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RF360 Europe GmbH

A Qualcomm – TDK Joint Venture

## SAW Components

### SAW duplexer

WCDMA band VIII

Series/type:	B8521
Ordering code:	B39941B8521P810
Date:	November 26, 2014
Version:	2.0

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# SAW Components

## SAW duplexer

WCDMA band VIII

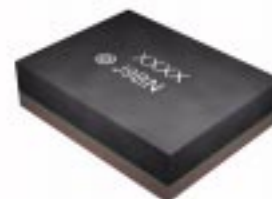
<b>Series/type:</b>	<b>B8521</b>
<b>Ordering code:</b>	<b>B39941B8521P810</b>
<b>Date:</b>	<b>November 26, 2014</b>
<b>Version:</b>	<b>2.0</b>

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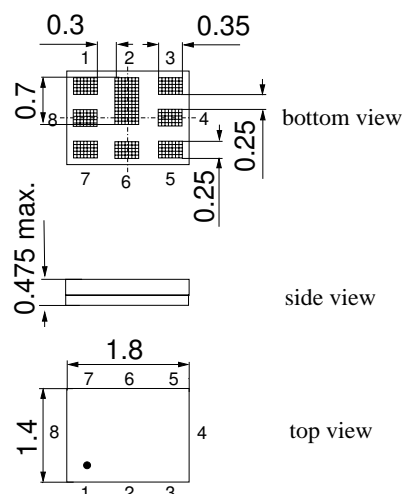
EPCOS AG is a TDK Group Company.

**Application**

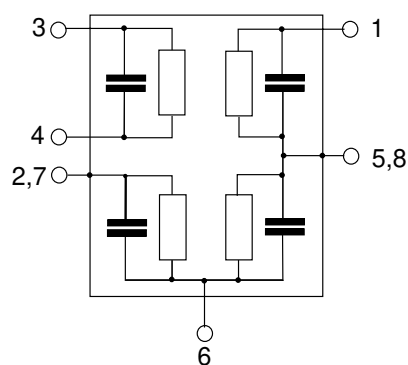
- Low-loss SAW duplexer for mobile telephone WCDMA Band VIII systems
- Low insertion attenuation
- Low amplitude ripple
- Usable passband 35 MHz
- Single ended to balanced transformation in Antenna - Rx path
- Impedance transformation 50Ω to 100Ω in Antenna - Rx path
- high Tx - Rx isolation


**Features**

- Package size 1.8 x 1.4 mm<sup>2</sup>, max package height 0.475 mm.
- RoHS compatible
- approx. weight 0.0042g
- Package for **Surface Mount Technology (SMT)**
- Ni, gold-plated terminals
- **Electrostatic Sensitive Device (ESD)**
- **Moisture Sensitive Level 3**


**Pin configuration**

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





**Data Sheet**

**Characteristics**

Temperature range for specification:	T = -20 °C to +90 °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	2.1	
ANT port	880.0 ... 915.0	MHz			—	1.7	2.1	
<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 +90 °C

**Data Sheet**

**Characteristics**

Temperature range for specification:	T = -20 °C to +90 °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>								
	0.3 ... 880.0	MHz	α		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>								
	925.0 ... 960.0	MHz	α		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			—	-127	-115	dBm
Blocker 2	852.5	MHz			—	-111	-100	dBm
Blocker 3	1840.0	MHz			—	-110	-100	dBm
Blocker 4	2737.5	MHz			—	-110	-100	dBm

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

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

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

**Data Sheet**

**Characteristics**

Temperature range for specification:	T = -20 °C to +90 °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 +90 °C




**Maximum ratings**

Storage temperature range	$T_{stg}$	-40/+90 <sup>1)</sup>	°C	
DC voltage	$V_{DC}$	5	V	
ESD voltage	$V_{ESD}$	100 <sup>2)</sup>	V	machine model, 10 pulses
ESD voltage	$V_{ESD}$	300 <sup>3)</sup>	V	HBM,+/- 1 pulses
ESD voltage	$V_{ESD}$	600 <sup>4)</sup>	V	CDM,+/- 3 pulses
Input power at	$P_{IN}$			
880.0 ... 915.0 MHz		29	dBm	} continuous wave 50 °C, 5000 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",  $\alpha_{WCDMA}$ ) is determined by

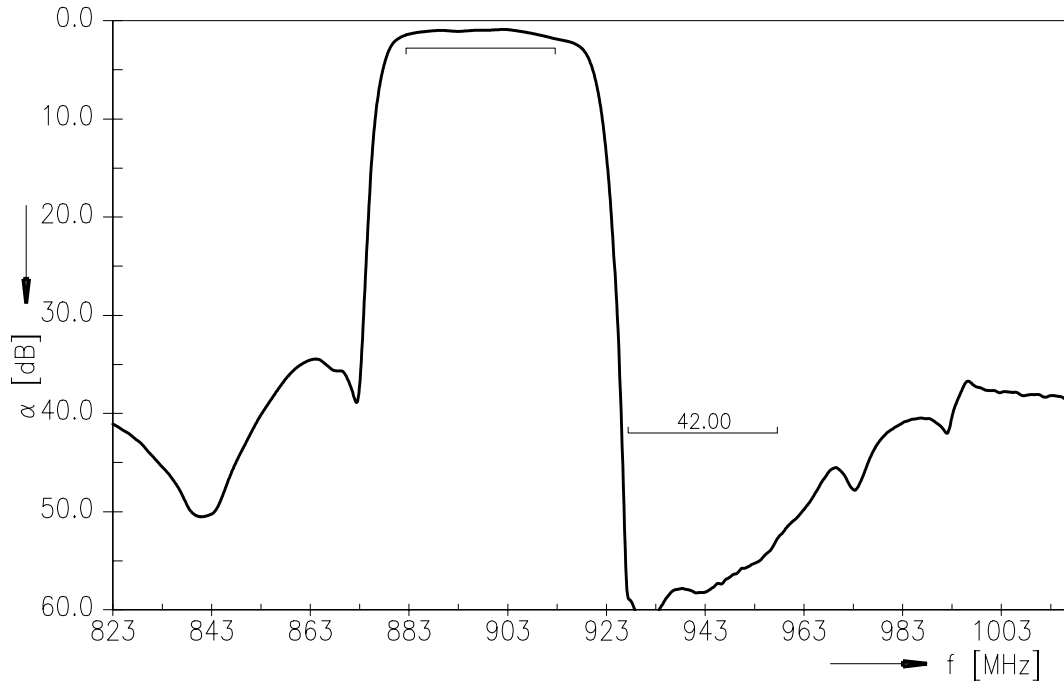
$$\int_{-\infty}^{\infty} |S_{ds2l}(f)H_{RRC}(f - f_{Carrier})|^2 df$$

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

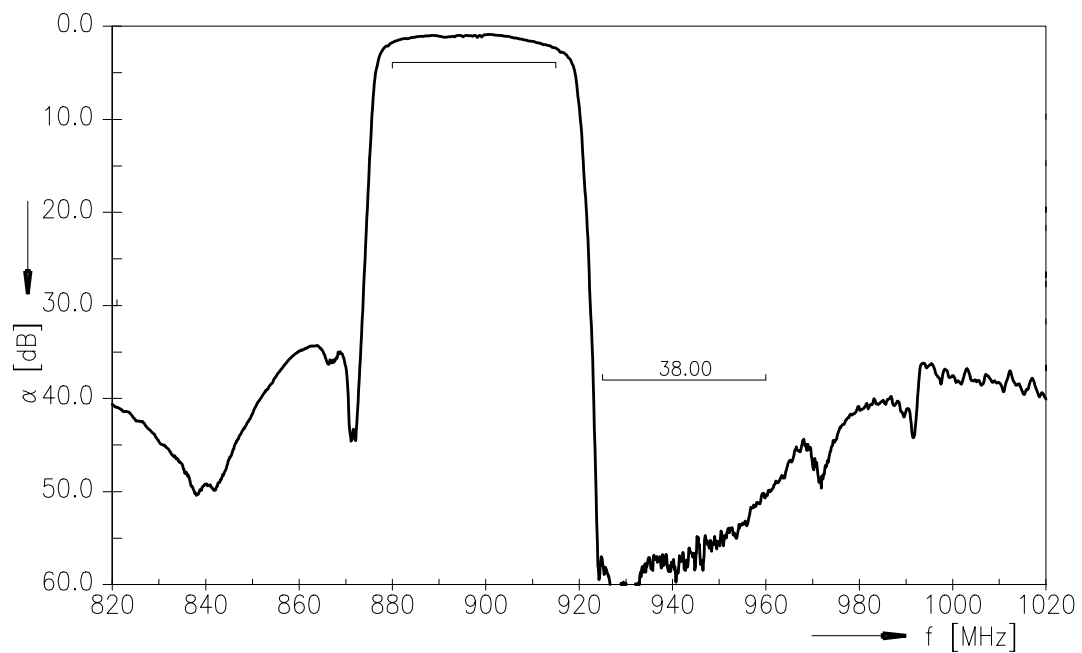
$$\int_{-\infty}^{\infty} |H_{RRC}(f)|^2 df = 1$$



**Frequency Response TX-ANT (Power transfer function)**

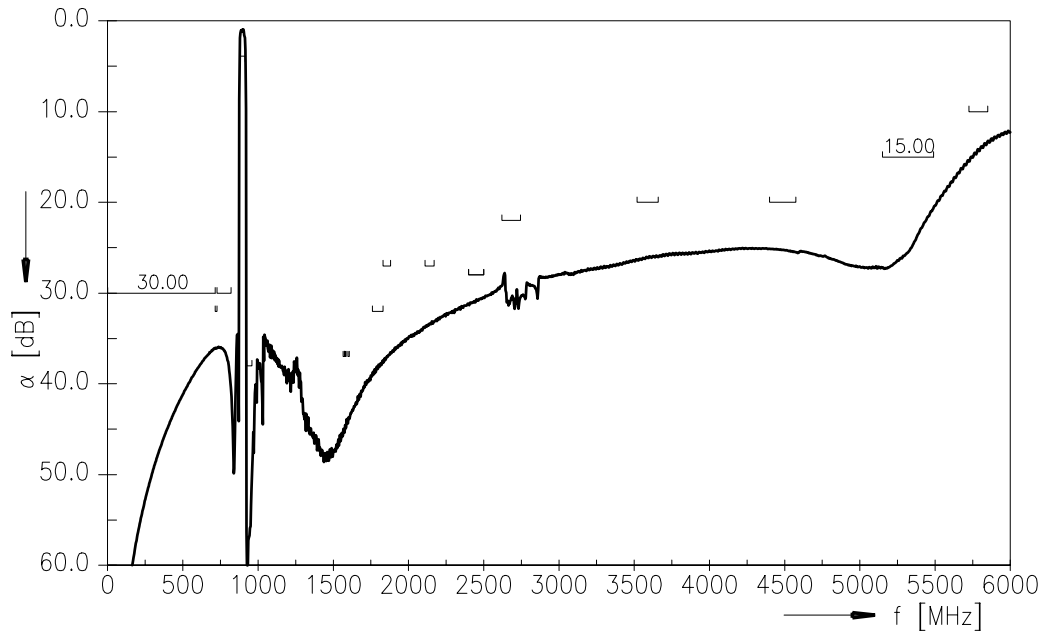


**Frequency Response TX-Ant (CW test signal, specification temperature range  $T=0\text{ }^{\circ}\text{C}$  to  $+90\text{ }^{\circ}\text{C}$ )**

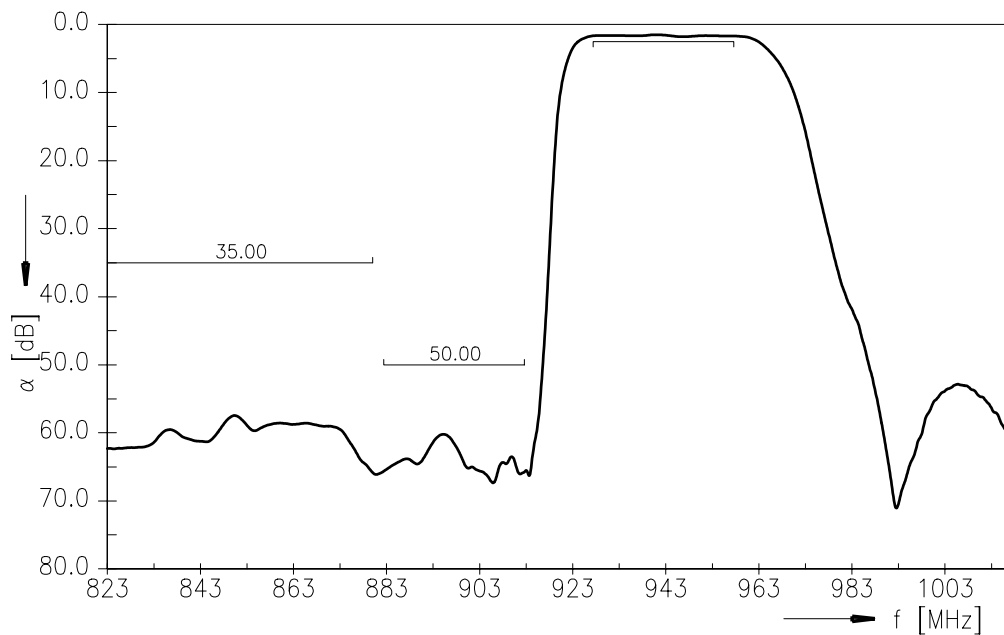




**Frequency Response TX-ANT (wideband)**

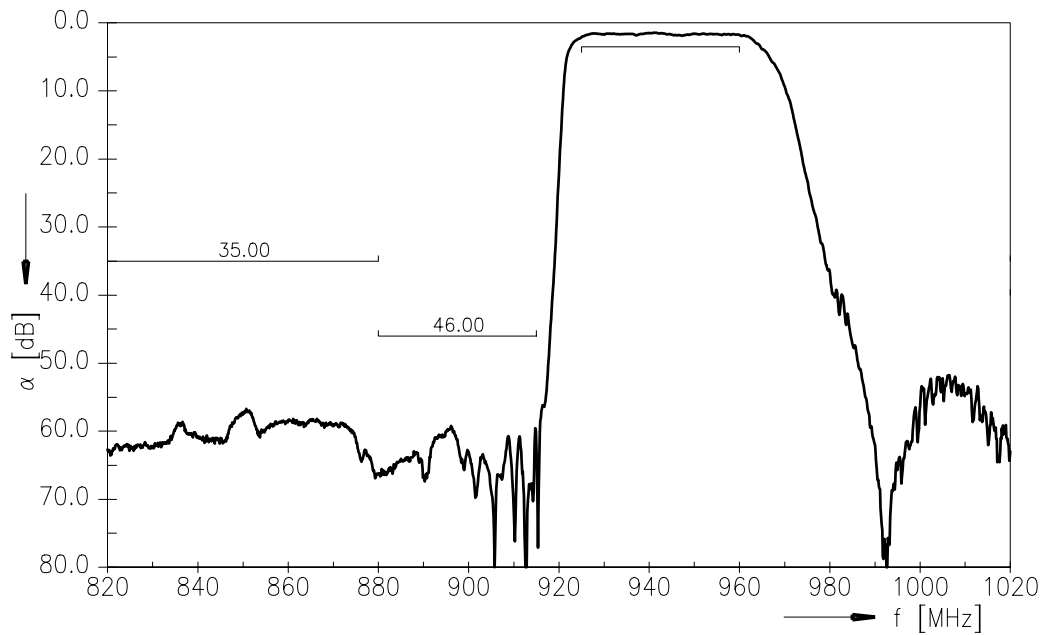


**Frequency Response ANT - RX (Power transfer function)**

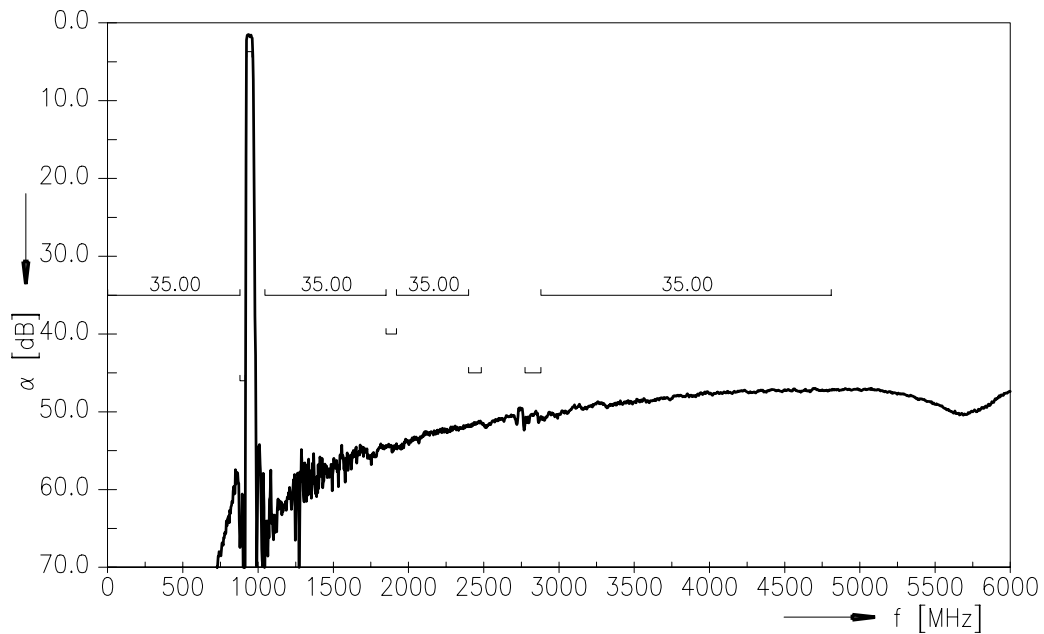




**Frequency Response (CW test signal)**

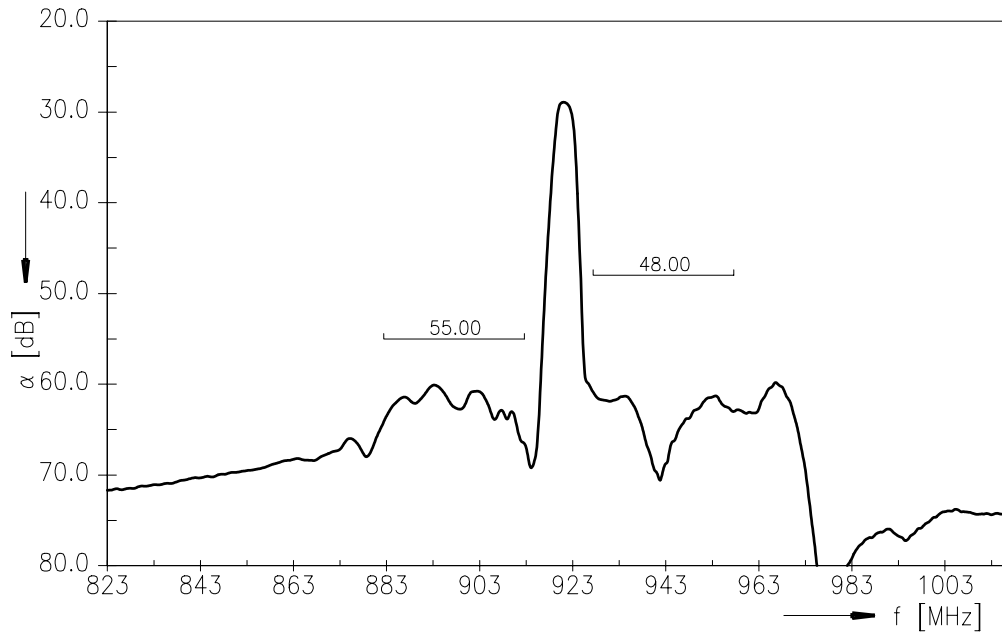


**Frequency Response ANT - RX (wideband)**

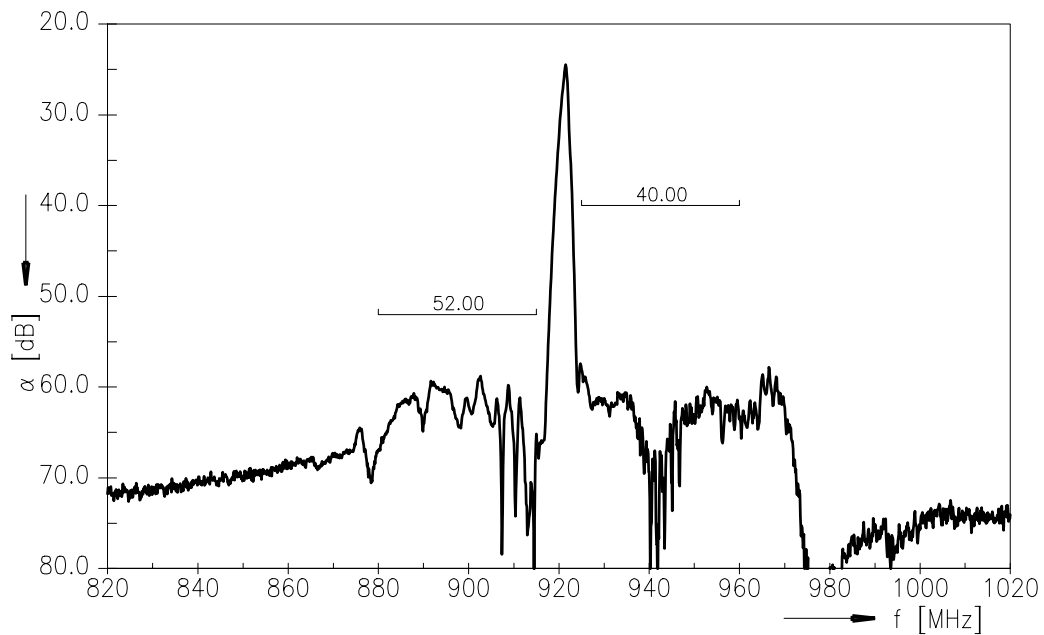




**Frequency Response TX - RX (Power transfer function, differential mode)**

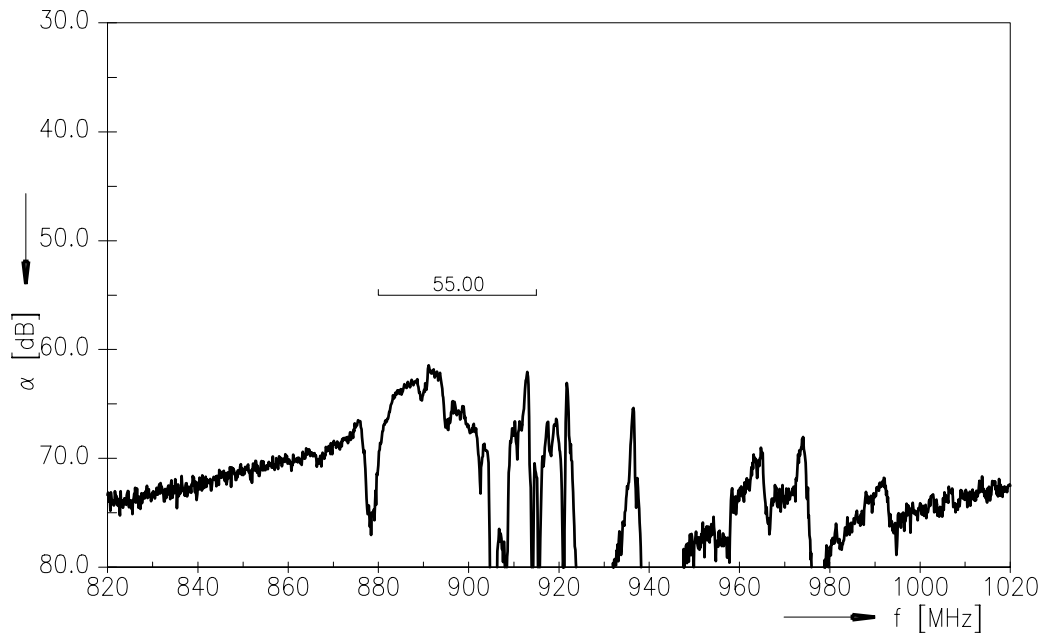


**Frequency Response TX-RX (differential, CW signal , spec temperature range T=0°C to +90°C)**





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

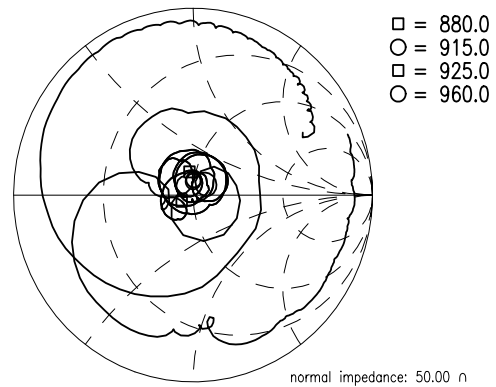
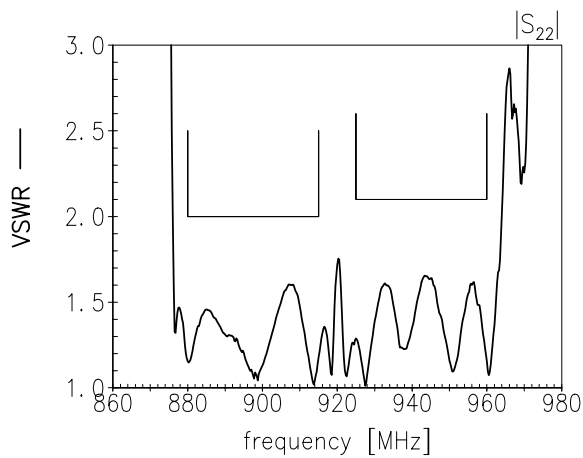
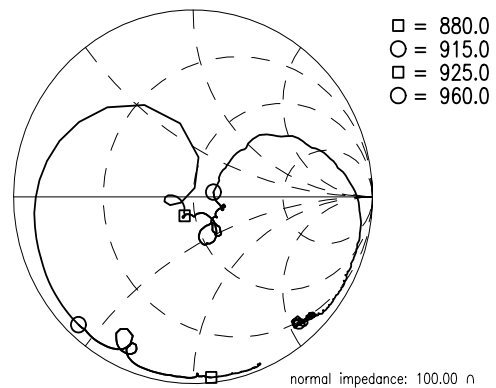
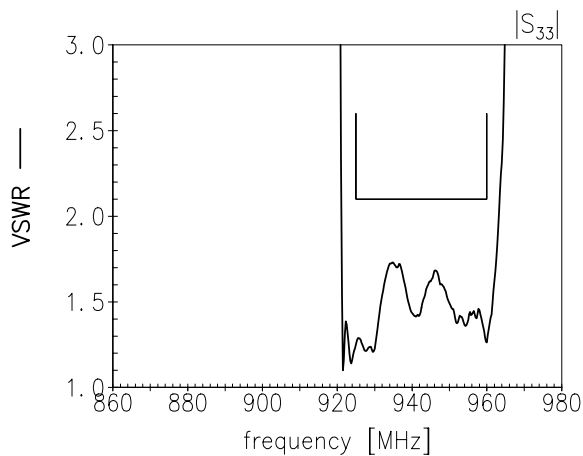
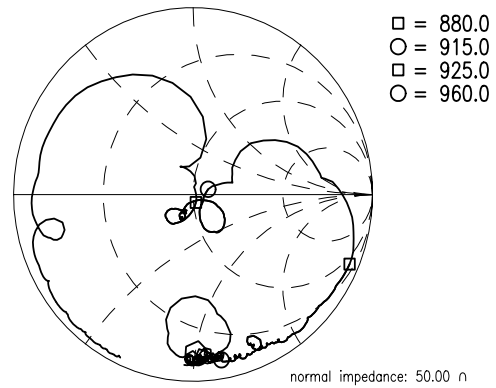
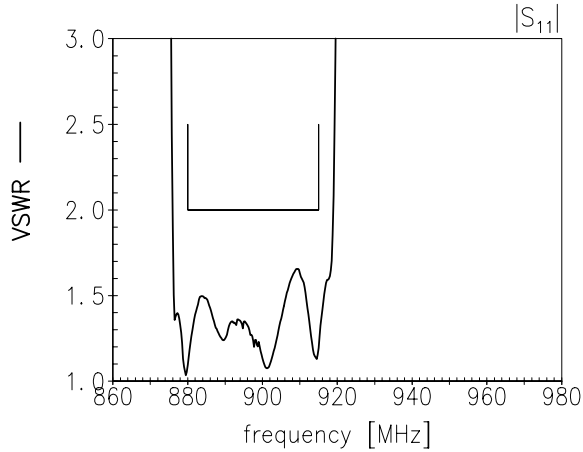




**Data Sheet**



**Return Loss: S<sub>11</sub> Tx port    S<sub>22</sub> Antenna port    S<sub>33</sub> Rx port**



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


**References**

<b>Type</b>	B8521
<b>Ordering code</b>	B39941B8521P810
<b>Marking and package</b>	C61157-A8-A79
<b>Packaging</b>	F61047-V8247-Z000
<b>Date codes</b>	L_1126
<b>S-parameters</b>	B8521_NB_UN.s4p, B8521_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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