SAW Components

SAW Duplexer

Automotive telematics

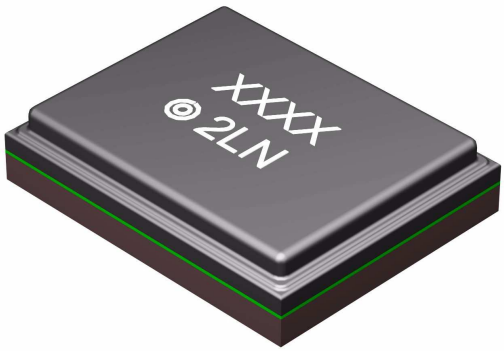
Series/type:	**B4400**
Ordering code:	**B39212B4400P810**
Date:	November 07, 2014
Version:	2.3

EPCOS AG is a TDK Group Company.

Data sheet SMD

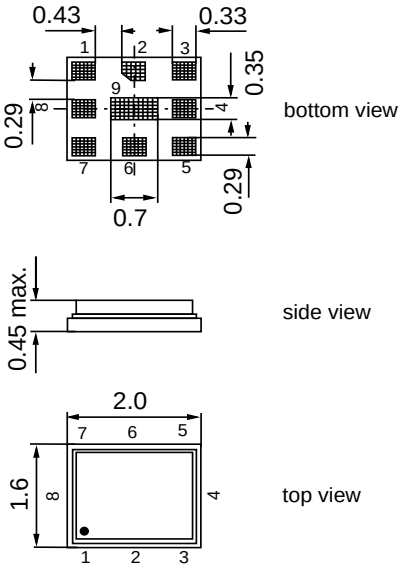
Application

- 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



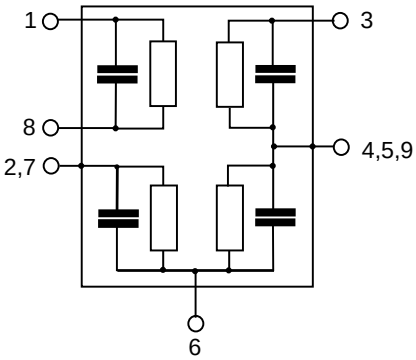
Features

- Package size 2.0 * 1.6 mm²
- Package height max. 0.45mm
- RoHS compatible
- Approximate weight 0.005 g
- Package for **S**urface **M**ount **T**echnology (**SMT**)
- Ni terminals, Au-plated
- AEC-Q200 qualified component family (operable temperature range -40˚C to +85˚C)
- **E**lectrostatic **S**ensitive **D**evice (**ESD**)



Pin configuration

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



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 teminating 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		$\alpha_{W\text{-}CDMA}$ [1]					
1922.4 ... 1977.6	MHz			—	1.7	2.3	dB
Amplitude ripple (p-p)		$\alpha_{W\text{-}CDMA}$ [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	$\alpha_{W\text{-}CDMA}$ [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

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 teminating 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	$\alpha_{W\text{-}CDMA}$ [1]				
2112.4 ... 2167.6 MHz		—	2.2	2.4	dB
Amplitude ripple (p-p)	$\alpha_{W\text{-}CDMA}$ [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

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 teminating 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	$\alpha_{W\text{-}CDMA}$ [1)]	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.

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 teminating impedance: Z_{Rx} = 100 Ω (balanced) || 17 nH

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	$\alpha_{W\text{-}CDMA}$ [1)]		52	57	—	dB
2112.4 ... 2167.6	MHz	$\alpha_{W\text{-}CDMA}$ [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	$\alpha_{W\text{-}CDMA}$ [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, $\alpha_{W\text{-}CDMA}$) is determined by

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

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:

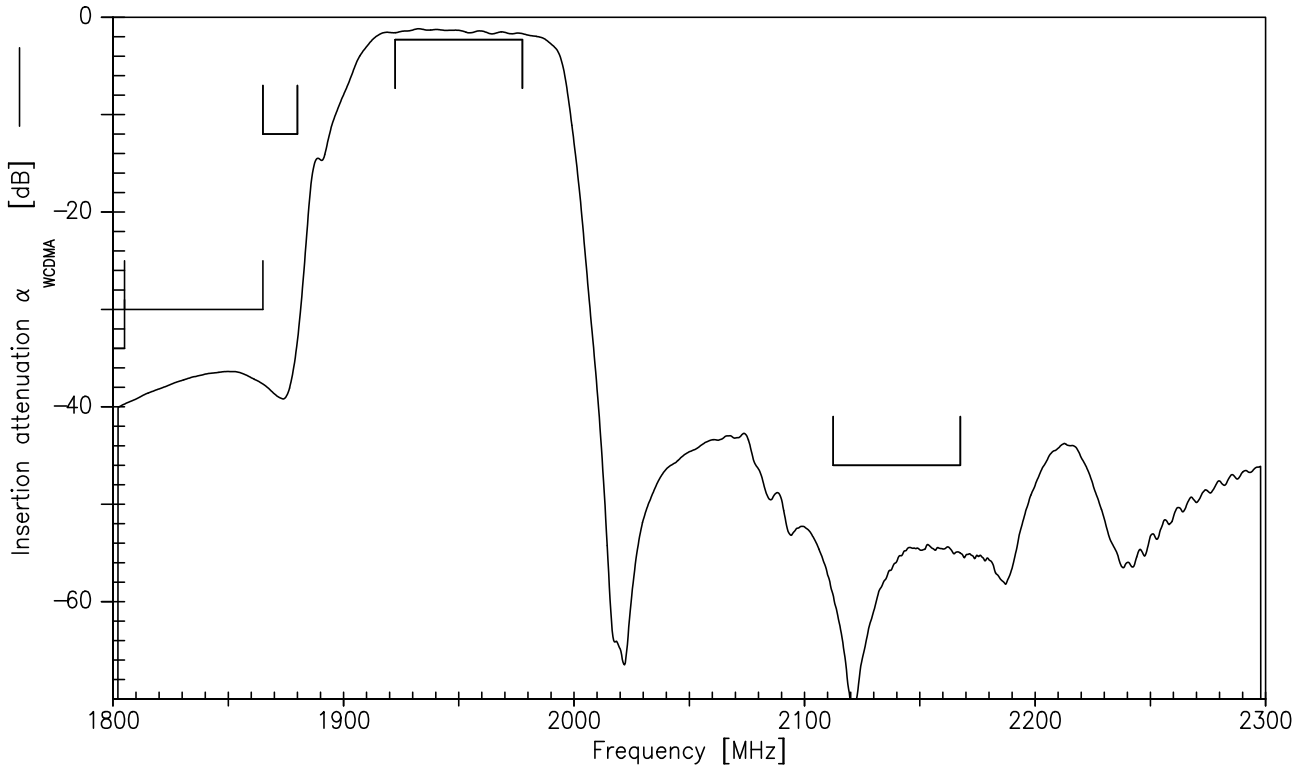
$$\int_{-\infty}^{\infty} \left| H_{RRC}(f) \right|^2 df = 1$$

Maximum Ratings

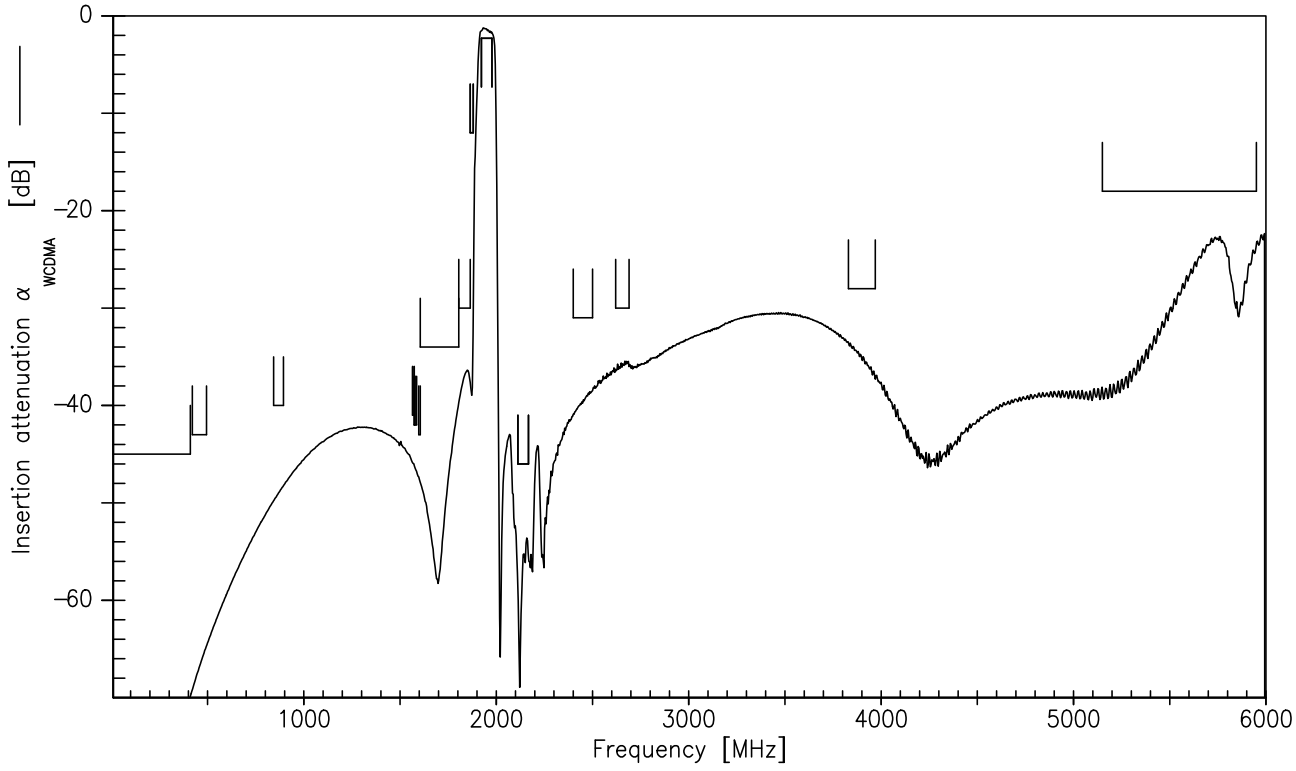
Operable temperature range	T	–40/+85	˚C	
Storage temperature range	T_{stg}	–40/+85	˚C	
DC voltage	V_{DC}	0	V	
ESD voltage	V_{ESD}	50[1)]	V	machine model, 10 pulses
Input power at				
1920.0 ... 1980.0 MHz	P_{in}	29	dBm	} continuous wave
elsewhere	P_{in}	10	dBm	} 50 ˚C, 5000h

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

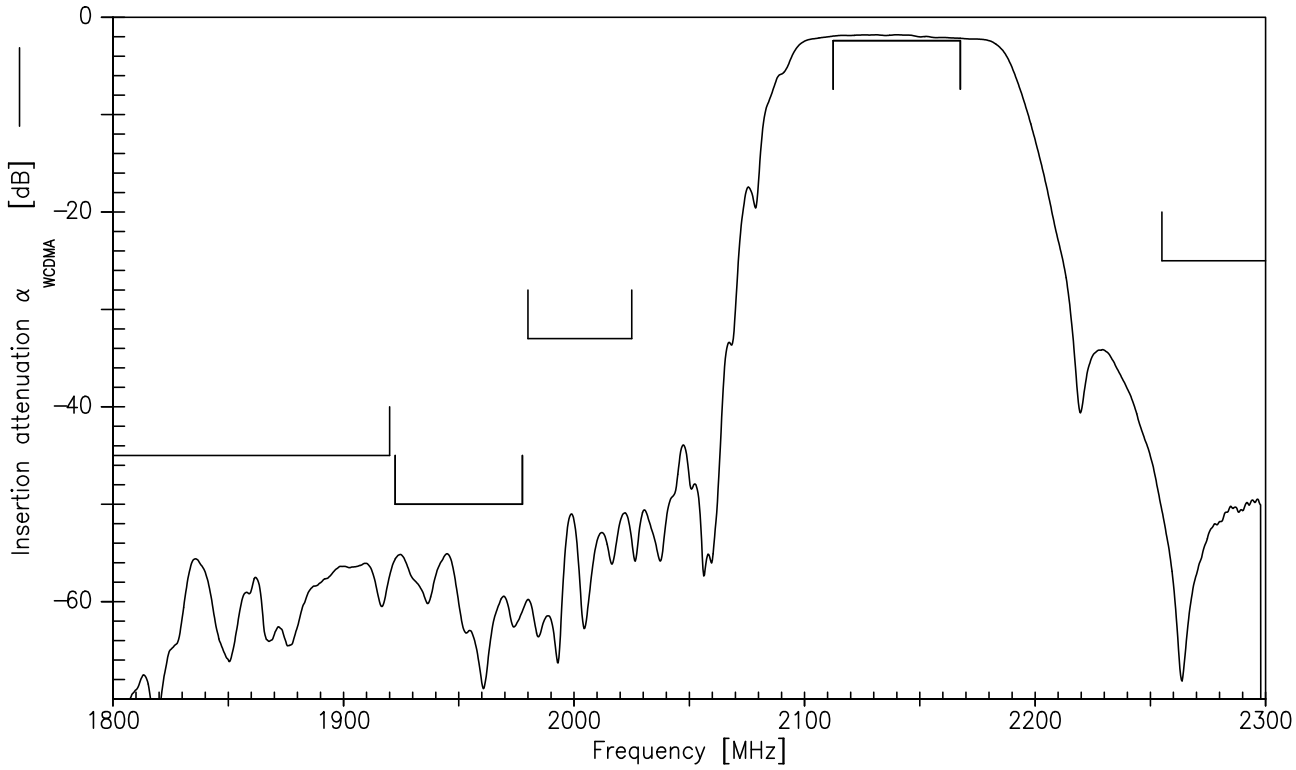
Frequency Response TX-ANT



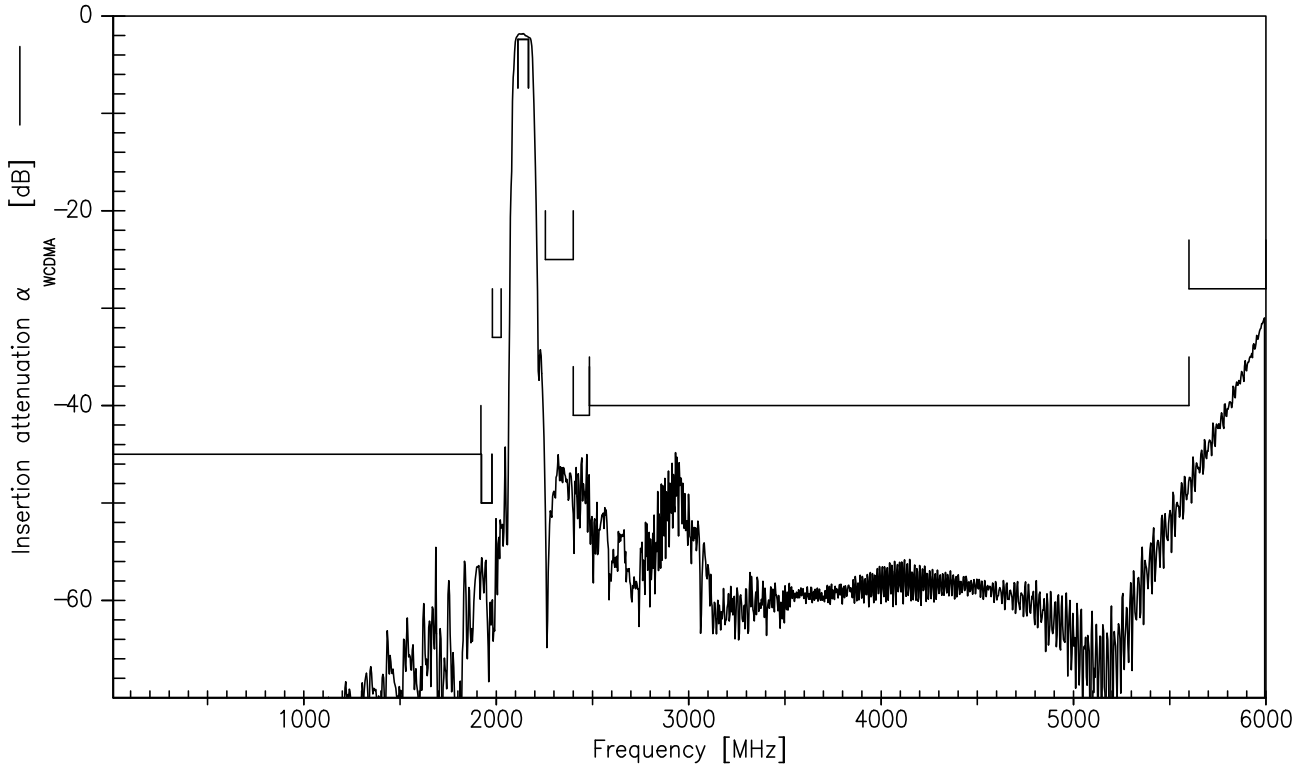
Frequency Response TX-ANT (wideband)



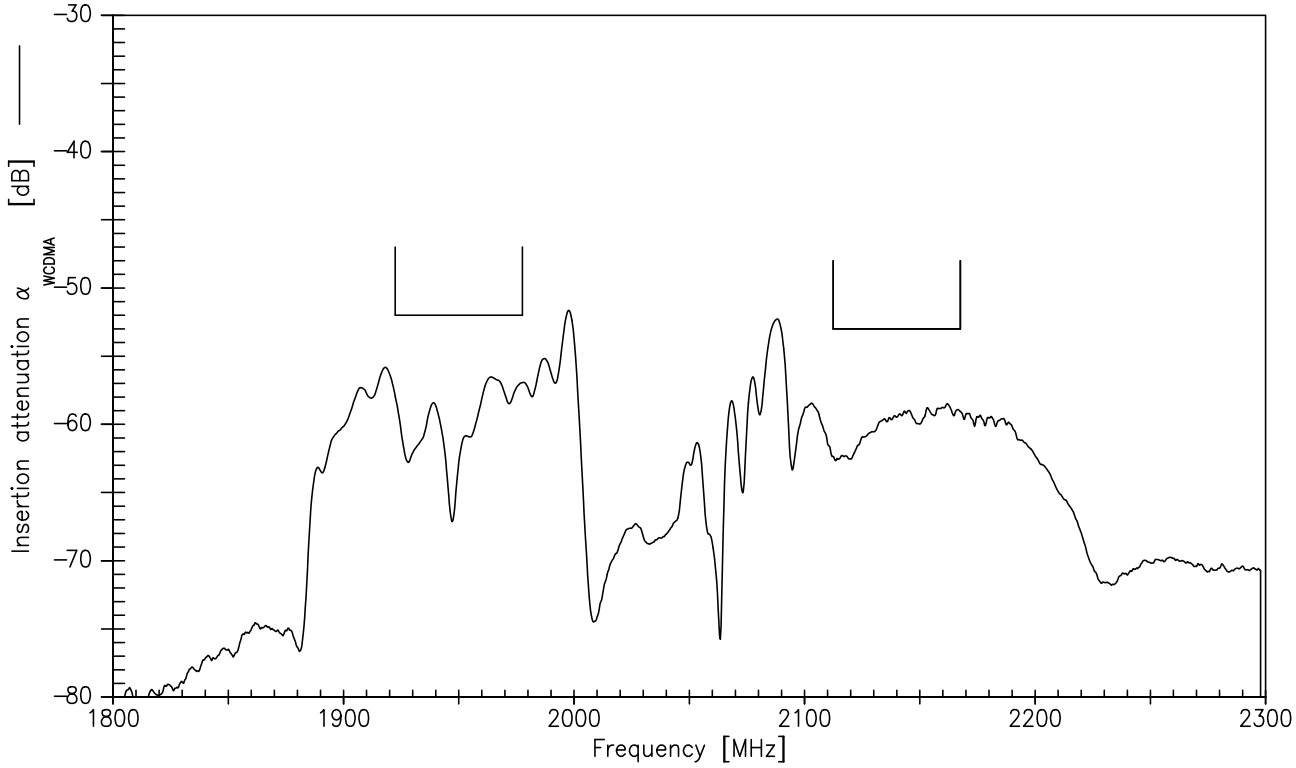
Frequency Response RX-ANT



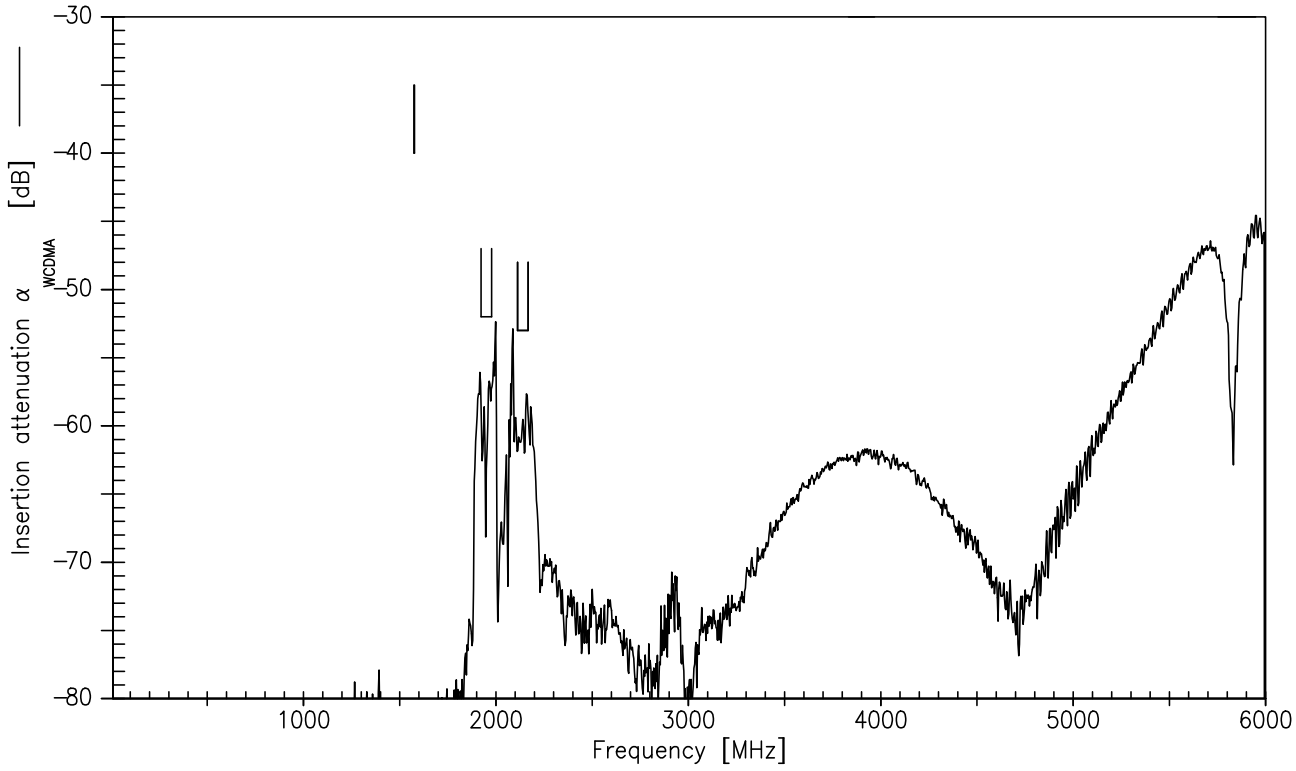
Frequency Response RX-ANT (wideband)



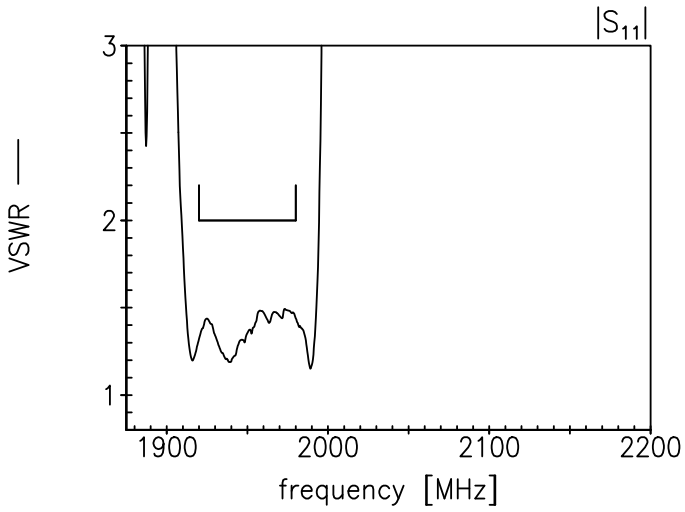
Frequency Response TX-RX

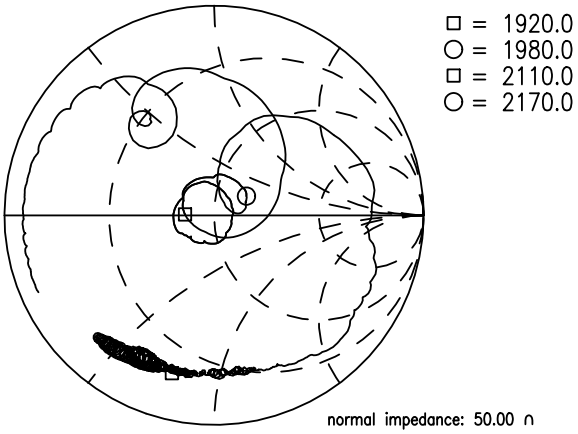


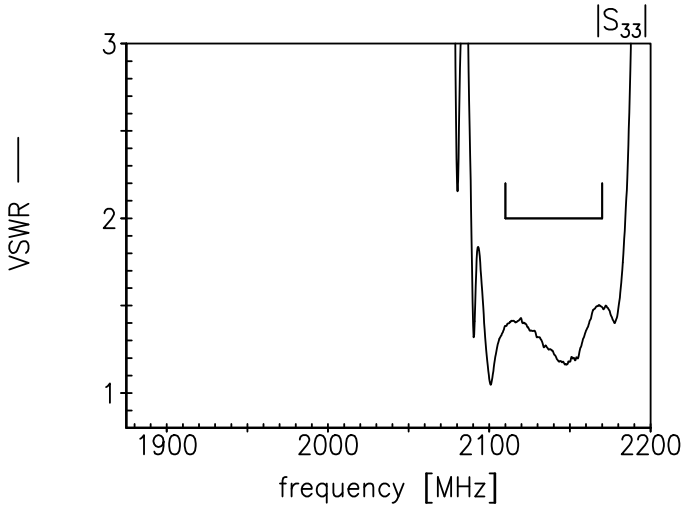
Frequency Response TX-RX (wideband)

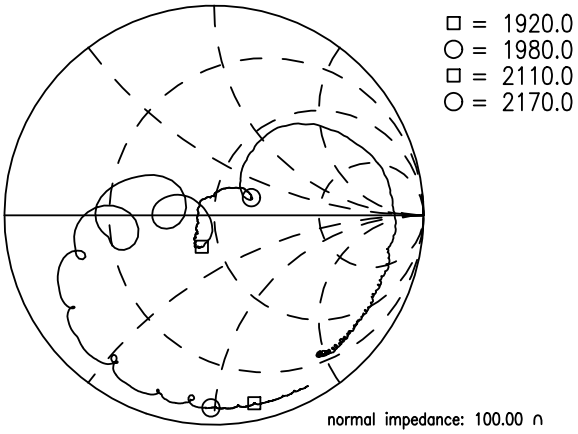


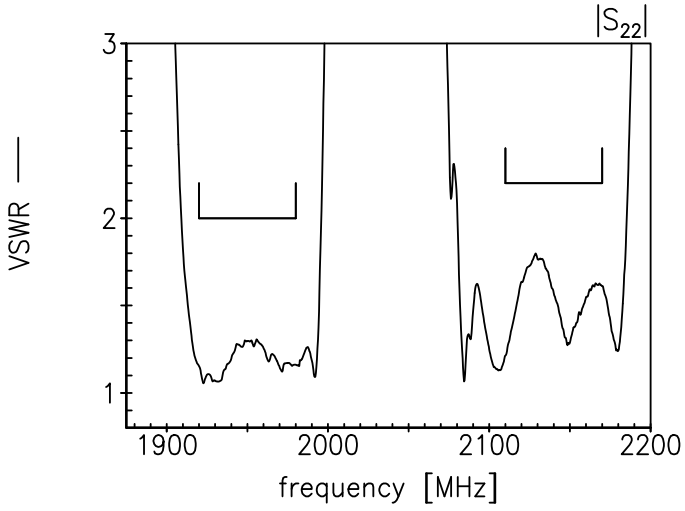
Return Loss **S_{11} TX- port** **S_{33} RX-port** **S_{22} ANT-port**

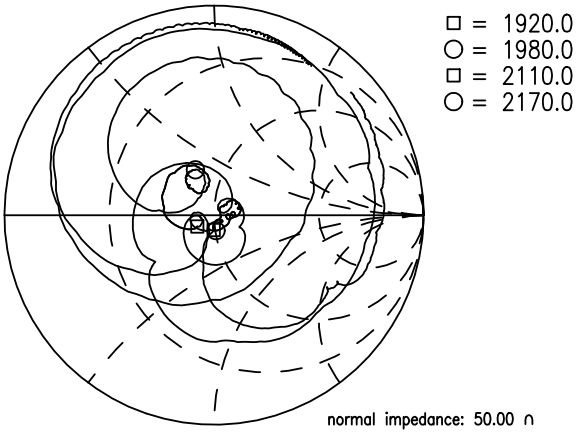












References

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 8th, 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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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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