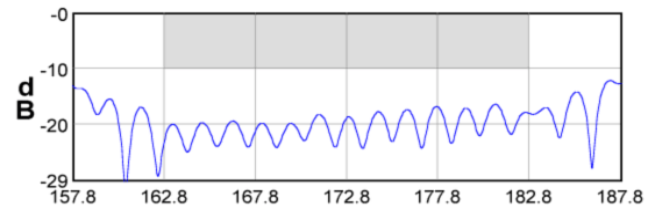
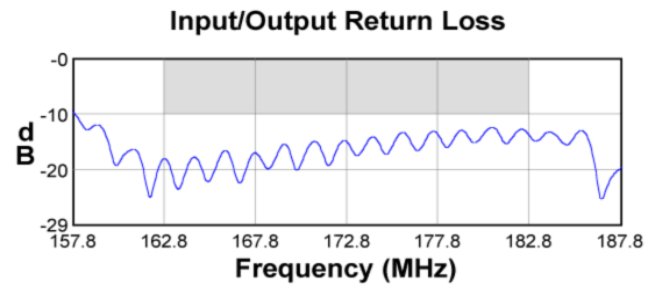
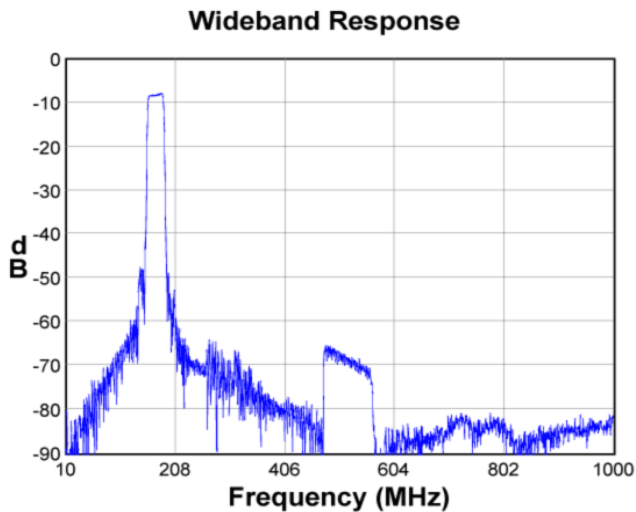
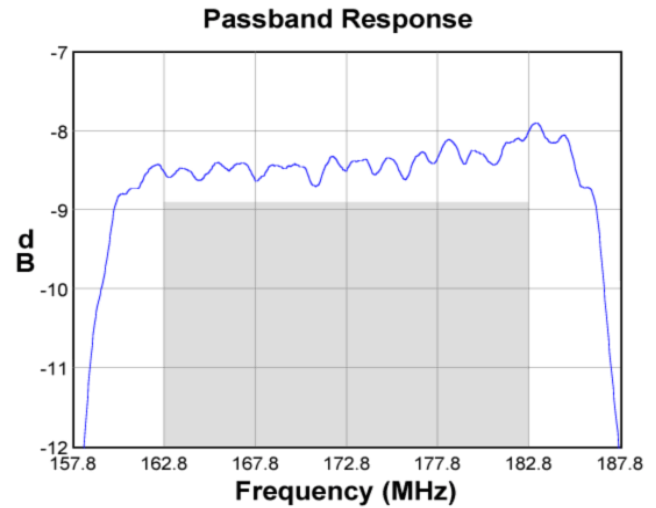
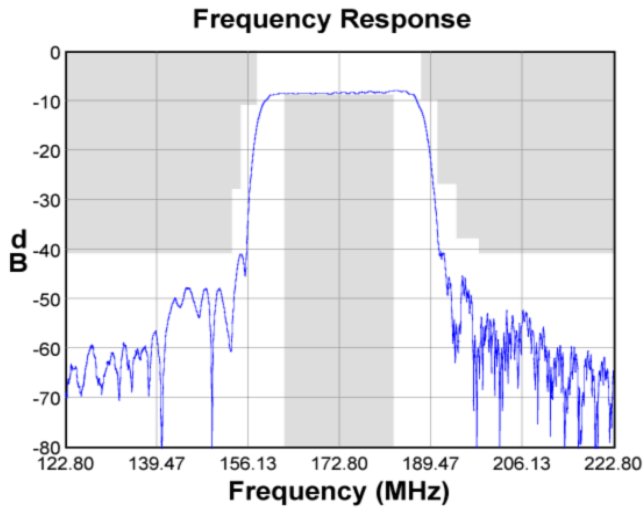
Operating Temperature Range: <sup>(2)</sup> -40 to +85 °C

Parameter <sup>(3)</sup>	Minimum	Typical <sup>(4)</sup>	Maximum	Unit
<b>Center Frequency</b>	-	172.8	-	MHz
<b>Minimum Insertion Loss</b> 162.8 – 182.8 MHz	-	8.0	9.0	dB
<b>1.0 dB Bandwidth <sup>(5)</sup></b>	20	25.9	-	MHz
<b>Amplitude Variation <sup>(6)</sup></b> 162.8 – 182.8 MHz	-	0.6	1.2	dB
<b>Group Delay Ripple <sup>(6, 7)</sup></b> 162.8 – 182.8 MHz	-	22	50	nsec
<b>Relative Attenuation <sup>(5, 6)</sup></b> 10 – 100.00 MHz	50	50	-	dB
100.00 – 153.30 MHz	33	39	-	dB
153.30 – 154.80 MHz	19	33	-	dB
154.80 – 157.80 MHz	2.5	6	-	dB
187.80 – 190.80 MHz	1.5	4	-	dB
190.80 – 194.30 MHz	14	28	-	dB
194.30 – 198.30 MHz	29	34	-	dB
198.30 – 250.00 MHz	33	40	-	dB
250.00 – 310.00 MHz	40	59	-	dB
310.00 – 410.00 MHz	50	60	-	dB
410.00 – 1000.0 MHz	55	60	-	dB
<b>Input /Output Return Loss</b> 162.8 – 182.8 MHz	10	14	-	dB
<b>EVM</b> 162.8 – 167.8 MHz	-	1.0	3.5	%
167.8 – 172.8 MHz	-	1.1	3.5	%
172.8 – 177.8 MHz	-	1.3	3.5	%
177.8 – 182.8 MHz	-	1.6	3.5	%
<b>Source Impedance (single-ended) <sup>(8)</sup></b>	-	50	-	Ω
<b>Load Impedance (single-ended) <sup>(8)</sup></b>	-	50	-	Ω
<b>Load Impedance (balanced) <sup>(8)</sup></b>	-	200	-	Ω

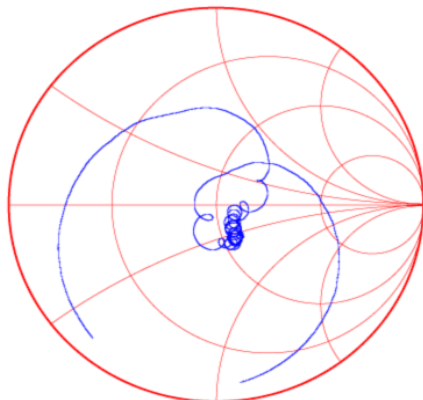
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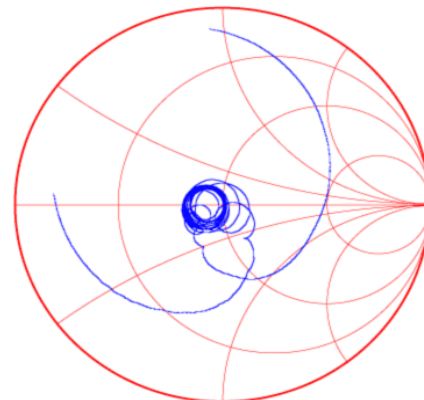
**Typical Performance (at room temperature)**



**Input Smith Chart**

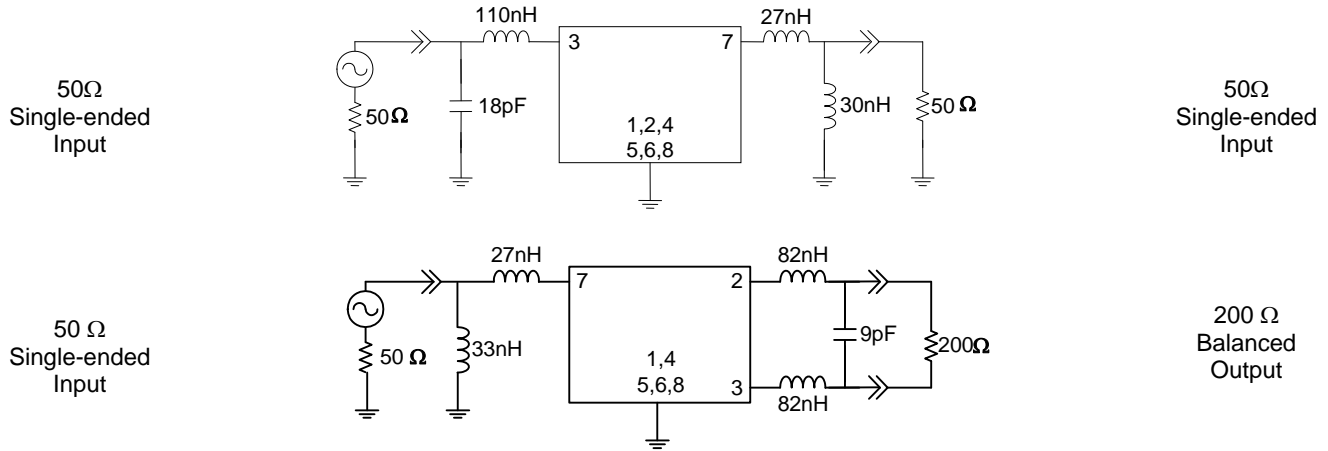


**Output Smith Chart**

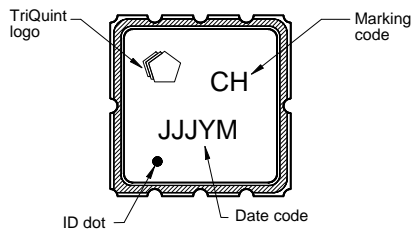


**Matching Schematics**

Actual matching values may vary due to PCB layout and parasitics

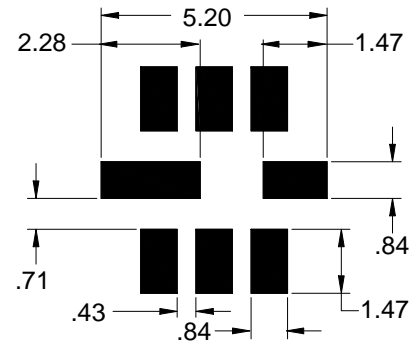


**Marking**



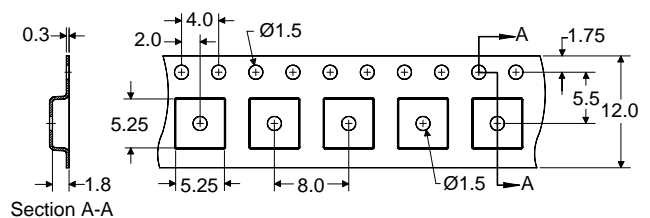
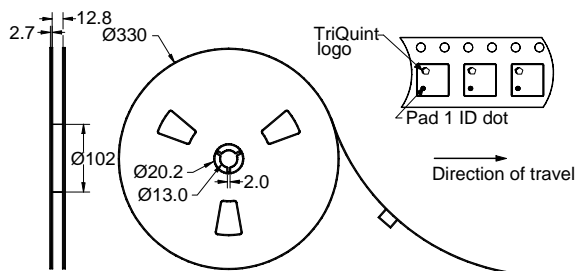
The date code consists of: JJJ = Julian day,  
Y = last digit of year, M = manufacturing site code

**PCB Footprint**



This footprint represents a recommendation only  
Dimensions shown are nominal in millimeters

**Tape and Reel**




Dimensions shown are nominal in millimeters  
Packaging quantity: 4000 units/reel

### Maximum Ratings


Parameter	Symbol	Minimum	Maximum	Unit
Operating Temperature Range	T	-40	+85	°C
Storage Temperature Range	T <sub>stg</sub>	-40	+85	°C

### Important Notes

#### Warnings

- Electrostatic Sensitive Device (ESD) 
- Avoid ultrasonic exposure

#### RoHS Compliance

- This product complies with EU directive 2002/95/EC (RoHS) 

#### Solderability

- Compatible with JESD22-B102, Pb-free process, 260C peak reflow temperature ([see soldering profile](#))

### Links to Additional Technical Information

[PCB Layout Tips](#)

[Qualification Flowchart](#)

[Soldering Profile](#)

[S-Parameters](#)

[RoHS Information](#)

[Other Technical Information](#)

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