



RF360
Europe GmbH

SAW Components

SAW Duplexer

WCDMA Band 2

Series/type: B8650
Ordering code: B39202B8650P810

Date: Jul 31, 2015
Version: 2.1

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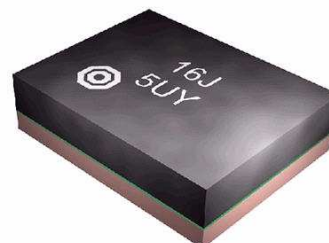
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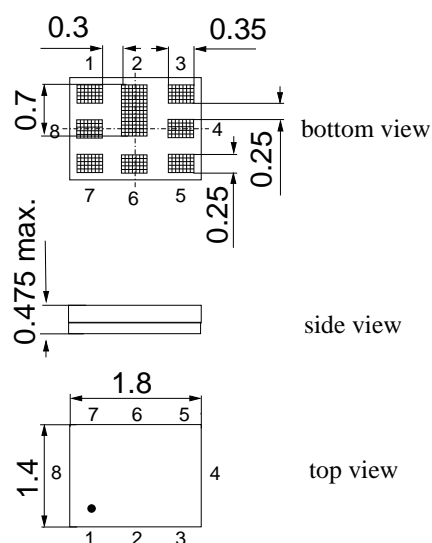
Data sheet

Application

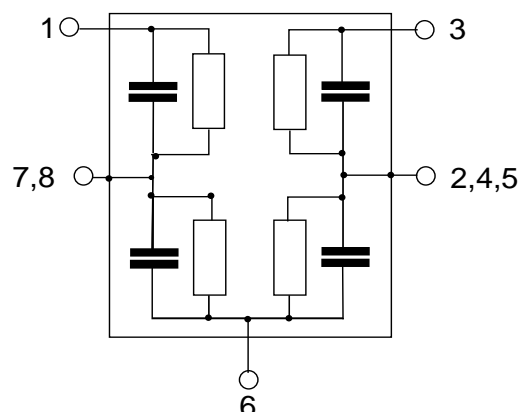
- SAW duplexer for mobile telephone WCDMA Band II systems
- Low insertion attenuation
- Low amplitude ripple
- Usable passband 60 MHz


Features

- Package size 1.8 x 1.4 mm²
- Max. package height 0.475 mm
- RoHS compatible
- Approx. weight 0.0042g
- Package for **Surface Mount Technology (SMT)**
- Ni, Au-plated terminals
- **Electrostatic Sensitive Device (ESD)**
- **Moisture Sensitivity Level 3**


Pin configuration

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



Data sheet

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 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)	Δα _{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.

Data sheet

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 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 $\alpha_{\text{WCDMA}}^{1)}$	28	49	—	dB
@f _{Carrier}	1932.4	... 1987.6	MHz $\alpha_{\text{WCDMA}}^{1)}$	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

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2) Valid for T=+65 °C

Data sheet

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 9.1 nH
TX terminating impedance:	Z _{TX} = 50 Ω

Characteristics 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)	Δα _{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 limits⁴⁾					
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).

Data sheet

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 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

Data sheet

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 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	52	57	—	dB
@f _{Carrier}	1898.6 ... 1907.6 MHz	46	49	—	dB
@f _{Carrier}	1852.4 ... 1898.6 MHz	52 ²⁾	57 ²⁾	—	dB
@f _{Carrier}	1898.6 ... 1907.6 MHz	46 ²⁾	50 ²⁾	—	dB
@f _{Carrier}	1932.4 ... 1987.6 MHz	37	53	—	dB
@f _{Carrier}	1932.4 ... 1987.6 MHz	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

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

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)). $H_{\text{RRC}}(f)$ is the transfer function of the root-raised cosine transmit pulse shaping filter according to 3GPP TS 25.101 with the following normalization:

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

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
		300 ³⁾	V	Human Body Model
		600 ⁴⁾	V	Charge Device Model
Input power	P_{IN}			source and load impedance 50 Ω
1852.4 ... 1907.6 MHz		28	dBm	} WCDMA UP signal $T = 50^\circ\text{C}, 5000\text{ h}$
elsewhere		10	dBm	

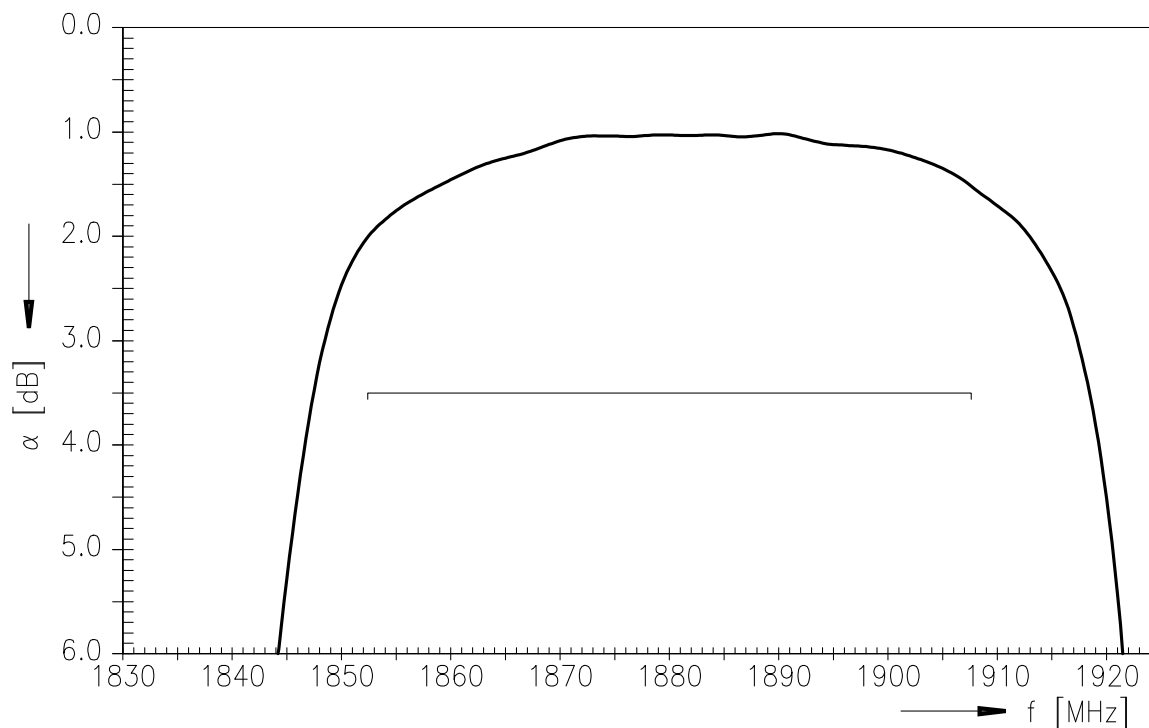
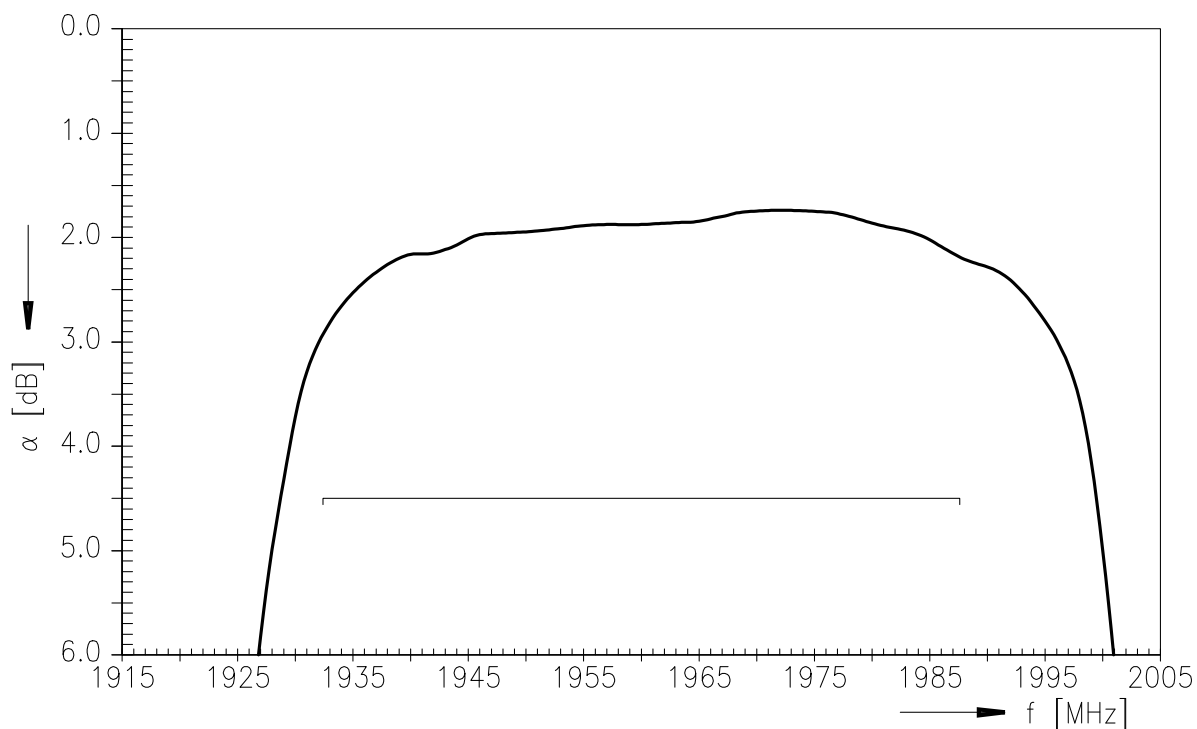
1) 168h Damp Heat Steady State acc. to IEC 60068-2-67 Cy.

2) acc. to JESD22-A115B (MM - Machine Model), 10 negative and 10 positive pulses.

3) acc. to JESD22-A114F (HBM - Human Body Model) , 1 negative & 1 positive pulses.

4) acc. to JESD22-C101C (CDM - Field Induced Charged Device Model) , 3 negative & 3 positive pulses.

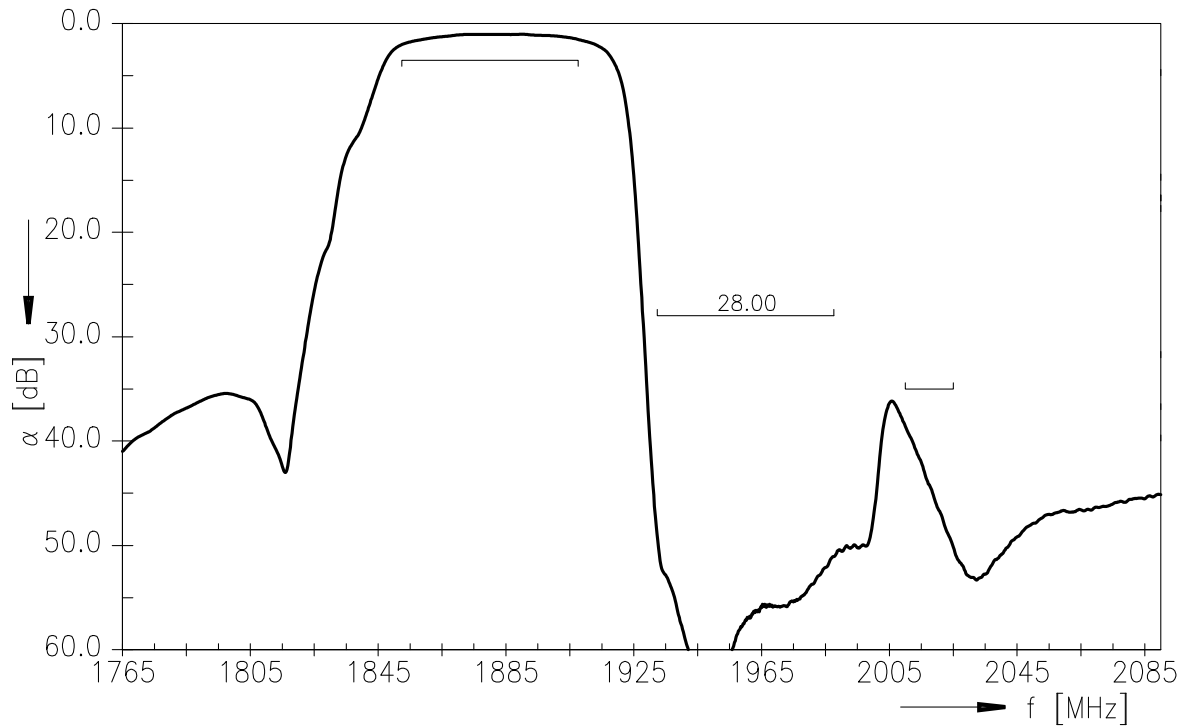
Data sheet

Frequency Response TX-ANT (Power transfer function)

Frequency Response RX-ANT (Power transfer function)


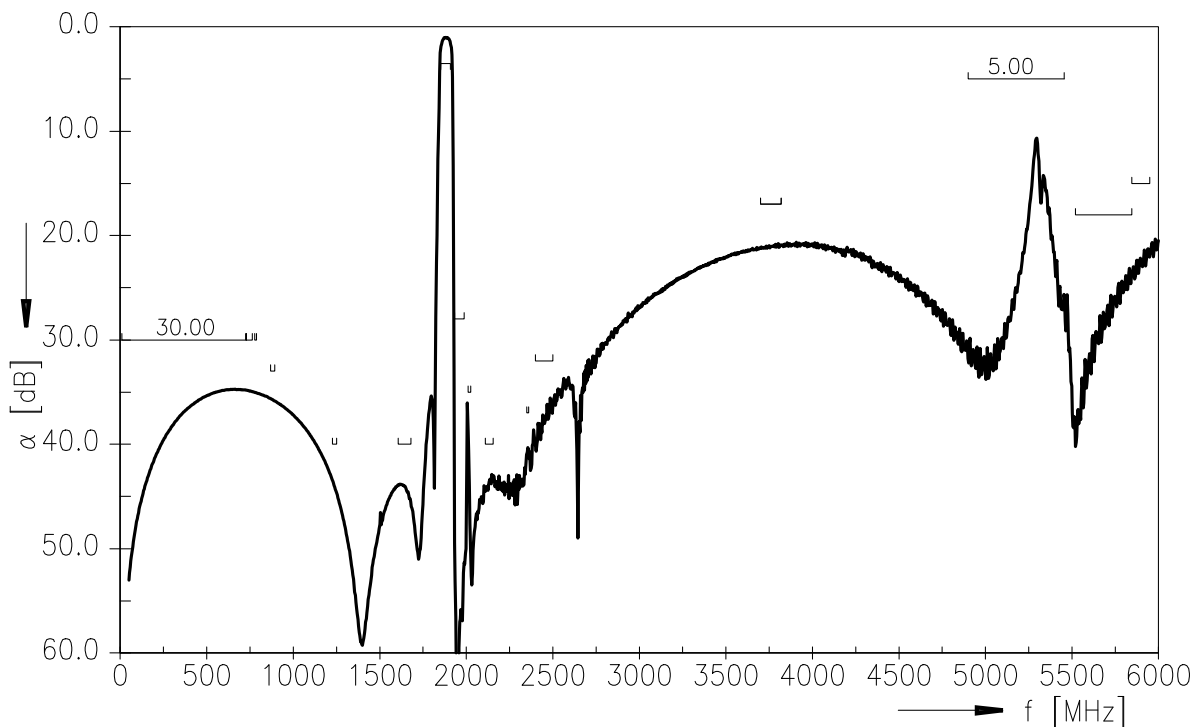
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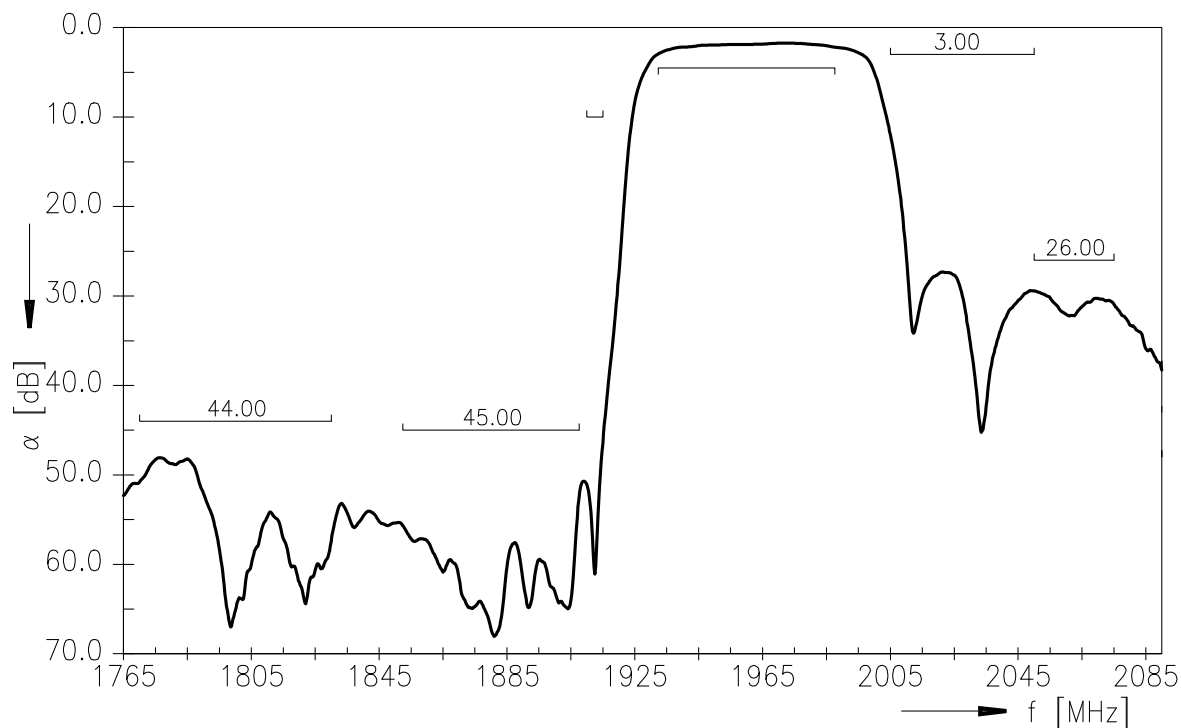
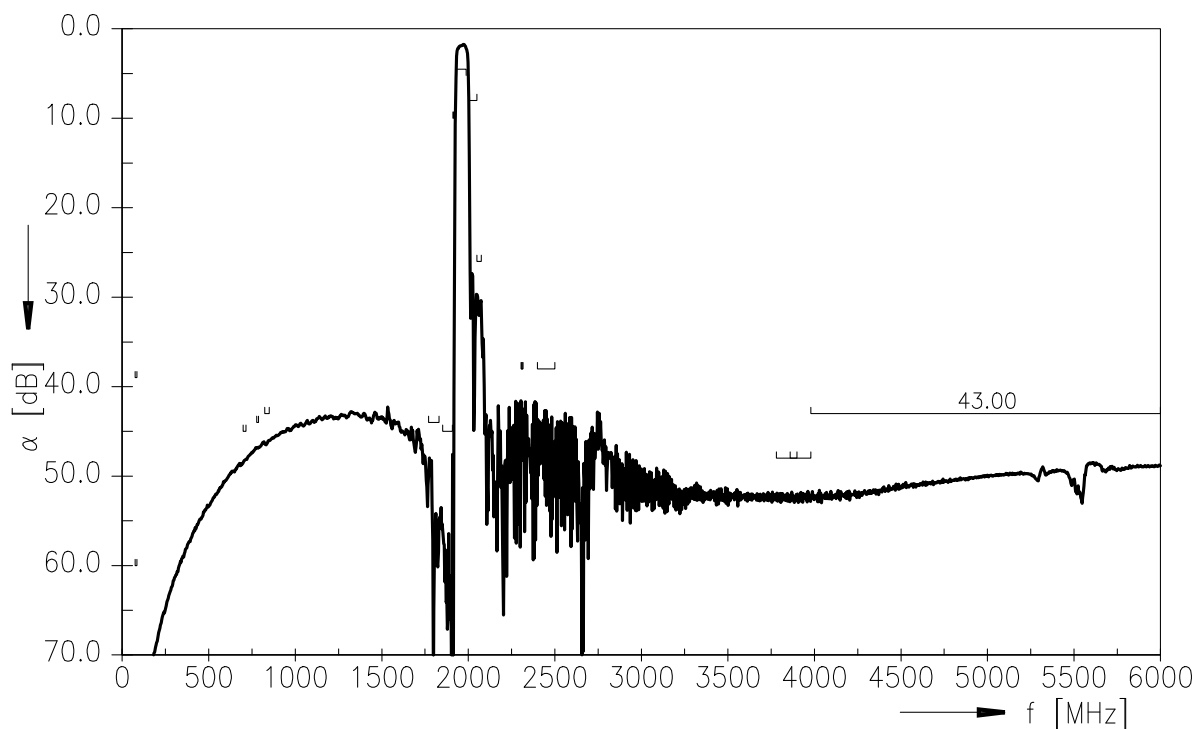
Frequency Response TX-ANT (Power transfer function)



Frequency Response TX-ANT (wideband)



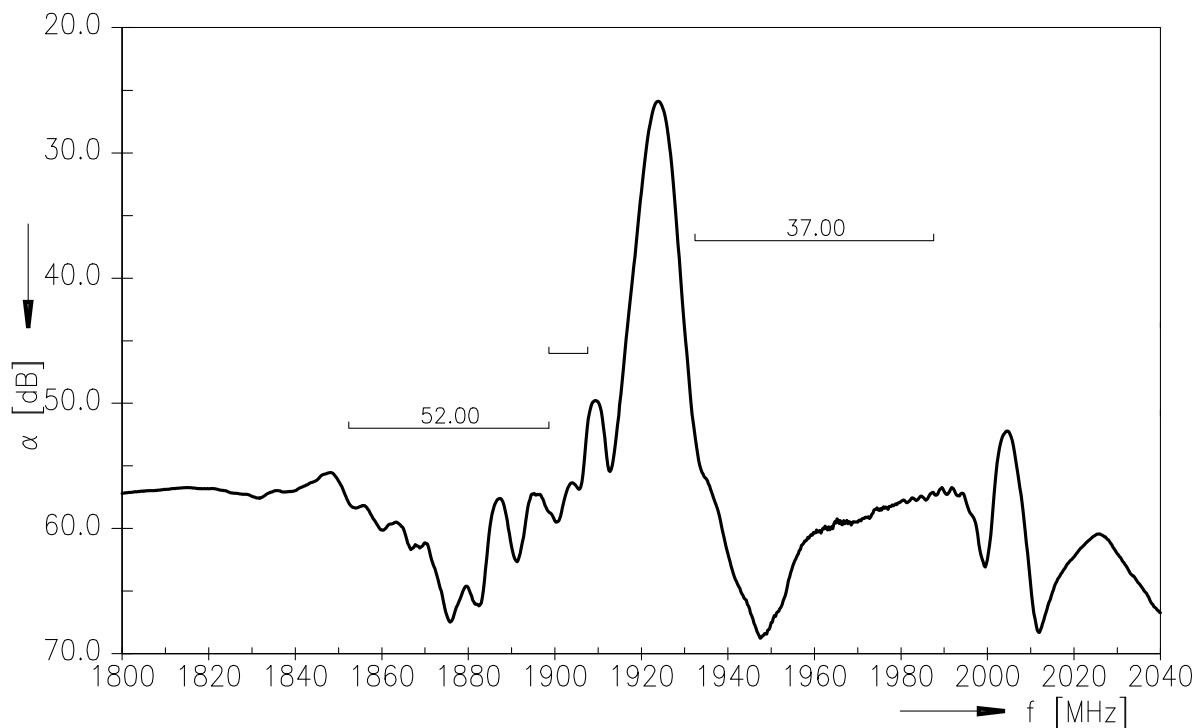
Data sheet


Frequency Response RX-ANT (Power transfer function)

Frequency Response RX-ANT (wideband)


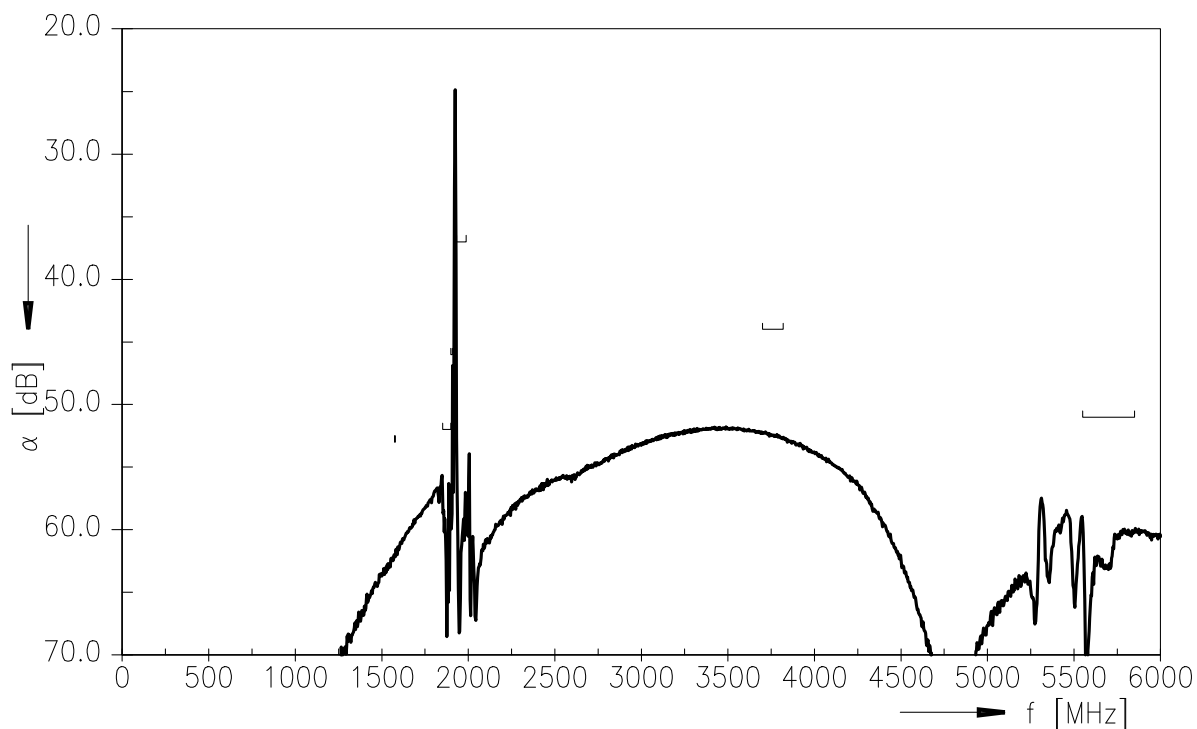
Data sheet



Frequency Response TX-RX (Power transfer function)



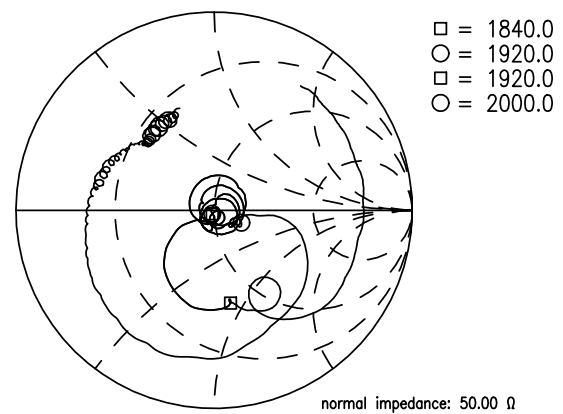
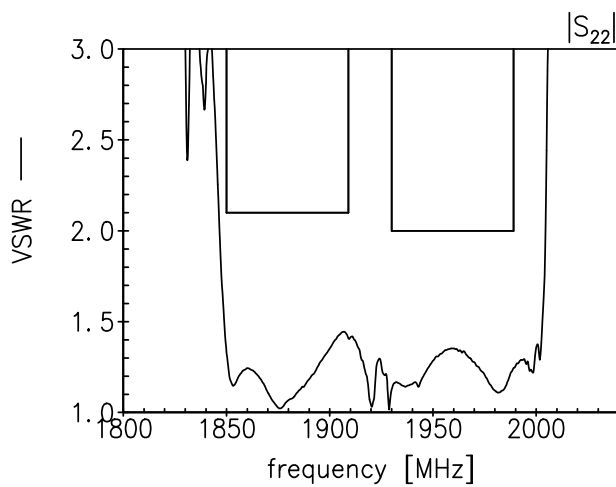
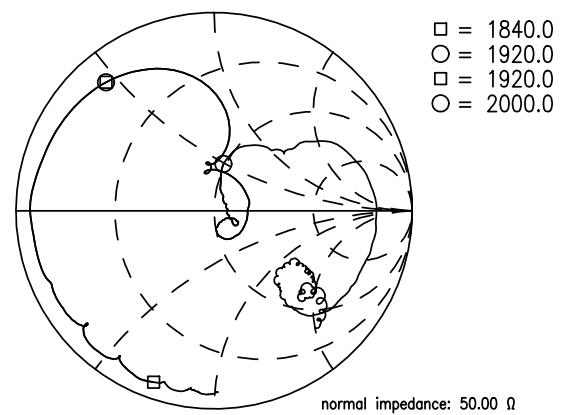
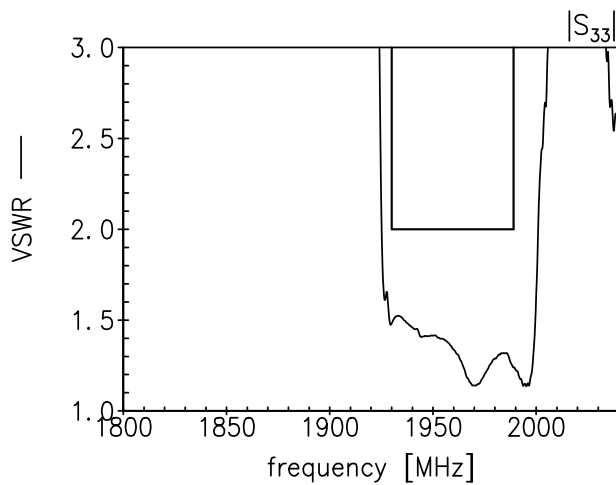
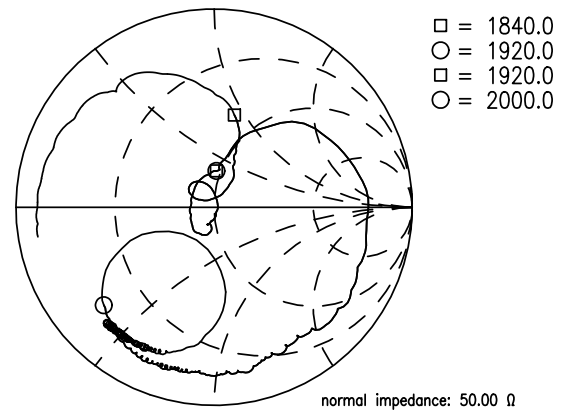
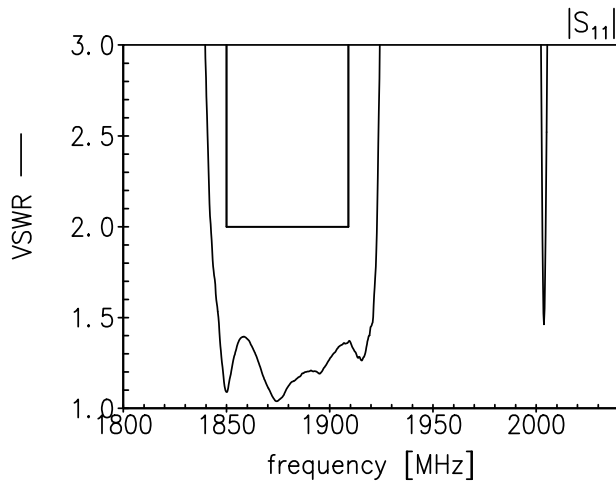
Frequency Response TX-RX (wideband)



Data sheet



VSWR **S₁₁ TX- port** **S₂₂ ANT-port** **S₃₃ RX-port**



Data sheet



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 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.
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.

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