



# SAW Components

## SAW TX Filter

Cellular / WCDMA band V

<b>Series/type:</b>	<b>B9859</b>
<b>Ordering code:</b>	<b>B39841B9859P810</b>
<b>Date:</b>	<b>June 27, 2012</b>
<b>Version:</b>	<b>2.0</b>

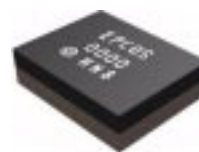
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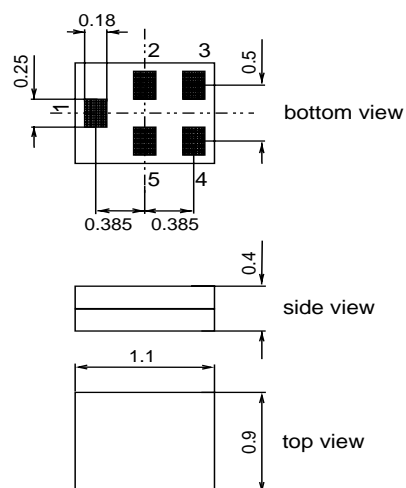
Data sheet


**Application**

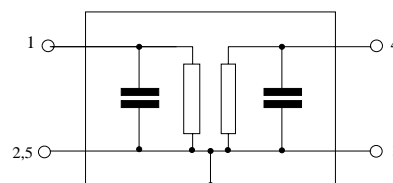
- Low-loss RF filter for mobile telephone WCDMA Band V / Cellular systems, transmit path (TX)
- Useable passband: 25 MHz
- Unbalanced / unbalanced operation
- Impedance 50  $\Omega$  input and output
- Suitable for GPRS class 1 to 12


**Features**

- Package size 1.1 x 0.9 x 0.4 mm<sup>3</sup>
- RoHS compatible
- Approximate weight: 0.001g
- Package for **Surface Mount Technology (SMT)**
- Ni, gold-plated terminals
- **Electrostatic Sensitive Device (ESD)**
- **Moisture Sensitivity Level 3**


**Pin configuration**

- 1 Input unbalanced
- 4 Output unbalanced
- 2,3,5 To be grounded



**Data sheet**

**Characteristics**

Temperature range for specification:  $T = -20\text{ °C to }+85\text{ °C}$   
 Terminating source impedance:  $Z_S = 50\ \Omega$  (unbalanced)  
 Terminating load impedance:  $Z_L = 50\ \Omega$  (unbalanced)

						<b>B9859</b>			
						<b>min.</b>	<b>typ. @ 25 °C</b>	<b>max.</b>	
<b>Center frequency</b>				$f_C$		—	836.5	—	MHz
<b>Maximum insertion attenuation</b>									
@ $f_{\text{Carrier Bd 5 TX}}$	826.4	...	846.6	MHz	$\alpha_{\text{WCDMA}}^{1)}$	—	1.2	1.6	dB
	824.0	...	849.0	MHz	$\alpha_{\text{Cellular}}$	—	1.4	1.8	dB
<b>Amplitude ripple (p-p)</b>									
	824.0	...	849.0	MHz	$\Delta\alpha$	—	0.7	1.1	dB
<b>Error Vector Magnitude<sup>2)</sup></b>									
@ $f_{\text{Carrier Bd 5 TX}}$	826.4	...	846.6	MHz	EVM	—	2.1	3.0	%
<b>Input VSWR</b>									
	824.0	...	849.0	MHz		—	1.9	2.1	
<b>Output VSWR</b>									
	824.0	...	849.0	MHz		—	1.8	2.1	
<b>Attenuation</b>					$\alpha$				
	DC	...	804.0	MHz		25	31	—	dB
	860.0	...	869.0	MHz		1	7	—	dB
	869.0	...	895.0	MHz	$\alpha_{\text{Cellular}}$	26	30	—	dB
@ $f_{\text{Carrier Bd 5 RX}}$	871.4	...	891.6	MHz	$\alpha_{\text{WCDMA}}^{1)}$	28	32	—	dB
	895.0	...	1210.0	MHz		20	23	—	dB
	1210.0	...	1648.0	MHz		25	30	—	dB
	1648.0	...	1698.0	MHz		28	32	—	dB
	1698.0	...	2480.0	MHz		25	29	—	dB
	2480.0	...	2547.0	MHz		20	28	—	dB
	2547.0	...	6000.0	MHz		15	23	—	dB

1) Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (4).

2) Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.


**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 Passband,  $f_{\text{Carrier}}$  ranges from 826.4 MHz (lowest Tx channel) to 846.6 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**

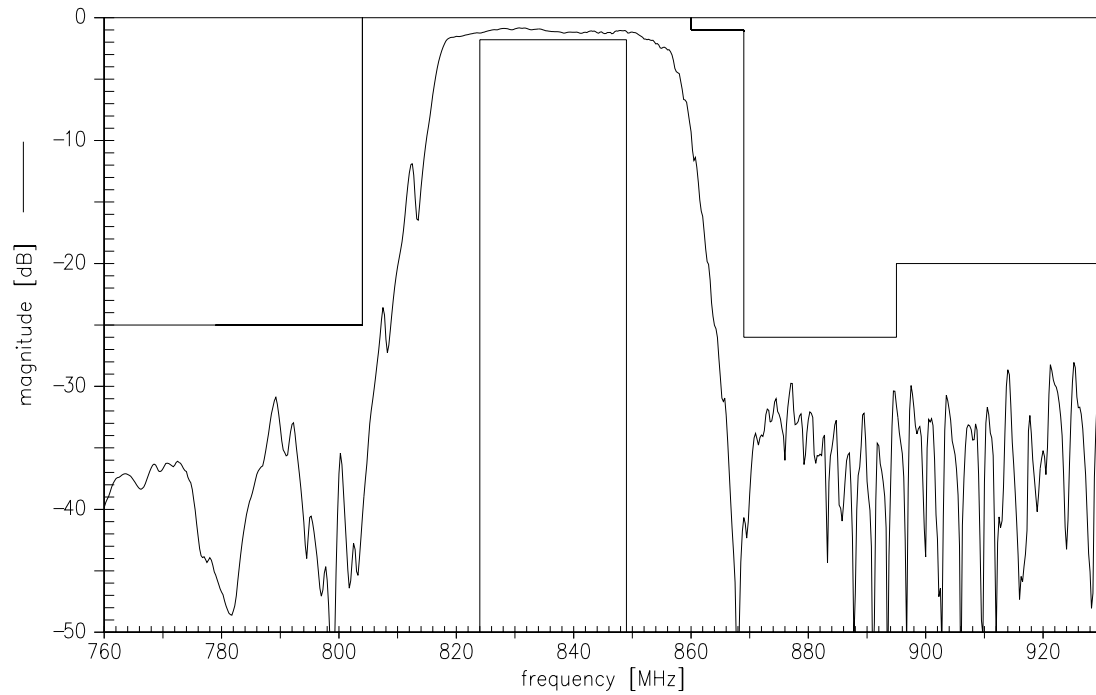
Operable temperature range	T	-40/+85	°C	
Storage temperature range	T <sub>stg</sub>	-40/+85	°C	
DC voltage	V <sub>DC</sub>	5	V	
ESD voltage	V <sub>ESD</sub>	100 <sup>1)</sup>	V	machine model, 10 pulses
Input power	P <sub>IN</sub>	15	dBm	2000h CW signal @ 55°

<sup>1)</sup> acc. to JESD22-A115A (machine model), 10 negative & 10 positive pulses.

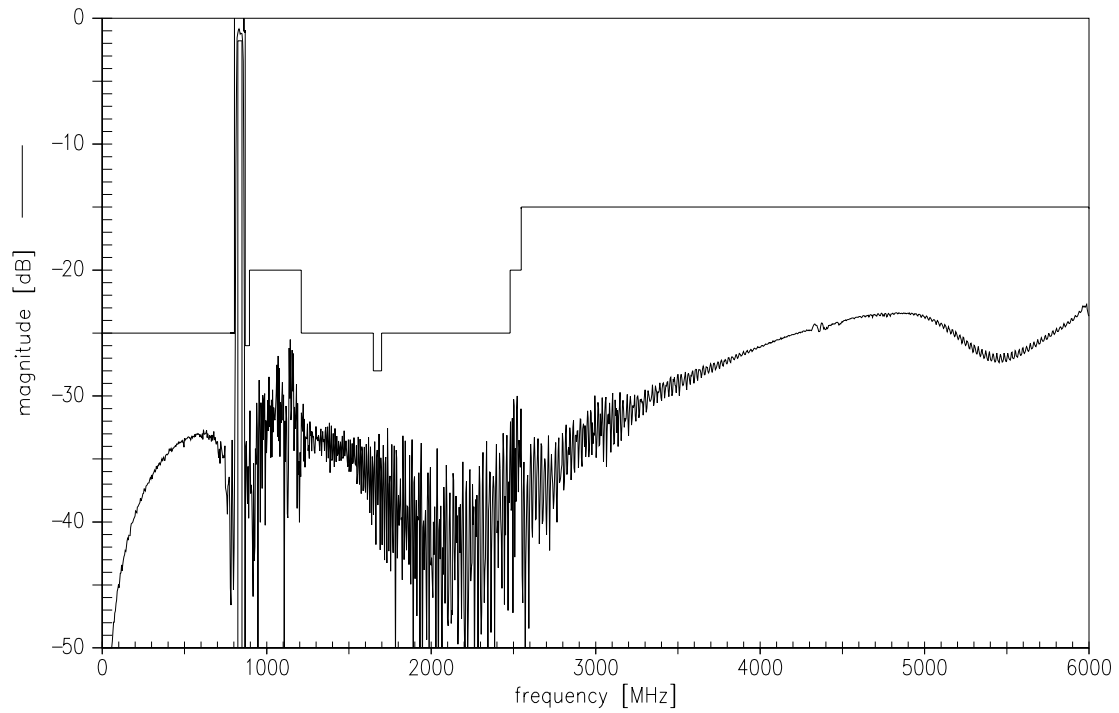
Data sheet



Transfer function for CW signals



Transfer function (wideband)

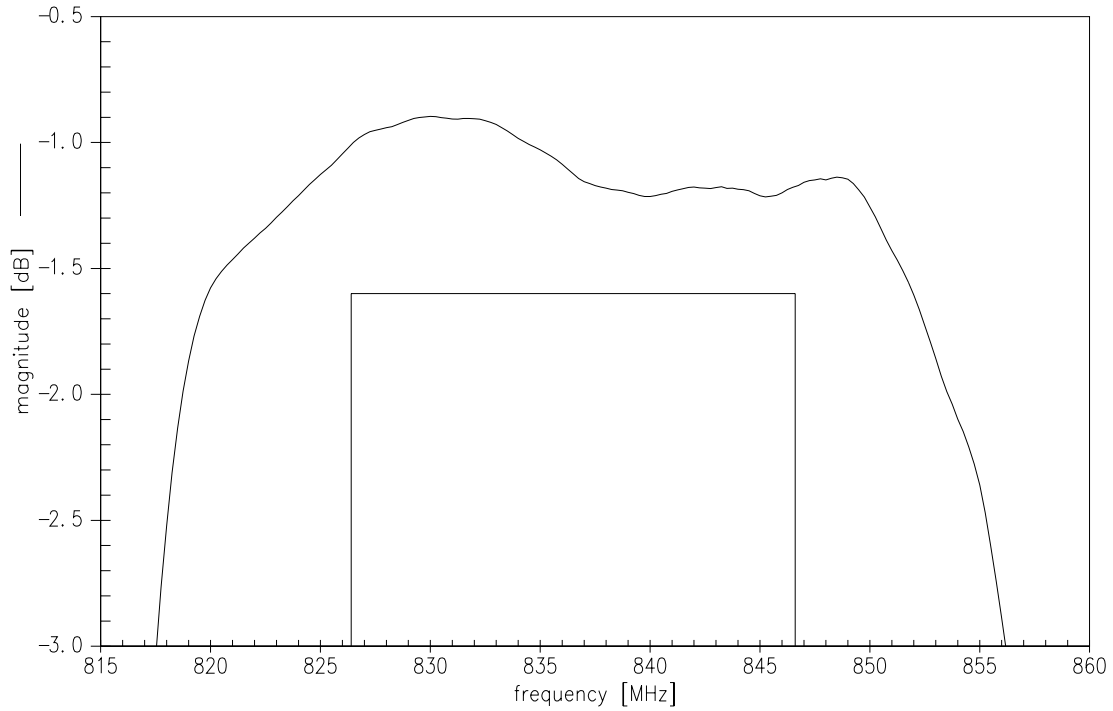


Please read *cautions and warnings and important notes* at the end of this document.

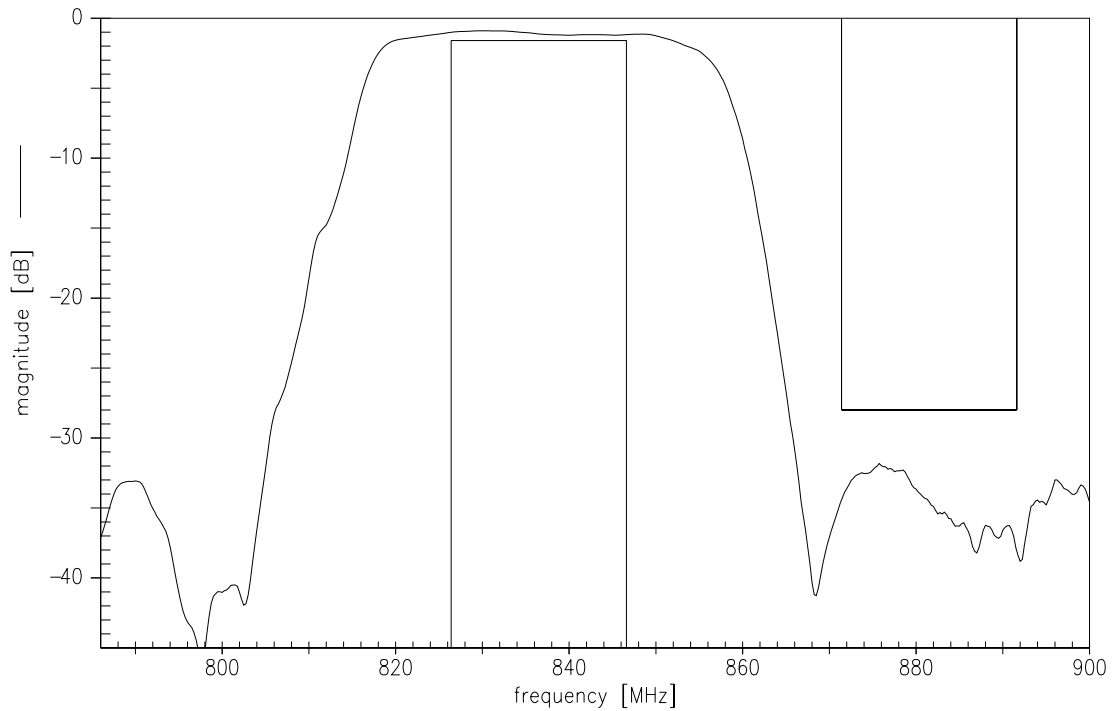
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Transfer function for WCDMA signals (Powertransferfunction vs. carrier frequency)



Transfer function for WCDMA signals (Powertransferfunction vs. carrier frequency)



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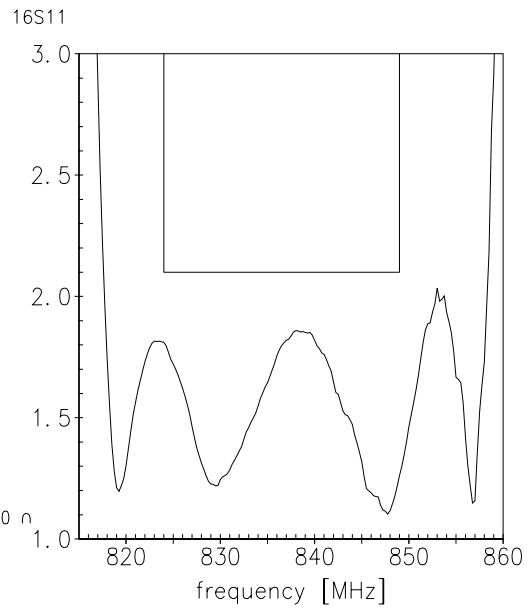
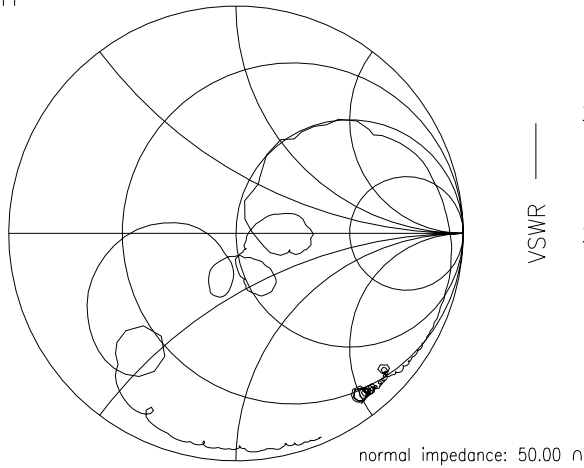
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Smith charts

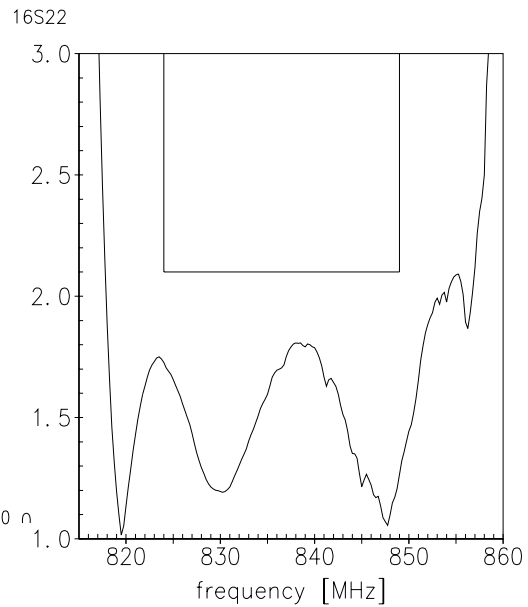
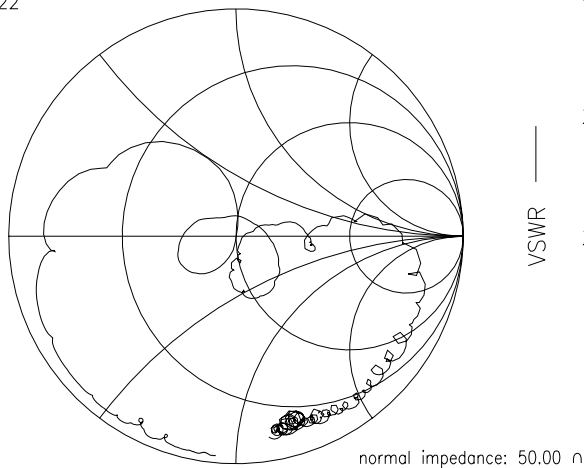
**Unbalanced input (pin1)**

S11



**Unbalanced output (pin4)**

S22



<b>SAW Components</b>	<b>B9859</b>
<b>SAW TX Filter</b>	<b>836.5 MHz</b>

Data sheet



### References

<b>Type</b>	B9859
<b>Ordering code</b>	B39841B9859P810
<b>Marking and package</b>	C61157-A8-A30
<b>Packaging</b>	F61074-V8255-Z00
<b>Date codes</b>	L_1126
<b>S-parameters</b>	B9859_NB.s2p B9859_WB.s2p See file header for port/pin assignment table.
<b>Soldering profile</b>	S_6001
<b>RoHS compatible</b>	defined as compatible with the following documents: "DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment. 2005/618/EC from April 18th, 2005, amending Directive 2002/95/EC of the European Parliament and of the Council for the purposes of establishing the maximum concentration values for certain hazardous substances in electrical and electronic equipment."
<b>Moldability</b>	Before using in overmolding environment, please contact your EPCOS sales office.
<b>Matching coils</b>	See Inductor pdf-catalog <a href="http://www.tdk.co.jp/tefe02/coil.htm#aname1">http://www.tdk.co.jp/tefe02/coil.htm#aname1</a> and Data Library for circuit simulation <a href="http://www.tdk.co.jp/etvcl/index.htm">http://www.tdk.co.jp/etvcl/index.htm</a> for a large variety of matching coils.

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