



# **SAW Components**

## **SAW Duplexer**

WCDMA Band IV (AWS)

<b>Series/type:</b>	<b>B7680</b>
<b>Ordering code:</b>	<b>B39212B7680A710</b>
<b>Date:</b>	June 06, 2008
<b>Version:</b>	2.0



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B7680

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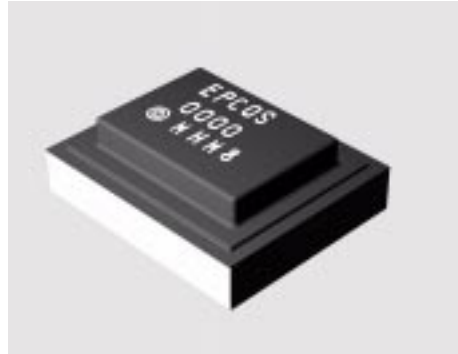
1732.5 / 2132.5 MHz

### Data Sheet



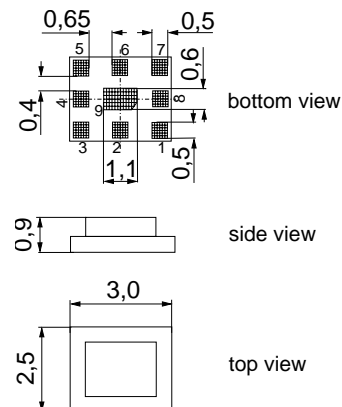
### Application

- Low-loss SAW duplexer for mobile telephone WCDMA Band IV (AWS) systems
- Low insertion attenuation
- Low amplitude ripple
- Usable passband 45 MHz
- Single ended to balanced transformation in Antenna - Rx path
- Impedance transformation 50Ω to 100Ω in Antenna - Rx path



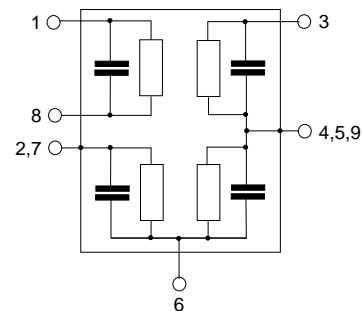
### Features

- Package size 3.0 x 2.5 x 0.9 mm<sup>3</sup>
- RoHS compatible
- Approx. weight 0.035 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
- 2, 4, 5 To be grounded
- 7, 9 To be grounded





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#### Characteristics

Temperature range for specification:	T = -20 °C to +85 °C
Antenna terminating impedance:	Z <sub>ANT</sub> = 50 Ω
RX terminating impedance:	Z <sub>RX</sub> = 100 Ω
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>		1732.5		MHz
<b>Maximum insertion attenuation</b> @f <sub>carrier</sub> 1712.4 ... 1752.6 MHz α <sub>WCDMA</sub> <sup>1)</sup>		1.7	2.0	dB
<b>Amplitude ripple (p-p)</b> @f <sub>carrier</sub> 1712.4 ... 1752.6 MHz Δα <sub>WCDMA</sub> <sup>1)</sup>		0.4	1.0	dB
<b>Amplitude ripple (p-p) per 5 MHz-channel</b> 1710.0 ... 1755.0 MHz Δα <sub>ch</sub>		0.2	0.5	dB
<b>Error Vector Magnitude</b> @f <sub>carrier</sub> 1712.4 ... 1752.6 MHz EVM <sup>2)</sup>		0.9	2.0	%
<b>Input VSWR (TX port)</b> 1710.0 ... 1755.0 MHz		1.8	2.1	
<b>Output VSWR (ANT port)</b> 1710.0 ... 1755.0 MHz		1.6	2.0	
<b>Attenuation</b> α				
10.0 ... 1574.0 MHz	30	35		dB
1574.0 ... 1577.0 MHz	40	44		dB
1805.0 ... 1880.0 MHz	20	43		dB
1930.0 ... 1990.0 MHz	27	40		dB
@f <sub>carrier</sub> 2112.4 ... 2152.6 MHz α <sub>WCDMA</sub> <sup>1)</sup>	42	51		dB
2400.0 ... 2500.0 MHz	29	36		dB
3420.0 ... 3510.0 MHz	20	29		dB
5130.0 ... 5350.0 MHz	18	23		dB
5725.0 ... 5850.0 MHz	15	19		dB
6840.0 ... 7020.0 MHz		10		dB
8550.0 ... 8775.0 MHz		23		dB
10260.0 ... 10530.0 MHz		34		dB
11970.0 ... 12285.0 MHz		31		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.



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RX terminating impedance:	Z <sub>RX</sub> = 100 Ω
TX terminating impedance:	Z <sub>TX</sub> = 50 Ω

Characteristics ANT - RX	min.	typ. @ 25 °C	max.	
<b>Center frequency</b> $f_C$		2132.5		MHz
<b>Maximum insertion attenuation</b> @ $f_{\text{carrier}}$ 2112.4 ... 2152.6 MHz $\alpha_{\text{WCDMA}}^{1)}$		2.1	2.5	dB
<b>Amplitude ripple (p-p)</b> @ $f_{\text{carrier}}$ 2112.4 ... 2152.6 MHz $\Delta\alpha_{\text{WCDMA}}^{1)}$		0.3	1.0	dB
<b>Amplitude ripple (p-p) per 5 MHz-channel</b> 2110.0 ... 2155.0 MHz $\Delta\alpha_{\text{ch}}$		0.2	0.5	dB
<b>Error Vector Magnitude</b> @ $f_{\text{carrier}}$ 2112.4 ... 2152.6 MHz EVM <sup>2)</sup>		0.5	2.0	%
<b>Input VSWR (ANT port)</b> 2110.0 ... 2155.0 MHz		1.6	2.0	
<b>Output VSWR (RX port)</b> 2110.0 ... 2155.0 MHz		1.8	2.0	
<b>Output phase balance</b> ( $\phi(S_{31}) - \phi(S_{21}) + 180^\circ$ ) 2110.0 ... 2155.0 MHz	-10	-7	10	degree
<b>Output amplitude balance</b> ( $ S_{31}/S_{21} $ ) 2110.0 ... 2155.0 MHz	-1.0	0.5	1.0	dB
<b>IMD Product Level Limits</b> <b>at <math>f_{\text{TX}} = 1732.5 \text{ MHz}</math> <math>f_{\text{RX}} = 2132.5 \text{ MHz}^{3)}</math></b>				
Blocker 1 400 MHz		-123	-106	dBm
Blocker 2 $2 f_{\text{TX}} + 400 \text{ MHz}$		-112	-106	dBm
Blocker 3 $f_{\text{TX}} - 400 \text{ MHz}$		-114	-109	dBm
Blocker 4 $3 f_{\text{TX}} + 400 \text{ MHz}$		-125	-109	dBm

<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> Power levels: 21 dBm Tx signal, -15dBm blocker at antenna port.



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RX terminating impedance:	Z <sub>RX</sub> = 100 Ω
TX terminating impedance:	Z <sub>TX</sub> = 50 Ω

Characteristics ANT - RX	min.	typ. @ 25 °C	max.	
<b>Attenuation</b>				$\alpha$
10.0 ... 1710.0 MHz	35	49		
@f <sub>carrier</sub> 1712.4 ... 1752.6 MHz	45	54		$\alpha_{\text{WCDMA}}^{1)}$
1755.0 ... 2025.0 MHz	15	33		
2240.0 ... 2400.0 MHz	15	33		
2400.0 ... 2484.0 MHz	30	42		
2484.0 ... 6000.0 MHz	35	40		
6000.0 ... 6475.0 MHz	-	53		
10540.0 ... 10785.0 MHz	-	28		

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

Characteristics TX - RX	min.	typ. @ 25 °C	max.	
<b>Isolation</b>				$\alpha_{\text{WCDMA}}^{1)}$
@f <sub>carrier</sub> 1712.4 ... 1752.6 MHz	53	56		
@f <sub>carrier</sub> 2112.4 ... 2152.6 MHz	43	47		

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



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### Maximum ratings

Temperature range for specification <sup>1)</sup>	T	-20/+85		
Operable temperature range <sup>2)</sup>	T	-30/+85	°C	
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>3)</sup>	V	machine model, 10 pulses
Input power at 1710.0 ... 1755.0 MHz	P <sub>IN</sub>	29	dBm	source and load impedance 50 Ω continuous wave T = 50 °C, 5.000 h
elsewhere		10	dBm	

- 1) Defines the temperature range in which the specification values are warranted.
- 2) Defines the temperature range in which the SAW device keeps its typical characteristics, however the specification values are not guaranteed.
- 3) 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

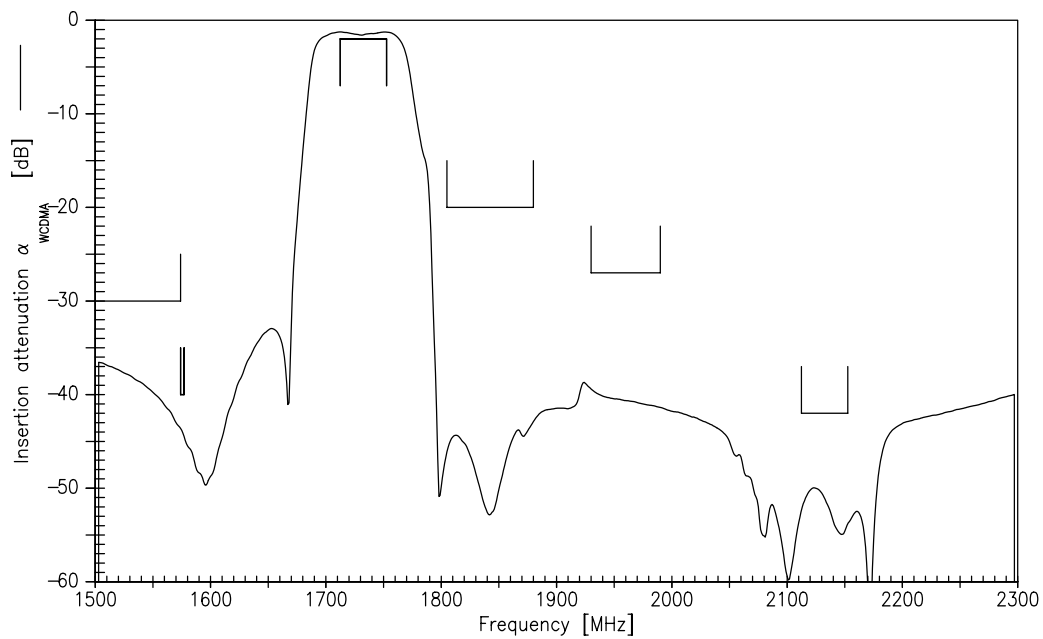
$$\int_{-\infty}^{\infty} |S_{\text{ds21}}(f) H_{\text{RRC}}(f - f_{\text{Carrier}})|^2 df$$

$f_{\text{Carrier}}$  according to 3GPP TS 25.101 (e.g. for WCDMA Band 5-Passband,  $f_{\text{Carrier}}$  ranges from 826.4 MHz (lowest Tx channel) to 846.6 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:

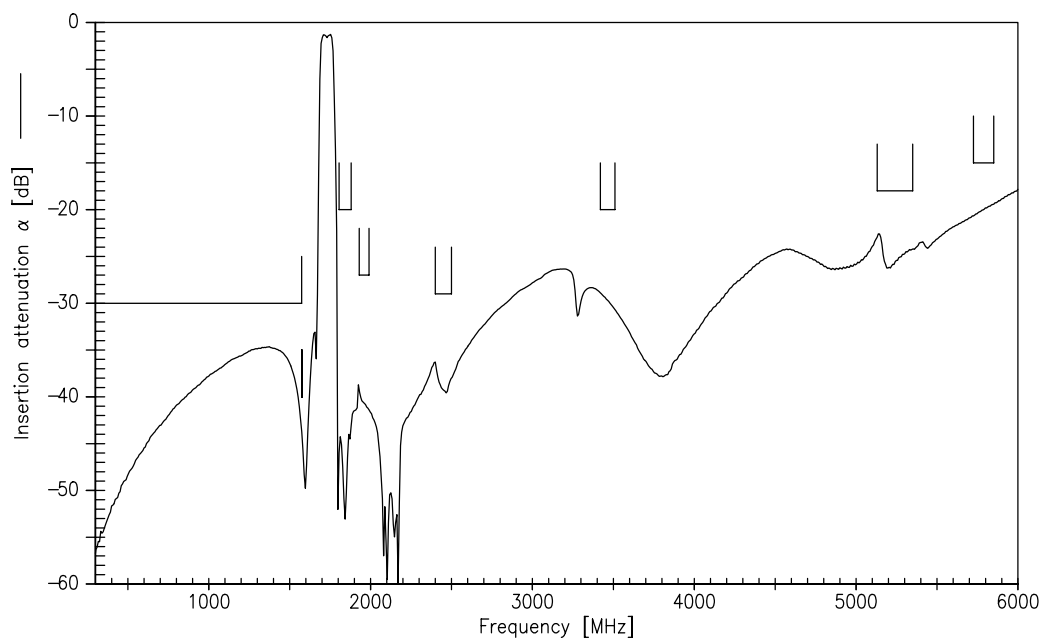
$$\int_{-\infty}^{\infty} |H_{\text{RRC}}(f)|^2 df = 1$$



Frequency response TX-ANT

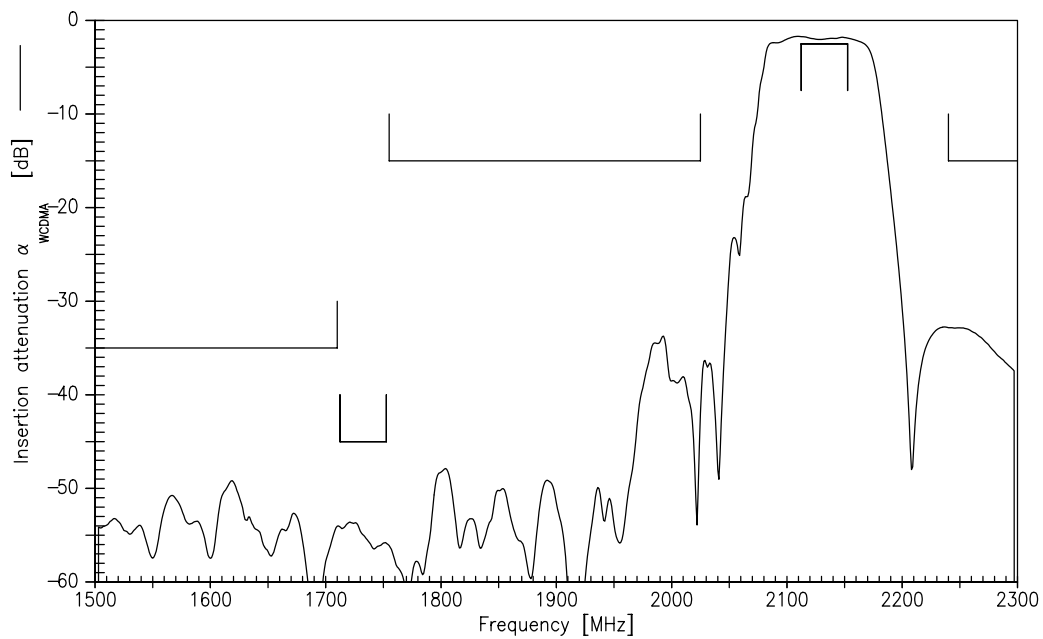


Frequency response TX-ANT (wideband)

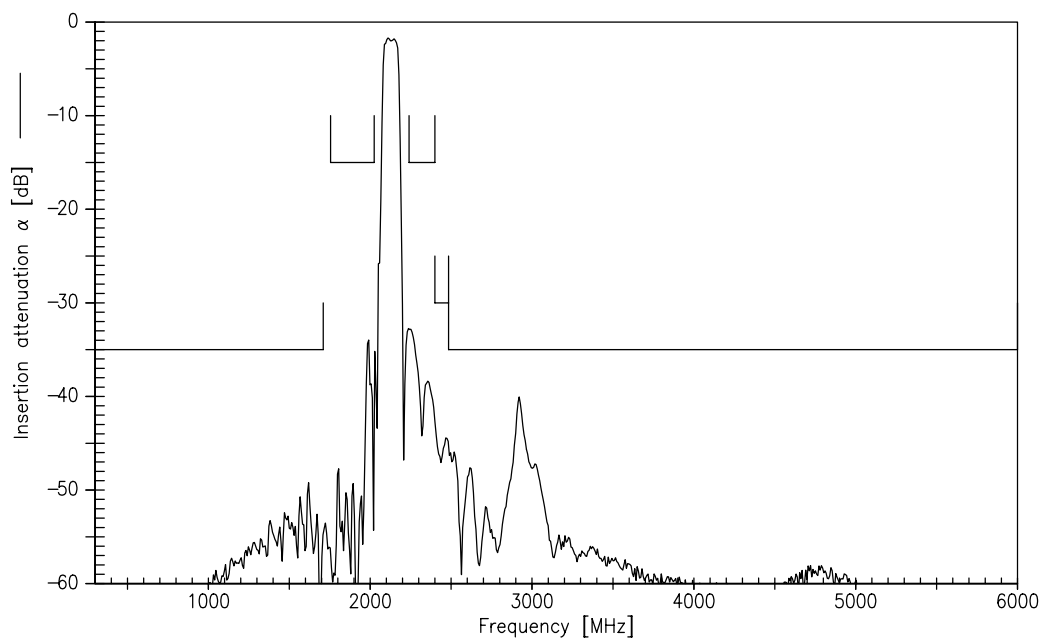




## Frequency response RX-ANT



## Frequency response RX-ANT (wideband)







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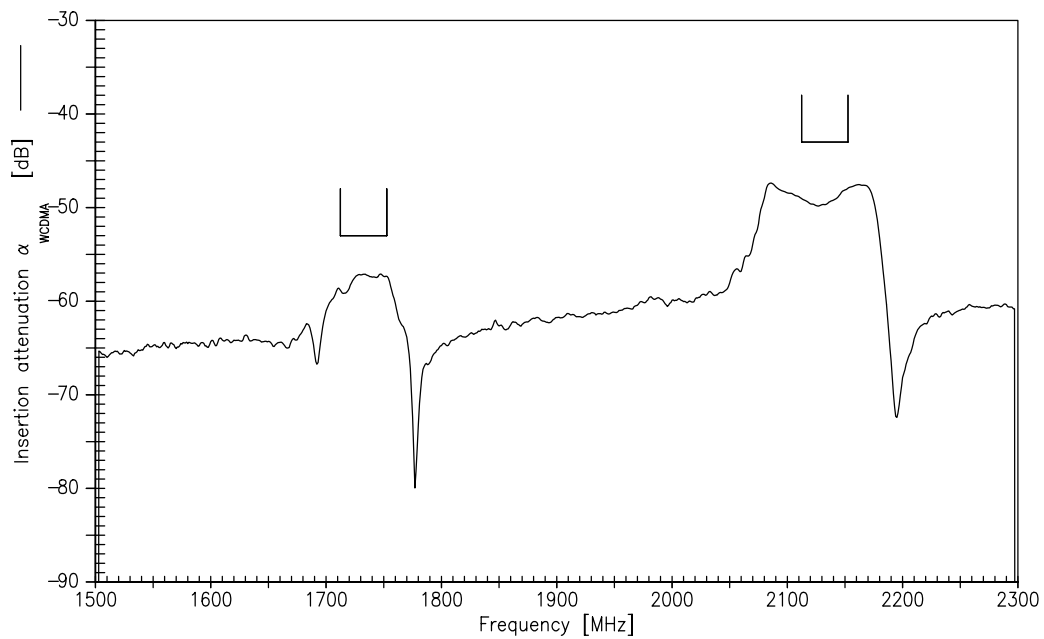
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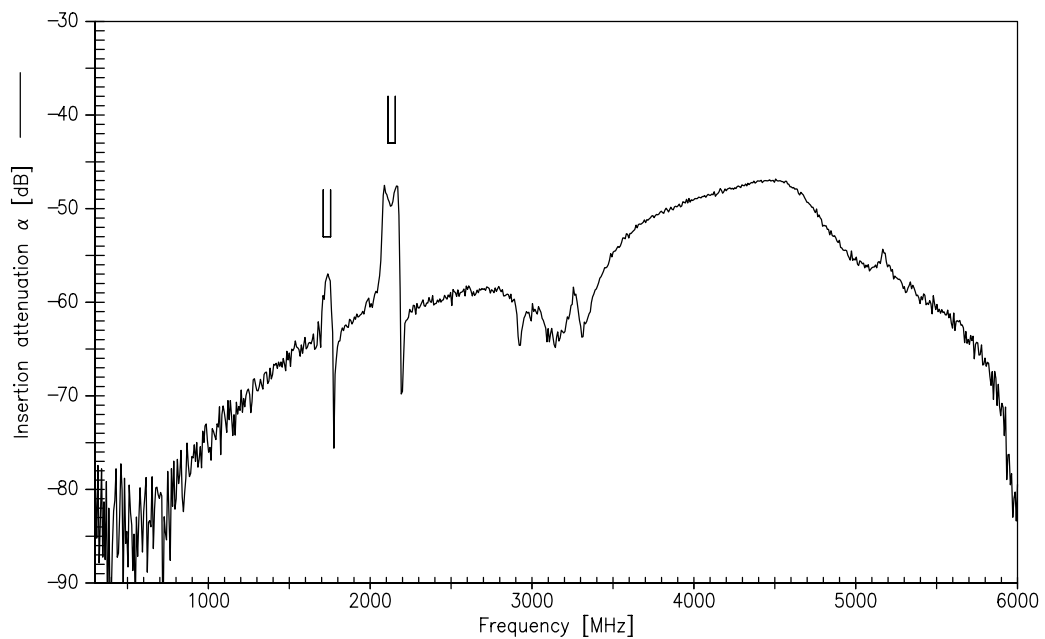
Data Sheet



### Frequency response TX-RX



### Frequency response TX-RX (wideband)



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



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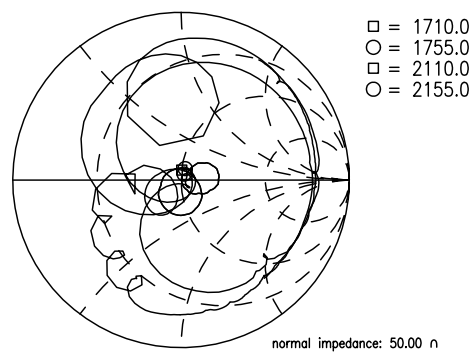
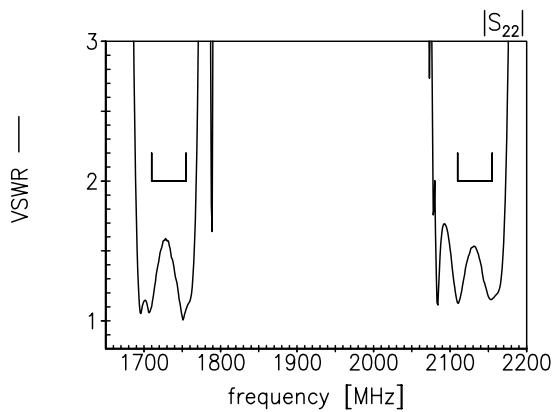
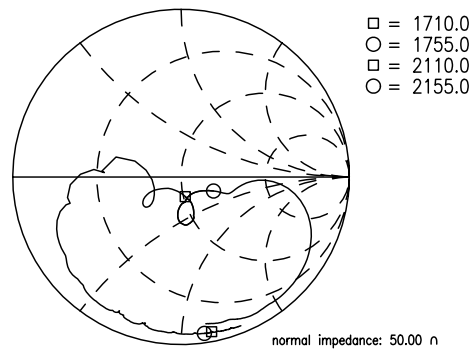
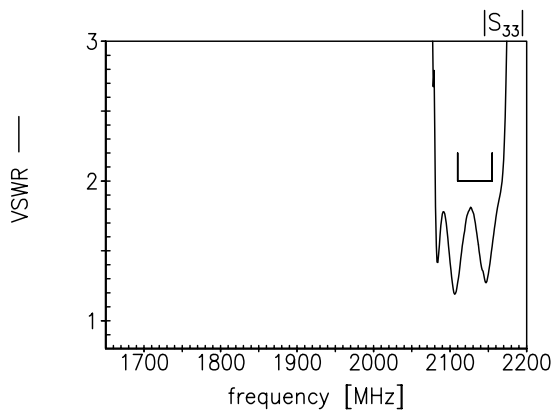
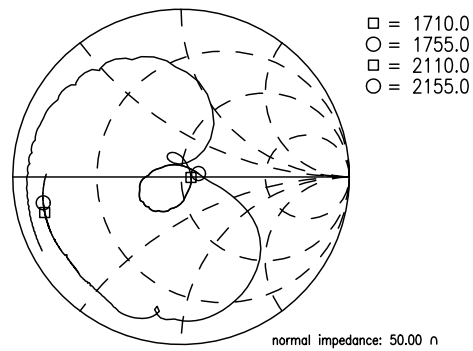
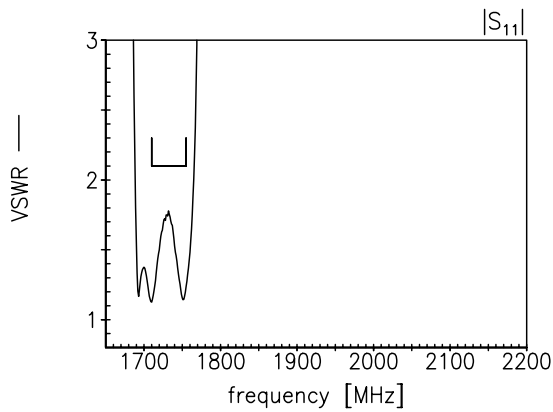


Return Loss

$S_{11}$  TX- port

$S_{22}$  ANT-port

$S_{33}$  RX-port



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Data Sheet

**References**

<b>Type</b>	B7680
<b>Ordering code</b>	B39212B7680A710
<b>Marking and package</b>	C61157-A3-A41
<b>Packaging</b>	F61074-V8211-Z000
<b>Date codes</b>	L_1126
<b>S-parameters</b>	B7680_NB.s4p B7680_WB.s4p See file header for pin / port assignments.
<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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**Published by EPCOS AG  
Surface Acoustic Wave Components Division  
P.O. Box 80 17 09, 81617 Munich, GERMANY**

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**11** June 06, 2008



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