RF360 Europe GmbH
A Qualcomm – TDK Joint Venture

SAW Components

SAW Tx filter
Automotive telematics

Series/type: B4315
Ordering code: B39192B4315P810
Date: August 14, 2012
Version: 2.1
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SAW Components

SAW Tx filter

Data sheet

Application

- Low-loss RF filter for mobile telephone PCS, transmit path (TX)
- No matching network required for operation at 50 Ω
- Usable passband 58.75 MHz

Features

- Package size 1.4 x 1.1 x 0.4 mm³
- Package code QCS5M
- RoHS compatible
- Approximate weight 0.003 g
- Package for Surface Mount Technology (SMT)
- Ni, gold-plated terminals
- AEC-Q200 qualified component family (operable temperature range -40°C to +85°C)
- Electrostatic Sensitive Device (ESD)

Pin configuration

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

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

SAW Tx filter

B4315

1880.0 MHz

Data sheet

Characteristics

Temperature range for specification: \( T = -30 \, ^\circ\text{C} \text{ to } +85 \, ^\circ\text{C} \)
Terminating source impedance: \( Z_S = 50 \, \Omega \parallel 20\text{nH} \)
Terminating load impedance: \( Z_L = 50 \, \Omega \parallel 10\text{nH} \)

<table>
<thead>
<tr>
<th></th>
<th>min.</th>
<th>typ. @ 25 °C</th>
<th>max.</th>
</tr>
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<tbody>
<tr>
<td>Center frequency ( f_C )</td>
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<td>1880.0</td>
<td>—</td>
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<td>Maximum insertion attenuation ( \alpha_{\text{max}} )</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1850.625 ... 1909.375 MHz</td>
<td>—</td>
<td>2.6</td>
<td>4.5 dB</td>
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<tr>
<td>Amplitude ripple (p-p) ( \Delta\alpha )</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1850.625 ... 1909.375 MHz</td>
<td>—</td>
<td>1.5</td>
<td>3.3 dB</td>
</tr>
<tr>
<td>VSWR</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Input 1850.625 ... 1909.375 MHz</td>
<td>—</td>
<td>1.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Output 1850.625 ... 1909.375 MHz</td>
<td>—</td>
<td>1.6</td>
<td>2.6</td>
</tr>
<tr>
<td>Attenuation ( \alpha )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.0 ... 1550.0 MHz</td>
<td>32</td>
<td>39</td>
<td>— dB</td>
</tr>
<tr>
<td>1550.0 ... 1580.0 MHz</td>
<td>35</td>
<td>40</td>
<td>— dB</td>
</tr>
<tr>
<td>1580.0 ... 1770.0 MHz</td>
<td>30</td>
<td>38</td>
<td>— dB</td>
</tr>
<tr>
<td>1770.0 ... 1830.0 MHz</td>
<td>14</td>
<td>26</td>
<td>— dB</td>
</tr>
<tr>
<td>1930.625 ... 1990.0 MHz</td>
<td>20</td>
<td>32</td>
<td>— dB</td>
</tr>
<tr>
<td>1990.0 ... 2032.0 MHz</td>
<td>35</td>
<td>40</td>
<td>— dB</td>
</tr>
<tr>
<td>2032.0 ... 2500.0 MHz</td>
<td>33</td>
<td>38</td>
<td>— dB</td>
</tr>
<tr>
<td>2500.0 ... 3700.0 MHz</td>
<td>30</td>
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<td>— dB</td>
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<tr>
<td>3700.0 ... 3820.0 MHz</td>
<td>35</td>
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<td>— dB</td>
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<tr>
<td>3820.0 ... 6000.0 MHz</td>
<td>24</td>
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<td>— dB</td>
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### Maximum ratings

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<th>Parameter</th>
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<tr>
<td>Storage temperature range</td>
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<td>DC voltage</td>
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<td>V</td>
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<td>ESD voltage</td>
<td>V&lt;sub&gt;ESD&lt;/sub&gt;</td>
<td>V</td>
<td>100&lt;sup&gt;1)&lt;/sup&gt;</td>
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</table>

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

**Input power at**

- **GSM850, GSM900**: $P_{IN} = 15$ dBm effective power in the on-state, duty cycle 4:8
- **GSM1800, GSM1900**: $P_{IN} = 15$ dBm
SAW Components

SAW Tx filter

1880.0 MHz

Data sheet

Frequency response (narrowband)

Frequency response (wideband)

Please read cautions and warnings and important notes at the end of this document.
ESD protection of SAW filters

SAW filters are Electro Static Discharge sensitive devices. To reduce the probability of damages caused by ESD, special matching topologies have to be applied.

In general, “ESD matching” has to be ensured at that filter port, where electrostatic discharge is expected.

Electrostatic discharges predominantly appear at the antenna input of RF receivers. Therefore only the input matching of the SAW filter has to be designed to short circuit or to block the ESD pulse.

Below three figures show recommended “ESD matching” topologies.

For wideband filters the high-pass ESD matching structure needs to be at least of 3rd order to ensure a proper matching for any impedance value of antenna and SAW filter input. The required component values have to be determined from case to case.

**Fig. 1 MLC varistor plus ESD matching**

**Fig. 2 Suppressor diode plus ESD matching**

In cases where minor ESD occur, following simplified “ESD matching” topologies can be used alternatively.

**Fig. 3 3rd order high-pass structure for basic ESD protection**

In all three figures the shunt inductor Lp2 could be replaced by a shorted microstrip with proper length and width. If this configuration is possible depends on the operating frequency and available pcb space.

Effectiveness of the applied ESD protection has to be checked according to relevant industry standards or customer specific requirements.

For further information, please refer to EPCOS Application report: “ESD protection for SAW filters”. This report can be found under [www.epcos.com/rke](http://www.epcos.com/rke). Click on “Applications Notes”.

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


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References

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**RoHS compatible**
defined as compatible with the following documents:

**Moldability**
Before using in overmolding environment, please contact your EPCOS sales office.

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See Inductor pdf-catalog
http://www.tdk.co.jp/tefe02/coil.htm#aname1
and Data Library for circuit simulation
http://www.tdk.co.jp/etvcl/index.htm

For further information please contact your local EPCOS sales office or visit our webpage at www.epcos.com.

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