SAW Components

SAW Duplexer

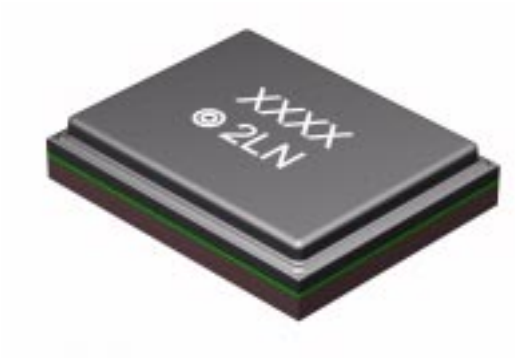
Automotive telematics

Series/type:	**B4408**
Ordering code:	**B39212B4408P810**
Date:	July 23, 2014
Version:	2.0

EPCOS AG is a TDK Group Company.

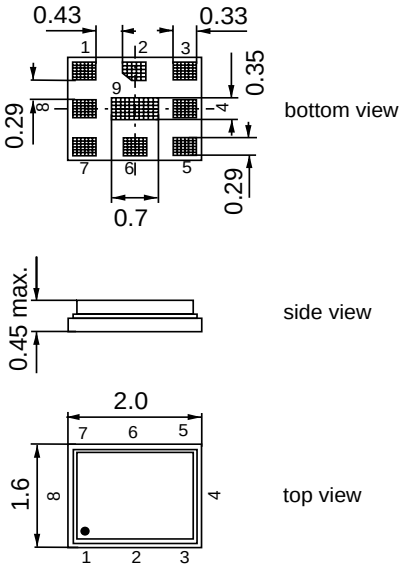
Application

- Low-loss SAW duplexer for W-CDMA Band 1 (UMTS) systems
- Low insertion attenuation
- Low amplitude ripple
- Usable passband 60 MHz
- High isolation between Tx and Rx



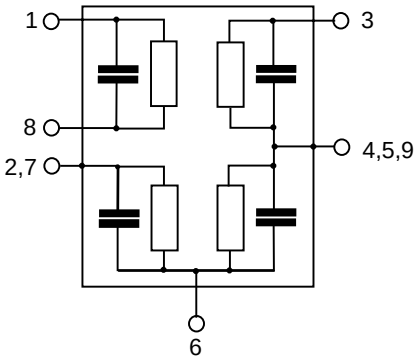
Features

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



Pin configuration

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



Characteristics

Temperature range for specification: T = –40 ˚C to +85 ˚C
TX terminating impedance: Z_{Tx} = 50 Ω
ANT terminating impedance: Z_{Ant} = 50 Ω || 2.4 nH
RX teminating impedance: Z_{Rx} = 50 Ω || 36.0 nH

Characteristics Tx-Antenna						min.	typ. @ 25 ˚C	max.	
Center frequency					f_c	—	1950.0	—	MHz
Maximum insertion attenuation									
@$f_{Carrier}$	1922.4	...	1977.6	MHz	$\alpha_{W\text{-}CDMA}$ [1)]	—	1.7	2.1	dB
	1920.0	...	1980.0	MHz		—	1.8	2.3	dB
Amplitude ripple (p-p)									
@$f_{Carrier}$	1922.4	...	1977.6	MHz	$\alpha_{W\text{-}CDMA}$ [1)]	—	0.5	0.9	dB
	1920.0	...	1980.0	MHz		—	0.6	1.0	dB
Error Vector Magnitude									
@$f_{Carrier}$	1922.4	...	1977.6	MHz	EVM [2)]	—	1.0	2.0	%
TX port VSWR									
	1920.0	...	1980.0	MHz		—	1.7	2.2	
ANT port VSWR									
	1920.0	...	1980.0	MHz		—	1.6	2.1	
Attenuation					α				
	50.0	...	420.0	MHz		46	53	—	dB
	420.0	...	494.0	MHz		44	50	—	dB
	494.0	...	894.0	MHz		35	42	—	dB
	894.0	...	1457.9	MHz		32	38	—	dB
	1457.9	...	1565.4	MHz		33	39	—	dB
	1565.4	...	1605.9	MHz		34	40	—	dB
	1605.9	...	1805.0	MHz		30	36	—	dB
	1805.0	...	1880.0	MHz		15	36	—	dB
	2020.0	...	2110.0	MHz		15	36	—	dB
	2110.0	...	2170.0	MHz		42	47	—	dB
	2170.0	...	2400.0	MHz		30	35	—	dB
	2400.0	...	2500.0	MHz		28	33	—	dB
	2500.0	...	2690.0	MHz		23	28	—	dB
	2690.0	...	3830.0	MHz		22	27	—	dB

Characteristics Tx-Antenna		min.	typ. @ 25 ˚C	max.	
Attenuation (cont.)					
3830.0 ... 3970.0 MHz		22	35	—	dB
3970.0 ... 4900.0 MHz		20	28	—	dB
4900.0 ... 5150.0 MHz		18	27	—	dB
5150.0 ... 6000.0 MHz		12	19	—	dB

1) Attenuation of W-CDMA signal (Power Transfer Function). Please, refer to page 8 of this document.
2) Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141

Characteristics

Temperature range for specification: T = –40 ˚C to +85 ˚C
TX terminating impedance: Z_{Tx} = 50 Ω
ANT terminating impedance: Z_{Ant} = 50 Ω || 2.4 nH
RX teminating impedance: Z_{Rx} = 50 Ω || 36.0 nH

Characteristics Antenna-Rx						min.	typ. @ 25 ˚C	max.	
Center frequency					f_c	—	2140.0	—	MHz
Maximum insertion attenuation									
@$f_{Carrier}$	2112.4	...	2167.6	MHz	$\alpha_{W\text{-}CDMA}$ [1)]	—	2.4	3.0	dB
	2110.0	...	2170.0	MHz		—	2.5	3.3	dB
Amplitude ripple (p-p)									
@$f_{Carrier}$	2112.4	...	2167.6	MHz	$\alpha_{W\text{-}CDMA}$ [1)]	—	0.7	1.3	dB
	2110.0	...	2170.0	MHz		—	0.8	1.5	dB
Error Vector Magnitude									
@$f_{Carrier}$	2112.4	...	2167.6	MHz	EVM [2)]	—	1.0	2.0	%
ANT port VSWR									
	2110.0	...	2170.0	MHz		—	1.6	2.1	
RX port VSWR									
	2110.0	...	2170.0	MHz		—	1.5	2.1	
Attenuation					α				
	50.0	...	814.0	MHz		48	55	—	dB
	814.0	...	915.0	MHz		45	53	—	dB
	915.0	...	1427.9	MHz		42	46	—	dB
	1427.9	...	1605.9	MHz		40	45	—	dB
	1605.9	...	1790.0	MHz		35	42	—	dB
	1790.0	...	1920.0	MHz		38	45	—	dB
	1920.0	...	1980.0	MHz		43	50	—	dB
	1980.0	...	2075.0	MHz		10	18	—	dB
	2210.0	...	2255.0	MHz		18	26	—	dB
	2255.0	...	2400.0	MHz		38	46	—	dB
	2400.0	...	2500.0	MHz		36	46	—	dB
	2500.0	...	2700.0	MHz		36	47	—	dB
	2700.0	...	4030.0	MHz		26	41	—	dB

Characteristics Antenna-Rx	min.	typ. @ 25 ˚C	max.	
Attenuation (cont.)				
4030.0 ... 4150.0 MHz	20	40	—	dB
4150.0 ... 4340.0 MHz	22	38	—	dB
4340.0 ... 4900.0 MHz	24	38	—	dB
4900.0 ... 6000.0 MHz	30	43	—	dB

1) Attenuation of W-CDMA signal (Power Transfer Function). Please, refer to page 8 of this document.
2) Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141

Characteristics

Temperature range for specification: T = –40 ˚C to +85 ˚C
TX terminating impedance: Z_{Tx} = 50 Ω
ANT terminating impedance: Z_{Ant} = 50 Ω || 2.4 nH
RX teminating impedance: Z_{Rx} = 50 Ω || 36.0 nH

Characteristics Tx-Rx		min.	typ. @ 25 ˚C	max.	
Isolation	α				
1920.0 ... 1980.0 MHz		45	50	—	dB
1980.0 ... 2110.0 MHz		40	49	—	dB
2110.0 ... 2170.0 MHz		44	53	—	dB
1574.0 ... 1577.0 MHz		42	56	—	dB
3830.0 ... 3970.0 MHz		30	47	—	dB
5750.0 ... 5950.0 MHz		20	42	—	dB

Annotation for characteristics section

Attenuation of W-CDMA signal (Power Transfer Function, $\alpha_{W\text{-}CDMA}$) is determined by

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

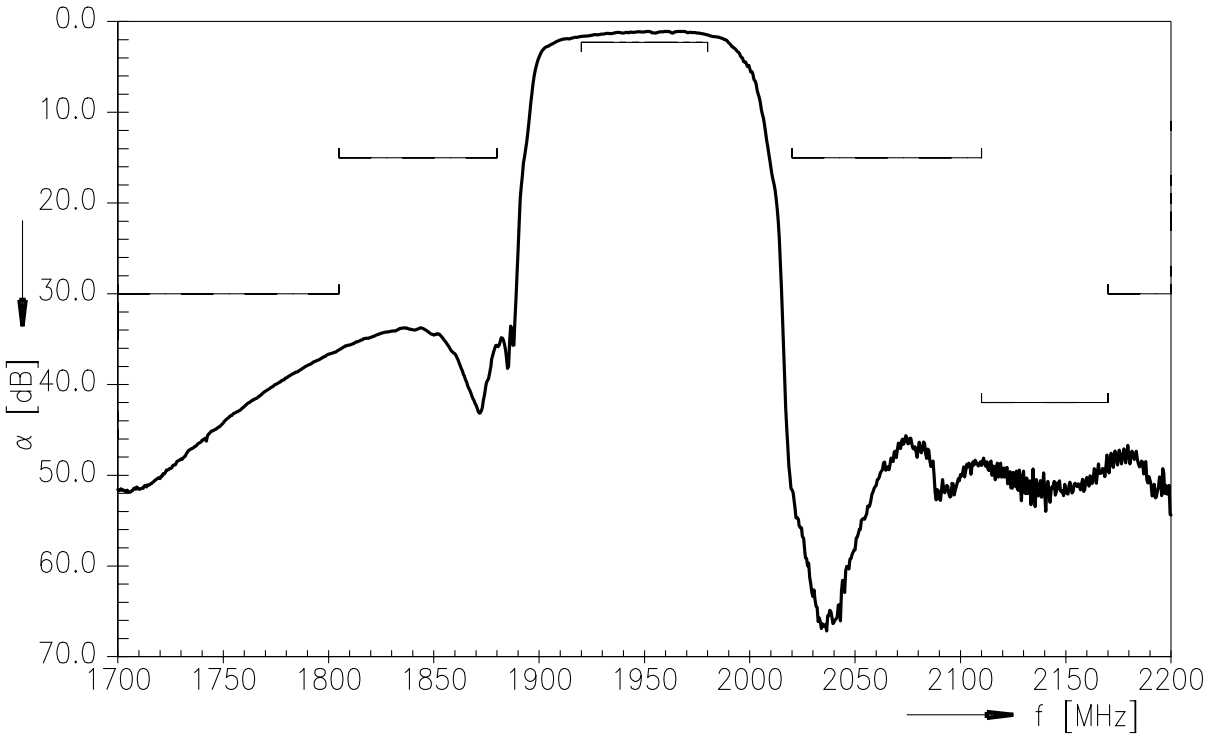
with $f_{Carrier}$ according to 3GPP TS 25.101 (e.g. for UMTS pass band, $f_{Carrier}$ ranges from 1922.4 MHz (lowest Tx channel) to 1967.6 MHz (highest Tx channel)). Here, $H_{RRC}(f)$ is the transfer function of the root-raised cosine transmit pulse shaping filter according to 3GPP TS 25.101 with the following normalization:

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

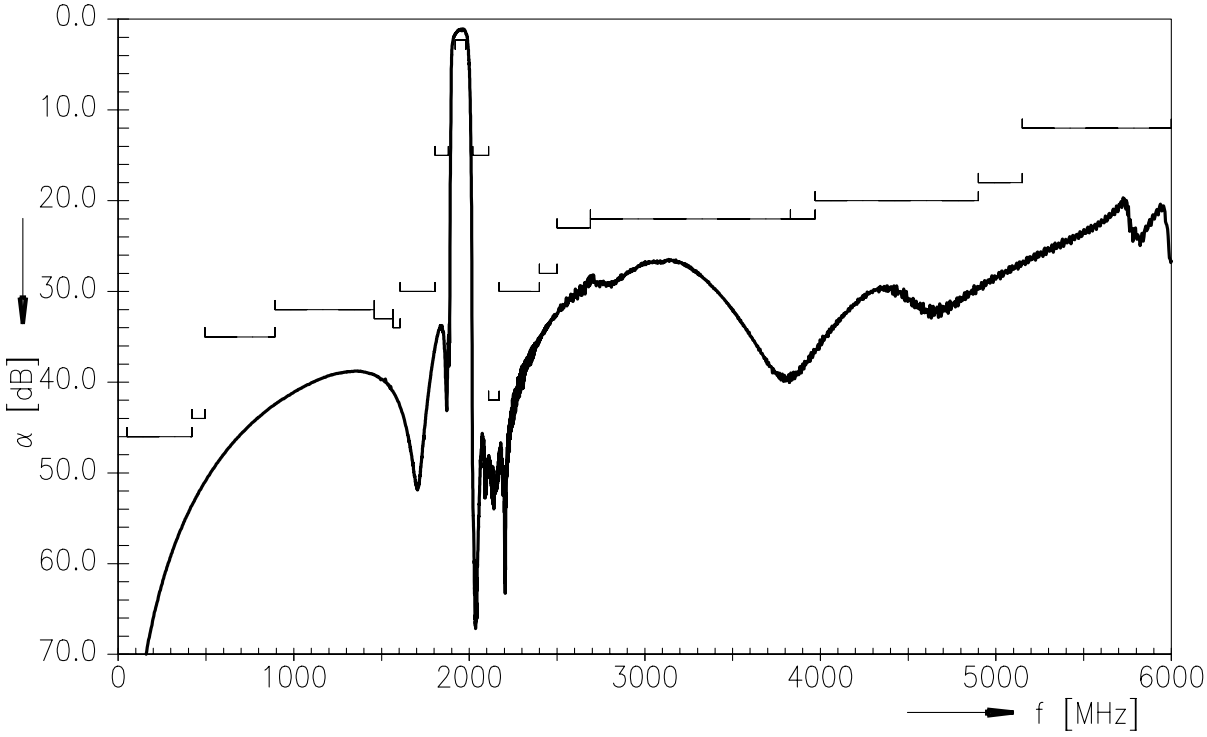
Maximum ratings

Operable temperature range	T	–40/+85	˚C	
Storage temperature range	T_{stg}	–40/+85	˚C	
DC voltage	V_{DC}	0	V	
Input power at				
1920.0 ... 1980.0 MHz	P_{in}	26	dBm	} continuous wave
elsewhere	P_{in}	10	dBm	} 50 ˚C, 5000h

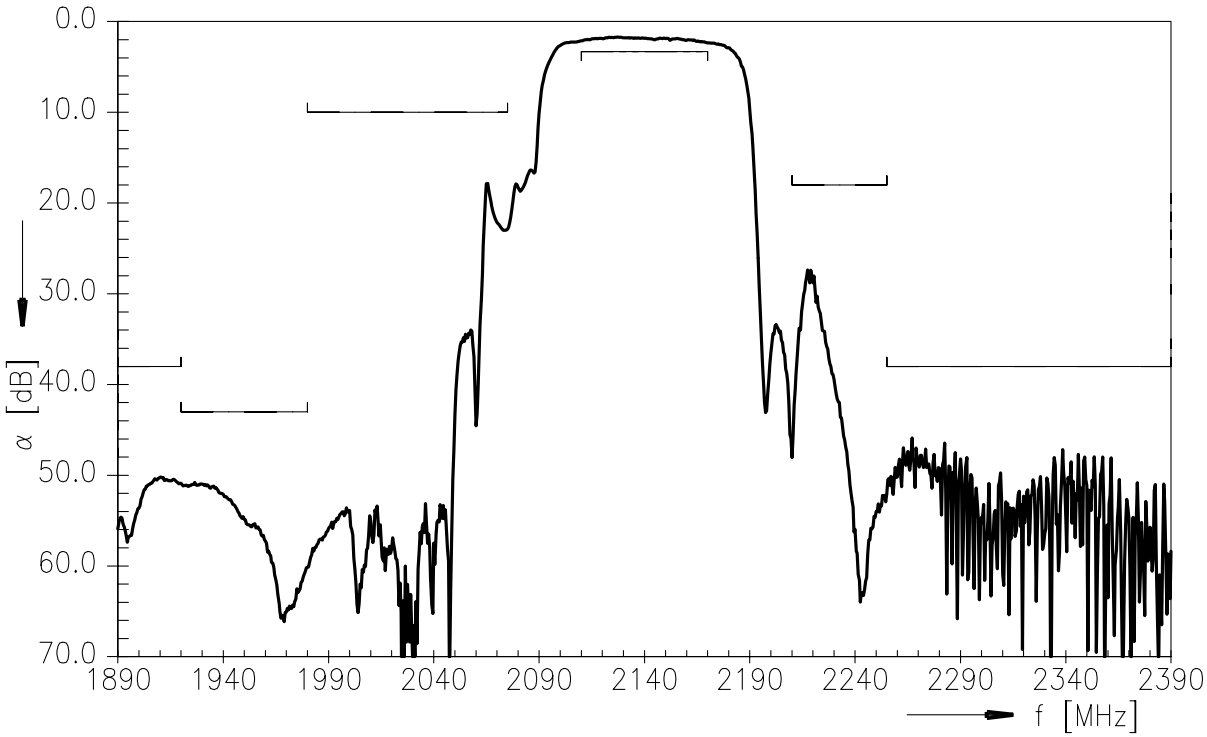
Frequency Response TX-ANT



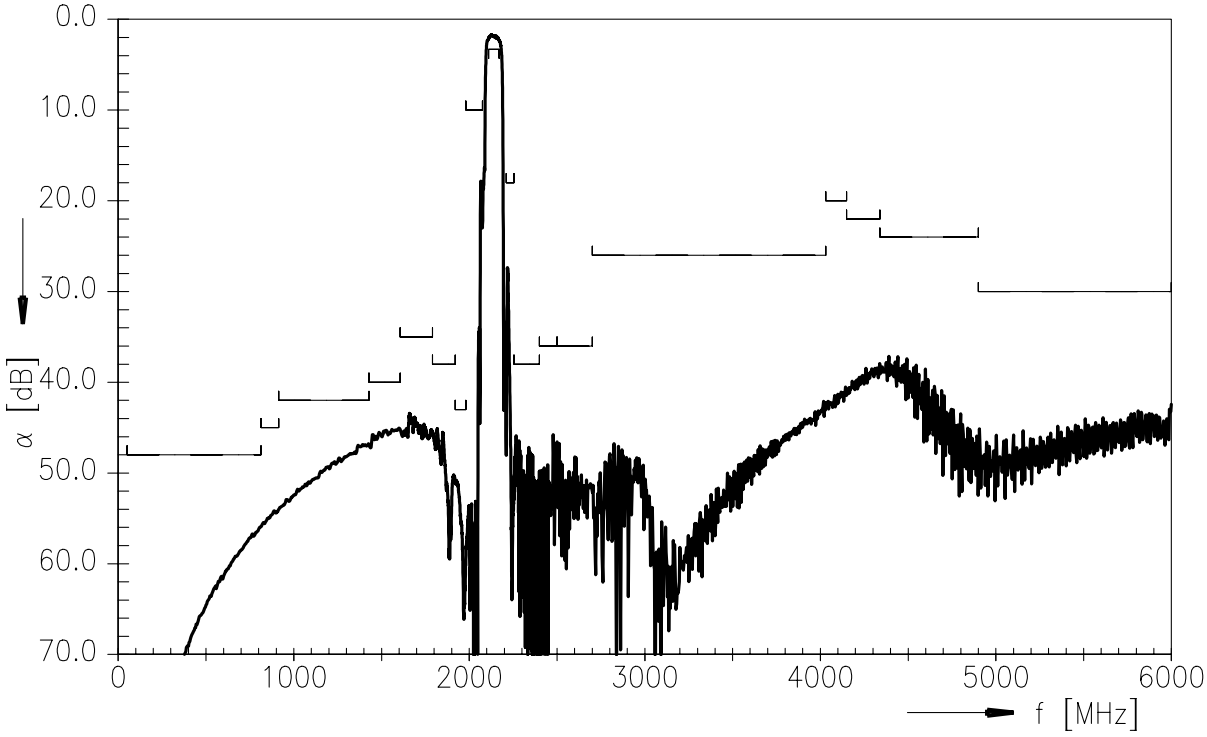
Frequency Response TX-ANT (wideband)



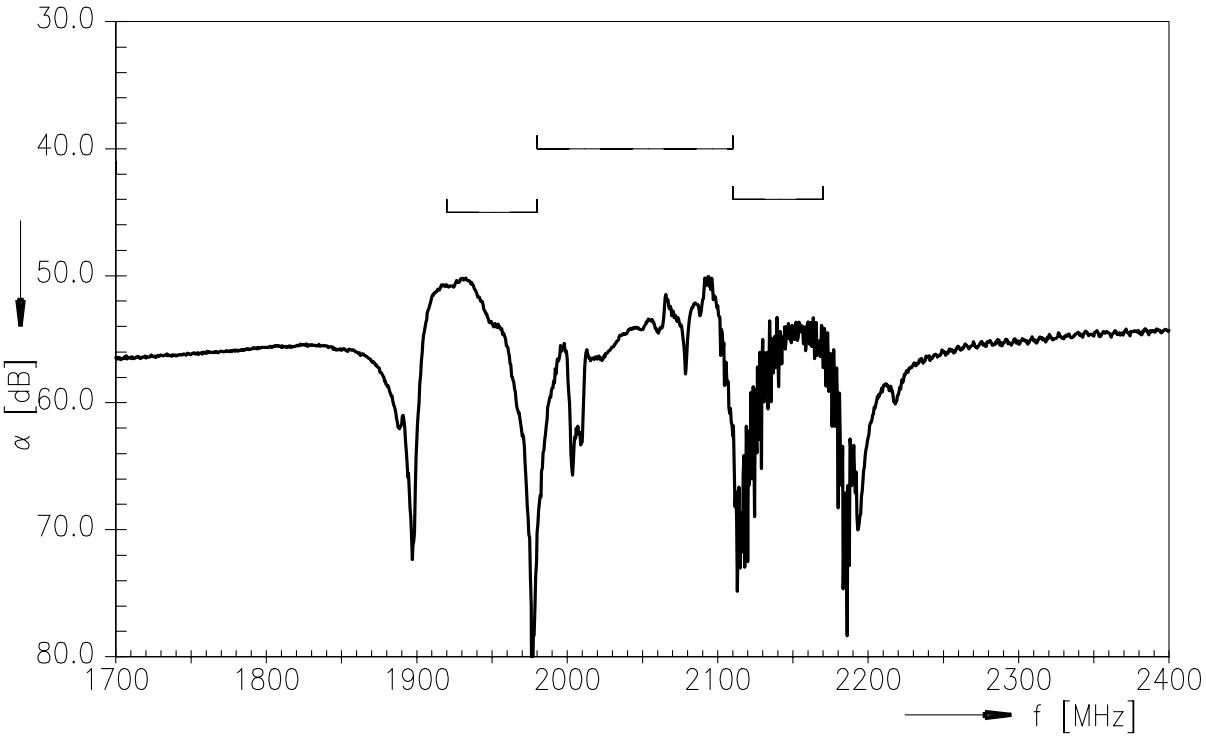
Frequency Response RX-ANT



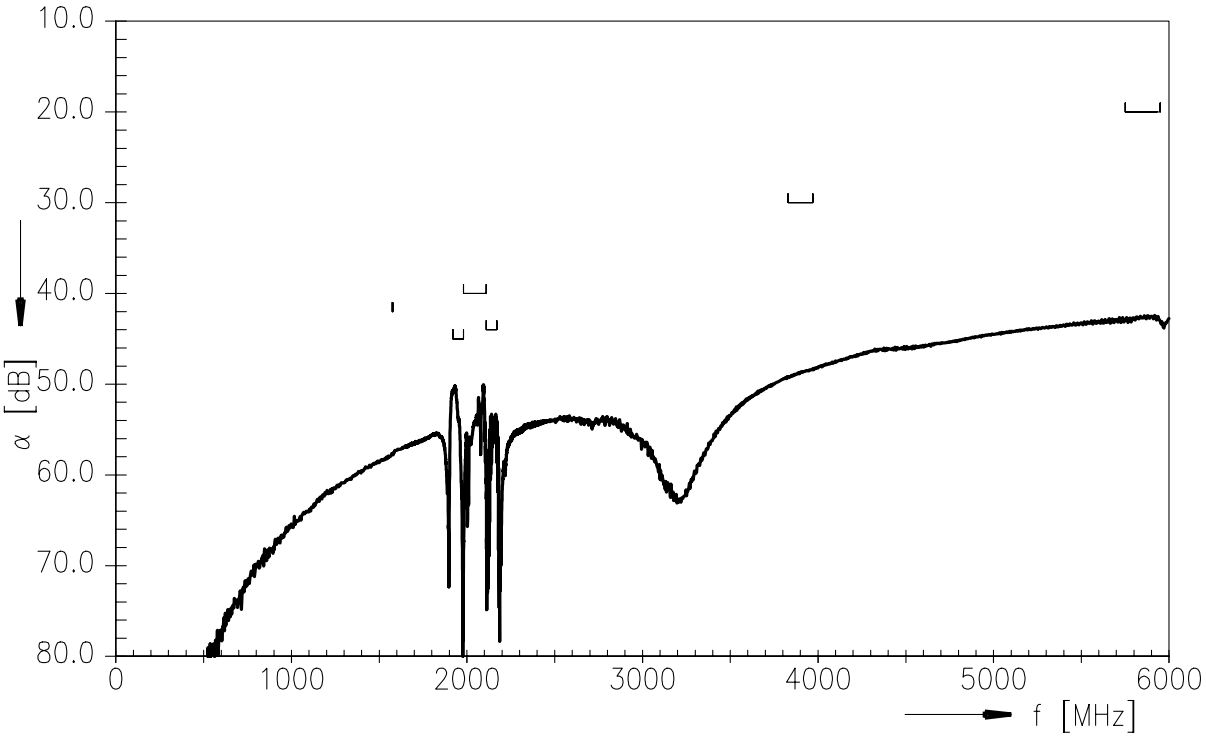
Frequency Response RX-ANT (wideband)



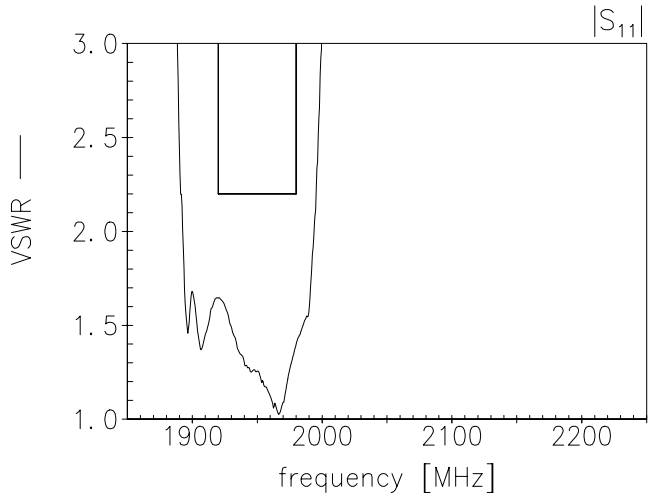
Frequency Response TX-RX

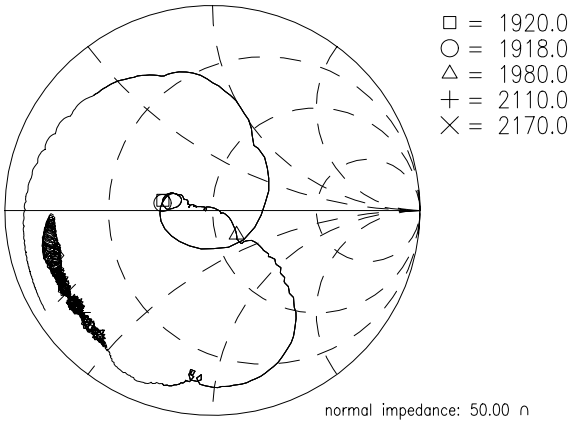


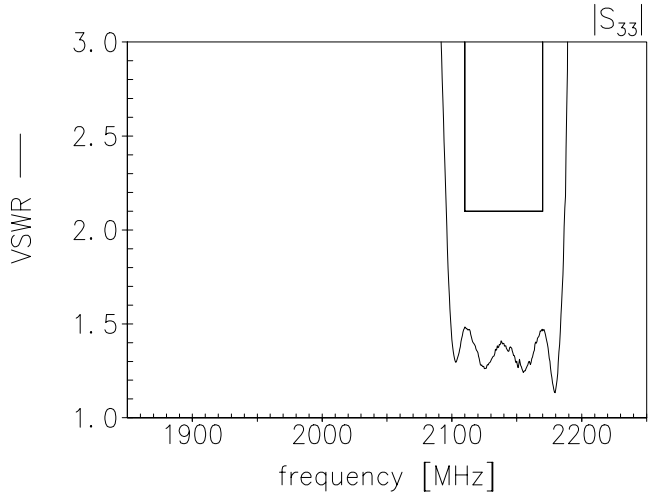
Frequency Response TX-RX (wideband)

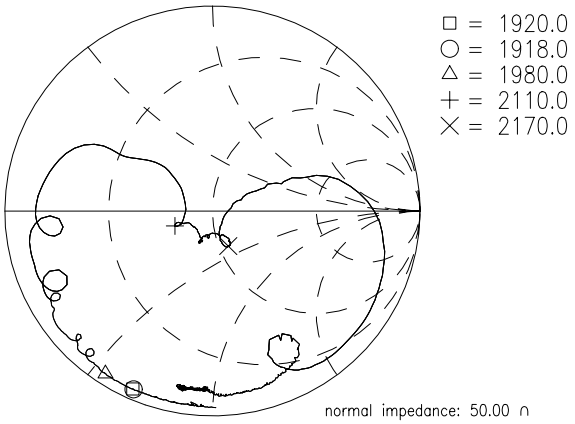


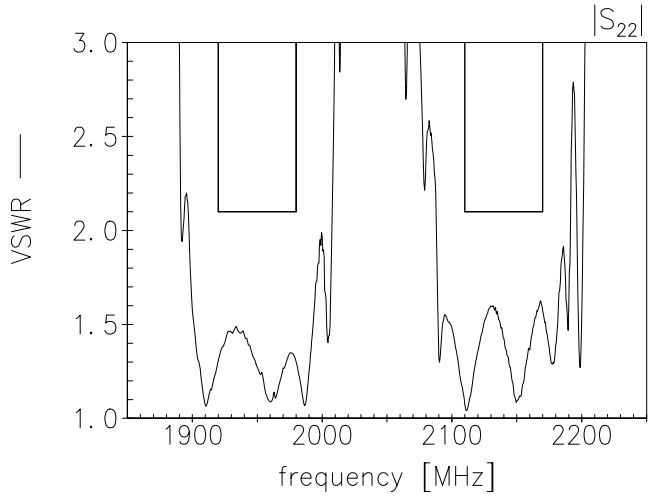
Return Loss **S_{11} TX- port** **S_{33} RX-port** **S_{22} ANT-port**

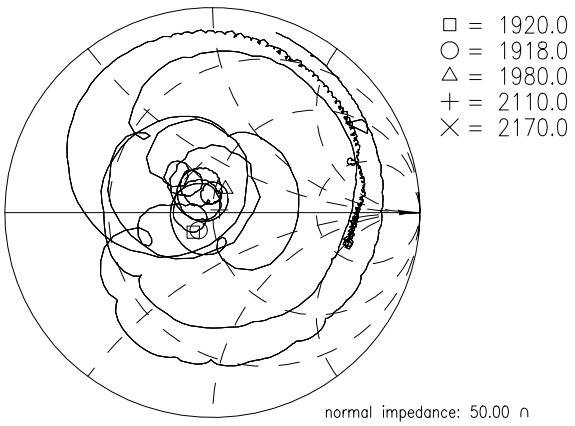












References

Type	B4408
Ordering code	B39212B4408P810
Marking and package	C61157-A8-A50
Packaging	F61074-V8247-Z000
Date codes	L_1126
S-parameters	B4408_NB_UN.s3p, B4408_WB_UN.s3p 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.
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 for a large variety of matching coils.

For further information please contact your local EPCOS sales office or visit our webpage at www.epcos.com .

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