



## **SAW Components**

### **SAW Rx 2in1 filter**

GSM 1900 / GSM 850

<b>Series/type:</b>	<b>B9506</b>
<b>Ordering code:</b>	<b>B39202B9506L310</b>
<b>Date:</b>	<b>October 31, 2008</b>
<b>Version:</b>	<b>2.0</b>

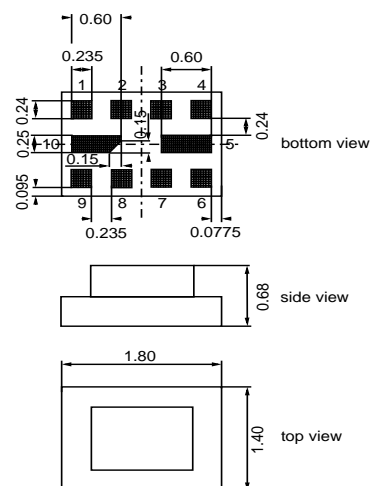
**Data sheet**

**Application**

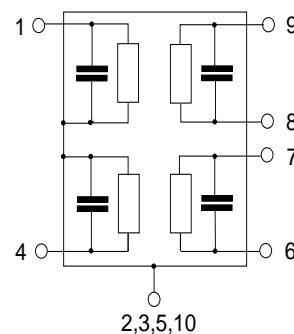
- Low-loss 2in1 RF filter for mobile telephone GSM 1900 and GSM 850 systems, receive path (Rx)
- Usable passband:  
Filter 1 (GSM 1900): 60 MHz  
Filter 2 (GSM 850): 25 MHz
- Unbalanced to balanced operation for both filters
- Impedance transformation from 50  $\Omega$  to 150  $\Omega$  for both filters
- Low amplitude ripple
- Suitable for GPRS class 1 to 12


**Features**

- Package size 1.8 x 1.4 x 0.68 mm<sup>3</sup>
- Package code QCS10U
- RoHS compatible
- Approx. weight 0.006g
- Package for Surface Mount Technology (SMT)
- Ni, gold-plated terminals
- **Electrostatic Sensitive Device (ESD)**


**Pin configuration**

- 1 Input [Filter 1]
- 4 Input [Filter 2]
- 6,7 Output balanced [Filter 2]
- 8,9 Output balanced [Filter 1]
- 2,3,5,10 Case-ground





# SAW Components

B9506

## SAW Rx 2in1 filter

1960.0 / 881.5 MHz

### Data sheet



#### Characteristics of Filter 1 (GSM1900)

Temperature range for specification:  $T = -20\text{ °C to }+75\text{ °C}$   
Terminating source impedance:  $Z_S = 50\ \Omega$   
Terminating load impedance:  $Z_L = 150\ \Omega \parallel 13\text{ nH (balanced)}$

		min.	typ. @ 25 °C	max.	
<b>Center frequency</b>	$f_C$	—	1960.0	—	MHz
<b>Maximum insertion attenuation</b>	$\alpha_{\max}$	—	1.3	2.3 <sup>1)</sup>	dB
1930.0 ... 1990.0 MHz					
<b>Amplitude ripple (p-p)</b>	$\Delta\alpha$	—	0.4	1.4 <sup>2)</sup>	dB
1930.0 ... 1990.0 MHz					
<b>Input VSWR</b>		—	1.7	2.1	
1930.0 ... 1990.0 MHz					
<b>Output VSWR</b>		—	1.7	2.1	
1930.0 ... 1990.0 MHz					
<b>Output amplitude balance (<math> S_{31}/S_{21} </math>)</b>		-1.3	-0.8/0.2	1.3	dB
1930.0 ... 1990.0 MHz					
<b>Output phase balance (<math>\phi(S_{31})-\phi(S_{21})+180^\circ</math>)</b>		-10	-7/+5	10	°
1930.0 ... 1990.0 MHz					
<b>Attenuation</b>	$\alpha$				
10.0 ... 1510.0 MHz		40	44	—	dB
1510.0 ... 1830.0 MHz		30	34	—	dB
1830.0 ... 1890.0 MHz		20	25	—	dB
1890.0 ... 1910.0 MHz		12	16	—	dB
2010.0 ... 2070.0 MHz		12	17	—	dB
2070.0 ... 2400.0 MHz		19	23	—	dB
2400.0 ... 2500.0 MHz		35	40	—	dB
2500.0 ... 3860.0 MHz		28	33	—	dB
3860.0 ... 3980.0 MHz		36	43	—	dB
3980.0 ... 5790.0 MHz		30	39	—	dB
5790.0 ... 6000.0 MHz		32	40	—	dB

<sup>1)</sup> 2.2 dB at 25 °C

<sup>2)</sup> 1.3 dB at 25 °C



SAW Components		B9506
SAW Rx 2in1 filter		1960.0 / 881.5 MHz
Data sheet	SMD	

#### Maximum ratings of Filter 1

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>	50 <sup>1)</sup>	V	machine model, 1 pulse
Input Power at				
GSM 850, GSM 900	P <sub>IN</sub>	15	dBm	effective power in the on-state, duty cycle 4:8
GSM 1800, GSM 1900	P <sub>IN</sub>	15	dBm	
Tx bands				

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



SAW Components

B9506

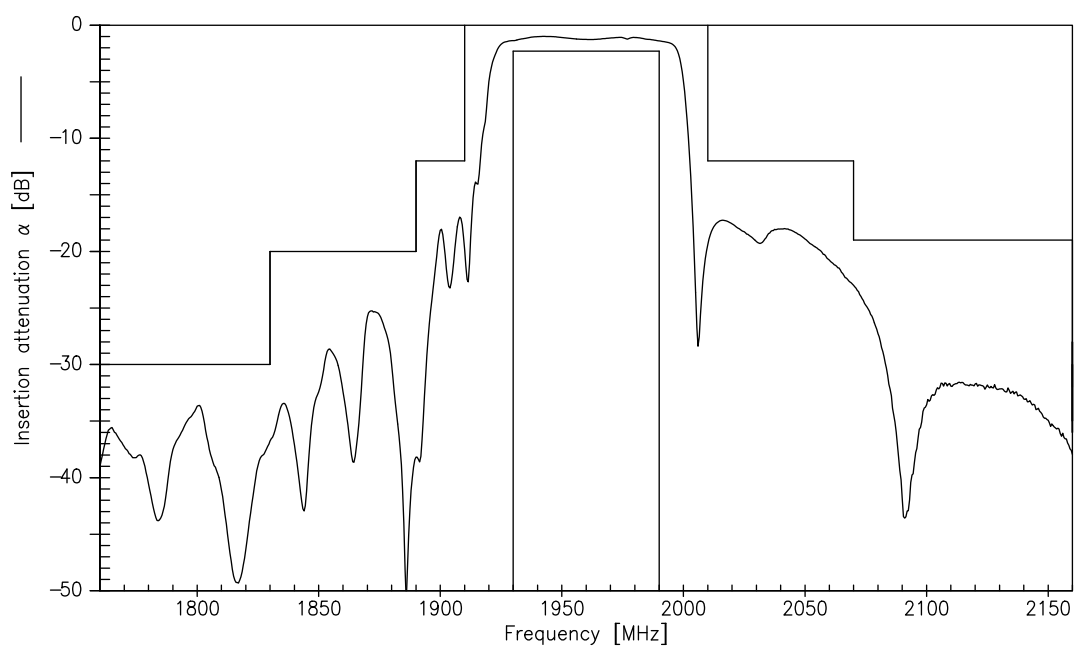
SAW Rx 2in1 filter

1960.0 / 881.5 MHz

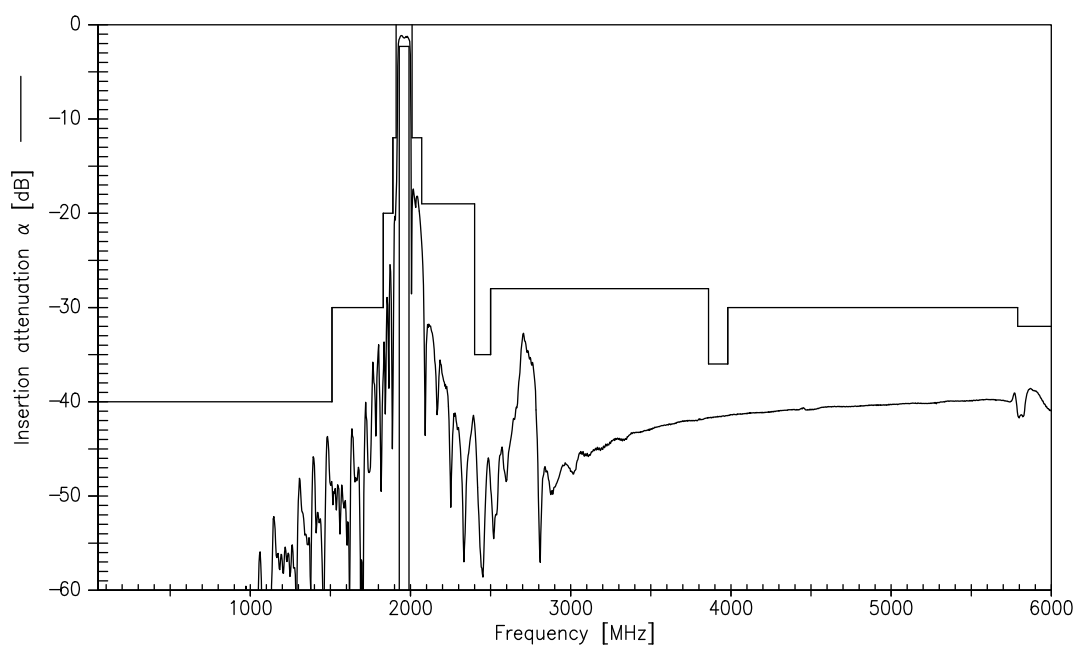
Data sheet



### Transfer function Filter 1 (GSM1900)



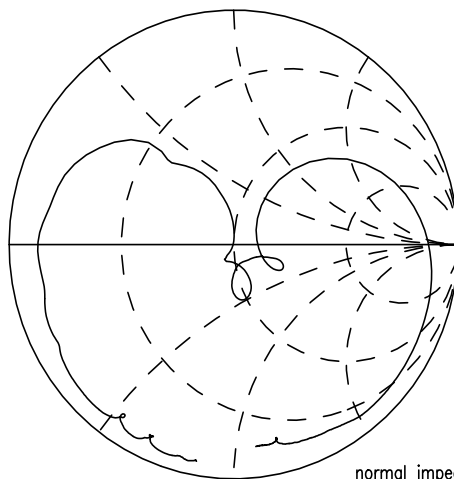
### Transfer function Filter 1 (GSM1900) - Wideband



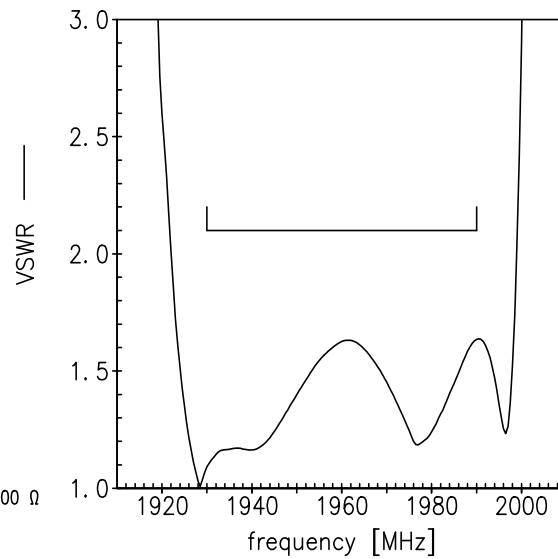
Please read *cautions and warnings* and *important notes* at the end of this document.

Smith charts of Filter 1 (GSM1900)

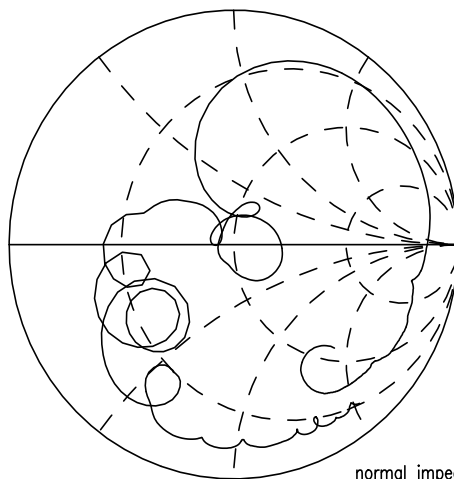
$S_{11}$  function



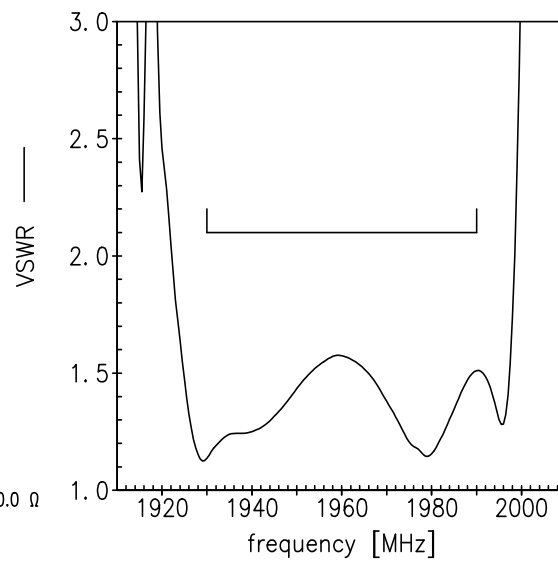
normal impedance: 50.00  $\Omega$



$S_{22}$  function



normal impedance: 150.0  $\Omega$





<b>SAW Components</b>	<b>B9506</b>
<b>SAW Rx 2in1 filter</b>	<b>1960.0 / 881.5 MHz</b>

Data sheet



### Characteristics of Filter 2 (GSM850)

Temperature range for specification:	$T = -20\text{ °C to }+75\text{ °C}$
Terminating source impedance:	$Z_S = 50\ \Omega$
Terminating load impedance:	$Z_L = 150\ \Omega \parallel 82\text{ nH (balanced)}$

		min.	typ. @ 25 °C	max.	
<b>Center frequency</b>	$f_c$	—	881.5	—	MHz
<b>Maximum insertion attenuation</b>	$\alpha_{\max}$	—	1.4	2.0 <sup>1)</sup>	dB
869.0 ... 894.0 MHz		—			
<b>Amplitude ripple (p-p)</b>	$\Delta\alpha$	—	0.5	1.2 <sup>2)</sup>	dB
869.0 ... 894.0 MHz		—			
<b>Input VSWR</b>		—	1.6	2.0	
869.0 ... 894.0 MHz		—			
<b>Output VSWR</b>		—	1.6	2.0	
869.0 ... 894.0 MHz		—			
<b>Output amplitude balance</b> ( $ S_{31}/S_{21} $ )		-1.2	-1.0/+1.0	1.2	dB
869.0 ... 894.0 MHz					
<b>Output phase balance</b> ( $\phi(S_{31})-\phi(S_{21}))+180^\circ$ )		-12	-7/+7	12	°
869.0 ... 894.0 MHz					
<b>Attenuation</b>	$\alpha$				
10.0 ... 447.0 MHz		45	49	—	dB
447.0 ... 849.0 MHz		30	37	—	dB
914.0 ... 954.0 MHz		21	26	—	dB
954.0 ... 1738.0 MHz		28	36	—	dB
1738.0 ... 1788.0 MHz		40	56	—	dB
1788.0 ... 3476.0 MHz		35	43	—	dB
3476.0 ... 6000.0 MHz		26	30	—	dB

<sup>1)</sup> 1.7 dB at 25 °C

<sup>2)</sup> 0.9 dB at 25 °C



SAW Components		B9506
SAW Rx 2in1 filter		1960.0 / 881.5 MHz
Data sheet	SMD	

#### Maximum ratings of Filter 2

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, 1 pulse
Input Power at				
GSM 850, GSM 900	P <sub>IN</sub>	15	dBm	effective power in the on-state, duty cycle 4:8
GSM 1800, GSM 1900	P <sub>IN</sub>	15	dBm	
Tx bands				

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





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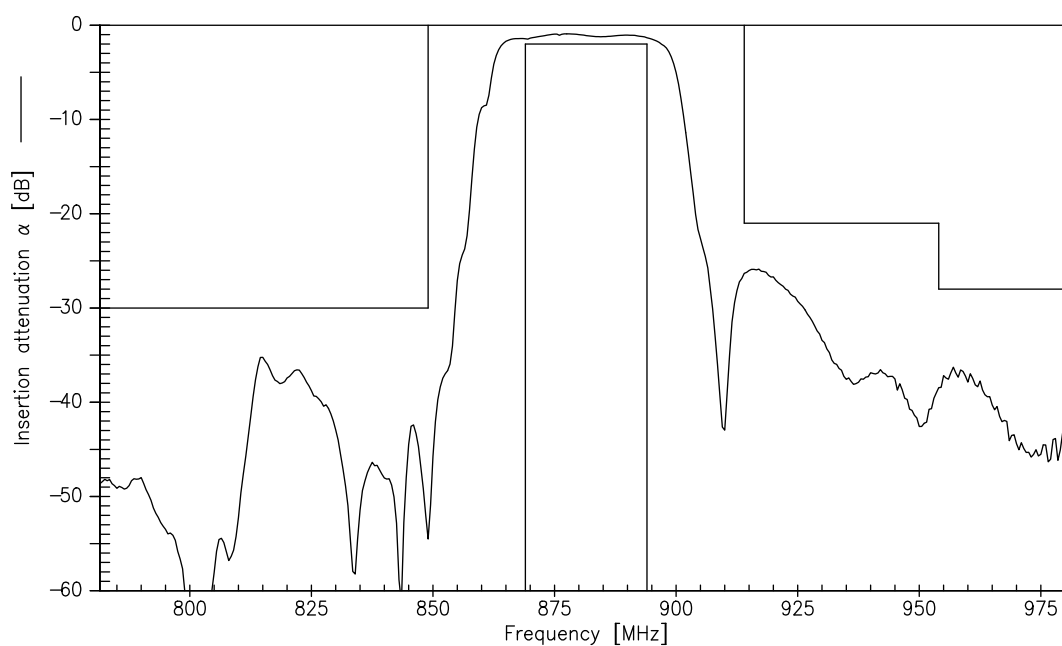
SAW Rx 2in1 filter

1960.0 / 881.5 MHz

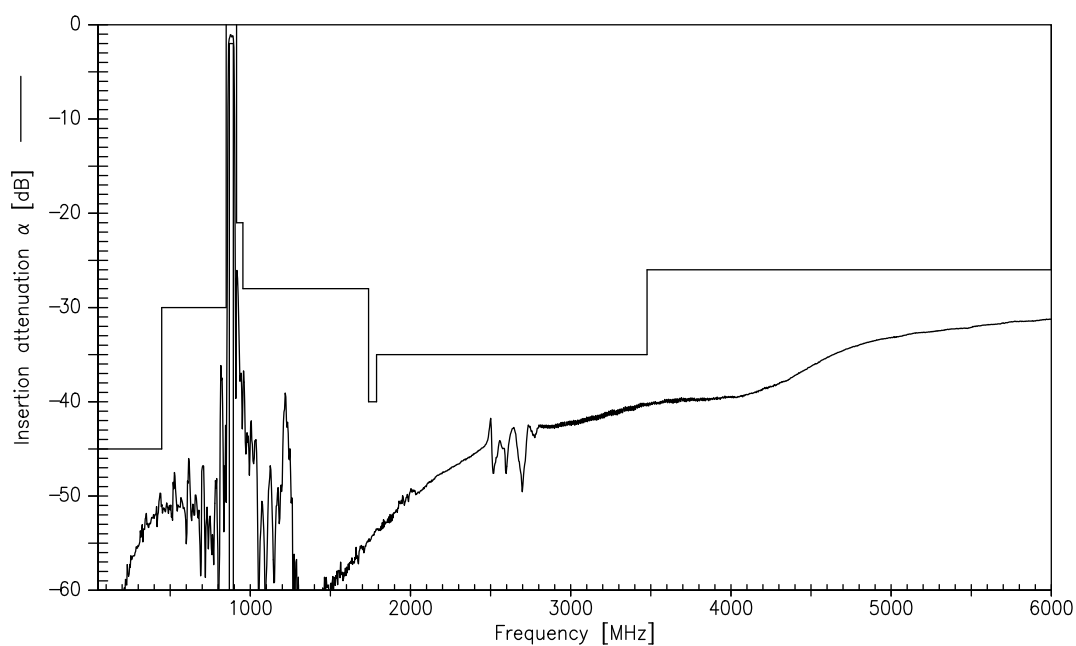
Data sheet



### Transfer function Filter 2 (GSM850)



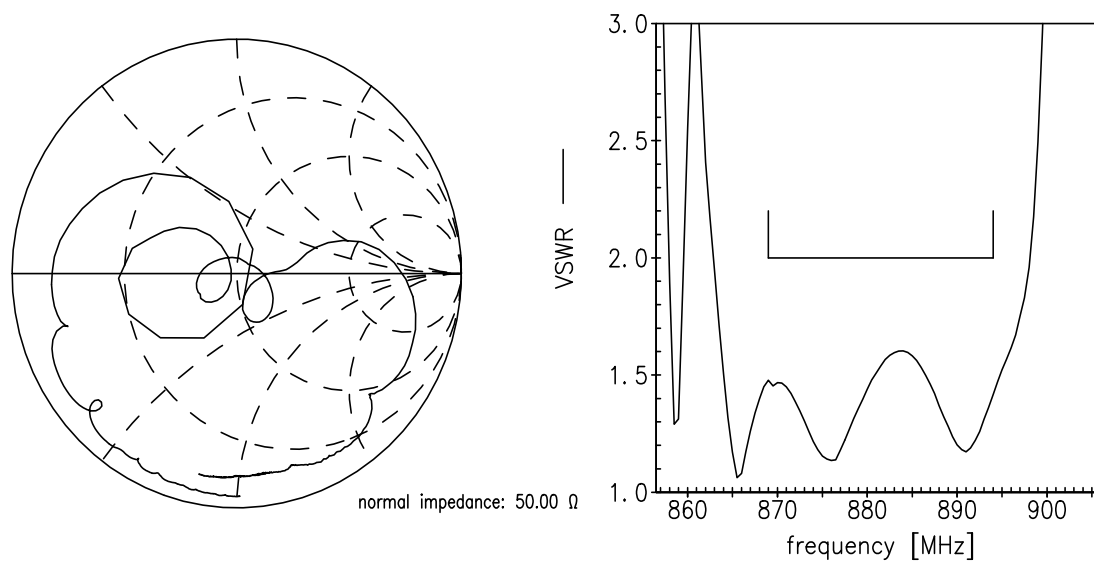
### Transfer function Filter 2 (GSM850) - Wideband



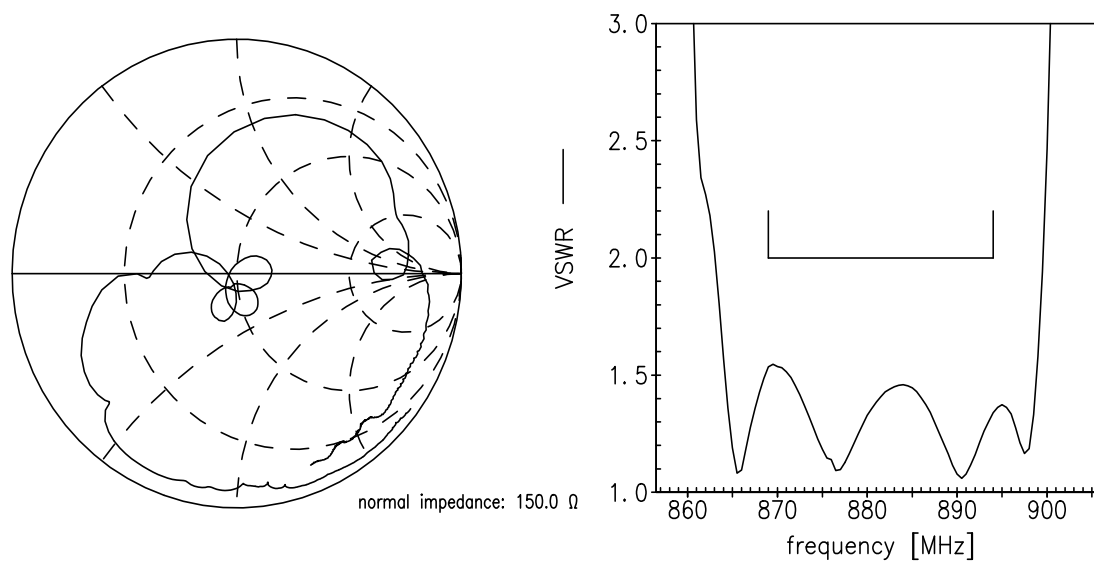
Please read *cautions and warnings* and *important notes* at the end of this document.

Smith charts of Filter 2 (GSM850)

$S_{11}$  function



$S_{22}$  function



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Data sheet

**References**

<b>Type</b>	B9506
<b>Ordering code</b>	B39202B9506L310
<b>Marking and package</b>	C61157-A7-A152
<b>Packaging</b>	F61074-V8226-Z000
<b>Date codes</b>	L_1126
<b>S-parameters</b>	B9506_LB_NB.s3p B9506_LB_WB.s3p B9506_UB_NB.s3p B9506_UB_WB.s3p 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."

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**Published by EPCOS AG**

**Surface Acoustic Wave Components Division**

**P.O. Box 80 17 09, 81617 Munich, GERMANY**

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