



# SAW Components

## SAW band-stop filter

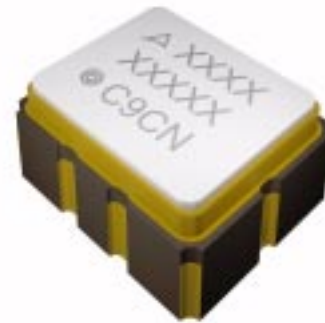
Automotive telematics

<b>Series/type:</b>	<b>B3470</b>
<b>Ordering code:</b>	<b>B39162B3470H910</b>
<b>Date:</b>	<b>February 14, 2013</b>
<b>Version:</b>	<b>2.1</b>

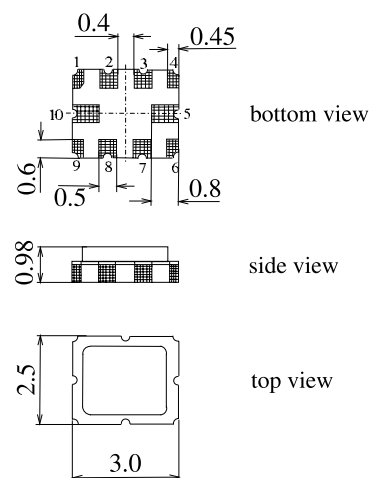
Data sheet


**Application**

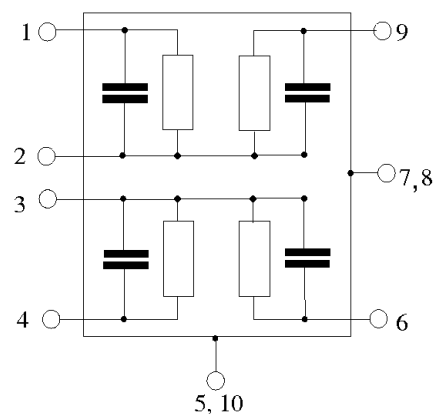
- Low-loss RF band-stop filter for GPS
- Very low insertion loss
- Three usable passbands


**Features**

- Package size 3.0 x 2.5 x 0.98 mm<sup>3</sup>
- Package code QCC10G
- RoHS compatible
- Approximate weight 0.027 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**

- 1 Input
- 2, 3 Coupling pin
- 4 Output
- 6, 9 to be grounded
- 5, 7, 8, 10 Case ground



Data sheet


**Characteristics**

Temperature range for specification:  $T = -40\text{ °C to }+85\text{ °C}$   
 Terminating source impedance:  $Z_S = 50\ \Omega$  and matching network  
 Terminating load impedance:  $Z_L = 50\ \Omega$  and matching network

		min.	typ. @ 25 °C	max.	
<b>Center frequency</b>	$f_C$	—	1575.42	—	MHz
<b>Maximum insertion attenuation<sup>1)</sup></b>	$\alpha_{\max}$ 824.00 ... 960.00 MHz	—	0.65	0.9	dB
	1710.00 ... 1990.00 MHz	—	1.35	1.7	dB
	2110.00 ... 2170.00 MHz	—	1.9	2.3	dB
<b>Attenuation</b>	$\alpha$ 1572.42 ... 1578.42 MHz	32	35	—	dB

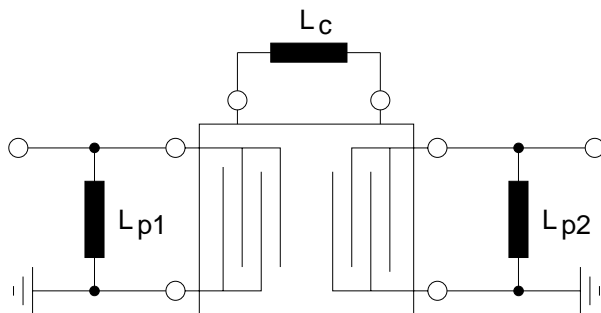
<sup>1)</sup> incl. loss in matching elements ( $Q_L = 90$  @ 1000 MHz)


**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 <sup>1)</sup>	V	
ESD Voltage	V <sub>ESD</sub>	50 <sup>2)</sup>	V	machine model, 10 pulses
Source power	P <sub>S</sub>			source impedance 50 Ω
824.0... 960.0 MHz		33.0	dBm	continuous wave
1710.0... 1990.0 MHz		33.0	dBm	continuous wave

1) Applied to pin 1 or 4

2) According to JESD-A115B (machine model), +/- 10 pulse.

**Matching network to 50 Ω and coupling coil**


$$L_{p1} = 8.2 \text{ nH}$$

$$L_C = 3.3 \text{ nH}$$

$$L_{p2} = 8.2 \text{ nH}$$

**Q factors of inductors:**

**90 @ 1000 MHz**



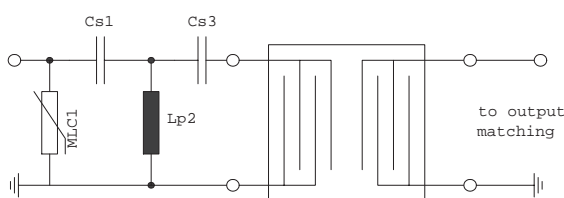
### ESD protection of SAW filters

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.

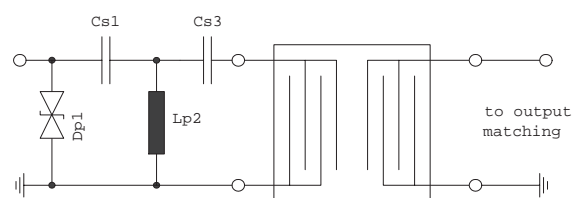
Electrostatic discharges predominantly appear at the antenna input of RF receivers. Therefore only the input matching of the SAW filter has to be designed to short circuit or to block the ESD pulse.

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.

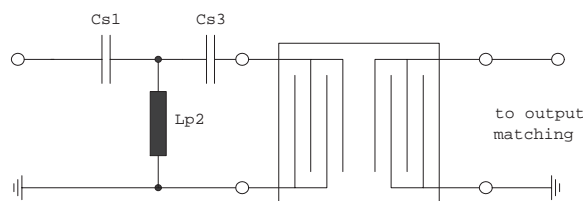


**Fig. 1 MLC varistor plus ESD matching**



**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.

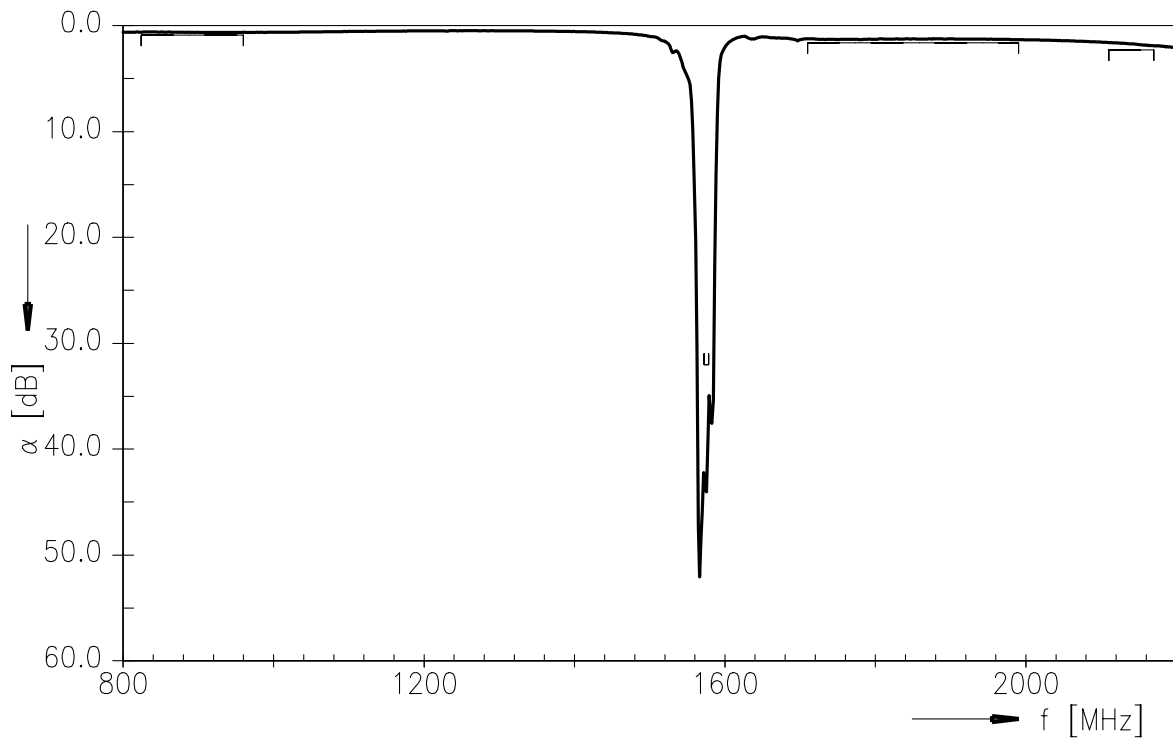
Effectiveness of the applied ESD protection has to be checked according to relevant industry standards or customer specific requirements.

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 “Application Notes”

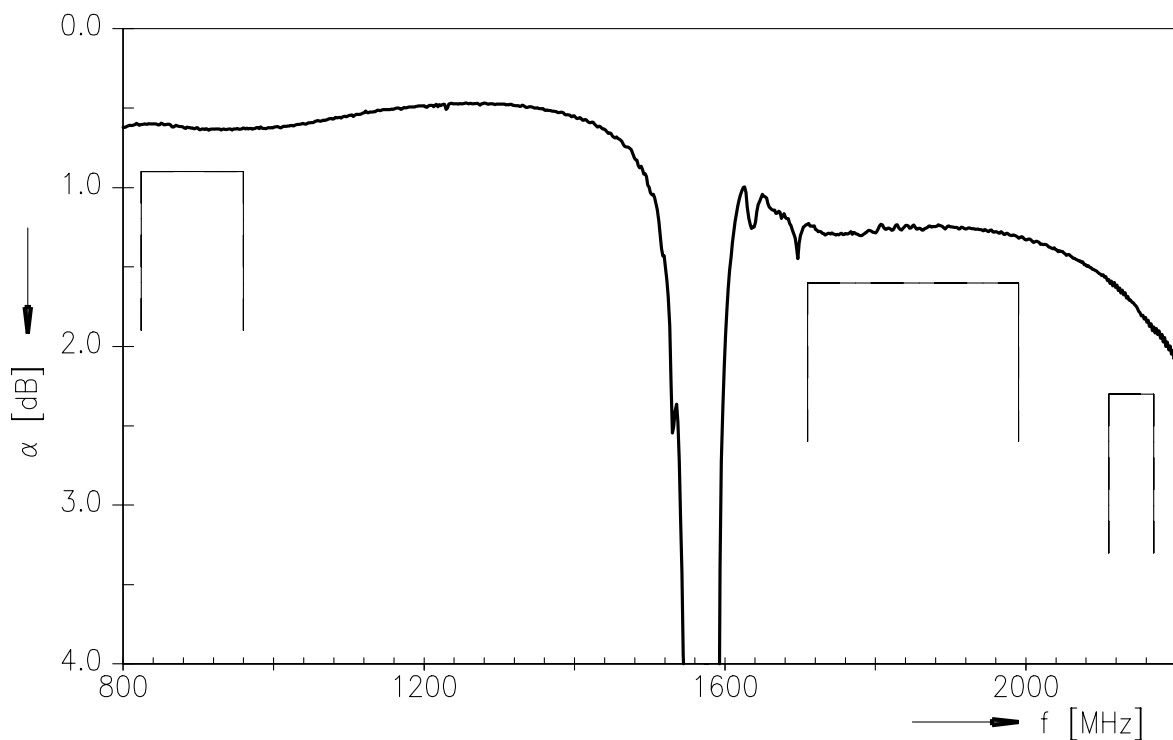
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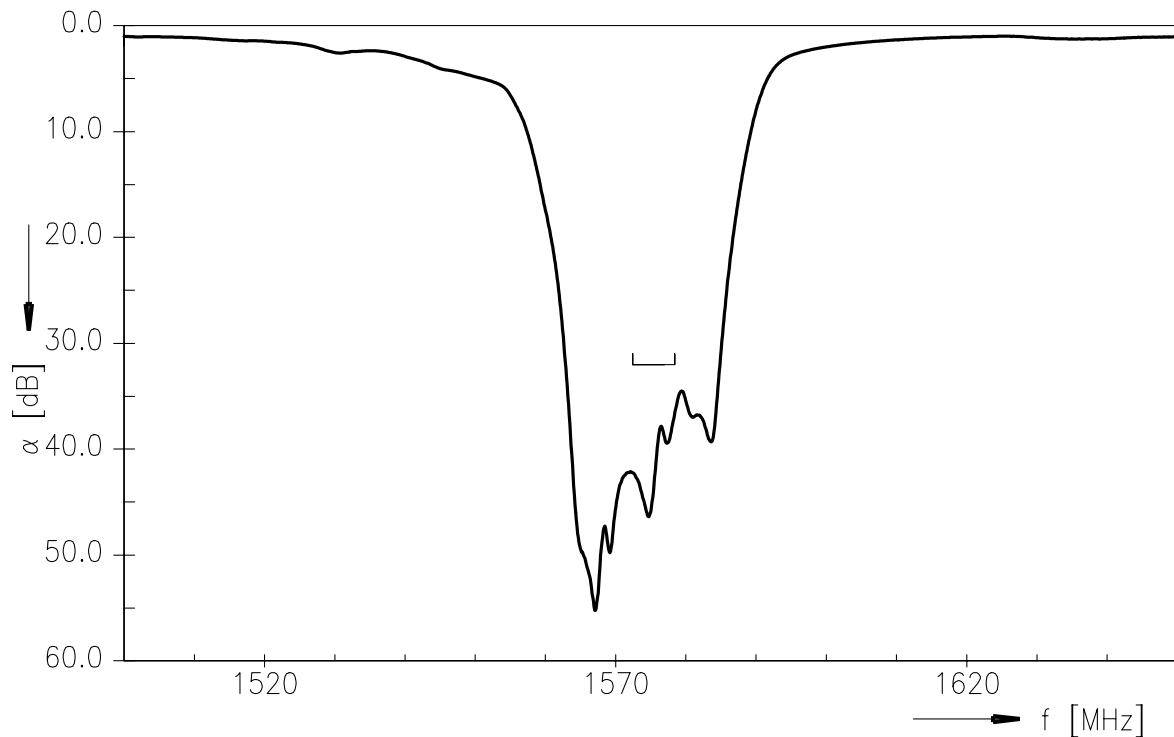
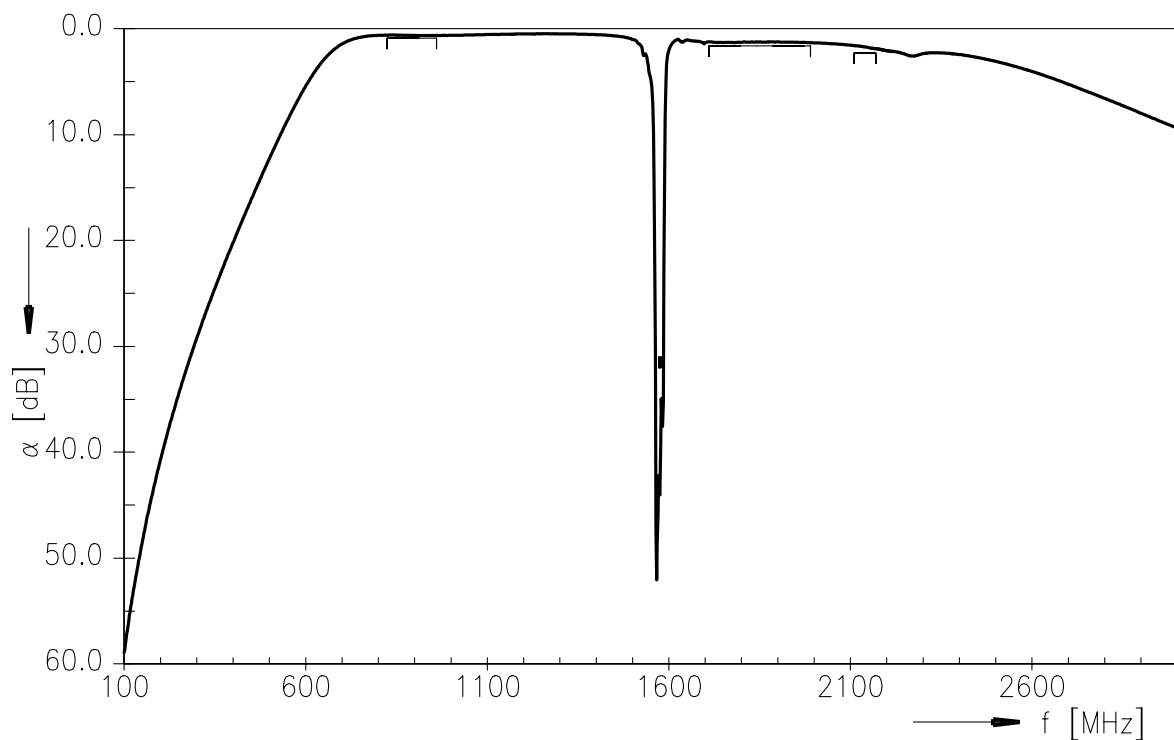
**Transfer function**



**Transfer function (passband)**



Data sheet


**Transfer function (band-stop)**

**Transfer function (wideband)**



**References**

<b>Type</b>	B3470
<b>Ordering code</b>	B39162B3470H910
<b>Marking and package</b>	C61157-A7-A142
<b>Packaging</b>	F61074-V8174-Z000
<b>Date codes</b>	L_1126
<b>S-parameters</b>	B3470_NB.s2p, B3470_WB.s2p, B3470_NB_UN.s4p, B3470_WB_UN.s4p See file header for port/pin assignment table.
<b>Soldering profile</b>	S_6001
<b>RoHS compatible</b>	RoHS-compatible means that products are compatible with the requirements according to Art. 4 (substance restrictions) of Directive 2011/65/EU of the European Parliament and of the Council of June 8 <sup>th</sup> , 2011, on the restriction of the use of certain hazardous substances in electrical and electronic equipment ("Directive") with due regard to the application of exemptions as per Annex III of the Directive in certain cases.
<b>Matching coils</b>	See Inductor pdf-catalog <a href="http://www.tdk.co.jp/tefe02/coil.htm#aname1">http://www.tdk.co.jp/tefe02/coil.htm#aname1</a> and Data Library for circuit simulation <a href="http://www.tdk.co.jp/etvcl/index.htm">http://www.tdk.co.jp/etvcl/index.htm</a>

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