



## **SAW Components**

**SAW filter 2in1 filter**

GSM Dualband EU

|                       |                         |
|-----------------------|-------------------------|
| <b>Series/type:</b>   | <b>B9521</b>            |
| <b>Ordering code:</b> | <b>B39182B9521P810</b>  |
| <b>Date:</b>          | <b>January 05, 2012</b> |
| <b>Version:</b>       | <b>2.0</b>              |

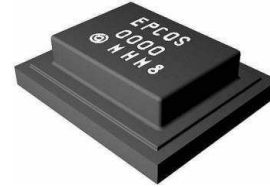


Data Sheet



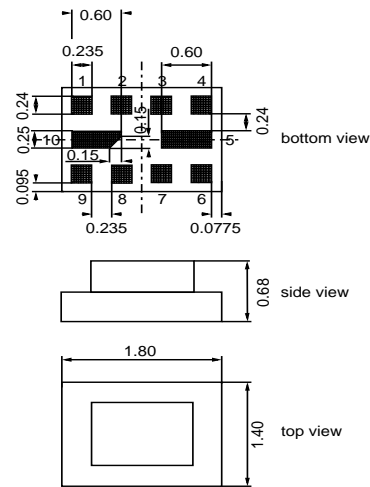
Application

- 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 (GSM1800) : 75 MHz
- Unbalanced to unbalanced operation for both filters
- Very low insertion attenuation
- Low amplitude ripple
- Suitable for GPRS class 1 to 12



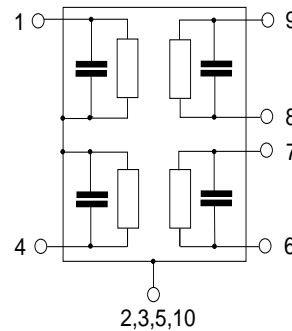
Features

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



Pin configuration

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





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SAW filter 2in1 filter

942.5/1842.5 MHz

Data Sheet



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

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

|                                      |                | min. | typ.<br>@ 25 °C | max. |     |
|--------------------------------------|----------------|------|-----------------|------|-----|
| <b>Center frequency</b>              | $f_C$          | —    | 942.5           | —    | MHz |
| <b>Maximum insertion attenuation</b> | $\alpha_{max}$ | —    | 1.6             | 3.0  | dB  |
| 925.0 ... 960.0 MHz                  |                |      |                 |      |     |
| <b>Amplitude ripple (p-p)</b>        | $\Delta\alpha$ | —    | 0.8             | 2.0  | dB  |
| 925.0 ... 960.0 MHz                  |                |      |                 |      |     |
| <b>Input VSWR</b>                    |                | —    | 1.7             | 2.2  |     |
| 925.0 ... 960.0 MHz                  |                |      |                 |      |     |
| <b>Output VSWR</b>                   |                | —    | 1.7             | 2.2  |     |
| 925.0 ... 960.0 MHz                  |                |      |                 |      |     |
| <b>Attenuation</b>                   | $\alpha$       |      |                 |      |     |
| 10.0 ... 480.0 MHz                   |                | 45   | 49              | —    | dB  |
| 480.0 ... 850.0 MHz                  |                | 40   | 44              | —    | dB  |
| 850.0 ... 905.0 MHz                  |                | 29   | 33              | —    | dB  |
| 905.0 ... 914.0 MHz                  |                | 15   | 24              | —    | dB  |
| 980.0 ... 1850.0 MHz                 |                | 28   | 33              | —    | dB  |
| 1850.0 ... 1920.0 MHz                |                | 40   | 45              | —    | dB  |
| 1920.0 ... 3700.0 MHz                |                | 32   | 36              | —    | dB  |
| 3700.0 ... 6000.0 MHz                |                | 28   | 31              | —    | dB  |



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SAW filter 2in1 filter

942.5/1842.5 MHz

Data Sheet



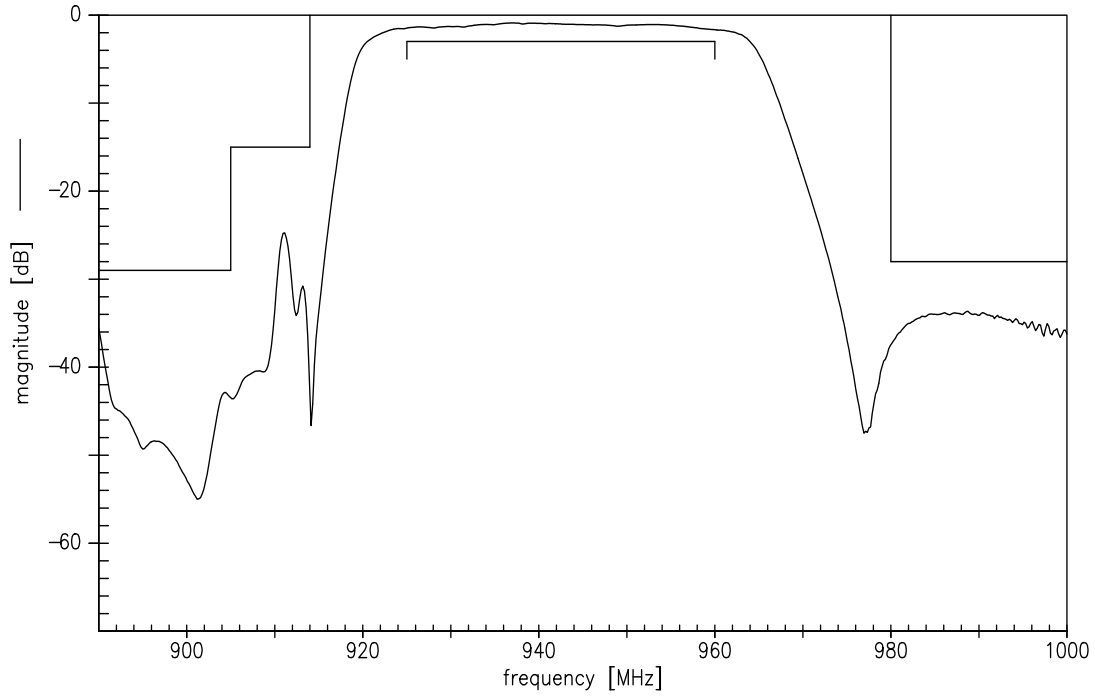
**Maximum ratings**

|                            |                  |                   |     |  |
|----------------------------|------------------|-------------------|-----|--|
| Operable temperature range | T                | -40/+85           | °C  |  |
| Storage temperature range  | T <sub>stg</sub> | -40/+85           | °C  |  |
| DC voltage                 | V <sub>DC</sub>  | 0                 | 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,<br>duty cycle 4:8 |
| GSM 1800, GSM 1900         | PIN              | 15                | dBm |  |
| Tx bands                   |                  |                   |     |  |

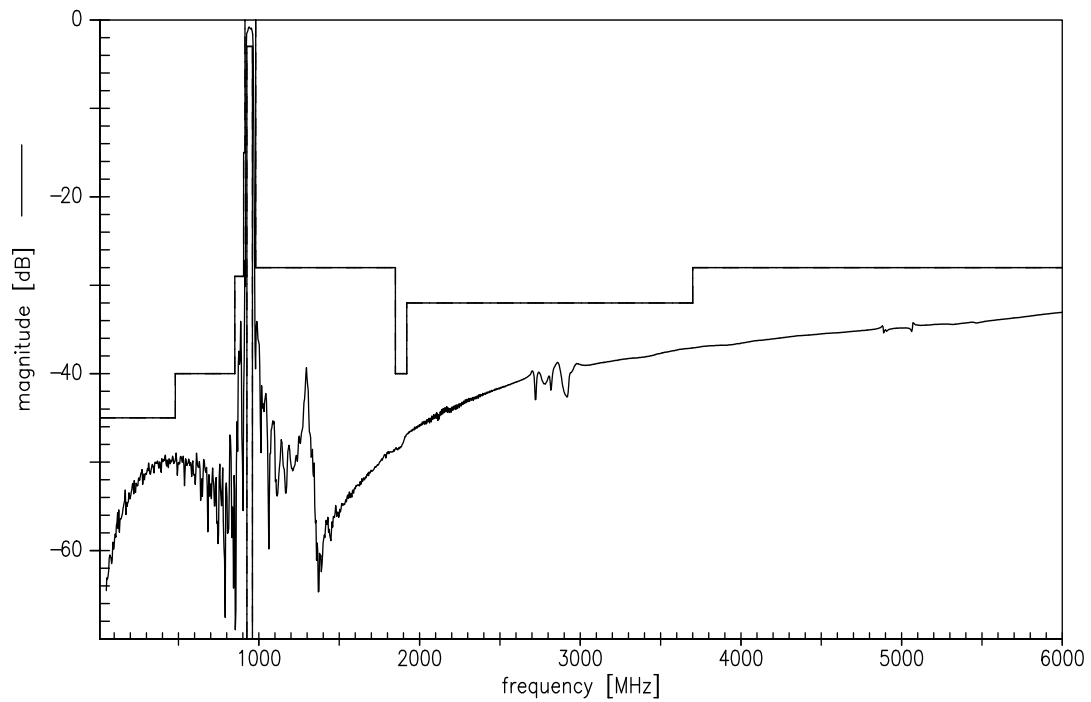
<sup>1)</sup> acc. to JESD22-A115A (machine model), 1 negative & 1 positive pulse.



Transfer function Filter 1 (GSM900)

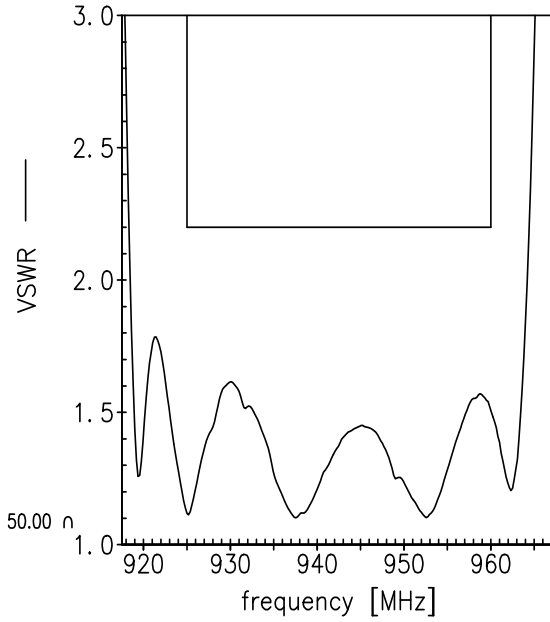
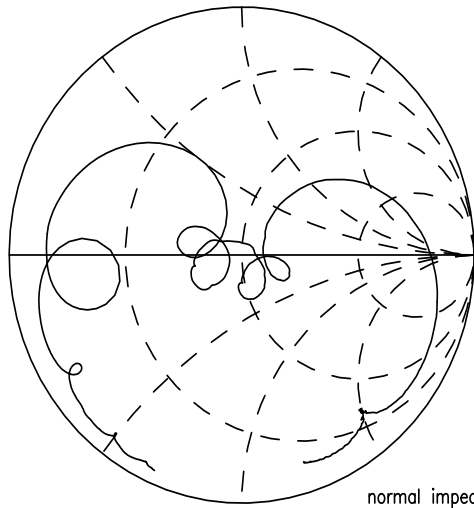


Transfer function Filter 1 (GSM900) - Wideband

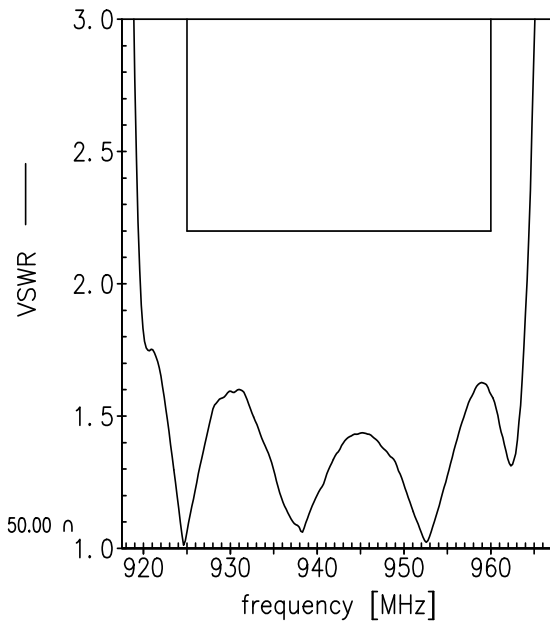
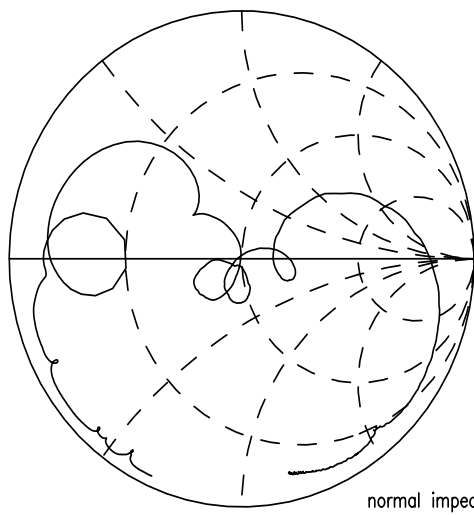


Smith charts of Filter 1

$S_{11}$  function



$S_{22}$  function





SAW Components

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SAW filter 2in1 filter

942.5/1842.5 MHz

Data Sheet



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

Temperature range for specification:  $T = -20$  to  $+85$  °C  
 Terminating source impedance:  $Z_S = 50 \Omega + 900\text{pH}$  (unbalanced)  
 Terminating load impedance:  $Z_L = 50 \Omega + 900\text{pH}$  (unbalanced)

|                                      |                 | min. | typ.<br>@ 25 °C | max. |     |
|--------------------------------------|-----------------|------|-----------------|------|-----|
| <b>Center frequency</b>              | $f_C$           | —    | 1842.5          | —    | MHz |
| <b>Maximum insertion attenuation</b> | $\alpha_{\max}$ | —    | 1.8             | 3.3  | dB  |
| 1805.0 ... 1880.0 MHz                |                 |      |                 |      |     |
| <b>Amplitude ripple (p-p)</b>        | $\Delta\alpha$  | —    | 0.7             | 2.3  | dB  |
| 1805.0 ... 1880.0 MHz                |                 |      |                 |      |     |
| <b>Input VSWR</b>                    |                 | —    | 1.7             | 2.2  |     |
| 1805.0 ... 1880.0 MHz                |                 |      |                 |      |     |
| <b>Output VSWR</b>                   |                 | —    | 1.8             | 2.2  |     |
| 1805.0 ... 1880.0 MHz                |                 |      |                 |      |     |
| <b>Attenuation</b>                   | $\alpha$        |      |                 |      |     |
| 10.0 ... 940.0 MHz                   |                 | 40   | 43              | —    | dB  |
| 940.0 ... 1705.0 MHz                 |                 | 28   | 38              | —    | dB  |
| 1705.0 ... 1785.0 MHz                |                 | 13   | 17              | —    | dB  |
| 1920.0 ... 1980.0 MHz                |                 | 25   | 27              | —    | dB  |
| 1980.0 ... 2030.0 MHz                |                 | 26   | 34              | —    | dB  |
| 2030.0 ... 2500.0 MHz                |                 | 32   | 40              | —    | dB  |
| 2500.0 ... 2775.0 MHz                |                 | 28   | 36              | —    | dB  |
| 2775.0 ... 5000.0 MHz                |                 | 35   | 46              | —    | dB  |
| 5000.0 ... 6000.0 MHz                |                 | 28   | 37              | —    | dB  |



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SAW filter 2in1 filter

942.5/1842.5 MHz

Data Sheet



**Maximum ratings**

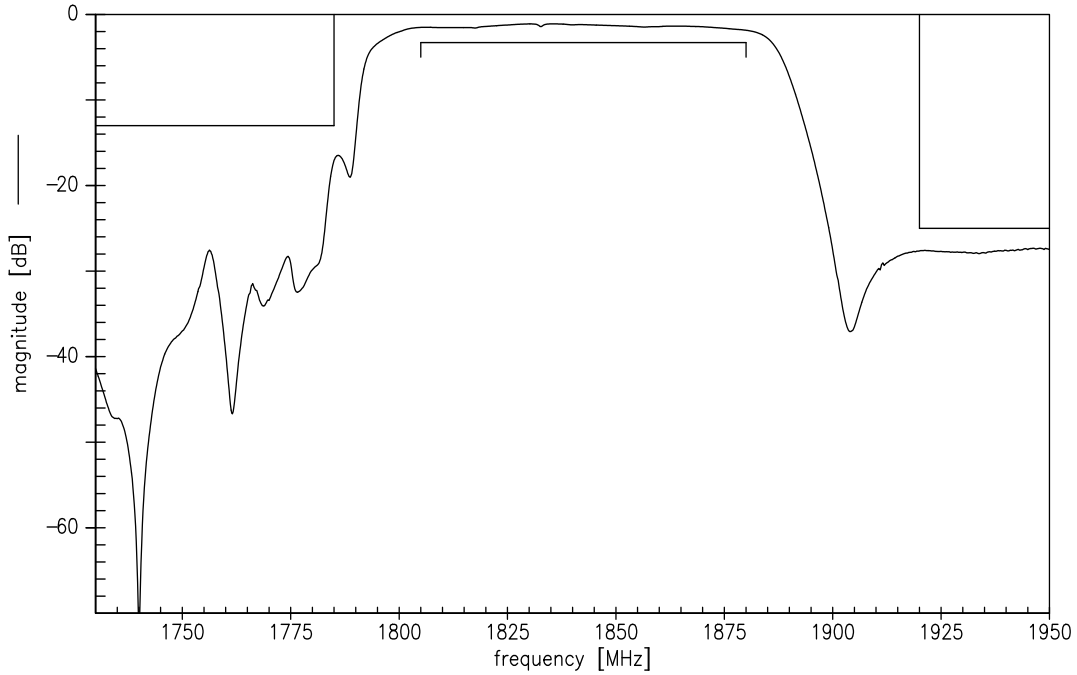
|                            |                  |                  |     |  |
|----------------------------|------------------|------------------|-----|--|
| Operable temperature range | T                | -40/+85          | °C  |  |
| Storage temperature range  | T <sub>stg</sub> | -40/+85          | °C  |  |
| DC voltage                 | V <sub>DC</sub>  | 5                | V   |  |
| ESD voltage                | V <sub>ESD</sub> | 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,<br>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.

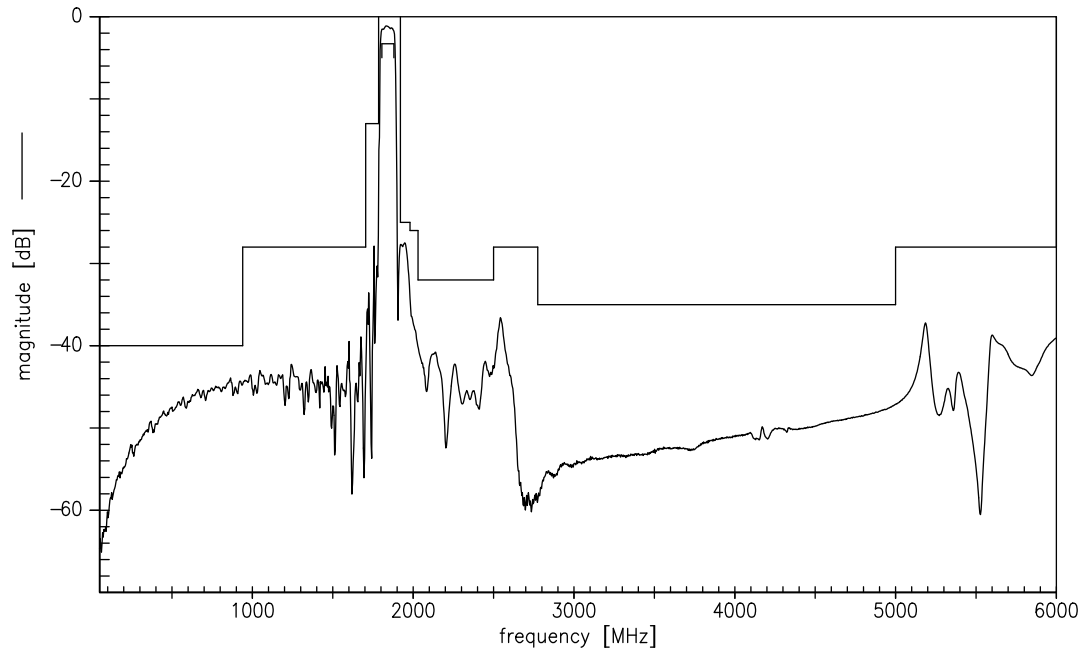




**Transfer function of Filter 2 (GSM1800)**

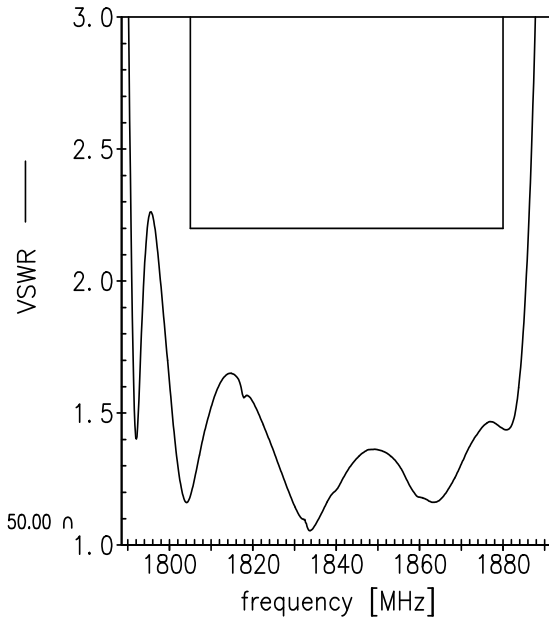
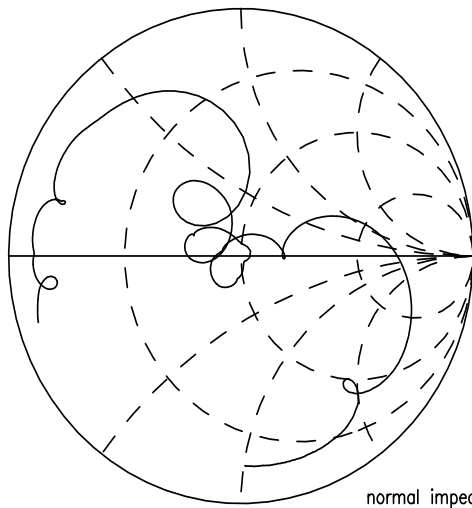


**Transfer function of Filter 1 (GSM1800) - Wideband**

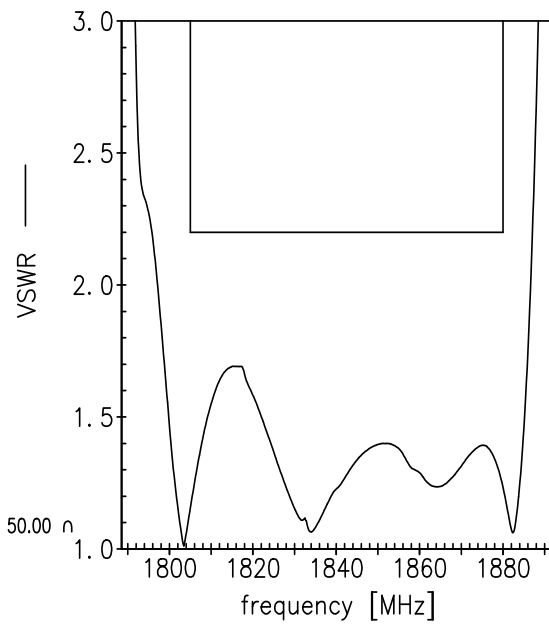
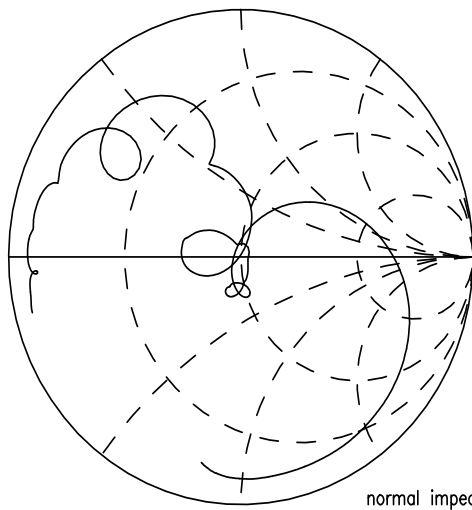


Smith charts of Filter 2

$S_{11}$  function



$S_{22}$  function





|                               |                         |
|-------------------------------|-------------------------|
| <b>SAW Components</b>         | <b>B9521</b>            |
| <b>SAW filter 2in1 filter</b> | <b>942.5/1842.5 MHz</b> |

Data Sheet



### References

|                            |  |
|----------------------------|--|
| <b>Type</b>                | B9521  |
| <b>Ordering code</b>       | B39182B9521P810  |
| <b>Marking and package</b> | C61157-A7-A152   |
| <b>Packaging</b>           | F61074-V8226-Z000  |
| <b>Date codes</b>          | L_1126   |
| <b>S-parameters</b>        | B9521_LB_NB.s2p;B9521_LB_WB.s2p<br>B9521_UB_NB.s2p;B9521_UB_WB.s2p<br>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:<br>"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>Matching coils</b>      | See Inductor pdf-catalog<br><a href="http://www.tdk.co.jp/tefe02/coil.htm#aname1">http://www.tdk.co.jp/tefe02/coil.htm#aname1</a><br>and Data Library for circuit simulation<br><a href="http://www.tdk.co.jp/etvcl/index.htm">http://www.tdk.co.jp/etvcl/index.htm</a>  |

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