



SAW Components

SAW Duplexer

W-CDMA Band 5 / CDMA 800

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



SAW Components

B7689

SAW Duplexer

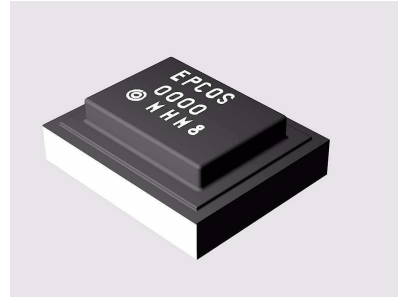
836.5 / 881.5 MHz

Data Sheet



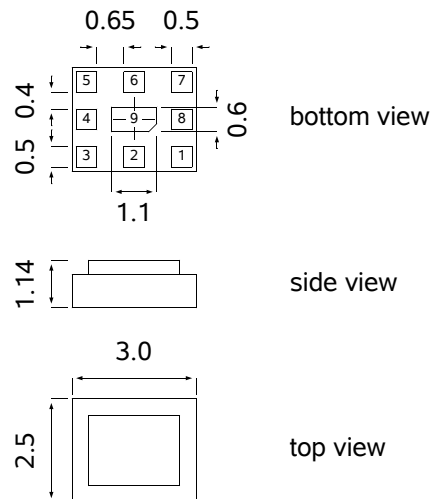
Application

- 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



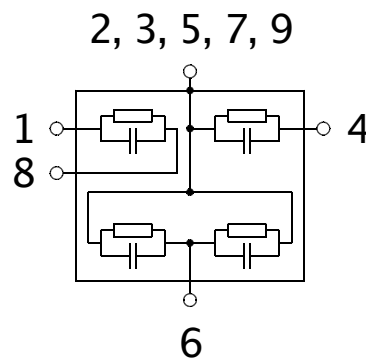
Features

- 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





SAW Components

B7689

SAW Duplexer

836.5 / 881.5 MHz

Data Sheet



Characteristics for W-CDMA Band 5

Temperature range for specification:	$T = -15\text{ °C to }+80\text{ °C}$
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 °C to +80 °C
Antenna terminating impedance:	Z _{ANT} = 50 Ω
RX terminating impedance:	Z _{RX} = 100 Ω (balanced)
TX terminating impedance:	Z _{TX} = 50 Ω

Characterisitcs TX - ANT					min.	typ. @ 25 °C	max.	
Attenuation								
				α				
	0.3	...	779.0	MHz	30	40		dB
			779.0	...	30	41		dB
@f _{Carrier}	871.4	...	891.6	MHz	45	54		dB
				α _{WCDMA} ¹⁾				
	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).



SAW Components

B7689

SAW Duplexer

836.5 / 881.5 MHz

Data Sheet



Characteristics for W-CDMA Band 5

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

Characterisitcs ANT - RX	min.	typ. @ 25 °C	max.	
Center frequency f_c		881.5		MHz
Maximum insertion attenuation @ f_{Carrier} 871.4 ... 891.6 MHz α_{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: $T = -15\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$
 Antenna terminating impedance: $Z_{\text{ANT}} = 50\text{ }\Omega$
 RX terminating impedance: $Z_{\text{RX}} = 100\text{ }\Omega$ (balanced)
 TX terminating impedance: $Z_{\text{TX}} = 50\text{ }\Omega$

Characterisitcs ANT - RX					min.	typ. @ 25 °C	max.	
IMD product level limits ¹⁾ at f _{TX} = 836.5 MHz f _{RX} = 881.5 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								

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

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

Characterisitcs TX - RX					min.	typ. @ 25 °C	max.	
Isolation								
@ f_{Carrier}	826.4	...	846.6	MHz	$\alpha_{\text{WCDMA}}^{1)}$	54	58	dB
@ f_{Carrier}	871.4	...	891.6	MHz	α_{WCDMA}	50	55	dB
Common Mode Isolation								
@ f_{Carrier}	826.4	...	846.6	MHz	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:	$T = -30\text{ °C to }+85\text{ °C}$
Antenna terminating impedance:	$Z_{ANT} = 50\ \Omega$
RX terminating impedance:	$Z_{RX} = 100\ \Omega$ (balanced)
TX terminating impedance:	$Z_{TX} = 50\ \Omega$

Characterisitcs 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



Characteristics for CDMA 800

Temperature range for specification:	T = -30 °C to +85 °C
Antenna terminating impedance:	Z _{ANT} = 50 Ω
RX terminating impedance:	Z _{RX} = 100 Ω (balanced)
TX terminating impedance:	Z _{TX} = 50 Ω

Characterisitcs 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



Characteristics for CDMA 800

Temperature range for specification:	T = -30 °C to +85 °C
Antenna terminating impedance:	Z _{ANT} = 50 Ω
RX terminating impedance:	Z _{RX} = 100 Ω (balanced)
TX terminating impedance:	Z _{TX} = 50 Ω

Characterisitcs 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 °C to +85 °C
Antenna terminating impedance:	Z _{ANT} = 50 Ω
RX terminating impedance:	Z _{RX} = 100 Ω (balanced)
TX terminating impedance:	Z _{TX} = 50 Ω

Characterisitcs 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
Characterisitcs 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	P _{IN}			source and load impedance 50 Ω
824.0 ... 849.0 MHz		30	dBm	} continuous wave T = 55° C, 50.000 h
elsewhere		10	dBm	

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

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

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)). $H_{\text{RRC}}(f)$ is the transfer function of the root-raised cosine transmit pulse shaping filter according to 3GPP TS 25.101 with the following normalization:

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



SAW Components

B7689

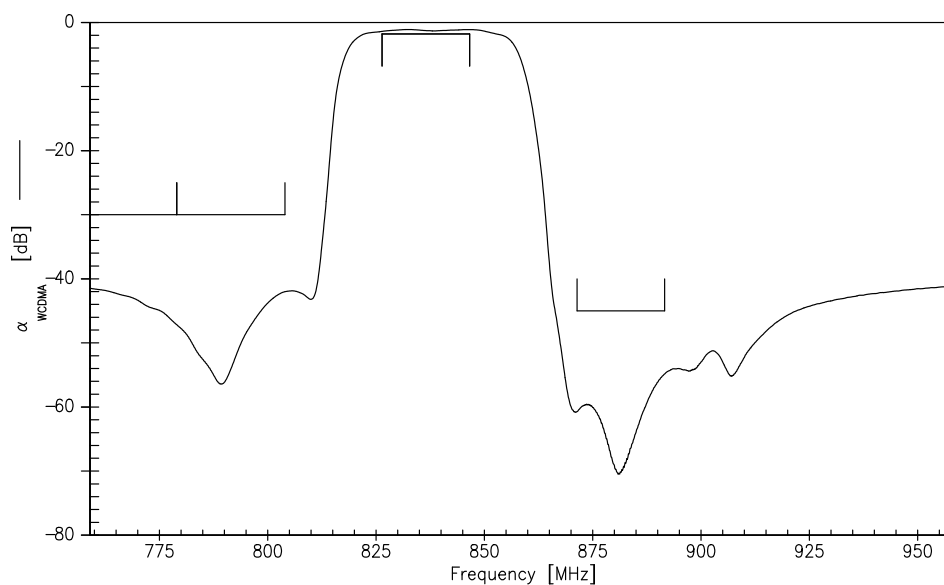
SAW Duplexer

836.5 / 881.5 MHz

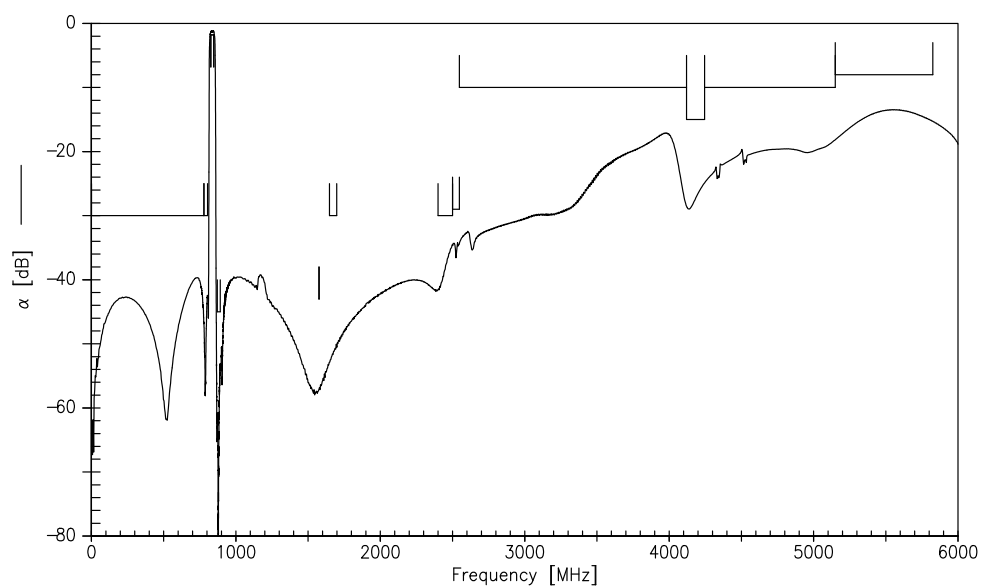
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Frequency Response TX-ANT for W-CDMA Band 5



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



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



SAW Components

B7689

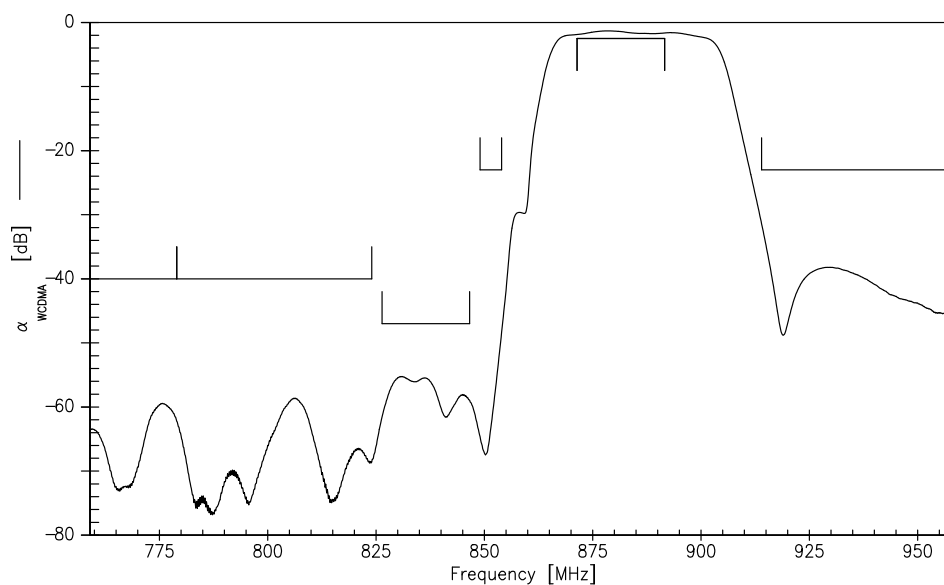
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836.5 / 881.5 MHz

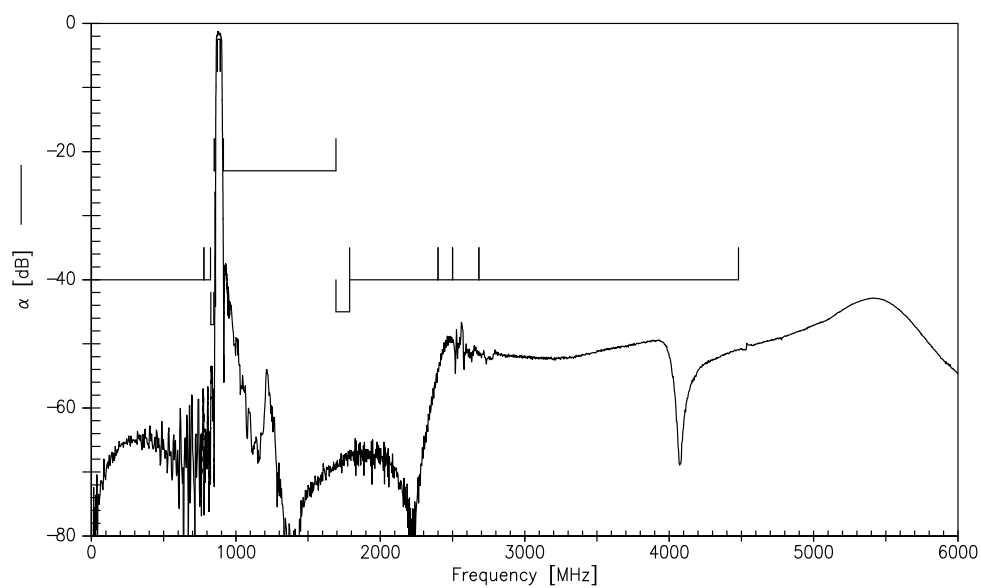
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Frequency Response ANT-RX for W-CDMA Band 5



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



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SAW Components

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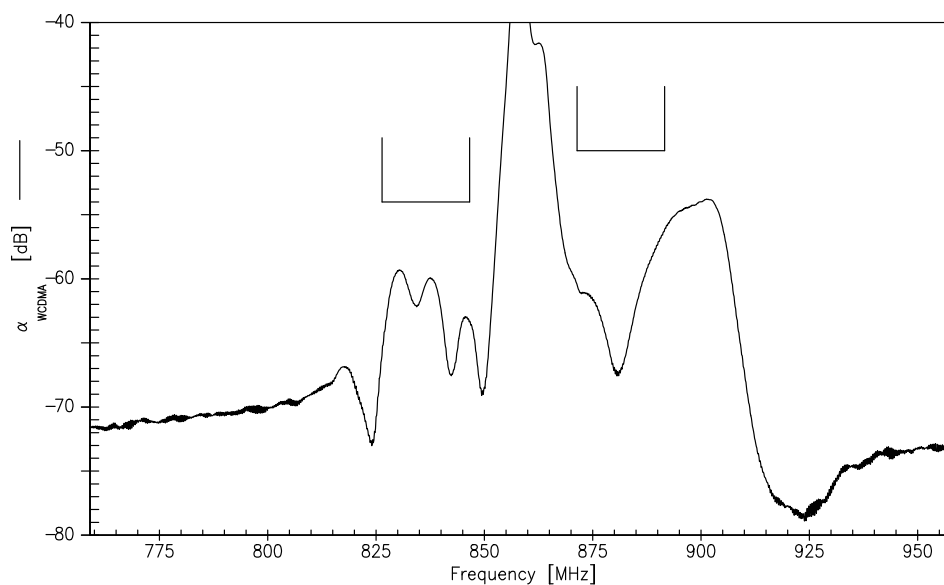
SAW Duplexer

836.5 / 881.5 MHz

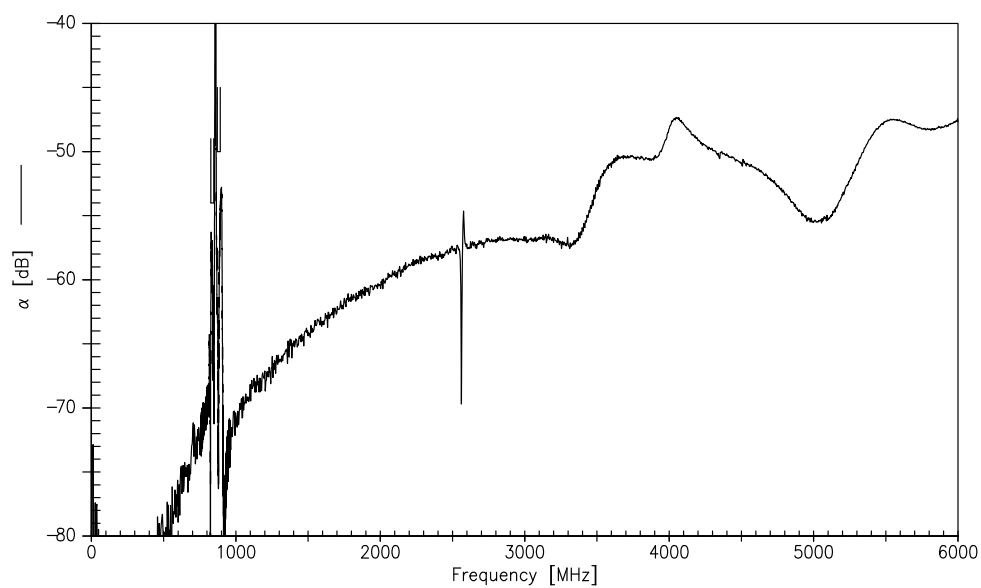
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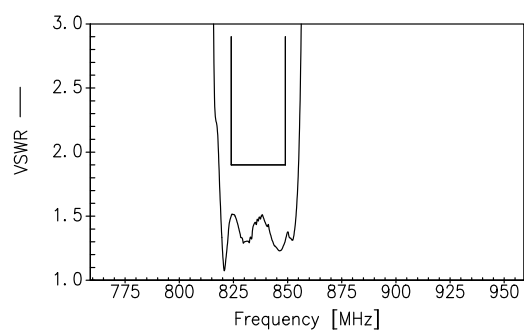
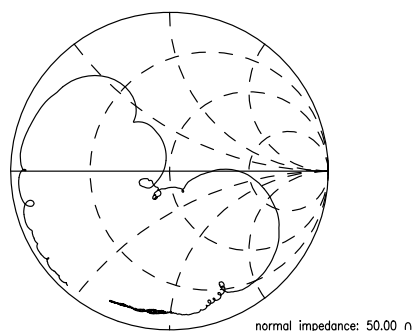
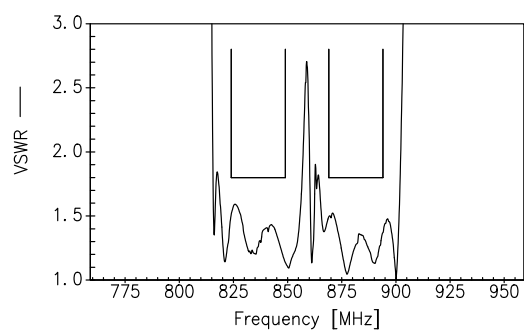
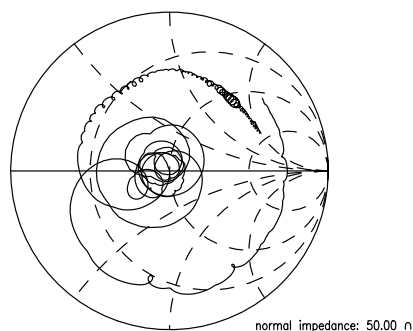
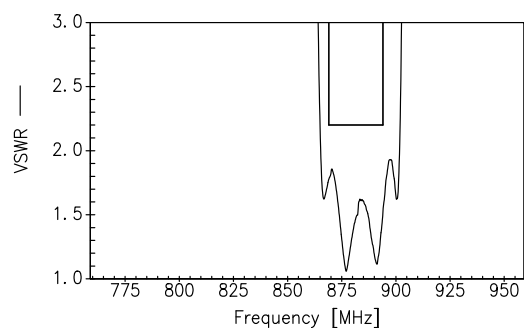
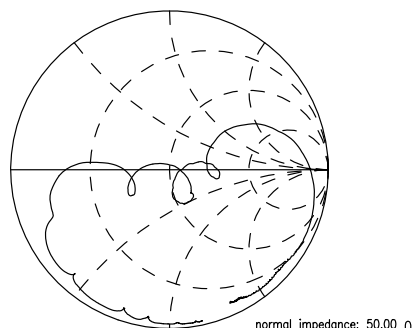
Frequency Response TX-RX for W-CDMA Band 5



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



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

Matching
 S_{11} (TX) VSWR

 S_{11} (TX)

 S_{22} (ANT) VSWR

 S_{22} (ANT)

 S_{33} (RX) VSWR

 S_{33} (RX)




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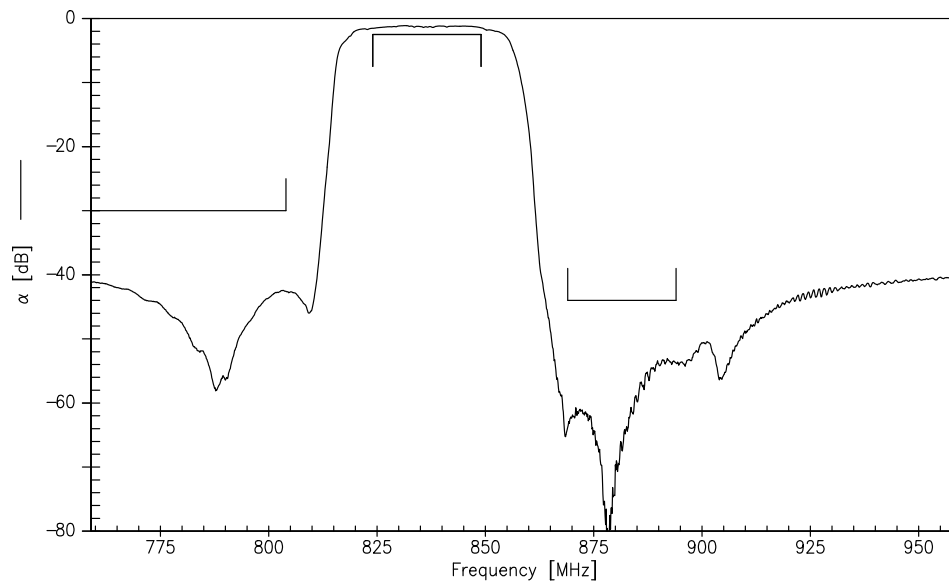
SAW Duplexer

836.5 / 881.5 MHz

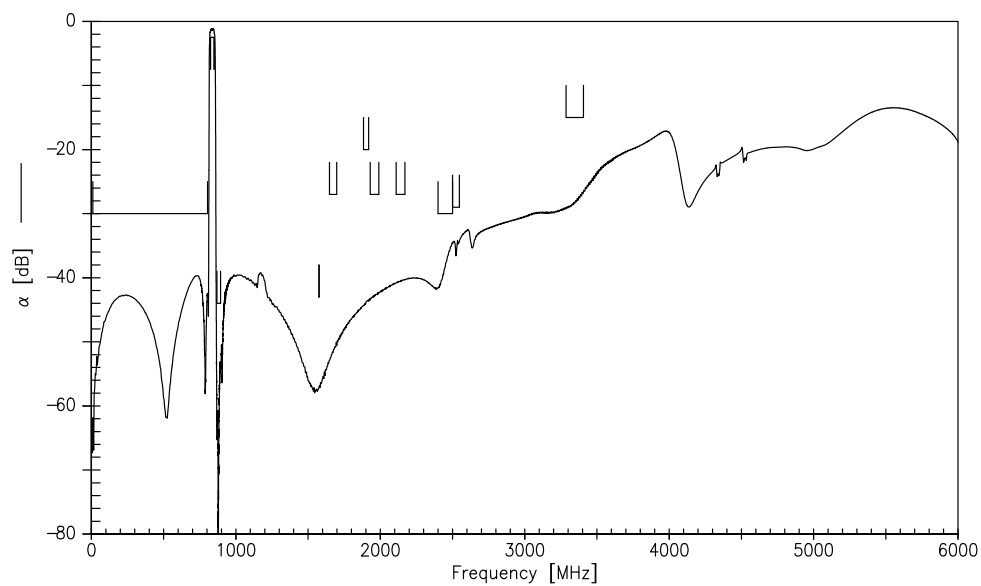
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Frequency Response TX-ANT for CDMA 800



Frequency Response TX-ANT (wideband) for CDMA 800



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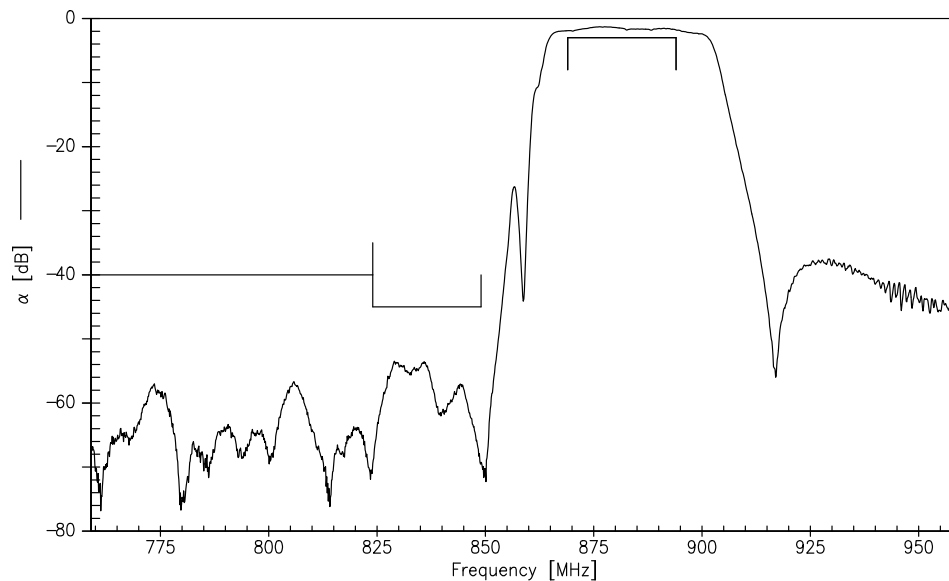
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836.5 / 881.5 MHz

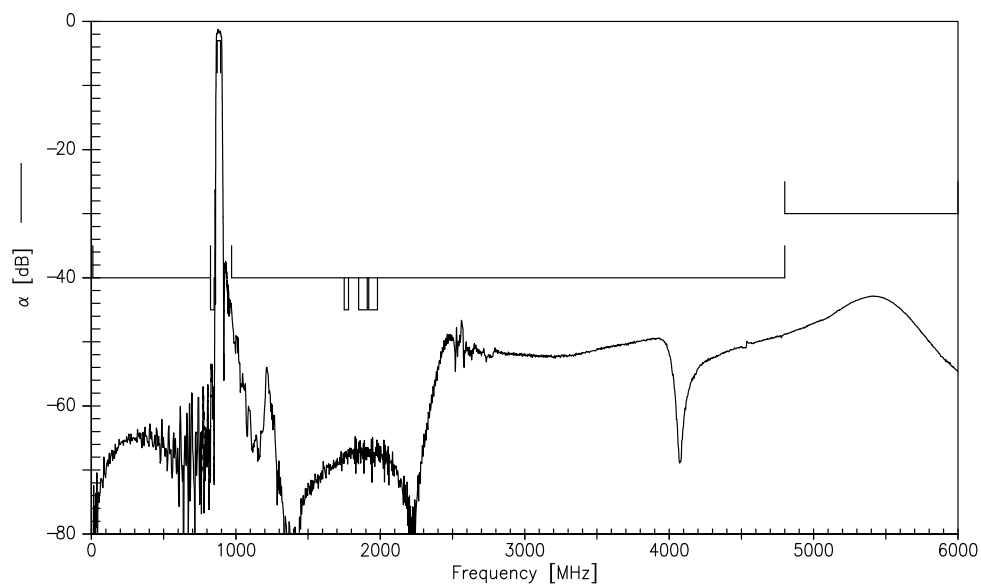
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Frequency Response ANT-RX for CDMA 800



Frequency Response ANT-RX (wideband) for CDMA 800



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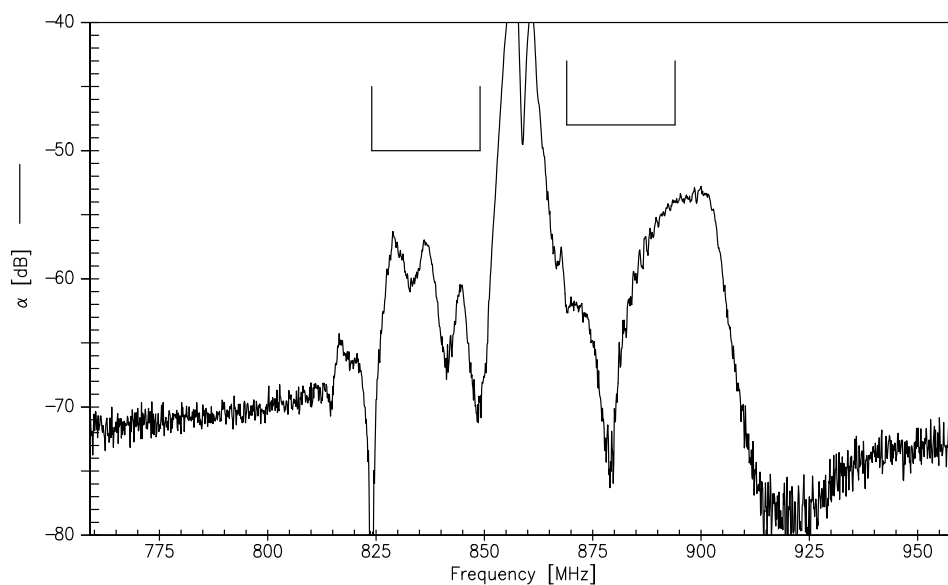
SAW Duplexer

836.5 / 881.5 MHz

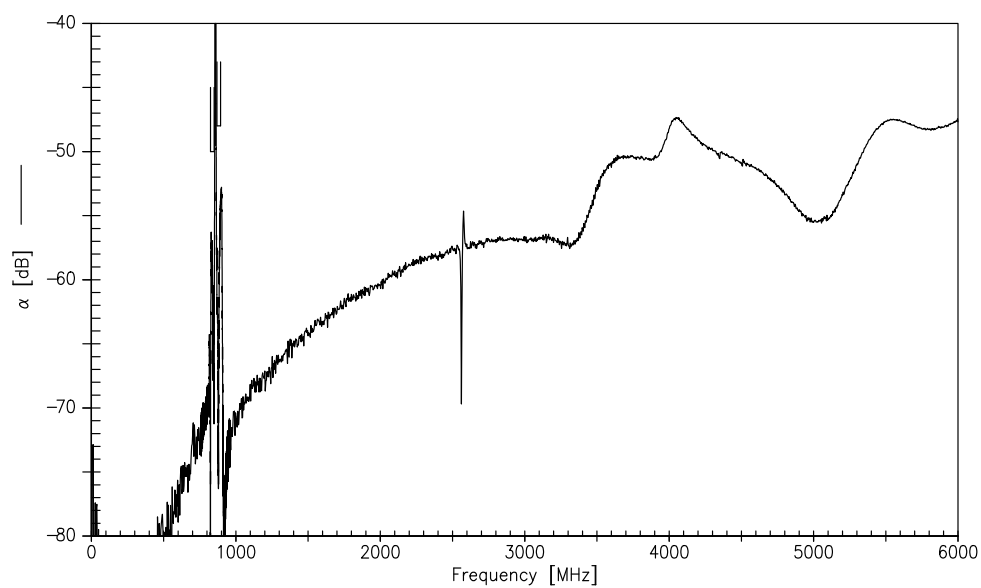
Data Sheet



Frequency Response TX-RX for CDMA 800



Frequency Response TX-RX (wideband) for CDMA 800



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**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 maxi- mum concentration values for certain hazardous substances in electrical and electronic equipment."

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SAW Components	B7689
SAW Duplexer	836.5 / 881.5 MHz
Data Sheet	

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