



SAW Components

SAW Duplexer

W-CDMA Band 5 / CDMA 800

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



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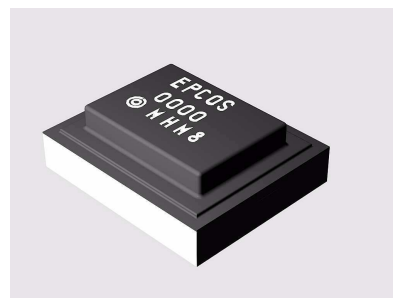
836.5 / 881.5 MHz

Data Sheet



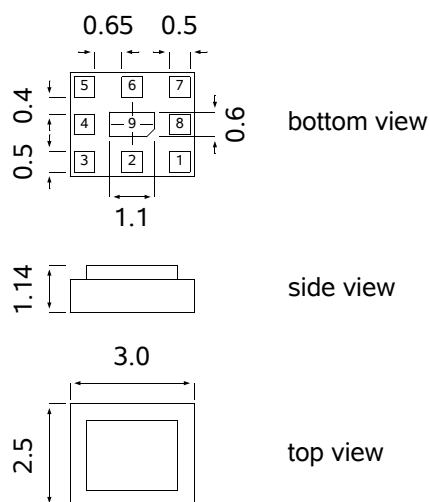
Application

- 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



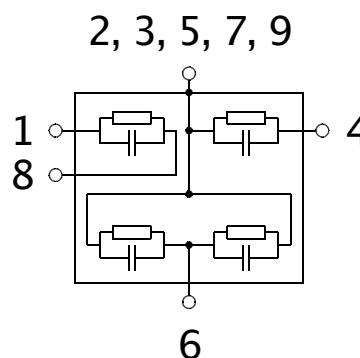
Features

- 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





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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

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 α _{WCDMA} ¹⁾		1.4	1.8	dB
Amplitude ripple (p-p) @f _{Carrier} 826.4 ... 846.6 MHz Δα _{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.



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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
			1574.0	...	43	54		dB
			1648.0	...	30	48		dB
			2400.0	...	30	35		dB
			2500.0	...	29	34		dB
			2547.0	...	10	16		dB
			4120.0	...	15	24		dB
			4245.0	...	10	13		dB
			5150.0	...	8	11		dB
			5825.0	MHz				dB

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



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Characteristics for W-CDMA Band 5

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Antenna terminating impedance:	Z _{ANT} = 50 Ω
RX terminating impedance:	Z _{RX} = 100 Ω (balanced)
TX terminating impedance:	Z _{TX} = 50 Ω

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 α _{WCDMA} ¹⁾		1.8	2.5	dB
Amplitude ripple (p-p) @f _{Carrier} 871.4 ... 891.6 MHz Δα _{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



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Characteristics for W-CDMA Band 5

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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.	
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	α _{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).



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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.	
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	



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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



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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



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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



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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:

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



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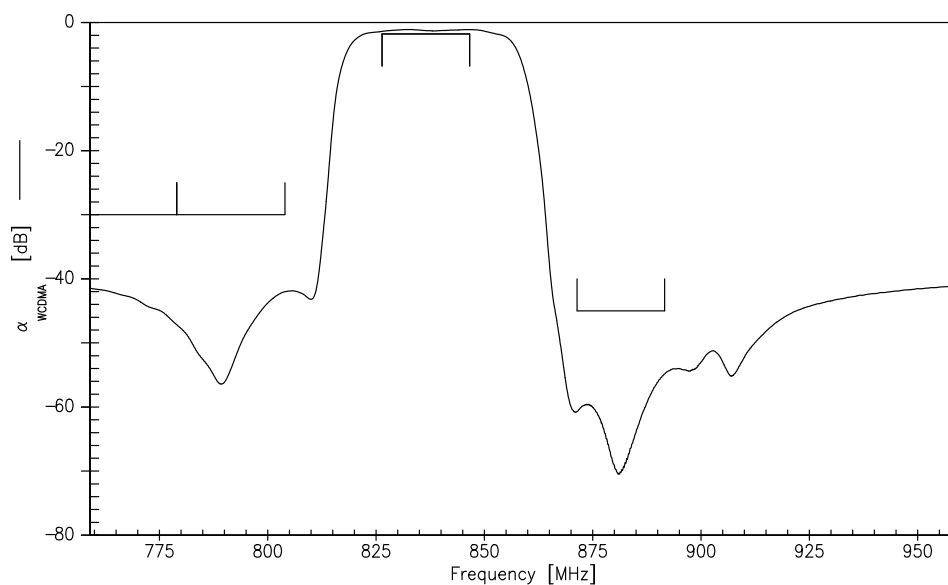
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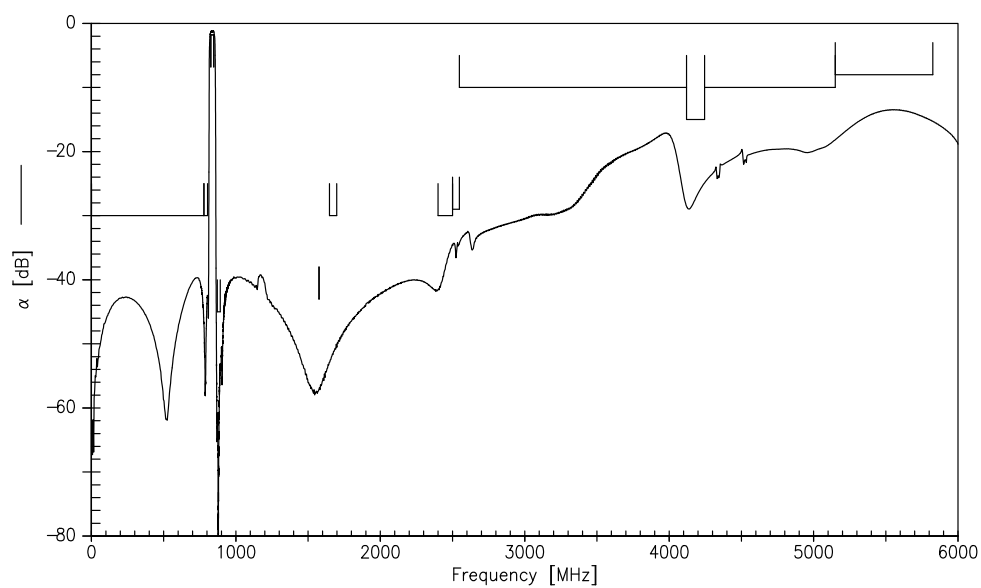
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Frequency Response TX-ANT for W-CDMA Band 5



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



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



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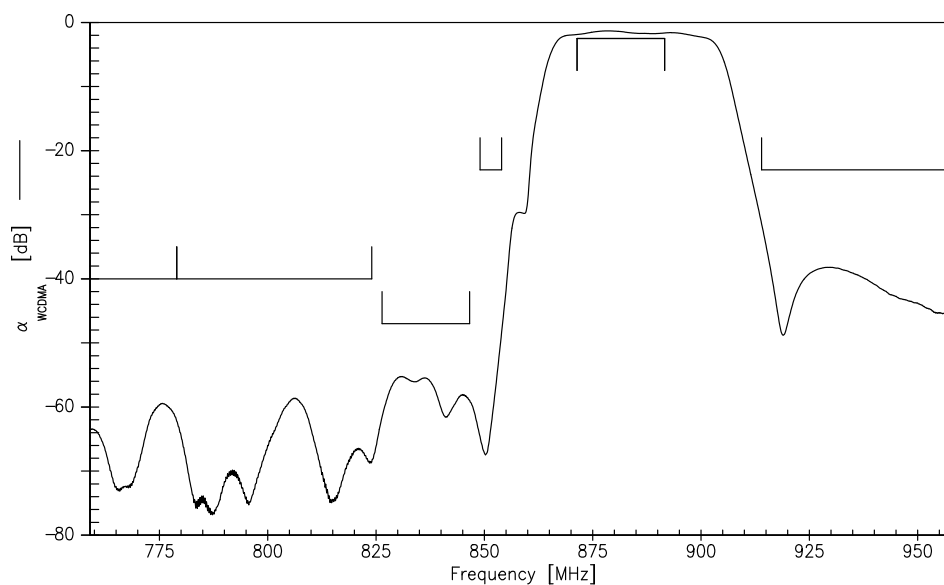
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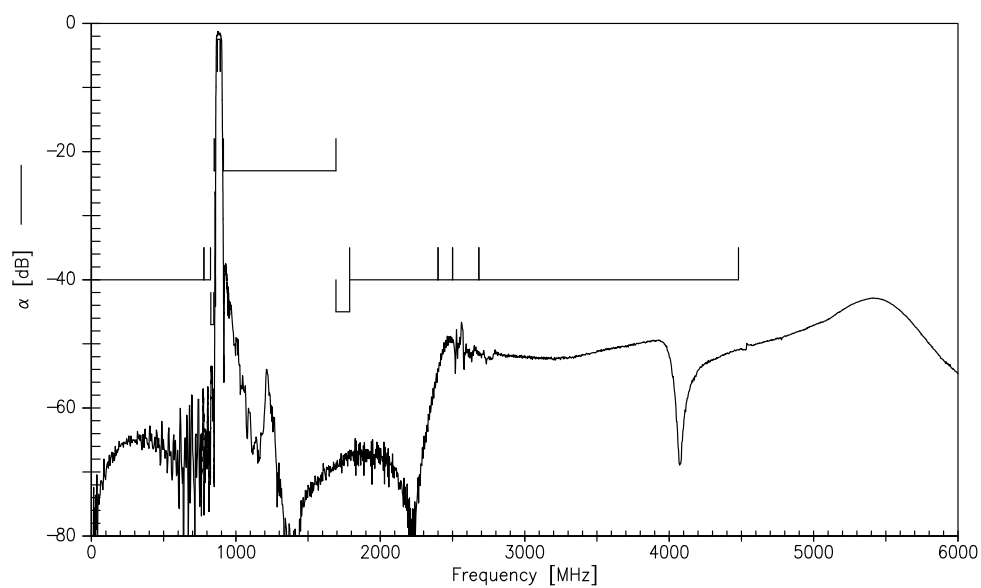
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Frequency Response ANT-RX for W-CDMA Band 5



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



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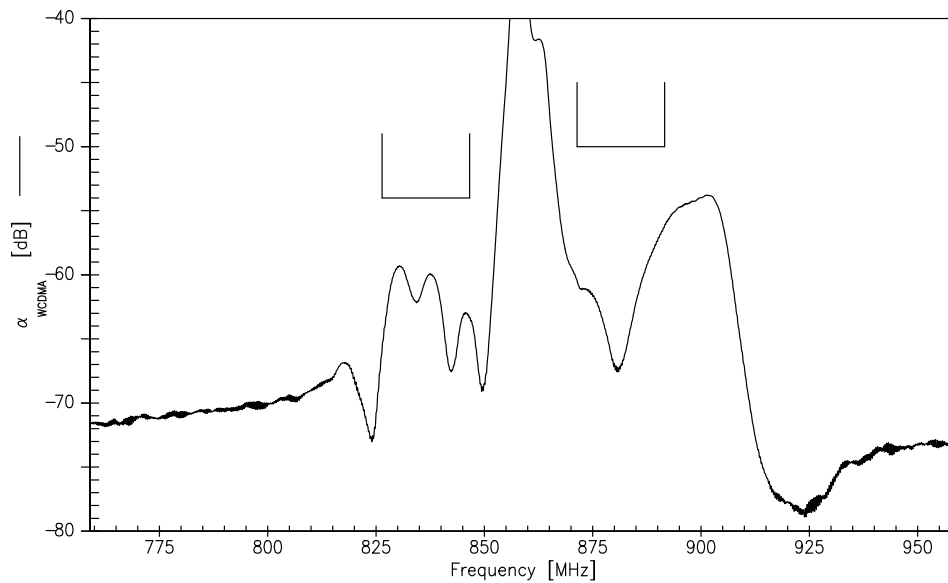
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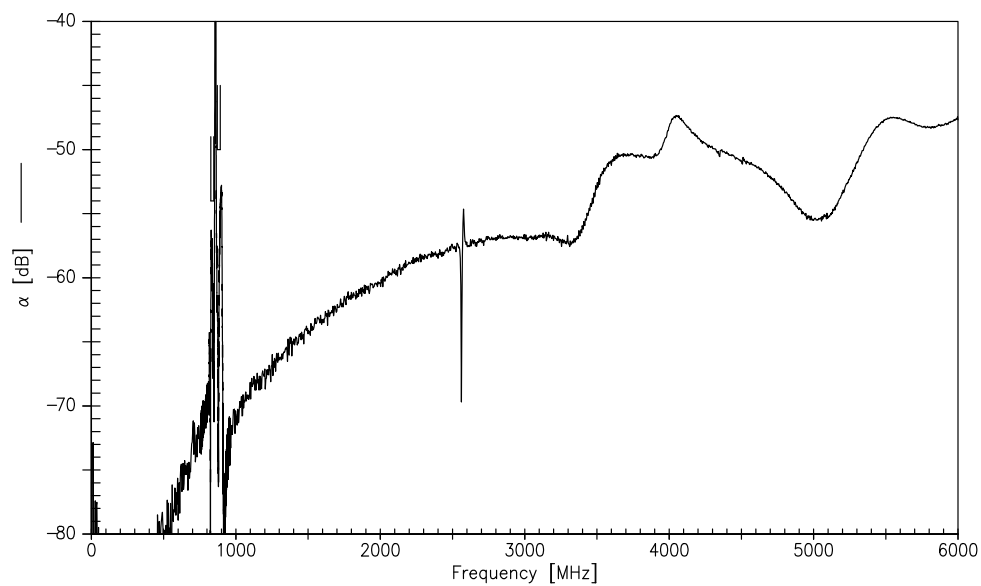
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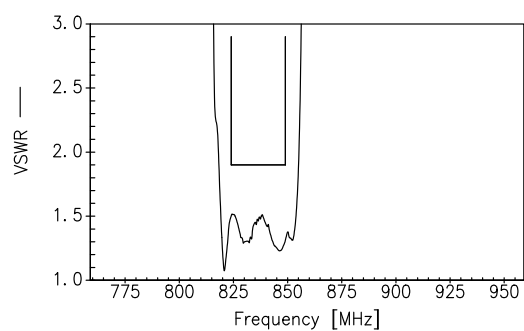
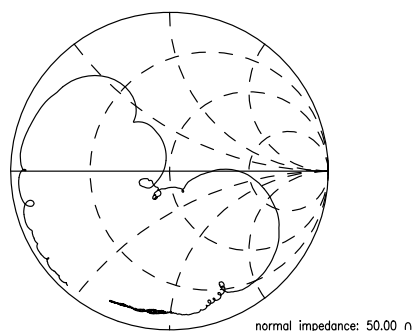
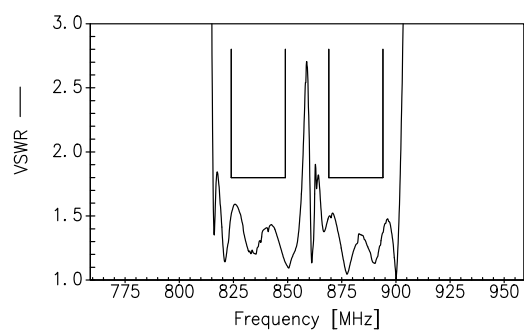
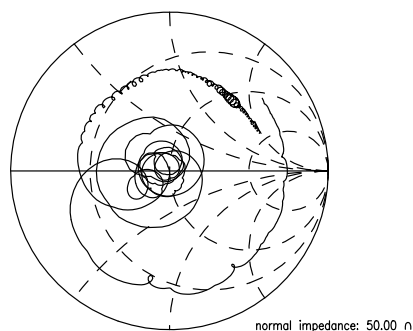
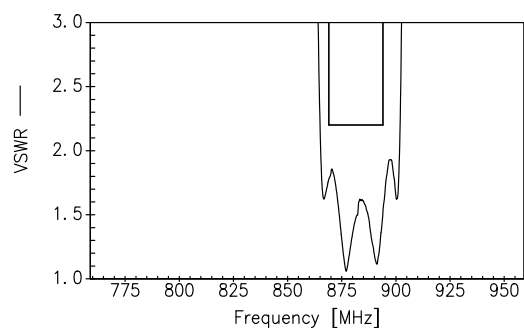
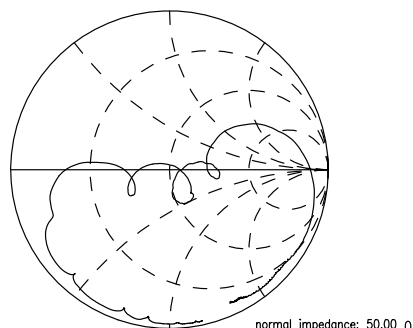
Frequency Response TX-RX for W-CDMA Band 5



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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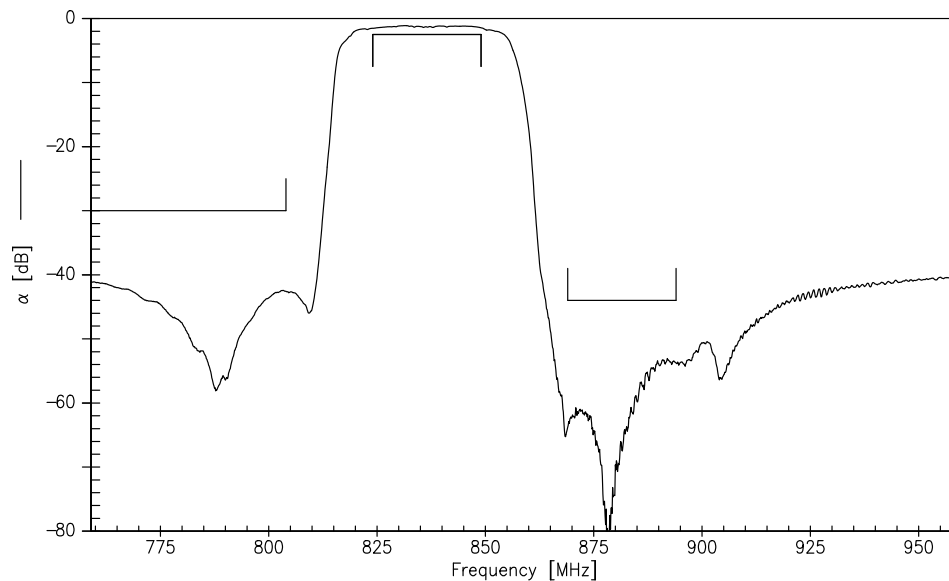
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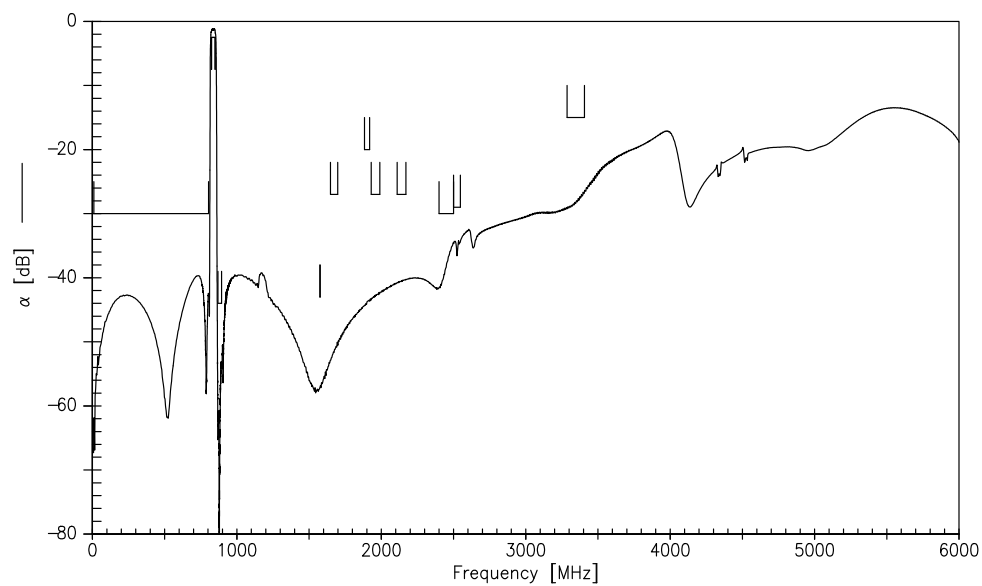
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Frequency Response TX-ANT for CDMA 800



Frequency Response TX-ANT (wideband) for CDMA 800



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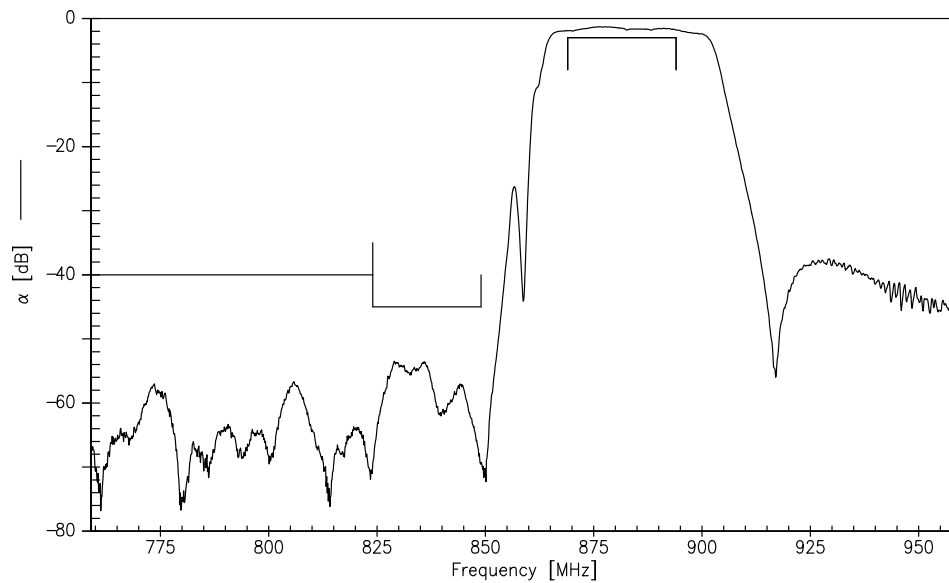
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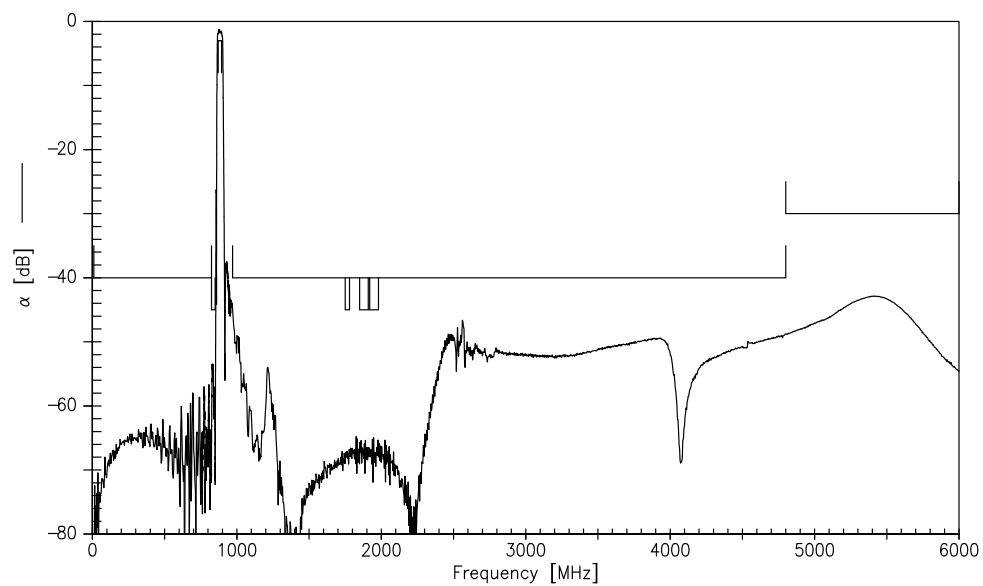
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SMD

Frequency Response ANT-RX for CDMA 800



Frequency Response ANT-RX (wideband) for CDMA 800



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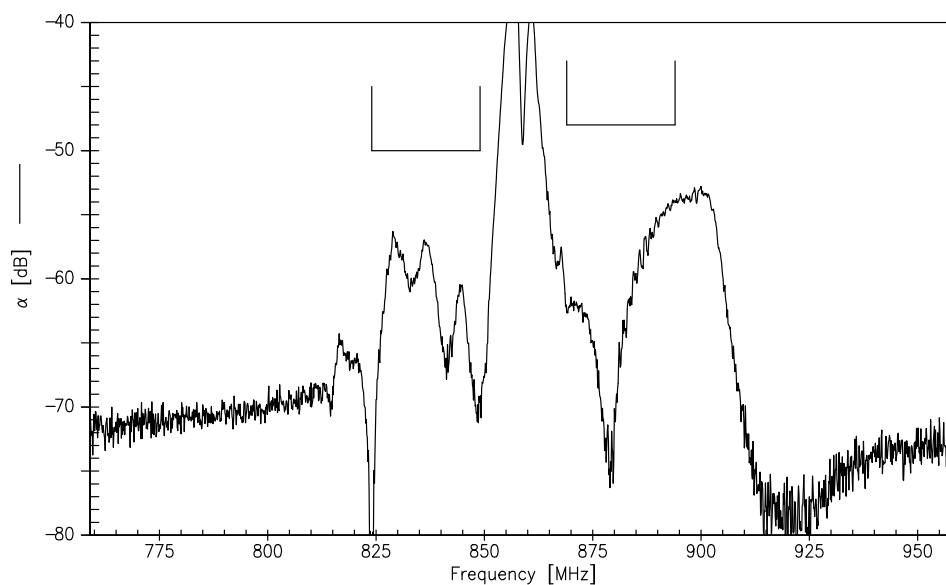
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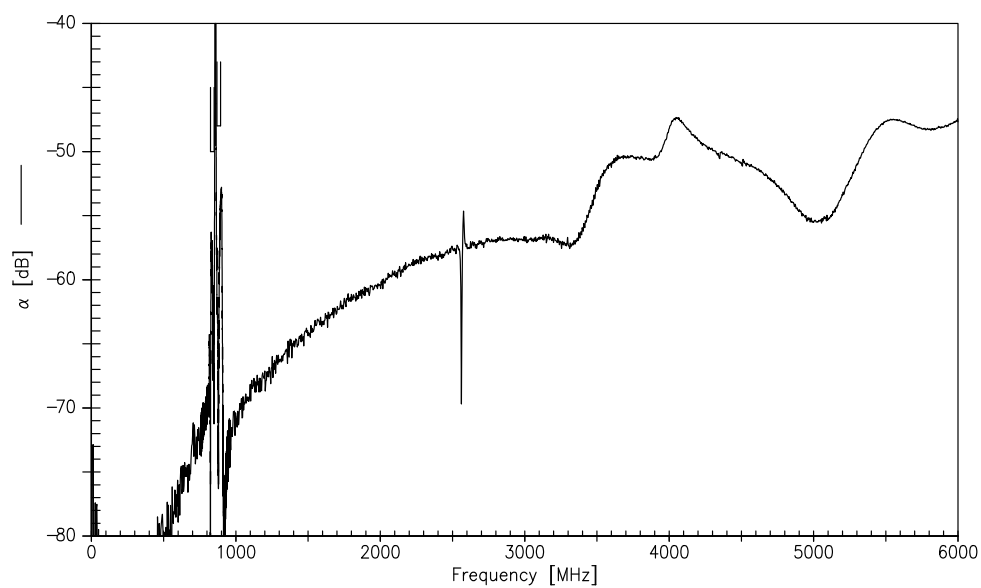
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Frequency Response TX-RX for CDMA 800



Frequency Response TX-RX (wideband) for CDMA 800



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**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."

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

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