



SAW Components

SAW Duplexer

Automotive telematics

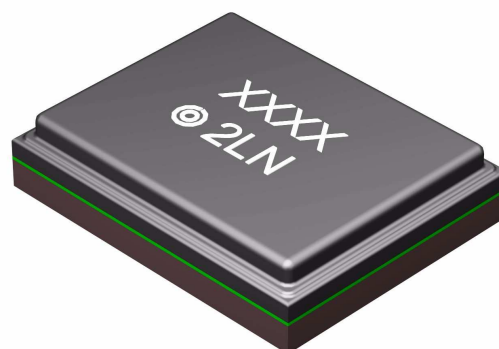
Series/type:	B4400
Ordering code:	B39212B4400P810
Date:	November 07, 2014
Version:	2.3

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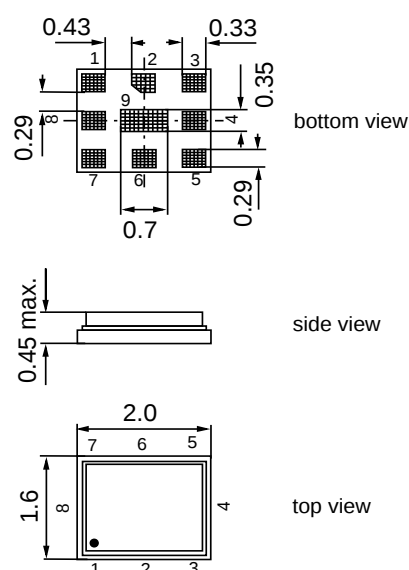
Application

- Low-loss SAW duplexer for W-CDMA Band 1 (UMTS) systems
- Low insertion attenuation
- Low amplitude ripple
- Usable passband 60 MHz
- Single-ended to balanced transformation in Antenna-Rx path
- Impedance transformation 50 Ω to 100 Ω in Antenna-Rx path
- High isolation between Tx and Rx



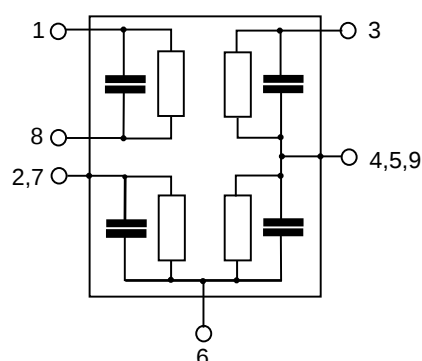
Features

- Package size 2.0 * 1.6 mm²
- Package height max. 0.45mm
- RoHS compatible
- Approximate weight 0.005 g
- Package for **Surface Mount Technology (SMT)**
- Ni terminals, Au-plated
- AEC-Q200 qualified component family (operable temperature range -40°C to +85°C)
- **Electrostatic Sensitive Device (ESD)**



Pin configuration

- 3 Tx input
- 1, 8 Rx output (balanced)
- 6 Antenna
- 2, 4, 5, 7, 9 To be grounded



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B4400
SAW Duplexer
1950.0 / 2140.0 MHz
Data sheet

Characteristics

Temperature range for specification:	T = -20 °C to +85 °C
TX terminating impedance:	Z _{Tx} = 50 Ω 6.0 nH
ANT terminating impedance:	Z _{Ant} = 50 Ω 2.2 nH
RX terminating impedance:	Z _{Rx} = 100 Ω (balanced) 17 nH

Characteristics Tx-Antenna				min.	typ. @ 25 °C	max.	
Center frequency	f _c				1950.0		MHz
Maximum insertion attenuation	α _{W-CDMA} ¹⁾						
1922.4 ... 1977.6 MHz				—	1.7	2.3	dB
Amplitude ripple (p-p)	α _{W-CDMA} ¹⁾						
1922.4 ... 1977.6 MHz				—	0.5	1.1	dB
Error Vector Magnitude	EVM ²⁾						
1922.4 ... 1977.6 MHz				—	1.4	2.3	%
TX port VSWR							
1920.0 ... 1980.0 MHz				—	1.6	2.0	
ANT port VSWR							
1920.0 ... 1980.0 MHz				—	1.4	2.0	
Attenuation	α						
10.0 ... 410.0 MHz				45	69	—	dB
420.0 ... 494.0 MHz				43	64	—	dB
843.0 ... 894.0 MHz				40	47	—	dB
1565.0 ... 1574.0 MHz				41	45	—	dB
1574.0 ... 1577.0 MHz				42	46	—	dB
1577.0 ... 1586.0 MHz				42	47	—	dB
1597.0 ... 1605.0 MHz				43	48	—	dB
1605.0 ... 1805.0 MHz				34	39	—	dB
1805.0 ... 1865.0 MHz				30	36	—	dB
1865.0 ... 1880.0 MHz				12	33	—	dB
2112.4 ... 2167.6 MHz	α _{W-CDMA} ¹⁾			46	54	—	dB
2400.0 ... 2500.0 MHz				31	38	—	dB
2620.0 ... 2690.0 MHz				30	36	—	dB
3830.0 ... 3970.0 MHz				28	34	—	dB
5150.0 ... 5950.0 MHz				18	22	—	dB

¹⁾ Attenuation of W-CDMA signal (Power Transfer Function). Please, refer to page 7 of this document.

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

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RX terminating impedance:	Z _{Rx} = 100 Ω (balanced) 17 nH

Characteristics Antenna-Rx		min.	typ. @ 25 °C	max.	
Center frequency	f _c		2140.0		MHz
Maximum insertion attenuation	α _{W-CDMA} ¹⁾				
2112.4 ... 2167.6 MHz		—	2.2	2.4	dB
Amplitude ripple (p-p)	α _{W-CDMA} ¹⁾				
2112.4 ... 2167.6 MHz		—	0.4	0.8	dB
Error Vector Magnitude	EVM ²⁾				
2112.4 ... 2167.6 MHz		—	1.0	2.0	%
ANT port VSWR					
2110.0 ... 2170.0 MHz		—	1.8	2.2	
RX port VSWR					
2110.0 ... 2170.0 MHz		—	1.6	2.0	

1) Attenuation of W-CDMA signal (Power Transfer Function). Please, refer to page 7 of this document.

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

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RX terminating impedance:	Z _{RX} = 100 Ω (balanced) 17 nH

Characteristics Antenna-Rx				min.	typ. @ 25 °C	max.	
Attenuation							
			α				
10.0	...	1920.0	MHz	45	53	—	dB
1922.4	...	1977.6	MHz	50	55	—	dB
1980.0	...	2025.0	MHz	33	49	—	dB
2255.0	...	2400.0	MHz	25	45	—	dB
2400.0	...	2484.0	MHz	41	44	—	dB
2484.0	...	5600.0	MHz	40	45	—	dB
5600.0	...	6000.0	MHz	28	32	—	dB

¹⁾ Attenuation of W-CDMA signal (Power Transfer Function). Please, refer to page 7 of this document.

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Characteristics Tx-Rx					min.	typ. @ 25 °C	max.	
Differential Mode Isolation								
				α				
1574.0	...	1577.0	MHz		40	79	—	dB
1922.4	...	1977.6	MHz	α _{W-CDMA} ¹⁾	52	57	—	dB
2112.4	...	2167.6	MHz	α _{W-CDMA} ¹⁾	53	59	—	dB
3830.0	...	3970.0	MHz		30	61	—	dB
5750.0	...	5950.0	MHz		30	44	—	dB
Common Mode Isolation								
				α				
1922.4	...	1977.6	MHz	α _{W-CDMA} ¹⁾	42	45	—	dB

¹⁾ Attenuation of W-CDMA signal (Power Transfer Function). Please, refer to page 7 of this document.

Annotation for characteristics section

Attenuation of W-CDMA signal (Power Transfer Function, α_{W-CDMA}) is determined by

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

with $f_{Carrier}$ according to 3GPP TS 25.101 (e.g. for UMTS pass band, $f_{Carrier}$ ranges from 1922.4 MHz (lowest Tx channel) to 2167.6 MHz (highest Tx channel)). Here, $H_{RRC}(f)$ is the transfer function of the root-raised cosine transmit pulse shaping filter according to 3GPP TS 25.101 with the following normalization:

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

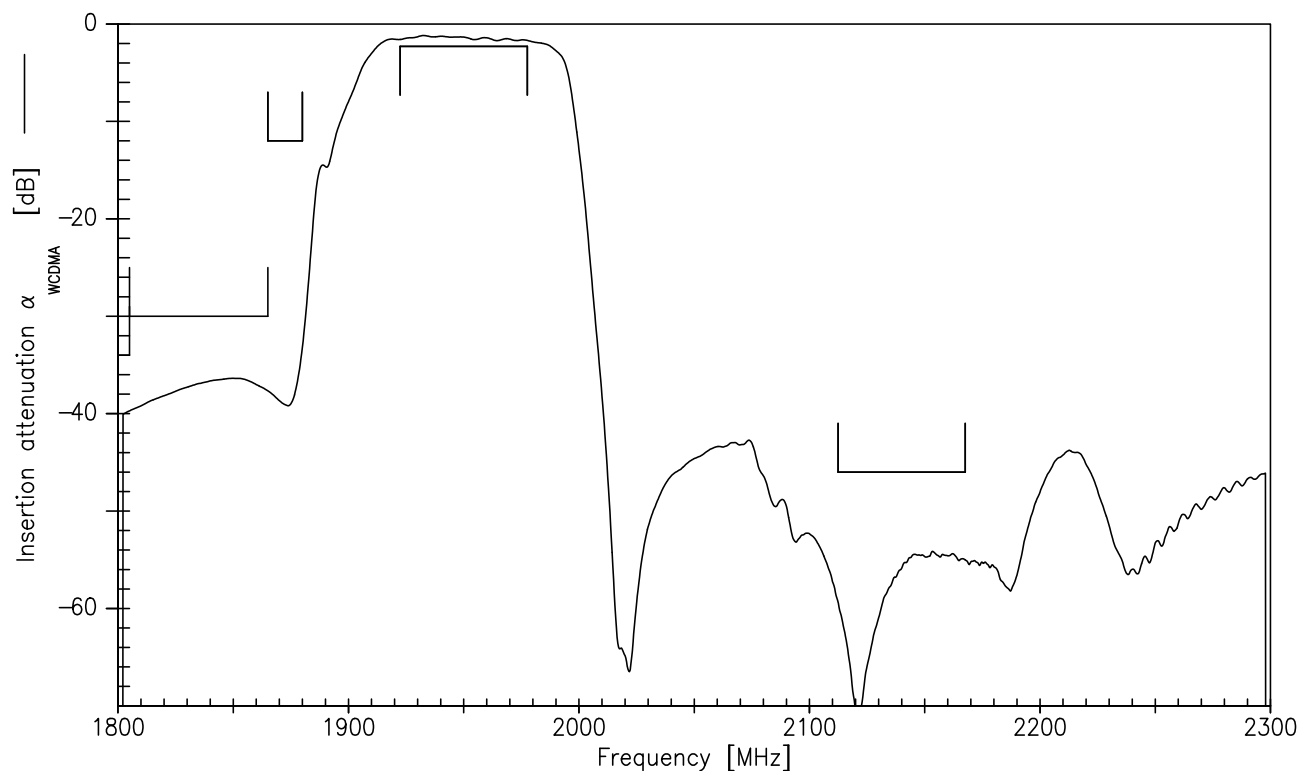
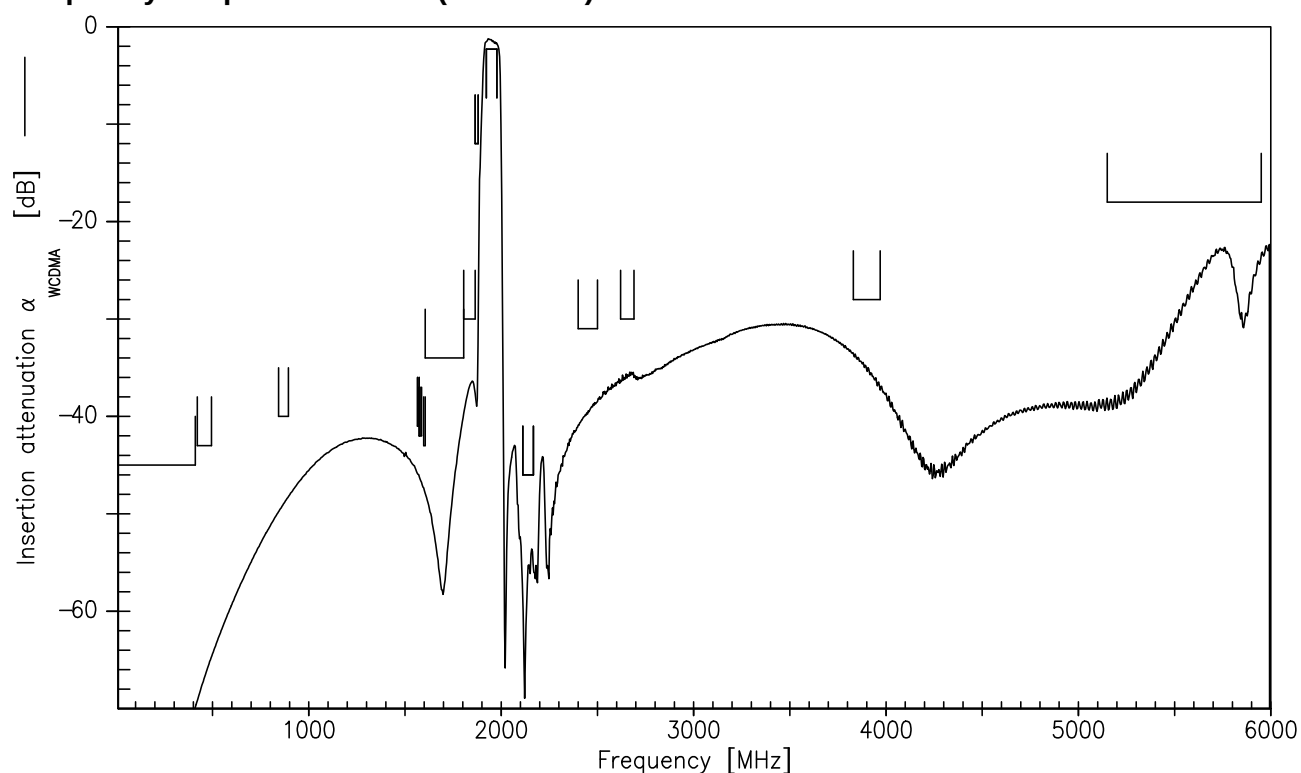
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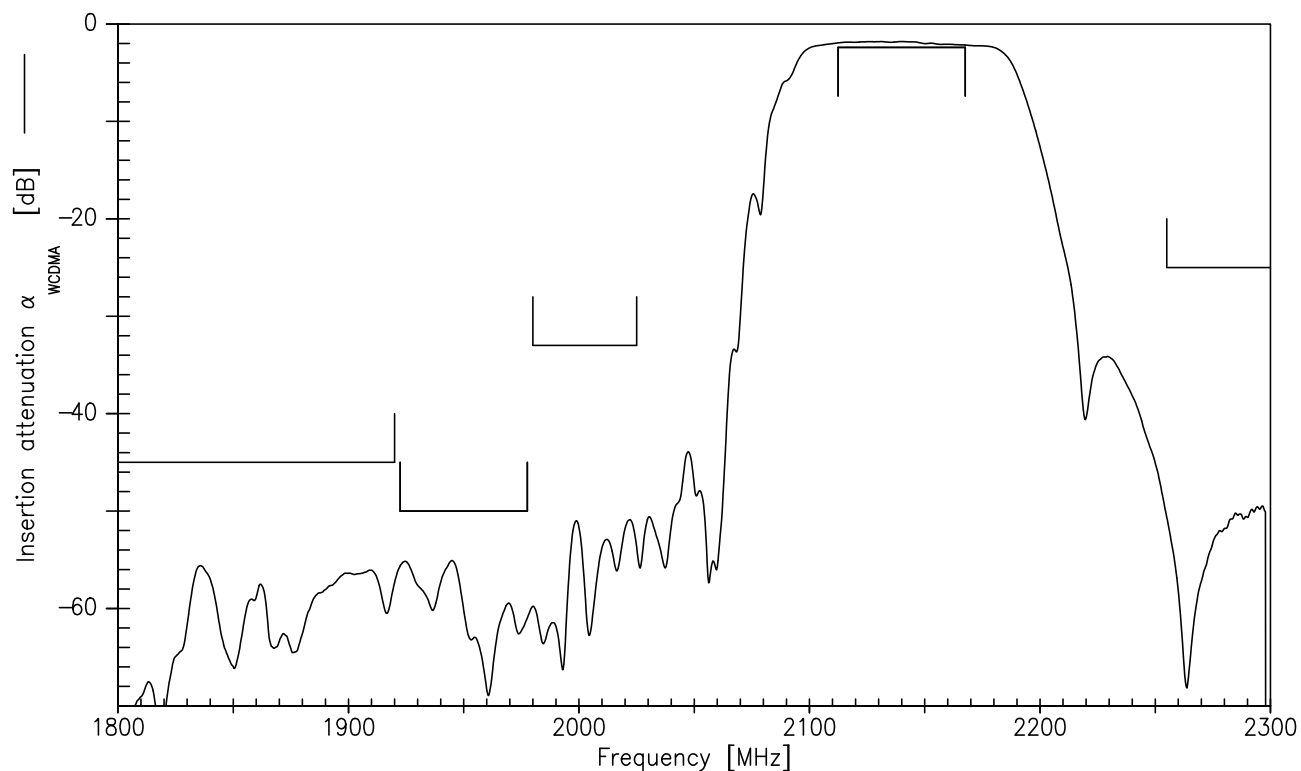

Maximum Ratings

Operable temperature range	T	−40/+85	°C	
Storage temperature range	T _{stg}	−40/+85	°C	
DC voltage	V _{DC}	0	V	
ESD voltage	V _{ESD}	50 ¹⁾	V	machine model, 10 pulses
Input power at				
1920.0 ... 1980.0 MHz	P _{in}	29	dBm	} continuous wave 50 °C, 5000h
elsewhere	P _{in}	10	dBm	

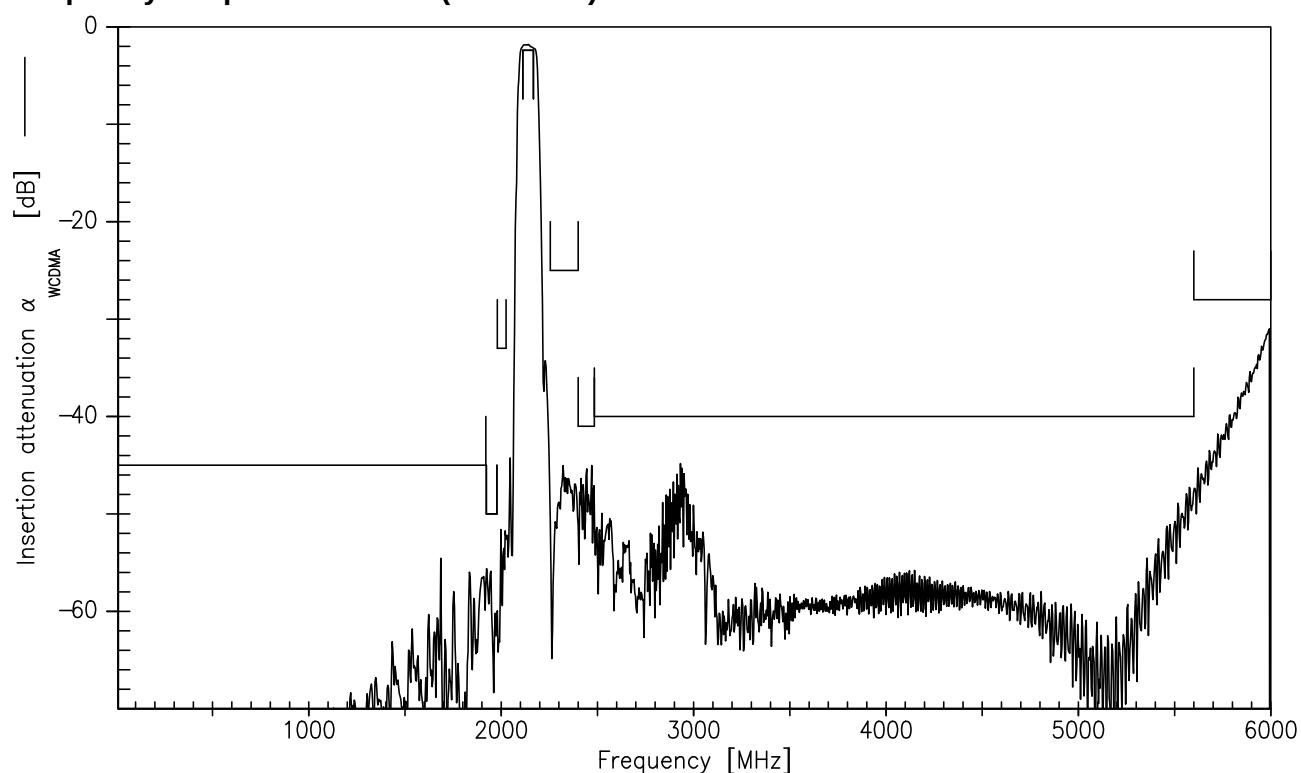
¹⁾ According to JESD22-A115A (machine model), 10 negative and 10 positive pulses.

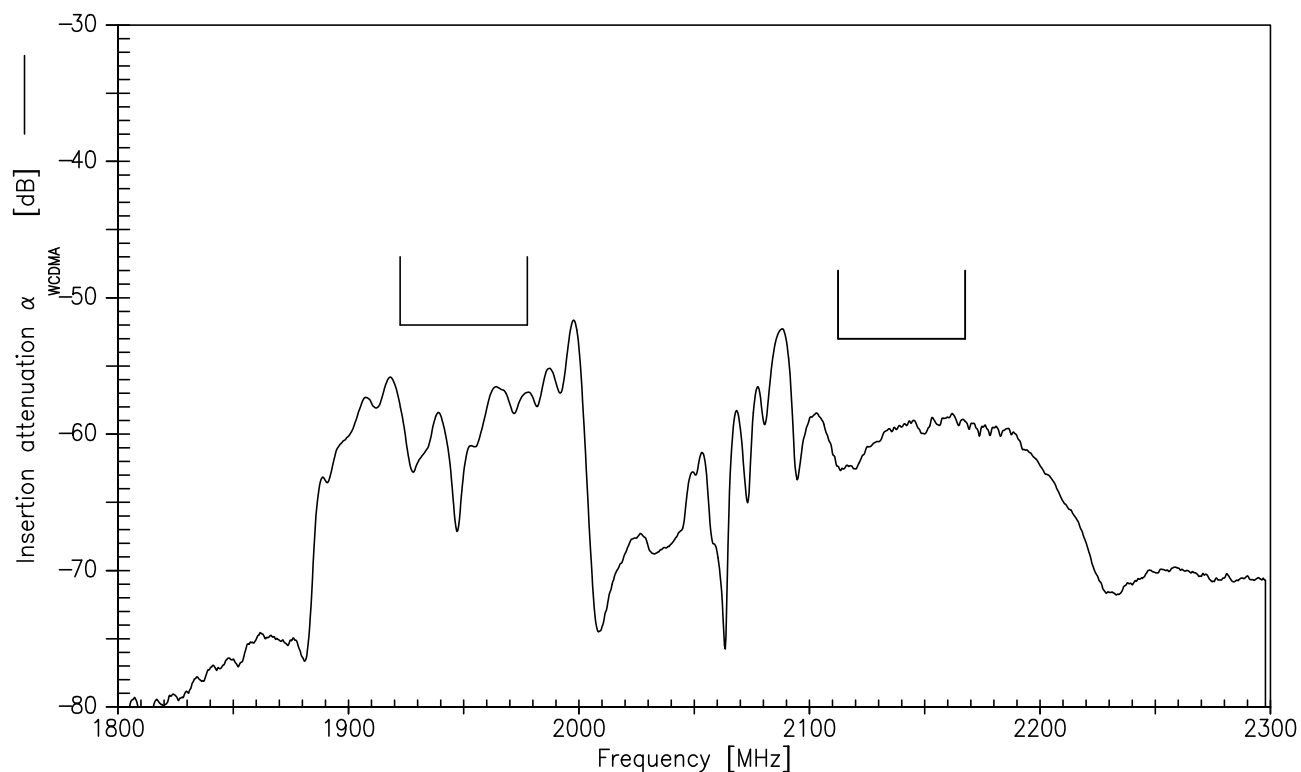
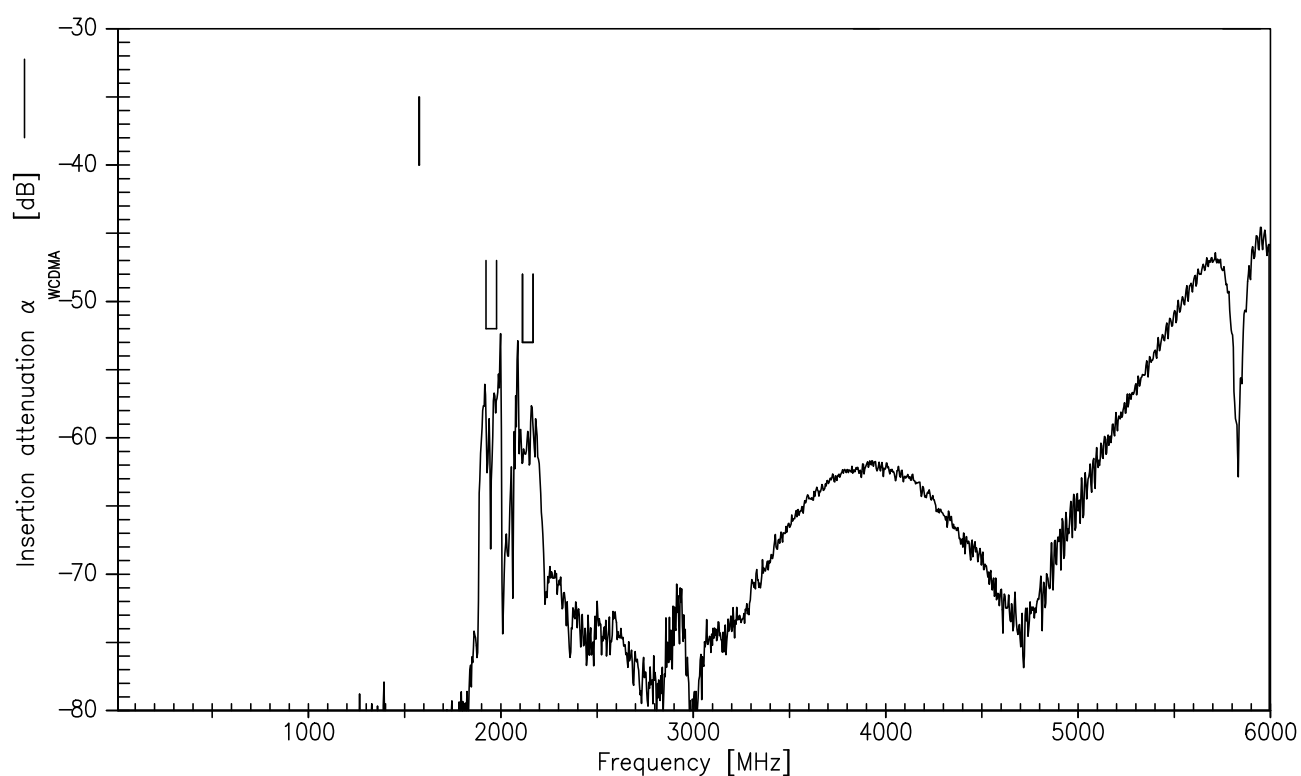
Frequency Response TX-ANT

Frequency Response TX-ANT (wideband)


Frequency Response RX-ANT



Frequency Response RX-ANT (wideband)



Frequency Response TX-RX

Frequency Response TX-RX (wideband)


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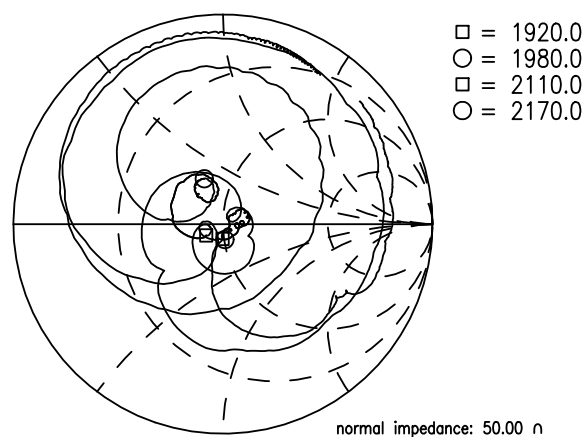
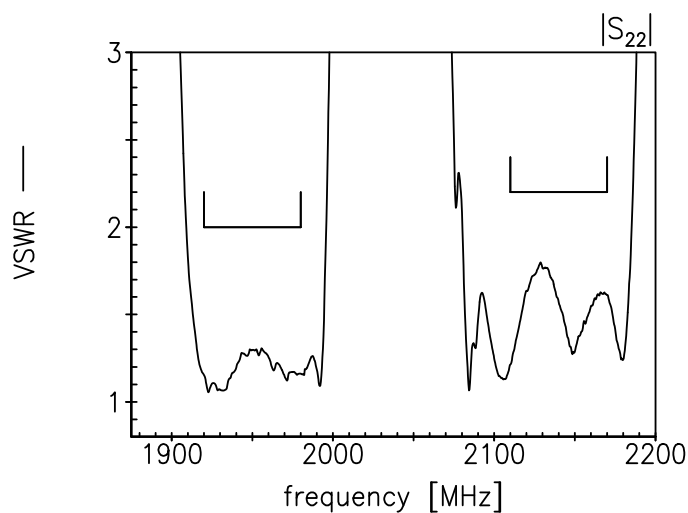
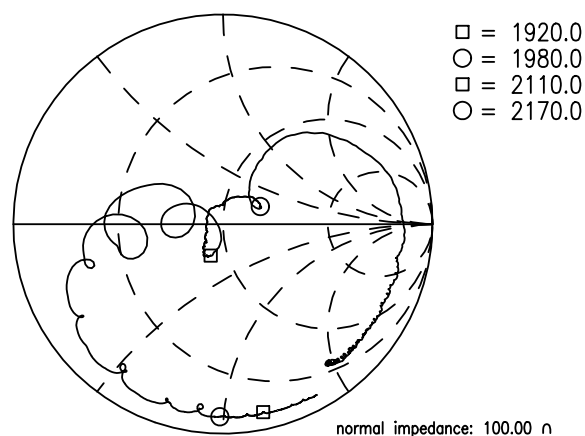
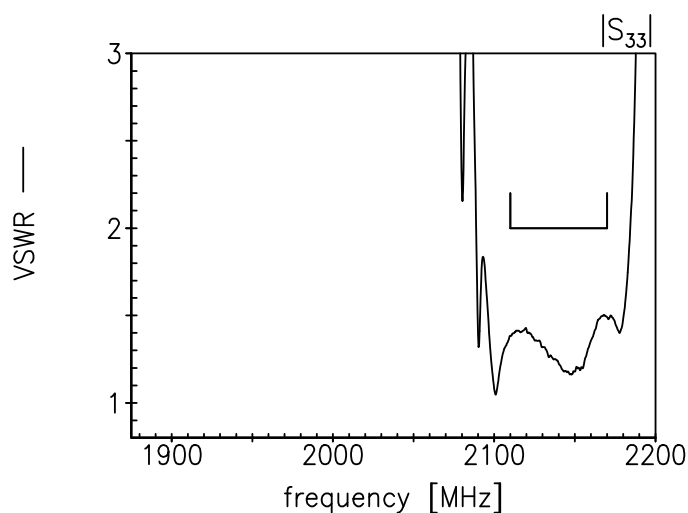
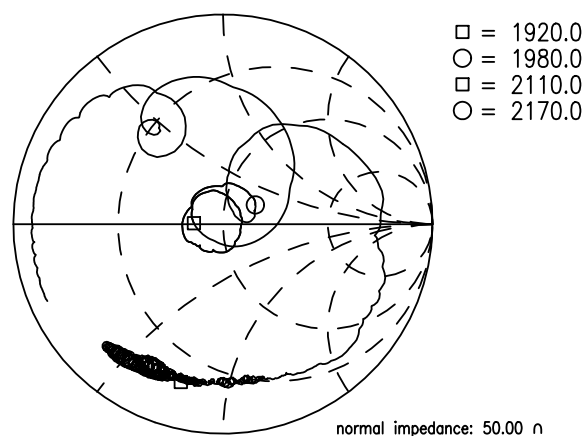
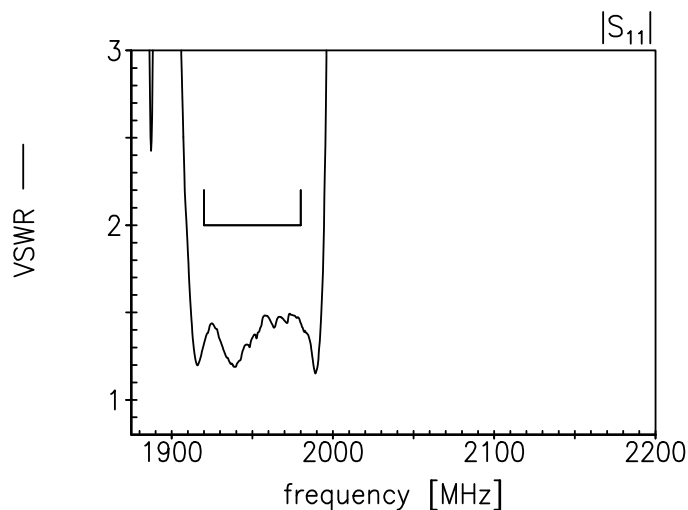
SMD

Return Loss

S_{11} TX- port

S_{33} RX-port

S_{22} ANT-port



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References

Type	B4400
Ordering code	B39212B4400P810
Marking and package	C61157-A8-A50
Packaging	F61074-V8247-Z000
Date codes	L_1126
S-parameters	B4400_NB_UN.s4p, B4400_WB_UN.s4p See file header for port/pin assignment table.
Soldering profile	S_6001
RoHS compatible	RoHS-compatible means that products are compatible with the requirements according to Art. 4 (substance restrictions) of Directive 2011/65/EU of the European Parliament and of the Council of June 8 th , 2011, on the restriction of the use of certain hazardous substances in electrical and electronic equipment ("Directive") with due regard to the application of exemptions as per Annex III of the Directive in certain cases.
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Published by EPCOS AG

Systems, Acoustics, Waves Business Group

P.O. Box 80 17 09, 81617 Munich, GERMANY

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