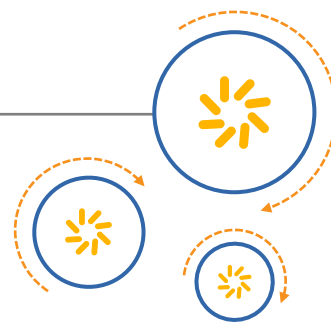


RF360 Europe GmbH

A Qualcomm – TDK Joint Venture



## SAW Components

### SAW RF filter

Automotive telematics

Series/type: B3528  
Ordering code: B39162B3528U510

Date: January 31, 2013  
Version: 2.3

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# SAW Components

## SAW RF filter

Automotive telematics

|                       |                         |
|-----------------------|-------------------------|
| <b>Series/type:</b>   | <b>B3528</b>            |
| <b>Ordering code:</b> | <b>B39162B3528U510</b>  |
| <b>Date:</b>          | <b>January 31, 2013</b> |
| <b>Version:</b>       | <b>2.3</b>              |

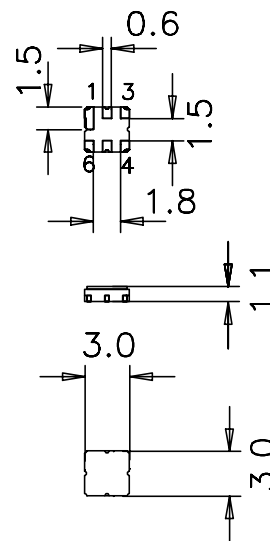
**Data sheet**

**Application**

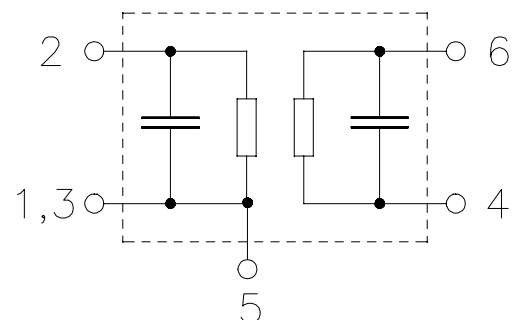
- Low-loss RF filter for GPS applications
- Impedance transformation from 50  $\Omega$  to 100  $\Omega$
- Unbalanced to balanced operation
- Very low insertion attenuation
- Low amplitude ripple
- Usable passband 2.0 MHz


**Features**

- Package size 3.0 x 3.0 x 1.1 mm<sup>3</sup>
- Package code DCC6D
- RoHS compatible
- Approximate weight 0.037 g
- Package for **Surface Mount Technology (SMT)**
- Ni, gold-plated terminals
- Lead free soldering compatible with J - STD20C
- AEC-Q200 qualified component family
- **Electrostatic Sensitive Device (ESD)**


**Pin configuration**

- 2 Input
- 4,6 Output balanced
- 1,3,5 Case ground (to be grounded)



**SAW Components**
**B3528**
**SAW RF filter**
**1575.42 MHz**
**Data sheet**

**Characteristics**

Temperature range for specification:  $T = -40\text{ }^{\circ}\text{C to } +85\text{ }^{\circ}\text{C}$   
 Terminating source impedance:  $Z_S = 50\text{ }\Omega$   
 Terminating load impedance:  $Z_L = 100\text{ }\Omega$  (balanced)

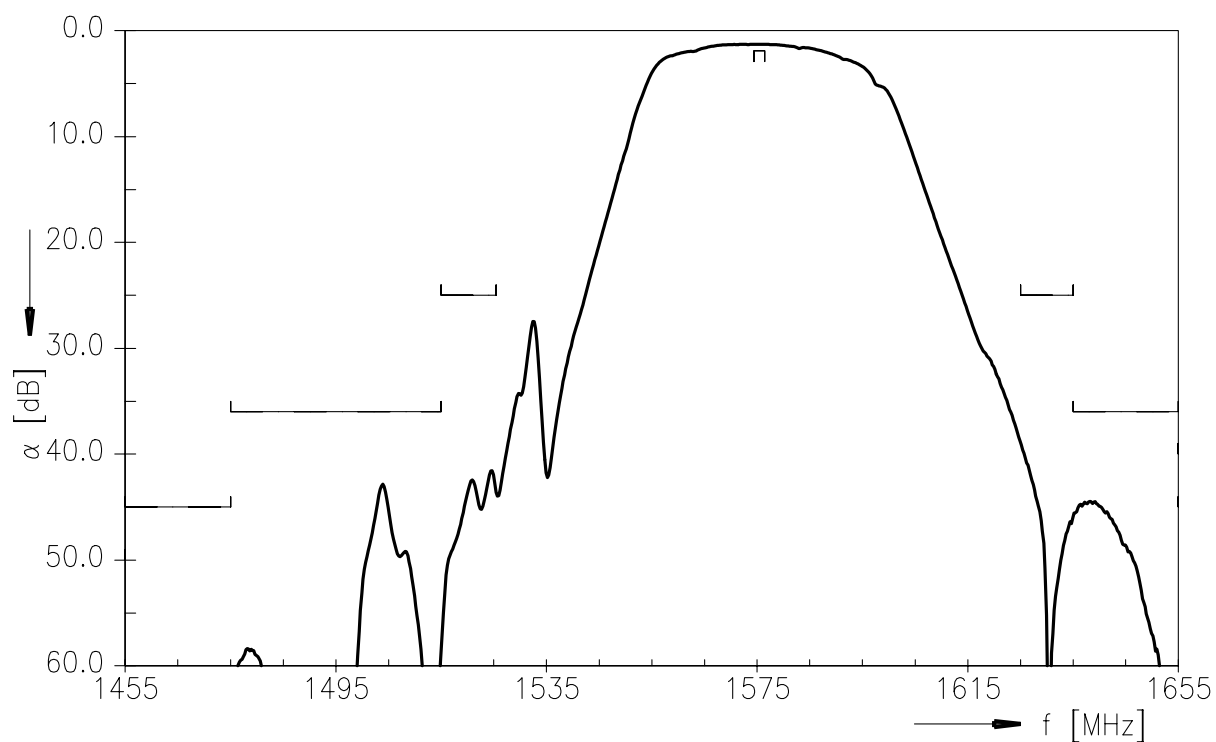
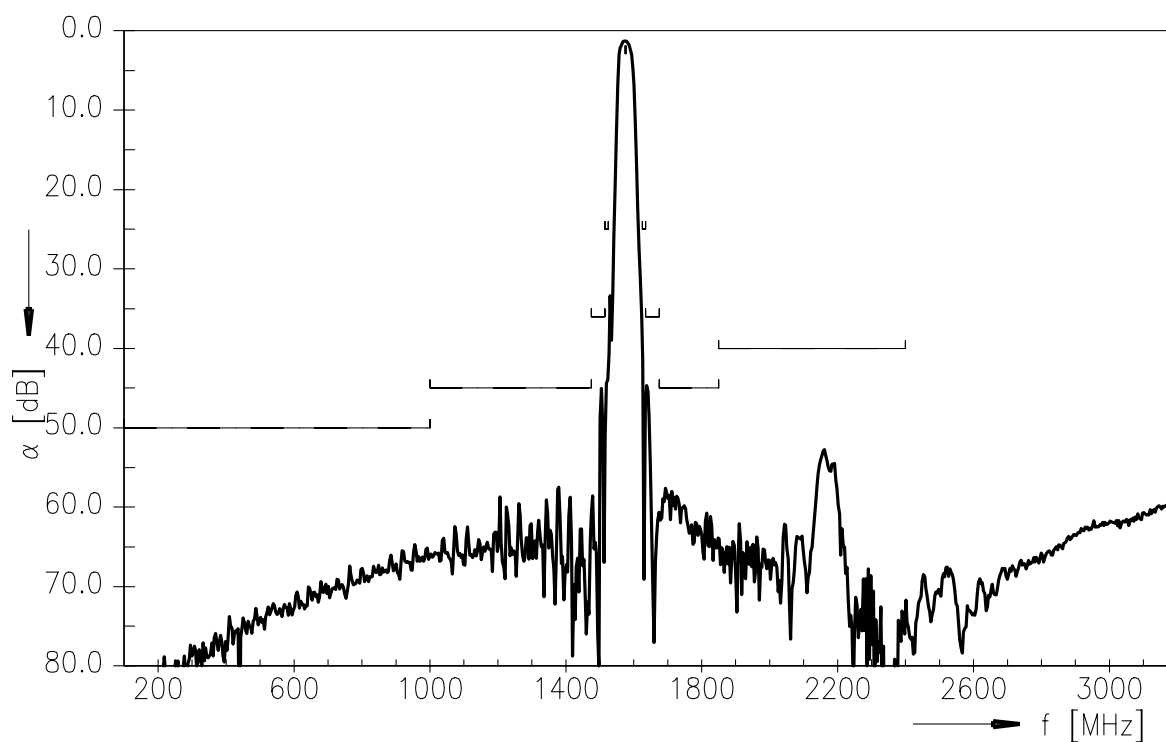
|                                      |                 | min. | typ.<br>@ 25 °C | max. |     |
|--------------------------------------|-----------------|------|-----------------|------|-----|
| <b>Center frequency</b>              | $f_C$           | —    | 1575.42         | —    | MHz |
| <b>Maximum insertion attenuation</b> | $\alpha_{\max}$ |      |                 |      |     |
| 1574.42 ... 1576.42 MHz              |                 | —    | 1.2             | 1.9  | dB  |
| <b>Amplitude ripple (p-p)</b>        | $\Delta\alpha$  |      |                 |      |     |
| 1574.42 ... 1576.42 MHz              |                 | —    | 0.2             | 0.6  | dB  |
| <b>VSWR</b>                          |                 |      |                 |      |     |
| Input 1574.42 ... 1576.42 MHz        |                 | —    | 1.3             | 1.7  |     |
| Output 1574.42 ... 1576.42 MHz       |                 | —    | 1.3             | 1.7  |     |
| <b>Attenuation</b>                   | $\alpha$        |      |                 |      |     |
| 100.0 ... 960.0 MHz                  |                 | 50   | 60              | —    | dB  |
| 960.0 ... 1475.0 MHz                 |                 | 45   | 52              | —    | dB  |
| 1475.0 ... 1515.0 MHz                |                 | 36   | 43              | —    | dB  |
| 1515.0 ... 1525.42 MHz               |                 | 25   | 36              | —    | dB  |
| 1625.0 ... 1635.0 MHz                |                 | 25   | 36              | —    | dB  |
| 1635.0 ... 1675.0 MHz                |                 | 36   | 45              | —    | dB  |
| 1675.0 ... 1850.0 MHz                |                 | 45   | 55              | —    | dB  |
| 1850.0 ... 2400.0 MHz                |                 | 40   | 45              | —    | dB  |

**SAW Components**
**B3528**
**SAW RF filter**
**1575.42 MHz**
**Data sheet**

**Maximum ratings**

|                            |                  |                  |     |                          |
|----------------------------|------------------|------------------|-----|--------------------------|
| Operable temperature range | T                | −45/+125         | °C  |                          |
| Storage temperature range  | T <sub>stg</sub> | −45/+125         | °C  |                          |
| DC voltage                 | V <sub>DC</sub>  | 6                | V   |                          |
| ESD voltage                | V <sub>ESD</sub> | 50 <sup>1)</sup> | V   | machine model, 10 pulses |
| Input power at             |                  |                  |     | source 50Ω, load100Ω     |
| 1574.42 ... 1576.42 MHz    | P <sub>IN</sub>  | 5                | dBm | cw                       |
| 2400 ... 2483.5 MHz        | P <sub>IN</sub>  | 20               | dBm | cw                       |
| 824...960, 1710...2170 MHz | P <sub>IN</sub>  | 25               | dBm | cw                       |
| 960...1525 MHz             | P <sub>IN</sub>  | 10               | dBm | cw                       |

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

**Transfer function**

**Transfer function (wideband)**




## ESD protection of SAW filters

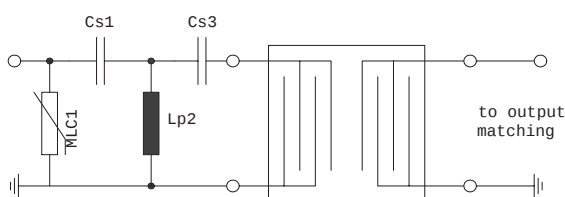
SAW filters are **E**lectro **S**tatic **D**ischarge sensitive devices. To reduce the probability of damages caused by ESD, special matching topologies have to be applied.

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

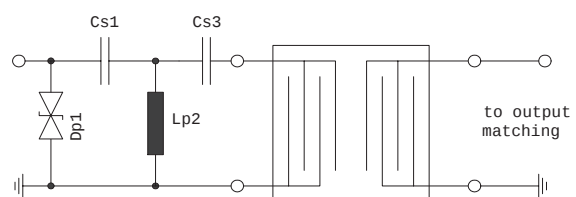
Electrostatic discharges predominantly appear at the antenna input of RF receivers. Therefore only the input matching of the SAW filter has to be designed to short circuit or to block the ESD pulse.

Below three figures show recommended “ESD matching” topologies.

For wideband filters the high-pass ESD matching structure needs to be at least of 3<sup>rd</sup> 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.

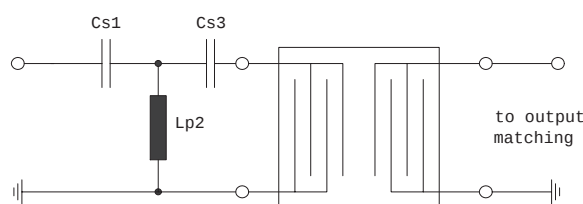


**Fig. 1 MLC varistor plus ESD matching**



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

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



**Fig. 3 3<sup>rd</sup> 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”.

**SAW Components**
**B3528**
**SAW RF filter**
**1575.42 MHz**

Data sheet


**References**

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Type</b>                | B3528                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Ordering code</b>       | B39162B3528U510                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Marking and package</b> | C61157-A7-A68                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Packaging</b>           | F61074-V8228-Z000                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Date codes</b>          | L_1126                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>S-parameters</b>        | B3528_NB.s3p, B3528_WB.s3p<br>see file header for port/pin assignment table.                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Soldering profile</b>   | S_6001                                                                                                                                                                                                                                                                                                                                                                                                                                              |
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