



RF360
Europe GmbH

SAW Components

SAW Duplexer

WCDMA Band 4/ CDMA 1x AWS Band / LTE Band 4

Series/type: B8524
Ordering code: B39212B8524P810

Date: April 29, 2015
Version: 2.1

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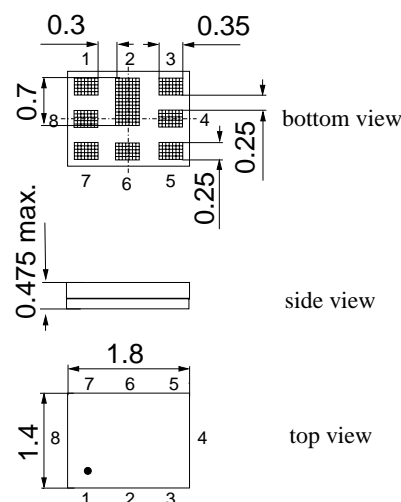
EPCOS AG is a TDK Group Company.


Application

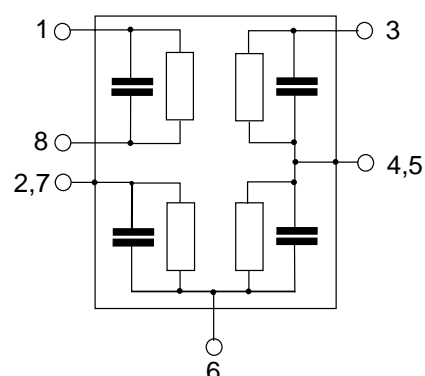
- Low-loss SAW duplexer for mobile telephone WCDMA Band 4 / CDMA 1x AWS systems
- Low insertion attenuation
- Low amplitude ripple
- Usable passband 45 MHz
- Single-ended to balanced transformation in Antenna-Rx path
- Impedance transformation 50Ω to 100Ω in Antenna-Rx path
- High isolation between Tx 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 **Surface Mount Technology (SMT)**
- Ni, Au-plated terminals
- Balanced Rx port, unbalanced Tx port
- **Electrostatic Sensitive Device (ESD)**
- **Moisture Sensitivity Level 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 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 - Antenna		B8524		
		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)	Δα			
@f _{Carrier} 1712.4 ... 1752.6 MHz	Δα _{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

Characteristics Antenna - Rx		B8524		
		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)	Δα			
@f _{Carrier} 2112.4 ... 2152.6 MHz	Δα _{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 (S₃₂-S₄₂ / S₃₂+S₄₂)				
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

Characteristics Antenna - Rx				B8524		
				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	$\alpha_{\text{WCDMA}}^{1)}$	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.	typ. @ 25 °C	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 / LTE Band 4

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

Characteristics TX - Antenna		B8524		
		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 / LTE Band 4

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

Characteristics Antenna - Rx		B8524		
		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 (S₃₂-S₄₂ / S₃₂+S₄₂)				
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 / LTE Band 4


Characteristics for CDMA 1x AWS Band / LTE Band 4

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

Characteristics Tx - Rx	B8524			
	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

$$\int_{-\infty}^{\infty} |S_{\text{ds21}}(f)H_{\text{RRC}}(f - f_{\text{Carrier}})|^2 df$$

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)). $H_{\text{RRC}}(f)$ is the transfer function of the root-raised cosine transmit pulse shaping filter according to 3GPP TS 25.101 with the following normalization:

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


Maximum Ratings

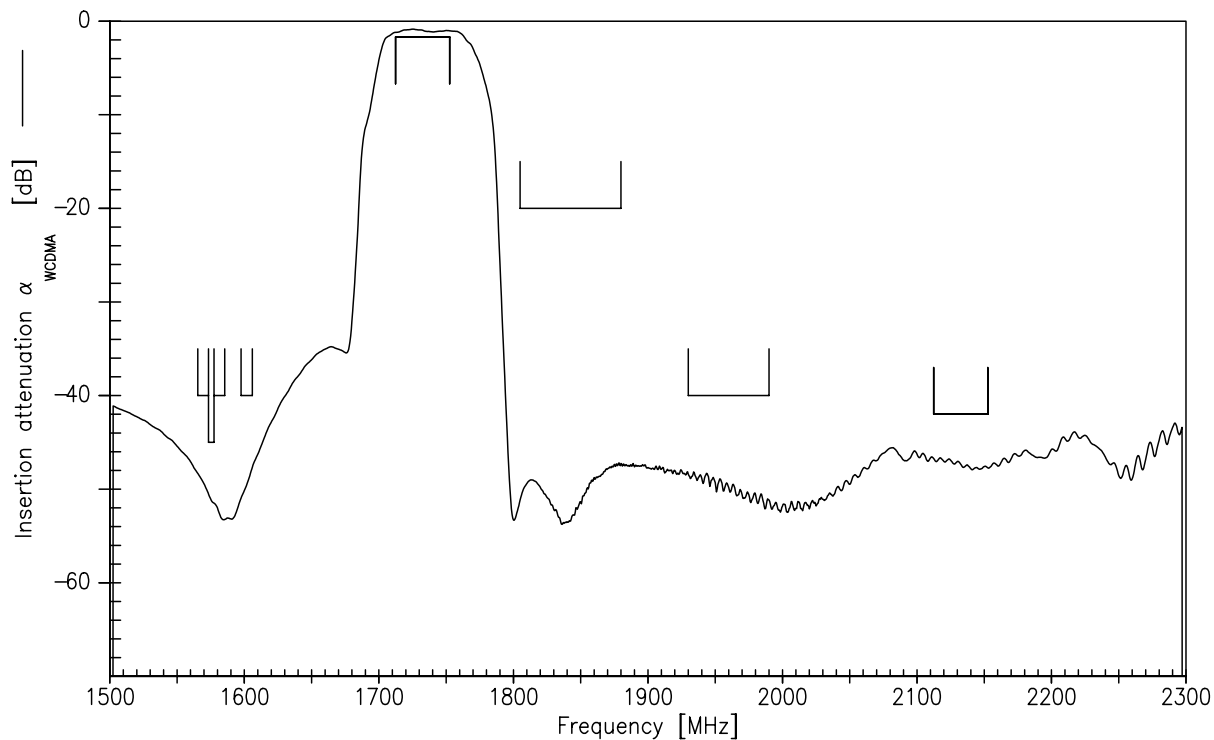
Storage temperature range	T_{stg}	-40/+85	°C	machine model, 10 pulses source and load impedance 50 Ω } continuous wave 50°C, 5.000 h
DC voltage	V_{DC}	5 ¹⁾	V	
ESD voltage	V_{ESD}	50 ²⁾	V	
Input power at 1710.0 ... 1755.0 MHz	P_{IN}	29	dBm	
elsewhere		10	dBm	

1) 168h Damp Heat Steady State according to IEC 60068-2-67Cy

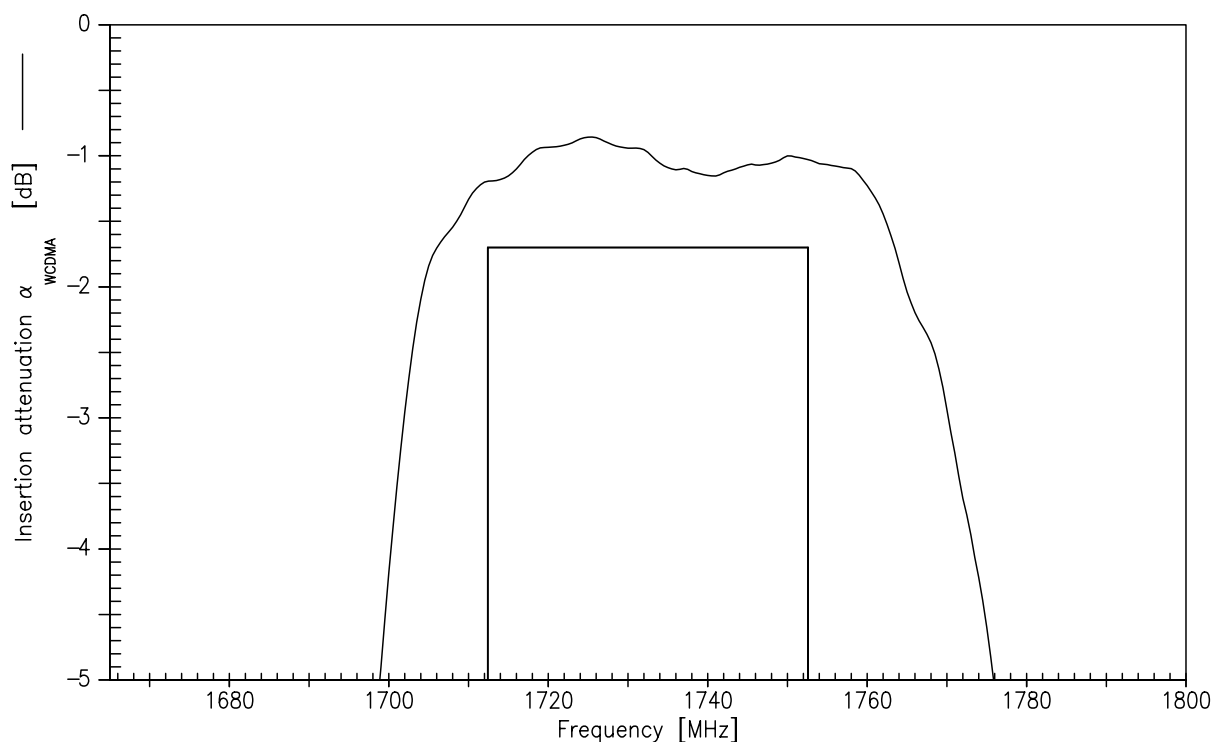
2) acc. to JESD22-A115A (machine model), 10 negative & 10 positive pulses.



Power Transfer Function Tx-Ant:

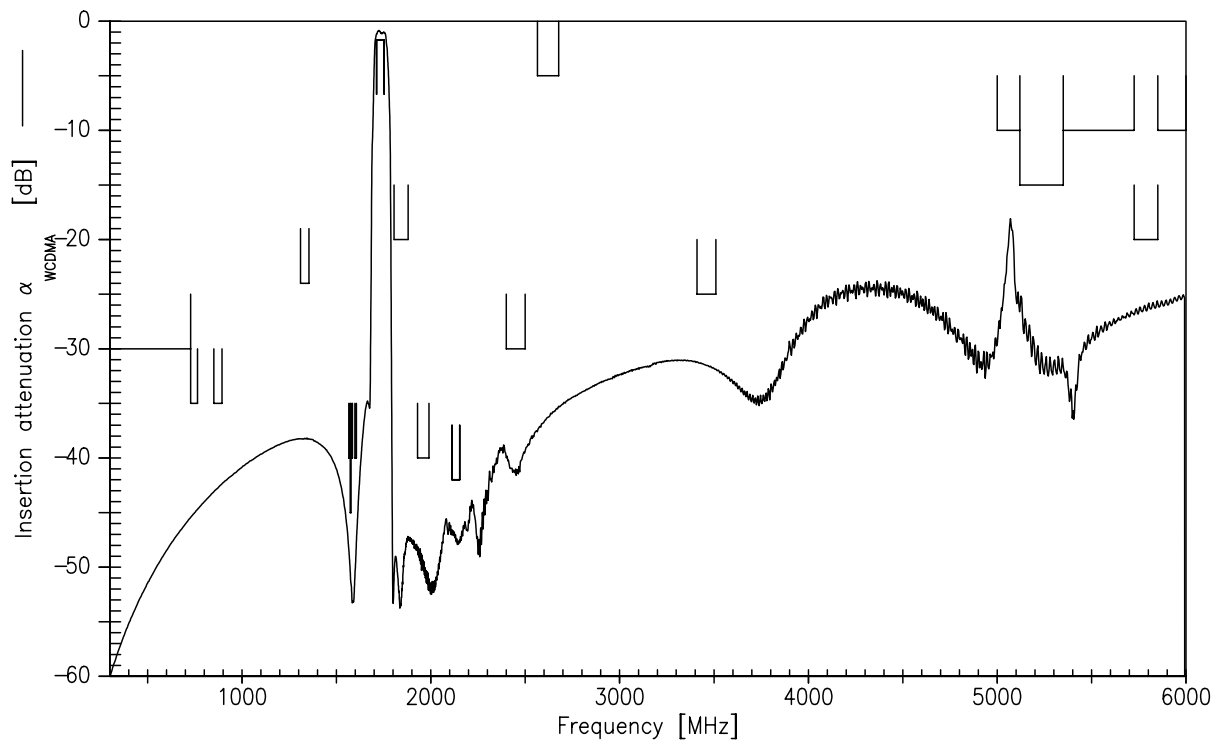


Power Transfer Function Tx-Ant (Passband):

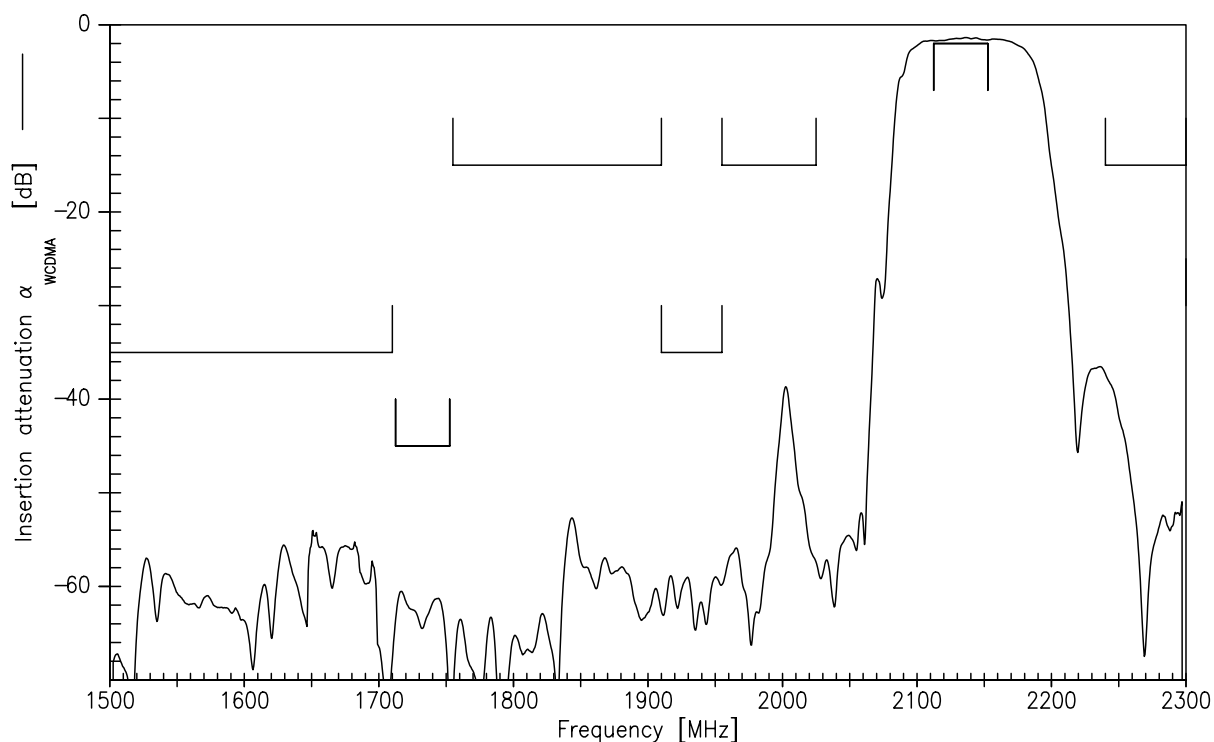




Power Transfer Function Tx-Ant (Wideband):

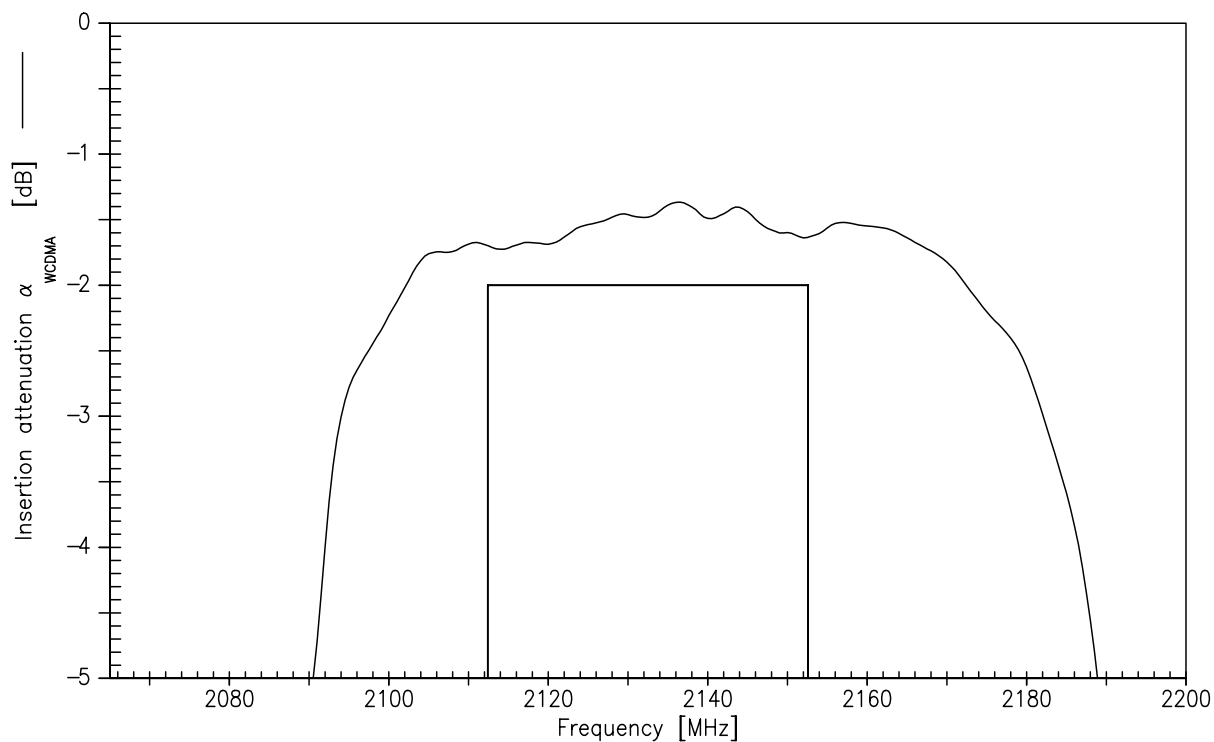


Power Transfer Function Ant-Rx:

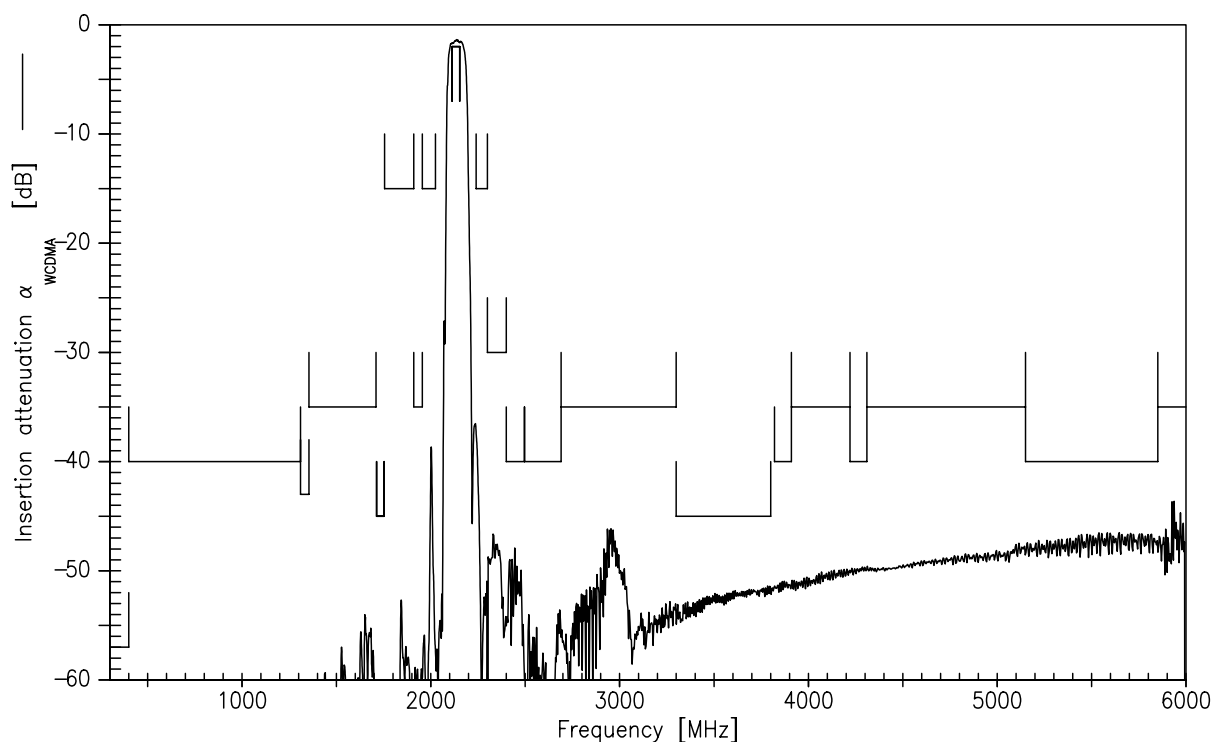




Power Transfer Function Ant-Rx (Passband):

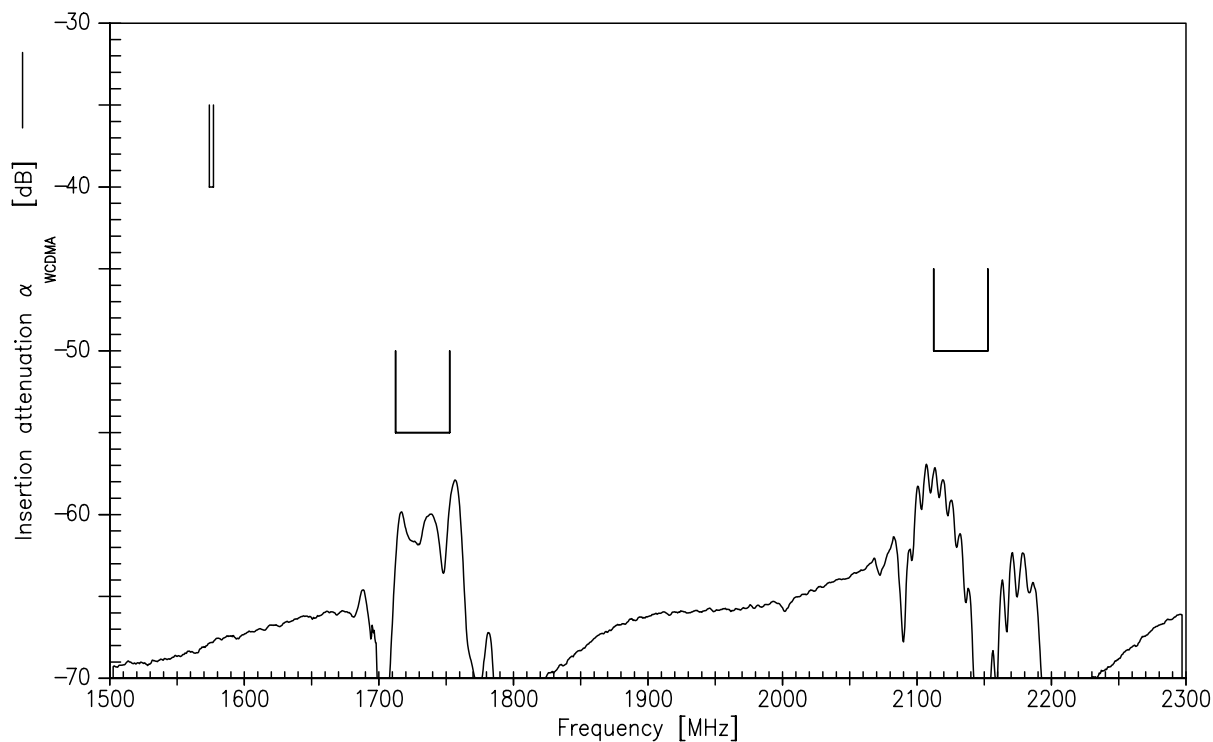


Power Transfer Function Ant-Rx (Wideband):

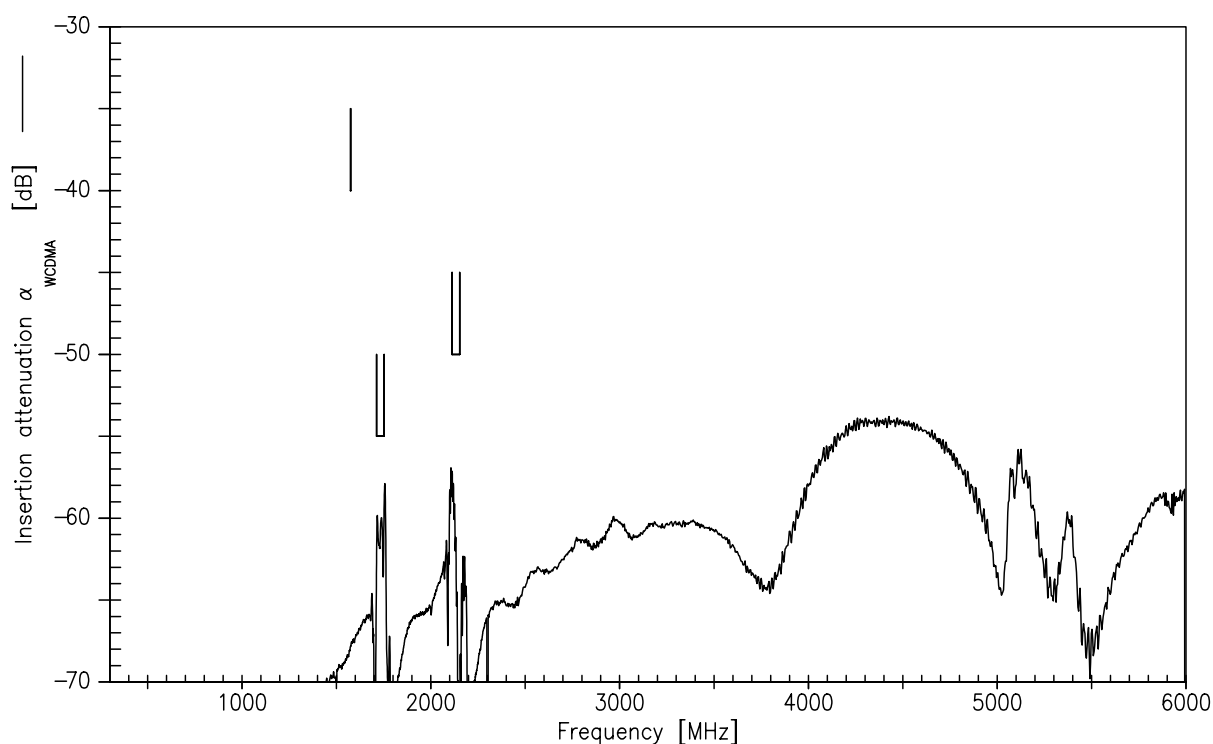




Power Transfer Function Tx-Rx isolation:

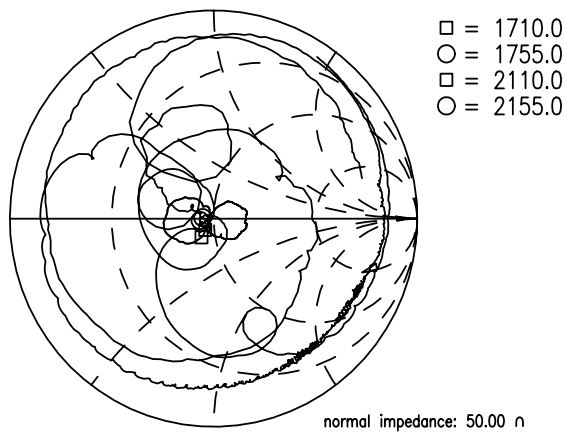
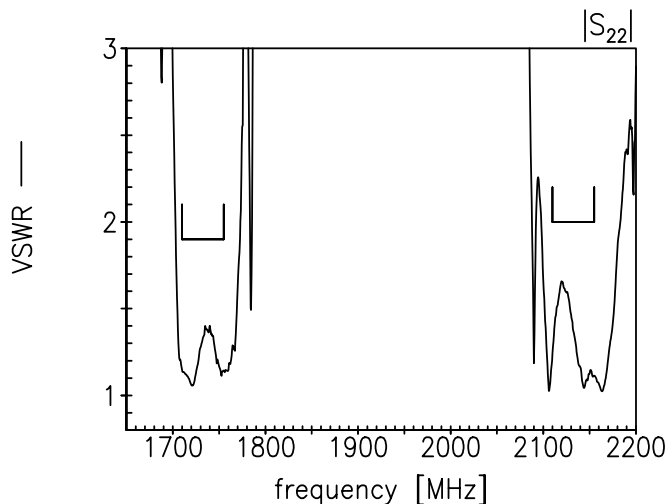
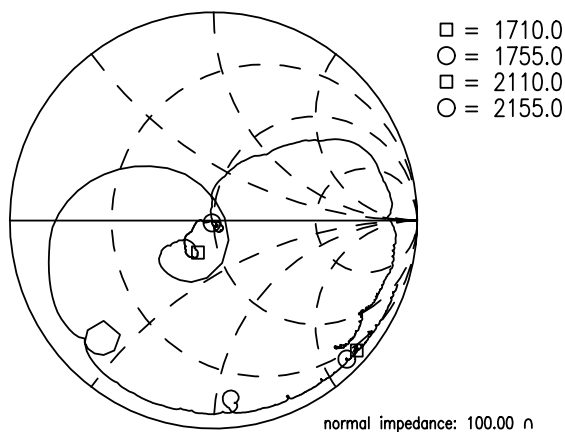
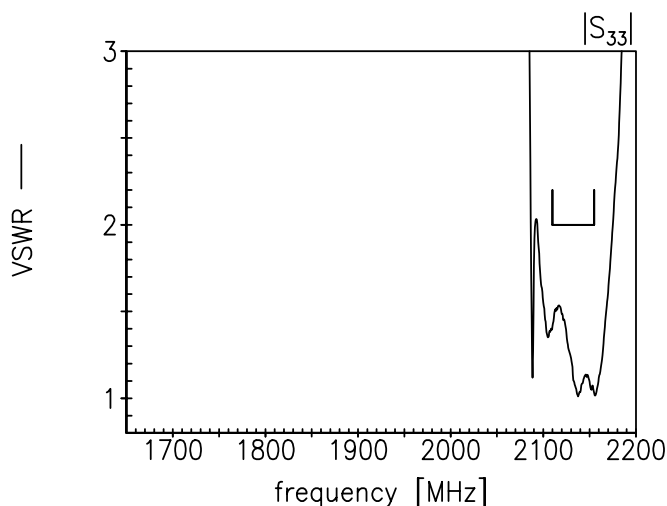
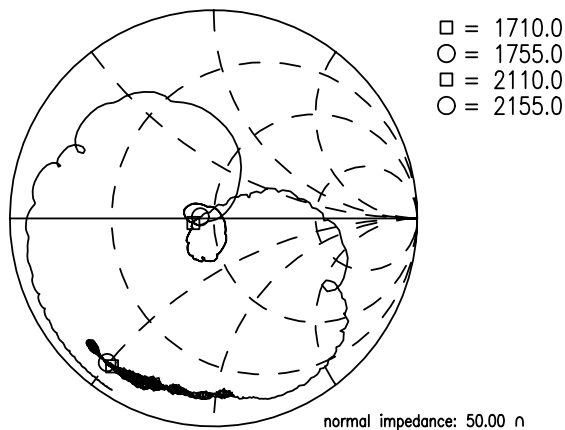
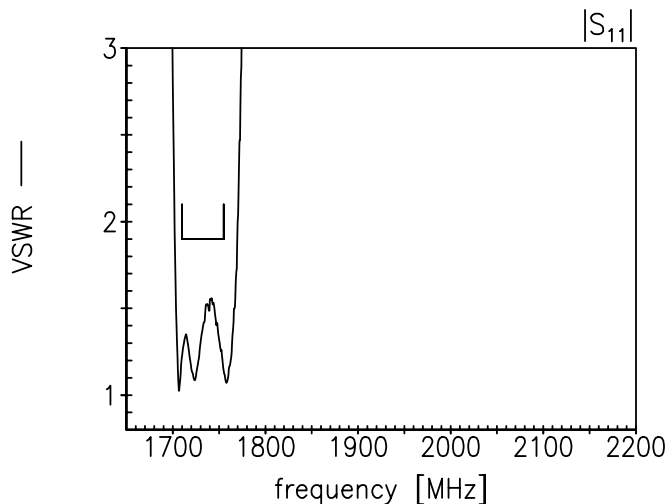


Power Transfer Function Tx-Rx isolation (Wideband):





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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