
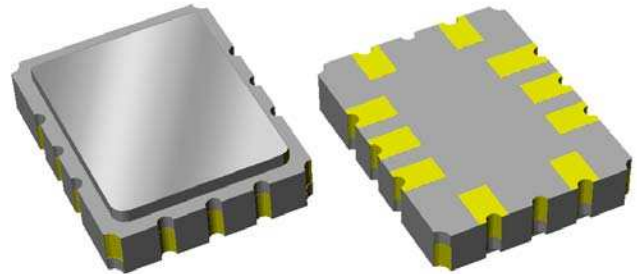


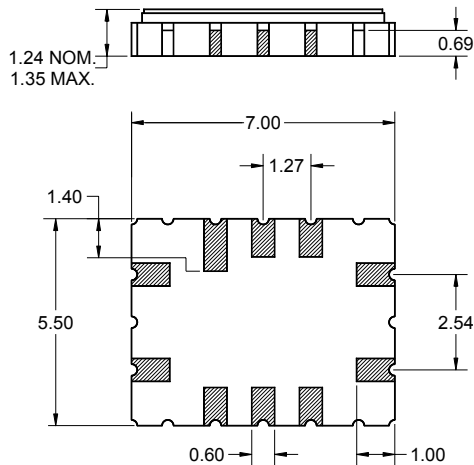
**Features**

- For WiBro and WiMAX applications
- Usable bandwidth 10 MHz
- High attenuation
- Balanced operation 200 Ω
- Ceramic Surface Mount Package (SMP)
- Hermetic
- RoHS compliant (2002/95/EC), Pb-free 



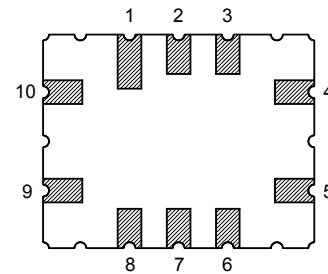
**Package**

Surface Mount 7.00 x 5.50 x 1.24 mm



**Pin Configuration**

Bottom View



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

Dimensions shown are nominal in millimeters  
All tolerances are ±0.15mm except overall  
length and width ±0.13mm

Body: Al<sub>2</sub>O<sub>3</sub> ceramic  
Lid: Kovar, Ni plated  
Terminations: Au plating 0.5 - 1.0µm,  
over a 2 - 6µm Ni plating

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

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

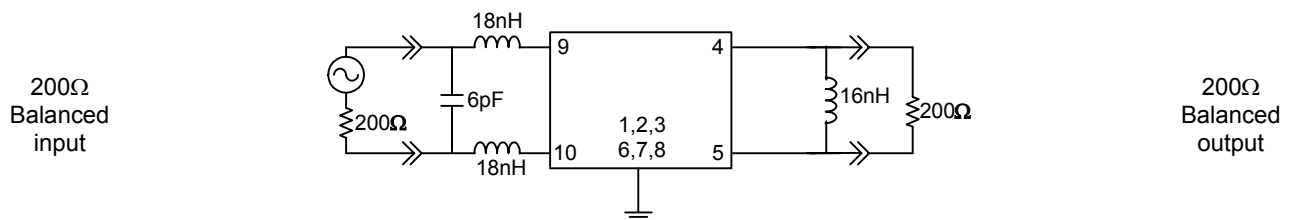
Parameter <sup>(3)</sup>	Minimum	Typical	Maximum	Unit
Center Frequency, $f_0$	-	456	-	MHz
Minimum Insertion Loss 451 - 461 MHz	-	8.30	9.50	dB
Amplitude Variation 451 - 461 MHz	-	0.45	1.00	dB
30 dB Bandwidth <sup>(3)</sup>	-	20.00	20.35	MHz
Relative Attenuation <sup>(3)</sup>				
10 - 256 MHz	45	70	-	dB
256 - 360 MHz	40	65	-	dB
360 - 421 MHz	45	50	-	dB
421 - 440 MHz	37	40	-	dB
472.4 - 491 MHz	39	42	-	dB
491 - 552 MHz	45	50	-	dB
552 - 656 MHz	40	55	-	dB
656 - 946 MHz	45	60	-	dB
Absolute Group Delay at $F_0$	-	0.49	0.51	$\mu$ sec
Group Delay Variation 451 - 461 MHz	-	30	65	ns
Input/Output Return Loss 451 - 461 MHz	9	14	-	dB
Source Impedance (Balanced) <sup>(4)</sup>	-	200	-	$\Omega$
Load Impedance (Balanced) <sup>(4)</sup>	-	200	-	$\Omega$

**Notes:**

1. All specifications are based on the 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. Referenced to minimum insertion loss
4. This is the optimum impedance in order to achieve performance shown

**Test Circuit:**

Actual matching values may vary due to PCB layout and parasitics



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

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

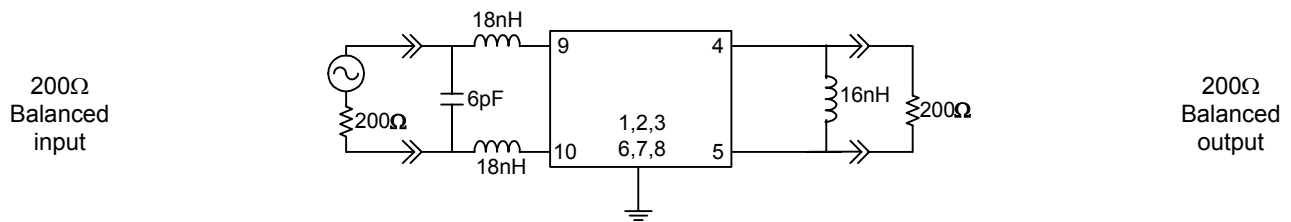
Parameter <sup>(3)</sup>	Minimum	Typical	Maximum	Unit
<b>Center Frequency, <math>f_0</math></b>	-	456	-	MHz
<b>Minimum Insertion Loss</b> 451 - 461 MHz	-	8.30	9.75	dB
<b>Amplitude Variation</b> 451 - 461 MHz	-	0.45	1.25	dB
<b>30 dB Bandwidth <sup>(3)</sup></b>	-	20.00	20.38	MHz
<b>Relative Attenuation <sup>(3)</sup></b>				
10 - 256 MHz	45	70	-	dB
256 - 360 MHz	40	65	-	dB
360 - 421 MHz	45	50	-	dB
421 - 440 MHz	37	40	-	dB
472.4 - 491 MHz	39	42	-	dB
491 - 552 MHz	45	50	-	dB
552 - 656 MHz	40	55	-	dB
656 - 946 MHz	45	60	-	dB
<b>Absolute Group Delay at <math>F_0</math></b>	-	0.49	0.51	μsec
<b>Group Delay Variation</b> 451 - 461 MHz	-	30	75	ns
<b>Input/Output Return Loss</b> 451 - 461 MHz	8	14	-	dB
<b>Source Impedance (Balanced) <sup>(4)</sup></b>	-	200	-	Ω
<b>Load Impedance (Balanced) <sup>(4)</sup></b>	-	200	-	Ω

**Notes:**

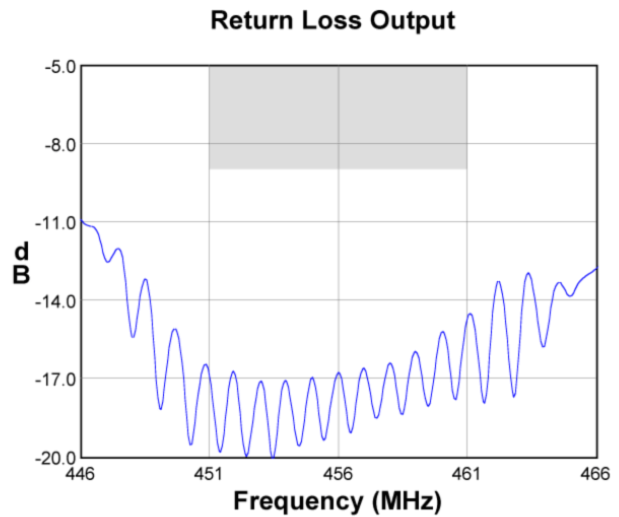
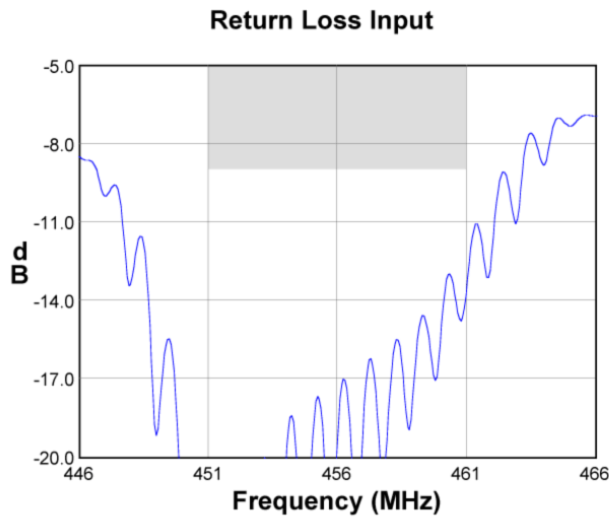
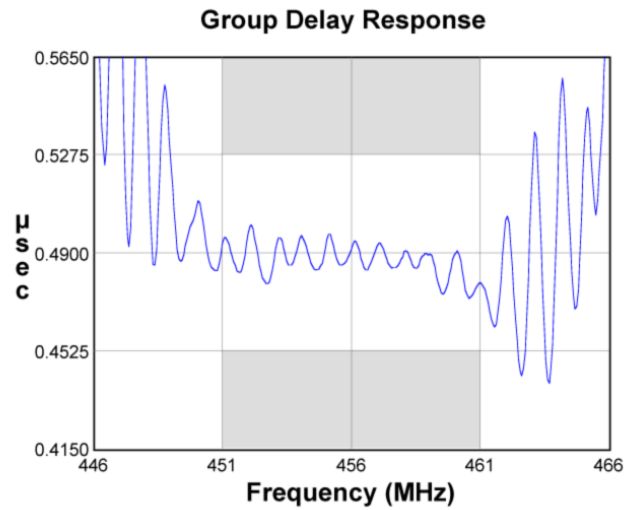
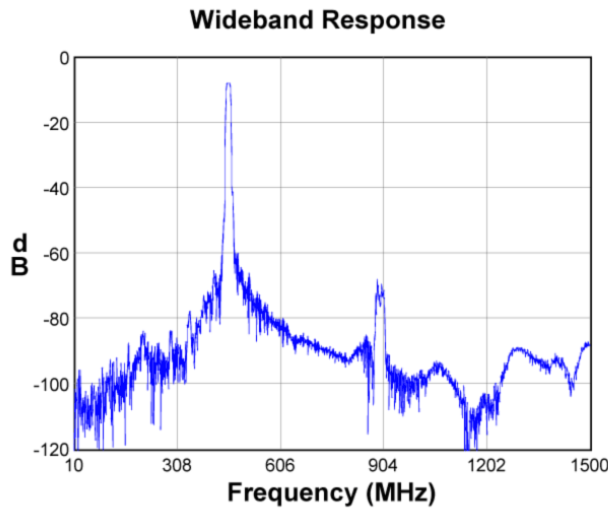
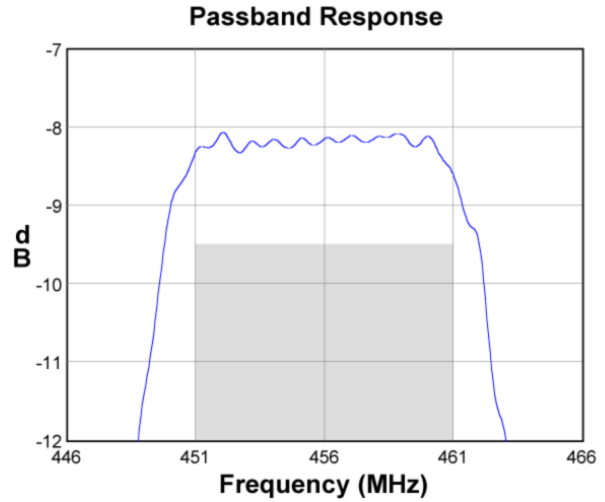
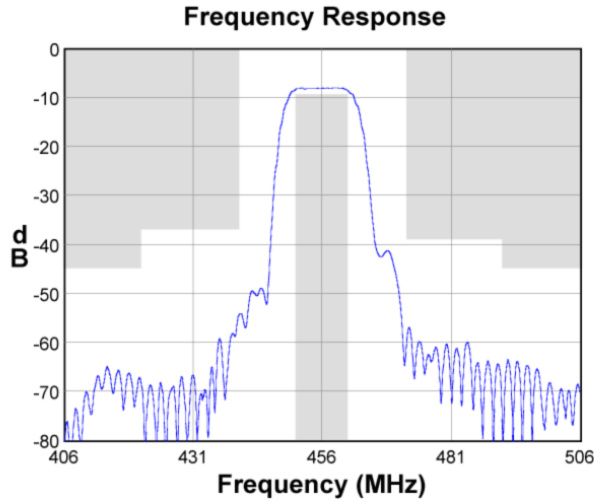
1. All specifications are based on the test circuit shown below
2. In production, devices will be tested at room temperature to a guardbanded specification to ensure electrical compliance over temperature
3. Referenced to minimum insertion loss
4. This is the optimum impedance in order to achieve performance shown

**Test Circuit:**

Actual matching values may vary due to PCB layout and parasitics

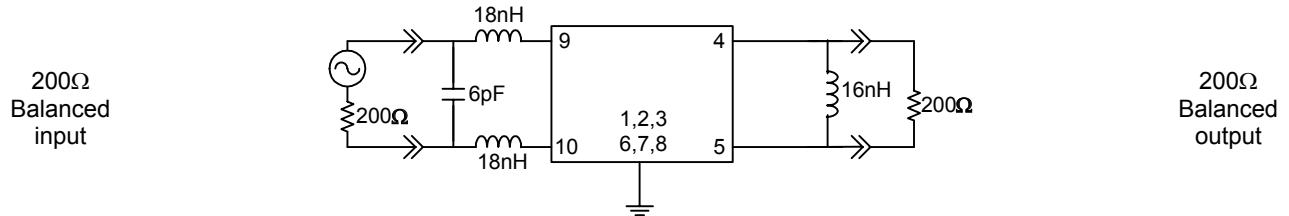


**Typical Performance (at +25°C)**



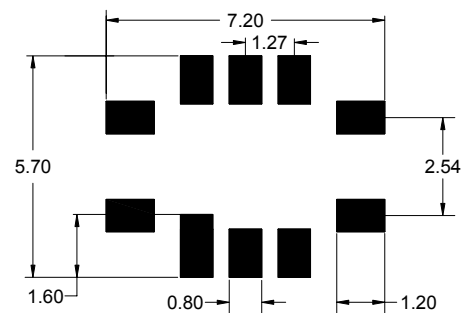
**Matching Schematics**

Actual matching values may vary due to PCB layout and parasitics



**Marking**

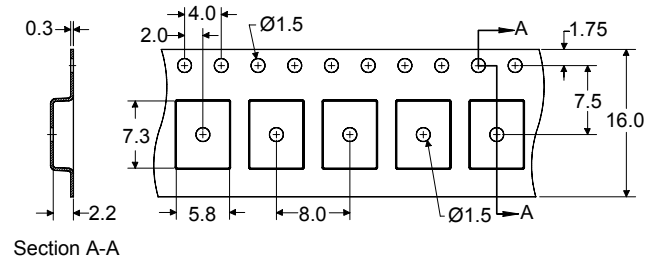
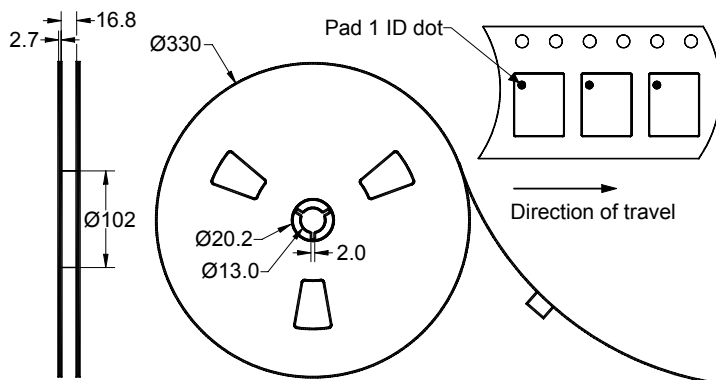
**PCB Footprint**



The date code consists of: day of the current year (Julian, 3 digits), last digit of the year (1 digit) and hour (2 digits)

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

**Tape and Reel**




Dimensions shown are nominal in millimeters  
Packaging quantity: 3000 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 JEDEC J-STD-020C **Pb-free** process, **260°C** 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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