



SAW Components

SAW Rx filter

WCDMA Band III

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

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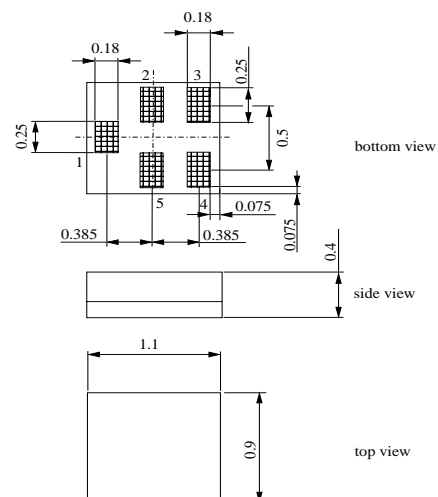
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Application

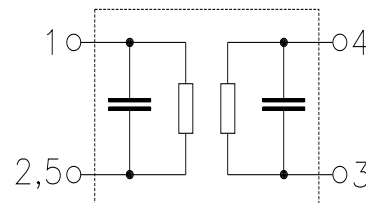
- Low-loss RF filter for mobile telephone WCDMA Band III, receive path (RX)
- Suitable for diversity applications
- High TX suppression
- Impedance transformation from 50 Ω to 100 Ω
- Unbalanced to balanced operation
- Usable passband: 75 MHz


Features

- Package size 1.1 x 0.9 x 0.4 mm³
- RoHS compatible
- Approx. weight 0.001g
- Package for **Surface Mount Technology (SMT)**
- Ni, gold-plated terminals
- **Electrostatic Sensitive Device (ESD)**
- **Moisture Sensitive Level (MSL) 3**


Pin configuration

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



Please read *cautions and warnings and important notes* at the end of this document.

Data Sheet

Characteristics

Temperature range for specification:	$T = -20\text{ °C to }+85\text{ °C}$
Terminating source impedance:	$Z_S = 50\ \Omega \parallel 8.2\text{nH}$ (unbalanced)
Terminating load impedance:	$Z_L = 100\ \Omega \parallel 11\text{nH} + 2 \times 2.2\text{pF}$ (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 Magnitude⁴⁾					
@ $f_{\text{Carrier Bd 3 RX}}$ 1807.4 ... 1877.6 MHz	EVM		2.6	5.0	%
@ $f_{\text{Carrier Bd 3 RX}}$ 1807.4 ... 1877.6 MHz	EVM ²⁾		2.6	4.0	%
@ $f_{\text{Carrier Bd 3 RX}}$ 1807.4 ... 1877.6 MHz	EVM ³⁾		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 ($S_{21}-S_{31} / S_{21}+S_{31}$)					
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

Characteristics

Temperature range for specification:

$$T = -20\text{ }^{\circ}\text{C to }+85\text{ }^{\circ}\text{C}$$

Terminating source impedance:

$$Z_S = 50\ \Omega \parallel 8.2\text{nH (unbalanced)}$$

Terminating load impedance:

$$Z_L = 100\ \Omega \parallel 11\text{nH} + 2 \times 2.2\text{pF (balanced)}$$

				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

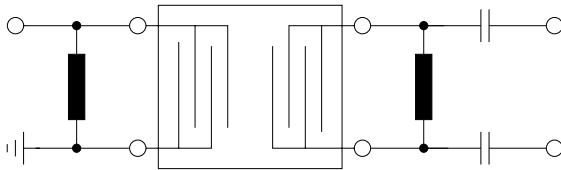

Annotation for characteristics section

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

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

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

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

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


Input (ubal): $L_p=8.2\text{nH}$

Output (bal): $L_p=11\text{nH}$, $C_s=2.2\text{pF}$

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	$P_{\text{IN(TX)}}$	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

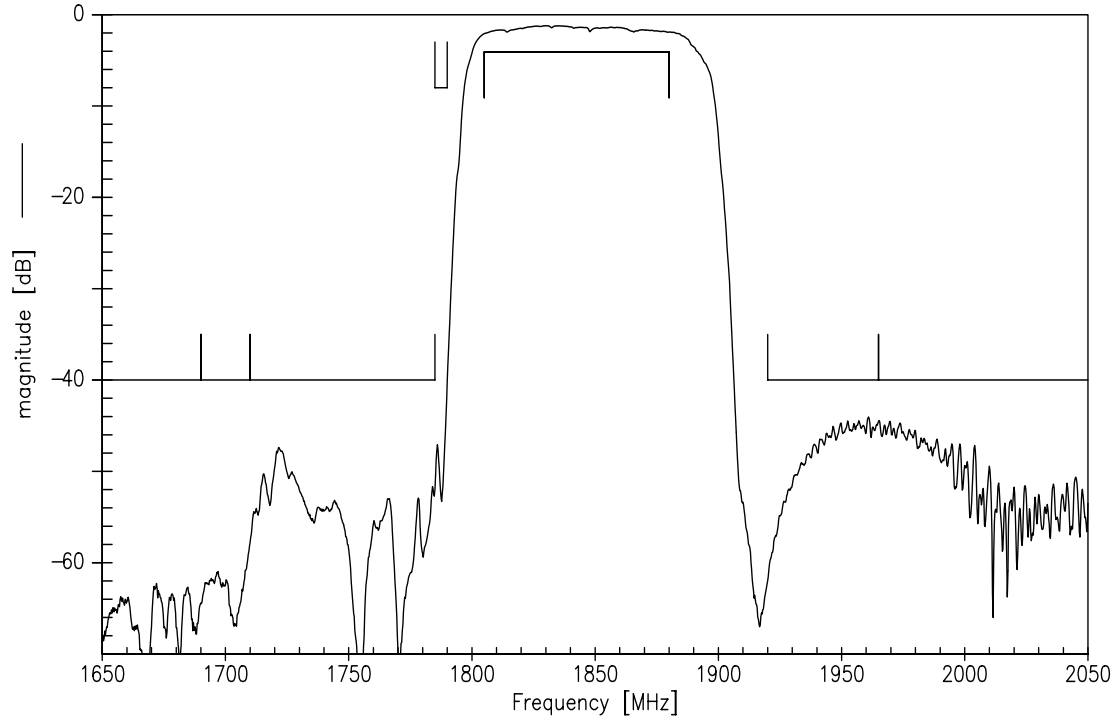
4) acc. to JESD22-A114F (HBM - Human Body Model), 1 negative & 1 positive pulses

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

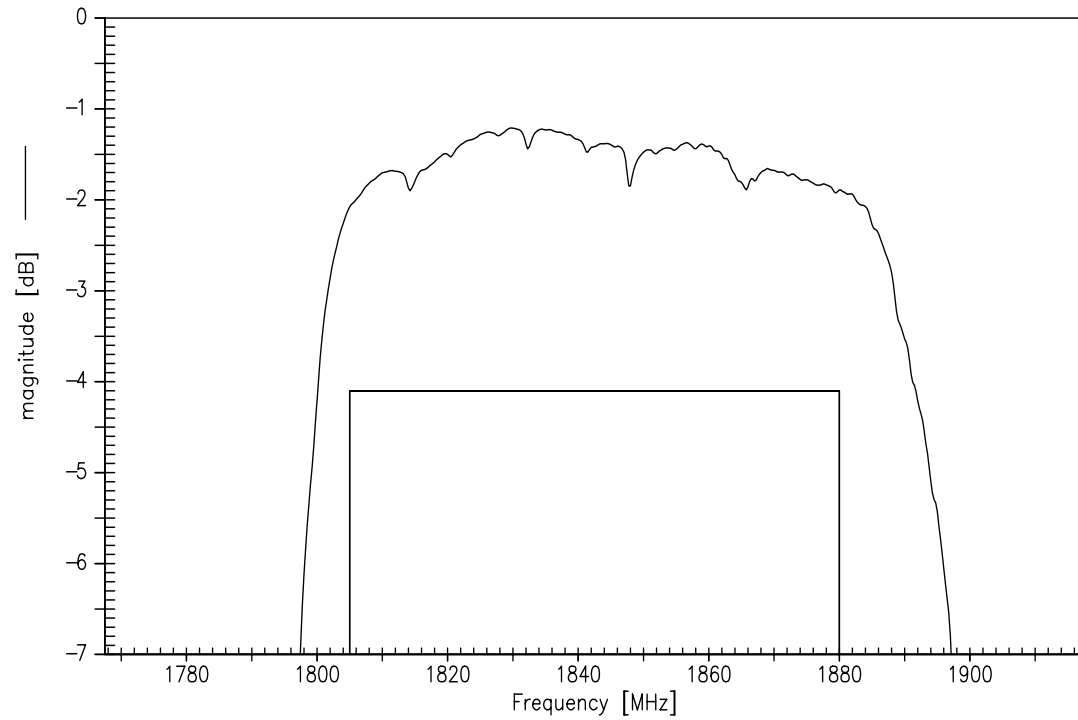
Data Sheet



Transfer function



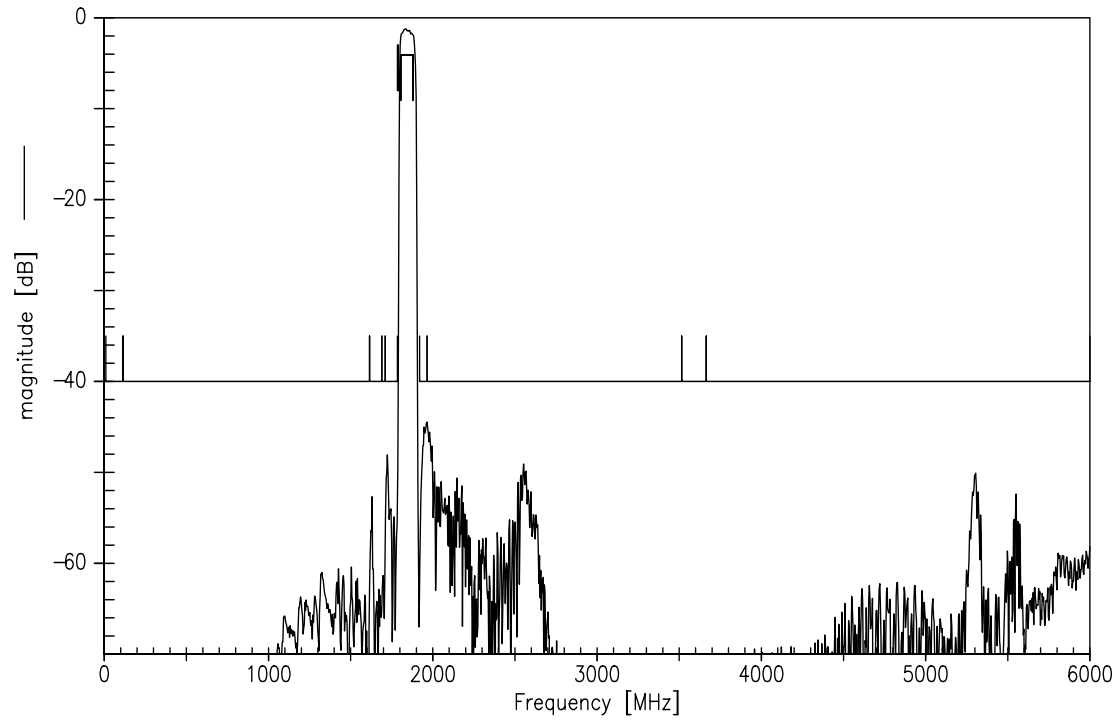
Transfer function



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Transfer function (wideband)

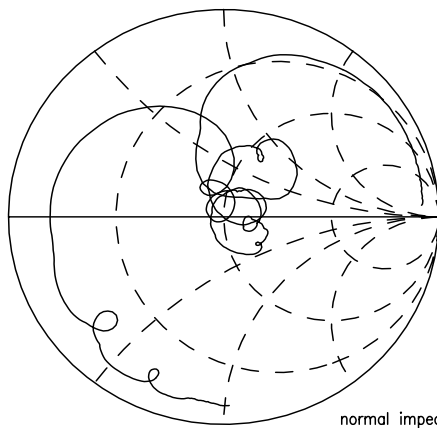


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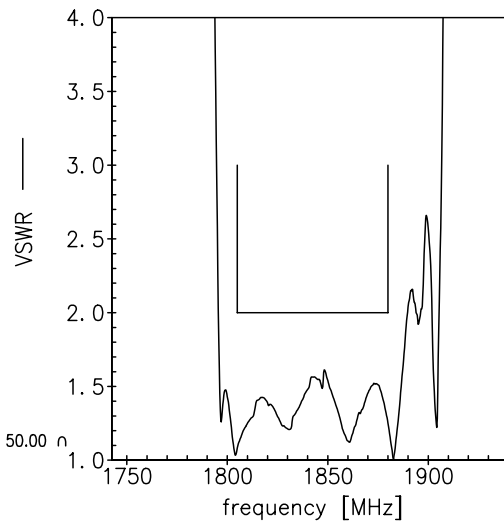


Smith charts (matching topology acc. to page 5)

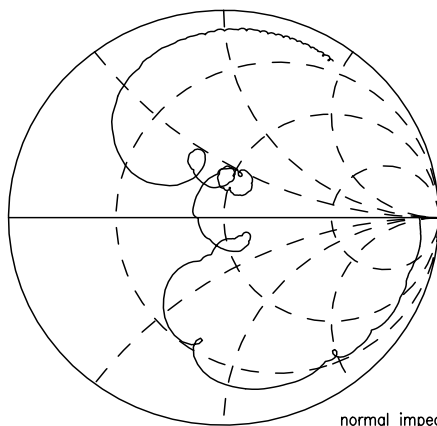
S₁₁ function



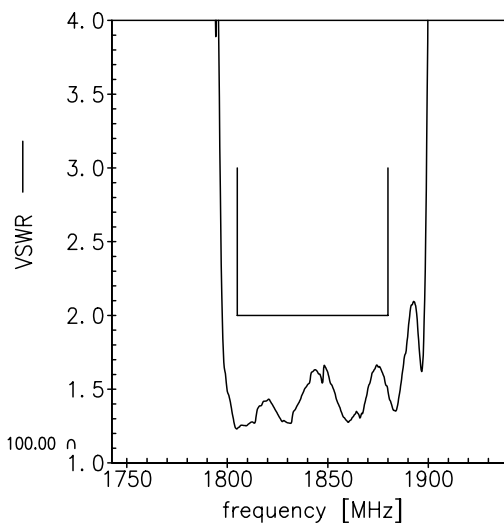
normal impedance: 50.00 Ω



S₂₂ function



normal impedance: 100.00 Ω



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SAW Components	B9896
SAW Filter	1842.5 MHz
Data Sheet	

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 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 http://www.tdk.co.jp/tefe02/coil.htm#aname1 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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9 July 31, 2014

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