
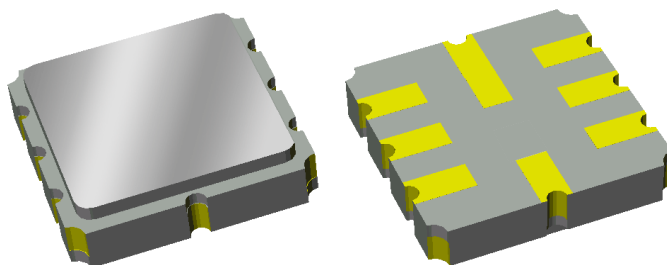


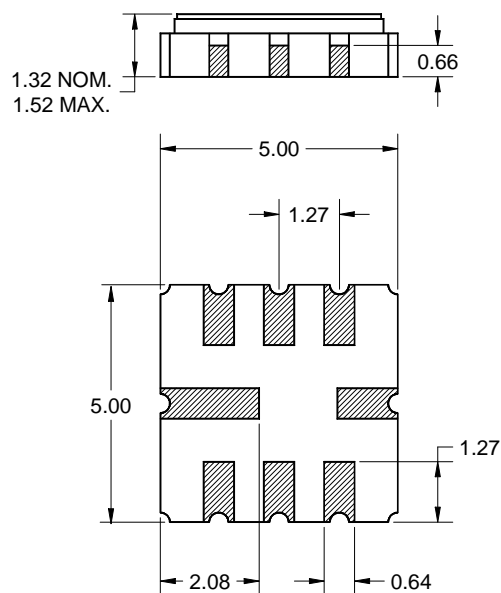
## Features

- For WiBro and WiMAX applications
- Usable bandwidth 10 MHz
- High attenuation
- Balanced operation
- 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

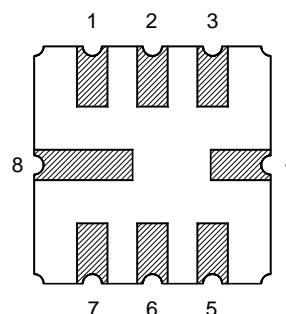


Dimensions shown are nominal in millimeters  
All tolerances are  $\pm 0.15$ mm except overall  
length and width  $+0.15/-0.10$ mm

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



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

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

Operating Temperature Range: <sup>(2)</sup> -20 to +60 °C

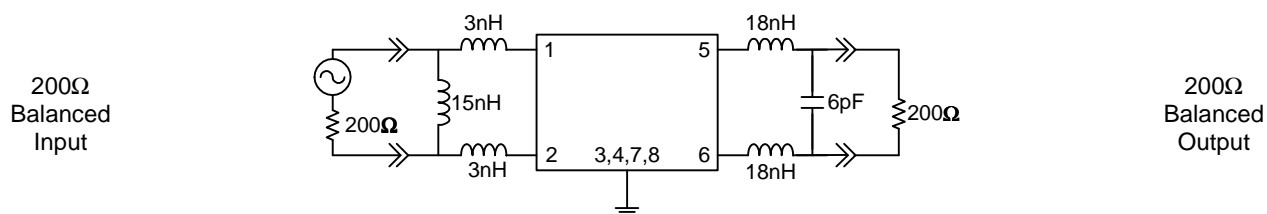
Parameter <sup>(3)</sup>	Minimum	Typical	Maximum	Unit
<b>Center Frequency</b>	-	456	-	MHz
<b>Minimum Insertion Loss</b> 451 - 461 MHz	-	8.3	9.5	dB
<b>Amplitude Variation</b> 451 - 461 MHz	-	0.4	1.25	dB
<b>30 dB Bandwidth <sup>(4)</sup></b>	-	20.1	20.55	MHz
<b>Relative Attenuation <sup>(4)</sup></b>				
10 - 256 MHz	45	70	-	dB
256 - 360 MHz	40	65	-	dB
360 - 421 MHz <sup>(5)</sup>	45	50	-	dB
421 - 440 MHz	37	40	-	dB
472.4 - 491 MHz	39	42	-	dB
491 - 552 MHz <sup>(5)</sup>	45	50	-	dB
552 - 656 MHz	40	55	-	dB
656 - 946 MHz	45	60	-	dB
<b>Absolute Group Delay at Center Frequency</b>	-	0.43	0.45	μsec
<b>Group Delay Variation</b> 451 - 461 MHz	-	35	65	ns
<b>Input/Output Return Loss</b> 451 - 461 MHz	9	14	-	dB
<b>Optimal Source Impedance (Balanced) <sup>(6)</sup></b>	-	200	-	Ω
<b>Optimal Load Impedance (Balanced) <sup>(6)</sup></b>	-	200	-	Ω

**Notes:**

1. All specifications are based on TriQuint test circuit 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
4. Referenced to minimum insertion loss
5. The rejection "floor" in specified ranges allows for 100KHz wide spurious responses at a max peak of 40dB below minimum insertion loss
6. This is the optimum impedance in order to achieve the performance shown

**Test Circuit:**

Actual matching values may vary due to PCB layout and parasitics



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

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

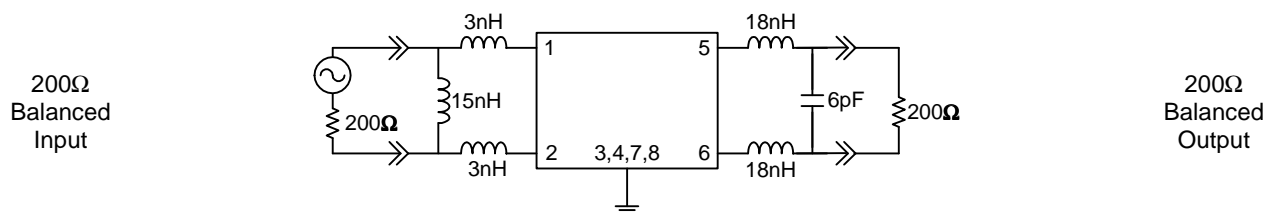
Parameter <sup>(3)</sup>	Minimum	Typical	Maximum	Unit
<b>Center Frequency</b>	-	456	-	MHz
<b>Minimum Insertion Loss</b> 451 - 461 MHz	-	8.3	9.75	dB
<b>Amplitude Variation</b> 451 - 461 MHz	-	0.4	1.25	dB
<b>30 dB Bandwidth <sup>(4)</sup></b>	-	20.1	20.6	MHz
<b>Relative Attenuation <sup>(4)</sup></b>				
10 - 256 MHz	45	70	-	dB
256 - 360 MHz	40	65	-	dB
360 - 421 MHz <sup>(5)</sup>	45	50	-	dB
421 - 440 MHz	37	40	-	dB
472.4 - 491 MHz	38	42	-	dB
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**Notes:**

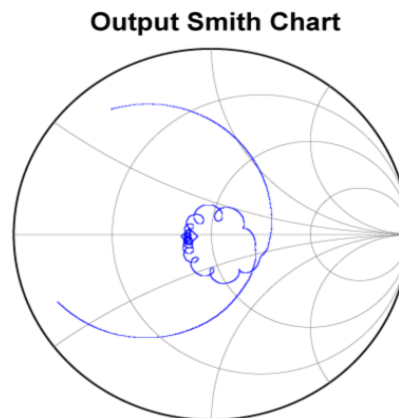
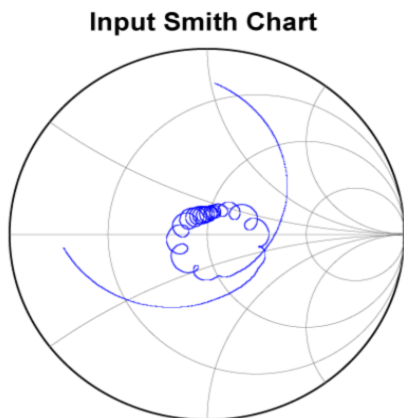
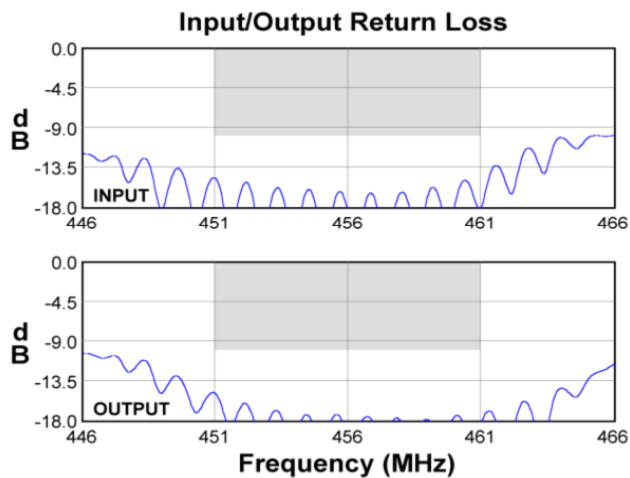
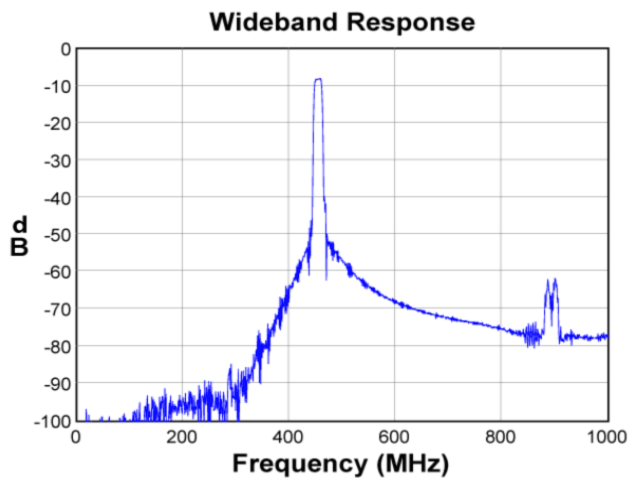
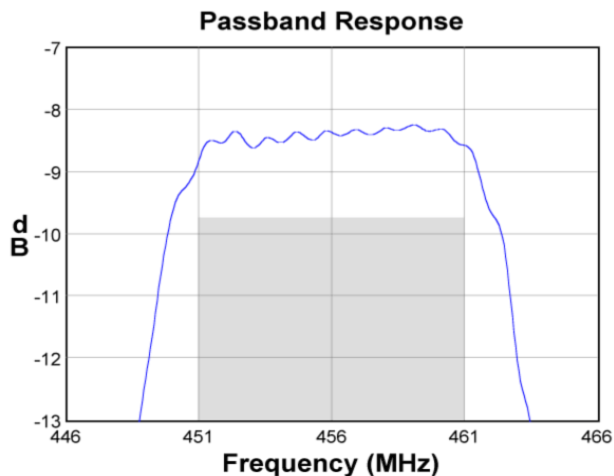
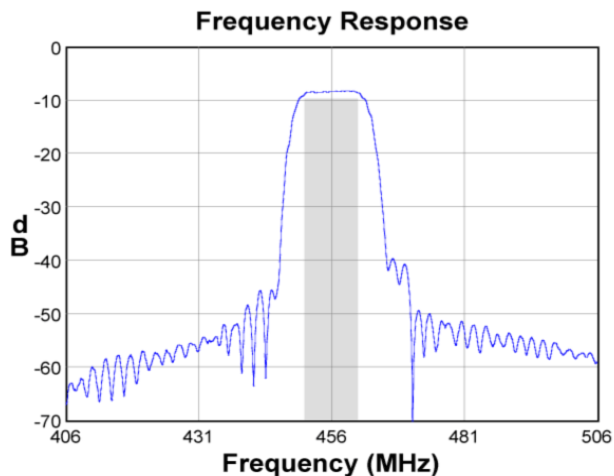
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**Test Circuit:**

Actual matching values may vary due to PCB layout and parasitics

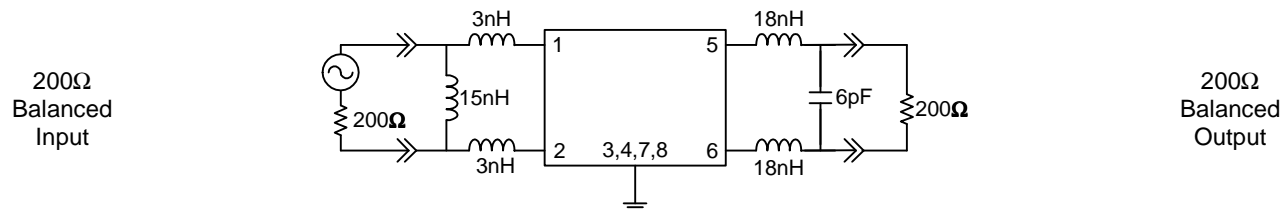


**Typical Performance (at +25°C)**

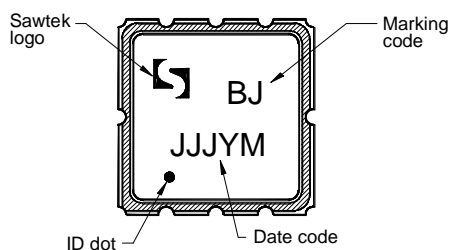


**Matching Schematics**

Actual matching values may vary due to PCB layout and parasitics

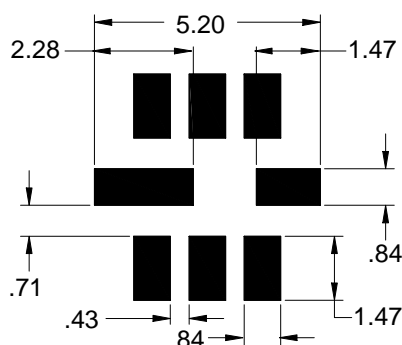


**Marking**



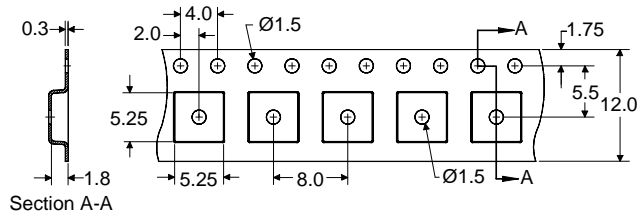
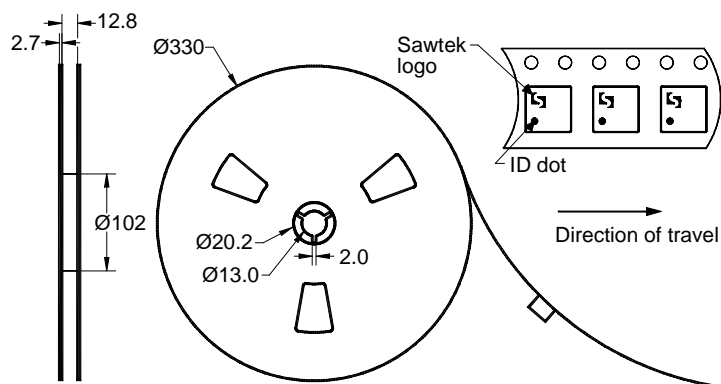
The date code consists of: JJJ = Julian day,  
Y = last digit of year, M = manufacturing site code

**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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