

RF360 Europe GmbH

A Qualcomm – TDK Joint Venture

## SAW Components

### SAW Duplexer

WCDMA/LTE Band IX

Series/type: B8557  
Ordering code: B39182B8557P810

Date: July 21, 2011  
Version: 2.0

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# SAW Components

## SAW Duplexer

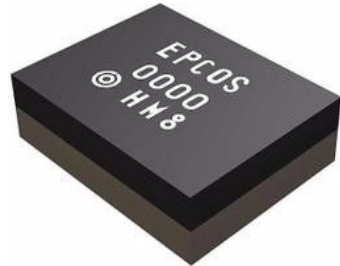
WCDMA/LTE Band IX

**Series/type:** B8557  
**Ordering code:** B39182B8557P810

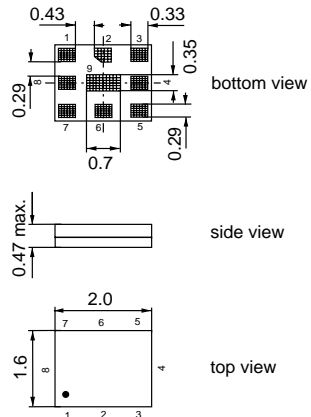
**Date:** July 21, 2011  
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**Application**

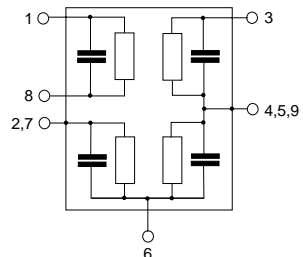
- Low-loss SAW duplexer for mobile telephone WCDMA/LTE Band IX systems
- Low insertion attenuation
- Low amplitude ripple
- Usable passband 35 MHz
- Single ended to balanced transformation in Antenna - Rx path
- Impedance transformation 50Ω to 100Ω in Antenna - Rx path


**Features**

- Package size 2.0 \* 1.6 mm<sup>2</sup>
- Max. height 0.47 mm
- RoHS compatible
- Approximate weight 0.006g
- Package for **Surface Mount Technology (SMT)**
- Ni terminals, Au-plated
- Balanced Rx port, unbalanced Tx port
- **Electrostatic Sensitive Device (ESD)**
- **Moisture Sensitivity Level (MSL) 3**


**Pin configuration**

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



**Data Sheet**

**Characteristics**

Temperature range for specification:	T = -30 °C to +85 °C
Antenna terminating impedance:	Z <sub>ANT</sub> = 50 Ω    3.6 nH
RX terminating impedance:	Z <sub>RX</sub> = 100 Ω (balanced)    8.2 nH
TX terminating impedance:	Z <sub>TX</sub> = 50 Ω

Characterisitcs TX - ANT		min.	typ. @ 25 °C	max.	
<b>Center frequency</b>	f <sub>C</sub>	—	1767.4	—	MHz
<b>Maximum insertion attenuation</b>					
1749.9 ... 1784.9 MHz			1.4	1.8	dB
@f <sub>carrier</sub> 1752.4 ... 1782.4 MHz	α <sub>WCDMA</sub> <sup>1)</sup>		1.4	1.8	dB
<b>Amplitude ripple(p-p)</b>					
1749.9 ... 1784.9 MHz			0.4	0.8	dB
@f <sub>carrier</sub> 1752.4 ... 1782.4 MHz	α <sub>WCDMA</sub> <sup>3)</sup>		0.4	0.8	dB
<b>Error Vector Magnitude</b>					
@f <sub>carrier</sub> 1752.4 ... 1782.4 MHz	EVM <sup>2)</sup>		1.3	2.0	%
<b>Input VSWR (TX port)</b>					
1749.9 ... 1784.9 MHz			1.4	1.8	
<b>Output VSWR (ANT port)</b>					
1749.9 ... 1784.9 MHz			1.5	1.8	

<sup>1)</sup> Attenuation of WCDMA signal("Powertransferfunction").Please refer to annotation on page (8).

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

<b>SAW Components</b>	<b>B8557</b>
<b>SAW Duplexer</b>	<b>1767.4 / 1862.4 MHz</b>

Data Sheet



**Characteristics**

Temperature range for specification:	T = -30 °C to +85 °C
Antenna terminating impedance:	Z <sub>ANT</sub> = 50 Ω    3.6 nH
RX terminating impedance:	Z <sub>RX</sub> = 100 Ω (balanced)    8.2 nH
TX terminating impedance:	Z <sub>TX</sub> = 50 Ω

Characterisitcs TX - ANT	min.	typ. @ 25 °C	max.	
<b>Attenuation</b>				$\alpha$
10.0 ... 95.0 MHz	30	80		
470.0 ... 770.0 MHz	30	48		
810.0 ... 828.0 MHz	30	47		
860.0 ... 895.0 MHz	30	46		
921.0 ... 960.0 MHz	30	45		
1475.9 ... 1500.9 MHz	30	40		
1500.9 ... 1565.42 MHz	30	40		
1565.42 ... 1573.374 MHz	40	43		
1573.374 ... 1577.466 MHz	40	43		
1577.466 ... 1585.42 MHz	40	44		
1597.5515 ... 1605.886 MHz	40	46		
1605.886 ... 1680.0 MHz	25	31		
1805.0 ... 1845.0 MHz	1	4		
1844.9 ... 1879.9 MHz	45	50		
@f <sub>carrier</sub> 1847.4 ... 1877.4 MHz	45	50		$\alpha_{\text{WCDMA}}^{1)}$
1884.5 ... 1919.6 MHz	40	46		
2110.0 ... 2170.0 MHz	27	42		
2400.0 ... 2500.0 MHz	35	40		
3500.0 ... 3570.0 MHz	20	31		
5150.0 ... 5355.0 MHz	20	23		
5725.0 ... 5850.0 MHz	18	21		

<sup>1)</sup> Attenuation of WCDMA signal("Powertransferfunction").Please refer to annotation on page (8).

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<b>SAW Duplexer</b>	<b>1767.4 / 1862.4 MHz</b>

Data Sheet



**Characteristics**

Temperature range for specification:	T = -30 °C to +85 °C
Antenna terminating impedance:	Z <sub>ANT</sub> = 50 Ω    3.6 nH
RX terminating impedance:	Z <sub>RX</sub> = 100 Ω (balanced)    8.2 nH
TX terminating impedance:	Z <sub>TX</sub> = 50 Ω

<b>Characterisitcs ANT - RX</b>	<b>min.</b>	<b>typ. @ 25 °C</b>	<b>max.</b>	
<b>Center frequency</b> f <sub>C</sub>	—	1862.4	—	MHz
<b>Maximum insertion attenuation</b>				
1844.9 ... 1879.9 MHz		2.0	2.5	dB
@f <sub>carrier</sub> 1847.4 ... 1877.4 MHz α <sub>WCDMA</sub> <sup>1)</sup>		2.0	2.5	dB
<b>Amplitude ripple(p-p)</b>				
1844.9 ... 1879.9 MHz		0.4	0.7	dB
@f <sub>carrier</sub> 1847.4 ... 1877.4 MHz α <sub>WCDMA</sub> <sup>3)</sup>		0.3	0.7	dB
<b>Common Mode Rejection Ratio CMRR</b>				
1844.9 ... 1879.9 MHz	21 <sup>2)</sup>	26		dB
<b>Input VSWR (ANT port)</b>				
1844.9 ... 1879.9 MHz		1.4	1.8	
<b>Output VSWR (RX port)</b>				
1844.9 ... 1879.9 MHz		1.4	1.8	

<sup>1)</sup> Attenuation of WCDMA signal("Powertransferfunction").Please refer to annotation on page (8).

<sup>2)</sup> A combination of 10° phase balance and 1dB amplitude balance corresponds to 19.6 dB CMRR.

**Data Sheet**

**Characteristics**

Temperature range for specification:	T = -30 °C to +85 °C
Antenna terminating impedance:	Z <sub>ANT</sub> = 50 Ω    3.6 nH
RX terminating impedance:	Z <sub>RX</sub> = 100 Ω (balanced)    8.2 nH
TX terminating impedance:	Z <sub>TX</sub> = 50 Ω

<b>Characterisitcs ANT - RX</b>				<b>min.</b>	<b>typ. @ 25 °C</b>	<b>max.</b>	
<b>Attenuation</b>			$\alpha$				
	10.0 ... 95.0 MHz			70	79		dB
	614.9 ... 626.7 MHz			45	80		dB
	922.5 ... 940.0 MHz			45	72		dB
	1654.9 ... 1689.9 MHz			35	60		dB
	1689.9 ... 1750.0 MHz			35	56		dB
	1749.9 ... 1784.9 MHz			48	58		dB
@f <sub>carrier</sub>	1752.4 ... 1782.4 MHz		$\alpha_{\text{WCDMA}}^1)$	48	58		dB
	1965.0 ... 2400.0 MHz			15	52		dB
	2400.0 ... 2497.0 MHz			30	57		dB
	3594.8 ... 3664.8 MHz			40	59		dB
	3689.8 ... 3759.8 MHz			35	58		dB
	5344.7 ... 5449.7 MHz			40	51		dB
	5534.7 ... 5639.7 MHz			35	51		dB
	5639.7 ... 5650.0 MHz			35	51		dB
<b>IMD Product Level Limits<sup>2)</sup></b>							
<b>at f<sub>TX</sub> = 1767.4 MHz f<sub>RX</sub> = 1862.4 MHz</b>							
Blocker 1		95.0 MHz			-130	-105	dBm
Blocker 2		1672.4 MHz			-111	-105	dBm
Blocker 3		3629.8 MHz			-120	-105	dBm
Blocker 4		5397.2 MHz			-124	-105	dBm

<sup>1)</sup> Attenuation of WCDMA signal("Powertransferfunction").Please refer to annotation on page (8).

<sup>2)</sup> IMD product level limits for power levels P<sub>TX</sub>=21.5dB (antenna port output power) and P<sub>Block-ER</sub>=-15dBm (antenna port input power).



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<b>SAW Duplexer</b>	<b>1767.4 / 1862.4 MHz</b>

Data Sheet



**Characteristics**

Temperature range for specification:	T = -30 °C to +85 °C
Antenna terminating impedance:	Z <sub>ANT</sub> = 50 Ω    3.6 nH
RX terminating impedance:	Z <sub>RX</sub> = 100 Ω (balanced)    8.2 nH
TX terminating impedance:	Z <sub>TX</sub> = 50 Ω

Characterisitcs TX - RX	min.	typ. @ 25 °C	max.	
<b>Differential Mode Isolation</b>				
1749.9 ... 1784.9 MHz	55	58		dB
@f <sub>carrier</sub> 1752.4 ... 1782.4 MHz	55	58		dB
1844.9 ... 1879.9 MHz	50	56		dB
@f <sub>carrier</sub> 1847.4 ... 1877.4 MHz	50	57		dB
<b>Common mode Isolation</b>				
1749.9 ... 1784.9 MHz	53	56		dB
@f <sub>carrier</sub> 1752.4 ... 1782.4 MHz	53	56		dB

1) Attenuation of WCDMA signal("Powertransferfunction").Please refer to annotation on page (8).


**Maximum ratings**

Storage temperature range	T <sub>stg</sub>	-40/+85	°C	
DC voltage	V <sub>DC</sub>	5	V	
ESD voltage	V <sub>ESD</sub>	50 <sup>1)</sup>	V	machine model, 10 pulses
Input power at 1749.9 ... 1784.9 MHz	P <sub>IN</sub>	29	dBm	source and load impedance 50 Ω } continuous wave } T = 50°C, 5.000 h
elsewhere		10	dBm	

<sup>1)</sup> acc. to JESD22-A115A (machine model), 10 negative & 10 positive pulses.

**Annotation for characteristics section**

Attenuation of WCDMA signal ("Powertransferfunction",  $\alpha_{\text{WCDMA}}$ ) is determined by

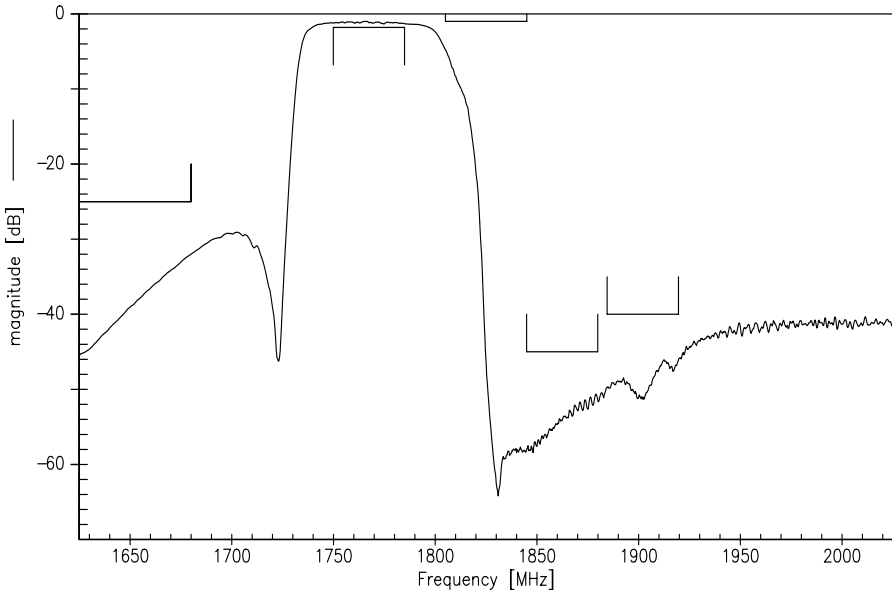
$$\int_{-\infty}^{\infty} |S_{\text{ds21}}(f) H_{\text{RRC}}(f - f_{\text{Carrier}})|^2 df$$

$f_{\text{Carrier}}$  according to 3GPP TS 25.101 (e.g. for WCDMA Band 9-Passband,  $f_{\text{Carrier}}$  ranges from 1752.4 MHz (lowest Tx channel) to 1782.4 MHz (highest Tx channel)).  $H_{\text{RRC}}(f)$  is the transfer function of the root-raised cosine transmit pulse shaping filter according to 3GPP TS 25.101 with the following normalization:

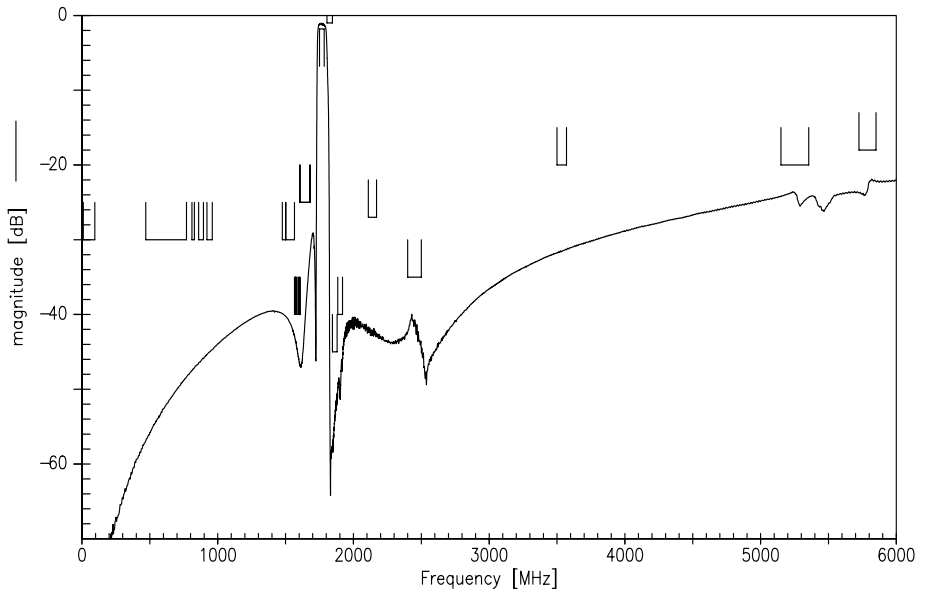
$$\int_{-\infty}^{\infty} |H_{\text{RRC}}(f)|^2 df = 1$$



Frequency Response Tx-ANT (passband)

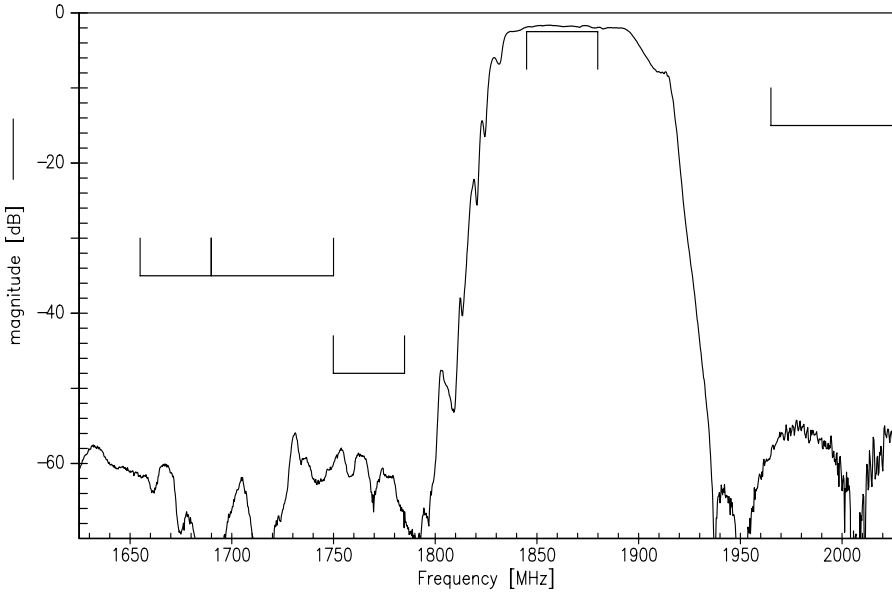


Frequency Response Tx-ANT (wideband)

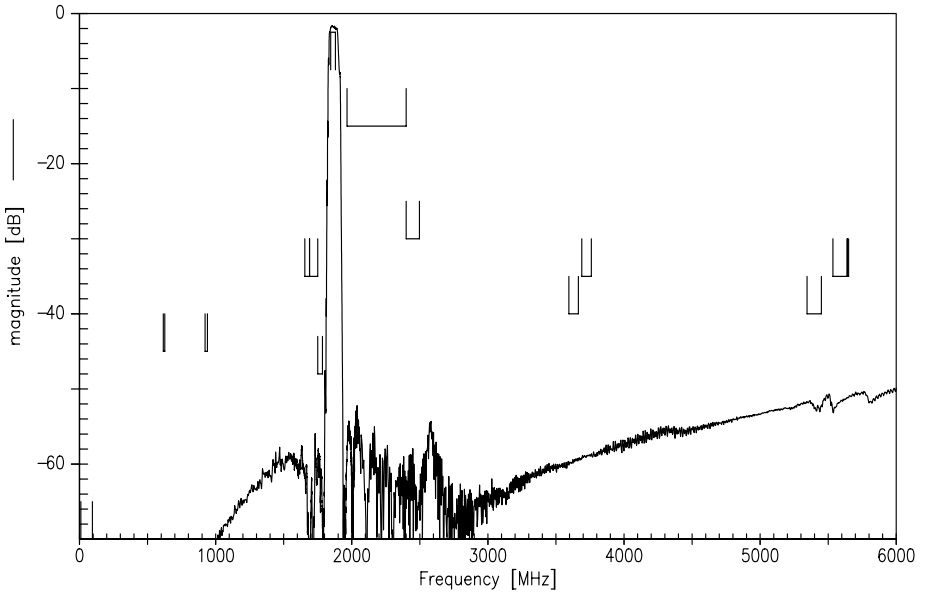




**Frequency Response ANT-Rx (passband)**

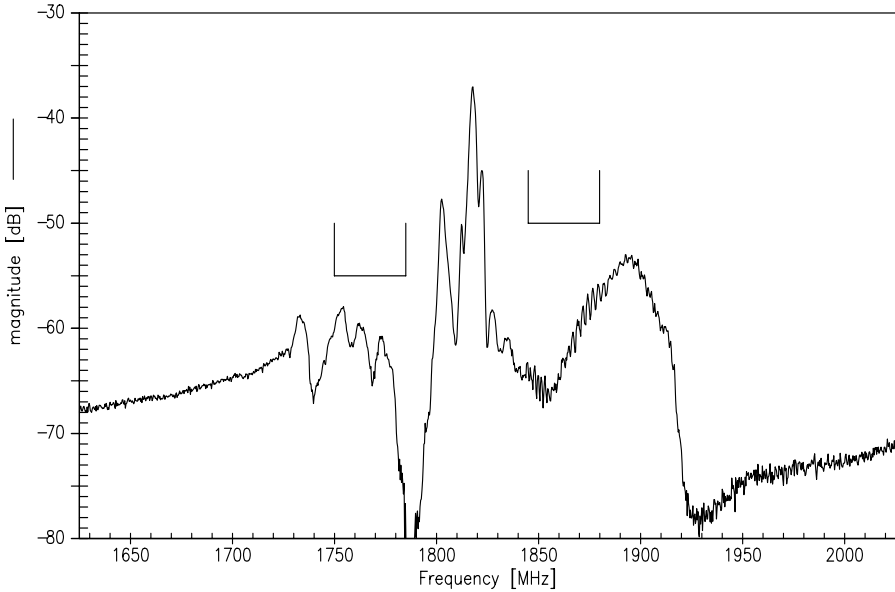


**Frequency Response ANT-Rx (wideband)**

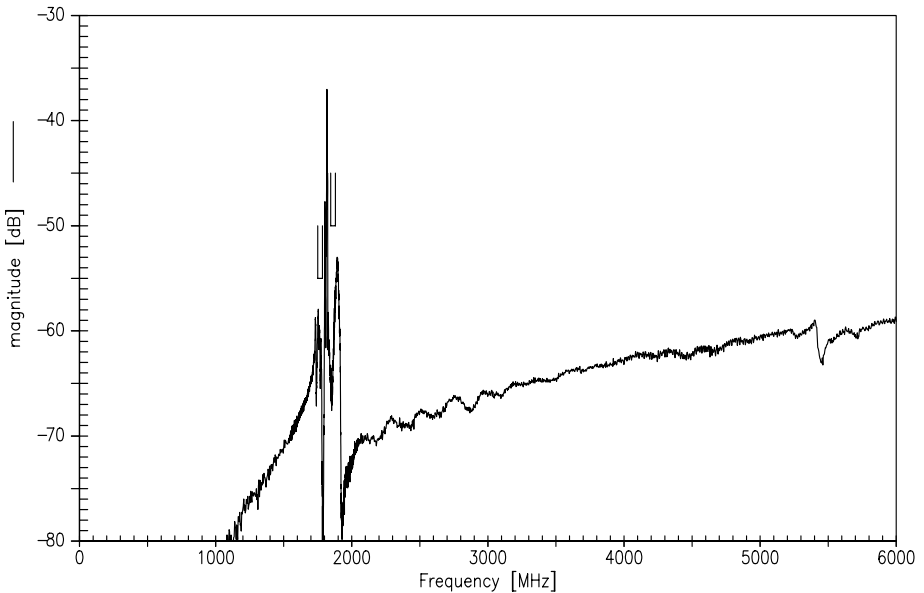




Frequency Response Tx-Rx (passband) / Differential Mode

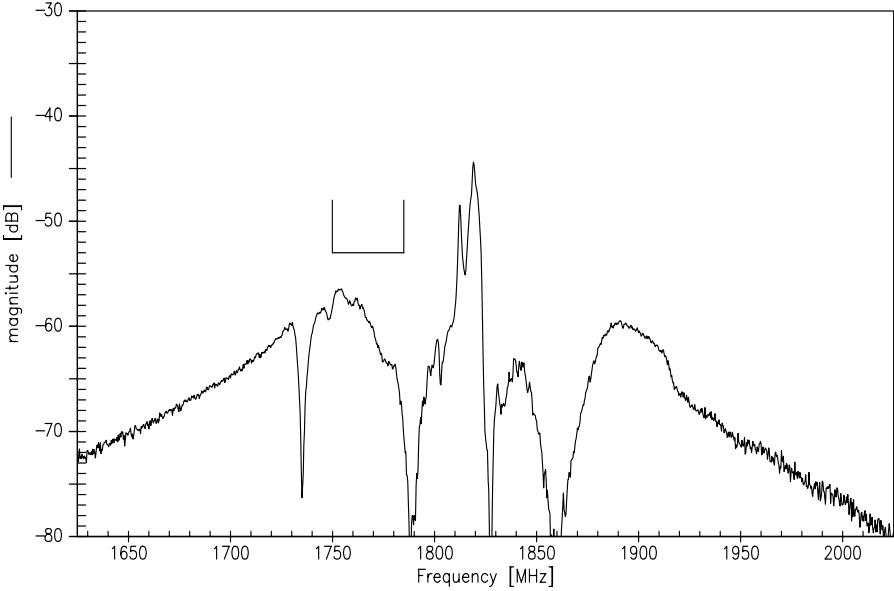


Frequency Response Tx-Rx (wideband) / Differential Mode

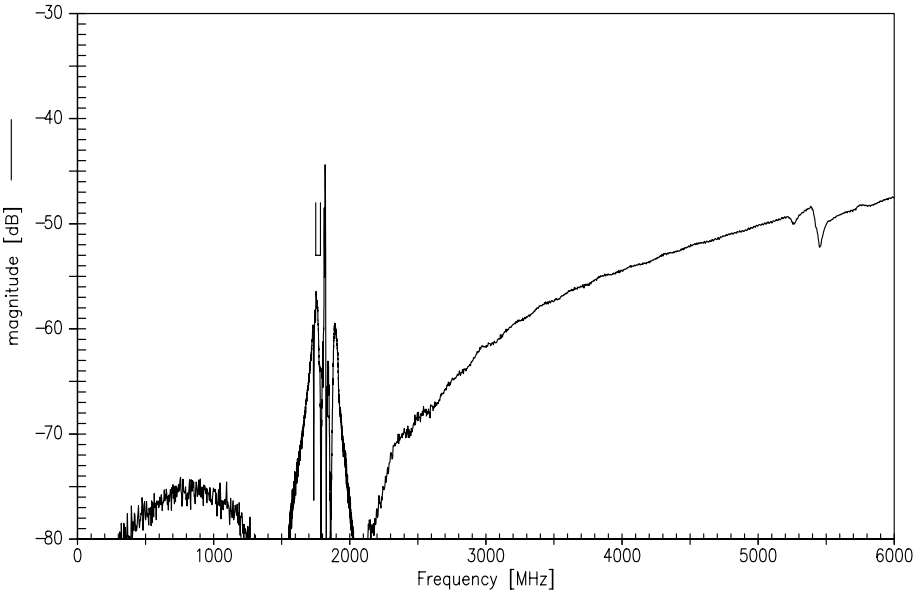




**Frequency Response Tx-Rx (passband) / Common Mode**

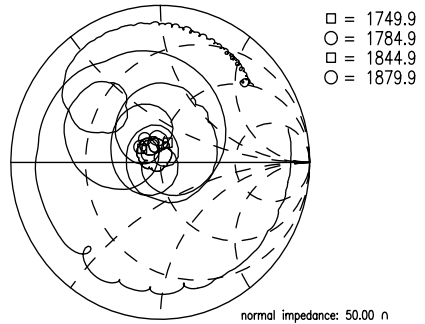
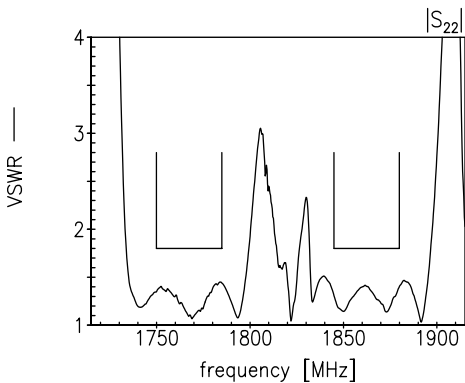
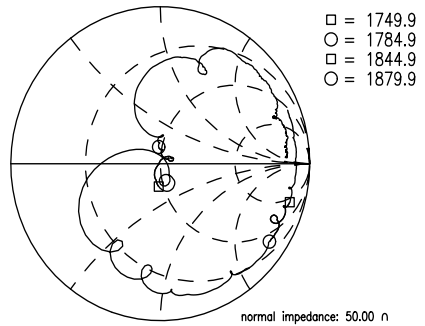
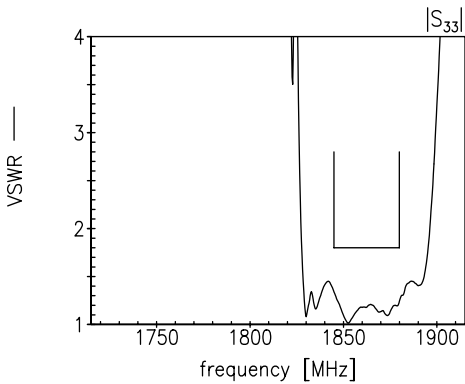
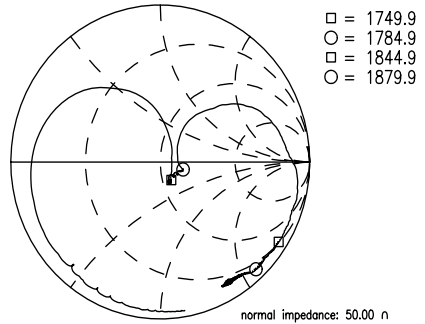
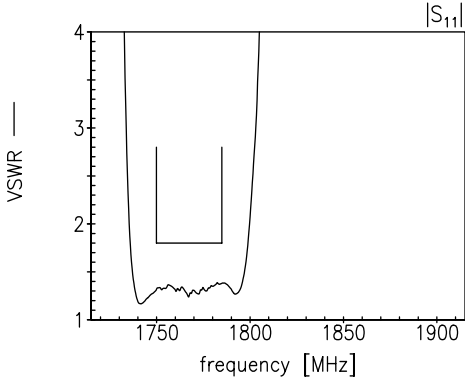


**Frequency Response Tx-Rx (wideband) / Common Mode**





Return Loss  $S_{11}$  Tx - port  $S_{22}$  ANT - port  $S_{33}$  Rx - port



<b>SAW Components</b>	<b>B8557</b>
<b>SAW Duplexer</b>	<b>1767.4 / 1862.4 MHz</b>

Data Sheet



**References**

<b>Type</b>	B8557
<b>Ordering code</b>	B39182B8557P810
<b>Marking and package</b>	C61157-A8-A38
<b>Packaging</b>	F61074-V8247-Z000
<b>Date codes</b>	L_1126
<b>S-parameters</b>	B8557_NB.s4p, B8557_WB.s4p See file header for port/pin assignment table.
<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."
<b>Moldability</b>	Before using in overmolding environment, please contact your EPCOS sales office.
<b>Matching coils</b>	See Inductor pdf-catalog <a href="http://www.tdk.co.jp/tefe02/coil.htm#aname1">http://www.tdk.co.jp/tefe02/coil.htm#aname1</a> and Data Library for circuit simulation <a href="http://www.tdk.co.jp/etvcl/index.htm">http://www.tdk.co.jp/etvcl/index.htm</a>

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