



# SAW Components

## SAW duplexer

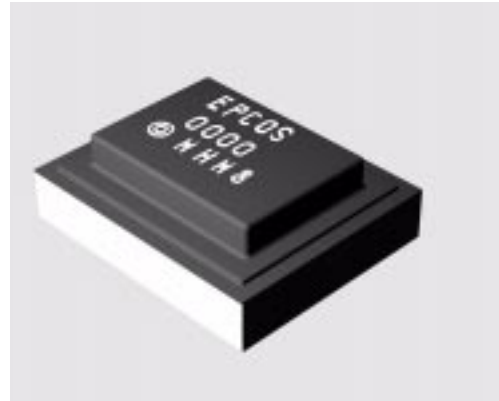
2100 MHz WCDMA Band I (UMTS)

**Series/type:** B7695  
**Ordering code:** B39212B7695P810

**Date:** October 21, 2009  
**Version:** 2.2

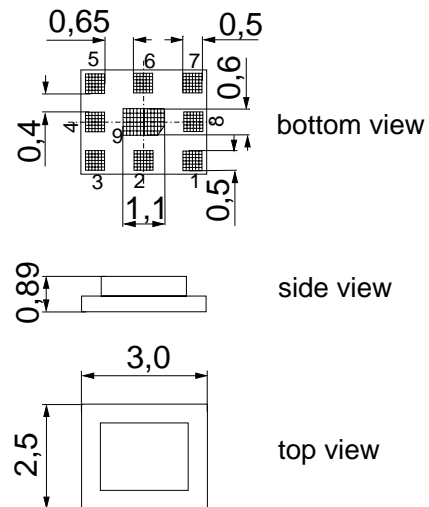
**Application**

- Low-loss SAW duplexer for mobile telephone WCDMA Band I (UMTS) 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



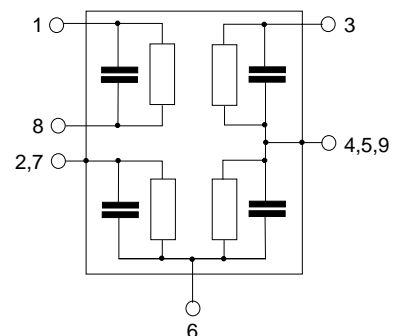
**Features**

- Package size 3.0 x 2.5 x 0.89 mm<sup>3</sup>
- RoHS compatible
- Approximate weight 0.024 g
- Package for **S**urface **M**ount **T**echnology (**SMT**)
- Ni, gold-plated terminals
- **E**lectrostatic **S**ensitive **D**evice (**ESD**)



**Pin configuration**

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





<b>SAW Components</b>	<b>B7695</b>
<b>SAW duplexer</b>	<b>1950.0 / 2140.0 MHz</b>

Data Sheet



**Characteristics**

Temperature range for specification:  $T = -15\text{ °C to }+80\text{ °C}$   
 ANT terminating impedance:  $Z_{ANT} = 50\ \Omega$   
 RX terminating impedance:  $Z_{RX} = 100\ \Omega \parallel 12\text{ nH (balanced)}$   
 TX terminating impedance:  $Z_{TX} = 50\ \Omega$

<b>Characteristics TX-ANT</b>	<b>min.</b>	<b>typ. @ 25°C</b>	<b>max.</b>	
<b>Center frequency</b> $f_C$	—	1950.00	—	MHz
<b>Maximum insertion attenuation</b> @ $f_{Carrier}$ 1922.4 ... 1977.6 MHz $\alpha_{WCDMA}^{1)}$	—	1.4	1.8 <sup>2)</sup>	dB
<b>Amplitude ripple (p-p)</b> @ $f_{Carrier}$ 1922.4 ... 1977.6 MHz $\Delta\alpha_{WCDMA}^{1)}$	—	0.3	0.9	dB
<b>Error vector magnitude</b> $EVM^{3)}$ 1922.4 ... 1977.6 MHz	—	0.4	2.0	%
<b>VSWR</b>				
TX port 1920.0 ... 1980.0 MHz	—	1.4	1.7	
ANT port 1920.0 ... 1980.0 MHz	—	1.5	1.8	
<b>Attenuation</b> $\alpha$				
470.0 ... 1000.0 MHz	30	38	—	dB
1000.0 ... 1450.0 MHz	10	35	—	dB
1450.0 ... 1480.0 MHz	30	35	—	dB
1570.0 ... 1580.0 MHz	35	37	—	dB
1730.0 ... 1790.0 MHz	30	38	—	dB
2110.0 ... 2170.0 MHz	45	49	—	dB
2400.0 ... 2500.0 MHz	25	30	—	dB
2500.0 ... 3840.0 MHz	20	28	—	dB
3840.0 ... 3960.0 MHz	25	30	—	dB
5150.0 ... 5760.0 MHz	10	23	—	dB
5760.0 ... 5940.0 MHz	15	23	—	dB

1) Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (6).  
 2) 3.0dB in range -25...-15°C and +80...+85°C.  
 3) Error Vector Magnitude (EMV) based on definition given in 3GPP TS 25.141.



Data Sheet



Characteristics

Temperature range for specification: T = -15 °C to +80 °C  
 ANT terminating impedance: Z<sub>ANT</sub> = 50 Ω  
 RX terminating impedance: Z<sub>RX</sub> = 100 Ω || 12nH (balanced)  
 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>	—	2140.0	—	MHz
<b>Maximum insertion attenuation</b> @f <sub>Carrier</sub> 2112.4 ... 2167.6 MHz α <sub>WCDMA</sub> <sup>1)</sup>	—	1.8	2.2 <sup>2)</sup>	dB
<b>Amplitude ripple (p-p)</b> @f <sub>Carrier</sub> 2112.4 ... 2167.6 MHz Δα <sub>WCDMA</sub> <sup>1)</sup>	—	0.5	0.9	
<b>Error vector magnitude</b> EVM <sup>3)</sup> 2112.4 ... 2167.6 MHz	—	1.0	2.0	%
<b>Common mode rejection ratio</b> 2110.0 ... 2170.0 MHz	23 <sup>4)</sup>	28	—	dB
<b>IMD product level limits<sup>5)</sup></b> at f <sub>TX</sub> = 1950.0MHz, f <sub>RX</sub> = 2140MHz				
Blocker 190.0 MHz	—	-127	-110	dBm
Blocker 2 1760.0 MHz	—	-105	-100	dBm
Blocker 3 4090.0 MHz	—	-117	-110	dBm
<b>VSWR</b>				
RX port 2110.0 ... 2170.0 MHz	—	1.65	1.9	
ANT port 2110.0 ... 2170.0 MHz	—	1.5	1.8	

1) Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (6).  
 2) 3.5dB in range -25...-15°C and +80...+85°C.  
 3) Error Vector Magnitude (EMV) based on definition given in 3GPP TS 25.141.  
 4) A combination of 10 ° phase balance and 1 dB amplitude balance corresponds to 19.6 dB CMRR  
 5) Power levels: 21.5 dBm Tx signal, -15dBm blocker at antenna port.



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Data Sheet



**Characteristics**

Temperature range for specification:	T = -15 °C to +80 °C
ANT terminating impedance:	Z <sub>ANT</sub> = 50 Ω
RX terminating impedance:	Z <sub>RX</sub> = 100 Ω    12nH (balanced)
TX terminating impedance:	Z <sub>TX</sub> = 50 Ω

Characteristics ANT-RX	min.	typ. @ 25°C	max.	
<b>Attenuation</b> α				
0.3 ... 1730.0 MHz	30	47	—	dB
1730.0 ... 1790.0 MHz	38	47	—	dB
1920.0 ... 1980.0 MHz	50	53	—	dB
2015.0 ... 2025.0 MHz	30	38	—	dB
2025.0 ... 2050.0 MHz	15	37	—	dB
2050.0 ... 2085.0 MHz	7	14	—	dB
2400.0 ... 2500.0 MHz	30	42	—	dB
3000.0 ... 4030.0 MHz	15	45	—	dB
4030.0 ... 4150.0 MHz	30	56	—	dB
4150.0 ... 6000.0 MHz	30	56	—	dB

Characteristics TX-RX	min.	typ. @ 25°C	max.	
<b>Isolation between RX and TX</b> α				
@f <sub>Carrier</sub> 1922.4 ... 1977.6 MHz α <sub>WCDMA</sub> <sup>1)</sup>	52	54	—	dB
@f <sub>Carrier</sub> 2112.4 ... 2167.6 MHz α <sub>WCDMA</sub> <sup>1)</sup>	48	52	—	dB

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



**Maximum ratings**

Operable temperature range <sup>1)</sup>	T	-25 / +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>	75 <sup>2)</sup>	V	machine model, 1 pulse human body model, 1 pulse field-induced charge device model
	V <sub>ESD</sub>	150 <sup>3)</sup>	V	
	V <sub>ESD</sub>	500 <sup>4)</sup>	V	
Input Power at 1920.0 ... 1980.0 MHz elsewhere	P <sub>IN</sub>	30	dBm	} continuous wave 55 °C, 50000 h
		10	dBm	

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), 1 negative & 1 positive pulse.

3) acc. to JESD22-A114B (human body model), 1 negative & 1 positive pulse.

4) acc. to JESD22-C101C (field-induced charge device model), 3 negative & 3 positive pulses.

**Annotation for characteristics section**

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

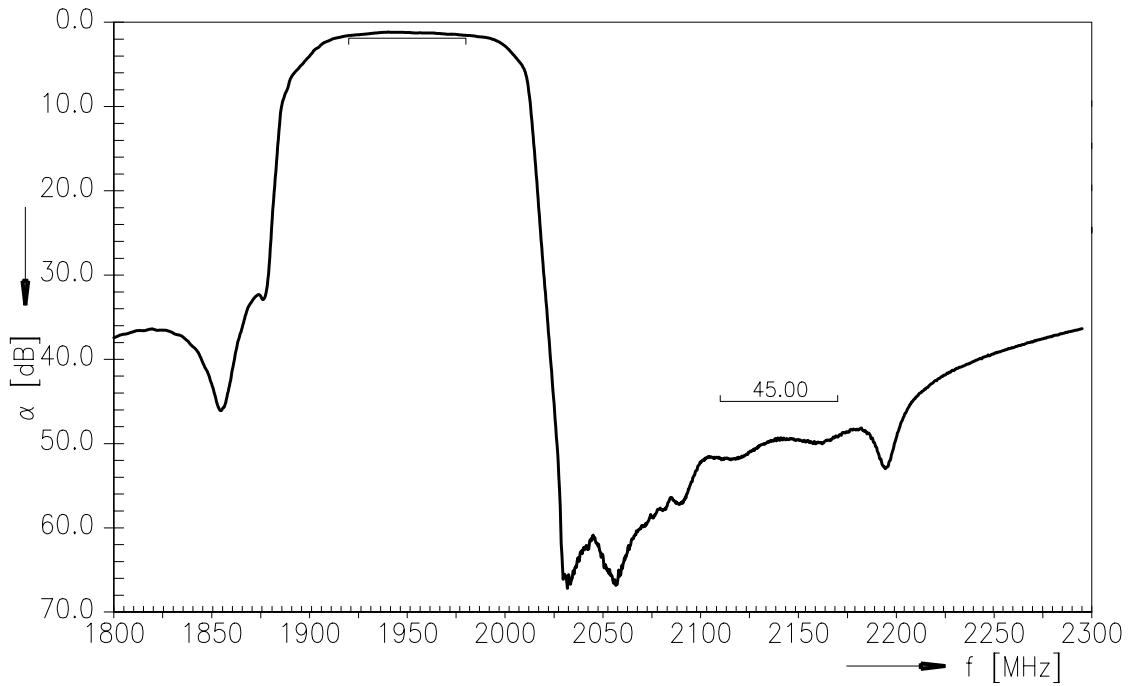
$$\int_{-\infty}^{\infty} |S_{ds21}(f)H_{RRC}(f - f_{Carrier})|^2 df$$

$f_{Carrier}$  according to 3GPP TS 25.101 (e.g. for UMTS-Passband,  $f_{Carrier}$  ranges from 882.4 MHz (lowest Tx channel) to 912.6 MHz (highest Tx 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:

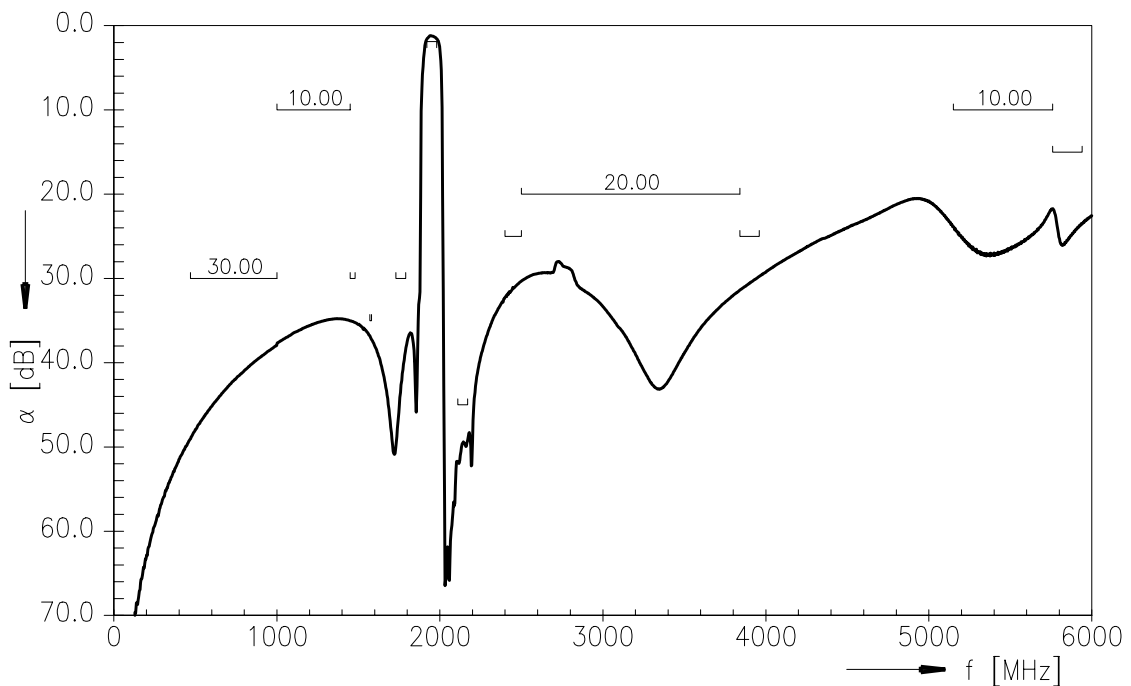
$$\int_{-\infty}^{\infty} |H_{RRC}(f)|^2 df = 1$$



Frequency Response TX-ANT

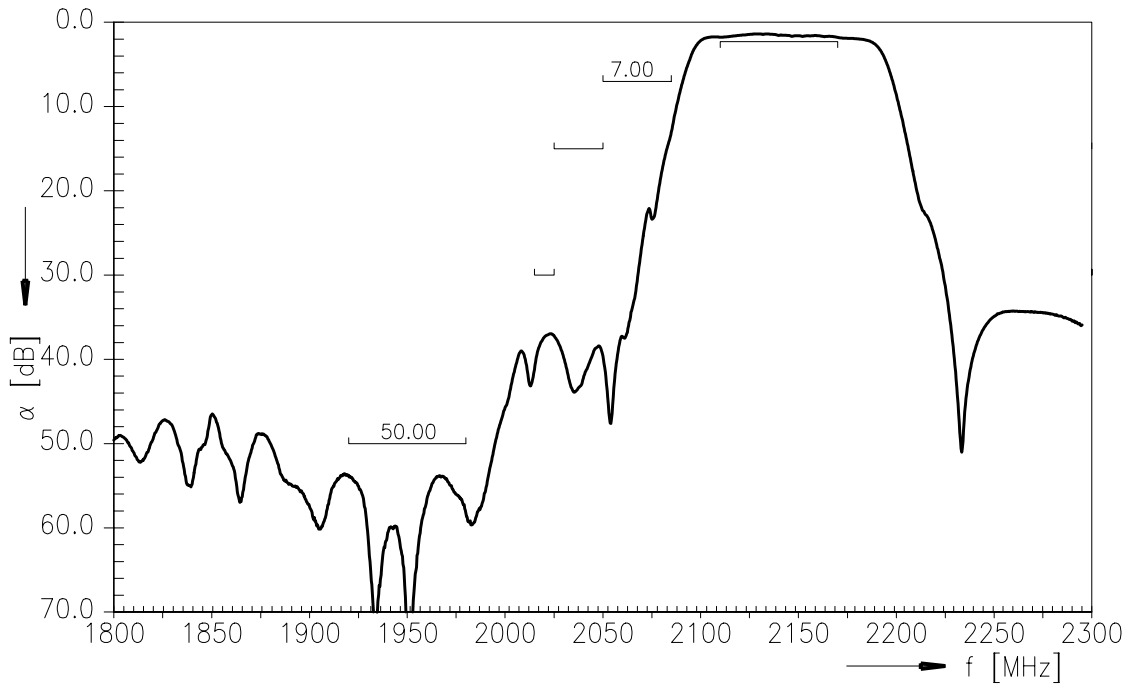


Frequency Response TX-ANT (wideband)

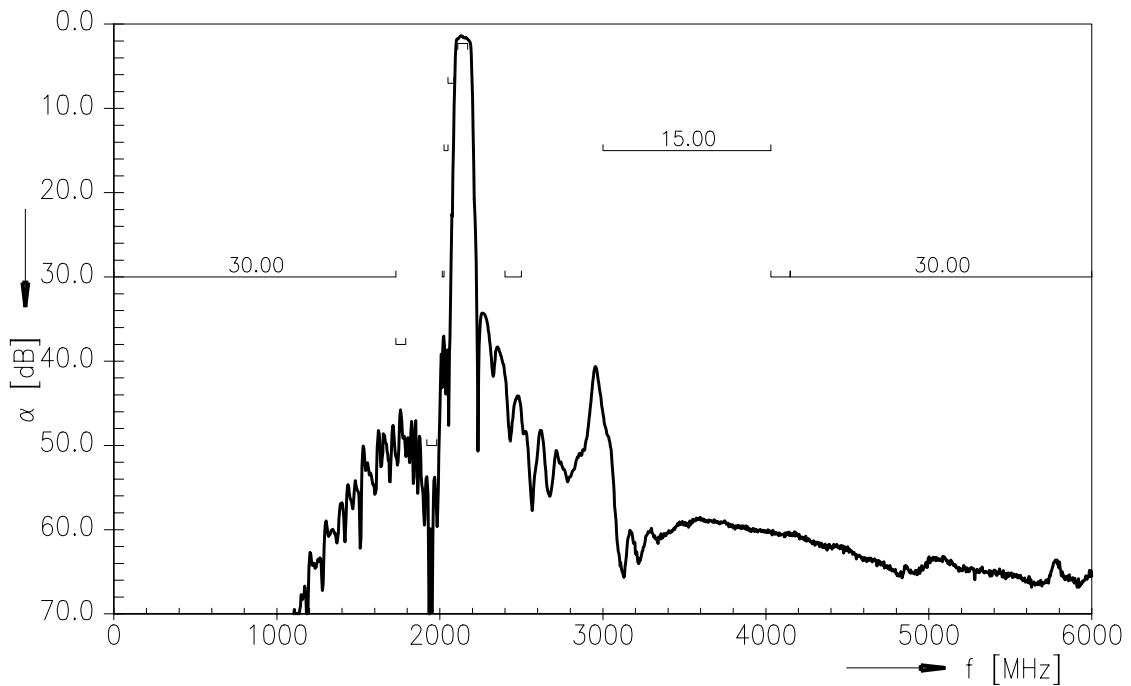




Frequency Response RX-ANT

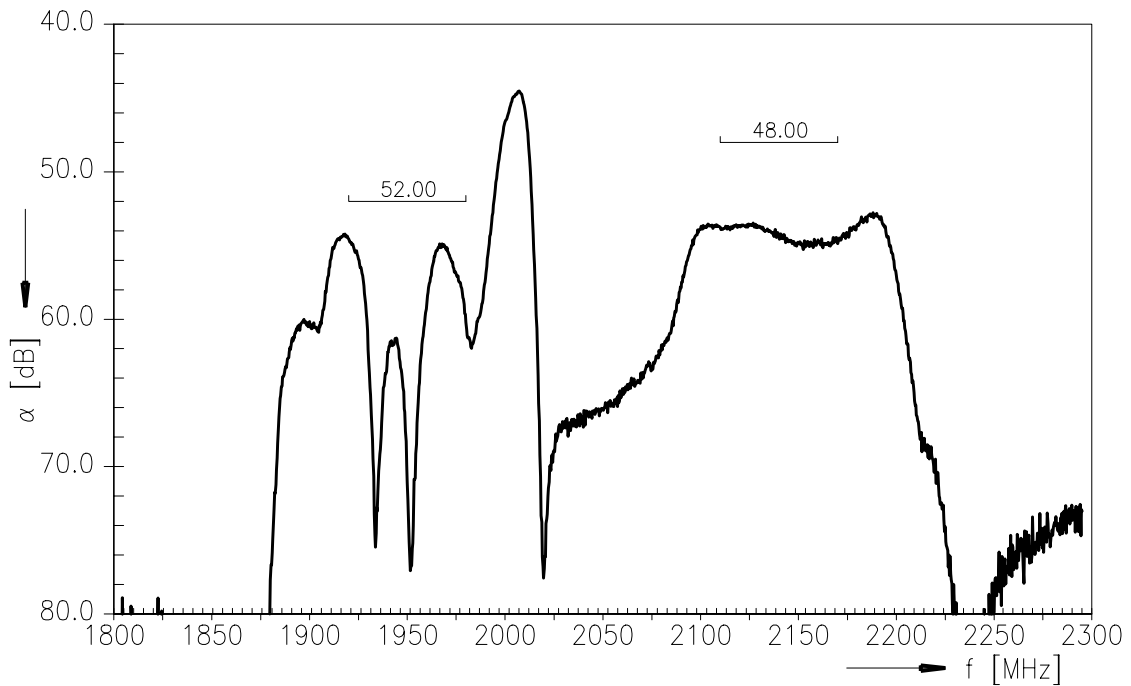


Frequency Response RX-ANT (wideband)

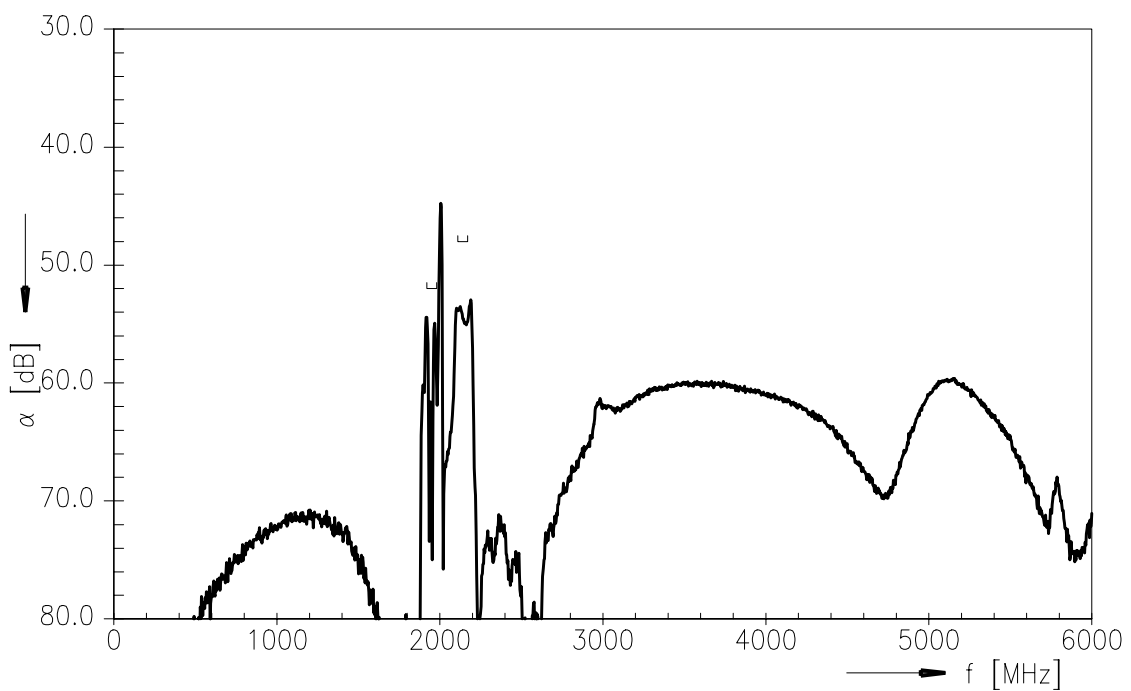




Frequency Response TX-RX



Frequency Response TX-RX (wideband)



**SAW Components****B7695****SAW duplexer****1950.0 / 2140.0 MHz**

Data Sheet

**References**

<b>Type</b>	B7695
<b>Ordering code</b>	B39212B7695P810
<b>Marking and Package</b>	C61157-A3-A60
<b>Packaging</b>	F61074-V8211-Z000
<b>Date Codes</b>	L_1126
<b>S-Parameters</b>	B7695_NB.s3p B7695_WB.s3p
<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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