



SAW Components

SAW duplexer

WCDMA band VIII

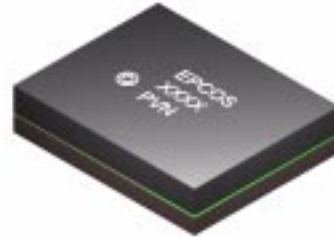
Series/type:	B8516
Ordering code:	B39941B8516P810
Date:	April 25, 2013
Version:	1.0

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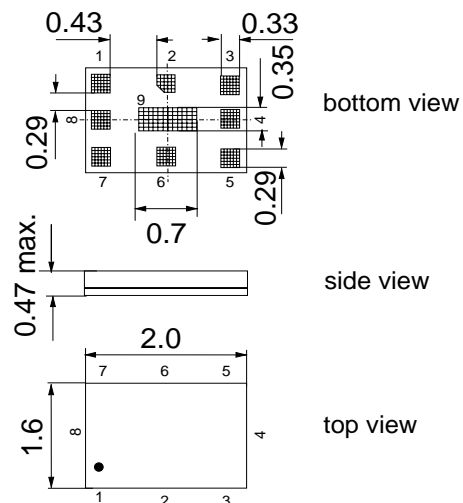
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Application

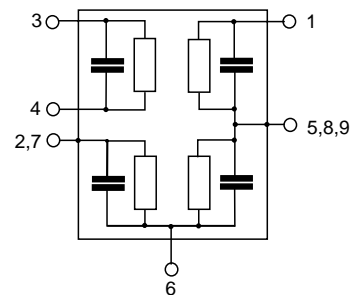
- Low-loss SAW duplexer for mobile telephone WCDMA Band VIII systems
- Low insertion attenuation
- Low amplitude ripple
- Usable passband 35 MHz
- Single ended to balanced transformation in Antenna - Rx path
- Impedance transformation 50Ω to 100Ω in Antenna - Rx path
- high Tx - Rx isolation


Features

- Package size 2.0 x 1.6 mm²
- Maximum package height 0.47 mm max.
- Approximate weight 0.0051 g
- RoHS compatible
- Package for **Surface Mount Technology (SMT)**
- Ni, gold-plated terminals
- **Electrostatic Sensitive Device (ESD)**
- **Moisture Sensitive Level 3**


Pin configuration

- 3,4 RX output, balanced
- 1 TX input, single ended
- 6 Antenna
- 2,5,7,8,9 To be Grounded



PreliminaryData

Characteristics

Temperature range for specification:	T = -20 °C to +85 °C
ANT terminating impedance:	Z _{ANT} = 50 Ω 5.6nH
TX terminating impedance:	Z _{TX} = 50 Ω ¹⁾
RX terminating impedance:	Z _{RX} = 100 Ω (balanced) ¹⁾

Characteristics Tx - Ant					min.	typ. @ 25 °C	max.	
Center frequency		f _C			—	897.5	—	MHz
Maximum insertion attenuation								
@f _{Carrier}	882.4 ... 912.6	MHz	α _{WCDMA} ²⁾		—	2.1	2.6	dB
	880.0 ... 915.0	MHz			—	2.8	3.9	dB
Amplitude ripple (p-p)								
@f _{Carrier}	882.4 ... 912.6	MHz	Δα _{WCDMA} ²⁾		—	1.2	1.8	dB
	880.0 ... 915.0	MHz			—	1.2	2.9	dB
Error Vector Magnitude								
@f _{Carrier}	882.4 ... 912.6	MHz	EVM ³⁾		—	2.3	6.0	%
@f _{Carrier}	882.4 ... 912.6	MHz	EVM ³⁾		—	2.3	4.0 ⁴⁾	%
VSWR								
TX port	880.0 ... 915.0	MHz			—	1.6	2.0	
ANT port	880.0 ... 915.0	MHz			—	1.5	2.0	
Attenuation			α					
	0.3 ... 716.0	MHz			30	37	—	dB
	716.0 ... 728.0	MHz			32	36	—	dB
	728.0 ... 865.0	MHz			30	35	—	dB
	865.0 ... 870.0	MHz			10	37	—	dB
@f _{Carrier}	927.4 ... 957.6	MHz	α _{WCDMA} ²⁾		42	50	—	dB
@f _{Carrier}	927.4 ... 957.6	MHz	α _{WCDMA} ²⁾		48 ⁴⁾	50	—	dB
	1452.0 ... 1477.0	MHz			20	47	—	dB
	1565.42 ... 1573.374	MHz			40	47	—	dB
	1573.374... 1577.466	MHz			40	46	—	dB
	1577.466... 1585.42	MHz			40	46	—	dB
	1597.55 ... 1605.89	MHz			40	45	—	dB
	1670.0 ... 1675.0	MHz			25	45	—	dB
	1760.0 ... 1830.0	MHz			35	43	—	dB

1) Appropriate matching network has to be applied towards PA and LNA. See page (8) for recommendation.

2) Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (7).

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

4) T=5 °C to +85 °C

Data sheet


Characteristics

Temperature range for specification:	T = -20 °C to +85 °C
ANT terminating impedance:	Z _{ANT} = 50 Ω 5.6nH
TX terminating impedance:	Z _{TX} = 50 Ω ¹⁾
RX terminating impedance:	Z _{RX} = 100 Ω (balanced) ¹⁾

Characteristics Tx - Ant				min.	typ. @ 25 °C	max.	
Attenuation			α				
	1830.0	... 1880.0	MHz	27	38	—	dB
	2110.0	... 2170.0	MHz	27	36	—	dB
	2400.0	... 2500.0	MHz	28	32	—	dB
	2620.0	... 2640.0	MHz	22	28	—	dB
	2640.0	... 2745.0	MHz	25	32	—	dB
	3520.0	... 3660.0	MHz	20	26	—	dB
	4400.0	... 4575.0	MHz	20	26	—	dB
	5100.0	... 5490.0	MHz	15	22	—	dB
	5490.0	... 5850.0	MHz	10	16	—	dB

¹⁾ Appropriate matching network has to be applied towards PA and LNA. See page (8) for recommendation.

PreliminaryData

Characteristics

Temperature range for specification:	T = -20 °C to +85 °C
ANT terminating impedance:	Z _{ANT} = 50 Ω 5.6nH
TX terminating impedance:	Z _{TX} = 50 Ω ¹⁾
RX terminating impedance:	Z _{RX} = 100 Ω (balanced) ¹⁾

Charcteristics Rx - Ant					min.	typ. @ 25 °C	max.	
Center frequency		f _C			—	942.5	—	MHz
Maximum insertion attenuation								
	@f _{Carrier}	927.4 ... 957.6	MHz	α _{WCDMA} ²⁾	—	2.0	2.5	dB
		925.0 ... 960.0	MHz		—	2.5	3.7	dB
Amplitude ripple (p-p)								
	@f _{Carrier}	927.4 ... 957.6	MHz	Δα _{WCDMA} ²⁾	—	0.6	1.2	dB
		925.0 ... 960.0	MHz		—	1.0	2.3	dB
Error Vector Magnitude								
	@f _{Carrier}	927.4 ... 957.6	MHz	EVM ³⁾	—	2.7	8.0	%
	@f _{Carrier}	927.4 ... 957.6	MHz	EVM ³⁾	—	2.7	4.0 ⁴⁾	%
VSWR								
RX port		925.0 ... 960.0	MHz		—	1.6	2.1	
ANT port		925.0 ... 960.0	MHz		—	1.6	2.0	
Attenuation				α				
		0.3 ... 462.0	MHz		35	62	—	dB
		462.0 ... 480.0	MHz		45	62	—	dB
		480.0 ... 835.0	MHz		38	62	—	dB
		835.0 ... 870.0	MHz		50	62	—	dB
		870.0 ... 880.0	MHz		38	62	—	dB
	@f _{Carrier}	882.4 ... 912.6	MHz	α _{WCDMA} ²⁾	50	58	—	dB
		980.0 ... 1045.0	MHz		16	36	—	dB
		1045.0 ... 2400.0	MHz		35	58	—	dB
		2400.0 ... 2500.0	MHz		45	58	—	dB
		2500.0 ... 4810.0	MHz		35	55	—	dB
		5100.0 ... 5825.0	MHz		35	54	—	dB
Common Mode Rejection Ratio				α				
		925.0 ... 960.0	MHz		23	28	—	dB

¹⁾ Appropriate matching network has to be applied towards PA and LNA. See page (8) for recommendation.

²⁾ Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (7).

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

⁴⁾ T=5 °C to +85 °C

Data sheet

Characteristics

Temperature range for specification:	T = -20 °C to +85 °C
ANT terminating impedance:	Z _{ANT} = 50 Ω 5.6nH
TX terminating impedance:	Z _{TX} = 50 Ω ¹⁾
RX terminating impedance:	Z _{RX} = 100 Ω (balanced) ¹⁾

Charcteristics Rx - Ant	min.	typ. @ 25 °C	max.	
IMD product level limits²⁾ at @f _{TX} = 897.5MHz, f _{RX} = 942.5MHz				
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
Charcteristics Tx - Rx	min.	typ. @ 25 °C	max.	
Differential Mode Isolation				
@f _{Carrier} 882.4 ... 912.6 MHz α _{WCDMA} ³⁾	56	63	—	dB
@f _{Carrier} 927.4 ... 957.6 MHz α _{WCDMA} ³⁾	50	58	—	dB
Common Mode Isolation				
@f _{Carrier} 882.4 ... 912.6 MHz α _{WCDMA} ³⁾	55	63	—	dB

¹⁾ Appropriate matching network has to be applied towards PA and LNA. See page (8) for recommendation.

²⁾ Power levels: 21dBm TXsignal, -15dBm blocker at antenna port

³⁾ Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (7).


Maximum ratings

Storage temperature range	T_{stg}	-40/+90	°C	
DC voltage	V_{DC}	5	V	
ESD voltage	V_{ESD}	100 ¹⁾	V	machine model, 10 pulses
ESD voltage	V_{ESD}	300 ²⁾	V	HBM, +/- 1 pulses
ESD voltage	V_{ESD}	600 ³⁾	V	CDM, +/- 3 pulses
Input power at	P_{IN}			
880.0 ... 915.0 MHz		29	dBm	} WCDMA signal 55 °C, 10000 h
elsewhere		10	dBm	

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

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

3) acc. to JESD22-C101C (charge device model), 3 negative & 3 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 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:

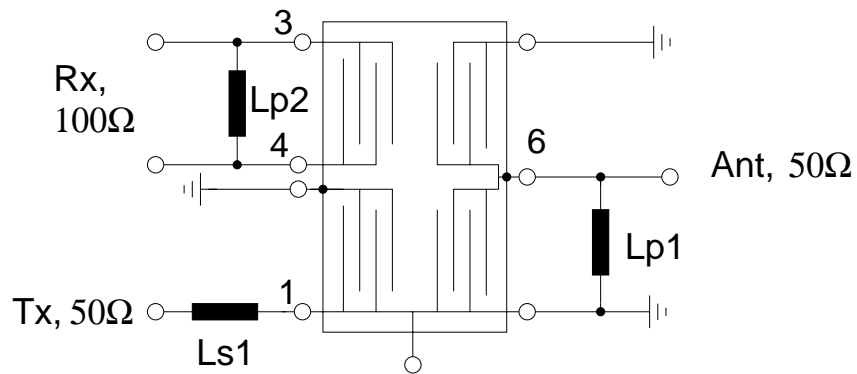
$$\int_{-\infty}^{\infty} |H_{RRC}(f)|^2 df = 1$$

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Matching circuit to terminating impedances

(element values depend upon pcb layout)



Lp1 = 5.6nH

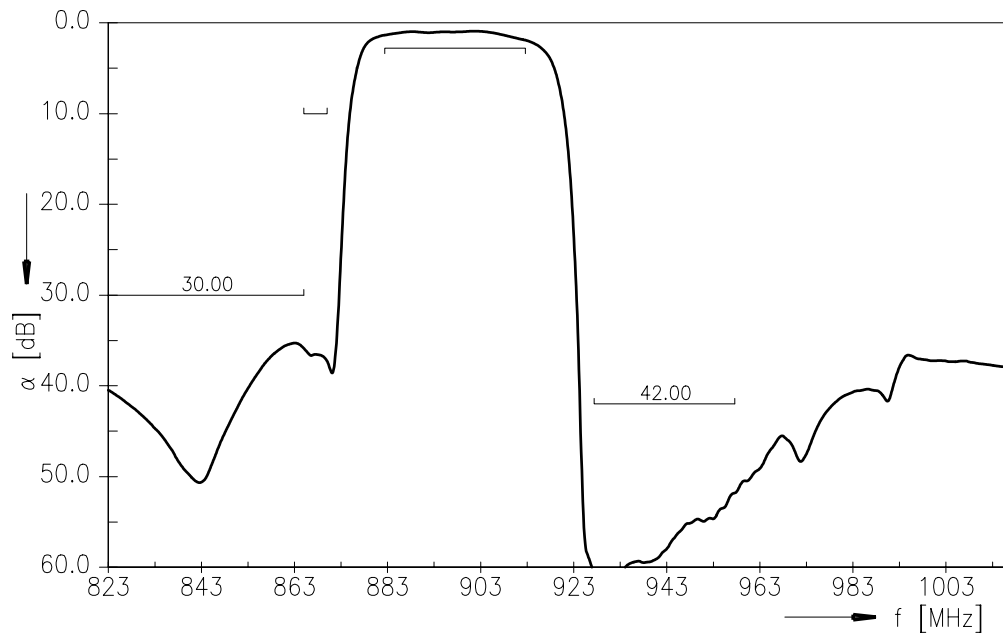
Lp2 = 82.0nH

Ls1 = 1.0nH

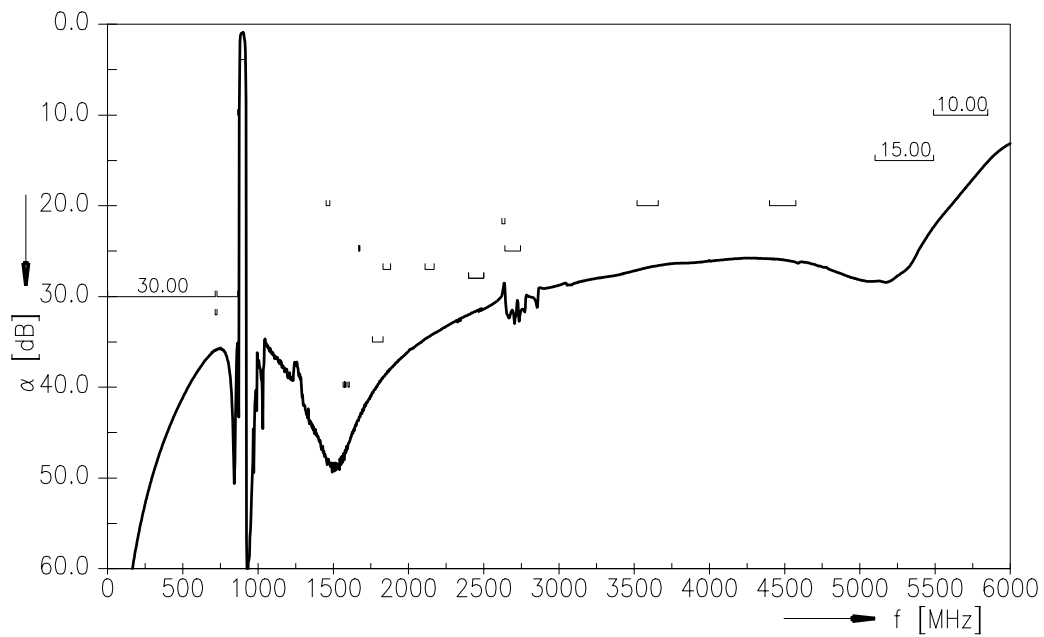
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Frequency Response TX-ANT (Power transfer function)

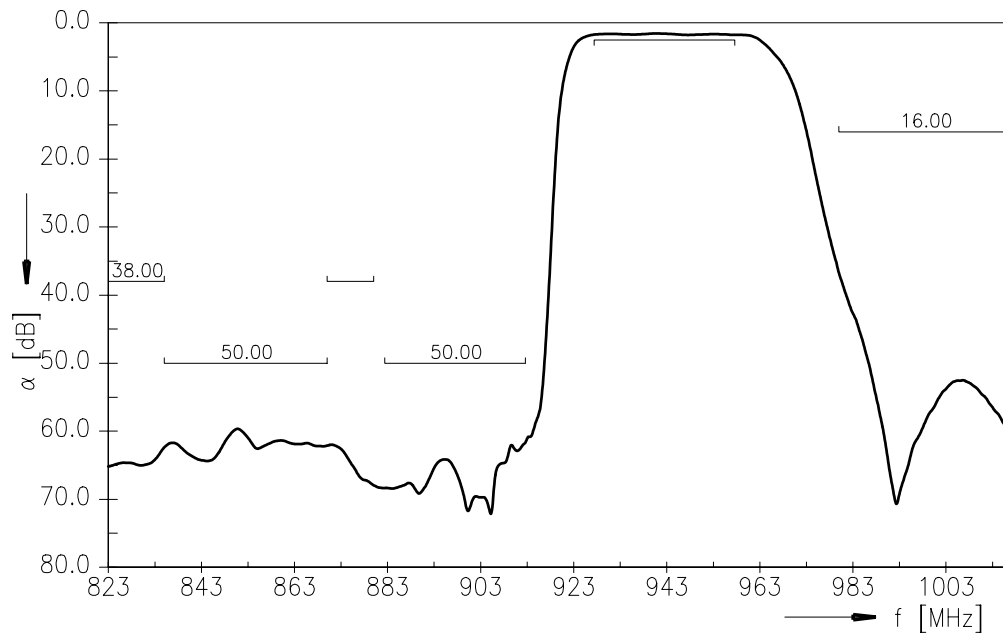


Frequency Response TX-ANT (wideband)

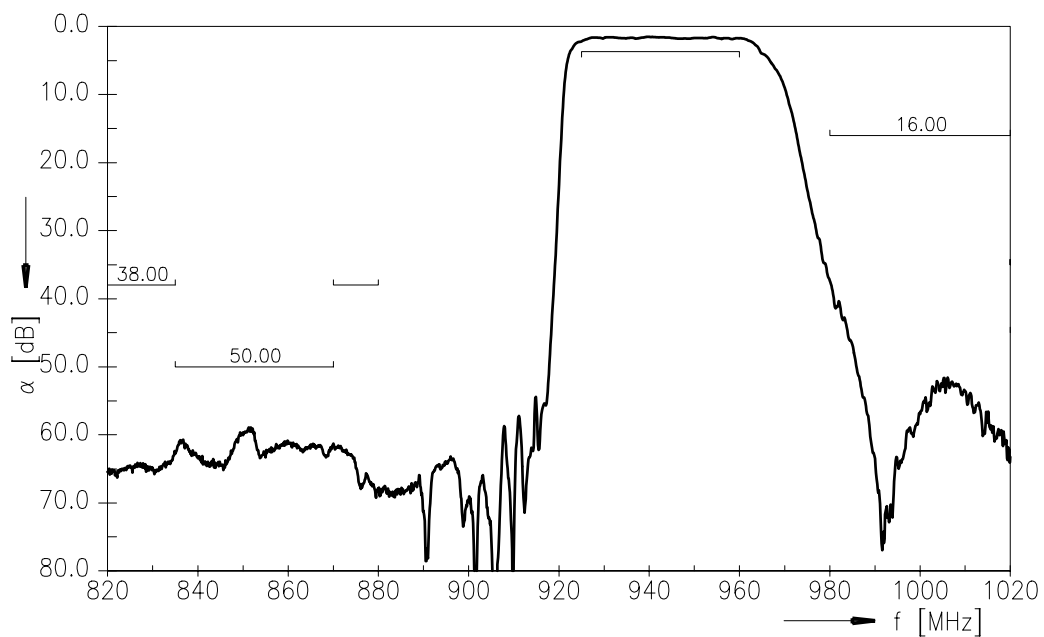




Frequency Response ANT- RX (Power transfer function)

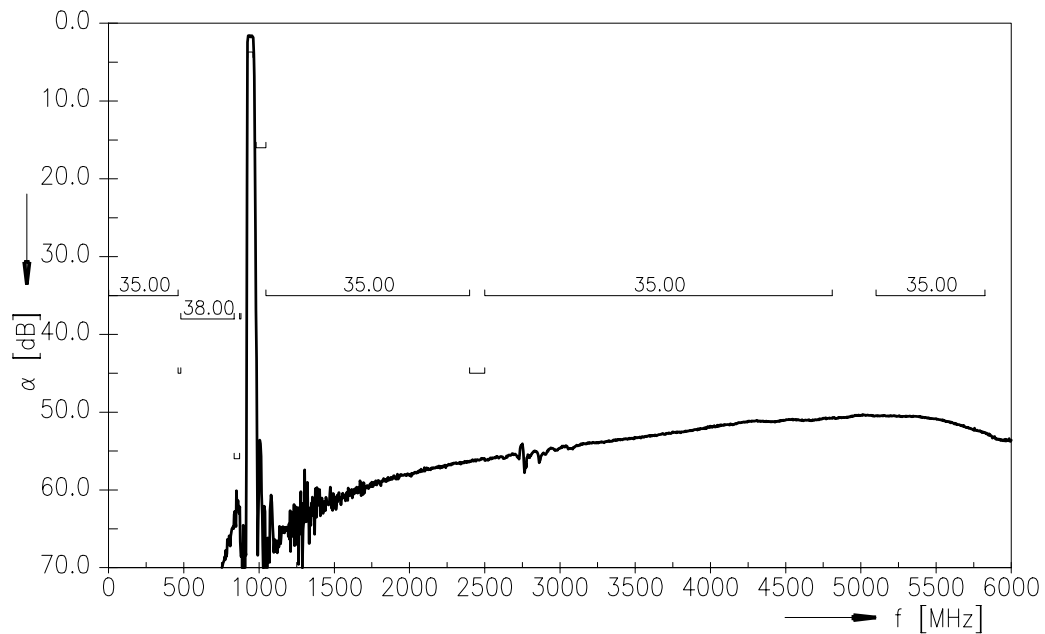


Frequency Response ANT- RX (CW test signal)

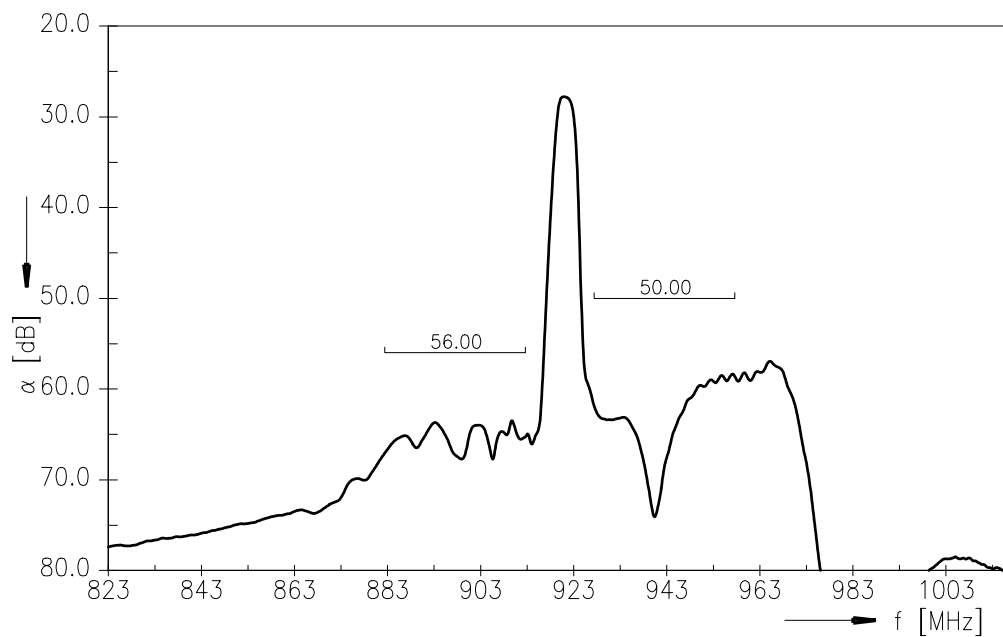




Frequency Response ANT - RX (wideband)

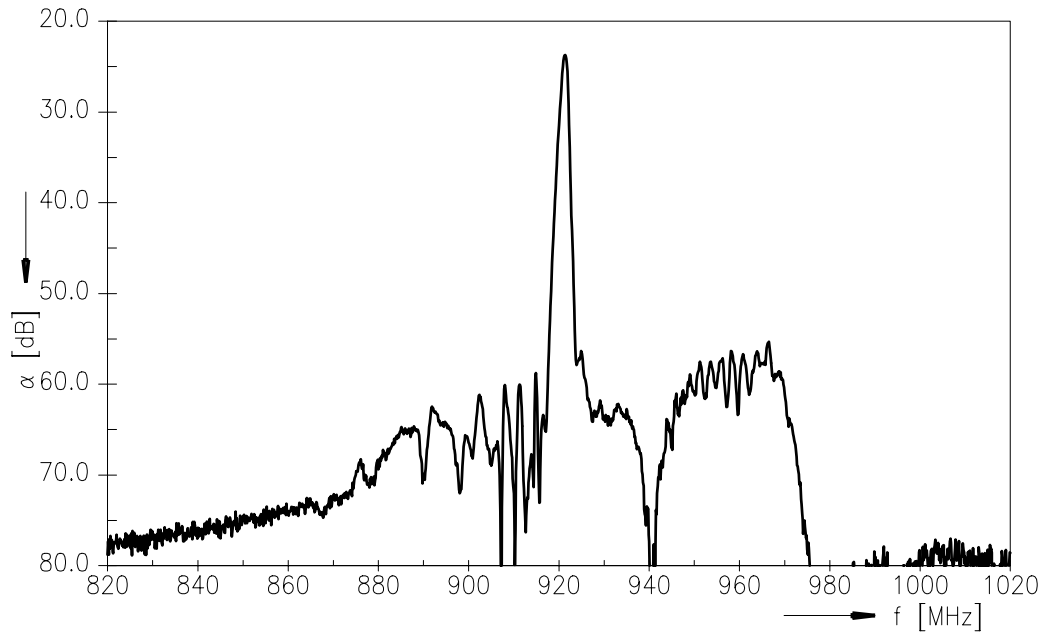


Frequency Response TX - RX (Power transfer function, differential mode)

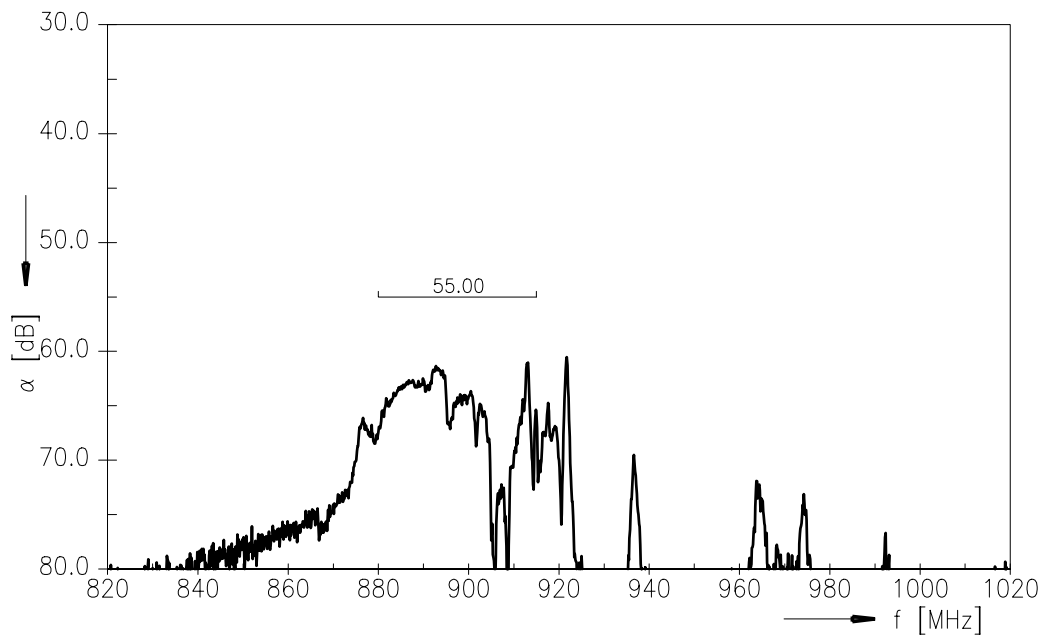




Frequency Response TX-RX (differential, CW signal)



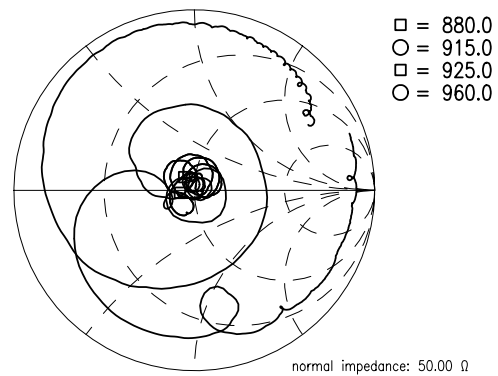
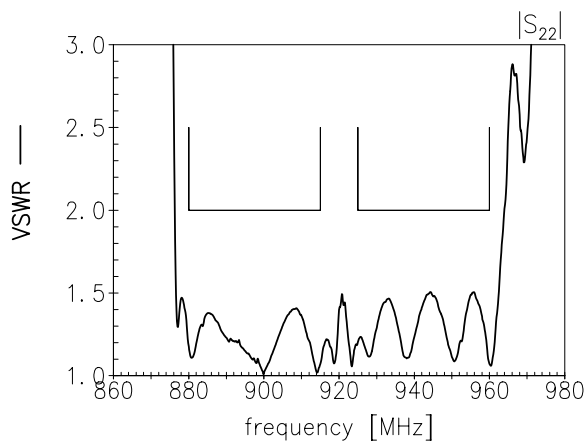
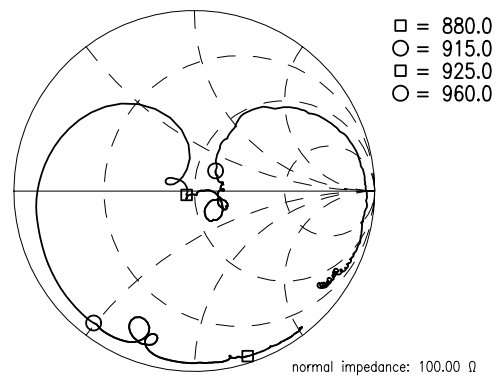
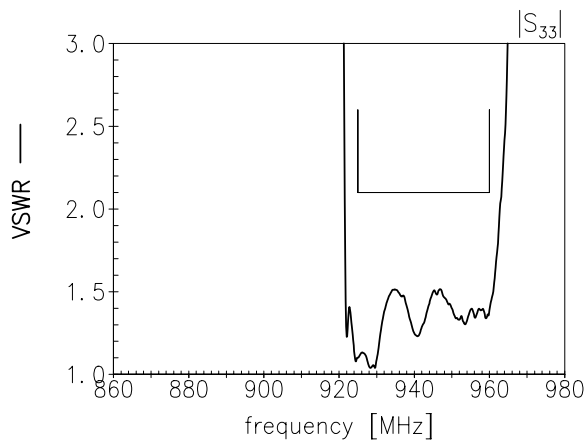
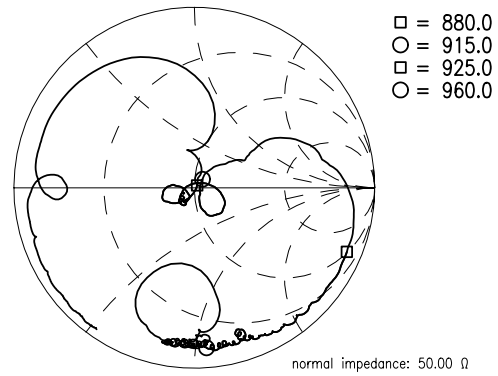
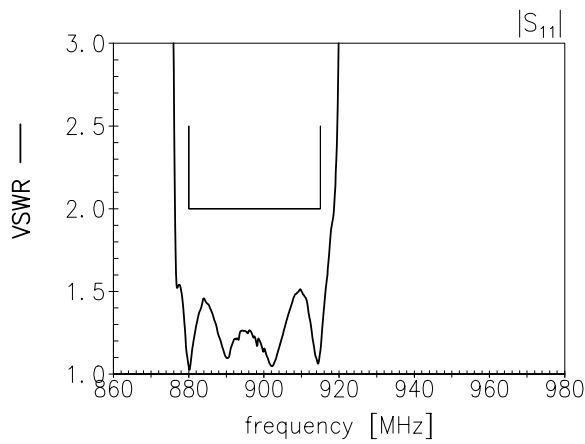
Frequency Response TX - RX (common mode, CW signal)



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Matching (TX, RX, ANT)



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


References

Type	B8516
Ordering code	B39941B8516P810
Marking and package	C61157-A8-A39
Packaging	F61074-V8247-Z000
Date codes	L_1126
S-parameters	B8516_NB_UN.s4p, B8516_WB_UN.s4p see file header for port/pin assignment table
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."
Moldability	Before using in overmolding environment, please contact your EPCOS sales office.
Matching coils	See Inductor pdf-catalog http://www.tdk.co.jp/tefe02/coil.htm#aname1 and Data Library for circuit simulation http://www.tdk.co.jp/etvcl/index.htm

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