SAW Components

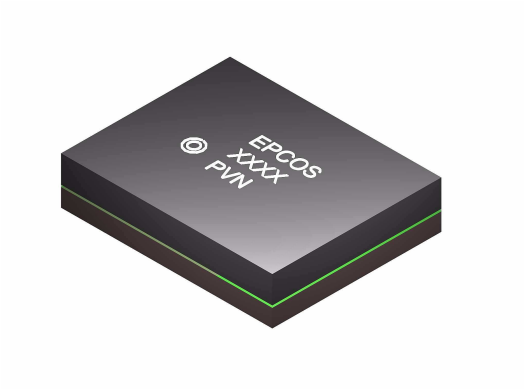
SAW Duplexer

WCDMA Band 2

Series/type:	**B8650**
Ordering code:	**B39202B8650P810**
Date:	Mar 20, 2015
Version:	2.0

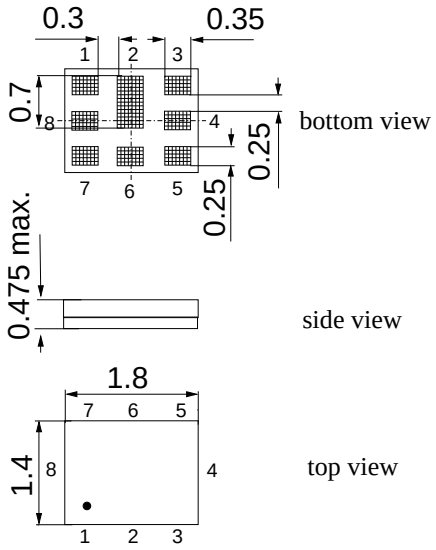
Application

- SAW duplexer for mobile telephoneWCDMA Band II systems
- Low insertion attenuation
- Low amplitude ripple
- Usable passband 60 MHz



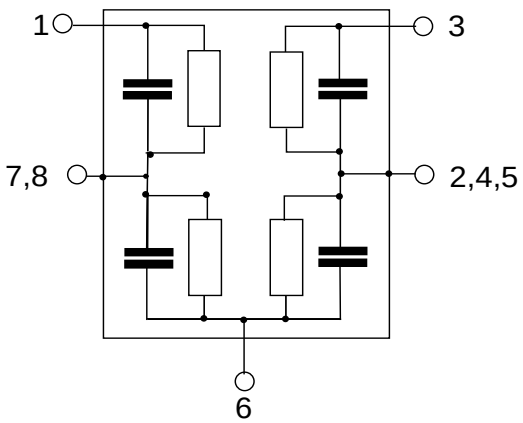
Features

- Package size 1.8 x 1.4 mm²
- Max. package height 0.475 mm
- RoHS compatible
- Approx. weight 0.0042g
- Package for **S**urface **M**ount **T**echnology (**SMT**)
- Ni, Au-plated terminals
- **E**lectrostatic **S**ensitive **D**evice (**ESD**)
- **M**oisture **S**ensitivity **L**evel **3**



Pin configuration

3	TX Input
1	RX Output
6	Antenna
2, 4, 5, 7,8	To be grounded



Characteristics

Temperature range for specification: T = –30 ˚C to +90 ˚C
Antenna terminating impedance: Z_{ANT}= 50 Ω
RX terminating impedance: Z_{RX} = 50 Ω ll 9.1 nH
TX terminating impedance: Z_{TX} = 50 Ω

Characterisitcs TX - ANT		min.	typ. @ 25 ˚C	max.	
Center frequency	f_C	—	1880	—	MHz
Maximum insertion attenuation	α_{WCDMA}[1]				
@$f_{Carrier}$1852.4 ... 1907.6 MHz		—	2.0	3.5	dB
@$f_{Carrier}$1852.4 ... 1907.6 MHz		—	1.8[2]	2.3[2]	dB
Amplitude ripple (p-p)	$\Delta\alpha_{WCDMA}$[1]				
@$f_{Carrier}$1852.4 ... 1907.6 MHz		—	1.0	2.5	dB
@$f_{Carrier}$1852.4 ... 1907.6 MHz		—	0.8[2]	2.3[2]	dB
Error Vector Magnitude	EVM[3]				
@$f_{Carrier}$1852.4 ... 1907.6 MHz		—	1.4	6.5	%
@$f_{Carrier}$1852.4 ... 1907.6 MHz		—	1.0[2]	3.5[2]	%
Input VSWR (TX port)					
1850.0 ... 1910.0 MHz		—	1.4	2.0	
1850.0 ... 1910.0 MHz		—	1.4[2]	2.0[2]	
Output VSWR (ANT port)					
1850.0 ... 1910.0 MHz		—	1.5	2.1	
1850.0 ... 1910.0 MHz		—	1.5[2]	2.0[2]	

1) Attenuation of WCDMA signal (“Powertransferfunction”). Please refer to annotation on page (8).
2) Valid for T=+65 ˚C
3) Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.

Characteristics

Temperature range for specification: T = –30 ˚C to +90 ˚C
Antenna terminating impedance: Z_{ANT} = 50 Ω
RX terminating impedance: Z_{RX} = 50 Ω ll 9.1 nH
TX terminating impedance: Z_{TX} = 50 Ω

Characterisitcs TX - ANT					min.	typ. @ 25 ˚C	max.	
Absolute attenuation				α				
	10.0	... 728.0	MHz		30	35	—	dB
	704.0	... 716.0	MHz		30	35	—	dB
	728.0	... 764.0	MHz		30	35	—	dB
	777.0	... 787.0	MHz		30	35	—	dB
	869.0	... 894.0	MHz		33	36	—	dB
	1226.0	...1250.0	MHz		40	43	—	dB
	1605.886	...1680.0	MHz		40	43	—	dB
@$f_{Carrier}$	1932.4	...1987.6	MHz	α_{WCDMA} [1]	28	49	—	dB
@$f_{Carrier}$	1932.4	...1987.6	MHz	α_{WCDMA} [1]	45 [2]	50 [2]	—	dB
	2010.0	...2025.0	MHz		35	38	—	dB
	2110.0	...2155.0	MHz		40	43	—	dB
	2350.0	...2360.0	MHz		37	40	—	dB
	2400.0	...2500.0	MHz		32	35	—	dB
	3700.0	...3820.0	MHz		17	20	—	dB
	4900.0	...5850.0	MHz		5	10	—	dB
	5254.0	...5455.0	MHz		5	10	—	dB
	5520.0	...5845.0	MHz		18	23	—	dB
	5540.0	...5950.0	MHz		15	21	—	dB

[1] Attenuation of WCDMA signal (“Powertransferfunction”). Please refer to annotation on page (8).
[2] Valid for T=+65 ˚C

Characteristics

Temperature range for specification: T = –30 ˚C to +90 ˚C
Antenna terminating impedance: Z_{ANT}= 50 Ω
RX terminating impedance: Z_{RX} = 50 Ω ll 9.1 nH
TX terminating impedance: Z_{TX} = 50 Ω

Characterisitcs ANT - RX		min.	typ. @ 25 ˚C	max.	
Center frequency	f_C	—	1960	—	MHz
Maximum insertion attenuation	α_{WCDMA}[1]				
@$f_{Carrier}$1932.4 ... 1987.6 MHz		—	2.9	4.5	dB
@$f_{Carrier}$1932.4 ... 1987.6 MHz		—	2.5[2]	3.1[2]	dB
Amplitude ripple (p-p)	$\Delta\alpha_{WCDMA}$[1]				
@$f_{Carrier}$1932.4 ... 1987.6 MHz		—	1.2	2.9	dB
@$f_{Carrier}$1932.4 ... 1987.6 MHz		—	0.8[2]	2.5[2]	dB
Error Vector Magnitude	EVM[3]				
@$f_{Carrier}$1932.4 ... 1987.6 MHz		—	2.5	10.0	%
@$f_{Carrier}$1932.4 ... 1987.6 MHz		—	1.4[2]	4.5[2]	%
Input VSWR (ANT port)					
1930.0 ... 1990.0 MHz		—	1.4	2.0	
1930.0 ... 1990.0 MHz		—	1.4[2]	2.0[2]	
Output VSWR (RX port)					
1930.0 ... 1990.0 MHz		—	1.5	2.0	
1930.0 ... 1990.0 MHz		—	1.5[2]	2.0[2]	
IMD product level limits[4] at f_{TX}=1880MHz, f_{RX}=1960MHz					
Blocker 1 80.0 MHz		—	-107	-97	dBm
Blocker 2 1880.0 MHz		—	-108	-98	dBm
Blocker 3 3840.0 MHz		—	-118	-108	dBm
Blocker 4 5720.0 MHz		—	-129	-109	dBm

1) Attenuation of WCDMA signal (“Powertransferfunction”). Please refer to annotation on page (8).
2) Valid for T=+65 ˚C
3) Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.
4) IMD product level limits for power levels P_{TX}=21.5 dBm (antenna port output power) and $P_{Blocker}$=-15dBm (antenna port input power).

Characteristics

Temperature range for specification: T = –30 ˚C to +90 ˚C
Antenna terminating impedance: Z_{ANT}= 50 Ω
RX terminating impedance: Z_{RX} = 50 Ω ll 9.1 nH
TX terminating impedance: Z_{TX} = 50 Ω

Characterisitcs ANT - RX					min.	typ. @ 25 ˚C	max.	
Attenuation				α				
10.0	...	1850.0	MHz		39	42	—	dB
		80.0	MHz		60	70	—	dB
699.0	...	716.0	MHz		45	48	—	dB
777.0	...	787.0	MHz		44	47	—	dB
824.0	...	849.0	MHz		43	46	—	dB
1770.0	...	1830.0	MHz		44	47	—	dB
@$f_{Carrier}$ 1852.4.	..	1907.6	MHz	α_{WCDMA}[1)]	45	52	—	dB
@$f_{Carrier}$ 1852.4.	..	1907.6	MHz	α_{WCDMA}[1)]	47[2)]	50[2)]	—	dB
1910.0	...	1915.0	MHz		10	27	—	dB
2005.0	...	2050.0	MHz		3	20	—	dB
2050.0	...	2075.0	MHz		26	29	—	dB
2075.0	...	6000.0	MHz		26	29	—	dB
2305.0	...	2315.0	MHz		38	41	—	dB
2400.0	...	2500.0	MHz		38	41	—	dB
3780.0	...	3900.0	MHz		48	51	—	dB
3860.0	...	3980.0	MHz		48	51	—	dB
3980.0	...	6000.0	MHz		43	48	—	dB
4900.0	...	5950.0	MHz		43	48	—	dB
5610.0	...	5845.0	MHz		43	48	—	dB
5630.0	...	5810.0	MHz		43	48	—	dB
5790.0	...	5970.0	MHz		43	48	—	dB

1) Attenuation of WCDMA signal (“Powertransferfunction”). Please refer to annotation on page (8).
2) Valid for T=+65 ˚C

Characteristics

Temperature range for specification: T = –30 ˚C to +90 ˚C
Antenna terminating impedance: Z_{ANT} = 50 Ω
RX terminating impedance: Z_{RX} = 50 Ω ll 9.1 nH
TX terminating impedance: Z_{TX} = 50 Ω

Characterisitcs TX - RX		min.	typ. @ 25 ˚C	max.	
Isolation	α				
1574.0 ... 1577.0 MHz		53	61	—	dB
@$f_{Carrier}$ 1852.4 ... 1898.6 MHz	α_{WCDMA} 1)	52	57	—	dB
@$f_{Carrier}$ 1898.6 ... 1907.6 MHz	α_{WCDMA} 1)	46	49	—	dB
@$f_{Carrier}$ 1852.4 ... 1898.6 MHz	α_{WCDMA} 1)	52 2)	57 2)	—	dB
@$f_{Carrier}$ 1898.6 ... 1907.6 MHz	α_{WCDMA} 1)	46 2)	50 2)	—	dB
@$f_{Carrier}$ 1932.4 ... 1987.6 MHz	α_{WCDMA} 1)	37	53	—	dB
@$f_{Carrier}$ 1932.4 ... 1987.6 MHz	α_{WCDMA} 1)	50 2)	56 2)	—	dB
3700.0 ... 3820.0 MHz		44	52	—	dB
5550.0 ... 5850.0 MHz		51	59	—	dB

1) Attenuation of WCDMA signal (“Powertransferfunction”). Please refer to annotation on page (8).
2) Valid for T=+65 ˚C

Annotation for characteristics section

Attenuation of WCDMA signal ("Powertransferfunction", α_{WCDMA}) is determined by

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

$f_{Carrier}$ according to 3GPP TS 25.101 (e.g. for WCDMA Band 2-Passband, $f_{Carrier}$ ranges from 1852.4MHz (lowest TX channel) to 1907.6 MHz (highest TX channel)). $H_{RRC}(f)$ is the transfer function of the root-raised cosine transmit pulse shaping filter according to 3GPP TS 25.101 with the following normalization:

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

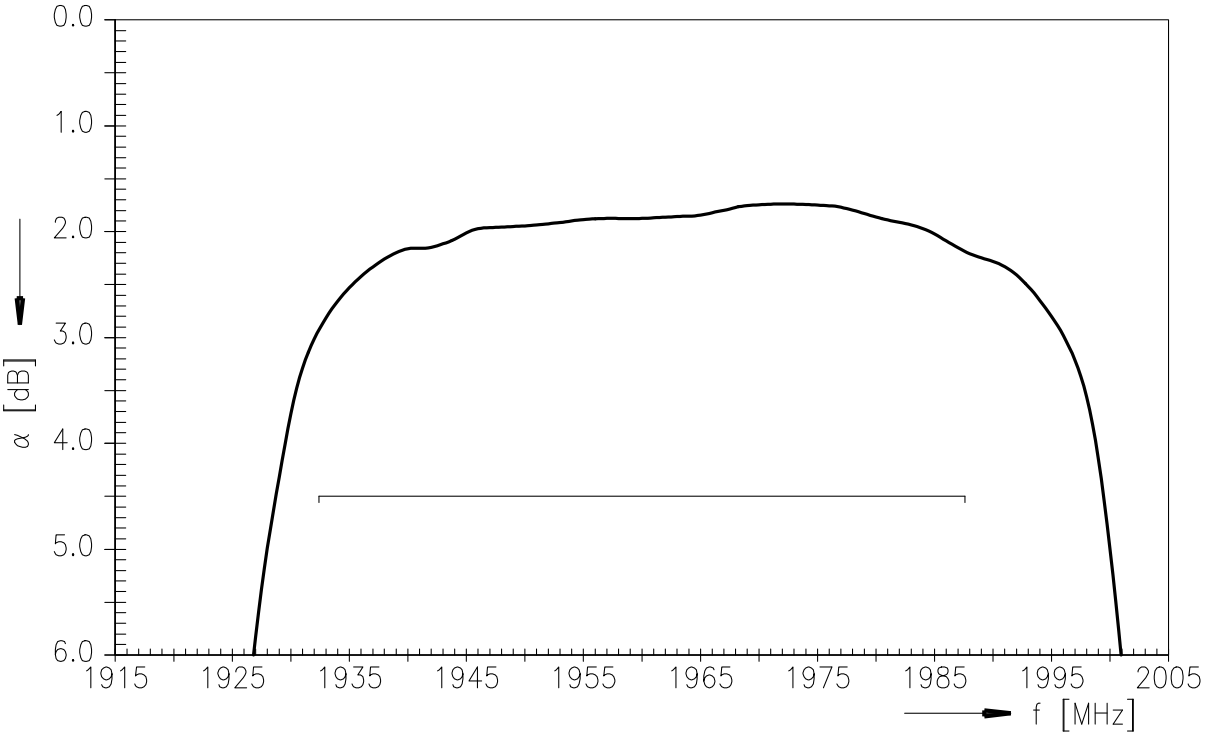
Maximum ratings

Storage temperature range	T_{stg}	–40/+85	°C	
DC voltage	V_{DC}	5[1)]	V	
ESD voltage	V_{ESD}	50[2)]	V	Machine Model
Input power	P_{IN}			source and load impedance 50 Ω
1852.4 ... 1907.6 MHz		28	dBm	} WCDMA UP signal
elsewhere		10	dBm	*T* = 50°C, 5000 h

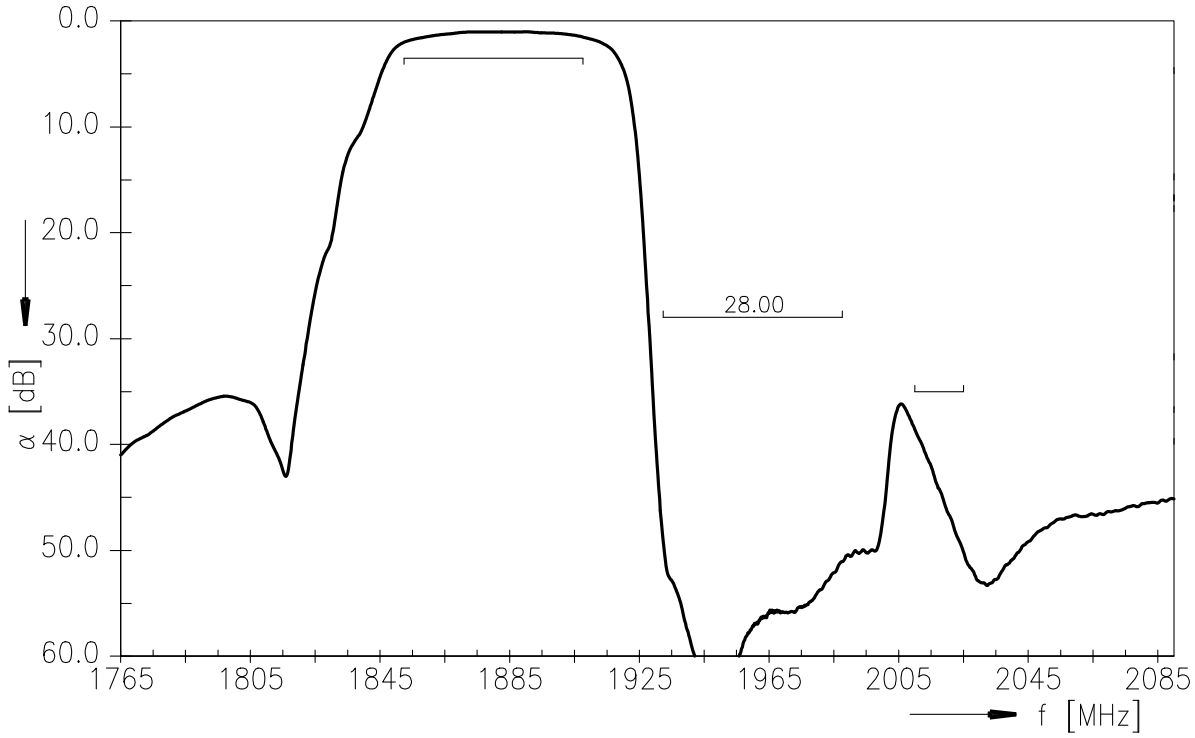
1) 168h Damp Heat Steady State acc. to IEC 60068-2-67 Cy
2) acc. to JESD22-A115B (MM - Machine Model), 10 negative and 10 positive pulses.

Frequency Response TX-ANT (Power transfer function)

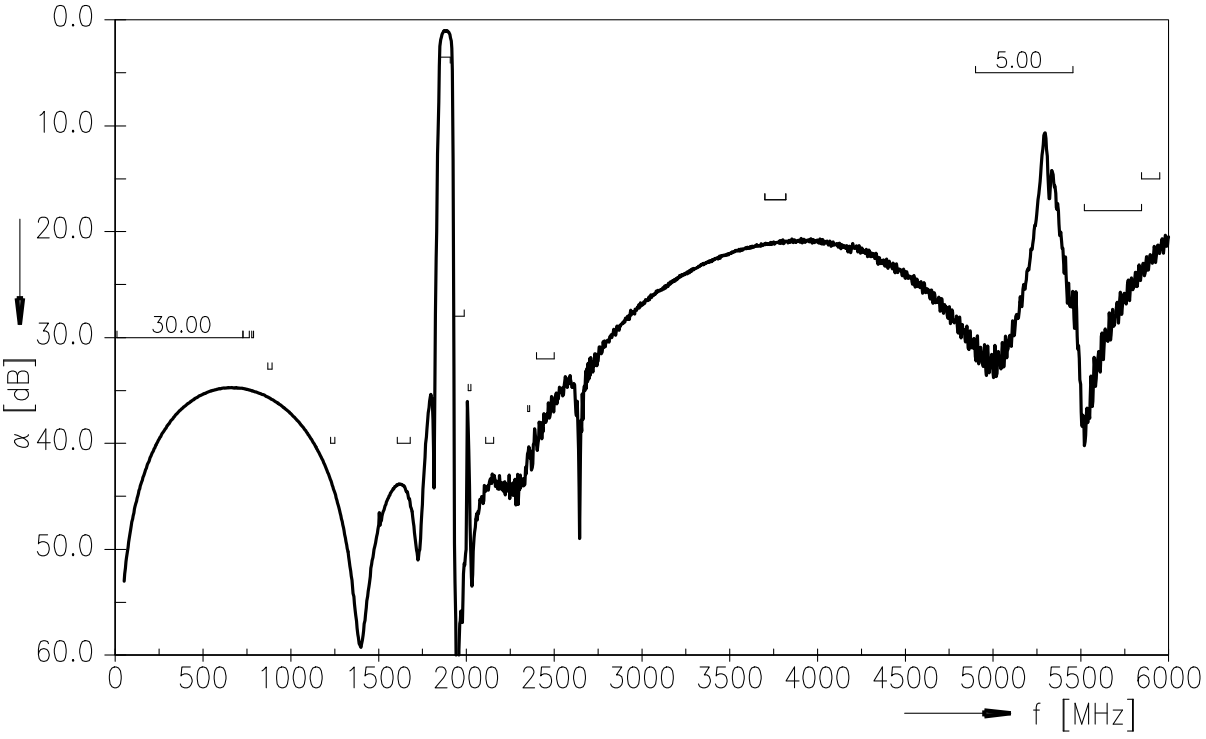
Frequency Response RX-ANT (Power transfer function)



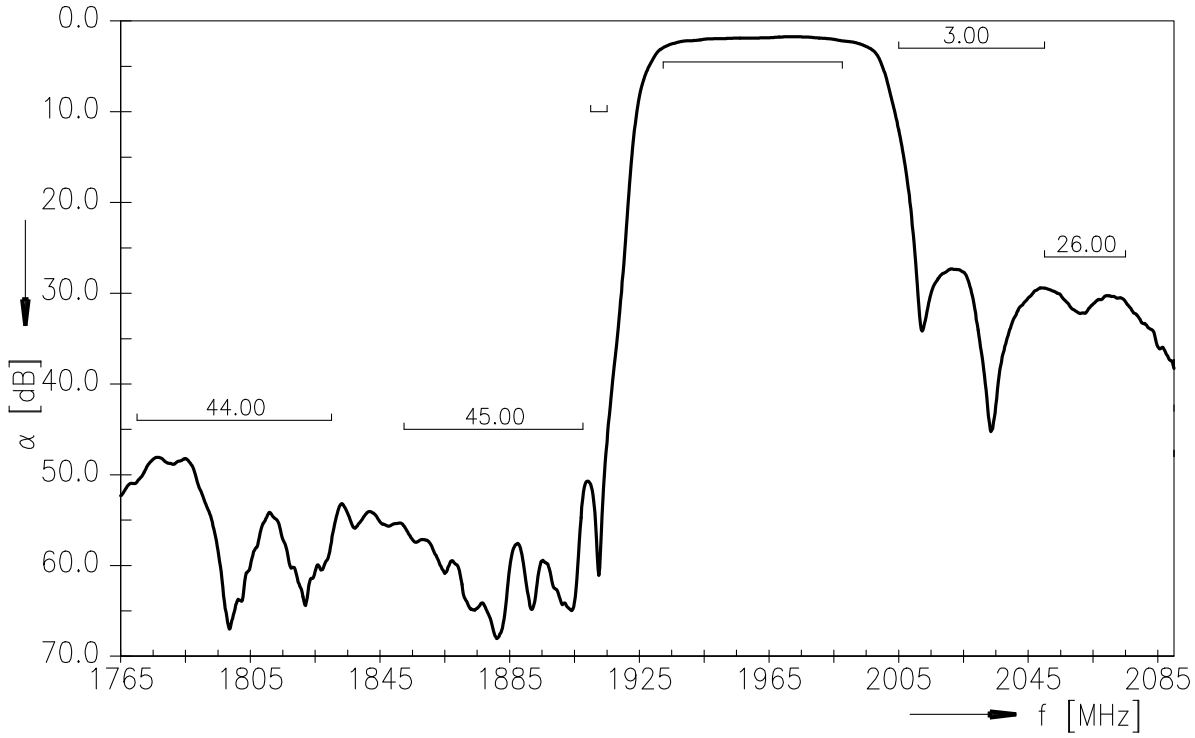
Frequency Response TX-ANT (Power transfer function)



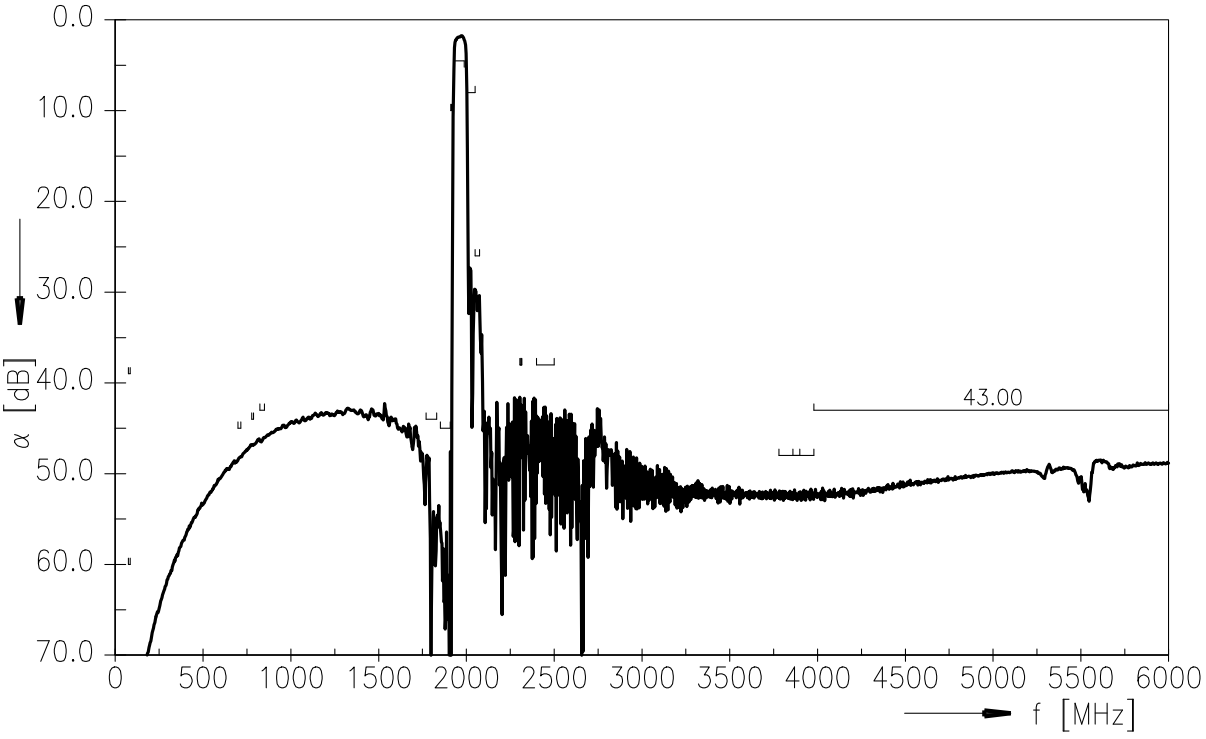
Frequency Response TX-ANT (wideband)



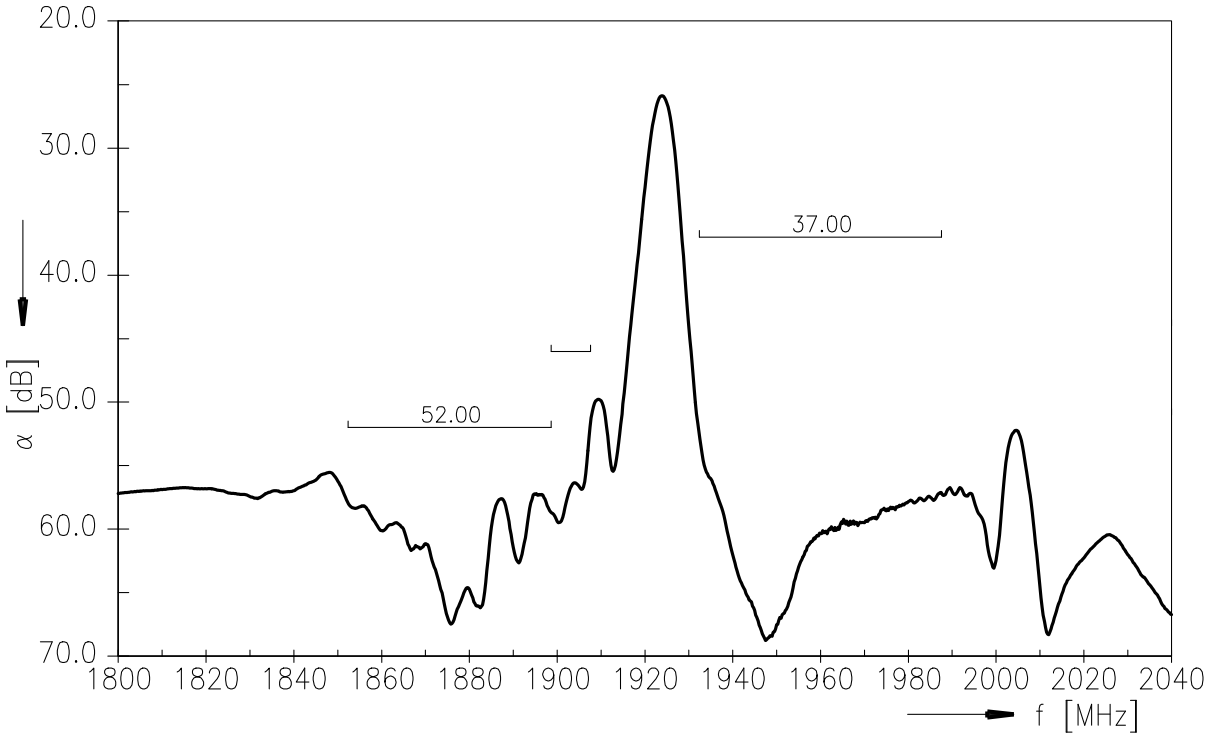
Frequency Response RX-ANT (Power transfer function)



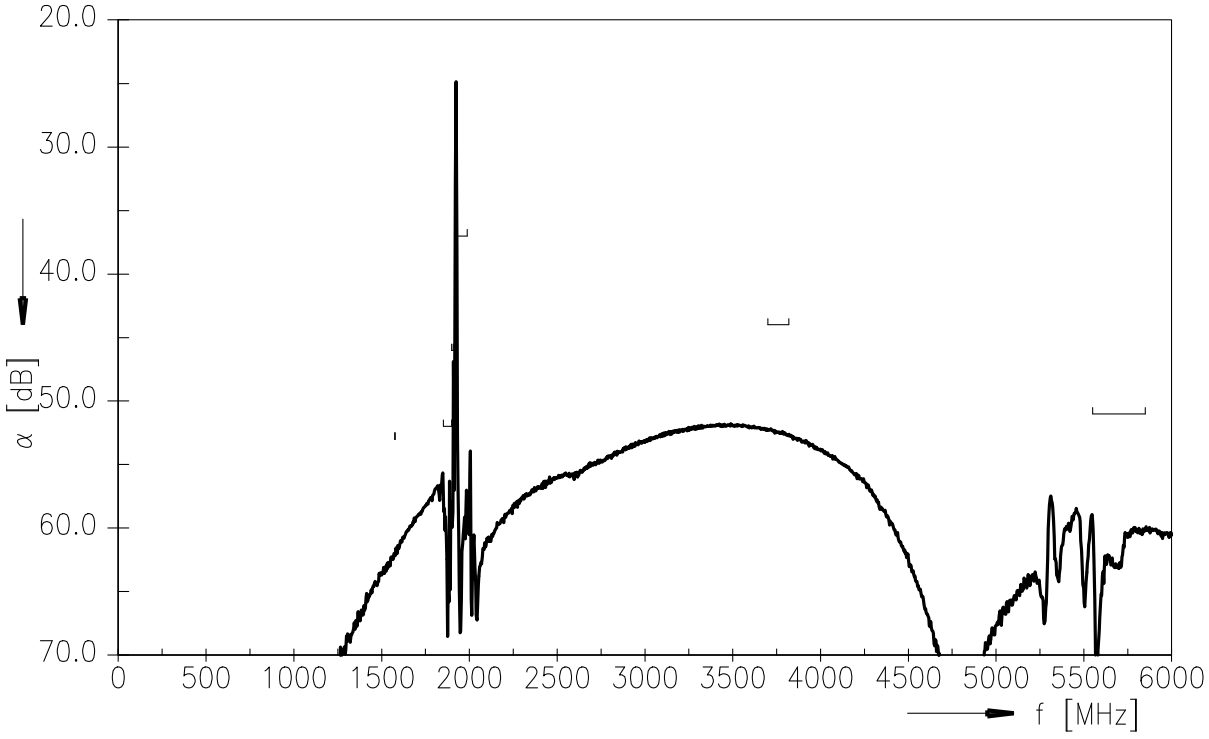
Frequency Response RX-ANT (wideband)



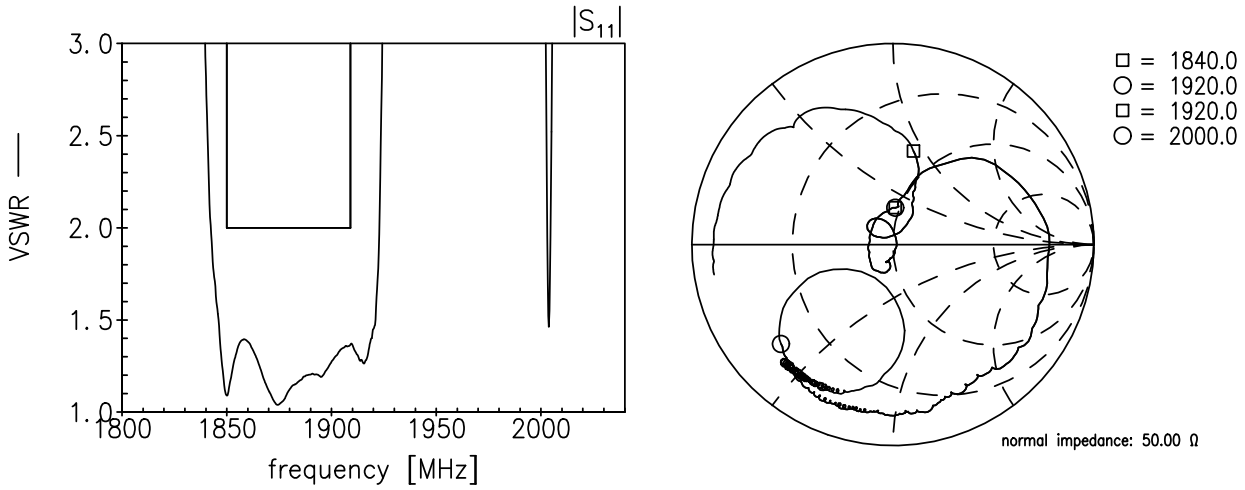
Frequency Response TX-RX (Power transfer function)

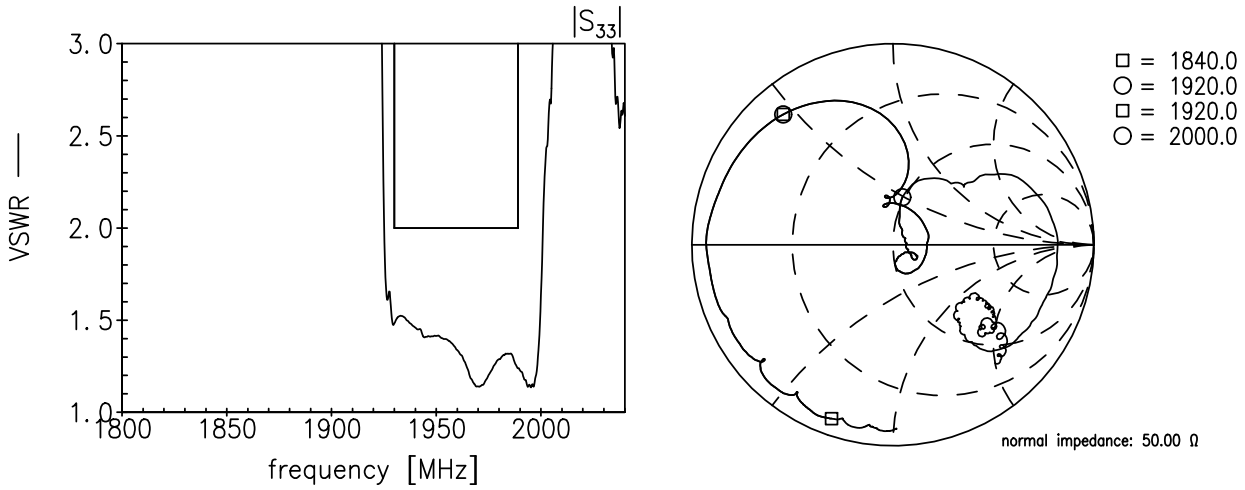


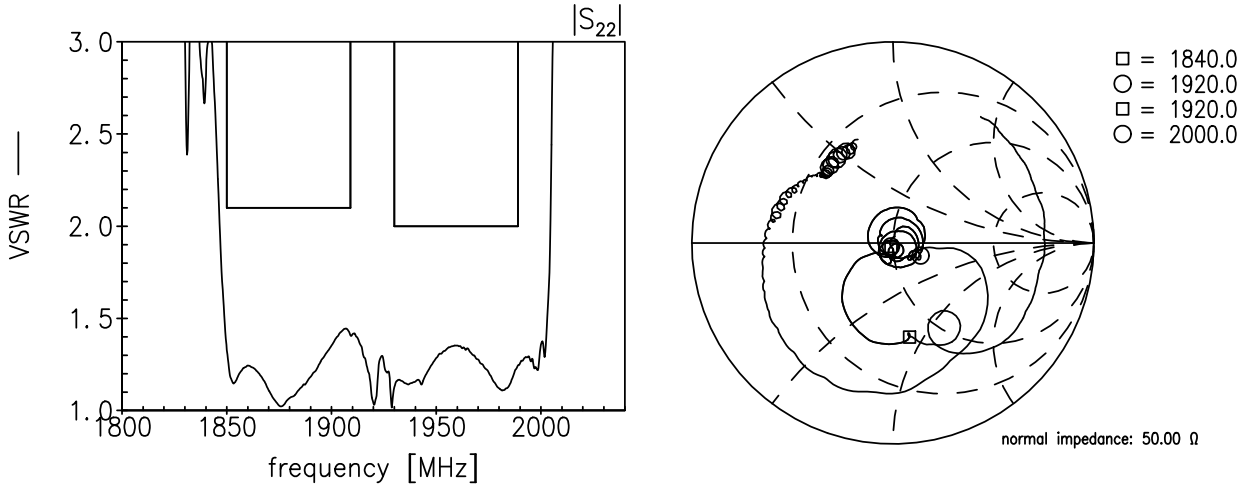
Frequency Response TX-RX (wideband)



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







References

Type	B8650
Ordering code	B39202B8650P810
Marking and package	C61157-A8-A87
Packaging	F61074-V8259-Z000
Date codes	L_1126
S-parameters	B8650_NB_UN.s3p, B8650_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

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