
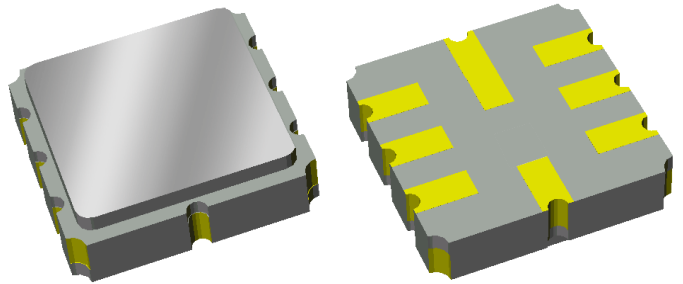


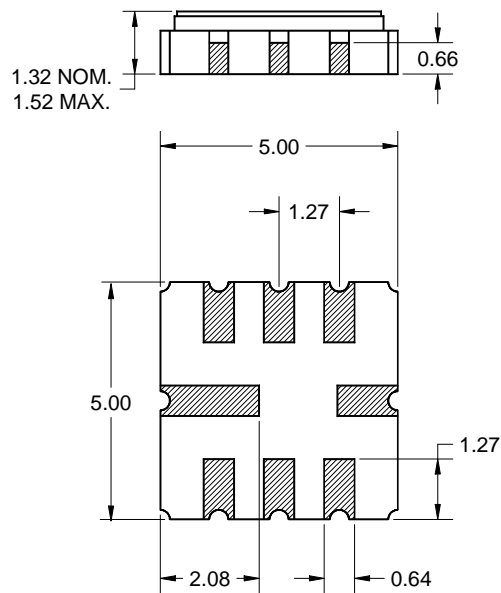
## Features

- For WCDMA applications
- Usable 1 dB bandwidth of 20 MHz
- Low loss
- Single-ended operation at 50  $\Omega$
- Single-ended input \ balanced output at 200  $\Omega$
- 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-20A

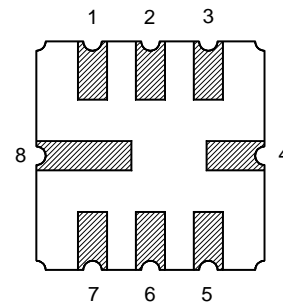


Dimensions shown are nominal in millimeters  
All tolerances are  $\pm 0.15$ mm except overall  
length and width  $+0.15/-0.10$ mm

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

## Pin Configuration

Bottom View



### SE - Balanced Configuration

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

### Single-ended Configuration

Pin No.	Description
3	Input
7	Output
1,2,5,6	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>	-	168.5	-	MHz
<b>Minimum Insertion Loss</b> 158.5 – 178.5 MHz	-	8.0	9.0	dB
<b>1.0 dB Bandwidth</b>	22	26.4	-	MHz
<b>Amplitude Variation</b> 158.5 – 178.5 MHz	-	0.6	1.0	dB
<b>Group Delay Ripple</b> 158.5 – 178.5 MHz 160.5 – 176.5 MHz	- -	20 20	40 40	nsec nsec
<b>Relative Attenuation <sup>(5)</sup></b> 10 – 100 MHz 100 – 149 MHz 149 – 150.5 MHz 150.5 – 153.5 MHz 183.5 – 186.5 MHz 186.5 – 190 MHz 190 – 250 MHz 250 – 310 MHz 310 – 410 MHz 410 – 1000 MHz	50 33 20 3 2 19 33 40 50 55	61 41 32 6.5 4.5 32 42 56 59 59	- - - - - - - - - -	dB dB dB dB dB dB dB dB dB dB
<b>Input/Output Return Loss</b> 158.5 – 178.5 MHz	10	14	-	dB
<b>EVM</b> 158.5 – 163.5 MHz 163.5 – 168.5 MHz 168.5 – 173.5 MHz 173.5 – 178.5 MHz	- - - -	1.2 1.2 1.2 1.3	2.5 2.6 2.5 2.5	% % % %
<b>Source Impedance (single-ended) <sup>(6)</sup></b>	-	50	-	Ω
<b>Load Impedance (single-ended) <sup>(6)</sup></b>	-	50	-	Ω
<b>Load Impedance (balanced) <sup>(6)</sup></b>	-	200	-	Ω

**Notes:**

1. All specifications are based on the TriQuint test circuit matching schematics shown on page 5
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. Relative to minimum insertion loss
6. This is the optimum impedance in order to achieve the performance shown

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

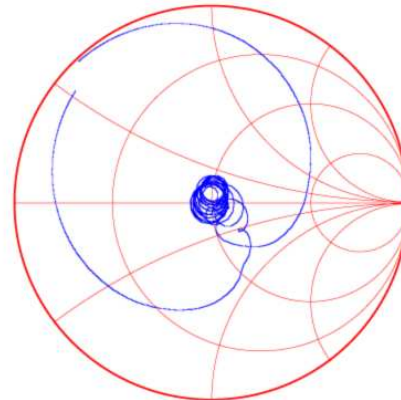
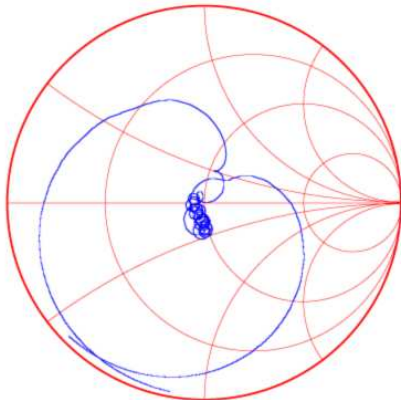
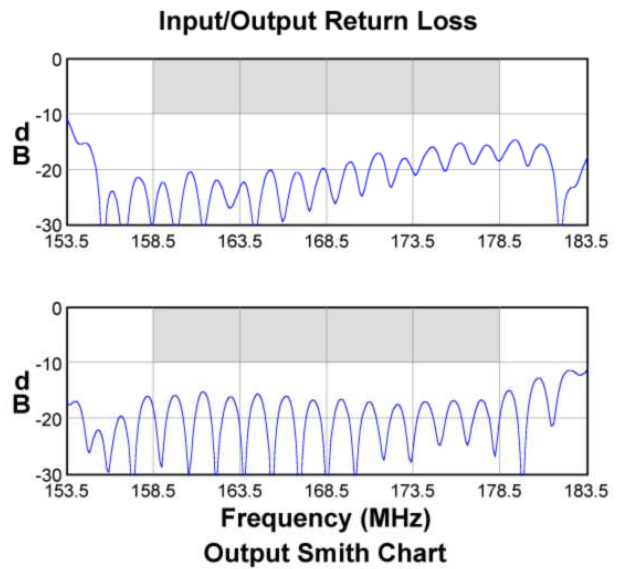
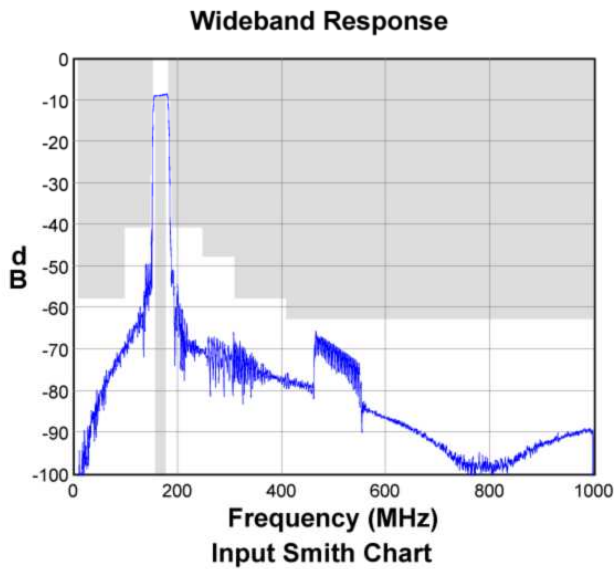
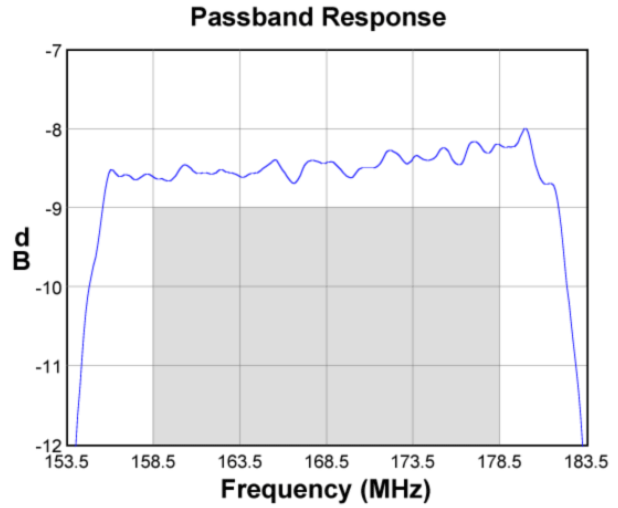
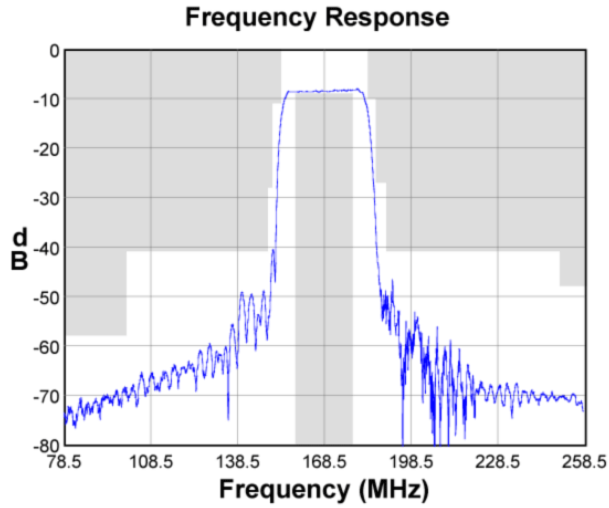
Operating Temperature Range: <sup>(2)</sup> -40 to +85 °C

Parameter <sup>(3)</sup>	Minimum	Typical <sup>(4)</sup>	Maximum	Unit
<b>Center Frequency</b>	-	168.5	-	MHz
<b>Minimum Insertion Loss</b> 158.5 – 178.5 MHz	-	8.0	9.0	dB
<b>1.0 dB Bandwidth</b>	22	26.4	-	MHz
<b>Amplitude Variation</b> 158.5 – 178.5 MHz	-	0.6	1.0	dB
<b>Group Delay Ripple</b> 158.5 – 178.5 MHz 160.5 – 176.5 MHz	- -	20 20	50 40	nsec nsec
<b>Relative Attenuation <sup>(5)</sup></b> 10 – 100 MHz 100 – 149 MHz 149 – 150.5 MHz 150.5 – 153.5 MHz 183.5 – 186.5 MHz 186.5 – 190 MHz 190 – 250 MHz 250 – 310 MHz 310 – 410 MHz 410 – 1000 MHz	50 33 19 2.5 1.8 16 33 40 50 55	61 41 32 6.5 4.5 32 42 56 59 59	- - - - - - - - - -	dB dB dB dB dB dB dB dB dB dB
<b>Input/Output Return Loss</b> 158.5 – 178.5 MHz	10	14	-	dB
<b>EVM</b> 158.5 – 163.5 MHz 163.5 – 168.5 MHz 168.5 – 173.5 MHz 173.5 – 178.5 MHz	- - - -	1.2 1.2 1.2 1.3	3.5 3.5 3 3	% % % %
<b>Source Impedance (single-ended) <sup>(6)</sup></b> <b>Load Impedance (single-ended) <sup>(6)</sup></b> <b>Load Impedance (balanced) <sup>(6)</sup></b>	- - -	50 50 200	- - -	Ω Ω Ω

**Notes:**

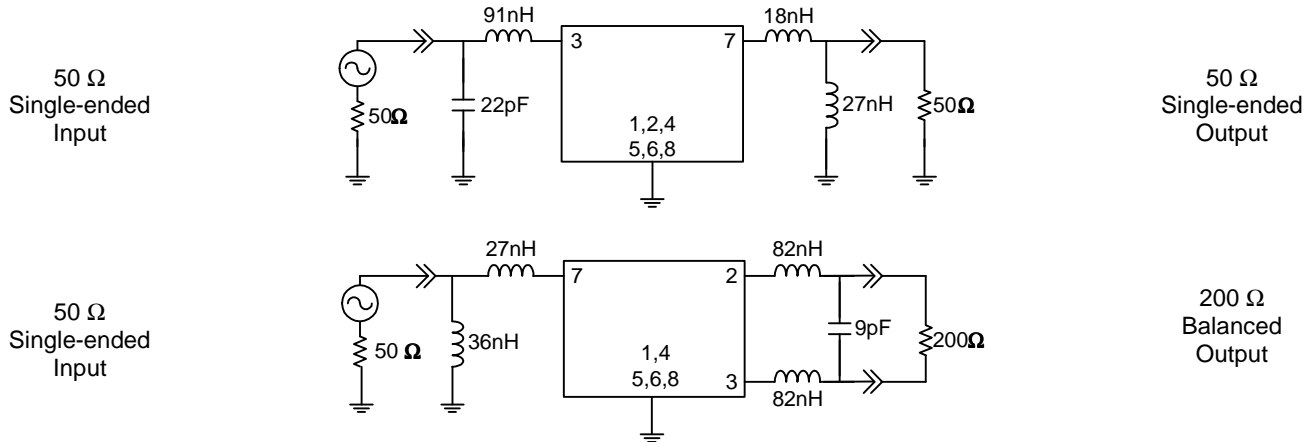
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**Typical Performance (at room temperature)**

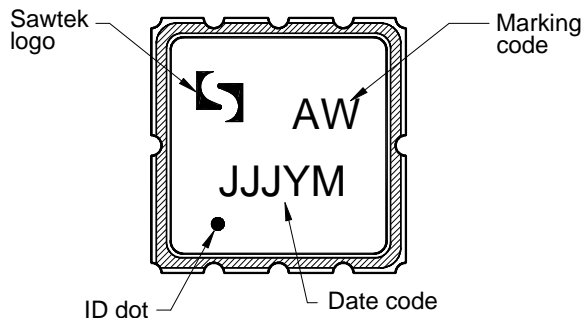


**Matching Schematics**

Actual matching values may vary due to PCB layout and parasitics

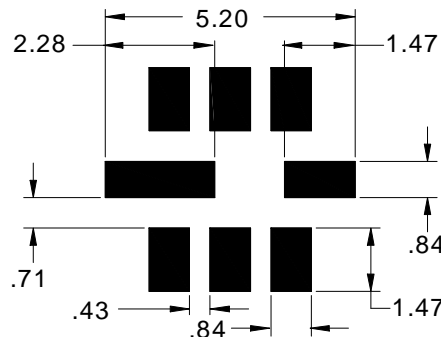


**Marking**



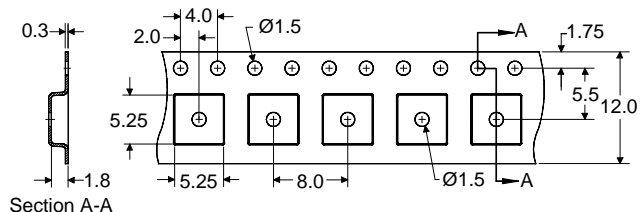
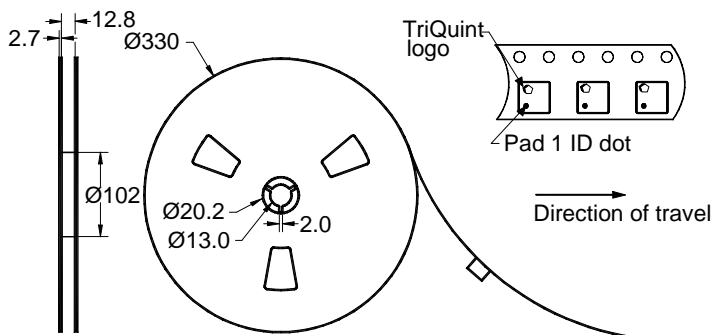
The date code consists of: JJJ = Julian day,  
Y = last digit of year, M = manufacturing site code

**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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