



SAW Components

SAW Duplexer

WCDMA Band 4/ CDMA 1x AWS Band

Series/type:	B8563
Ordering Code:	B39212B8563P810
Date:	January 27, 2012
Version:	2.0

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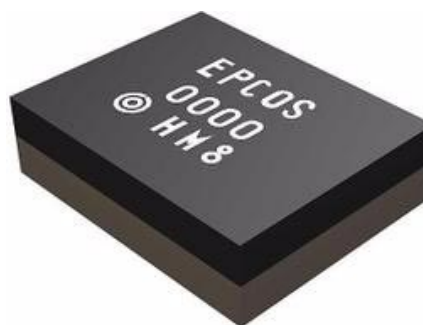
1732.5 / 2132.5 MHz

Data sheet



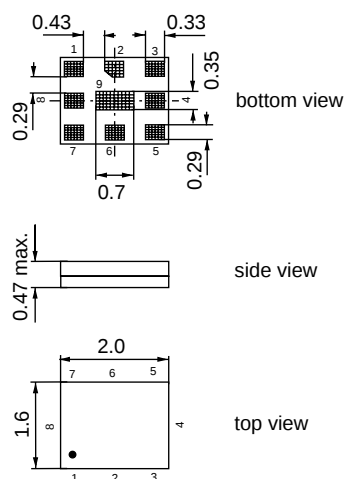
Application

- 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 2.0 x 1.6 mm², package height 0.47 mm max.
- RoHS compatible
- Approx. weight 0.005 g
- 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, 9 To be grounded

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Characteristics for W-CDMA Band 4

Temperature range for specification:

 $T = -15\text{ }^{\circ}\text{C to } +80\text{ }^{\circ}\text{C}$

Antenna terminating impedance:

 $Z_{\text{ANT}} = 50\text{ }\Omega \parallel 2.4\text{ nH}$

RX terminating impedance:

 $Z_{\text{RX}} = 100\text{ }\Omega \text{ (balanced)} \parallel 11\text{ nH}$

TX terminating impedance:

 $Z_{\text{TX}} = 50\text{ }\Omega$

					B8563			
Characterisitcs 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	$\alpha_{\text{WCDMA}}^{1)}$					1.3	1.8	dB
Amplitude ripple (p-p)	$\Delta\alpha$							
@ f_{Carrier} 1712.4 ... 1752.6 MHz	$\Delta\alpha_{\text{WCDMA}}^{1)}$					0.3	0.8	dB
Error vector magnitude	EVM ²⁾							
@ f_{Carrier} 1712.4 ... 1752.6 MHz						1.1	2.5	%
Input VSWR (TX port)								
1710.0 ... 1755.0 MHz						1.4	1.9	
Output VSWR (ANT port)								
1710.0 ... 1755.0 MHz						1.4	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	43		dB
1310.0 ... 1355.0 MHz					24	38		dB
1565.42 ... 1573.374MHz					40	50		dB
1573.374 ... 1577.466MHz					45	52		dB
1577.466 ... 1585.42 MHz					40	52		dB
1597.5515... 1605.886MHz					40	45		dB
1805.0 ... 1880.0 MHz					20	47		dB
1930.0 ... 1990.0 MHz					40	49		dB
@ f_{Carrier} 2112.4 ... 2152.6 MHz	$\alpha_{\text{WCDMA}}^{1)}$				42	46		dB
2400.0 ... 2500.0 MHz					30	38		dB
2565.0 ... 2677.0 MHz					5	33		dB
3410.0 ... 3510.0 MHz					25	32		dB
5000.0 ... 5120.0 MHz					10	21		dB
5120.0 ... 5350.0 MHz					15	25		dB
5350.0 ... 5725.0 MHz					10	28		dB
5725.0 ... 5850.0 MHz					20	28		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 (EMV) based on definition given in 3GPP TS 25.141.

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Characteristics for W-CDMA Band 4

Temperature range for specification:

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Antenna terminating impedance:

 $Z_{\text{ANT}} = 50\text{ }\Omega \parallel 2.4\text{ nH}$

RX terminating impedance:

 $Z_{\text{RX}} = 100\text{ }\Omega \text{ (balanced)} \parallel 11\text{ nH}$

TX terminating impedance:

 $Z_{\text{TX}} = 50\text{ }\Omega$

		B8563			
Characterisitcs 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	$\alpha_{\text{WCDMA}}^{1)}$		1.8	2.2	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
@ f_{Carrier} 2112.4 ... 2152.6 MHz	$\Delta\alpha_{\text{WCDMA}}^{1)}$		0.3	0.7	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			1.4	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⁾	26		dB

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

²⁾ Error Vector Magnitude (EMV) 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.

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Characteristics for W-CDMA Band 4

Temperature range for specification:

 $T = -15\text{ }^{\circ}\text{C to } +80\text{ }^{\circ}\text{C}$

Antenna terminating impedance:

 $Z_{\text{ANT}} = 50\text{ }\Omega \parallel 2.4\text{ nH}$

RX terminating impedance:

 $Z_{\text{RX}} = 100\text{ }\Omega \text{ (balanced)} \parallel 11\text{ nH}$

TX terminating impedance:

 $Z_{\text{TX}} = 50\text{ }\Omega$

				B8563			
Characterisitcs Antenna - Rx				min.	typ. @ 25 °C	max.	
Attenuation							
			α				
	1.0	...	400.0 MHz	57	70		dB
	400.0	...	1310.0 MHz	40	70		dB
	1310.0	...	1355.0 MHz	43	68		dB
	1355.0	...	1710.0 MHz	35	51		dB
@f _{Carrier}	1712.4	...	1752.6 MHz	45	63		dB
	1755.0	...	1910.0 MHz	15	52		dB
	1910.0	...	1955.0 MHz	35	57		dB
	1955.0	...	2025.0 MHz	15	39		dB
	2240.0	...	2300.0 MHz	15	38		dB
	2300.0	...	2400.0 MHz	30	46		dB
	2400.0	...	2496.0 MHz	40	45		dB
	2496.0	...	2690.0 MHz	40	54		dB
	2690.0	...	3300.0 MHz	35	48		dB
	3300.0	...	3800.0 MHz	45	56		dB
	3820.0	...	3910.0 MHz	40	56		dB
	3910.0	...	4220.0 MHz	35	55		dB
	4220.0	...	4310.0 MHz	40	54		dB
	4310.0	...	5150.0 MHz	35	50		dB
	5150.0	...	5850.0 MHz	40	44		dB
	5850.0	...	6475.0 MHz	35	43		dB

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

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Antenna terminating impedance:

 $Z_{\text{ANT}} = 50\text{ }\Omega \parallel 2.4\text{ nH}$

RX terminating impedance:

 $Z_{\text{RX}} = 100\text{ }\Omega \text{ (balanced)} \parallel 11\text{ nH}$

TX terminating impedance:

 $Z_{\text{TX}} = 50\text{ }\Omega$

				B8563			
Characterisitcs Tx - Rx				min.	typ. @ 25 °C	max.	
Differential Mode Isolation							
			α				
	1574.0 ... 1577.0	MHz		40	70		dB
@f _{Carrier}	1712.4 ... 1752.6	MHz	$\alpha_{\text{WCDMA}}^{1)}$	55	60		dB
@f _{Carrier}	2112.4 ... 2152.6	MHz	$\alpha_{\text{WCDMA}}^{1)}$	50	62		dB
	3410.0 ... 3520.0	MHz		20	70		dB
	5120.0 ... 5275.0	MHz		20	59		dB
Common Mode Isolation							
			α				
@f _{Carrier}	1712.4 ... 1752.6	MHz	$\alpha_{\text{WCDMA}}^{1)}$	48	51		dB

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

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Characteristics for CDMA 1x AWS Band

Temperature range for specification: $T = -30\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$
 Antenna terminating impedance: $Z_{\text{ANT}} = 50\text{ }\Omega \parallel 2.4\text{ nH}$
 RX terminating impedance: $Z_{\text{RX}} = 100\text{ }\Omega$ (balanced) $\parallel 11\text{ nH}$
 TX terminating impedance: $Z_{\text{TX}} = 50\text{ }\Omega$

				B8563		
Characterisitcs TX - Antenna				min.	typ. @ 25 °C	max.
Center frequency	f_c				1732.5	MHz
Maximum insertion attenuation	α					
1710.0 ... 1755.0	MHz				1.4	2.0
Amplitude ripple (p-p)	$\Delta\alpha$					
1710.0 ... 1755.0	MHz				0.4	1.2
Input VSWR (TX port)						
1710.0 ... 1755.0	MHz				1.4	1.9
Output VSWR (ANT port)						
1710.0 ... 1755.0	MHz				1.4	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	43	dB
1310.0 ... 1355.0	MHz			24	38	dB
1565.42 ... 1573.374	MHz			40	50	dB
1573.374 ... 1577.466	MHz			45	52	dB
1577.466 ... 1585.42	MHz			40	52	dB
1597.5515 ... 1605.886	MHz			40	45	dB
1805.0 ... 1880.0	MHz			20	47	dB
1930.0 ... 1990.0	MHz			40	49	dB
2110.0 ... 2155.0	MHz			42	46	dB
2400.0 ... 2500.0	MHz			30	38	dB
2565.0 ... 2677.0	MHz			5	33	dB
3410.0 ... 3510.0	MHz			25	32	dB
5000.0 ... 5120.0	MHz			10	21	dB
5120.0 ... 5350.0	MHz			15	25	dB
5350.0 ... 5725.0	MHz			10	28	dB
5725.0 ... 5850.0	MHz			20	28	dB
5850.0 ... 6000.0	MHz			10	25	dB

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 Antenna terminating impedance: $Z_{\text{ANT}} = 50\text{ }\Omega \parallel 2.4\text{ nH}$
 RX terminating impedance: $Z_{\text{RX}} = 100\text{ }\Omega$ (balanced) $\parallel 11\text{ nH}$
 TX terminating impedance: $Z_{\text{TX}} = 50\text{ }\Omega$

				B8563			
Characteristics Antenna - Rx				min.	typ. @ 25 °C	max.	
Center frequency	f_C				2132.5		MHz
Maximum insertion attenuation	α						
2110.0 ... 2155.0	MHz				1.8	2.3	dB
Amplitude ripple (p-p)	$\Delta\alpha$						
2110.0 ... 2155.0	MHz				0.4	0.8	dB
Input VSWR (RX port)							
2110.0 ... 2155.0	MHz				1.4	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⁾	26		dB
Attenuation	α						
1.0 ... 400.0	MHz			57	70		dB
400.0 ... 1310.0	MHz			40	70		dB
1310.0 ... 1355.0	MHz			43	68		dB
1355.0 ... 1710.0	MHz			35	51		dB
1710.0 ... 1755.0	MHz			45	63		dB
1755.0 ... 1910.0	MHz			15	52		dB
1910.0 ... 1955.0	MHz			35	57		dB
1955.0 ... 2025.0	MHz			15	39		dB
2240.0 ... 2300.0	MHz			15	38		dB
2300.0 ... 2400.0	MHz			30	46		dB
2400.0 ... 2496.0	MHz			40	45		dB
2496.0 ... 2690.0	MHz			40	54		dB
2690.0 ... 3300.0	MHz			35	48		dB
3300.0 ... 3800.0	MHz			45	56		dB
3820.0 ... 3910.0	MHz			40	56		dB
3910.0 ... 4220.0	MHz			35	55		dB
4220.0 ... 4310.0	MHz			40	54		dB
4310.0 ... 5150.0	MHz			35	50		dB
5150.0 ... 5850.0	MHz			40	44		dB
5850.0 ... 6475.0	MHz			35	43		dB

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

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Antenna terminating impedance:	$Z_{\text{ANT}} = 50\text{ }\Omega \parallel 2.4\text{ nH}$
RX terminating impedance:	$Z_{\text{RX}} = 100\text{ }\Omega \text{ (balanced)} \parallel 11\text{ nH}$
TX terminating impedance:	$Z_{\text{TX}} = 50\text{ }\Omega$

				B8563			
Characterisitcs Tx - Rx				min.	typ. @ 25 °C	max.	
Differential Mode Isolation							
		α					
1574.0	...	1577.0	MHz	40	70		dB
1710.0	...	1755.0	MHz	55	58		dB
2110.0	...	2155.0	MHz	50	60		dB
3410.0	...	3520.0	MHz	20	70		dB
5120.0	...	5275.0	MHz	20	59		dB
Common Mode Isolation							
		α					
1710.0	...	1755.0	MHz	48	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:

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

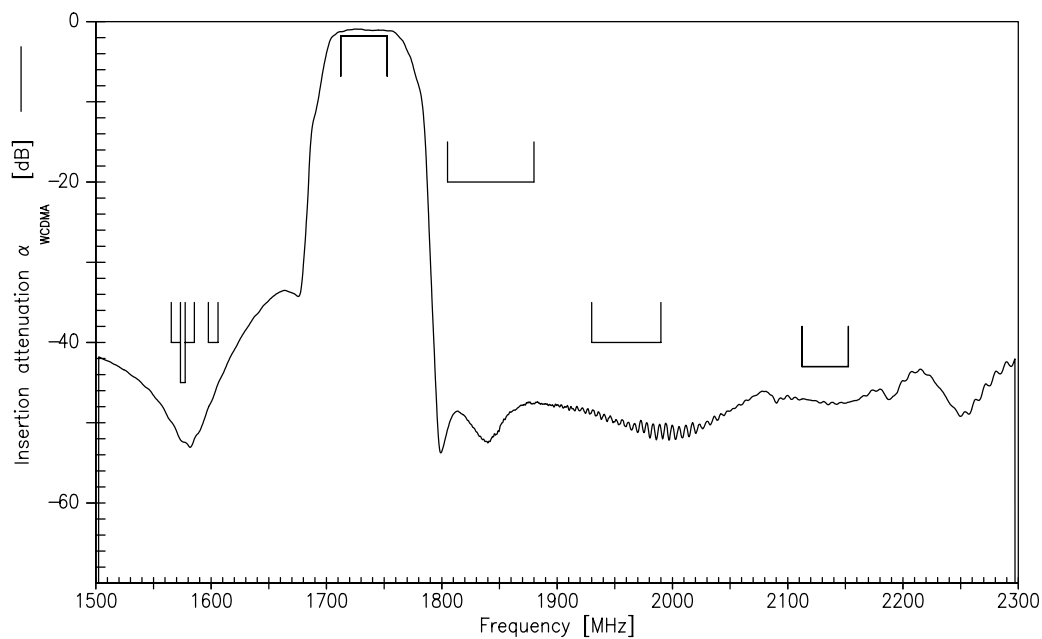
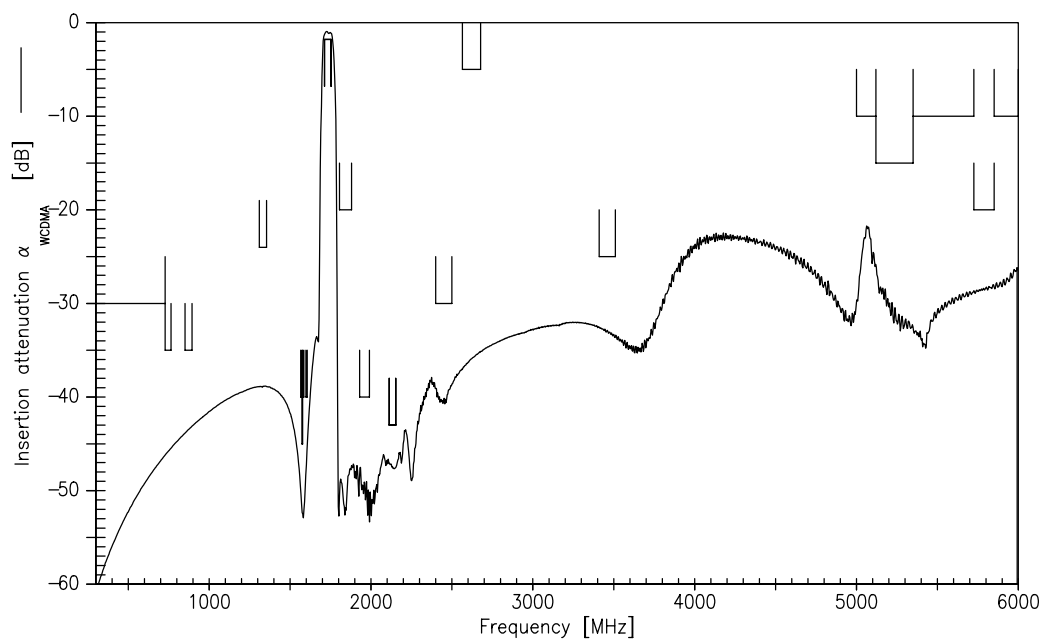
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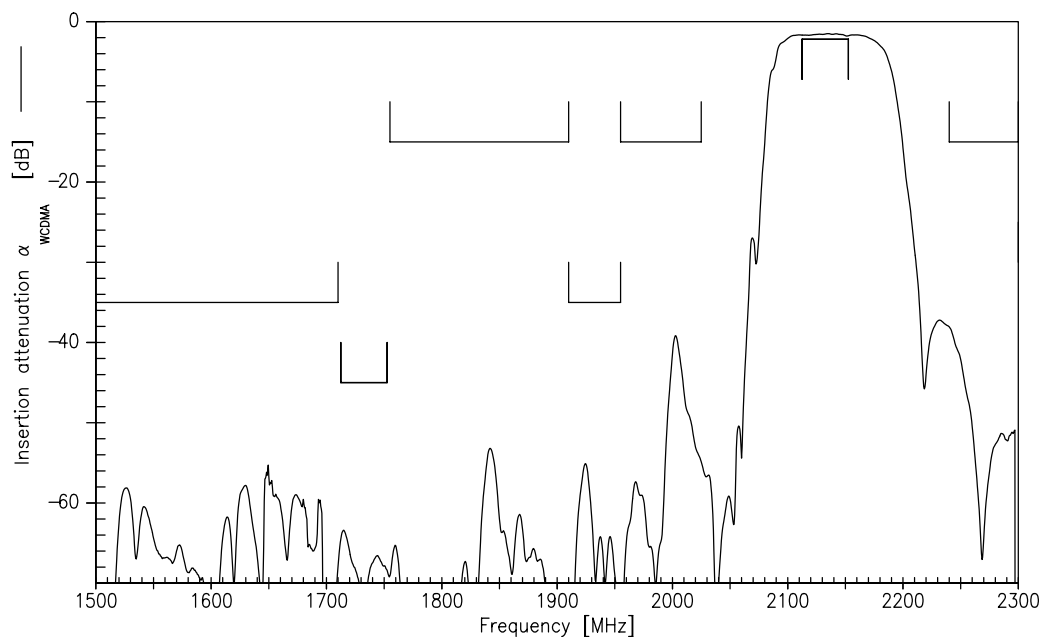
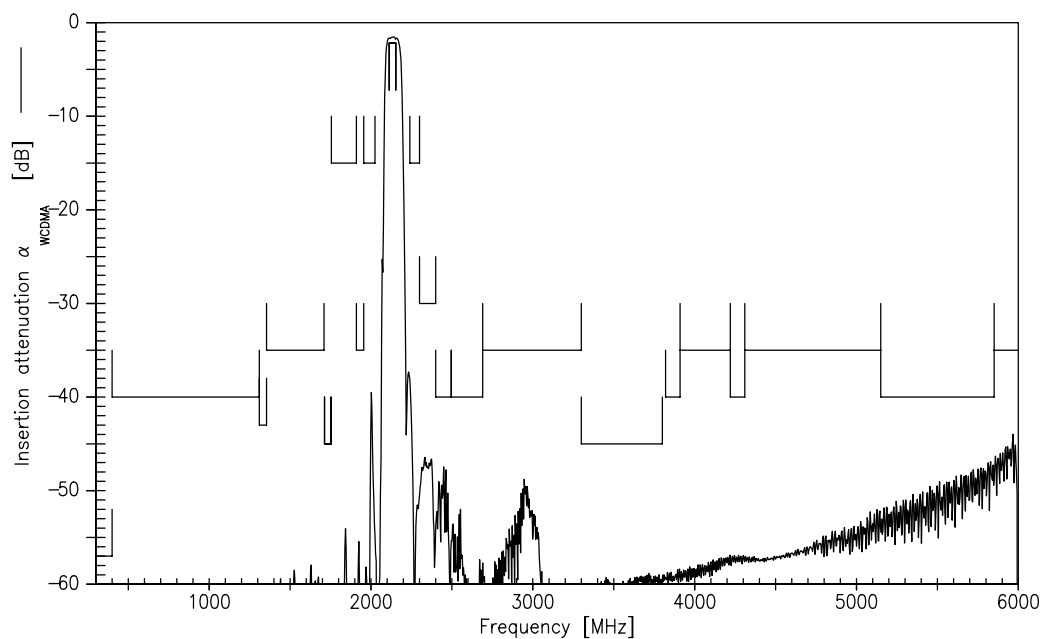
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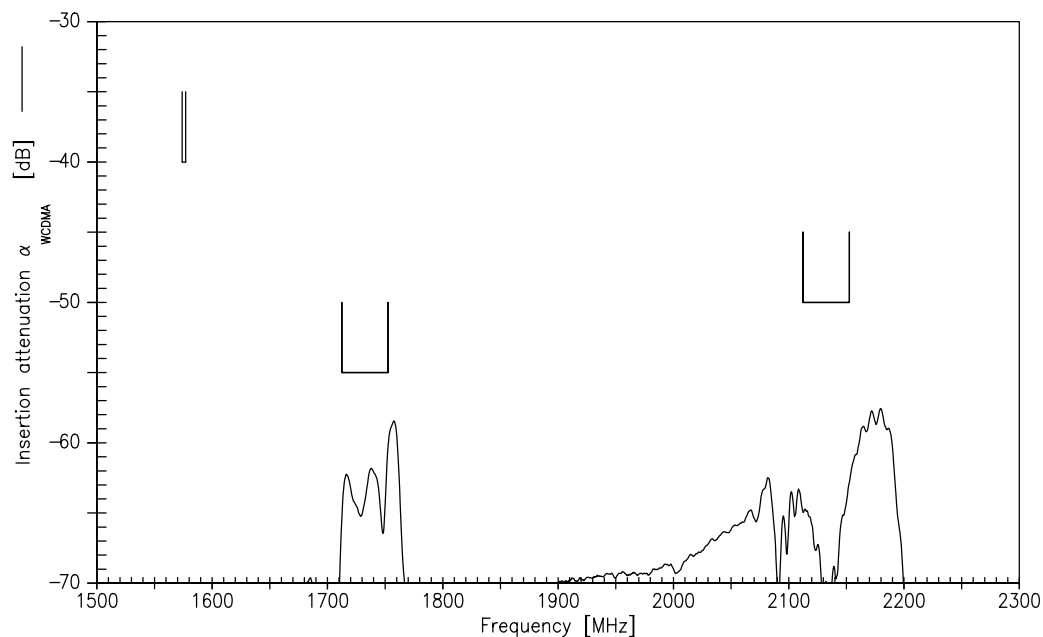
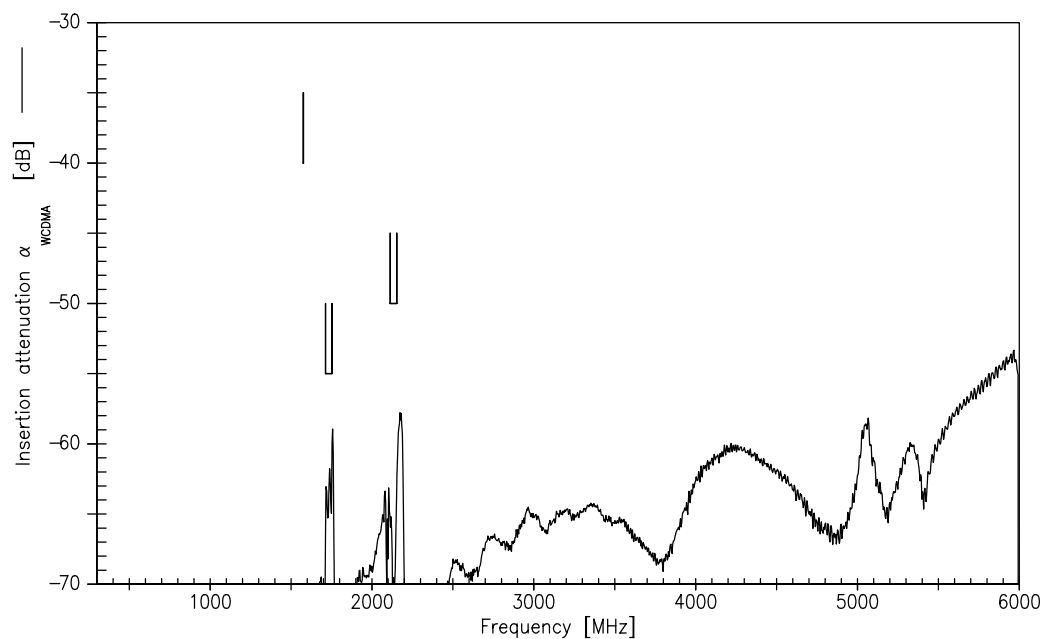

Maximum Ratings

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	V	
ESD voltage	V_{ESD}	50 ¹⁾	V	
Input power at 1710.0 ... 1755.0 MHz elsewhere	P_{IN}	29 10	dBm dBm	

¹⁾ acc. to JESD22-A115A (machine model), 10 negative & 10 positive pulses.

Power Transfer Function Tx-Ant:

Power Transfer Function Tx-Ant (Wideband):


Power Transfer Function Ant-Rx:

Power Transfer Function Ant-Rx (Wideband):


Power Transfer Function Tx-Rx isolation:

Power Transfer Function Tx-Rx isolation (Wideband):


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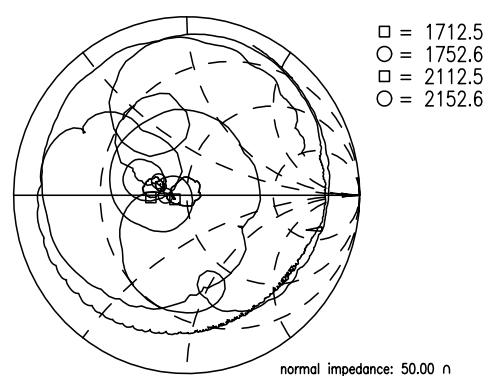
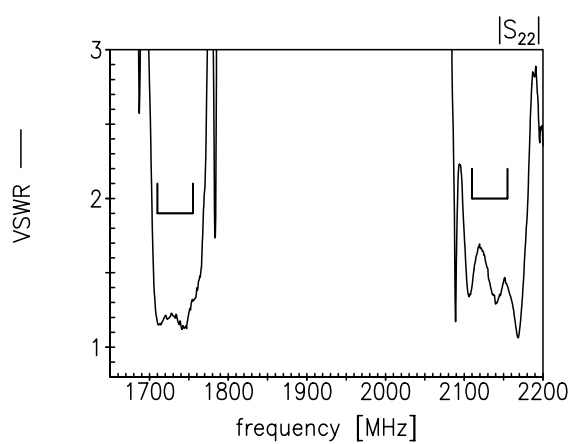
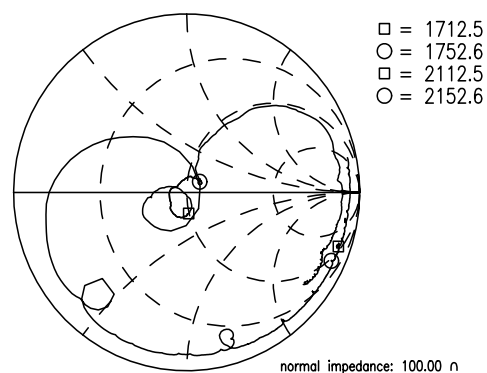
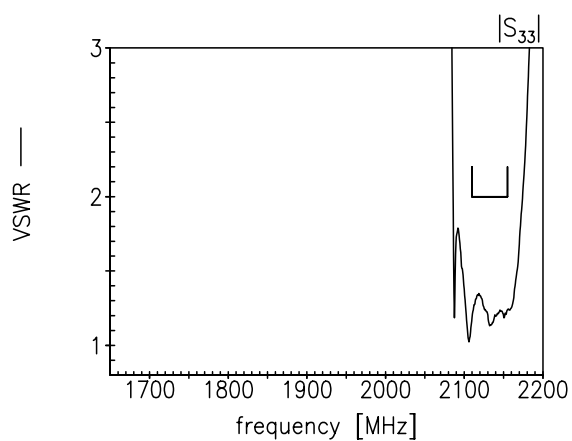
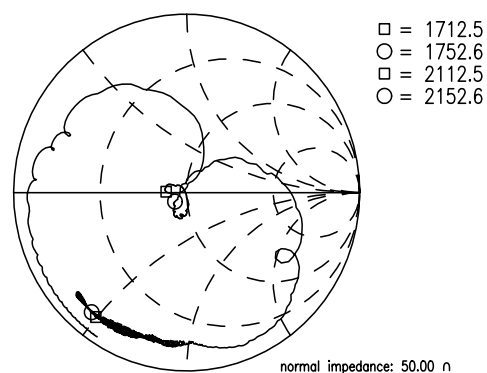
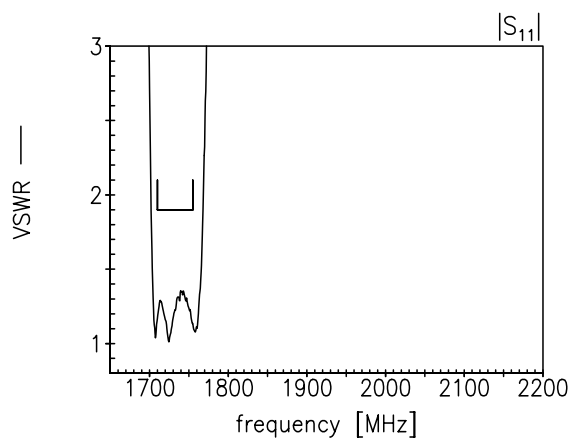
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VSWRs at Tx, Rx and Ant:



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

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References

Type	B8563
Ordering code	B39212B8563P810
Marking and package	C61157-A8-A45-51-27
Packaging	F61074-V8247-Z000-3-27
Date codes	L_1126
S-parameters	B8563_NB_UN.s4p, B8563_WB_UN.s4p See file header for pin/port assignment.
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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Systems, Acoustics, Waves Business Group

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