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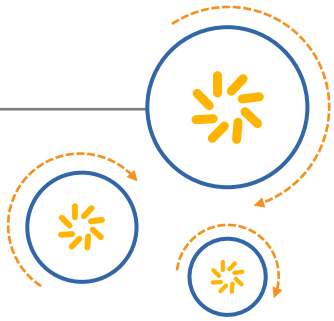

SAW Components

SAW Duplexer

WCDMA Band 4/ CDMA 1x AWS Band

Series/type:	B8524
Ordering code:	B39212B8524P810
Date:	July 12, 2013
Version:	2.0

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SAW Components

SAW Duplexer

WCDMA Band 4/ CDMA 1x AWS Band

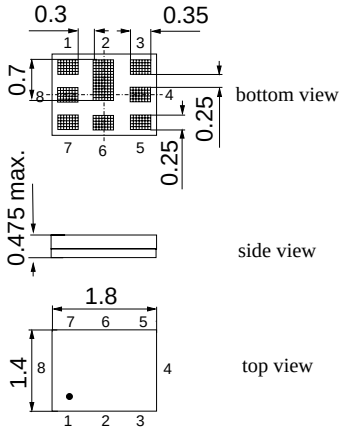
Series/type:	**B8524**
Ordering Code:	**B39212B8524P810**
Date:	July 12, 2013
Version:	2.0

Application

- Low-loss SAW duplexer for mobile telephone WCDMA Band 4 / CDMA 1x AWS systems
- Low insertion attenuation
- Low amplitude ripple
- Usable passband 45 MHz
- Single-ended to balanced transformation in Antenna-Rx path
- Impedance transformation 50Ω to 100Ω in Antenna-Rx path
- High isolation between Tx and Rx

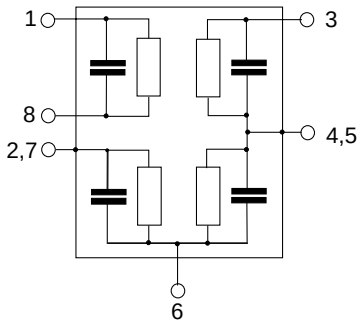
Features

- Package size 1.8 x 1.4 mm², package height 0.475 mm max.
- RoHS compatible
- Approx. weight 0.005g
- Package for **S**urface **M**ount **T**echnology (**SMT**)
- Ni, Au-plated terminals
- Balanced Rx port, unbalanced Tx port
- **E**lectrostatic **S**ensitive **D**evice (**ESD**)
- **M**oisture **S**ensitivity **L**evel 3



Pin configuration

3	Tx input, unbalanced
1,8	Rx output, balanced
6	Antenna
2, 4, 5, 7	To be grounded



Characteristics for W-CDMA Band 4

Temperature range for specification: T = –15 ˚C to +80 ˚C
Antenna terminating impeda-nce: Z_{ANT}= 50 Ω || 2.6nH
RX terminating impedance: Z_{RX} = 100 Ω (balanced) || 18nH
TX terminating impedance: Z_{TX} = 50 Ω

		B8524			
Characteristics TX - Antenna		**min.**	**typ. @ 25 ˚C**	**max.**	
Center frequency	f_C		1732.5		MHz
Maximum insertion attenuation	α				
@$f_{Carrier}$ 1712.4 ... 1752.6 MHz	α_{WCDMA} [1)]		1.1	1.8	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
@$f_{Carrier}$ 1712.4 ... 1752.6 MHz	$\Delta\alpha_{WCDMA}$ [1)]		0.4	0.9	dB
Error vector magnitude	EVM [2)]				
@$f_{Carrier}$ 1712.4 ... 1752.6 MHz			1.0	2.5	%
Input VSWR (TX port)					
1710.0 ... 1755.0 MHz			1.6	1.9	
Output VSWR (ANT port)					
1710.0 ... 1755.0 MHz			1.5	1.9	
Attenuation	α				
1.0 ... 728.0 MHz		30	45		dB
728.0 ... 764.0 MHz		35	45		dB
851.0 ... 894.0 MHz		35	42		dB
1310.0 ... 1355.0 MHz		24	38		dB
1565.42 ... 1573.374MHz		40	48		dB
1573.374 ... 1577.466MHz		45	50		dB
1577.466 ... 1585.42 MHz		40	51		dB
1597.5515... 1605.886MHz		40	47		dB
1805.0 ... 1880.0 MHz		20	46		dB
1930.0 ... 1990.0 MHz		40	46		dB
@$f_{Carrier}$ 2112.4 ... 2152.6 MHz	α_{WCDMA} [1)]	42	46		dB
2400.0 ... 2500.0 MHz		30	39		dB
2565.0 ... 2677.0 MHz		5	35		dB
3410.0 ... 3510.0 MHz		25	31		dB
5000.0 ... 5120.0 MHz		10	20		dB
5120.0 ... 5350.0 MHz		12	20		dB
5350.0 ... 5725.0 MHz		10	26		dB
5725.0 ... 5850.0 MHz		18	25		dB
5850.0 ... 6000.0 MHz		10	25		dB

[1)] Attenuation of WCDMA signal (“Powertransferfunction”). Please refer to annotation on page (10).
[2)] Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.

Characteristics for W-CDMA Band 4

Temperature range for specification: T = –15 ˚C to +80 ˚C
Antenna terminating impedance: Z_{ANT} = 50 Ω || 2.6nH
RX terminating impedance: Z_{RX} = 100 Ω (balanced) || 18nH
TX terminating impedance: Z_{TX} = 50 Ω

		B8524			
Characteristics Antenna - Rx		**min.**	**typ. @ 25 ˚C**	**max.**	
Center frequency	f_C		2132.5		MHz
Maximum insertion attenuation	α				
@$f_{Carrier}$ 2112.4 ... 2152.6 MHz	α_{WCDMA} [1]		1.6	2.3	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
@$f_{Carrier}$ 2112.4 ... 2152.6 MHz	$\Delta\alpha_{WCDMA}$ [1]		0.4	1.0	dB
Error vector magnitude	EVM [2]				
@$f_{Carrier}$ 2112.4 ... 2152.6 MHz			1.1	2.5	%
Input VSWR (RX port)					
2110.0 ... 2155.0 MHz			1.5	2.0	
Output VSWR (ANT port)					
2110.0 ... 2155.0 MHz			1.7	2.0	
CMRR ($\|S_{32}-S_{42}\|/\|S_{32}+S_{42}\|$)					
2110.0 ... 2155.0 MHz		20 [3]	29		dB

[1] Attenuation of WCDMA signal (“Powertransferfunction”). Please refer to annotation on page (10).
[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.

Characteristics for W-CDMA Band 4

Temperature range for specification: T = –15 ˚C to +80 ˚C
Antenna terminating impedance: Z_{ANT}= 50 Ω || 2.6nH
RX terminating impedance: Z_{RX} = 100 Ω (balanced) || 18nH
TX terminating impedance: Z_{TX} = 50 Ω

					B8524			
Characteristics Antenna - Rx					**min.**	**typ. @ 25 ˚C**	**max.**	
Attenuation				α				
1.0	...	400.0	MHz		57	> 70		dB
400.0	...	1310.0	MHz		40	67		dB
1310.0	...	1355.0	MHz		43	65		dB
1355.0	...	1710.0	MHz		35	49		dB
@$f_{Carrier}$ 1712.4	...	1752.6	MHz	α_{WCDMA} [1)]	45	60		dB
1755.0	...	1910.0	MHz		15	53		dB
1910.0	...	1955.0	MHz		35	58		dB
1955.0	...	2025.0	MHz		15	37		dB
2240.0	...	2300.0	MHz		15	36		dB
2300.0	...	2400.0	MHz		30	46		dB
2400.0	...	2496.0	MHz		40	47		dB
2496.0	...	2690.0	MHz		40	52		dB
2690.0	...	3300.0	MHz		35	45		dB
3300.0	...	3800.0	MHz		45	51		dB
3820.0	...	3910.0	MHz		40	50		dB
3910.0	...	4220.0	MHz		35	50		dB
4220.0	...	4310.0	MHz		40	49		dB
4310.0	...	5150.0	MHz		35	47		dB
5150.0	...	5850.0	MHz		37	46		dB
5850.0	...	6000.0	MHz		35	42		dB

[1)] Attenuation of WCDMA signal (“Powertransferfunction”). Please refer to annotation on page (10).

Characteristics for W-CDMA Band 4

Temperature range for specification: T = –15 ˚C to +80 ˚C
Antenna terminating impedance: Z_{ANT} = 50 Ω || 2.6nH
RX terminating impedance: Z_{RX} = 100 Ω (balanced) || 18nH
TX terminating impedance: Z_{TX} = 50 Ω

Characteristics Tx - Rx				B8524 min.	B8524 typ. @ 25 ˚C	B8524 max.	
Differential Mode Isolation			α				
1574.0	... 1577.0	MHz		40	68		dB
@$f_{Carrier}$ 1712.4	... 1752.6	MHz	α_{WCDMA} [1)]	55	59		dB
@$f_{Carrier}$ 2112.4	... 2152.6	MHz	α_{WCDMA} [1)]	50	57		dB
3410.0	... 3520.0	MHz		20	60		dB
5120.0	... 5275.0	MHz		20	55		dB
Common Mode Isolation			α				
@$f_{Carrier}$ 1712.4	... 1752.6	MHz	α_{WCDMA} [1)]	46	51		dB

1) Attenuation of WCDMA signal (“Powertransferfunction”). Please refer to annotation on page (10).

Characteristics for CDMA 1x AWS Band

Temperature range for specification: T = –30 ˚C to +85 ˚C
Antenna terminating impedance: Z_{ANT}= 50 Ω || 2.6nH
RX terminating impedance: Z_{RX} = 100 Ω (balanced) || 18nH
TX terminating impedance: Z_{TX} = 50 Ω

		B8524			
Characteristics TX - Antenna		**min.**	**typ. @ 25 ˚C**	**max.**	
Center frequency	f_C		1732.5		MHz
Maximum insertion attenuation	α				
1710.0 ... 1755.0 MHz			1.3	2.0	dB
Amplitude ripple (p-p)	Δα				
1710.0 ... 1755.0 MHz			0.5	1.2	dB
Input VSWR (TX port)					
1710.0 ... 1755.0 MHz			1.6	1.9	
Output VSWR (ANT port)					
1710.0 ... 1755.0 MHz			1.5	1.9	
Attenuation	α				
1.0 ... 728.0 MHz		30	45		dB
728.0 ... 764.0 MHz		35	45		dB
851.0 ... 894.0 MHz		35	42		dB
1310.0 ... 1355.0 MHz		24	38		dB
1565.42 ... 1573.374MHz		40	48		dB
1573.374 ... 1577.466MHz		45	50		dB
1577.466 ... 1585.42 MHz		40	51		dB
1597.5515... 1605.886MHz		40	47		dB
1805.0 ... 1880.0 MHz		20	46		dB
1930.0 ... 1990.0 MHz		40	46		dB
2110.0 ... 2155.0 MHz		42	46		dB
2400.0 ... 2500.0 MHz		30	39		dB
2565.0 ... 2677.0 MHz		5	35		dB
3410.0 ... 3510.0 MHz		25	31		dB
5000.0 ... 5120.0 MHz		10	20		dB
5120.0 ... 5350.0 MHz		12	20		dB
5350.0 ... 5725.0 MHz		10	26		dB
5725.0 ... 5850.0 MHz		18	25		dB
5850.0 ... 6000.0 MHz		10	25		dB

Characteristics for CDMA 1x AWS Band

Temperature range for specification: T = –30 ˚C to +85 ˚C
Antenna terminating impedance: Z_{ANT}= 50 Ω || 2.6nH
RX terminating impedance: Z_{RX} = 100 Ω (balanced) || 18nH
TX terminating impedance: Z_{TX} = 50 Ω

		B8524			
Characteristics Antenna - Rx		**min.**	**typ. @ 25 ˚C**	**max.**	
Center frequency	f_C		2132.5		MHz
Maximum insertion attenuation	α				
2110.0 ... 2155.0 MHz			1.7	2.3	dB
Amplitude ripple (p-p)	Δα				
2110.0 ... 2155.0 MHz			0.4	1.0	dB
Input VSWR (RX port)					
2110.0 ... 2155.0 MHz			1.5	2.0	
Output VSWR (ANT port)					
2110.0 ... 2155.0 MHz			1.7	2.0	
CMRR ($\|S_{32}-S_{42}\|/\|S_{32}+S_{42}\|$)					
2110.0 ... 2155.0 MHz		20[1)]	29		dB
Attenuation	α				
1.0 ... 400.0 MHz		57	> 70		dB
400.0 ... 1310.0 MHz		40	67		dB
1310.0 ... 1355.0 MHz		43	65		dB
1355.0 ... 1710.0 MHz		35	49		dB
1710.0 ... 1755.0 MHz		45	60		dB
1755.0 ... 1910.0 MHz		15	53		dB
1910.0 ... 1955.0 MHz		35	58		dB
1955.0 ... 2025.0 MHz		15	37		dB
2240.0 ... 2300.0 MHz		15	36		dB
2300.0 ... 2400.0 MHz		30	46		dB
2400.0 ... 2496.0 MHz		40	47		dB
2496.0 ... 2690.0 MHz		40	52		dB
2690.0 ... 3300.0 MHz		35	45		dB
3300.0 ... 3800.0 MHz		45	51		dB
3820.0 ... 3910.0 MHz		40	50		dB
3910.0 ... 4220.0 MHz		35	50		dB
4220.0 ... 4310.0 MHz		40	49		dB
4310.0 ... 5150.0 MHz		35	47		dB
5150.0 ... 5850.0 MHz		37	46		dB
5850.0 ... 6475.0 MHz		35	42		dB

1) A combination of 10 ˚ phase balance and 1 dB amplitude balance corresponds to 19.6 dB CMRR.

Characteristics for CDMA 1x AWS Band

Temperature range for specification: T = –30 ˚C to +85 ˚C
Antenna terminating impedance: Z_{ANT}= 50 Ω || 2.6nH
RX terminating impedance: Z_{RX} = 100 Ω (balanced) || 18nH
TX terminating impedance: Z_{TX} = 50 Ω

	B8524			
Characteristics Tx - Rx	**min.**	**typ. @ 25 ˚C**	**max.**	
Differential Mode Isolation α				
1574.0 ... 1577.0 MHz	40	68		dB
1710.0 ... 1755.0 MHz	55	58		dB
2110.0 ... 2155.0 MHz	50	56		dB
3410.0 ... 3520.0 MHz	20	60		dB
5120.0 ... 5275.0 MHz	20	55		dB
Common Mode Isolation α				
1710.0 ... 1755.0 MHz	46	51		dB

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 882.4 MHz (lowest Tx channel) to 912.6 MHz (highest Tx 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:

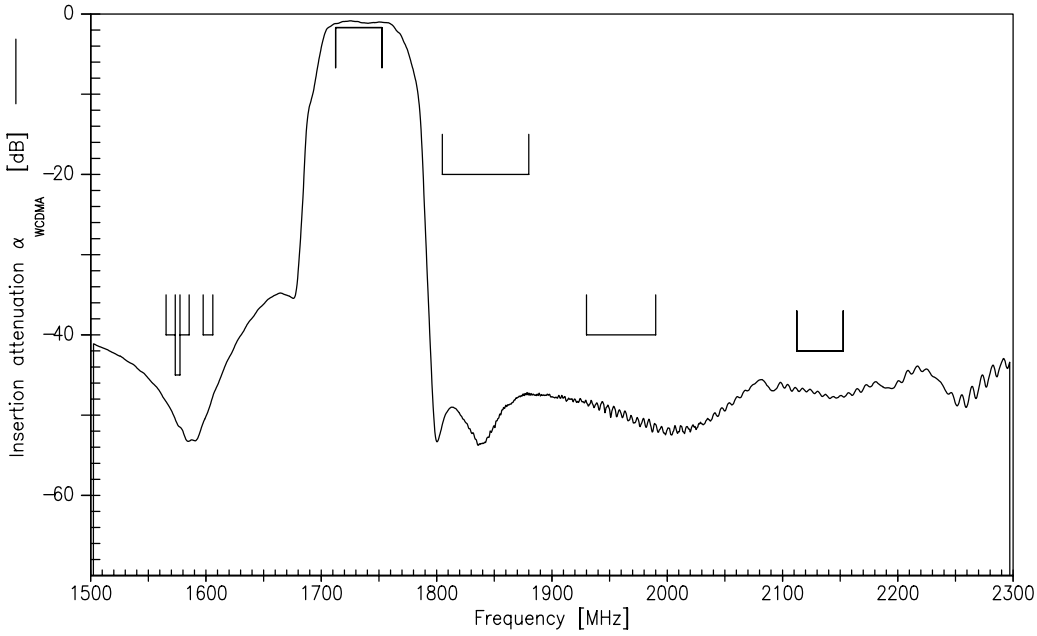
$$\int_{\infty}^{\infty} |H_{RRC}(f)|^2 df = 1$$

Maximum Ratings

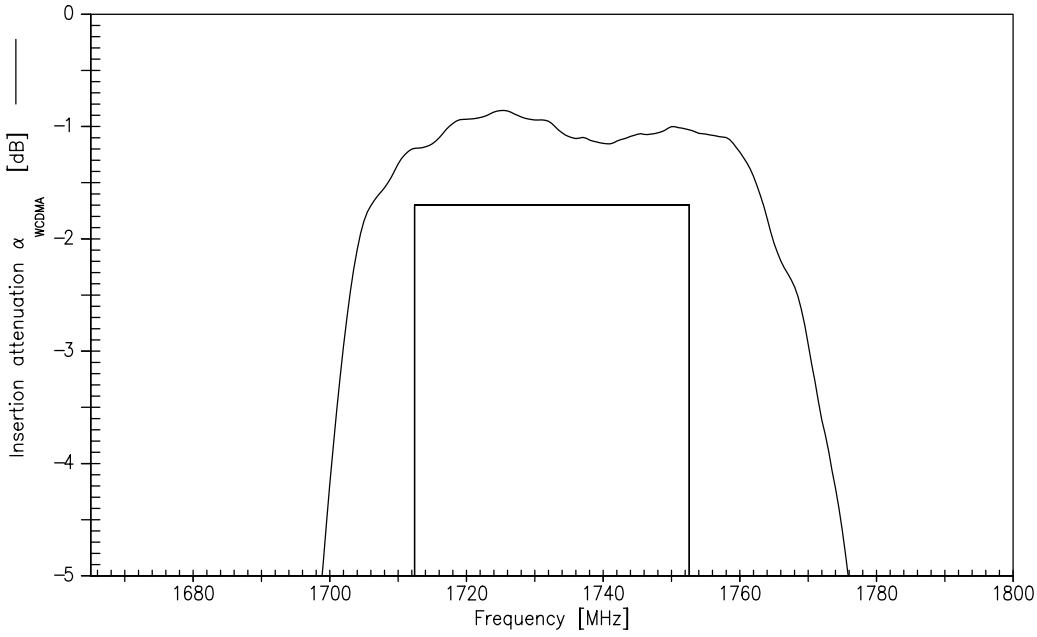
Storage temperature range	T_{stg}	–40/+85	˚C	
DC voltage	V_{DC}	5[1)]	V	
ESD voltage	V_{ESD}	50[2)]	V	machine model, 10 pulses
Input power at	P_{IN}			source and load impedance 50 Ω
1710.0 ... 1755.0 MHz		29	dBm	} continuous wave 50˚C, 5.000 h
elsewhere		10	dBm	

1) 168h Damp Heat Steady State according to IEC 60068-2-67Cy
2) acc. to JESD22-A115A (machine model), 10 negative & 10 positive pulses.

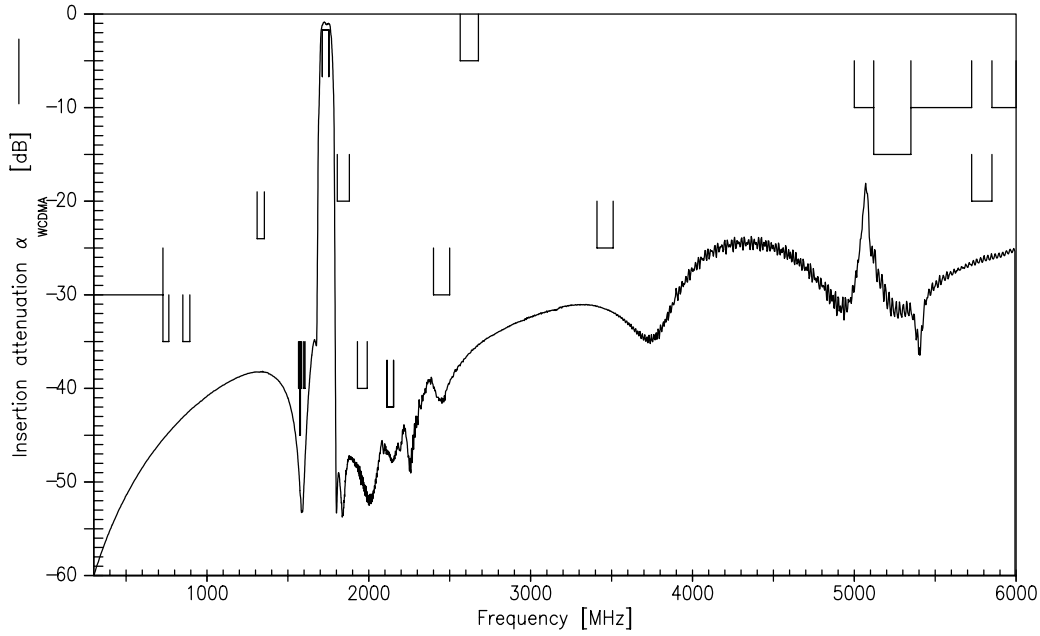
Power Transfer Function Tx-Ant:



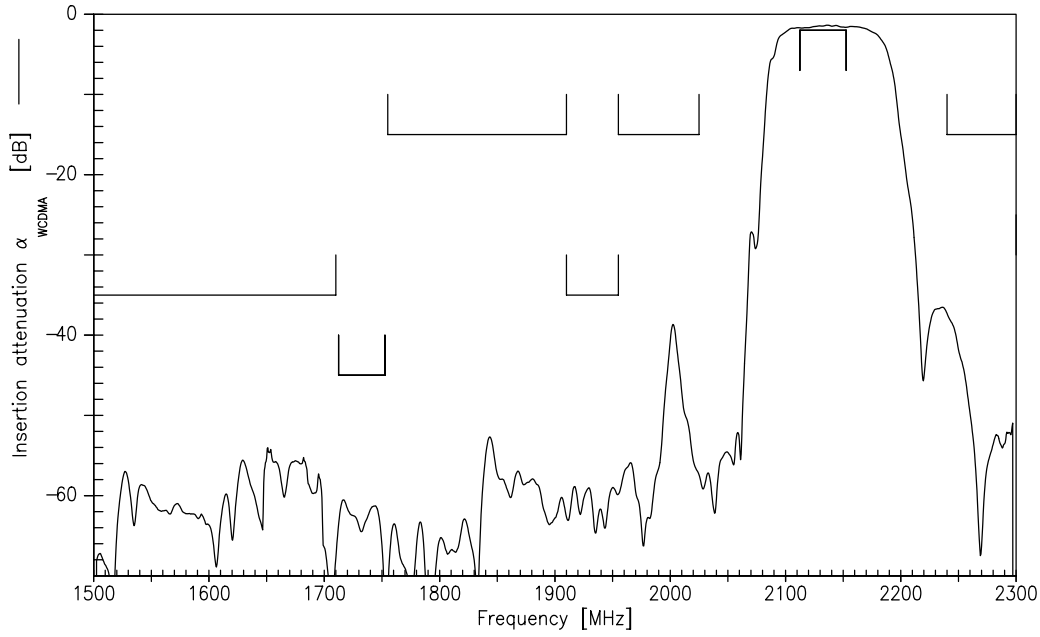
Power Transfer Function Tx-Ant (Passband):



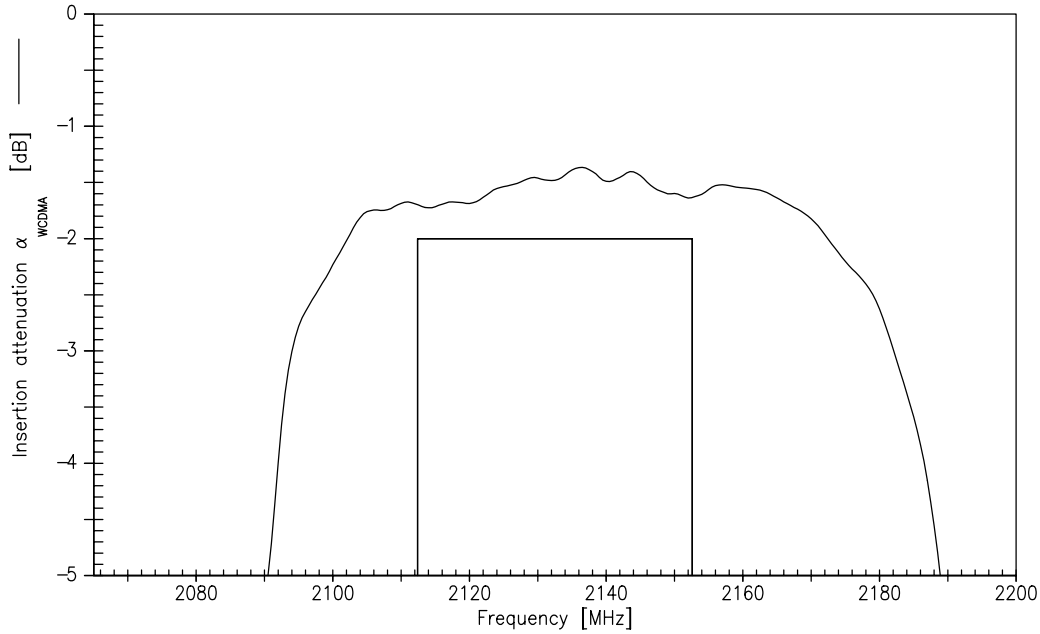
Power Transfer Function Tx-Ant (Wideband):



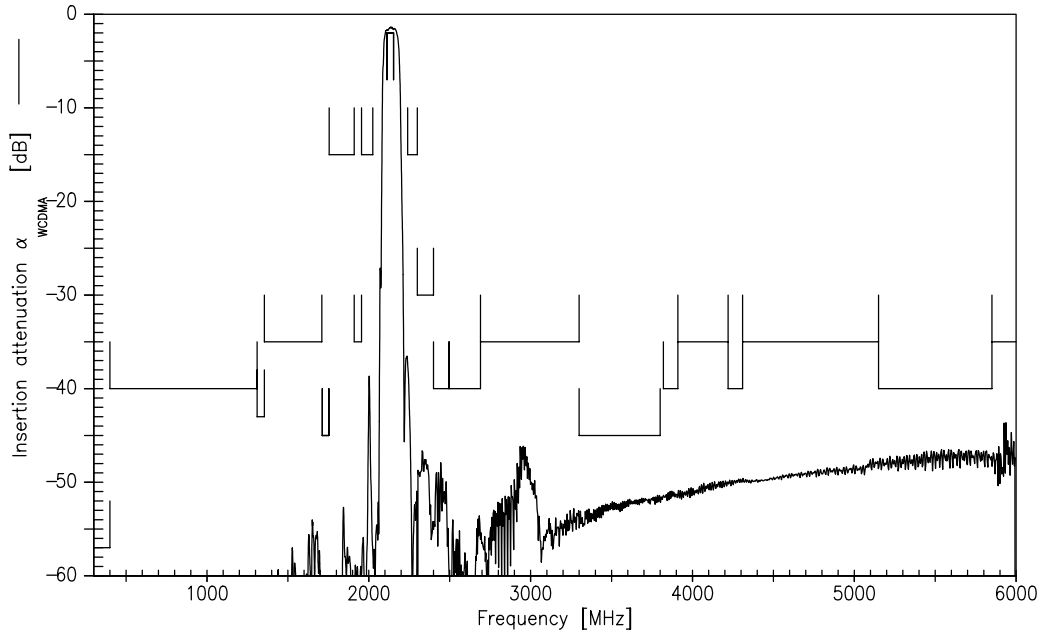
Power Transfer Function Ant-Rx:



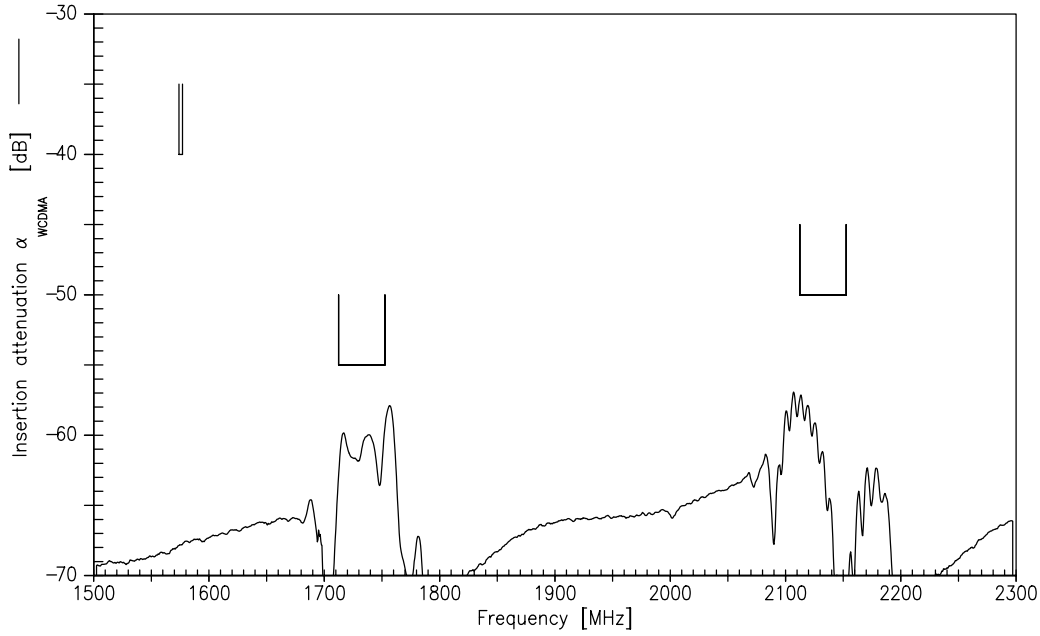
Power Transfer Function Ant-Rx (Passband):



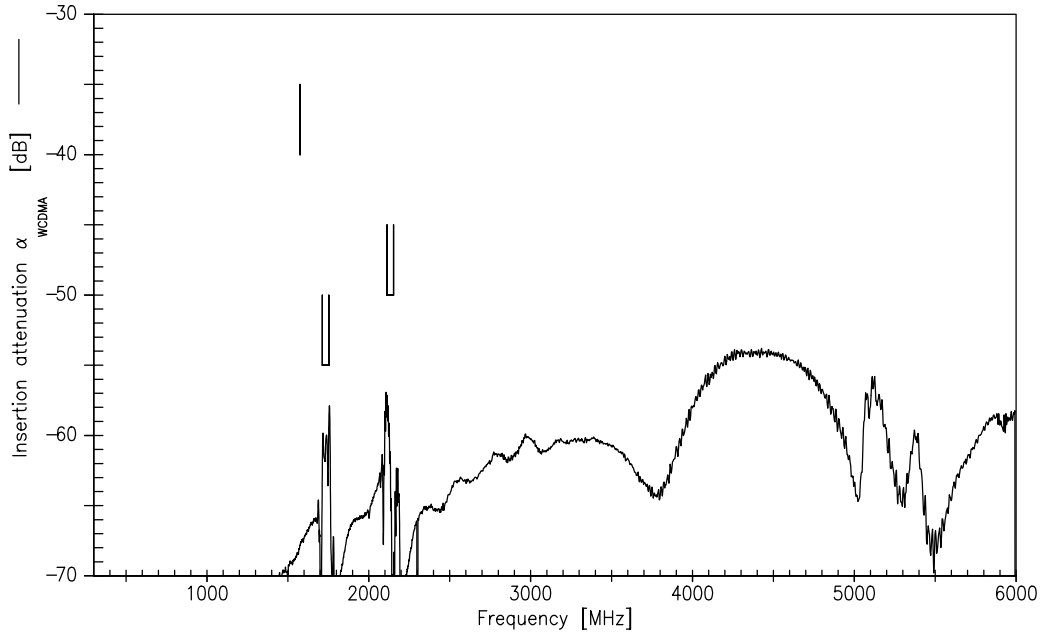
Power Transfer Function Ant-Rx (Wideband):



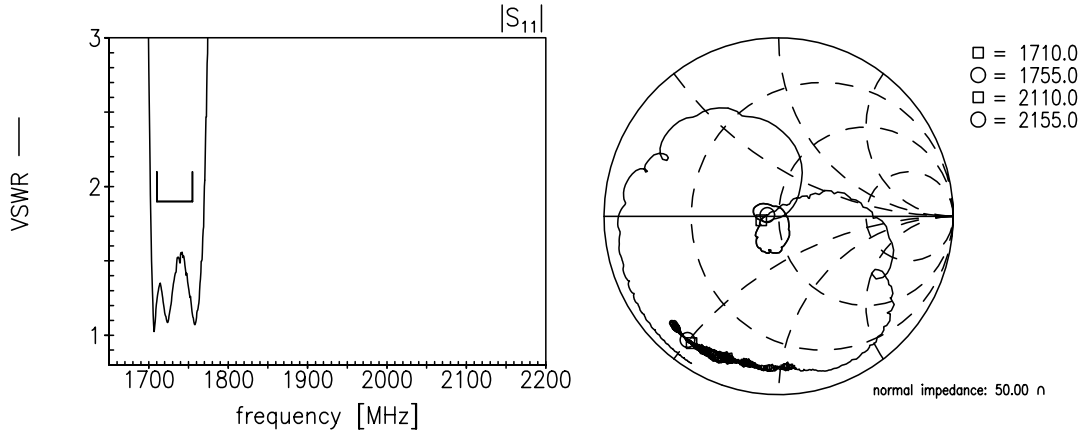
Power Transfer Function Tx-Rx isolation:

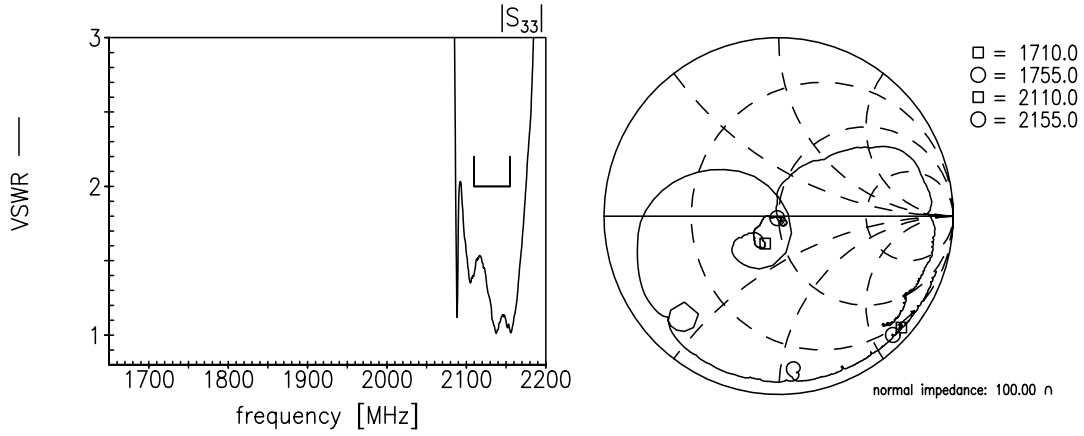


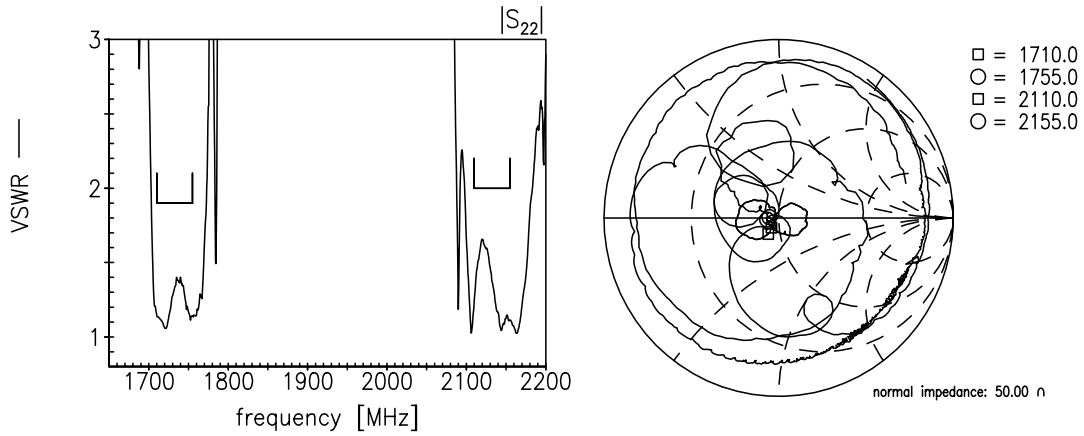
Power Transfer Function Tx-Rx isolation (Wideband):



VSWRs at Tx, Rx and Ant:







References

Type	B8524
Ordering code	B39212B8524P810
Marking and package	C61157-A8-A72-1-27
Packaging	F61074-V8259-Z000-2-27
Date codes	L_1126
S-parameters	B8524_NB_UN.s4p, B8524_WB_UN.s4p See file header for pin/port assignement.
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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