



## **SAW Components**

**SAW Rx 2in1 filter**

GSM 900 / GSM 1800

**Series/type:** B9501

**Ordering code:**

**Date:** March 06, 2008

**Version:** 1.1



**SAW Components**

**B9501**

**SAW Rx 2in1 filter**

**942.5 / 1842.5 MHz**

Preliminary data



**Revision History: Changes compared to previous iteration issue**

ISSUE	ORIGINATOR	DETAIL SPEC CHANGES	DATE
B9501_1.1	Ong WL	Insertion of filter type in datasheet	06.03.2008



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**B9501**

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**942.5 / 1842.5 MHz**

**Preliminary data**



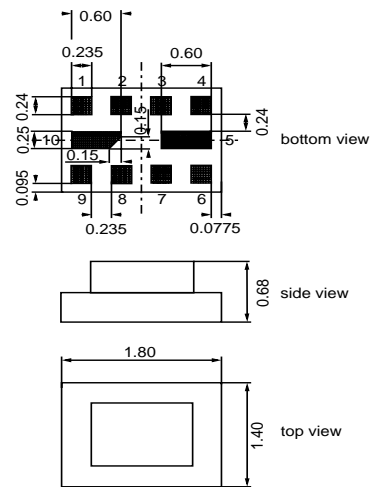
**Application**

- Low-loss 2in1 RF filter for mobile telephone GSM 900 and GSM 1800 systems, receive path (Rx)
- Usable passband:  
Filter 1 (GSM 900): 35 MHz  
Filter 2 (GSM 1800): 75 MHz
- Unbalanced to balanced operation for both filters
- Very low insertion attenuation
- Low amplitude ripple
- Impedance transformation from 50 Ω to 150 Ω for both filters
- Suitable for GPRS class 1 to 12



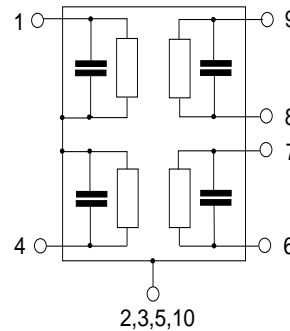
**Features**

- Package size 1.8 x 1.4 x 0.68 mm<sup>3</sup>
- Package code QCS10U
- RoHS compatible
- Approx. weight 0.006 g
- 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





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**Characteristics of filter 1 ( GSM 900 )**

Temperature range for specification:  $T = -20\text{ °C to }+75\text{ °C}$   
 Terminating source impedance:  $Z_S = 50\ \Omega$   
 Terminating load impedance:  $Z_L = 150\ \Omega \parallel 56\text{ nH (balanced)}$

		B9501 <sup>1)</sup>			DGL <sup>2)</sup>	
		min.	typ. @25°C	max.		
<b>Center frequency</b>	$f_C$	—	942.5	—		MHz
<b>Maximum insertion attenuation</b>	$\alpha_{max}$					
925.0 ... 960.0 MHz		—	1.2 <sup>3)</sup>	2.1 <sup>4)</sup>		dB
<b>Amplitude ripple (p-p)</b>	$\Delta\alpha$					
925.0 ... 960.0 MHz		—	0.5	1.3 <sup>5)</sup>		dB
<b>Input VSWR</b>						
925.0 ... 960.0 MHz		—	1.7	2.0		
<b>Output VSWR</b>						
925.0 ... 960.0 MHz		—	1.7	2.0		
<b>Output amplitude balance (<math> S_{31}/S_{21} </math>)</b>						
925.0 ... 960.0 MHz		-1.0	-0.7/0.2	1.0		dB
<b>Output phase balance (<math>\phi(S_{31})-\phi(S_{21})+180^\circ</math>)</b>						
925.0 ... 960.0 MHz		-10	-3/+3	10		°
<b>Attenuation</b>	$\alpha$					
10.0 ... 480.0 MHz		45	55	—		dB
480.0 ... 900.0 MHz		30	34	—		dB
900.0 ... 905.0 MHz		26	31	—		dB
905.0 ... 915.0 MHz		20	30	—		dB
980.0 ... 1000.0 MHz		25	30	—		dB
1000.0 ... 1850.0 MHz		28	36	—		dB
1850.0 ... 1920.0 MHz		40	59	—		dB
1920.0 ... 3700.0 MHz		35	38	—		dB
3700.0 ... 6000.0 MHz		32	38	—		dB

1) Values in columns min, typ and max indicate the development status of the current version.

2) Values in column DesignGoal (DGL) indicate the target performance.

3) Typical value excluding PCB losses of 0.16 dB.

4) 1.9 dB at 25 °c

5) 1.2 dB at 25 °c



**SAW Components**

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**942.5 / 1842.5 MHz**

Preliminary data



**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>	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				

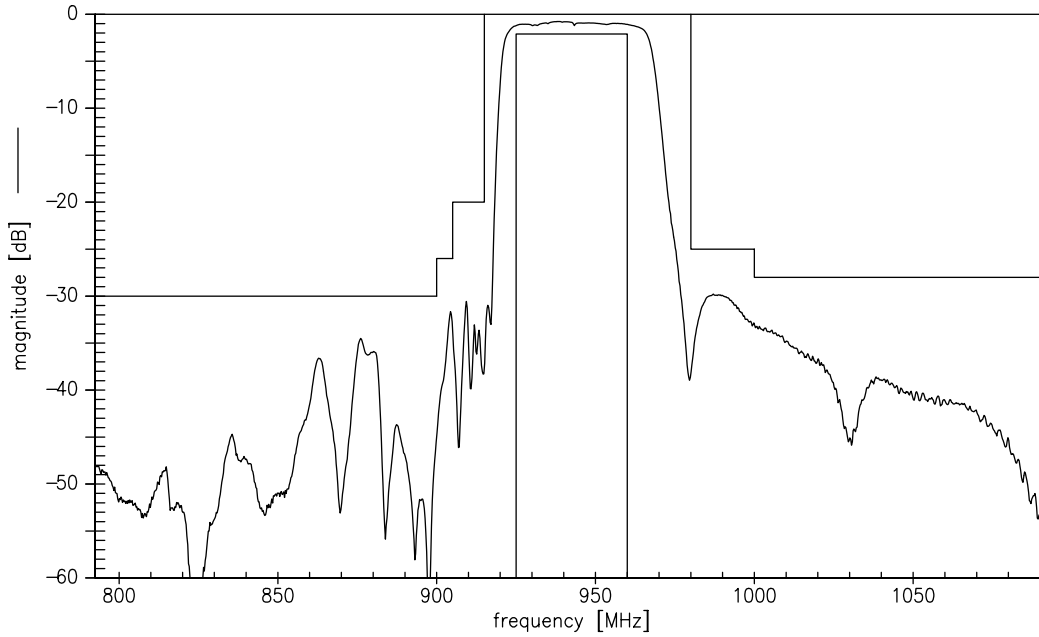
<sup>1)</sup> acc. to JEDEC22-A115A (machine model), 1 negative & 1 positive pulse.



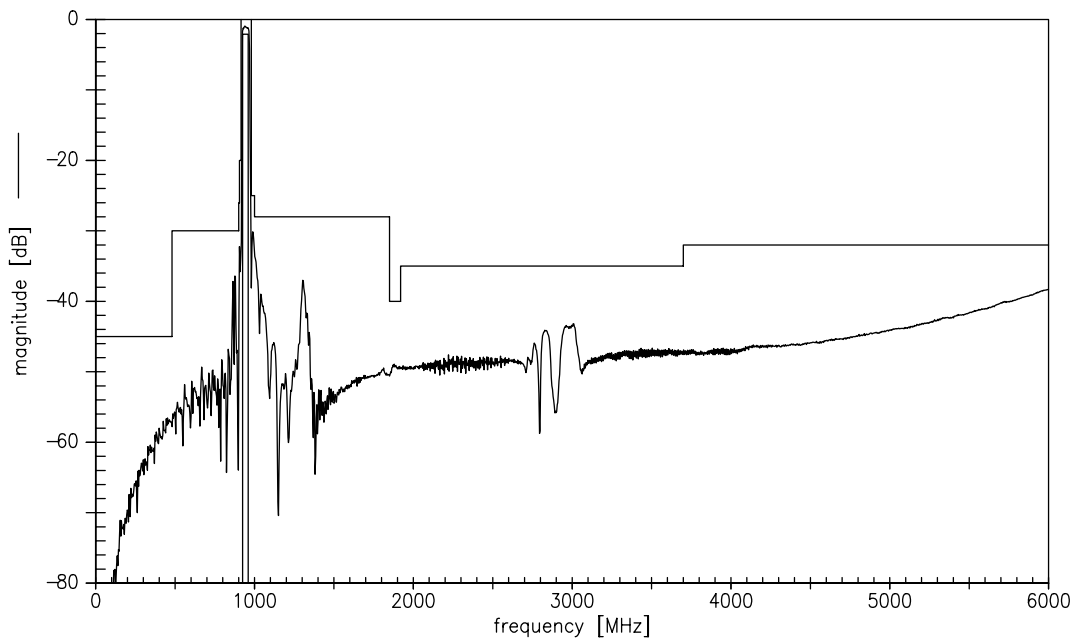
Preliminary data



Transfer function of filter 1



Transfer function of Filter 1 - wideband

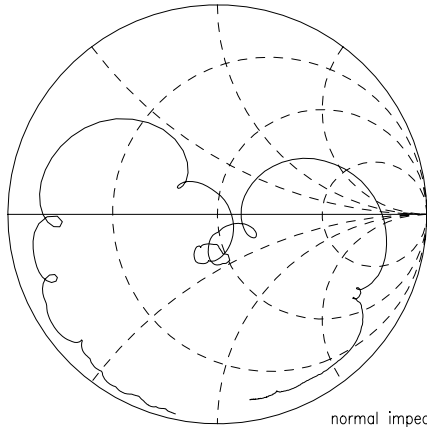


Preliminary data

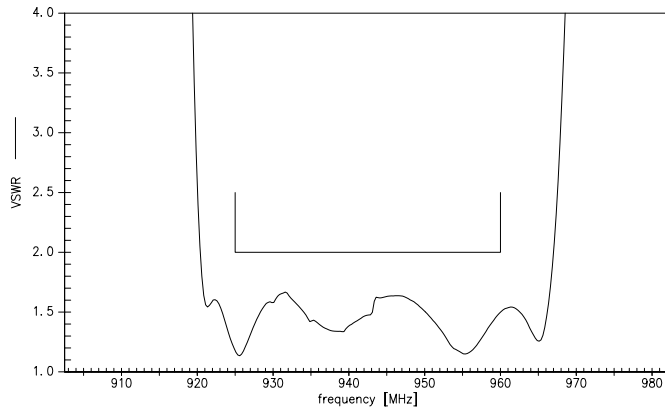


Smith Charts filter 1

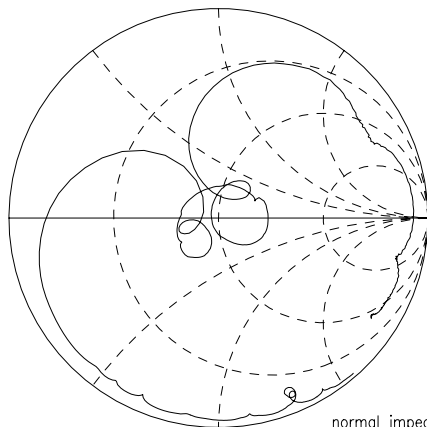
$S_{11}$  function



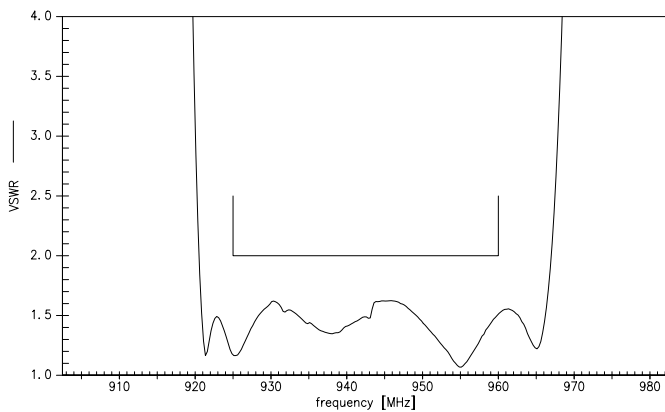
normal impedance: 50.00  $\Omega$



$S_{22}$  function



normal impedance: 150.0  $\Omega$





**SAW Components**

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**942.5 / 1842.5 MHz**

**Preliminary data**



**Characteristics of filter 2 ( GSM 1800 )**

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

		B9501 <sup>1)</sup>			DGL <sup>2)</sup>	
		min.	typ. @25°C	max.		
<b>Center frequency</b>	$f_C$	—	1842.5	—		MHz
<b>Maximum insertion attenuation</b>	$\alpha_{max}$					
1805.0 ... 1880.0 MHz		—	1.3 <sup>3)</sup>	2.2 <sup>4)</sup>		dB
<b>Amplitude ripple (p-p)</b>	$\Delta\alpha$					
1805.0 ... 1880.0 MHz		—	0.5	1.4 <sup>5)</sup>		dB
<b>Input VSWR</b>						
1805.0 ... 1880.0 MHz		—	1.7	2.0		
<b>Output VSWR</b>						
1805.0 ... 1880.0 MHz		—	1.7	2.0		
<b>Output amplitude balance (<math> S_{31}/S_{21} </math>)</b>						
1805.0 ... 1880.0 MHz		-1.0	-0.6/0.6	1.0		dB
<b>Output phase balance (<math>\phi(S_{31})-\phi(S_{21})+180^\circ</math>)</b>						
1805.0 ... 1880.0 MHz		-10	-6/+5	10		°
<b>Attenuation</b>	$\alpha$					
10.0 ... 902.0 MHz		45	54	—		dB
902.0 ... 940.0 MHz		45	54	—		dB
940.0 ... 1705.0 MHz		28	41	—		dB
1705.0 ... 1785.0 MHz		12 <sup>6)</sup>	16	—		dB
1920.0 ... 1980.0 MHz		17	23	—		dB
1980.0 ... 2030.0 MHz		25	33	—		dB
2030.0 ... 2400.0 MHz		28	34	—		dB
2400.0 ... 2500.0 MHz		32	41	—		dB
2500.0 ... 2775.0 MHz		28	34	—		dB
2775.0 ... 2880.0 MHz		38	50	—		dB
2880.0 ... 3610.0 MHz		28	47	—		dB
3610.0 ... 3760.0 MHz		38	46	—		dB
3760.0 ... 5415.0 MHz		28	39	—		dB
5415.0 ... 5640.0 MHz		32	38	—		dB
5640.0 ... 6000.0 MHz		28	37	—		dB

<sup>1)</sup> Values in columns min, typ and max indicate the development status of the current version.

<sup>2)</sup> Values in column DesignGoal (DGL) indicate the target performance.

<sup>3)</sup> Typical value excluding PCB losses of 0.27 dB.

<sup>4)</sup> 2.1 dB at 25 °C

<sup>5)</sup> 1.3 dB at 25 °C

<sup>6)</sup> 14 dB at 25 °C

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





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**942.5 / 1842.5 MHz**

Preliminary data



**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>	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				

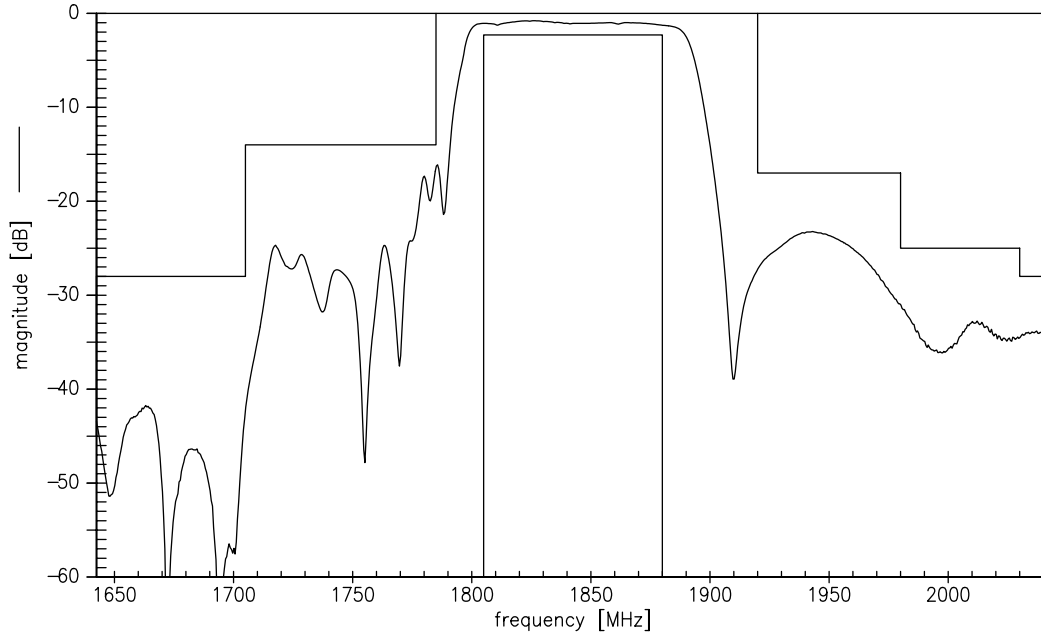
<sup>1)</sup> acc. to JEDEC22-A115A (machine model), 1 negative & 1 positive pulse.



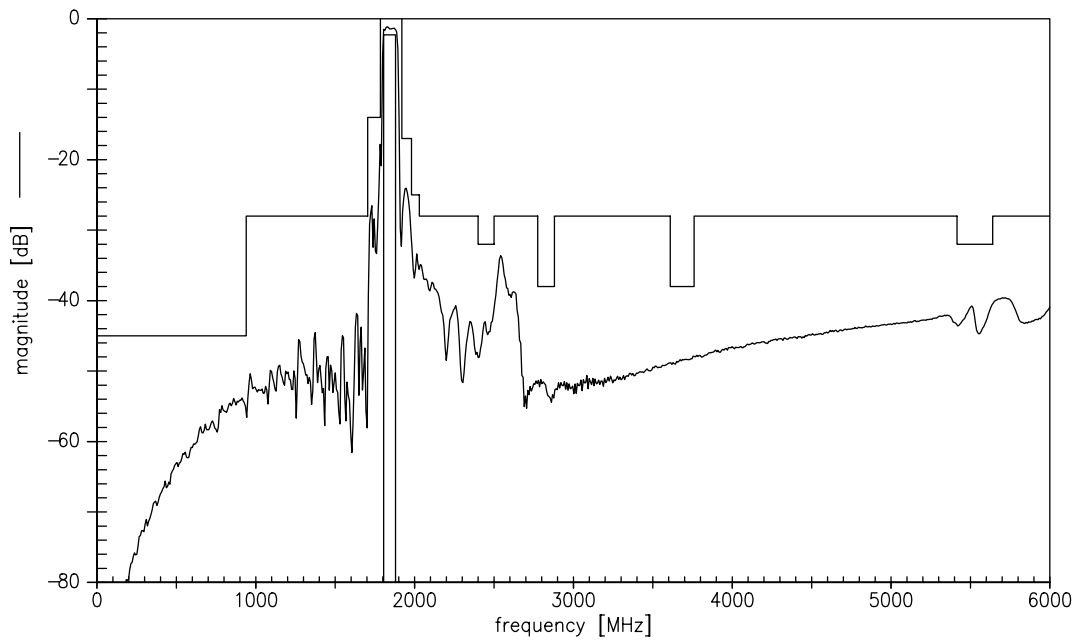
Preliminary data



Transfer function of filter 2



Transfer function of filter 2 - wideband

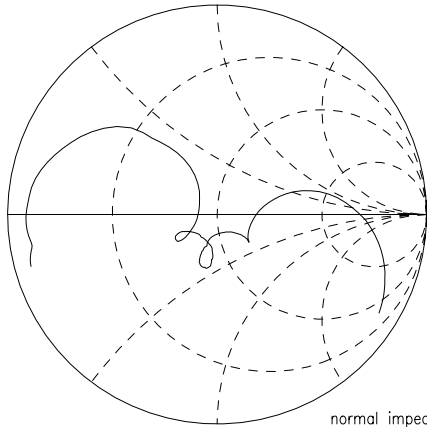


Preliminary data

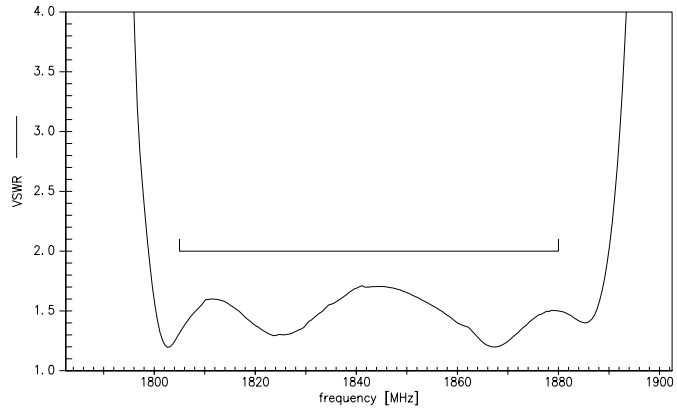


Smith Charts filter 2

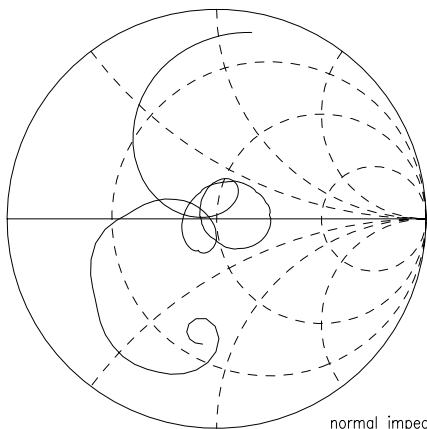
$S_{11}$  function



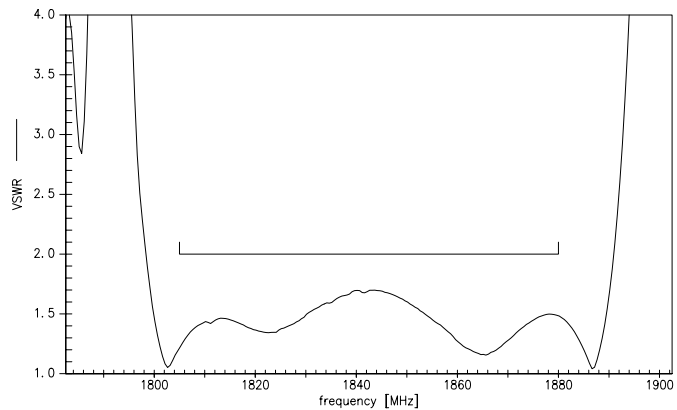
normal impedance: 50.00  $\Omega$



$S_{22}$  function



normal impedance: 150.0  $\Omega$





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## References

Type	B9501
Ordering code	
Marking and package	C61157-A7-A152
Packaging	F61074-V8226-Z000
Date code	L_1126
S-parameters	B9501_LB_NB.s3p B9501_LB_WB.s3p B9501_UB_NB.s3p B9501_UB_WB.s3p
Soldering profile	S_6001
RoHS compatible	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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