



# SAW Components

## SAW Rx filter

WCDMA Band III

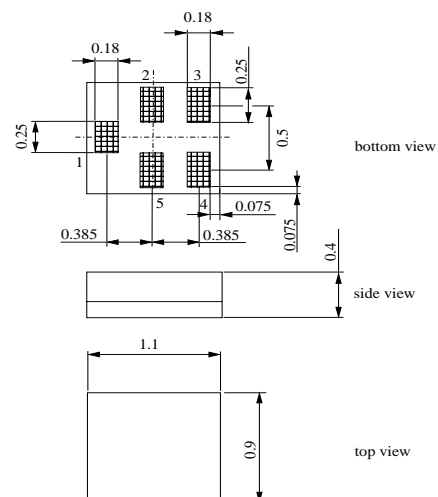
<b>Series/Type:</b>	<b>B9896</b>
<b>Ordering code:</b>	<b>B39182B9896P810</b>
<b>Date:</b>	<b>July 4, 2013</b>
<b>Version:</b>	<b>2.0</b>


**Application**

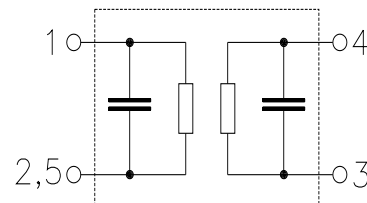
- Low-loss RF filter for mobile telephone WCDMA Band III, receive path (RX)
- Suitable for diversity applications
- High TX suppression
- Impedance transformation from 50 Ω to 100 Ω
- Unbalanced to balanced operation
- Usable passband: 75 MHz


**Features**

- Package size 1.1 x 0.9 x 0.4 mm<sup>3</sup>
- 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



**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.	
<b>Center frequency</b>	$f_C$	—	1842.5	—	MHz
<b>Average insertion attenuation</b>					
1805.0 ... 1880.0 MHz	$\alpha_{CW}$		1.5 <sup>1)</sup>		dB
<b>Maximum insertion attenuation</b>					
1805.0 ... 1880.0 MHz	$\alpha_{CW}$		2.2	3.8	dB
1805.0 ... 1880.0 MHz	$\alpha_{CW}$ <sup>2)</sup>		2.2	3.5	dB
1805.0 ... 1880.0 MHz	$\alpha_{CW}$ <sup>3)</sup>		2.2	4.1	dB
<b>Amplitude ripple (p-p)</b>					
1805.0 ... 1880.0 MHz	$\Delta\alpha$		1.1	2.7	dB
1805.0 ... 1880.0 MHz	$\Delta\alpha$ <sup>2)</sup>		1.1	2.4	dB
1805.0 ... 1880.0 MHz	$\Delta\alpha$ <sup>3)</sup>		1.1	3.0	dB
<b>Error Vector Magnitude<sup>4)</sup></b>					
@ $f_{\text{Carrier Bd 3 RX}}$ 1807.4 ... 1877.6 MHz	EVM		2.6	5.0	%
@ $f_{\text{Carrier Bd 3 RX}}$ 1807.4 ... 1877.6 MHz	EVM <sup>2)</sup>		2.6	4.0	%
@ $f_{\text{Carrier Bd 3 RX}}$ 1807.4 ... 1877.6 MHz	EVM <sup>3)</sup>		2.6	5.5	%
<b>Input VSWR</b>					
1805.0 ... 1880.0 MHz			1.5	2.0	
<b>Output VSWR</b>					
1805.0 ... 1880.0 MHz			1.6	2.0	
<b>CMRR (<math> S_{21}-S_{31}  /  S_{21}+S_{31} </math>)</b>					
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:

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

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.	
<b>Attenuation</b>			$\alpha$				
	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

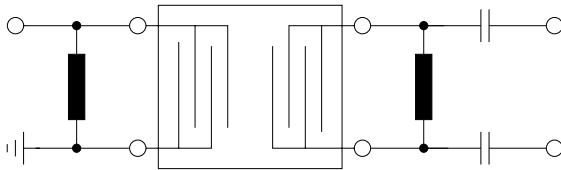

**Annotation for characteristics section**

Attenuation of WCDMA signal ("Powertransferfunction",  $\alpha_{\text{WCDMA}}$ ) is determined by

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

$f_{\text{Carrier}}$  according to 3GPP TS 25.101 (e.g. for band III RX passband,  $f_{\text{Carrier}}$  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**

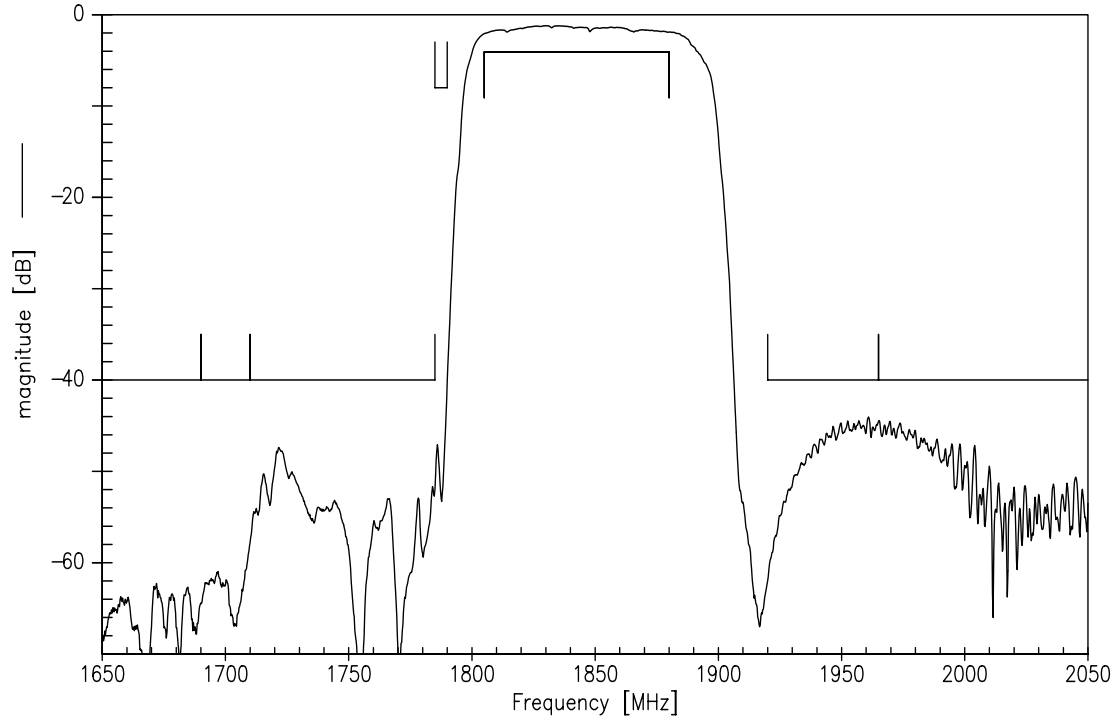
Operable temperature range	T	-40/+85	°C	
Storage temperature range	$T_{\text{stg}}$	-40/+85	°C	
DC voltage	$V_{\text{DC}}$	5	V	
ESD voltage	$V_{\text{ESD}}$	50 <sup>1)</sup>	V	machine model, 1 pulse
Input power	$P_{\text{IN(TX)}}$	17	dBm	CW @55°C, 2000h, Bd III TX band
	$P_{\text{IN}}$	10	dBm	CW @55°C, 2000h, all other bands

<sup>1)</sup> acc. to JESD22-A115A (machine model), 1 negative & 1 positive pulse.

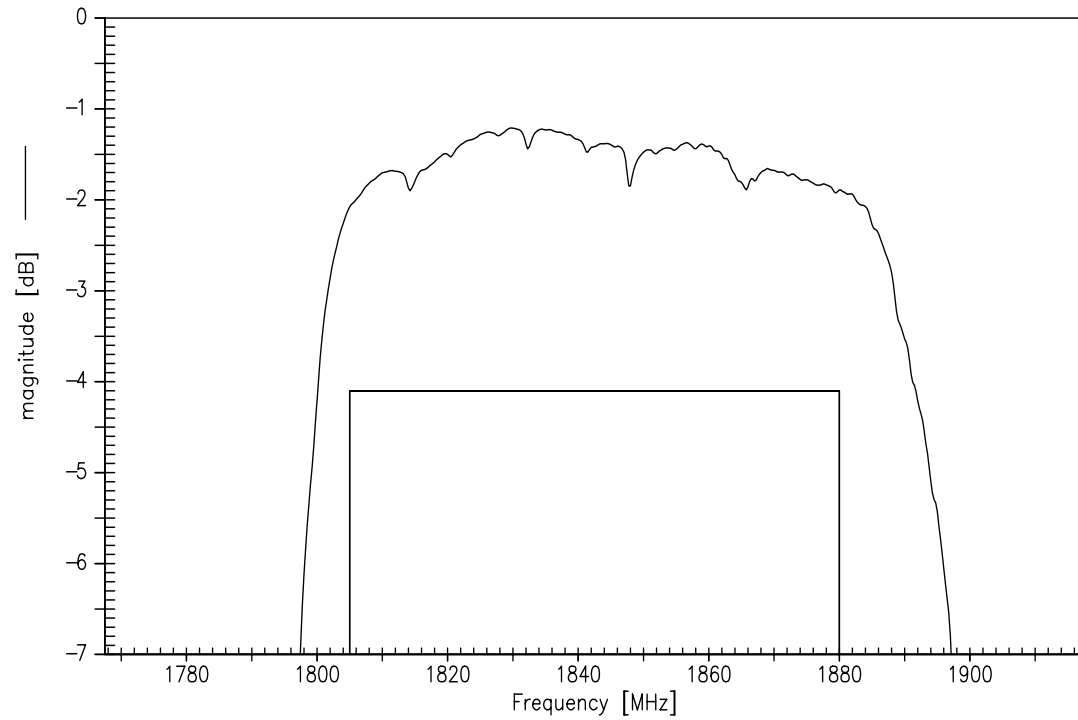
Data Sheet



Transfer function



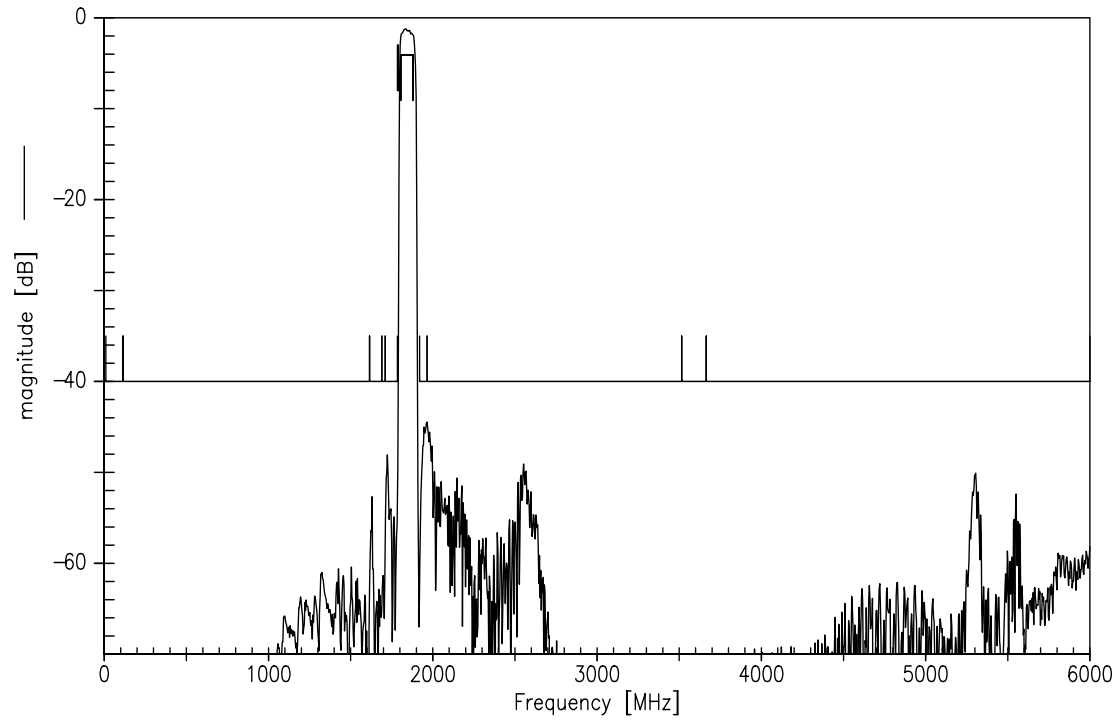
Transfer function



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



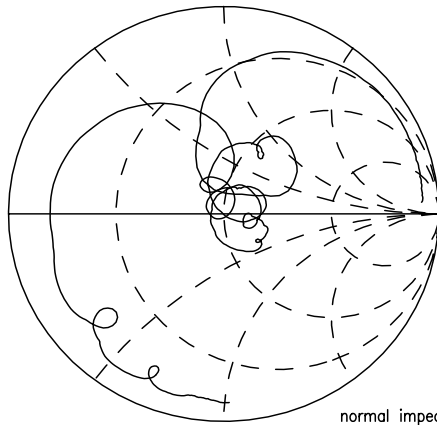
Transfer function (wideband)



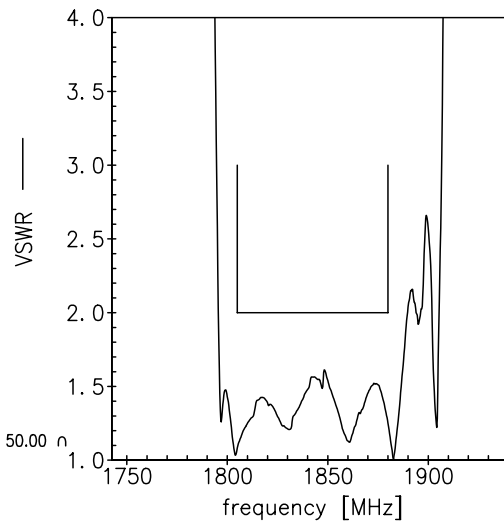


Smith charts (matching topology acc. to page 5)

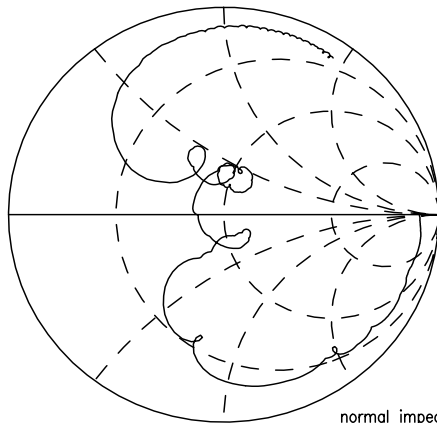
**S<sub>11</sub> function**



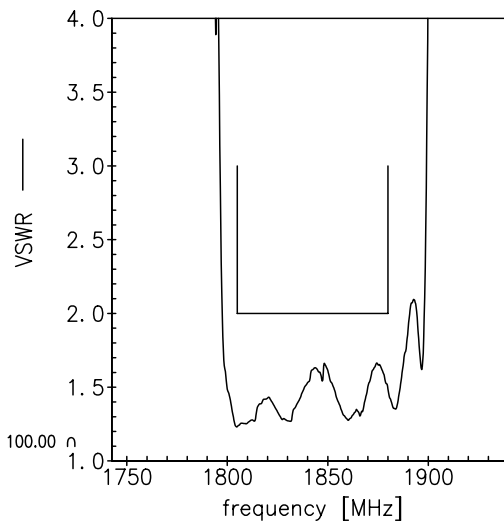
normal impedance: 50.00  $\Omega$



**S<sub>22</sub> function**



normal impedance: 100.00  $\Omega$





<b>SAW Components</b>	<b>B9896</b>
<b>SAW Filter</b>	<b>1842.5 MHz</b>

Data Sheet



## References

<b>Type</b>	B9896
<b>Ordering code</b>	B39182B9896P810
<b>Marking and package</b>	C61157-A8-A56
<b>Packaging</b>	F61074-V8255-Z000
<b>Date codes</b>	L_1126
<b>S-parameters</b>	B9896_NB_UN.s3p, B9896_WB_UN.s3p see file header for port/pin assignment table
<b>Soldering profile</b>	S_6001
<b>RoHS compatible</b>	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 <sup>th</sup> , 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.
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