



SAW Components

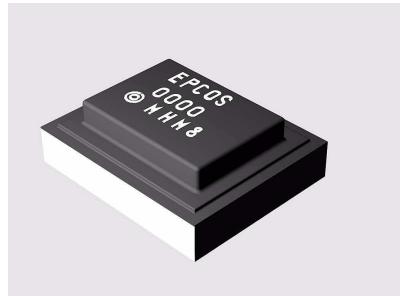
SAW Duplexer

W-CDMA Band 5 / CDMA 800

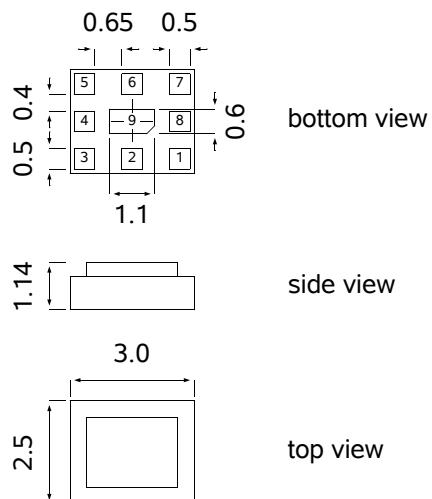
Series/type: B7689
Ordering code: B39881B7689L310
Date: November 28, 2008
Version: 2.0

Application

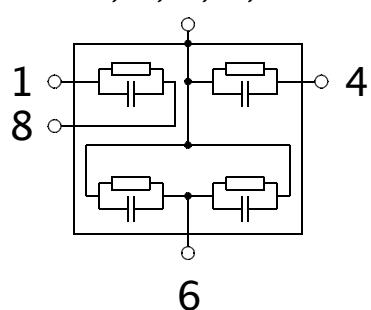
- Low-loss SAW duplexer for mobile telephone
W-CDMA Band 5 / CDMA 800 systems
- Low insertion attenuation
- Low amplitude ripple
- Single ended to balanced transformation
in Antenna - Rx path
- Impedance transformation 50Ω to 100Ω
in Antenna - Rx path


Features

- Package size 3.0 x 2.5 x 1.14 mm³
- 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, 7, 9 To be grounded

2, 3, 5, 7, 9


**SAW Components****B7689****SAW Duplexer****836.5 / 881.5 MHz****Data Sheet****SMD****Characteristics for W-CDMA Band 5**Temperature range for specification: $T = -15^{\circ}\text{C}$ to $+80^{\circ}\text{C}$ Antenna terminating impedance: $Z_{\text{ANT}} = 50\Omega$ RX terminating impedance: $Z_{\text{RX}} = 100\Omega$ (balanced)TX terminating impedance: $Z_{\text{TX}} = 50\Omega$

Characteristics TX - ANT		min.	typ. @ 25 °C	max.	
Center frequency	f_c		836.5		MHz
Maximum insertion attenuation @ f_{Carrier} 826.4 ... 846.6 MHz	$\alpha_{\text{WCDMA}}^1)$		1.4	1.8	dB
Amplitude ripple (p-p) @ f_{Carrier} 826.4 ... 846.6 MHz	$\Delta\alpha_{\text{WCDMA}}$		0.4	0.8	dB
Error Vector Magnitude @ f_{Carrier} 826.4 ... 846.6 MHz	EVM ²⁾		1.4	2.5	%
Input VSWR (TX port) 824.0 ... 849.0 MHz			1.7	1.9	
Output VSWR (ANT port) 824.0 ... 849.0 MHz			1.6	1.8	

¹⁾ Attenuation of W-CDMA signal (power transfer function). Please refer to annotation on page (11).²⁾ Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.

**SAW Components****B7689****SAW Duplexer****836.5 / 881.5 MHz****Data Sheet****Characteristics for W-CDMA Band 5**Temperature range for specification: $T = -15^{\circ}\text{C}$ to $+80^{\circ}\text{C}$ Antenna terminating impedance: $Z_{\text{ANT}} = 50\Omega$ RX terminating impedance: $Z_{\text{RX}} = 100\Omega$ (balanced)TX terminating impedance: $Z_{\text{TX}} = 50\Omega$

Characteristics TX - ANT				min.	typ. @ 25 °C	max.	
Attenuation			α				
0.3	...	779.0	MHz	30	40		dB
779.0	...	804.0	MHz	30	41		dB
@ f_{Carrier}	871.4	...	891.6	$\alpha_{\text{WCDMA}}^{1)}$	45	54	dB
1574.0	...	1577.0	MHz	43	54		dB
1648.0	...	1698.0	MHz	30	48		dB
2400.0	...	2500.0	MHz	30	35		dB
2500.0	...	2547.0	MHz	29	34		dB
2547.0	...	4120.0	MHz	10	16		dB
4120.0	...	4245.0	MHz	15	24		dB
4245.0	...	5150.0	MHz	10	13		dB
5150.0	...	5825.0	MHz	8	11		dB

¹⁾ Attenuation of W-CDMA signal (power transfer function). Please refer to annotation on page (11).

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Characteristics ANT - RX		min.	typ. @ 25 °C	max.	
Center frequency	f_c		881.5		MHz
Maximum insertion attenuation @ f_{Carrier} 871.4 ... 891.6 MHz	$\alpha_{\text{WCDMA}}^1)$		1.8	2.5	dB
Amplitude ripple (p-p) @ f_{Carrier} 871.4 ... 891.6 MHz	$\Delta\alpha_{\text{WCDMA}}$		0.6	1.1	dB
Error Vector Magnitude @ f_{Carrier} 871.4 ... 891.6 MHz	EVM ²⁾		1.8	3.0	%
Input VSWR (ANT port) 869.0 ... 894.0 MHz			1.6	1.8	
Output VSWR (RX port) 869.0 ... 894.0 MHz			1.9	2.2	
CMRR ($S_{32}-S_{42} / S_{32}+S_{42}$) 869.0 ... 894.0 MHz		20 ³⁾	30		dB

¹⁾ Attenuation of W-CDMA signal (power transfer function). Please refer to annotation on page (11).²⁾ Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.³⁾ A combination of 10 ° phase balance and 1 dB amplitude balance corresponds to 19.6 dB CMRR



SAW Components

B7689

SAW Duplexer

836.5 / 881.5 MHz

Data Sheet



Characteristics for W-CDMA Band 5

Temperature range for specification: $T = -15^{\circ}\text{C}$ to $+80^{\circ}\text{C}$

Antenna terminating impedance: $Z_{\text{ANT}} = 50\ \Omega$

RX terminating impedance: $Z_{\text{RX}} = 100\ \Omega$ (balanced)

TX terminating impedance: $Z_{\text{TX}} = 50\ \Omega$

Characteristics ANT - RX				min.	typ. @ 25 °C	max.	
IMD product level limits¹⁾							
at $f_{\text{TX}} = 836.5\ \text{MHz}$	$f_{\text{RX}} = 881.5\ \text{MHz}$						
Blocker 1	45.0	MHz			-108	-105	dBm
Blocker 2	791.5	MHz			-128	-110	dBm
Blocker 3	1718.0	MHz			-121	-110	dBm
Attenuation				α			
0.3	...	779.0	MHz	40	57		dB
779.0	...	824.0	MHz	40	57		dB
@ f_{Carrier}	826.4	...	846.6	$\alpha_{\text{WCDMA}}^{2)}$	47	55	dB
	849.0	...	854.0	MHz	23	45	dB
	914.0	...	1693.0	MHz	23	37	dB
	1693.0	...	1788.0	MHz	45	63	dB
	1788.0	...	2400.0	MHz	40	57	dB
	2400.0	...	2500.0	MHz	40	50	dB
	2500.0	...	2682.0	MHz	40	47	dB
	2682.0	...	4480.0	MHz	40	44	dB

¹⁾ Power levels: 21dBm Tx signal, -15dBm blocker at antenna port.

²⁾ Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (11).

Characteristics TX - RX				min.	typ. @ 25 °C	max.		
Isolation								
@ f_{Carrier}	826.4	...	846.6	α $\alpha_{\text{WCDMA}}^{1)}$	54	58		dB
	871.4	...	891.6	MHz α_{WCDMA}	50	55		dB
Common Mode Isolation				α				
@ f_{Carrier}	826.4	...	846.6	α_{WCDMA}	42	48		dB

¹⁾ Attenuation of W-CDMA signal (power transfer function). Please refer to annotation on page (11).

**SAW Components****B7689****SAW Duplexer****836.5 / 881.5 MHz****Data Sheet****Characteristics for CDMA 800**Temperature range for specification: $T = -30^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ Antenna terminating impedance: $Z_{\text{ANT}} = 50\ \Omega$ RX terminating impedance: $Z_{\text{RX}} = 100\ \Omega$ (balanced)TX terminating impedance: $Z_{\text{TX}} = 50\ \Omega$

Characteristics TX - ANT	min.	typ. @ 25 °C	max.	
Center frequency f_c		836.5		MHz
Maximum insertion attenuation 824.0 ... 849.0 MHz α		1.5	2.5	dB
Input VSWR (TX port) 824.0 ... 849.0 MHz		1.7	2.0	
Output VSWR (ANT port) 824.0 ... 849.0 MHz		1.6	2.0	

**SAW Components****B7689****SAW Duplexer****836.5 / 881.5 MHz****Data Sheet****SMD****Characteristics for CDMA 800**Temperature range for specification: $T = -30^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ Antenna terminating impedance: $Z_{\text{ANT}} = 50 \Omega$ RX terminating impedance: $Z_{\text{RX}} = 100 \Omega$ (balanced)TX terminating impedance: $Z_{\text{TX}} = 50 \Omega$

Characteristics TX - ANT				min.	typ. @ 25 °C	max.	
Attenuation			α				
10.0	...	804.0	MHz	30	40		dB
869.0	...	894.0	MHz	44	53		dB
1574.0	...	1577.0	MHz	45	54		dB
1648.0	...	1698.0	MHz	30	47		dB
1884.0	...	1919.0	MHz	20	42		dB
1930.0	...	1990.0	MHz	27	41		dB
2110.0	...	2170.0	MHz	27	39		dB
2400.0	...	2500.0	MHz	30	35		dB
2500.0	...	2547.0	MHz	29	34		dB
3286.0	...	3406.0	MHz	15	22		dB

**SAW Components****B7689****SAW Duplexer****836.5 / 881.5 MHz****Data Sheet****SMD****Characteristics for CDMA 800**Temperature range for specification: $T = -30^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ Antenna terminating impedance: $Z_{\text{ANT}} = 50 \Omega$ RX terminating impedance: $Z_{\text{RX}} = 100 \Omega$ (balanced)TX terminating impedance: $Z_{\text{TX}} = 50 \Omega$

Characteristics ANT - RX		min.	typ. @ 25 °C	max.	
Center frequency	f_c		881.5		MHz
Maximum insertion attenuation	869.0 ... 894.0 MHz	α_{max}	2.0	3.0	dB
Input VSWR (ANT port)	869.0 ... 894.0 MHz		1.6	2.0	
Output VSWR (RX port)	869.0 ... 894.0 MHz		1.9	2.2	
CMRR ($S_{32}-S_{42} / S_{32}+S_{42}$)	869.0 ... 894.0 MHz	20 ¹⁾	30		dB

¹⁾ A combination of 10 ° phase balance and 1 dB amplitude balance corresponds to 19.6 dB CMRR

**SAW Components****B7689****SAW Duplexer****836.5 / 881.5 MHz****Data Sheet****Characteristics for CDMA 800**Temperature range for specification: $T = -30^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ Antenna terminating impedance: $Z_{\text{ANT}} = 50 \Omega$ RX terminating impedance: $Z_{\text{RX}} = 100 \Omega$ (balanced)TX terminating impedance: $Z_{\text{TX}} = 50 \Omega$

Characteristics ANT - RX				min.	typ. @ 25 °C	max.	
Attenuation		α					
10.0	...	824.0	MHz	40	57		dB
824.0	...	849.0	MHz	45	54		dB
970.0	...	4800.0	MHz	40	44		dB
4800.0	...	6000.0	MHz	30	43		dB
1750.0	...	1780.0	MHz	45	63		dB
1850.0	...	1910.0	MHz	45	61		dB
1920.0	...	1980.0	MHz	45	61		dB
Characteristics TX - RX				min.	typ. @ 25 °C	max.	
Isolation		α					
824.0	...	849.0	MHz	50	56		dB
869.0	...	894.0	MHz	48	54		dB

**SAW Components****B7689****SAW Duplexer****836.5 / 881.5 MHz****Data Sheet****Maximum Ratings**

Temperature range for specification ¹⁾	T	-30/+85	°C	
Storage temperature range	T _{stg}	-40/+85	°C	
DC voltage	V _{DC}	5	V	
ESD voltage	V _{ESD}	100 ²⁾	V	machine model, 10 pulses
Input power at 824.0 ... 849.0 MHz elsewhere	P _{IN}	30 10	dBm dBm	source and load impedance 50 Ω continuous wave } T = 55 °C, 50.000 h

¹⁾ Defines the temperature range for specification values.

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

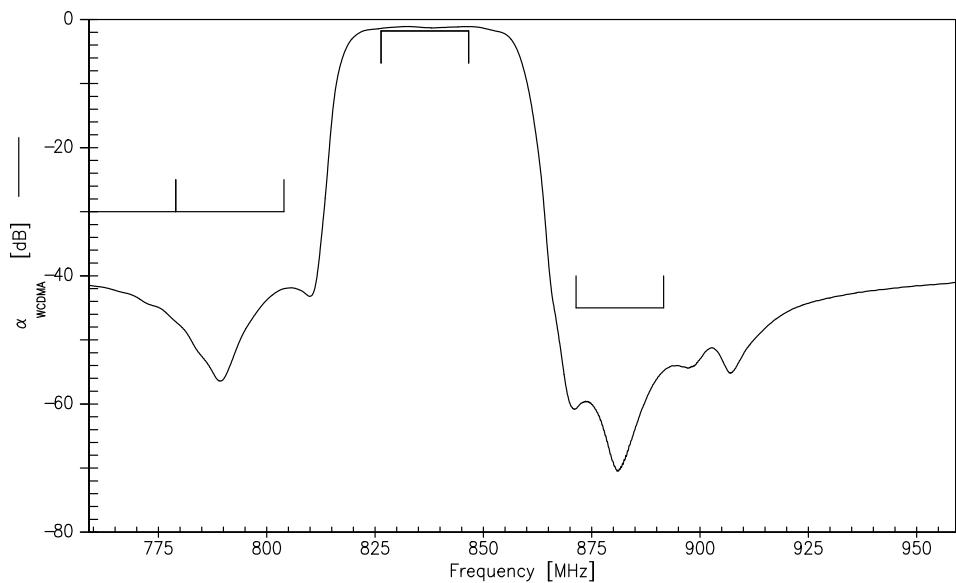
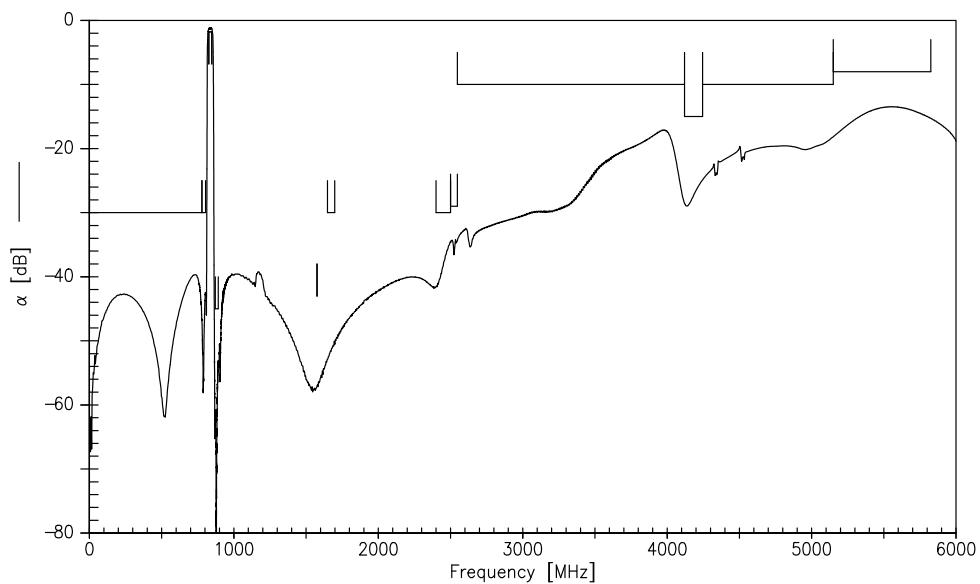
Annotation for characteristics section

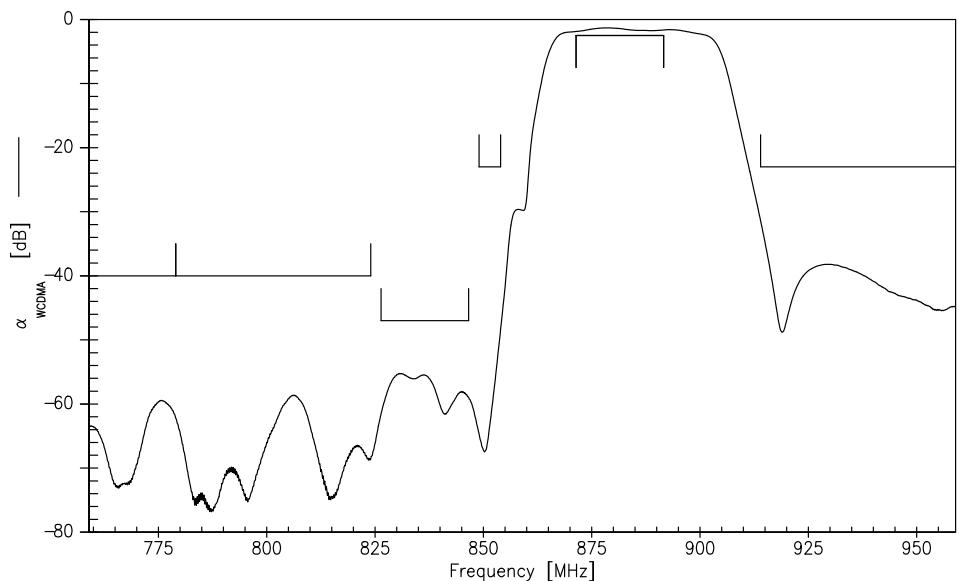
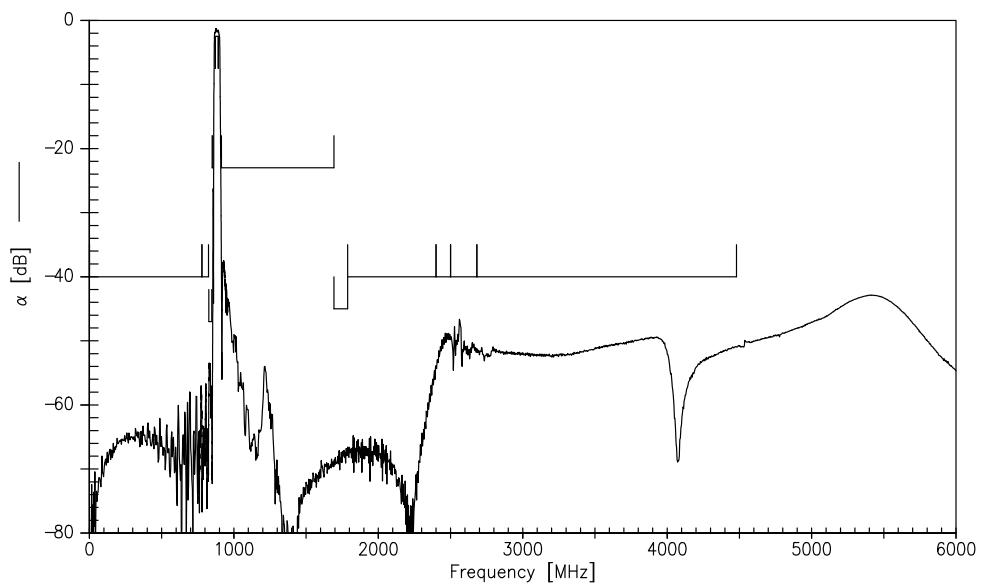
Attenuation of WCDMA signal ("Powertransferfunction", α_{WCDMA}) is determined by

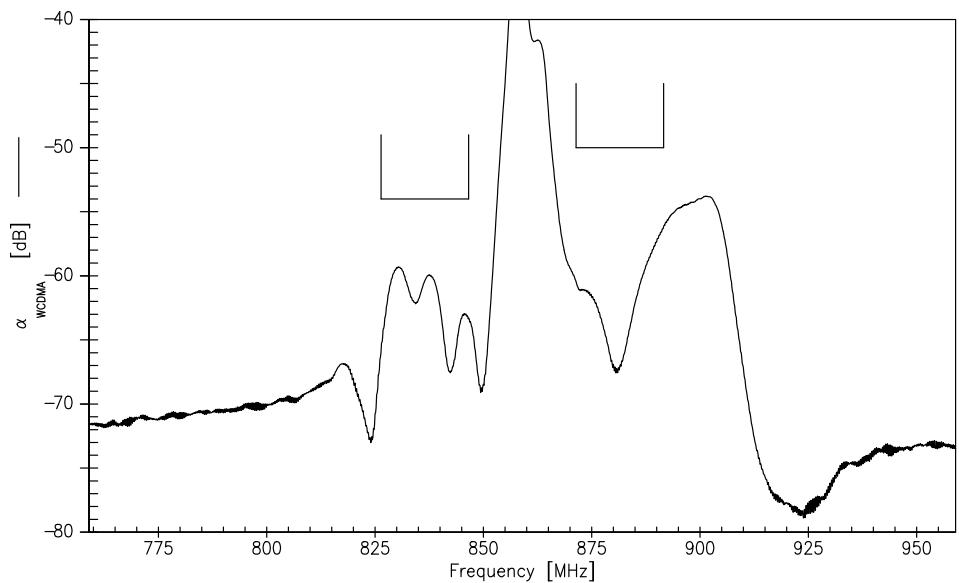
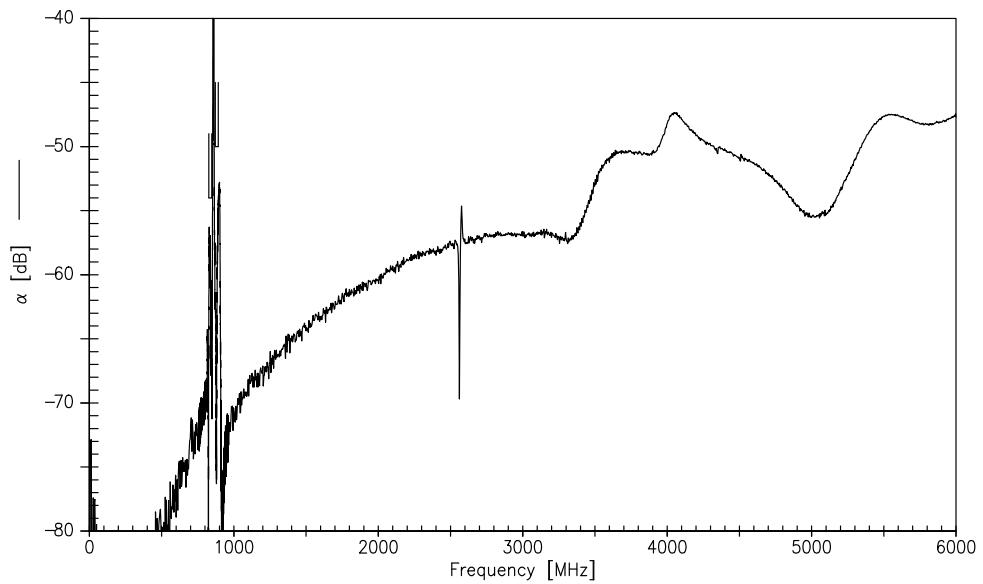
$$\int_{\infty}^{\infty} |S_{ds21}(f)H_{RRC}(f - f_{Carrier})|^2 df$$

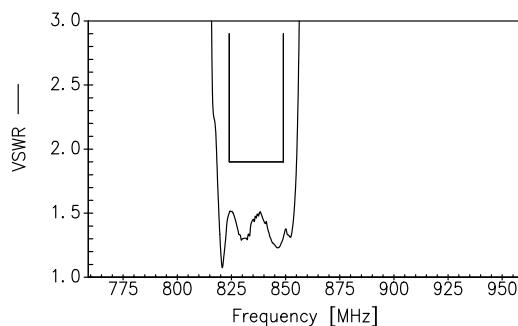
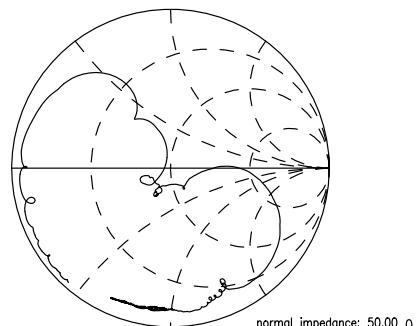
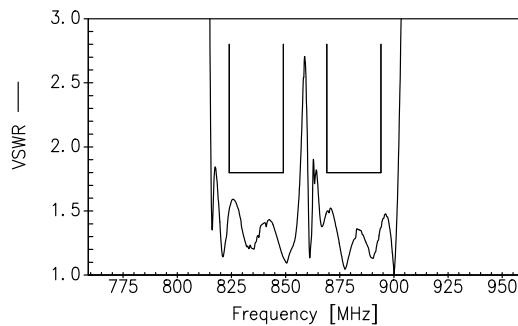
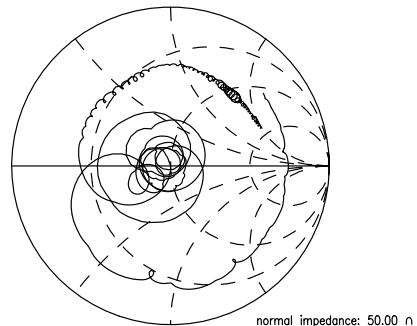
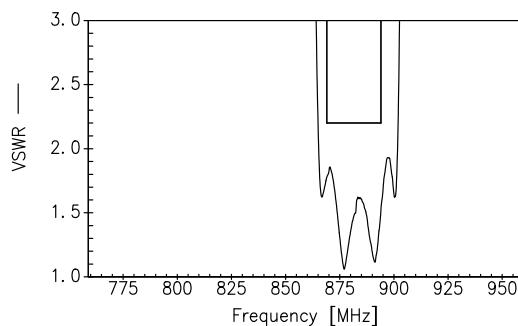
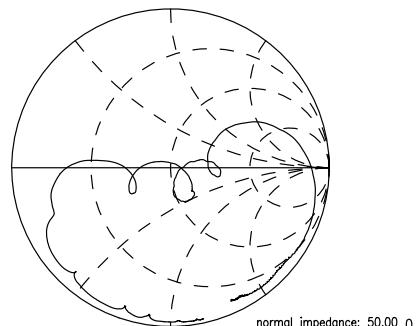
$f_{Carrier}$ according to 3GPP TS 25.101 (e.g. for WCDMA Band 5-Passband, $f_{Carrier}$ ranges from 826.4 MHz (lowest Tx channel) to 846.6 MHz (highest Tx channel)). $H_{RRC}(f)$ is the transfer function of the root-raised cosine transmit pulse shaping filter according to 3GPP TS 25.101 with the following normalization:

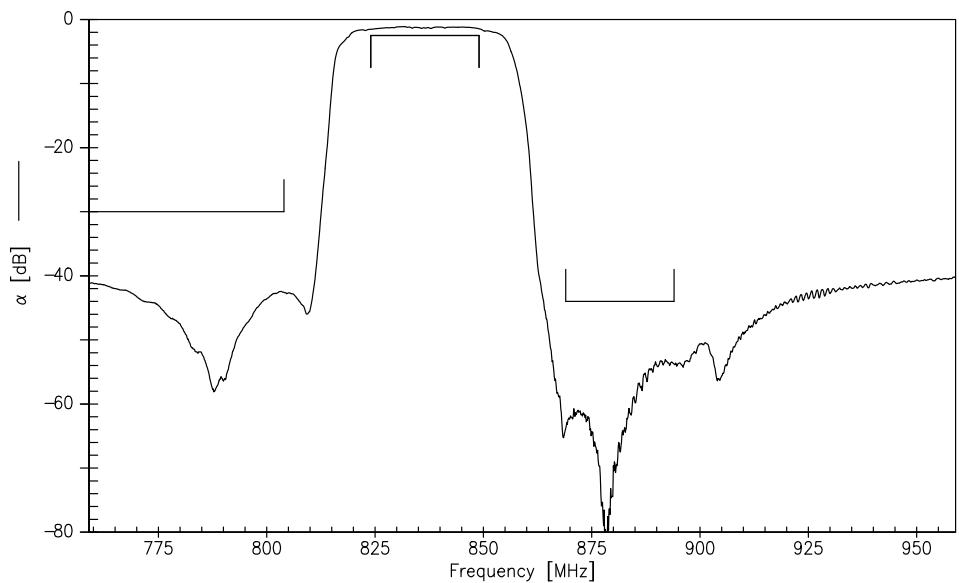
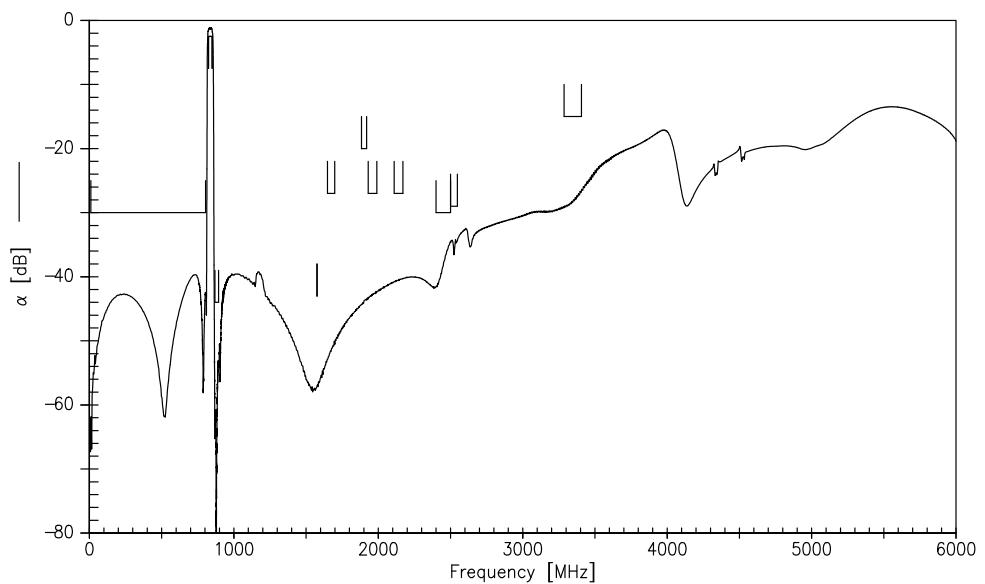
$$\int_{\infty}^{\infty} |H_{RRC}(f)|^2 df = 1$$


Frequency Response TX-ANT (wideband) for W-CDMA Band 5



Frequency Response ANT-RX (wideband) for W-CDMA Band 5



Frequency Response TX-RX (wideband) for WCDMA Band 5


S₁₁ (TX) VSWR

S₁₁ (TX)

S₂₂ (ANT) VSWR

S₂₂ (ANT)

S₃₃ (RX) VSWR

S₃₃ (RX)



Frequency Response TX-ANT (wideband) for CDMA 800


SAW Components

B7689

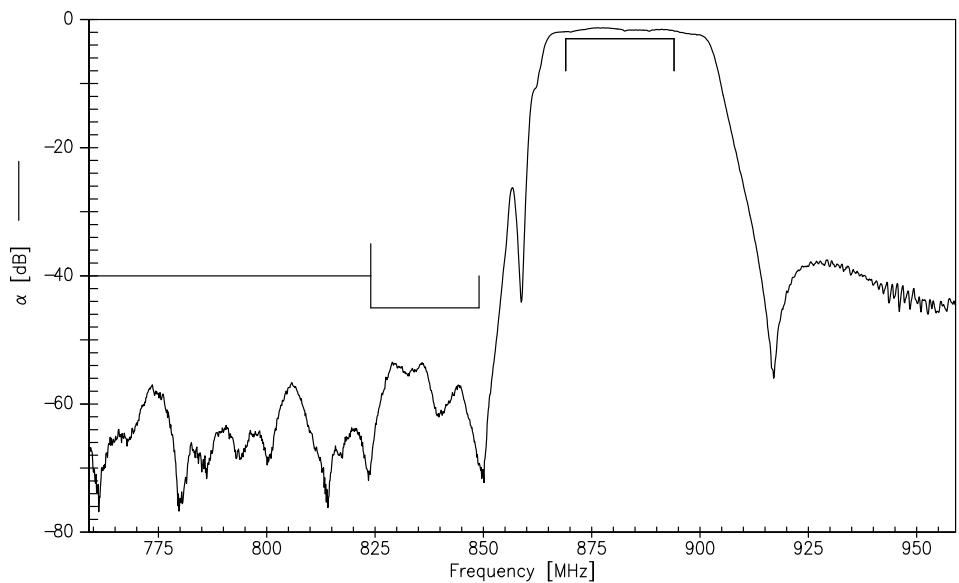
SAW Duplexer

836.5 / 881.5 MHz

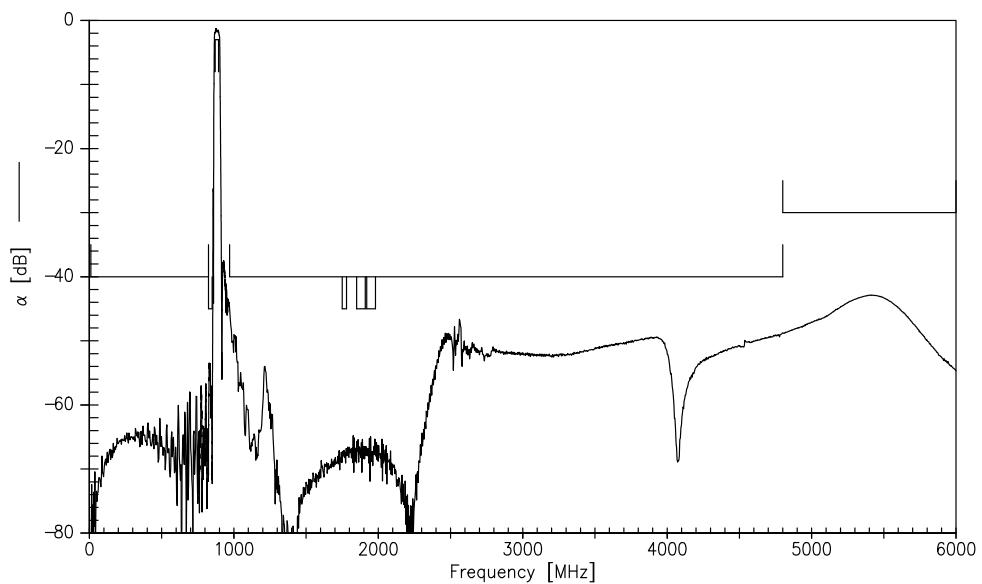
Data Sheet

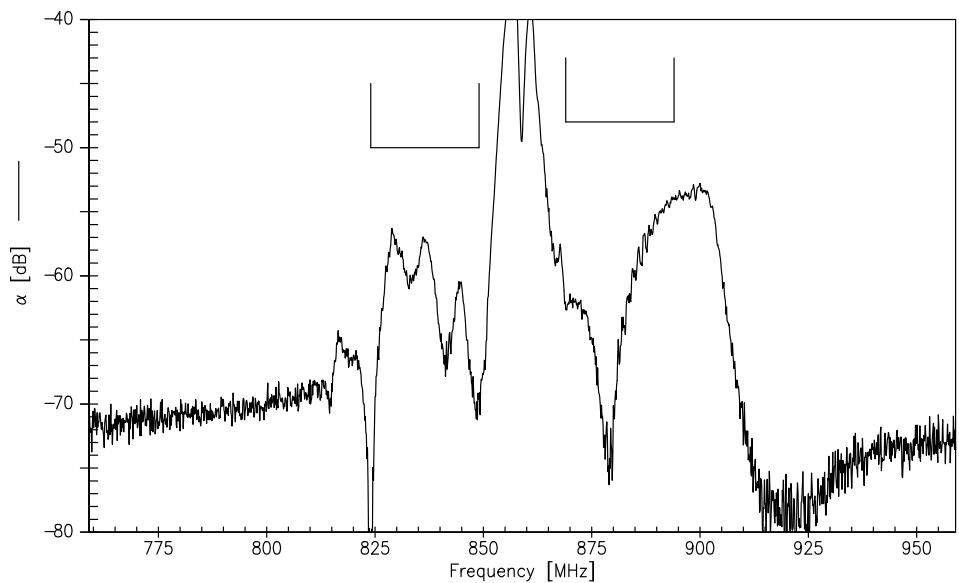
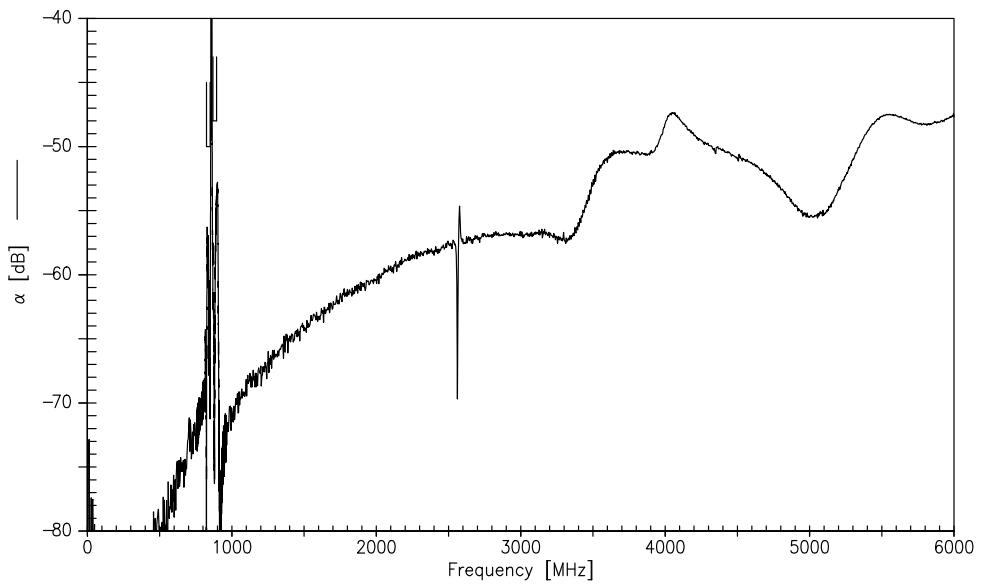
SMD

Frequency Response ANT-RX for CDMA 800



Frequency Response ANT-RX (wideband) for CDMA 800




Frequency Response TX-RX (wideband) for CDMA 800


**SAW Components****B7689****SAW Duplexer****836.5 / 881.5 MHz****Data Sheet****References**

Type	B7689
Ordering code	B39881B7689L310
Marking and package	C61157-A3-A37
Packaging	F61074-V8211-Z000
Date codes	L_1126
S-parameters	B7689_NB.s4p B7689_WB.s4p See file header for pin/port assignment.
Soldering profile	S_6001
RoHS compatible	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."

For further information please contact your local EPCOS sales office or visit our webpage at www.epcos.com .

Published by EPCOS AG

Surface Acoustic Wave Components Division

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Due to technical requirements components may contain dangerous substances. For information on the type in question please also contact one of our Sales Offices.

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



SAW Components	B7689
SAW Duplexer	836.5 / 881.5 MHz
Data Sheet	The logo for Surface Mount Device (SMD), consisting of the letters "SMD" in a stylized, blocky font.

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