



## **SAW Components**

### **SAW duplexer**

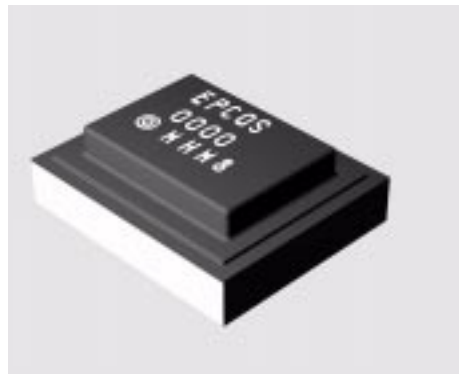
WCDMA band VIII

<b>Series/type:</b>	<b>B7953</b>
<b>Ordering code:</b>	<b>B39941B7953E110</b>
<b>Date:</b>	<b>September 28, 2009</b>
<b>Version:</b>	<b>2.0</b>



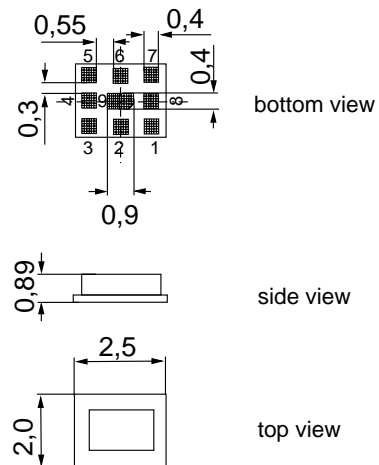
**Application**

- Low-loss SAW duplexer for mobile telephone WCDMA Band VIII 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
- Fully matched by integrated passives network



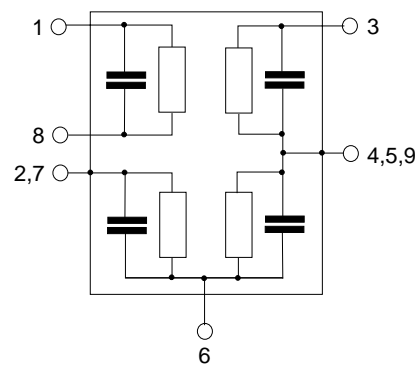
**Features**

- Package size 2.5 x 2.0 x 0.89 mm<sup>3</sup>
- RoHS compatible
- Package for **Surface Mount Technology (SMT)**
- Ni, gold-plated terminals
- **Electrostatic Sensitive Device (ESD)**



**Pin configuration**

- 1,8 RX output, balanced
- 3 TX input, single ended
- 6 Antenna
- 2,4,5,7,9 Ground





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**SAW duplexer**

**897.5 / 942.5 MHz**

Data sheet



**Characteristics**

Temperature range for specification: T = -20 °C to +85 °C  
 ANT terminating impedance: Z<sub>ANT</sub> = 50 Ω  
 TX terminating impedance: Z<sub>TX</sub> = 50 Ω  
 RX terminating impedance: Z<sub>RX</sub> = 100 Ω (balanced)

						<b>B7953</b>			
<b>Characteristics Tx - Ant</b>						<b>min.</b>	<b>typ. @ 25 °C</b>	<b>max.</b>	
<b>Center frequency</b>				$f_C$	—	897.5	—	MHz	
<b>Maximum insertion attenuation</b>									
@f <sub>Carrier</sub>	882.4	...	912.6	MHz	$\alpha_{WCDMA}^{1)}$	—	1.9	2.8	dB
<b>Amplitude ripple (p-p)</b>									
@f <sub>Carrier</sub>	882.4	...	912.6	MHz	$\Delta\alpha_{WCDMA}^{1)}$	—	0.7	1.6	dB
<b>Error Vector Magnitude</b>									
@f <sub>Carrier</sub>	882.4	...	912.6	MHz	EVM <sup>2)</sup>	—	2.2	5.5	%
@f <sub>Carrier</sub>	882.4	...	912.6	MHz	EVM <sup>2)</sup>	—	2.2	4.0 <sup>3)</sup>	%
<b>VSWR</b>									
TX port	880.0	...	915.0	MHz		—	1.7	2.0	
ANT port	880.0	...	915.0	MHz		—	1.7	2.0	
<b>Attenuation</b>					$\alpha$				
	0.3	...	793.0	MHz		30	33	—	dB
@f <sub>Carrier</sub>	927.4	...	957.6	MHz	$\alpha_{WCDMA}^{1)}$	38	44	—	dB
	1574.0	...	1577.0	MHz		38	42	—	dB
	1760.0	...	1830.0	MHz		38	49	—	dB
	1830.0	...	1880.0	MHz		27	52	—	dB
	2110.0	...	2170.0	MHz		27	44	—	dB
	2400.0	...	2500.0	MHz		30	36	—	dB
	2620.0	...	2745.0	MHz		30	35	—	dB
	3520.0	...	3660.0	MHz		20	27	—	dB
	4400.0	...	4575.0	MHz		15	23	—	dB
	5150.0	...	5490.0	MHz		2	10	—	dB
	5725.0	...	5850.0	MHz		2	8	—	dB

1) Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (5).  
 2) Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.  
 3) T=-15°C to +55°C


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**897.5 / 942.5 MHz**
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**Characteristics**

Temperature range for specification:	T = -20 °C to +85 °C
ANT terminating impedance:	Z <sub>ANT</sub> = 50 Ω
TX terminating impedance:	Z <sub>TX</sub> = 50 Ω
RX terminating impedance:	Z <sub>RX</sub> = 100 Ω (balanced)

						<b>B7953</b>			
<b>Charcteristics Rx - Ant</b>						<b>min.</b>	<b>typ. @ 25 °C</b>	<b>max.</b>	
<b>Center frequency</b>		$f_C$				—	942.5	—	MHz
<b>Maximum insertion attenuation</b>									
	@f <sub>Carrier</sub>	927.4 ... 957.6	MHz	$\alpha_{WCDMA}^{1)}$		—	2.3	2.9	dB
		925.0 ... 960.0	MHz			—	3.0	4.0	dB
<b>Amplitude ripple (p-p)</b>									
	@f <sub>Carrier</sub>	927.4 ... 957.6	MHz	$\Delta\alpha_{WCDMA}^{1)}$		—	0.7	1.4	dB
<b>Error Vector Magnitude</b>									
	@f <sub>Carrier</sub>	927.4 ... 957.6	MHz	EVM <sup>2)</sup>		—	2.7	5.5	%
	@f <sub>Carrier</sub>	927.4 ... 957.6	MHz	EVM <sup>2)</sup>		—	2.7	4.5 <sup>3)</sup>	%
<b>VSWR</b>									
RX port		925.0 ... 960.0	MHz			—	1.9	2.2	
ANT port		925.0 ... 960.0	MHz			—	1.6	2.0	
<b>Common Mode Suppression</b>				$\alpha$					
		925.0 ... 960.0	MHz			25	28	—	dB
<b>Attenuation</b>				$\alpha$					
		0.3 ... 880.0	MHz			35	57	—	dB
	@f <sub>Carrier</sub>	882.4 ... 912.6	MHz	$\alpha_{WCDMA}^{1)}$		48	58	—	dB
		1045.0 ... 1750.0	MHz			35	54	—	dB
		1750.0 ... 4810.0	MHz			35	54	—	dB
<b>Characteristics Tx - Rx</b>									
<b>Differential Mode Isolation</b>									
	@f <sub>Carrier</sub>	882.4 ... 912.6	MHz	$\alpha_{WCDMA}^{1)}$		55	58	—	dB
	@f <sub>Carrier</sub>	927.4 ... 957.6	MHz	$\alpha_{WCDMA}^{1)}$		42	45	—	dB
<b>Common Mode Isolation</b>									
	@f <sub>Carrier</sub>	882.4 ... 912.6	MHz	$\alpha_{WCDMA}^{1)}$		50	55	—	dB

1) Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (5).

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

3) T = +5 °C to +85 °C



**Maximum ratings**

Operable temperature range <sup>1)</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>	100 <sup>2)</sup>	V	machine model, 10 pulses
Input power at 880.0 ... 915.0 MHz elsewhere	P <sub>IN</sub>	30 10	dBm dBm	} continuous wave 55 °C, 10000 h

1) Defines the temperature range in which the 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",  $\alpha_{WCDMA}$ ) is determined by

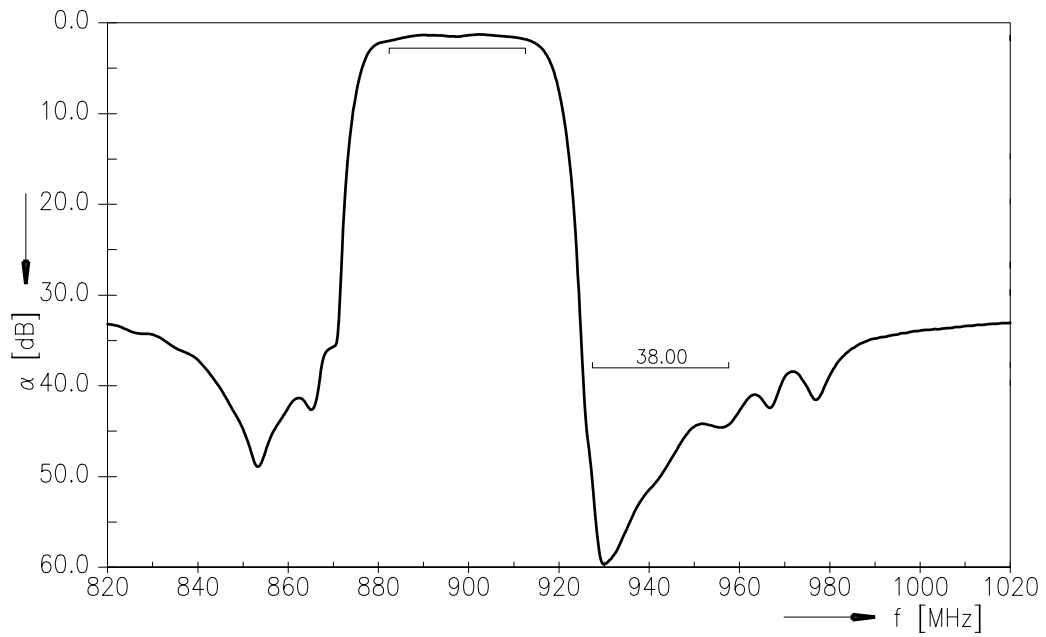
$$\int_{-\infty}^{\infty} |S_{ds21}(f)H_{RRC}(f - f_{Carrier})|^2 df$$

$f_{Carrier}$  according to 3GPP TS 25.101 (e.g. for UMTS-Passband,  $f_{Carrier}$  ranges from 2112.4 MHz (lowest Rx channel) to 2167.6 MHz (highest Rx channel)).  $H_{RRC}(f)$  is the transfer function of the root-raised cosine transmit pulse shaping filter according to 3GPP TS 25.101 with the following normalization:

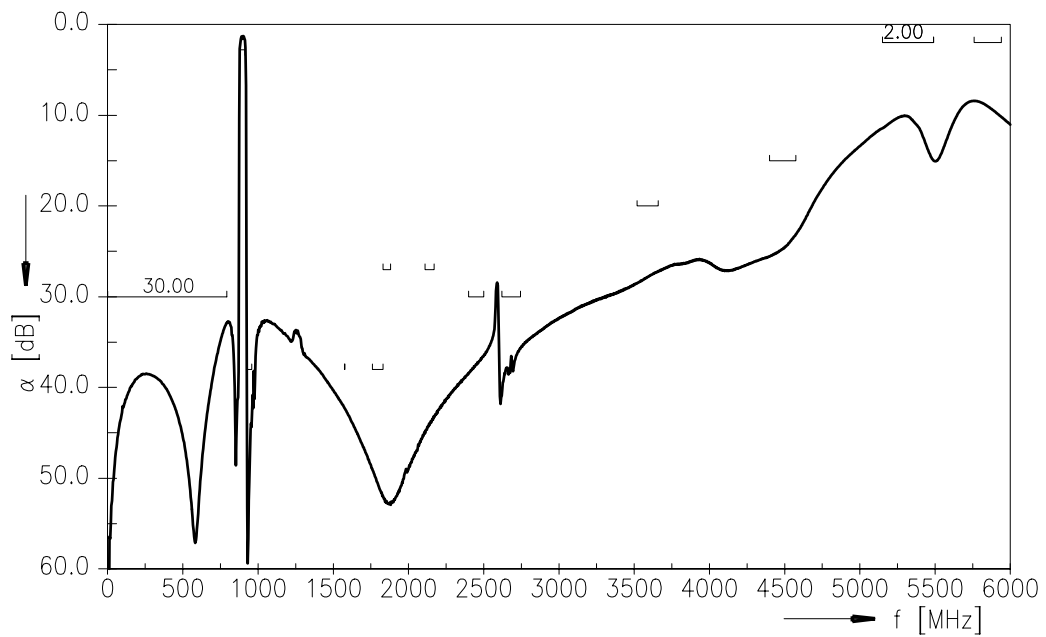
$$\int_{-\infty}^{\infty} |H_{RRC}(f)|^2 df = 1$$



Frequency Response TX-ANT (Power transfer function)

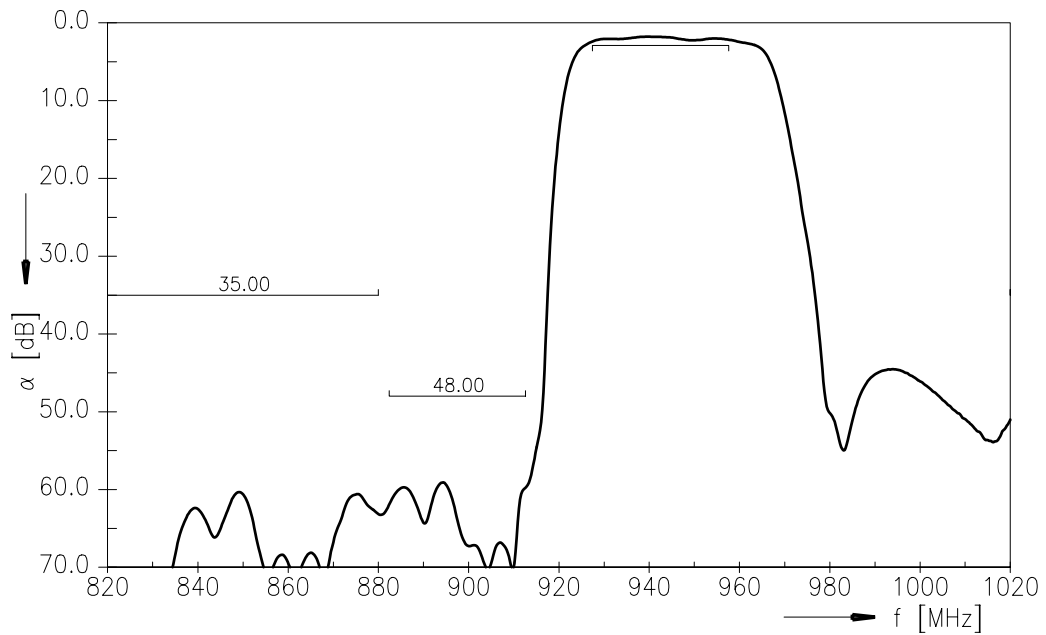


Frequency Response TX-ANT (wideband)

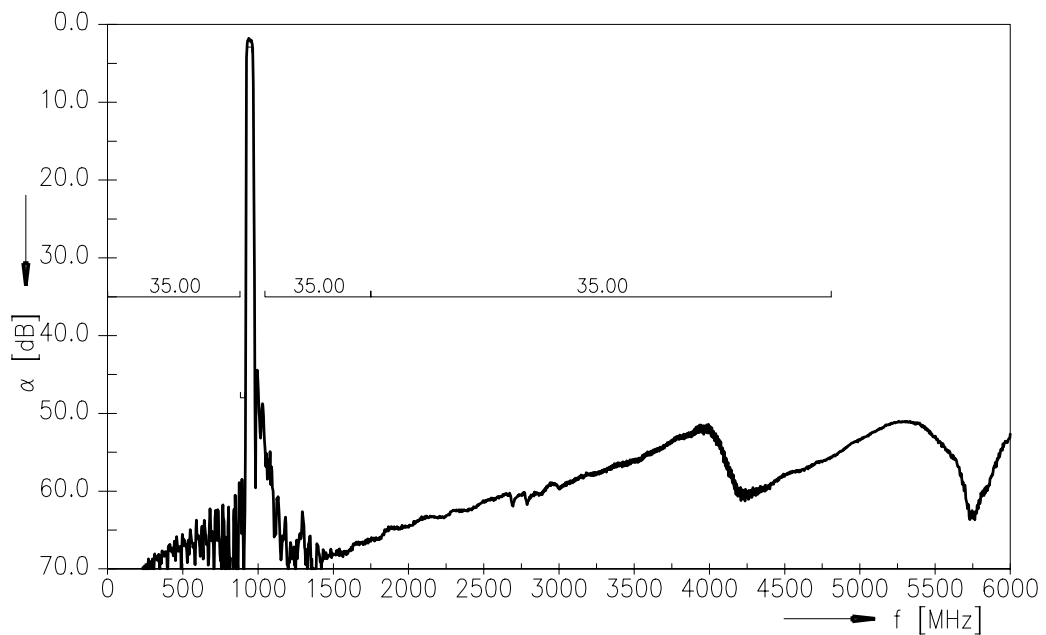




Frequency Response ANT - RX (Power transfer function)

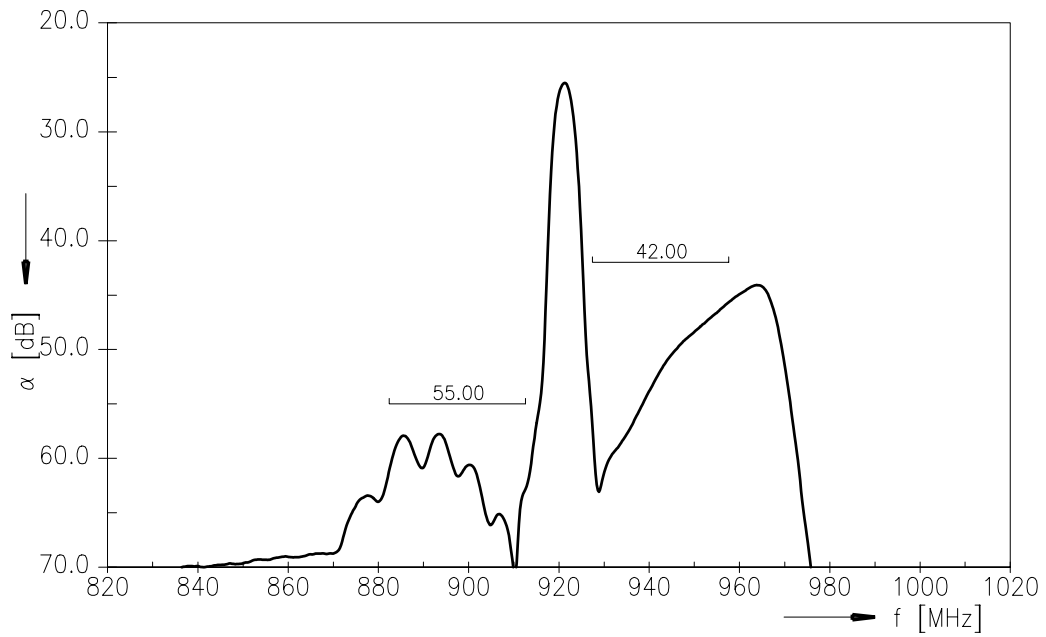


Frequency Response ANT - RX (wideband)

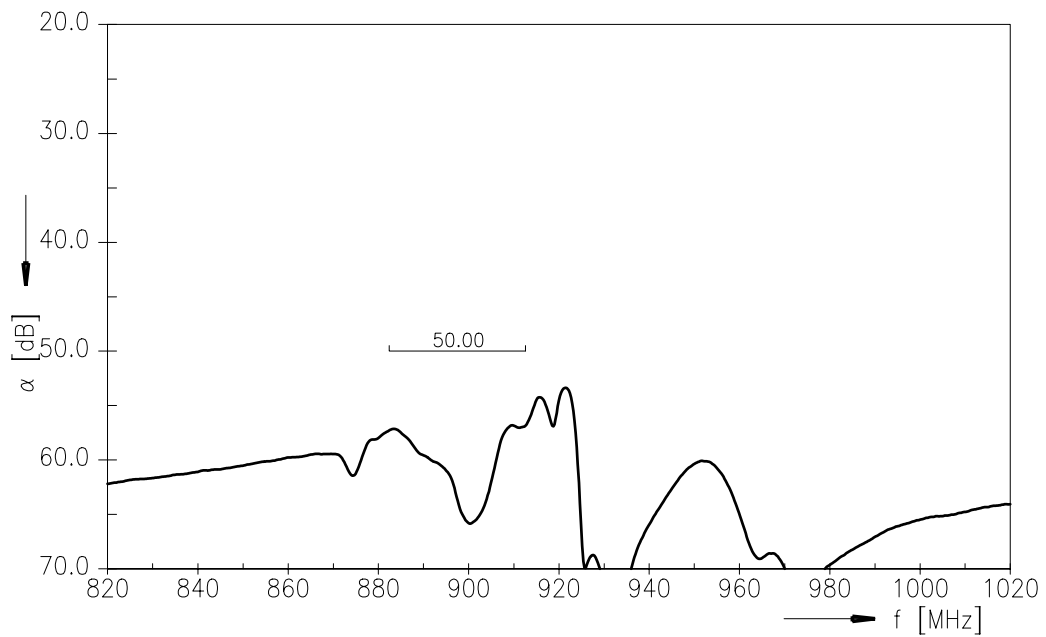




Frequency Response TX - RX (Power transfer function, differential mode)



Frequency Response TX - RX (Power transfer function, common mode)





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## References

<b>Type</b>	B7953
<b>Ordering code</b>	B39941B7953E110
<b>Marking and package</b>	C61157-Z3-C49
<b>Packaging</b>	F61074-V8153-Z000
<b>Date codes</b>	L_1126
<b>S-parameters</b>	B7953_NB_UN.s4p, B7953_WB_UN.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.

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