SAW Components

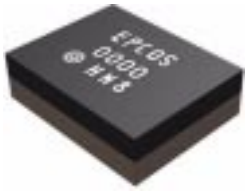
SAW Rx filter

WCDMA Band III

Series/Type:	**B9896**
Ordering code:	**B39182B9896P810**
Date:	July 31, 2014
Version:	2.1

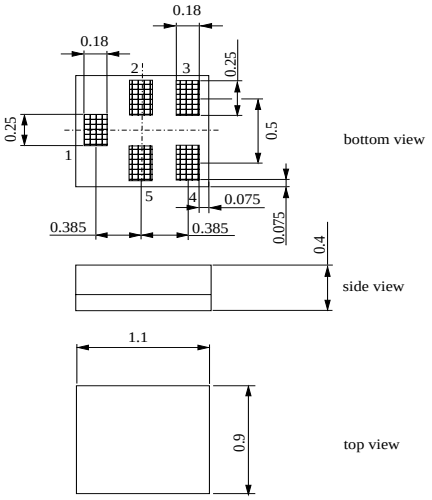
Application

- Low-loss RF filter for mobile telephone WCDMA Band III, receive path (RX)
- Suitable for diversity applications
- High TX suppression
- Impedance transformation from 50 Ω to 100 Ω
- Unbalanced to balanced operation
- Usable passband: 75 MHz



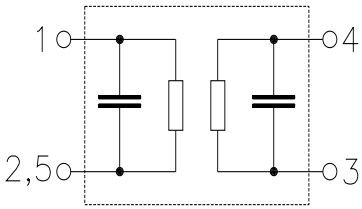
Features

- Package size 1.1 x 0.9 x 0.4 mm³
- RoHS compatible
- Approx. weight 0.001g
- Package for **S**urface **M**ount **T**echnology (**SMT**)
- Ni, gold-plated terminals
- **E**lectrostatic **S**ensitive **D**evice (**ESD**)
- **M**oisture **S**ensitive **L**evel (**MSL**) 3



Pin configuration

- 1 Input, unbalanced
- 3,4 Output, balanced
- 2,5 Case-ground



Characteristics

Temperature range for specification: T = –20 ˚C to +85 ˚C
Terminating source impedance: Z_S = 50 Ω || 8.2nH (unbalanced)
Terminating load impedance: Z_L = 100 Ω || 11nH + 2x2.2pF (balanced)

		min.	typ. @ 25˚C	max.	
Center frequency	f_C	—	1842.5	—	MHz
Average insertion attenuation					
1805.0 ... 1880.0 MHz	α_{cw}		1.5 1)		dB
Maximum insertion attenuation					
1805.0 ... 1880.0 MHz	α_{cw}		2.2	3.8	dB
1805.0 ... 1880.0 MHz	α_{cw} 2)		2.2	3.5	dB
1805.0 ... 1880.0 MHz	α_{cw} 3)		2.2	4.1	dB
Amplitude ripple (p-p)					
1805.0 ... 1880.0 MHz	$\Delta\alpha$		1.1	2.7	dB
1805.0 ... 1880.0 MHz	$\Delta\alpha$2)		1.1	2.4	dB
1805.0 ... 1880.0 MHz	$\Delta\alpha$3)		1.1	3.0	dB
Error Vector Magnitude 4)					
@$f_{Carrier\ Bd\ 3\ RX}$ 1807.4 ... 1877.6 MHz	EVM		2.6	5.0	%
@$f_{Carrier\ Bd\ 3\ RX}$ 1807.4 ... 1877.6 MHz	EVM2)		2.6	4.0	%
@$f_{Carrier\ Bd\ 3\ RX}$ 1807.4 ... 1877.6 MHz	EVM3)		2.6	5.5	%
Input VSWR					
1805.0 ... 1880.0 MHz			1.5	2.0	
Output VSWR					
1805.0 ... 1880.0 MHz			1.6	2.0	
CMRR ($\lvert S_{21}-S_{31}\rvert$ / $\lvert S_{21}+S_{31}\rvert$)					
1805.0 ... 1880.0 MHz		20	26		dB
1805.0 ... 1880.0 MHz	2)	20	26		dB
1805.0 ... 1880.0 MHz	3)	20	26		dB

1) Average value of the parameter over the indicated band. The average value may vary over time.
2) Temperature range +0 ˚C to +85 ˚C
3) Temperature range -30 ˚C to +85 ˚C
4) Error Vector Magnitude (EVM) for WCDMA signal based on definition given in 3GPP TS 25.141.

Data Sheet SMD

Characteristics

Temperature range for specification: T = –20 ˚C to +85 ˚C
Terminating source impedance: Z_S = 50 Ω || 8.2nH (unbalanced)
Terminating load impedance: Z_L = 100 Ω || 11nH + 2x2.2pF (balanced)

		min.	typ. @ 25˚C	max.	
Attenuation	α				
DC ... 115.0 MHz		40	120		dB
115.0 ... 1615.0 MHz		40	59		dB
1615.0 ... 1690.0 MHz		40	53		dB
1690.0 ... 1710.0 MHz		40	61		dB
1710.0 ... 1785.0 MHz		40	47		dB
1785.0 ... 1790.0 MHz		8	44		dB
1920.0 ... 1965.0 MHz		40	44		dB
1965.0 ... 3515.0 MHz		40	44		dB
3515.0 ... 3665.0 MHz		40	76		dB
3665.0 ... 6000.0 MHz		40	48		dB

Annotation for characteristics section

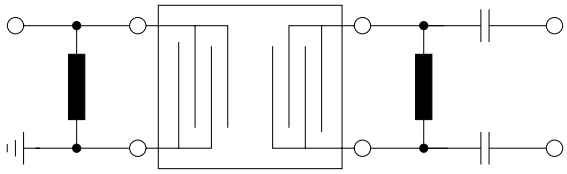
Attenuation of WCDMA signal ("Powertransferfunction", α_{WCDMA}) is determined by

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

$f_{Carrier}$ according to 3GPP TS 25.101 (e.g. for band III RX passband, $f_{Carrier}$ ranges from 1807.4 MHz (lowest RX channel) to 1877.6 MHz (highest RX 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:

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

Matching topology proposal for improved VSWR in 50/100Ω environment



Input (ubal): L_P=8.2nH

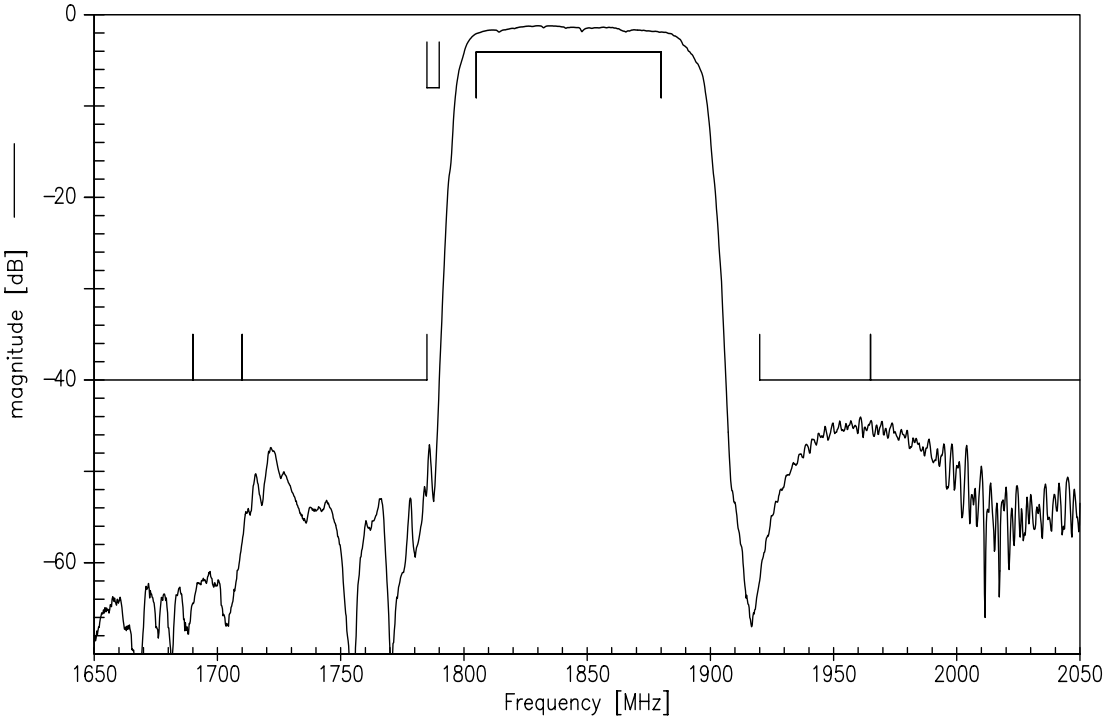
Output (bal): L_P=11nH, C_S=2.2pF

Maximum ratings

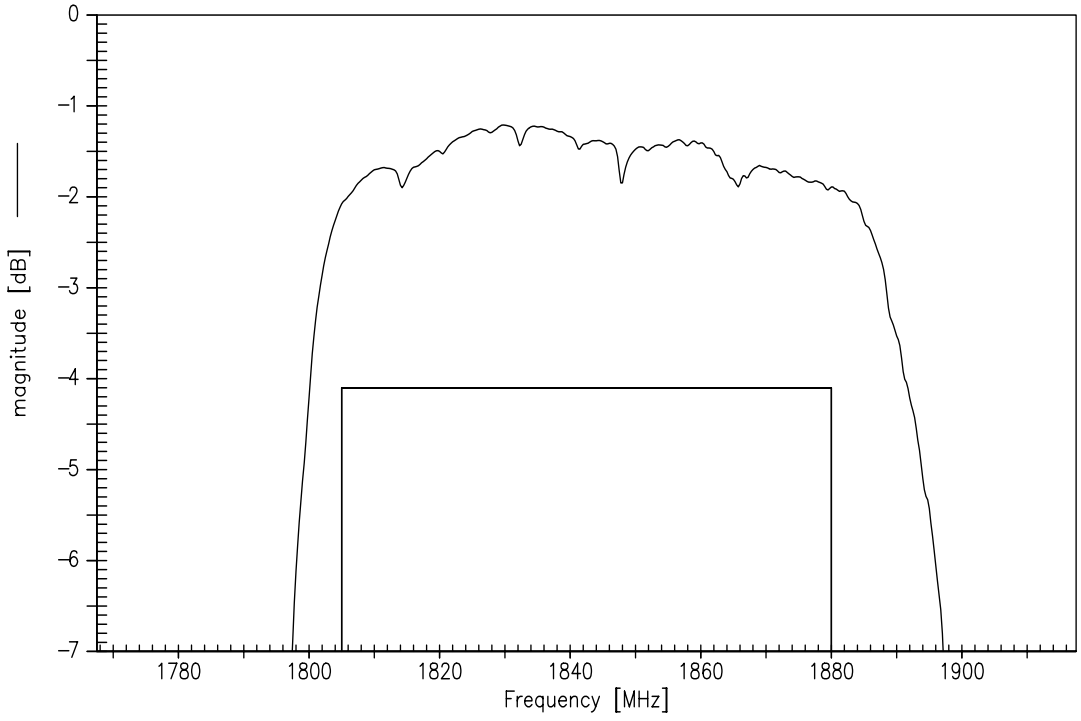
Storage temperature range	T_{stg}	–40/+85 [1]	°C	
DC voltage	V_{DC}	5 [2]	V	
ESD voltage	V_{ESD}	50 [3]	V	Machine Model
		275 [4]	V	Human Body Model
		600 [5]	V	Charged Device Model
Input power	$P_{IN(TX)}$	17	dBm	CW @55°C, 2000h, Bd III TX band
	P_{IN}	10	dBm	CW @55°C, 2000h, all other bands

[1] extended upperlimit: 96h@125°C acc. to IEC60068-2-2 Bb
[2] 168h Damp Heat Steady State acc. to IEC60068-2-67 Cy
[3] acc. to JESD22-A115B (MM - Machine Model), 10 negative & 10 positive pulses
[4] acc. to JESD22-A114F (HBM - Human Body Model), 1 negative & 1 positive pulses
[5] acc. to JESD22-C101C (CDM - Field Induced Charged Device Model), 3 negative & 3 positive pulses

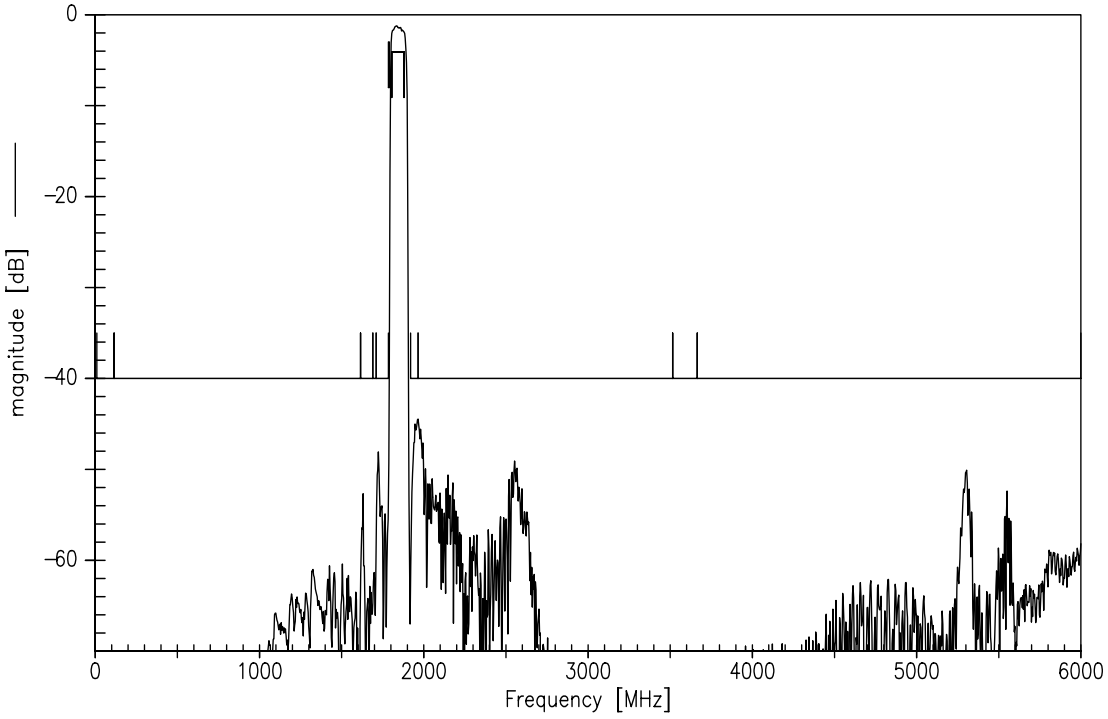
Transfer function



Transfer function

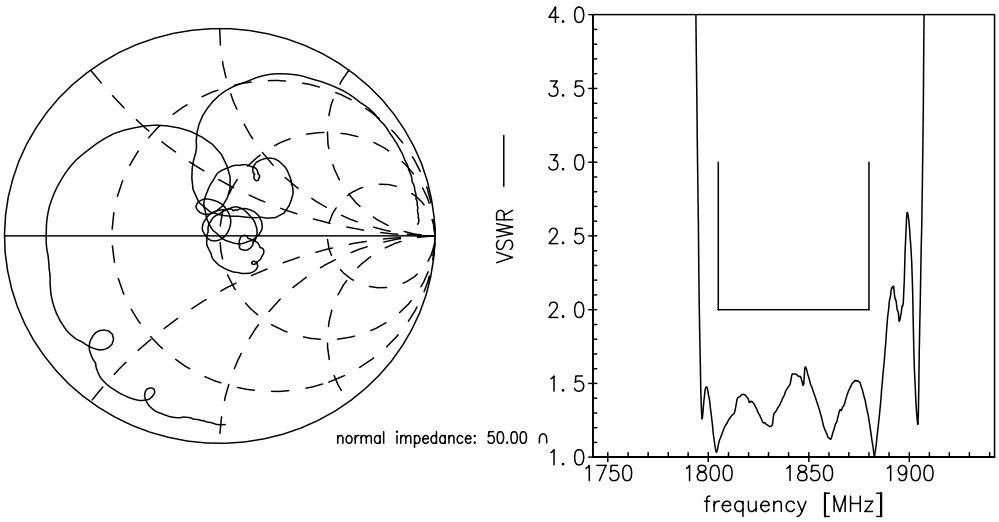


Transfer function (wideband)

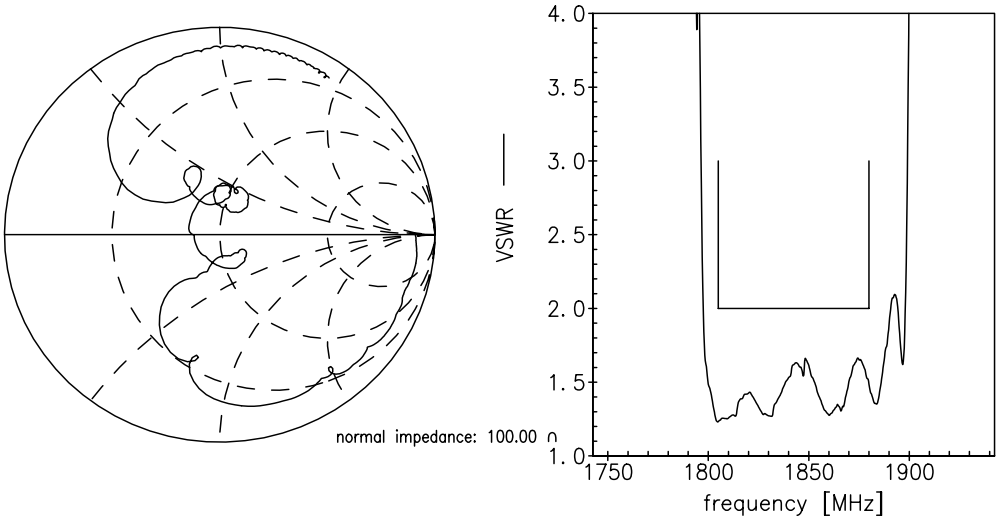


Smith charts (matching topology acc. to page 5)

S_{11} function



S_{22} function



References

Type	B9896
Ordering code	B39182B9896P810
Marking and package	C61157-A8-A56
Packaging	F61074-V8255-Z000
Date codes	L_1126
S-parameters	B9896_NB_UN.s3p, B9896_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 http://www.tdk.co.jp/tefe02/coil.htm#aname1 http://www.tdk.co.jp/etvcl/index.htm for a large variety of matching coils.

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