



RF360 Europe GmbH

A Qualcomm – TDK Joint Venture

## SAW Components

### SAW Duplexer

Automotive telematics

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

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# SAW Components

## SAW Duplexer

Automotive telematics

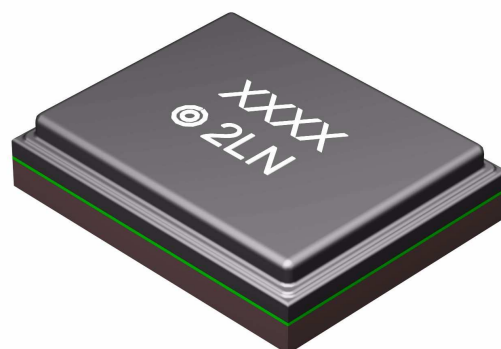
<b>Series/type:</b>	<b>B4400</b>
<b>Ordering code:</b>	<b>B39212B4400P810</b>
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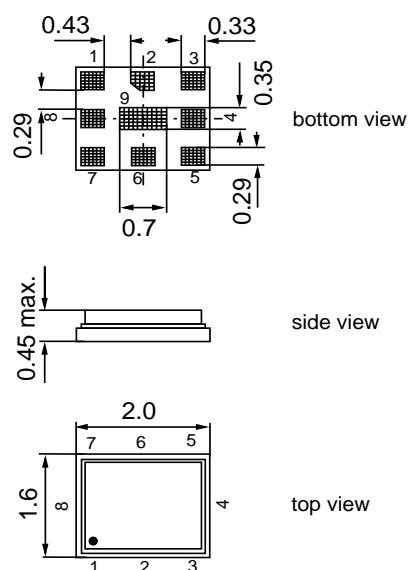
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**Application**

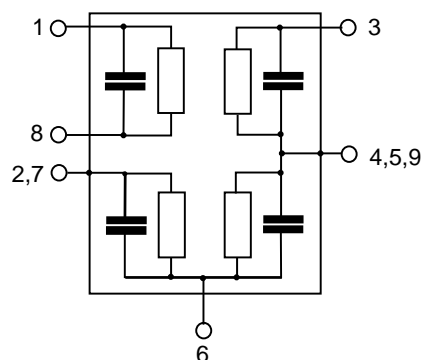
- Low-loss SAW duplexer for W-CDMA Band 1 (UMTS) systems
- Low insertion attenuation
- Low amplitude ripple
- Usable passband 60 MHz
- Single-ended to balanced transformation in Antenna-Rx path
- Impedance transformation 50 Ω to 100 Ω in Antenna-Rx path
- High isolation between Tx and Rx


**Features**

- Package size 2.0 \* 1.6 mm<sup>2</sup>
- 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



Data sheet


**Characteristics**

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

Characteristics Tx-Antenna		min.	typ. @ 25 °C	max.	
<b>Center frequency</b>	f <sub>c</sub>		1950.0		MHz
<b>Maximum insertion attenuation</b>	α <sub>W-CDMA</sub> <sup>1)</sup>				
1922.4 ... 1977.6 MHz		—	1.7	2.3	dB
<b>Amplitude ripple (p-p)</b>	α <sub>W-CDMA</sub> <sup>1)</sup>				
1922.4 ... 1977.6 MHz		—	0.5	1.1	dB
<b>Error Vector Magnitude</b>	EVM <sup>2)</sup>				
1922.4 ... 1977.6 MHz		—	1.4	2.3	%
<b>TX port VSWR</b>					
1920.0 ... 1980.0 MHz		—	1.6	2.0	
<b>ANT port VSWR</b>					
1920.0 ... 1980.0 MHz		—	1.4	2.0	
<b>Attenuation</b>	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 <sub>W-CDMA</sub> <sup>1)</sup>	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

Data sheet


**Characteristics**

Temperature range for specification:	T = -20 °C to +85 °C
TX terminating impedance:	Z <sub>TX</sub> = 50 Ω    6.0 nH
ANT terminating impedance:	Z <sub>Ant</sub> = 50 Ω    2.2 nH
RX terminating impedance:	Z <sub>RX</sub> = 100 Ω (balanced)    17 nH

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

Data sheet


**Characteristics**

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

Characteristics Antenna-Rx				min.	typ. @ 25 °C	max.	
<b>Attenuation</b>			$\alpha$				
	10.0 ... 1920.0	MHz		45	53	—	dB
	1922.4 ... 1977.6	MHz	$\alpha_{W-CDMA}^{1)}$	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.

Data sheet


**Characteristics**

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

Characteristics Tx-Rx				min.	typ. @ 25 °C	max.	
<b>Differential Mode Isolation</b>							
			α				
1574.0	...	1577.0	MHz	40	79	—	dB
1922.4	...	1977.6	MHz	52	57	—	dB
2112.4	...	2167.6	MHz	53	59	—	dB
3830.0	...	3970.0	MHz	30	61	—	dB
5750.0	...	5950.0	MHz	30	44	—	dB
<b>Common Mode Isolation</b>							
			α				
1922.4	...	1977.6	MHz	42	45	—	dB

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



Data sheet


**Annotation for characteristics section**

Attenuation of W-CDMA signal (Power Transfer Function,  $\alpha_{W-CDMA}$ ) 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:

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

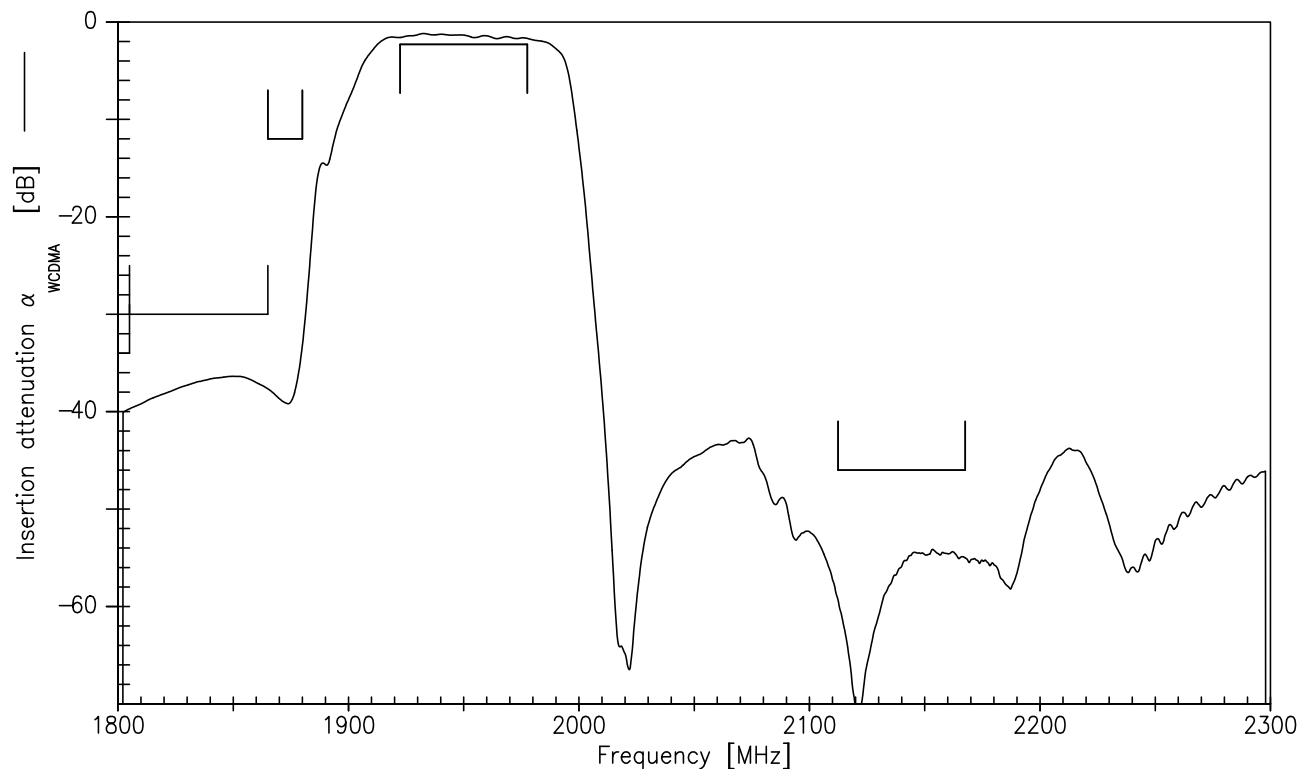
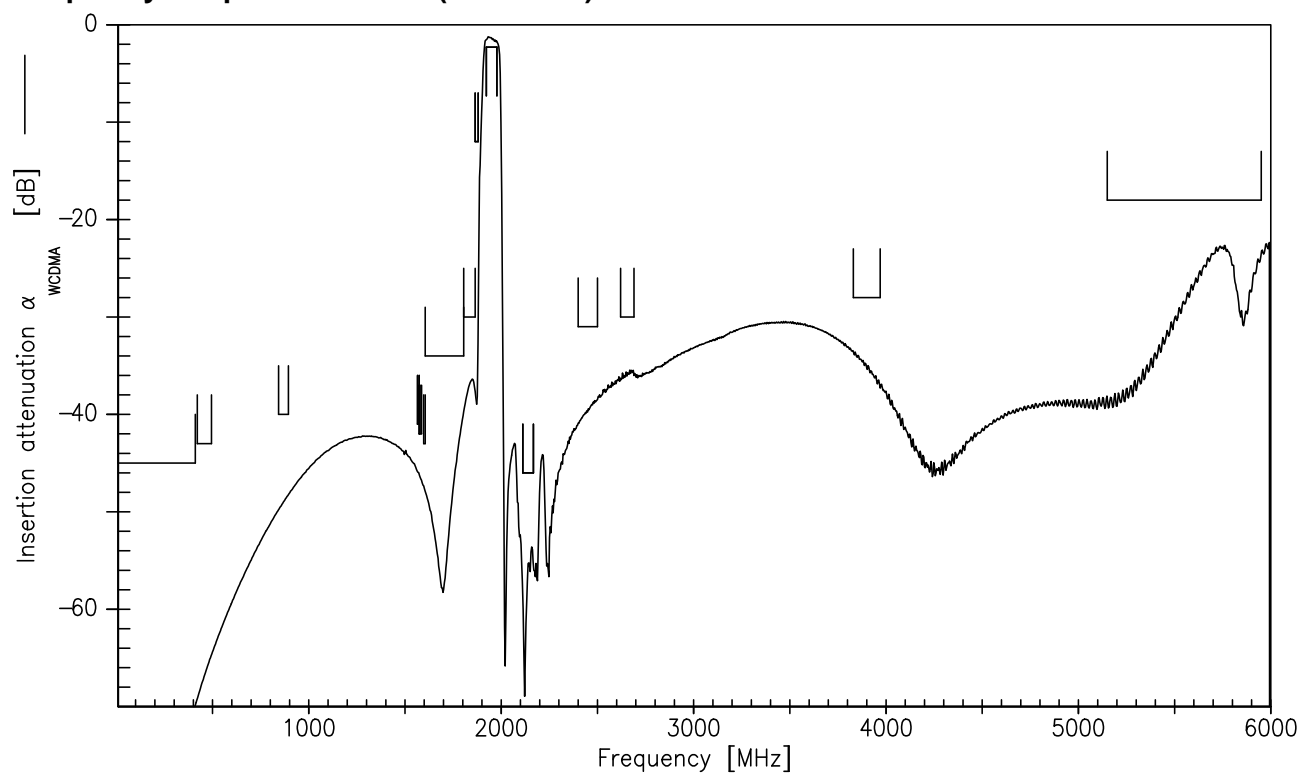
Data sheet


**Maximum Ratings**

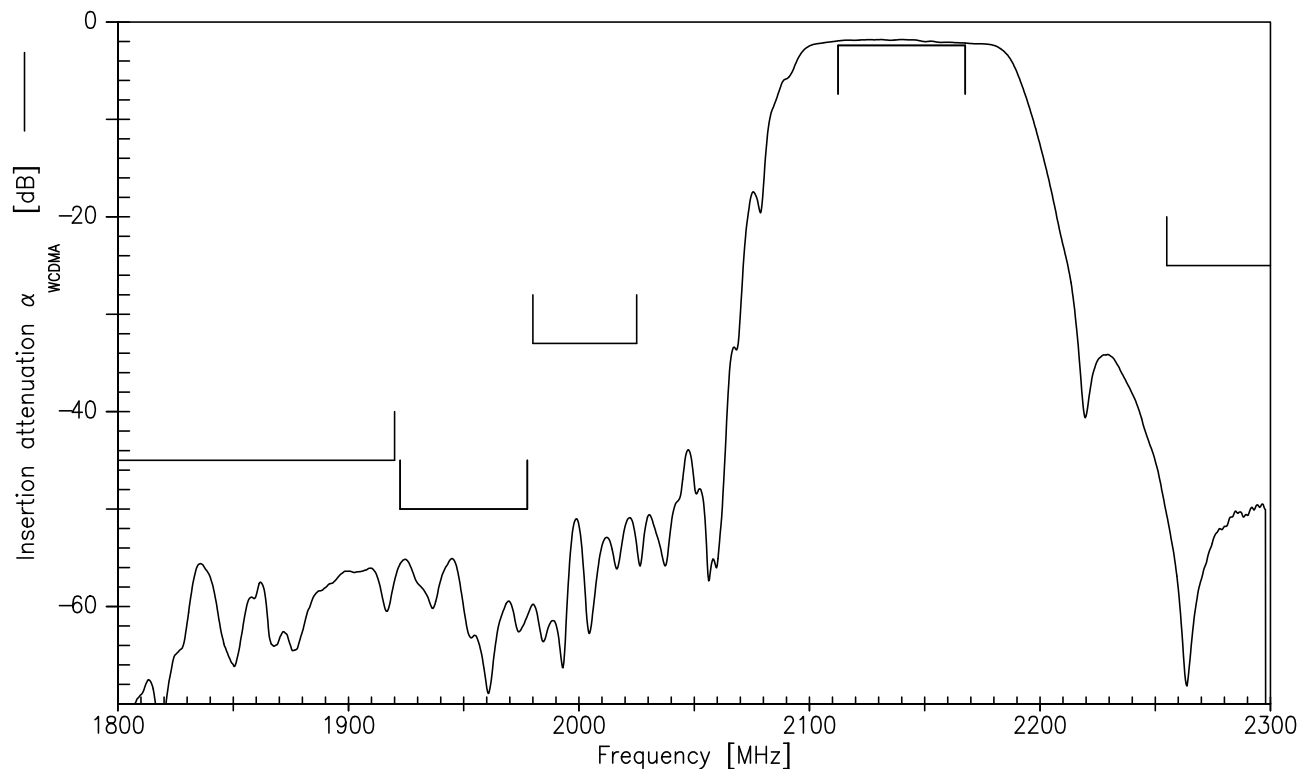
Operable temperature range	T	-40/+85	°C	
Storage temperature range	T <sub>stg</sub>	-40/+85	°C	
DC voltage	V <sub>DC</sub>	0	V	
ESD voltage	V <sub>ESD</sub>	50 <sup>1)</sup>	V	machine model, 10 pulses
Input power at				
1920.0 ... 1980.0 MHz	P <sub>in</sub>	29	dBm	} continuous wave 50 °C, 5000h
elsewhere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

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

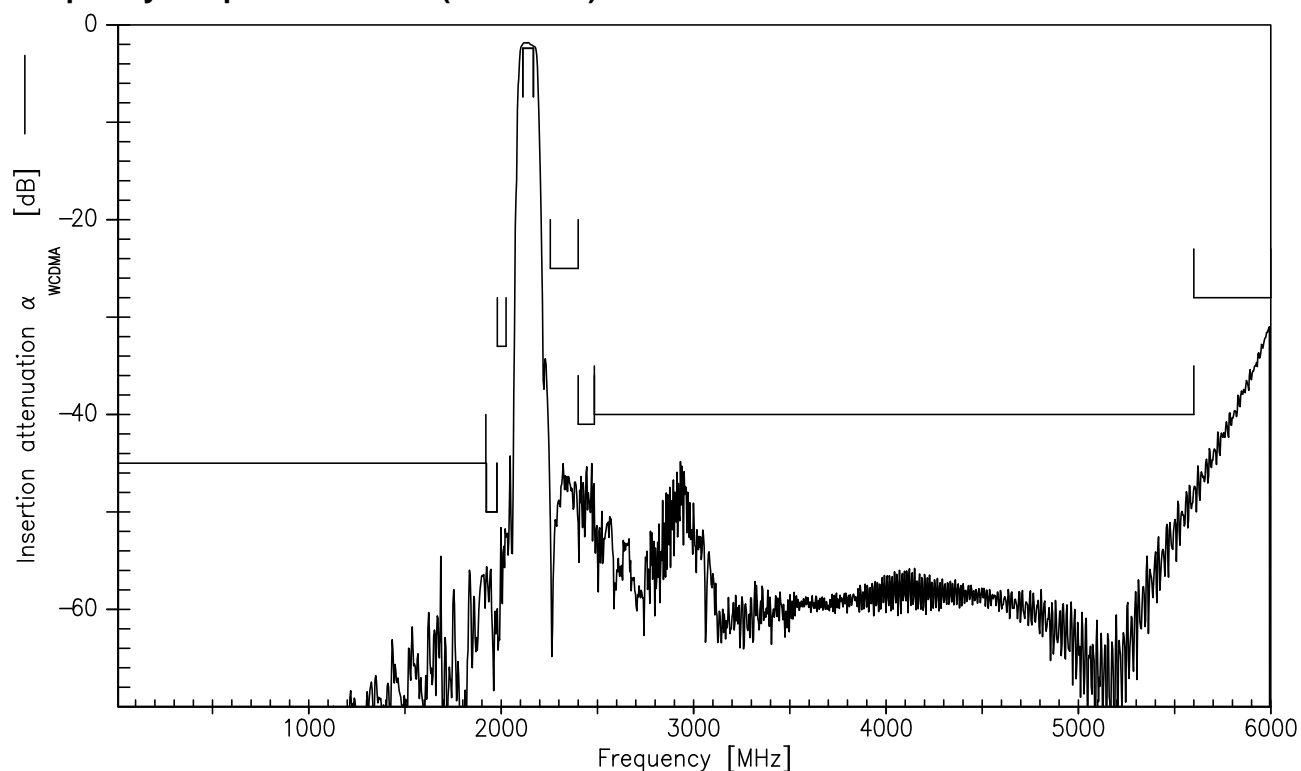
Data sheet


**Frequency Response TX-ANT**

**Frequency Response TX-ANT (wideband)**


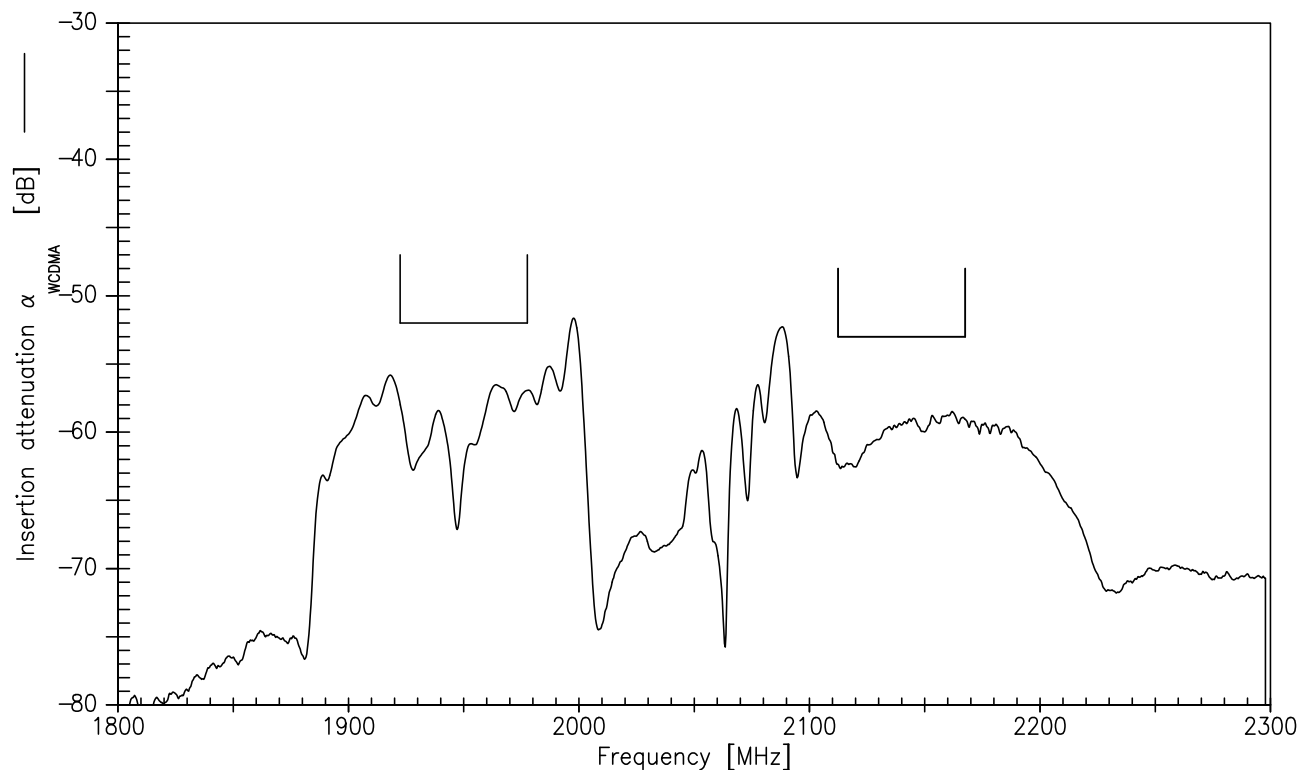
Frequency Response RX-ANT



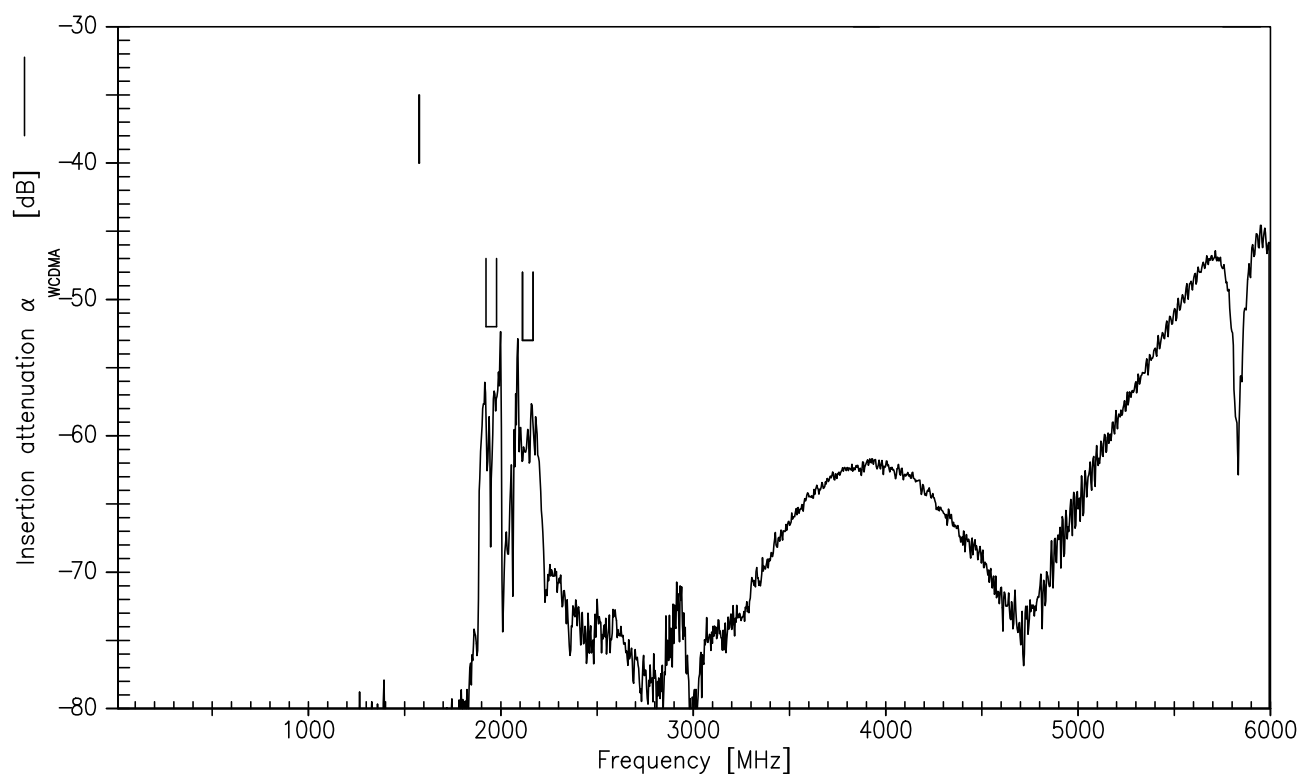
Frequency Response RX-ANT (wideband)



Frequency Response TX-RX



Frequency Response TX-RX (wideband)



Data sheet

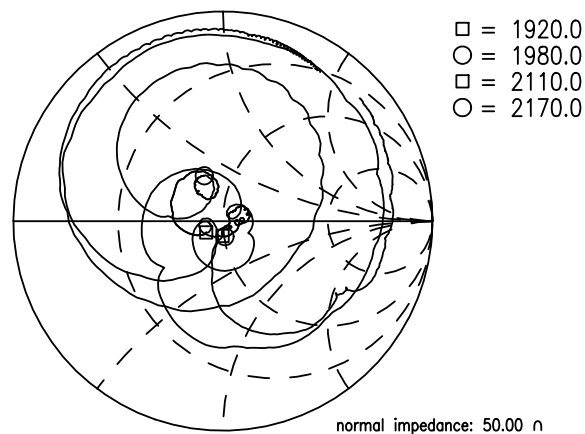
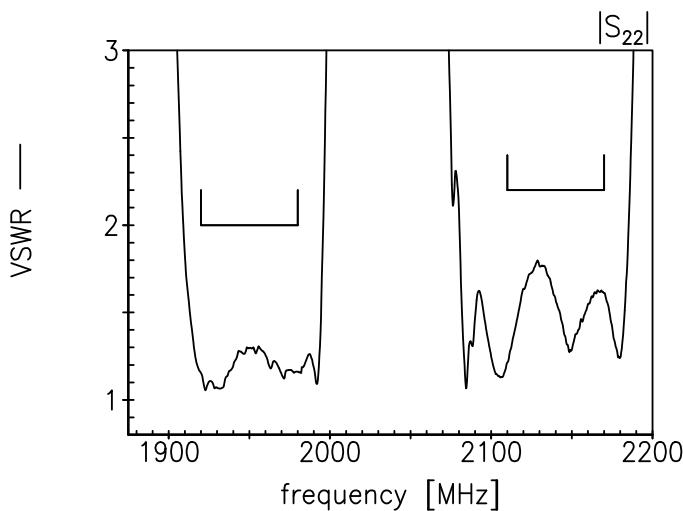
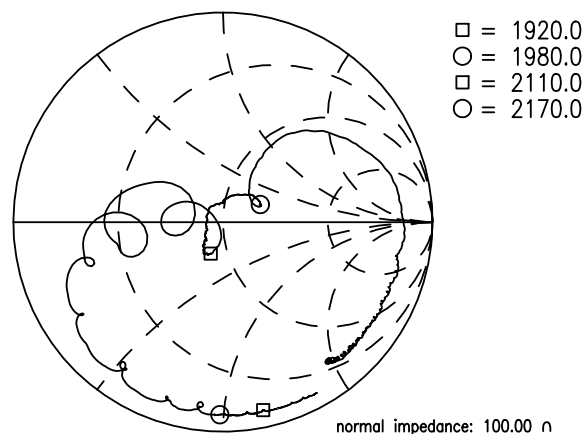
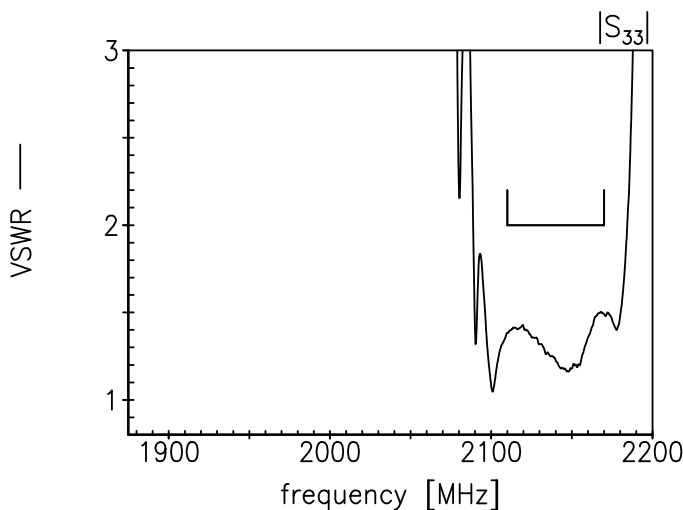
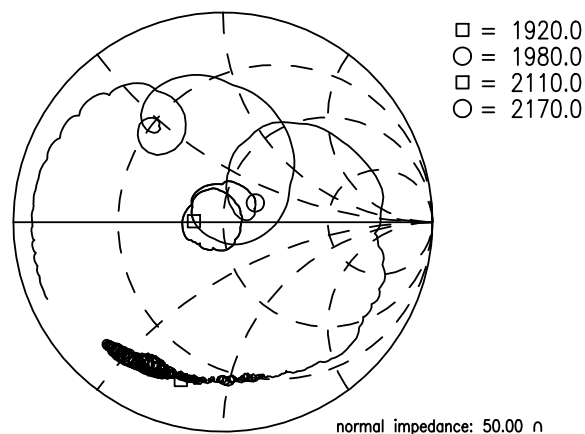
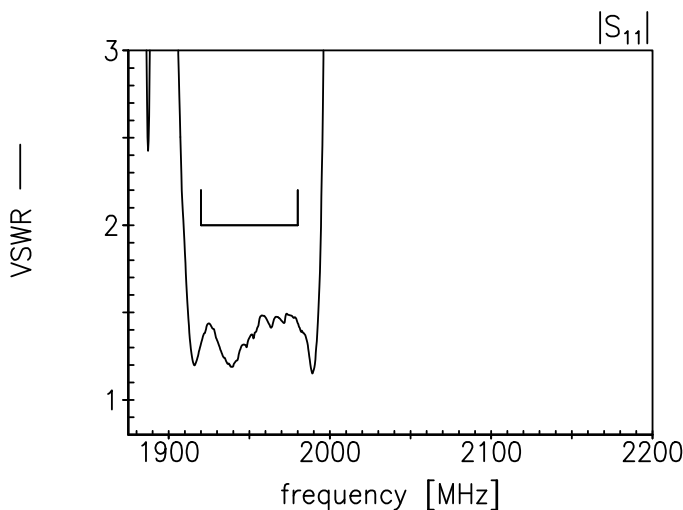
**SMD**

Return Loss

$S_{11}$  TX- port

$S_{33}$  RX-port

$S_{22}$  ANT-port



Data sheet



References

<b>Type</b>	B4400
<b>Ordering code</b>	B39212B4400P810
<b>Marking and package</b>	C61157-A8-A50
<b>Packaging</b>	F61074-V8247-Z000
<b>Date codes</b>	L_1126
<b>S-parameters</b>	B4400_NB_UN.s4p, B4400_WB_UN.s4p See file header for port/pin assignment table.
<b>Soldering profile</b>	S_6001
<b>RoHS compatible</b>	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 <sup>th</sup> , 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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<b>Matching coils</b>	See Inductor pdf-catalog <a href="http://www.tdk.co.jp/tefe02/coil.htm#aname1">http://www.tdk.co.jp/tefe02/coil.htm#aname1</a> and Data Library for circuit simulation <a href="http://www.tdk.co.jp/etvcl/index.htm">http://www.tdk.co.jp/etvcl/index.htm</a>

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