



## **SAW Components**

### **BAW/SAW Duplexer**

WCDMA Band II (PCS)

<b>Series/type:</b>	<b>B7956</b>
<b>Ordering code:</b>	<b>B39202B7956P810</b>
<b>Date:</b>	<b>December 22, 2009</b>
<b>Version:</b>	<b>2.0</b>

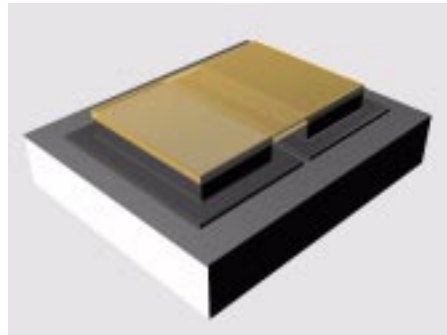


Data sheet



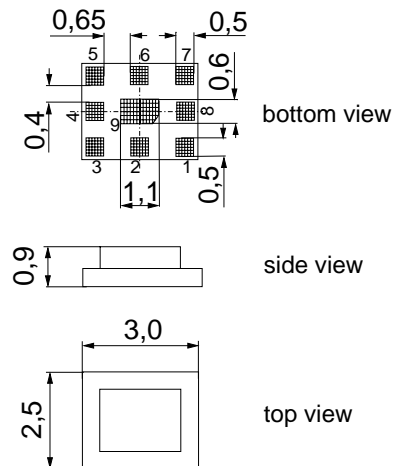
Application

- Low-loss BAW/SAW duplexer for mobile telephone WCDMA Band II (PCS) systems
- Low insertion attenuation
- Low amplitude ripple
- Usable passband 60 MHz
- Single ended to balanced transformation in Antenna - Rx path
- Impedance transformation 50Ω to 100Ω in Antenna - Rx path



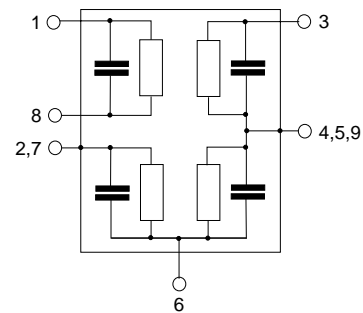
Features

- Package size 3.0 x 2.5 mm<sup>2</sup>, max. height 0.94 mm
- RoHS compatible
- Approx. weight 0.02 g
- Package for Surface Mount Technology (SMT)
- Ni, gold-plated terminals
- Fully matched by integrated matching network
- Electrostatic Sensitive Device (ESD)



Pin configuration

- 3 TX Input
- 1, 8 RX Output (balanced)
- 6 Antenna
- 4, 5, 9 To be grounded
- 2, 7 To be grounded





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Characteristics

Temperature range for specification: T = -10 °C to +85 °C  
 ANT terminating impedance: Z<sub>ANT</sub> = 50 Ω  
 RX terminating impedance: Z<sub>RX</sub> = 100 Ω (balanced) || 15nH  
 TX terminating impedance: Z<sub>TX</sub> = 50 Ω

Characteristics TX - ANT	min.	typ. @ 25 °C	max.	
<b>Center frequency</b> f <sub>C</sub>	—	1880	—	MHz
<b>Maximum insertion attenuation</b> @f <sub>Carrier</sub> 1852.4 ... 1907.6MHz α <sub>WCDMA</sub> <sup>1)</sup>	—	2.4	3.2	dB
<b>Amplitude ripple (p-p)</b> @f <sub>Carrier</sub> 1852.4 ... 1907.6MHz α <sub>WCDMA</sub> <sup>1)</sup>	—	1.0	1.8	dB
<b>Error Vector Magnitude</b> @f <sub>Carrier</sub> 1852.4 ... 1907.6MHz EVM <sup>2)</sup>	—	1.5	4.0	%
@f <sub>Carrier</sub> 1852.4 ... 1907.6MHz EVM <sup>2)</sup>	—	1.5	2.9 <sup>3)</sup>	%
<b>Input VSWR (TX port)</b> 1850.0 ... 1910.0MHz	—	1.6	2.3	
1850.0 ... 1910.0MHz	—	1.6	2.1 <sup>3)</sup>	
<b>Output VSWR (ANT port)</b> 1850.0 ... 1910.0MHz	—	1.6	2.3	
1850.0 ... 1910.0MHz	—	1.6	2.0 <sup>3)</sup>	
<b>Attenuation</b> α				
470.0 ... 750.0MHz	30	40	—	dB
1450.0 ... 1480.0MHz	30	33	—	dB
1570.0 ... 1580.0MHz	34	37	—	dB
1670.0 ... 1675.0MHz	30	42	—	dB
1770.0 ... 1824.0MHz	18	21	—	dB
1824.0 ... 1830.0MHz	10	21	—	dB
@f <sub>Carrier</sub> 1932.4 ... 1987.6MHz α <sub>WCDMA</sub> <sup>1)</sup>	45	51	—	dB
2400.0 ... 2500.0MHz	25	29	—	dB
3700.0 ... 3820.0MHz	15	20	—	dB
3820.0 ... 5150.0MHz	10	15	—	dB
5150.0 ... 5550.0MHz	5	12	—	dB
5550.0 ... 5730.0MHz	5	11	—	dB

<sup>1)</sup> Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (6).

<sup>2)</sup> Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.

<sup>3)</sup> Valid only for reduced temperature range +10 °C to +85 °C



Data sheet



**Characteristics**

Temperature range for specification: T = -10 °C to +85 °C  
 ANT terminating impedance: Z<sub>ANT</sub> = 50 Ω  
 RX terminating impedance: Z<sub>RX</sub> = 100 Ω (balanced) || 15nH  
 TX terminating impedance: Z<sub>TX</sub> = 50 Ω

Characteristics ANT - RX	min.	typ. @ 25°C	max.	
<b>Center frequency</b> f <sub>C</sub>	—	1960	—	MHz
<b>Maximum insertion attenuation</b>				
@f <sub>Carrier</sub> 1932.4 ... 1987.6MHz α <sub>WCDMA</sub> <sup>1)</sup>	—	2.9	3.7	dB
1930.0 ... 1935.0MHz	—	3.1	4.4	dB
1935.0 ... 1990.0MHz	—	2.8	3.7	dB
1935.0 ... 1990.0MHz	—	2.8	3.5 <sup>2)</sup>	dB
<b>Amplitude ripple (p-p)</b>				
@f <sub>Carrier</sub> 1932.4 ... 1987.6MHz α <sub>WCDMA</sub> <sup>1)</sup>	—	1.0	2.0	dB
<b>Error Vector Magnitude</b>				
@f <sub>Carrier</sub> 1932.4 ... 1987.6MHz EVM <sup>3)</sup>	—	2.0	4.0	%
@f <sub>Carrier</sub> 1932.4 ... 1987.6MHz EVM <sup>3)</sup>	—	2.0	2.8 <sup>4)</sup>	%
<b>Input VSWR (ANT port)</b>				
1930.0 ... 1990.0MHz	—	1.5	2.0	
<b>Output VSWR (RX port)</b>				
1930.0 ... 1990.0MHz	—	1.8	2.2	
<b>Attenuation</b> α				
0.3 ... 1770.0MHz	35	63	—	dB
1770.0 ... 1850.0MHz	38	58	—	dB
@f <sub>Carrier</sub> 1852.4 ... 1907.6MHz α <sub>WCDMA</sub> <sup>1)</sup>	50	56	—	dB
1910.0 ... 1915.0MHz	9	48	—	dB
2010.0 ... 2070.0MHz	5	14	—	dB
2070.0 ... 2500.0MHz	30	54	—	dB
2500.0 ... 3780.0MHz	35	59	—	dB
3780.0 ... 3980.0MHz	35	60	—	dB
3980.0 ... 6000.0MHz	35	55	—	dB

1) Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (6).  
 2) Valid for reduced temperature range from -10 °C to +80 °C  
 3) Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.  
 4) Valid for reduced temperature range +10 °C to +80 °C



<b>SAW Components</b>	<b>B7956</b>
<b>BAW/SAW Duplexer</b>	<b>1880.0 / 1960.0 MHz</b>

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**Characteristics**

Temperature range for specification: T = -10 °C to +85 °C  
 Antenna terminating impedance: Z<sub>ANT</sub> = 50 Ω  
 RX terminating impedance: Z<sub>RX</sub> = 100 Ω (balanced) || 15nH  
 TX terminating impedance: Z<sub>TX</sub> = 50 Ω

Characteristics ANT - RX		min.	typ. @ 25 °C	max.	
<b>Common mode suppression</b>	S <sub>cs21</sub> 1930.0 ... 1990.0 MHz	23	29	—	dB
<b>IMD Product Level Limits<sup>1)</sup></b>					
<b>at f<sub>TX</sub>=1880MHz, f<sub>RX</sub>=1960MHz</b>					
Blocker 1	80.0 MHz	—	-122	-110	dBm
Blocker 2	1800.0 MHz	—	-107	-102	dBm
Blocker 3	3840.0 MHz	—	-99	-93	dBm

<sup>1)</sup> IMD product level limits for power levels P<sub>TX</sub>=21dBm (antenna port output power) and P<sub>Blocker</sub>=-15dBm (antenna port input power)

Characteristics TX - RX		min.	typ. @ 25 °C	max.	
<b>Isolation</b>	α @f <sub>Carrier</sub> 1852.4 ... 1907.6 MHz α <sub>WCDMA</sub> <sup>1)</sup> @f <sub>Carrier</sub> 1932.4 ... 1987.6 MHz α <sub>WCDMA</sub> <sup>1)</sup>	53	56	—	dB
		48	53	—	dB

<sup>1)</sup> Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (6).



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**Maximum ratings**

Operable temperature range <sup>1)</sup>	T	-30/+85	°C	machine model, 10 pulses source and load impedance 50 Ω } continuous wave } T = 55°C, 50.000 h
Storage temperature range	T <sub>stg</sub>	-40/+85	°C	
DC voltage	V <sub>DC</sub>	3	V	
ESD voltage	V <sub>ESD</sub>	50 <sup>2)</sup>	V	
Input power at 1850.0 ... 1910.0 MHz	P <sub>IN</sub>	30	dBm	
elsewhere		10	dBm	

1) Defines the temperature range in which the BAW/SAW device keeps its typical characteristics, however the specification values are not guaranteed.

2) acc. to JESD22-A115A (machine model), 10 negative & 10 positive pulses.

**Annotation for characteristics section**

Attenuation of WCDMA signal ("Powertransferfunction", α<sub>WCDMA</sub>) is determined by

$$\int_{-\infty}^{\infty} |S_{ds21}(f)H_{RRC}(f - f_{Carrier})|^2 df$$

f<sub>Carrier</sub> according to 3GPP TS 25.101 (e.g. for WCDMA Band 2 Passband, f<sub>Carrier</sub> ranges from 1852.4 MHz (lowest Tx channel) to 1907.6 MHz (highest Tx channel)). H<sub>RRC</sub>(f) is the transfer function of the root-raised cosine transmit pulse shaping filter according to 3GPP TS 25.101 with the following normalization:

$$\int_{-\infty}^{\infty} |H_{RRC}(f)|^2 df = 1$$



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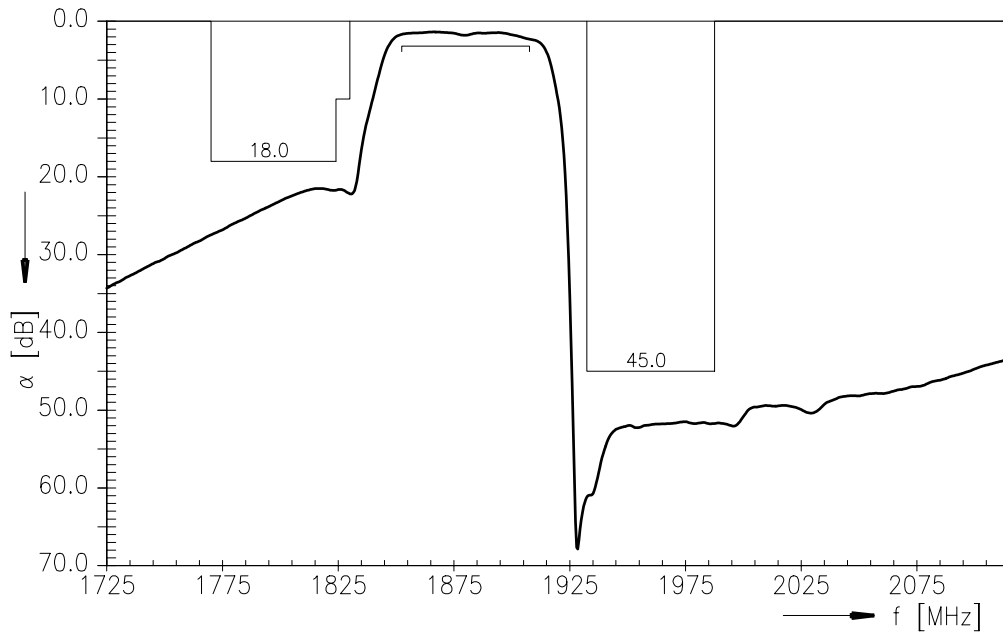
BAW/SAW Duplexer

1880.0 / 1960.0 MHz

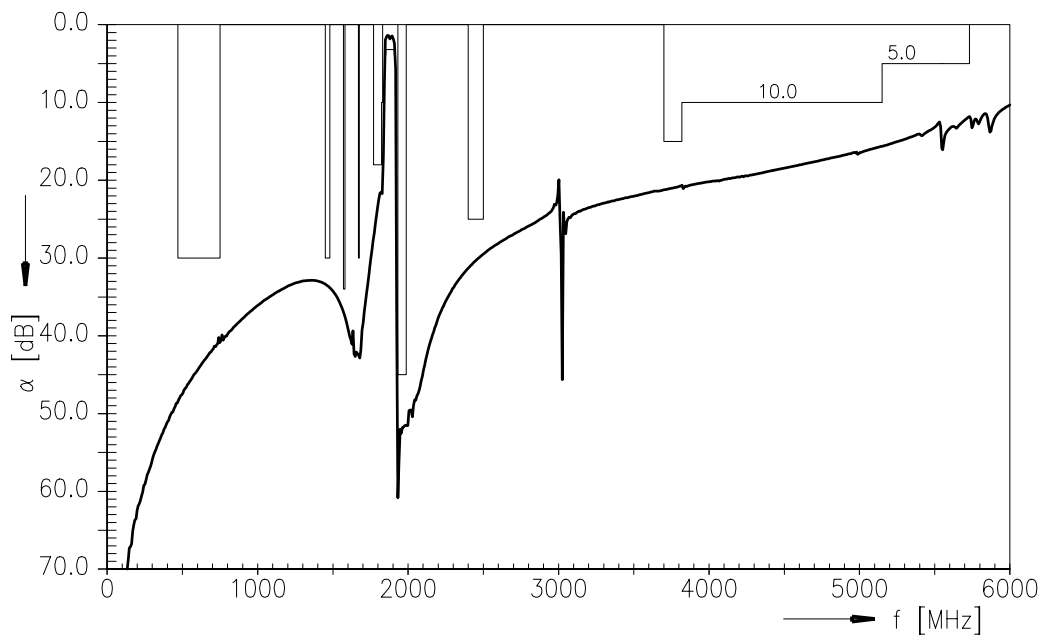
Data sheet



Frequency Response TX-ANT (PTF)



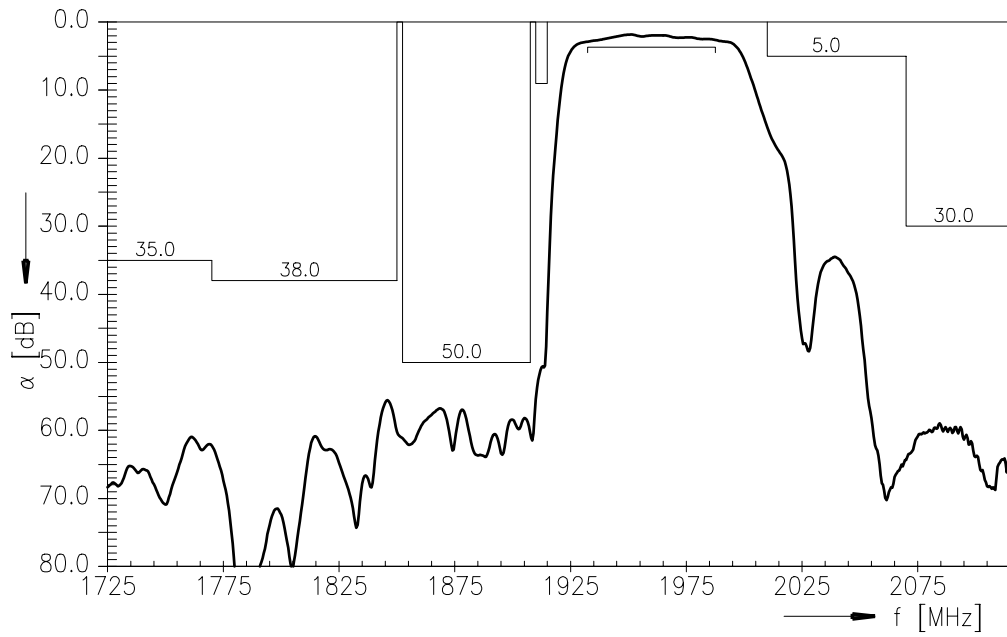
Frequency Response TX-ANT (wideband)



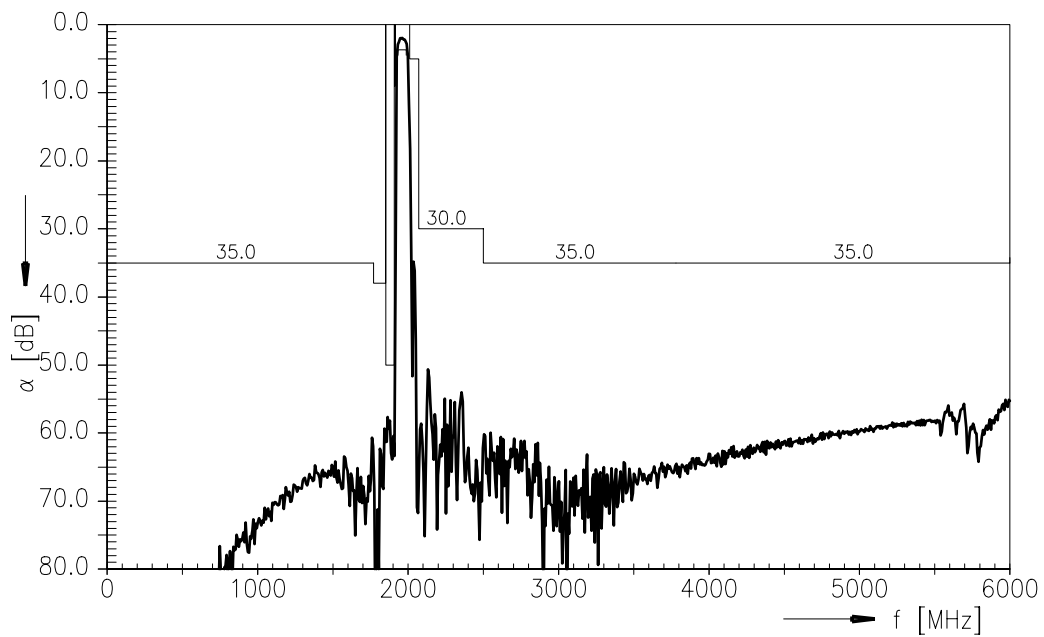
Please read *cautions and warnings* and *important notes* at the end of this document.



Frequency Response ANT-RX (PTF)



Frequency Response ANT-RX (wideband)





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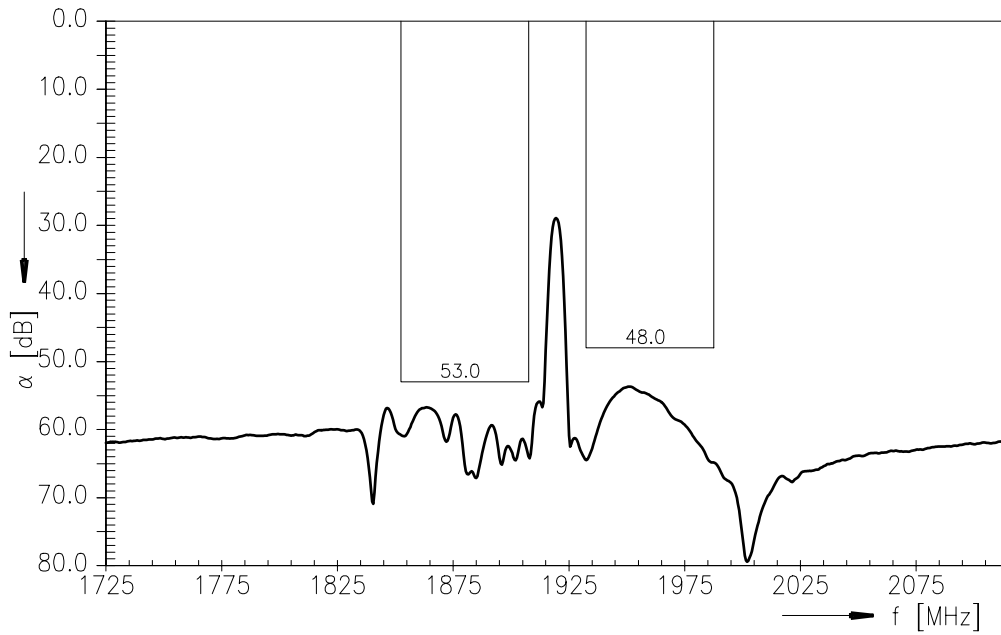
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1880.0 / 1960.0 MHz

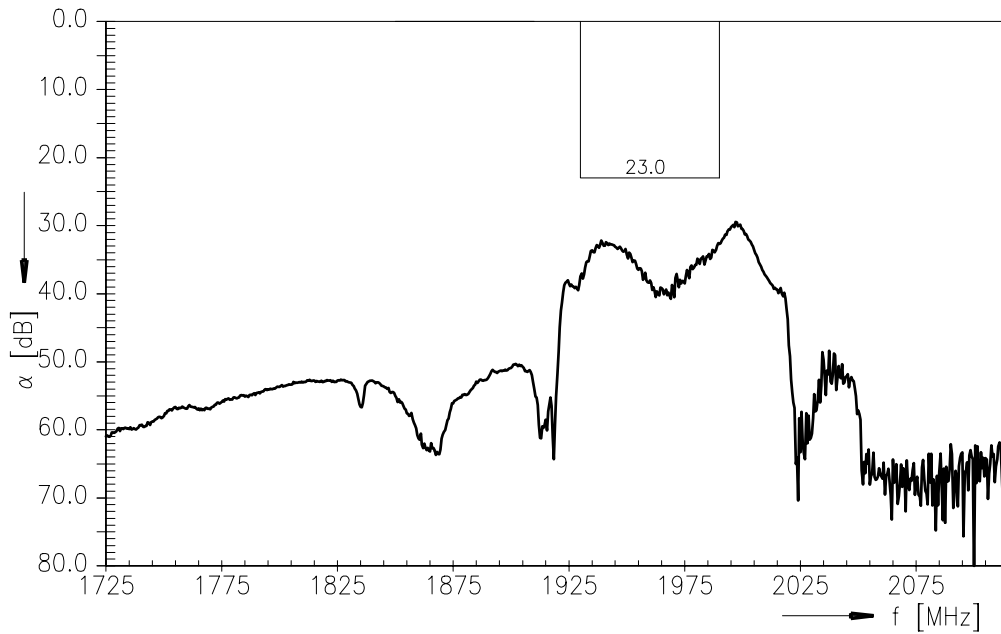
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### Frequency Response TX-RX (PTF)



### Frequency Response RX-ANT Common Mode Suppression



Please read *cautions and warnings and important notes* at the end of this document.

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**References**

<b>Type</b>	B7956
<b>Ordering code</b>	B39202B7956P810
<b>Marking and package</b>	C61157-A3-A63
<b>Packaging</b>	F61074-V8211-Z000
<b>Date codes</b>	L_1126
<b>S-parameters</b>	B7956_NB_UN.s4p B7956_WB_UN.s4p See file header for pin/port assignment.
<b>Soldering profile</b>	S_6001
<b>RoHS compatible</b>	defined as compatible with the following documents: "DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment. 2005/618/EC from April 18th, 2005, amending Directive 2002/95/EC of the European Parliament and of the Council for the purposes of establishing the maximum concentration values for certain hazardous substances in electrical and electronic equipment."

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