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RF360 Europe GmbH

A Qualcomm – TDK Joint Venture

## SAW Components

### SAW duplexer

WCDMA band VIII

Series/type:	B8505
Ordering code:	B39941B8505P810
Date:	July 1, 2013
Version:	2.1

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## SAW duplexer

WCDMA band VIII

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<b>Ordering code:</b>	<b>B39941B8505P810</b>
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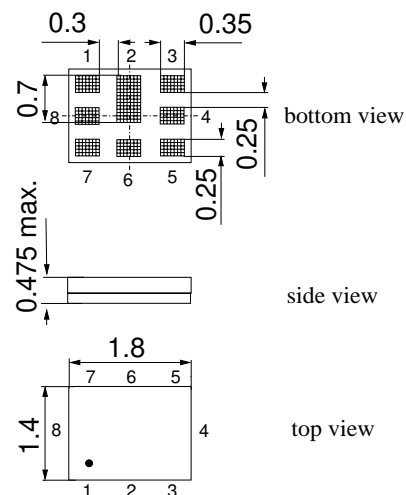
**Data Sheet**

**Application**

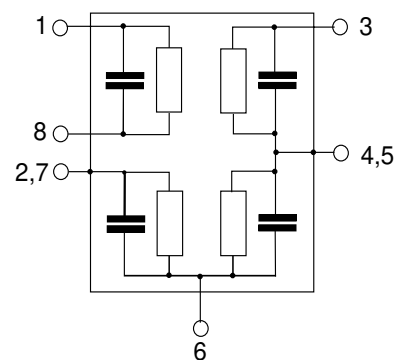
- Low-loss SAW duplexer for mobile telephone WCDMA Band VIII systems
- Low insertion attenuation
- Low amplitude ripple
- Usable passband 35 MHz
- Single ended to balanced transformation in Antenna - Rx path
- Impedance transformation 50Ω to 100Ω in Antenna - Rx path
- high Tx - Rx isolation


**Features**

- Package size 1.8 x 1.4 mm<sup>2</sup>, max package height 0.475 mm.
- RoHS compatible
- Package for **Surface Mount Technology (SMT)**
- Ni, gold-plated terminals
- **Electrostatic Sensitive Device (ESD)**
- **Moisture Sensitive Level 3**


**Pin configuration**

- 1,8 RX output, balanced
- 3 TX input, single ended
- 6 Antenna
- 2,4,5,7 To be Grounded



**Data Sheet**

**Characteristics**

Temperature range for specification:	T = -30 °C to +85 °C
ANT terminating impedance:	Z <sub>ANT</sub> = 50 Ω    5.6nH
TX terminating impedance:	Z <sub>TX</sub> = 50 Ω
RX terminating impedance:	Z <sub>RX</sub> = 100 Ω (balanced)

Characteristics Tx - Ant					min.	typ. @ 25 °C	max.	
<b>Center frequency</b>		f <sub>C</sub>			—	897.5	—	MHz
<b>Maximum insertion attenuation</b>								
@f <sub>Carrier</sub>	882.4 ... 912.6	MHz	α <sub>WCDMA</sub> <sup>1)</sup>		—	2.1	2.8	dB
	880.0 ... 915.0	MHz			—	2.8	3.9	dB
	880.24 ... 914.76	MHz			—	2.7	3.8	dB
<b>Amplitude ripple (p-p)</b>								
@f <sub>Carrier</sub>	882.4 ... 912.6	MHz	Δα <sub>WCDMA</sub> <sup>1)</sup>		—	1.2	1.8	dB
<b>Error Vector Magnitude</b>								
@f <sub>Carrier</sub>	882.4 ... 912.6	MHz	EVM <sup>2)</sup>		—	2.1	6.0	%
<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>			α					
	0.3 ... 716.0	MHz			30	37	—	dB
	716.0 ... 728.0	MHz			32	37	—	dB
	728.0 ... 821.0	MHz			30	35	—	dB
@f <sub>Carrier</sub>	927.4 ... 957.6	MHz	α <sub>WCDMA</sub> <sup>1)</sup>		42	48	—	dB
	925.0 ... 960.0	MHz			38 <sup>3)</sup>	48	—	dB
	925.24 ... 959.76	MHz			41 <sup>3)</sup>	48	—	dB
	1565.42 ... 1573.374	MHz			37	45	—	dB
	1573.374 ... 1577.466	MHz			37	45	—	dB
	1577.466 ... 1585.42	MHz			37	44	—	dB
	1597.55 ... 1605.89	MHz			37	43	—	dB
	1760.0 ... 1830.0	MHz			32	38	—	dB
	1830.0 ... 1880.0	MHz			27	33	—	dB
	2110.0 ... 2170.0	MHz			27	32	—	dB
	2400.0 ... 2500.0	MHz			28	33	—	dB
	2620.0 ... 2745.0	MHz			22	27	—	dB
	3520.0 ... 3660.0	MHz			20	26	—	dB
	4400.0 ... 4575.0	MHz			20	30	—	dB
	5150.0 ... 5490.0	MHz			15	18	—	dB
	5725.0 ... 5850.0	MHz			10	16	—	dB

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

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

<sup>3)</sup> T=0 °C to +85 °C

**Data Sheet**

**Characteristics**

Temperature range for specification:	T = -30 °C to +85 °C
ANT terminating impedance:	Z <sub>ANT</sub> = 50 Ω    5.6nH
TX terminating impedance:	Z <sub>TX</sub> = 50 Ω
RX terminating impedance:	Z <sub>RX</sub> = 100 Ω (balanced)

Charcteristics Rx - Ant					min.	typ. @ 25 °C	max.	
<b>Center frequency</b>	f <sub>C</sub>				—	942.5	—	MHz
<b>Maximum insertion attenuation</b>								
@f <sub>Carrier</sub> 927.4 ... 957.6 MHz	α <sub>WCDMA</sub> <sup>1)</sup>				—	2.0	2.5	dB
925.0 ... 960.0 MHz					—	2.5	3.7	dB
925.24 ... 959.76 MHz					—	2.5	3.5	dB
<b>Amplitude ripple (p-p)</b>								
@f <sub>Carrier</sub> 927.4 ... 957.6 MHz	Δα <sub>WCDMA</sub> <sup>1)</sup>				—	0.6	1.2	dB
<b>Error Vector Magnitude</b>								
@f <sub>Carrier</sub> 927.4 ... 957.6 MHz	EVM <sup>2)</sup>				—	2.7	6.0	%
<b>VSWR</b>								
RX port 925.0 ... 960.0 MHz					—	1.8	2.1	
ANT port 925.0 ... 960.0 MHz					—	1.8	2.1	
<b>Attenuation</b>	α							
0.3 ... 880.0 MHz					35	62	—	dB
@f <sub>Carrier</sub> 882.4 ... 912.6 MHz	α <sub>WCDMA</sub> <sup>1)</sup>				50	58	—	dB
880.0 ... 915.0 MHz					46	56	—	dB
1045.0 ... 4810.0 MHz					35	58	—	dB
1850.0 ... 1920.0 MHz					40	58	—	dB
2400.0 ... 2484.0 MHz					45	58	—	dB
2775.0 ... 2880.0 MHz					45	60	—	dB
<b>Common Mode Rejection Ratio</b>	α							
925.0 ... 960.0 MHz					25	33	—	dB
<b>IMD product level limits<sup>3)</sup></b>								
<b>at f<sub>TX</sub> = 897.5MHz, f<sub>RX</sub> = 942.5MHz</b>								
Blocker 1	45.0 MHz				—	-120	-110	dBm
Blocker 2	852.5 MHz				—	-108	-100	dBm
Blocker 3	1840.0 MHz				—	-110	-100	dBm
Blocker 4	2737.5 MHz				—	-108	-100	dBm

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

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

<sup>3)</sup> Power levels: 21.5 dBm Tx signal, -15dBm blocker at antenna port

**Data Sheet**

**Characteristics**

Temperature range for specification:	T = -30 °C to +85 °C
ANT terminating impedance:	Z <sub>ANT</sub> = 50 Ω    5.6nH
TX terminating impedance:	Z <sub>TX</sub> = 50 Ω
RX terminating impedance:	Z <sub>RX</sub> = 100 Ω (balanced)

Charcteristics Tx - Rx					min.	typ. @ 25 °C	max.	
<b>Differential Mode Isolation</b>								
	880.0	...	915.0	MHz	52	58	—	dB
@f <sub>Carrier</sub>	882.4	...	912.6	MHz α <sub>WCDMA</sub> <sup>1)</sup>	55	60	—	dB
	925.0	...	960.0	MHz	40 <sup>2)</sup>	56	—	dB
	925.24	...	959.76	MHz	43 <sup>2)</sup>	56	—	dB
@f <sub>Carrier</sub>	927.4	...	957.6	MHz α <sub>WCDMA</sub> <sup>1)</sup>	48	58	—	dB
<b>Common Mode Isolation</b>								
@f <sub>Carrier</sub>	882.4	...	912.6	MHz α <sub>WCDMA</sub> <sup>1)</sup>	55	63	—	dB

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

<sup>2)</sup> T=0 °C to +85 °C



**Maximum ratings**

Storage temperature range	T <sub>stg</sub>	-40/+85 <sup>1)</sup>	°C	
DC voltage	V <sub>DC</sub>	5	V	
ESD voltage	V <sub>ESD</sub>	100 <sup>2)</sup>	V	machine model, 10 pulses
ESD voltage	V <sub>ESD</sub>	300 <sup>3)</sup>	V	HBM,+/- 1 pulses
ESD voltage	V <sub>ESD</sub>	600 <sup>4)</sup>	V	CDM,+/- 3 pulses
Input power at	P <sub>IN</sub>			
880.0 ... 915.0 MHz		29	dBm	} WCDMA signal 55 °C, 10000 h
elsewhere		10	dBm	

1) Extended upperlimit: 168@125°C acc. to IEC 60068-2-2 Bb.

2) acc. to JESD22-A115B (machine model), 10 negative & 10 positive pulses.

3) acc. to JESD22-A114F (human body model), 1 negative & 1 positive pulses.

4) acc. to JESD22-A101C (charge device model), 3 negative & 3 positive pulse

**Annotation for characteristics section**

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

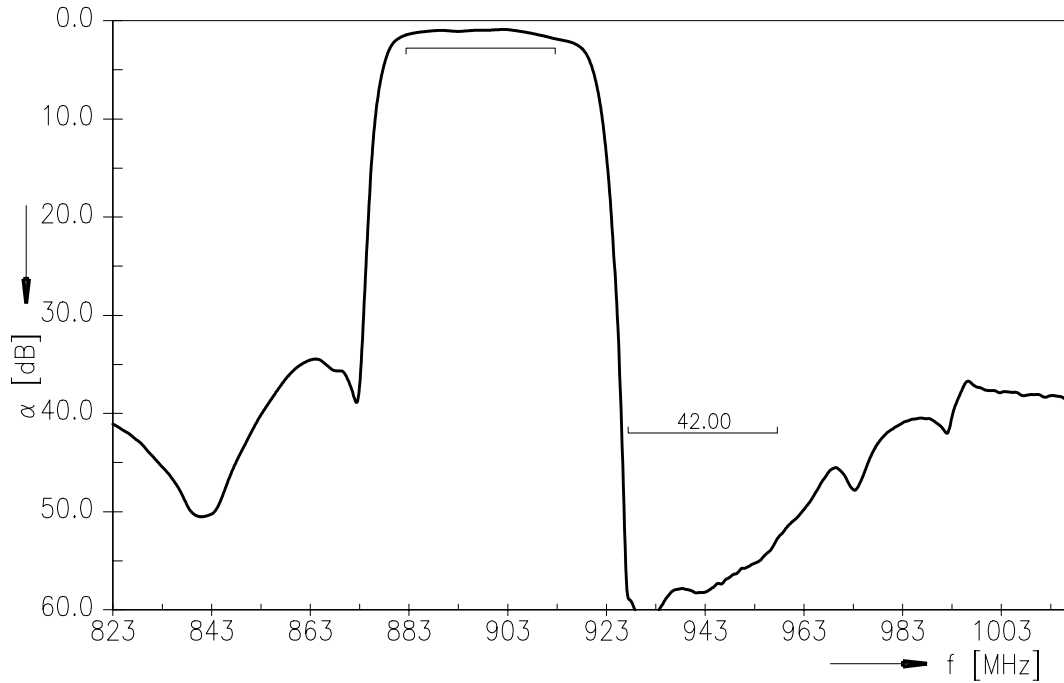
$$\int_{-\infty}^{\infty} |S_{\text{ds2l}}(f)H_{\text{RRC}}(f - f_{\text{Carrier}})|^2 df$$

$f_{\text{Carrier}}$  according to 3GPP TS 25.101 (e.g. for UMTS-Passband,  $f_{\text{Carrier}}$  ranges from 2112.4 MHz (lowest Rx channel) to 2167.6 MHz (highest Rx 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:

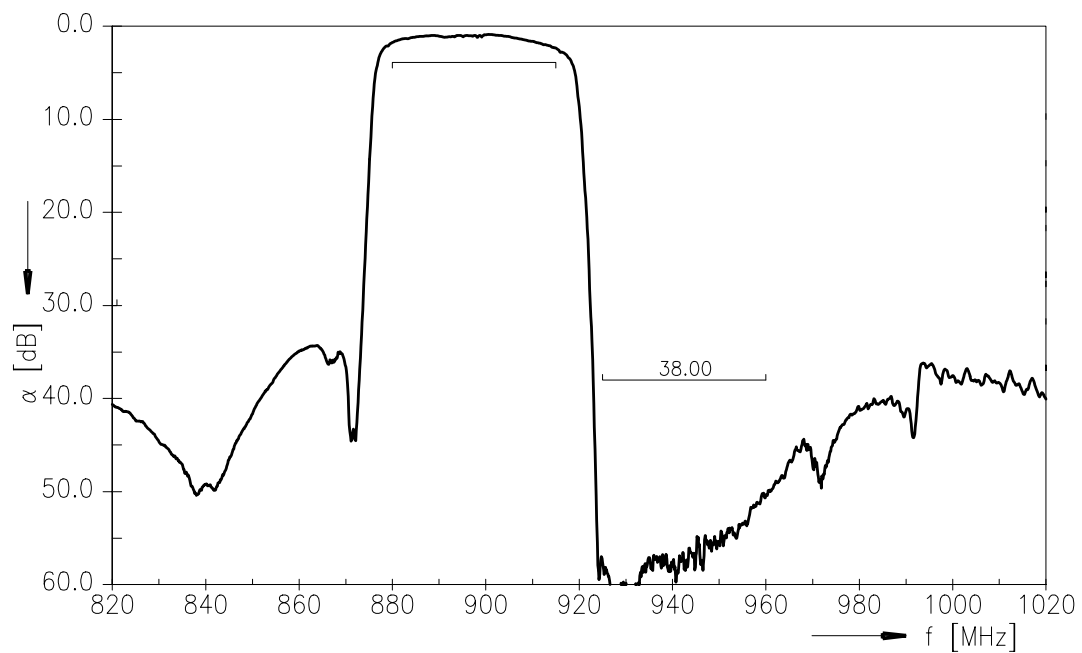
$$\int_{-\infty}^{\infty} |H_{\text{RRC}}(f)|^2 df = 1$$



Frequency Response TX-ANT (Power transfer function)

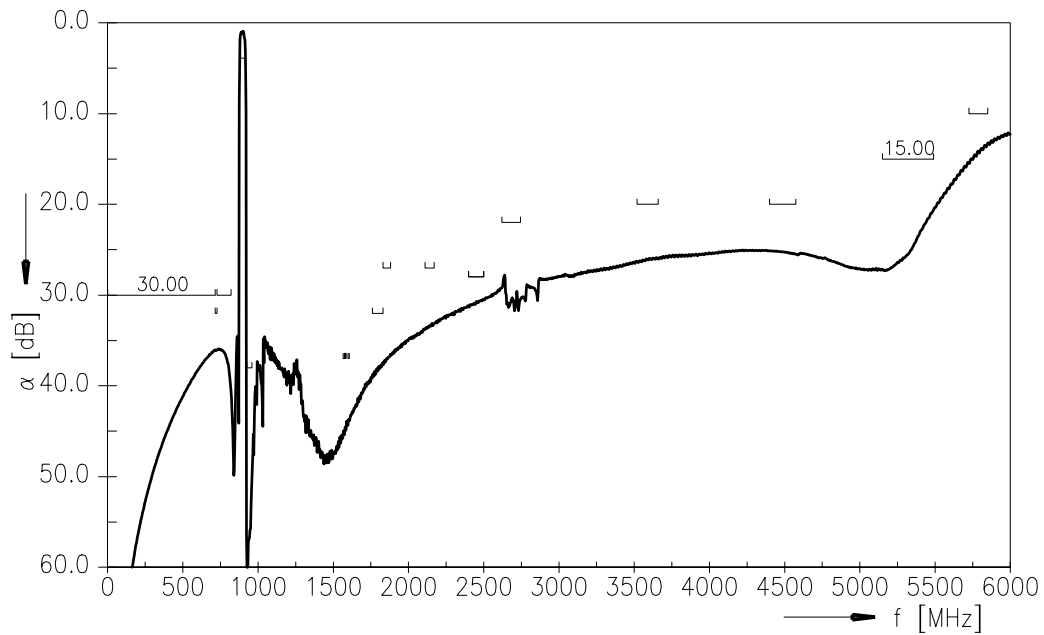


Frequency Response TX - Ant (CW test signal, specification temperature range  $T=0\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$ )

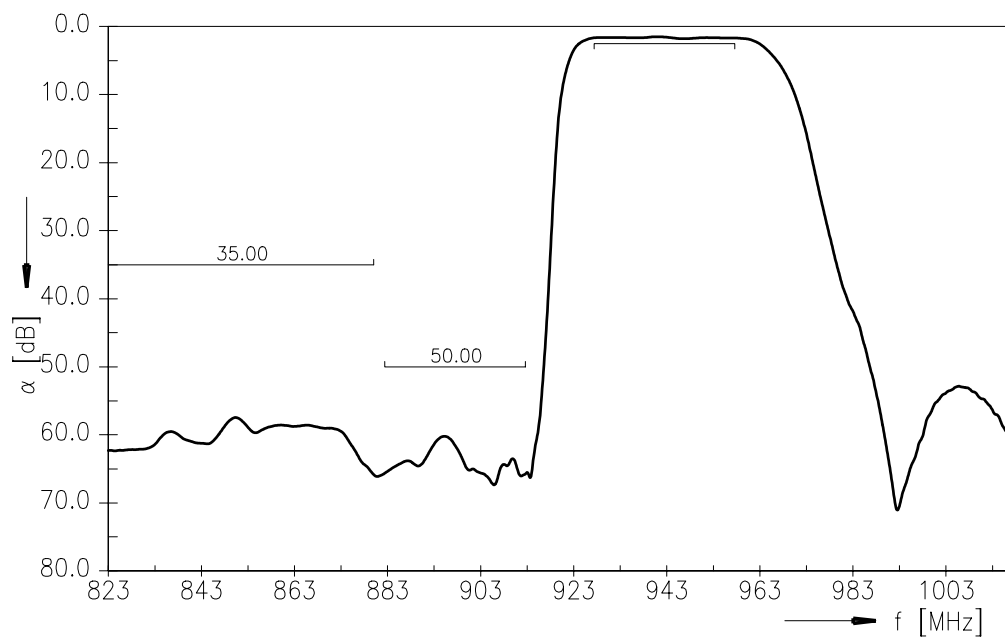




Frequency Response TX-ANT (wideband)

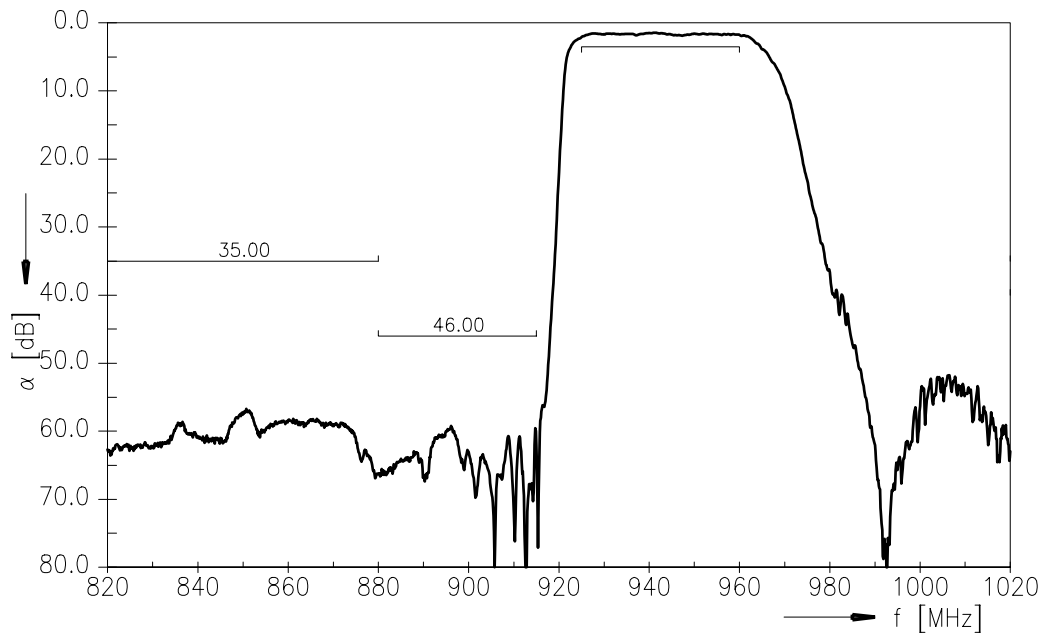


Frequency Response ANT - RX (Power transfer function)

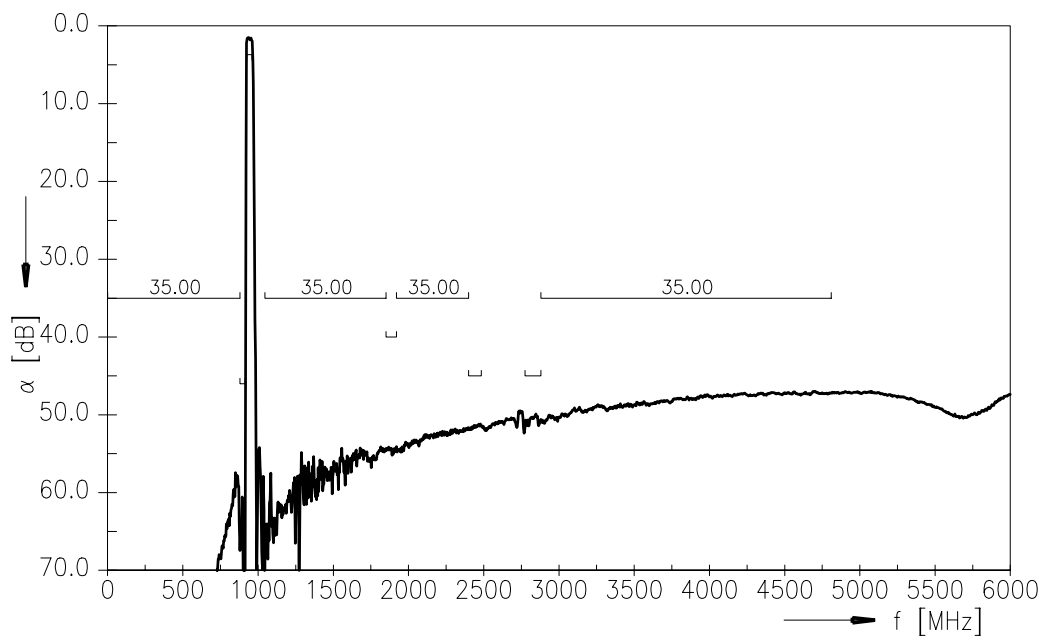




Frequency Response Ant - RX (CW test signal)

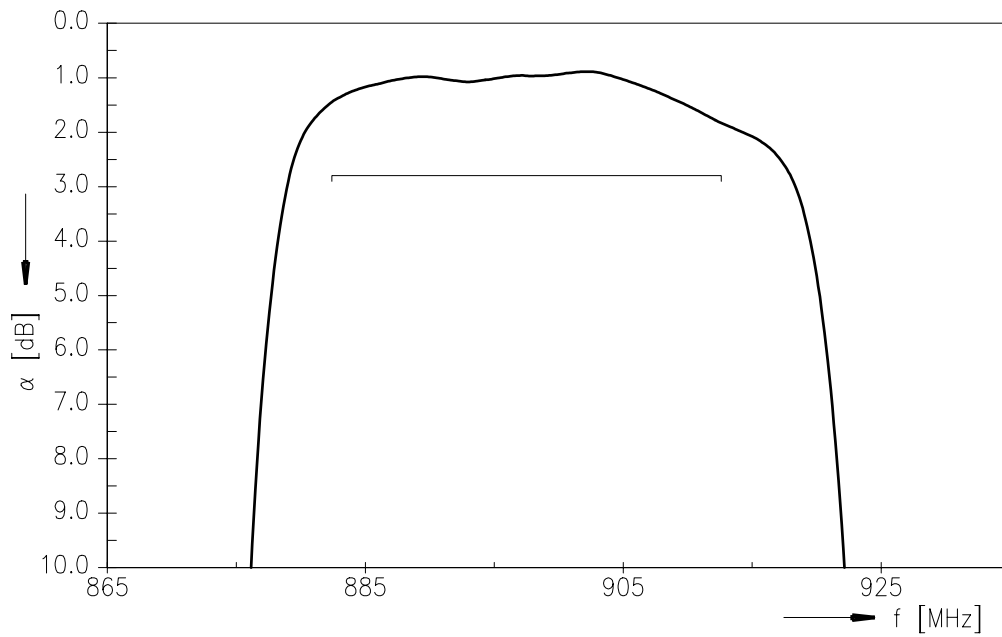


Frequency Response ANT - RX (wideband)

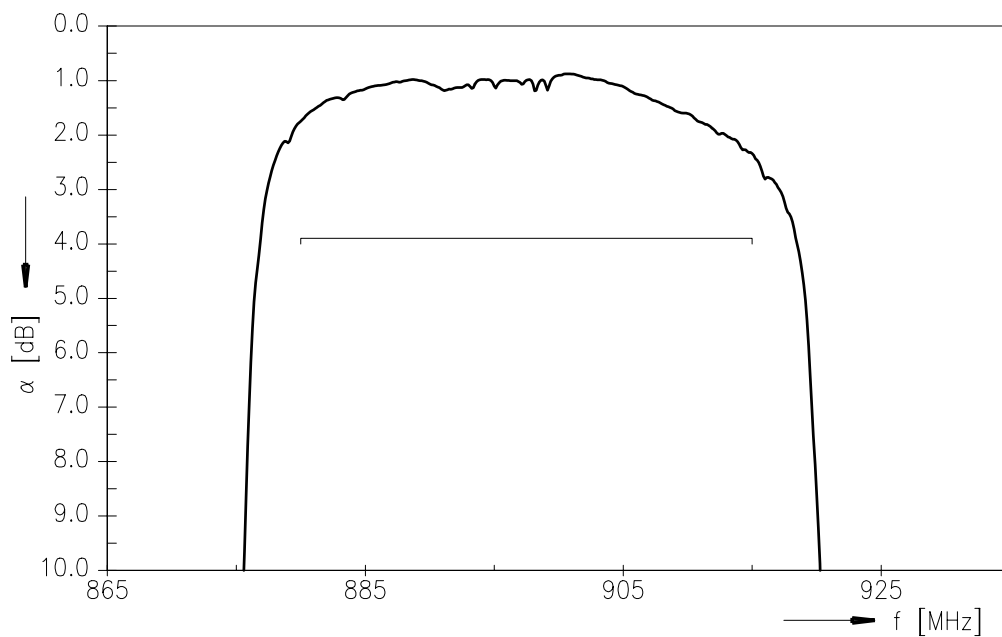




Frequency Response TX - Ant (passband, Power transfer function)

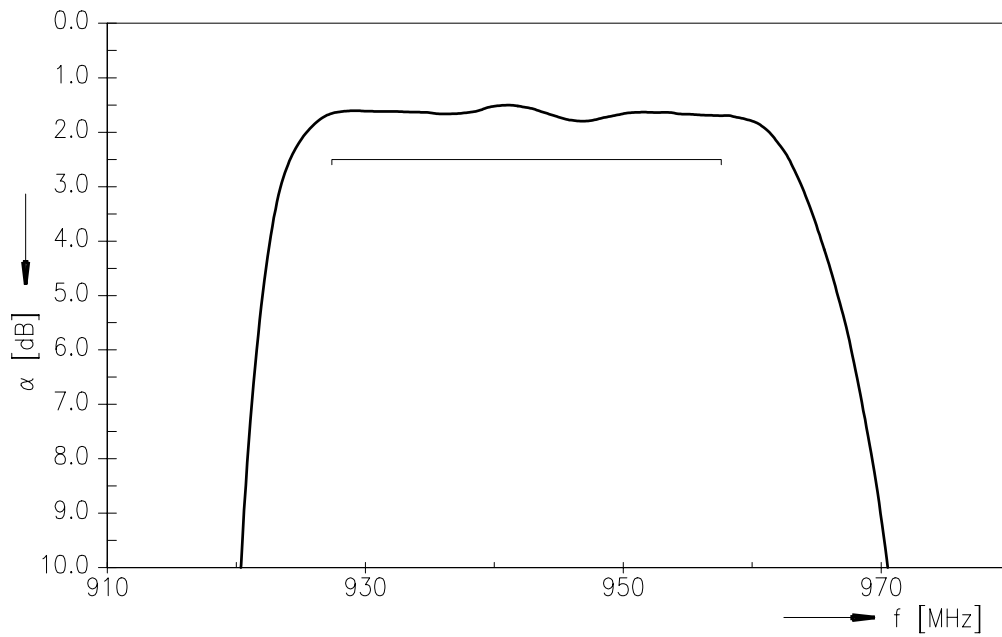


Frequency Response TX-Ant (passband, CW test signal)

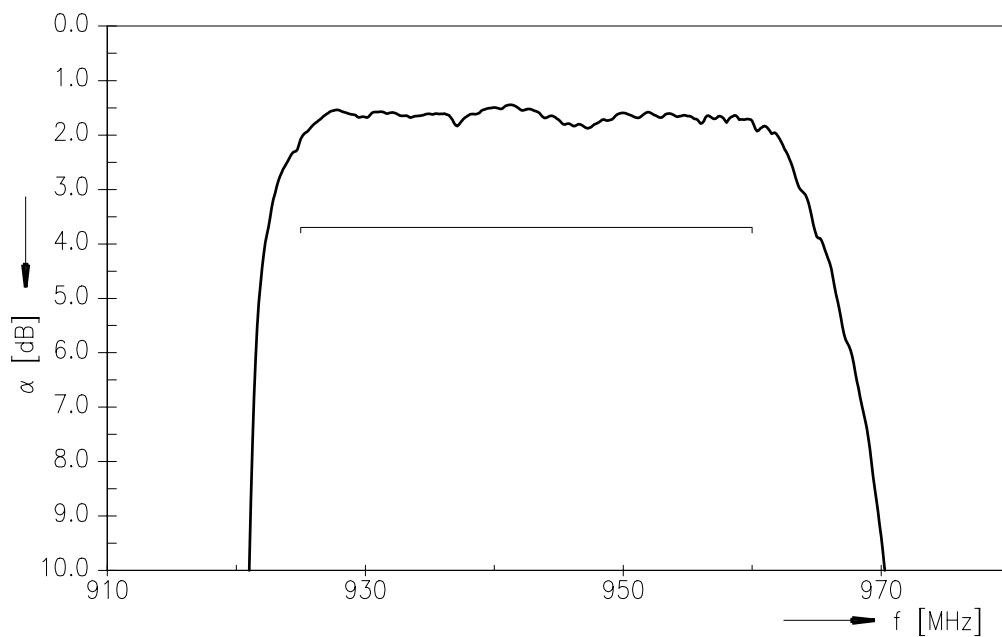




Frequency Response Ant - RX (passband, Power transfer function)

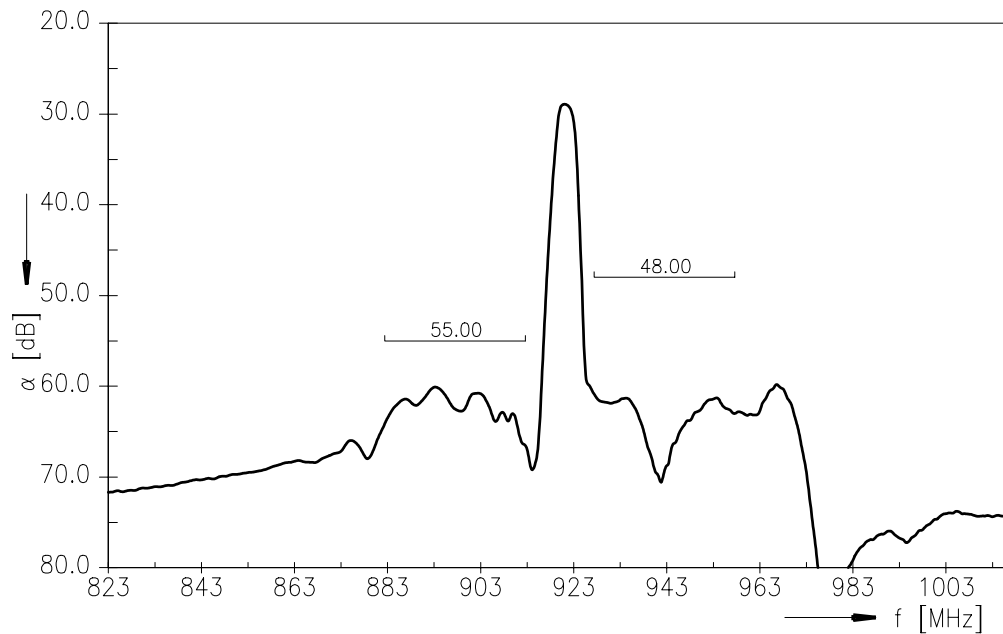


Frequency Response Ant - RX (passband, CW test signal)

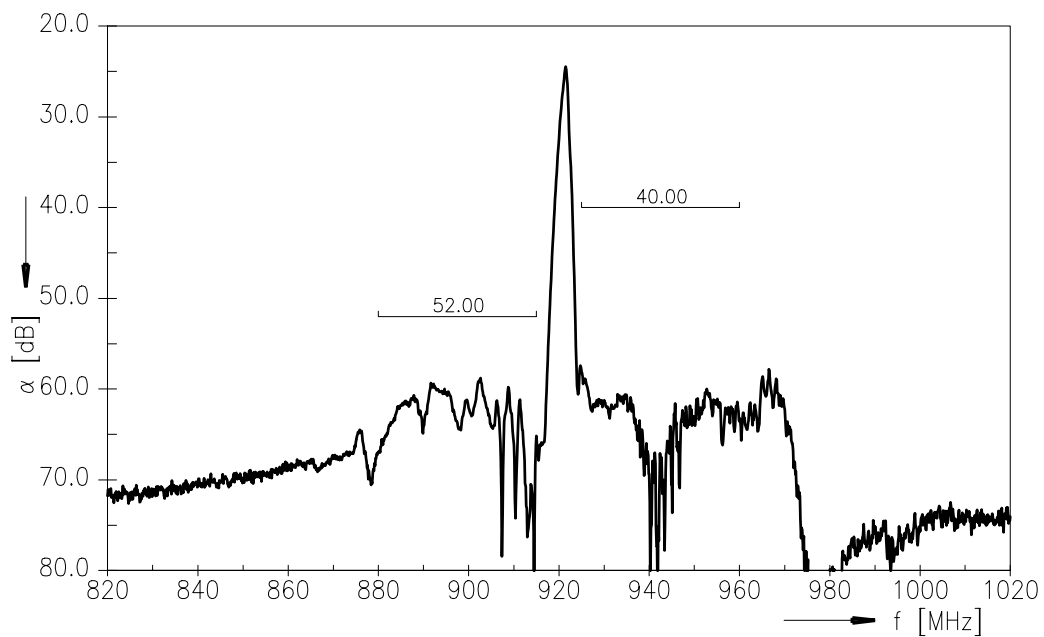




Frequency Response TX - RX (Power transfer function, differential mode)

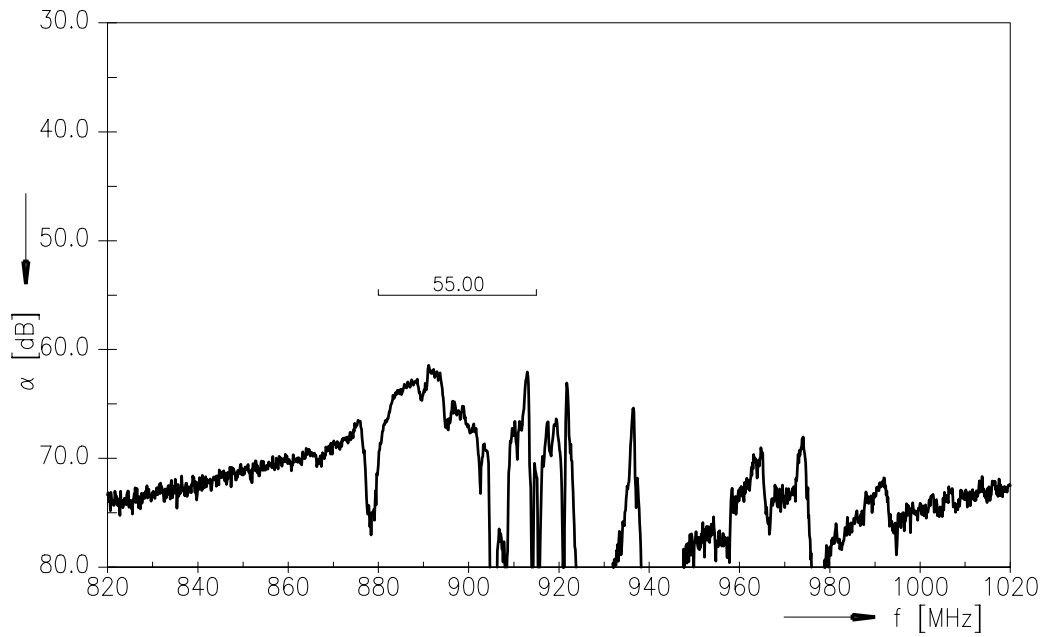


Frequency Response TX-RX (differential, CW signal , spec temperature range T=0°C to +85°C)





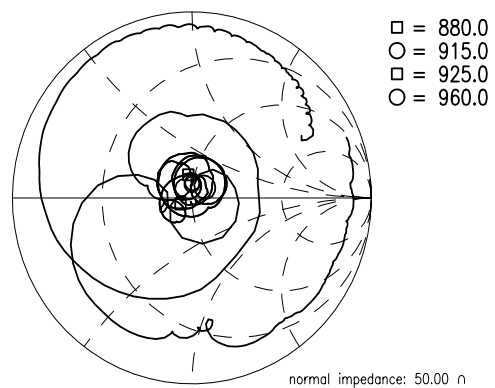
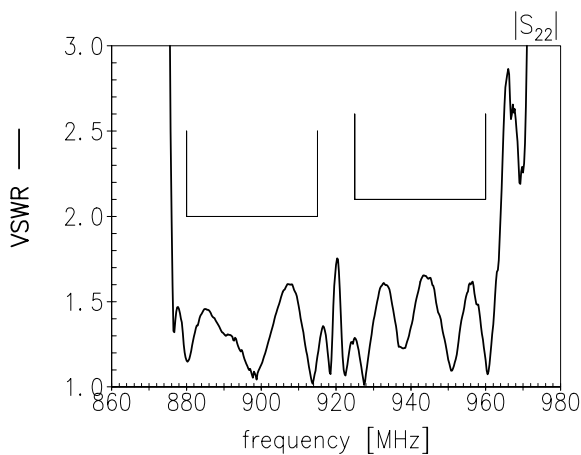
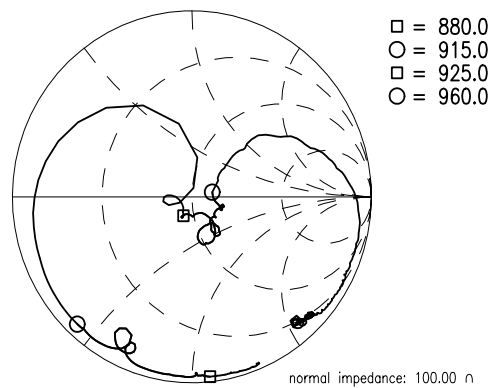
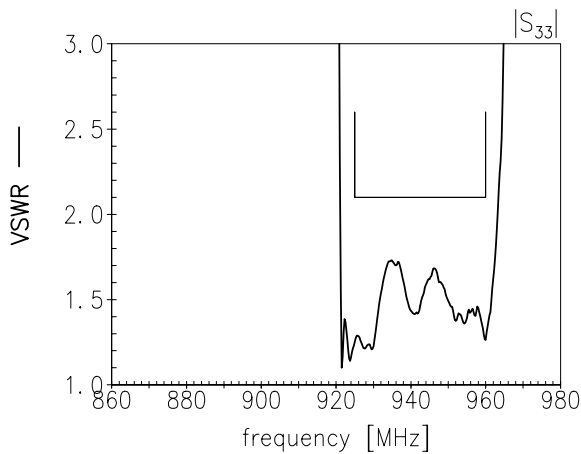
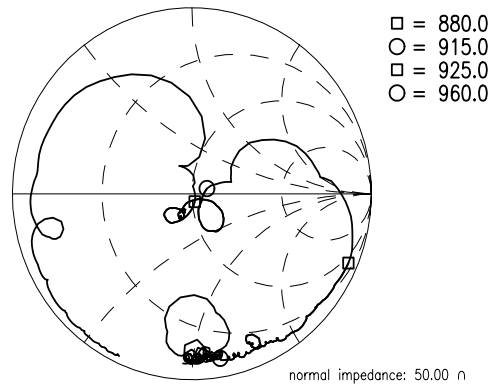
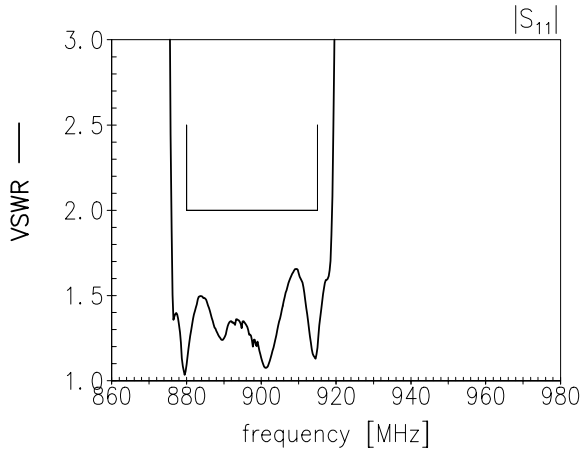
Frequency Response TX - RX (common mode, CW signal)







Matching (TX, RX, ANT)




**References**

<b>Type</b>	B8505
<b>Ordering code</b>	B39941B8505P810
<b>Marking and package</b>	C61157-A8-A79
<b>Packaging</b>	F61047-V8247-Z000
<b>Date codes</b>	L_1126
<b>S-parameters</b>	B8505_NB_UN.s4p, B8505_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.
<b>Matching coils</b>	See Inductor pdf-catalog <a href="http://www.tdk.co.jp/tefe02/coil.htm#aname1">http://www.tdk.co.jp/tefe02/coil.htm#aname1</a> and Data Library for circuit simulation <a href="http://www.tdk.co.jp/etvcl/index.htm">http://www.tdk.co.jp/etvcl/index.htm</a>

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