



# SAW Components

SAW RF filter

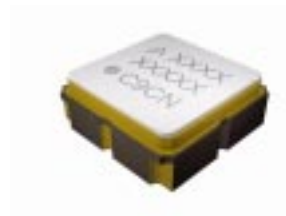
GPS

<b>Series/type:</b>	<b>B3522</b>
<b>Ordering code:</b>	<b>B39162B3522U410</b>
Date:	January 25, 2013
Version:	2.5

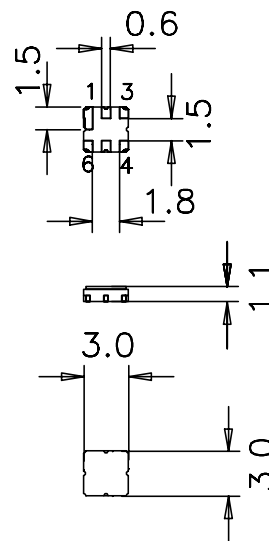
Data sheet


**Application**

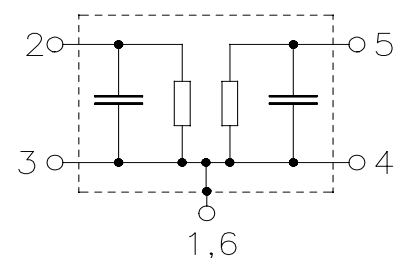
- Low-loss RF filter for GPS application
- No matching network required for operation at 50 Ω


**Features**

- Package size 3.0 x 3.0 x 1.1 mm<sup>3</sup>
- Package code DCC6C
- 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
- 5            Output
- 1,3,4,6    Ground



Data sheet


**Characteristics**

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

		min.	typ. @ 25 °C	max.	
<b>Center frequency</b>	$f_C$	—	1575.42	—	MHz
<b>Maximum insertion attenuation</b>	$\alpha_{\max}$	—	1.6	2.0	dB
1574.397 ... 1576.443 MHz					
<b>Amplitude ripple (p-p)</b>	$\Delta\alpha$	—	0.2	0.8	dB
1574.397 ... 1576.443 MHz					
<b>Input VSWR</b>		—	1.4	1.8	
1574.397 ... 1576.443 MHz					
<b>Output VSWR</b>		—	1.3	1.8	
1574.397 ... 1576.443 MHz					
<b>Attenuation</b>	$\alpha$				dB
10.00 ... 1450.00 MHz		40	43	—	
1450.00 ... 1500.00 MHz		35	45	—	
1625.00 ... 1640.00 MHz		35	50	—	
1640.00 ... 1800.00 MHz		44	47	—	
1800.00 ... 2000.00 MHz		42	44	—	
2000.00 ... 3000.00 MHz		30	35	—	

**SAW Components**
**B3522**
**SAW RF filter**
**1575.42 MHz**

Data sheet


**Characteristics**

Temperature range for specification:	T = -40 °C to +105 °C
Terminating source impedance:	Z <sub>S</sub> = 50 Ω
Terminating load impedance:	Z <sub>L</sub> = 50 Ω

		min.	typ. @ 25 °C	max.	
<b>Center frequency</b>	f <sub>C</sub>	—	1575.42	—	MHz
<b>Maximum insertion attenuation</b>	α <sub>max</sub>	—	1.6	2.2	dB
1574.397 ... 1576.443 MHz		—	1.6	2.2	
<b>Amplitude ripple (p-p)</b>	Δα	—	0.2	1.0	
1574.397 ... 1576.443 MHz		—	0.2	1.0	
<b>Input VSWR</b>		—	1.4	1.9	
1574.397 ... 1576.443 MHz		—	1.4	1.9	
<b>Output VSWR</b>		—	1.3	1.9	
1574.397 ... 1576.443 MHz		—	1.3	1.9	
<b>Attenuation</b>	α				
10.00 ... 1450.00 MHz		40	43	—	dB
1450.00 ... 1500.00 MHz		33	45	—	dB
1625.00 ... 1640.00 MHz		35	50	—	dB
1640.00 ... 1800.00 MHz		44	47	—	dB
1800.00 ... 2000.00 MHz		42	44	—	dB
2000.00 ... 3000.00 MHz		30	35	—	dB

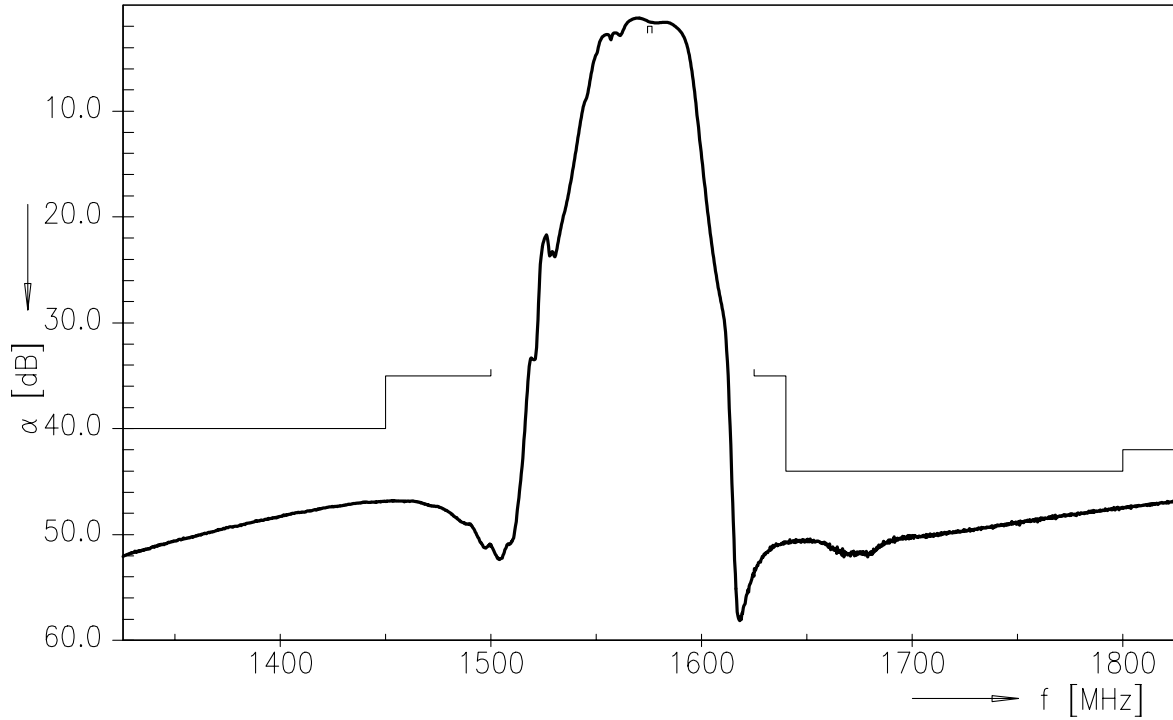
**Maximum ratings**

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	
Source power	P <sub>S</sub>	10	dBm	source impedance 50 Ω 824 MHz to 915 MHz, 1710 MHz to 1785 MHz, 1850 MHz to 1910 MHz
		20	dBm	

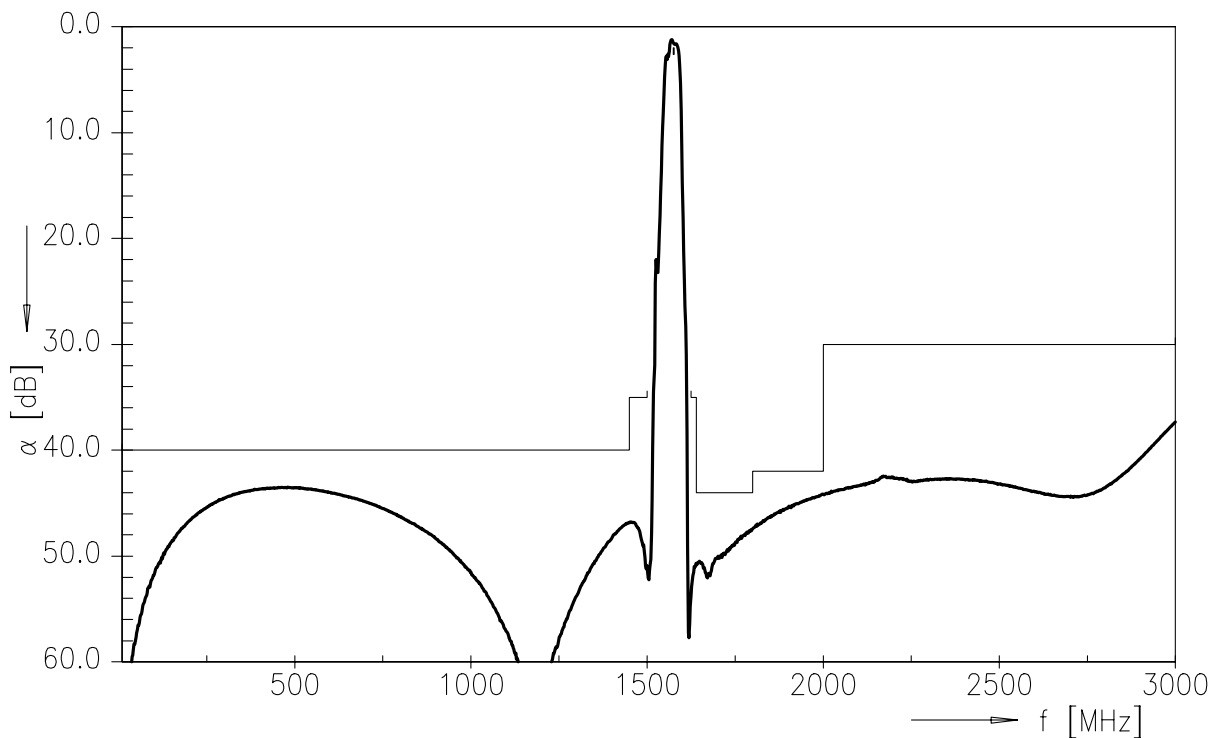
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**Transfer function**



**Transfer function (wideband)**





### ESD protection of SAW filters

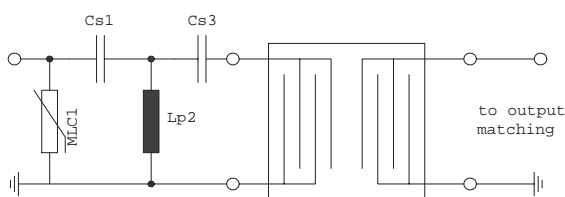
SAW filters are **E**lectro **S**tatic **D**ischarge sensitive devices. To reduce the probability of damages caused by ESD, special matching topologies have to be applied.

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

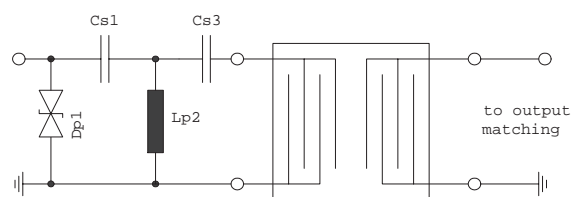
Electrostatic discharges predominantly appear at the antenna input of RF receivers. Therefore only the input matching of the SAW filter has to be designed to short circuit or to block the ESD pulse.

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.

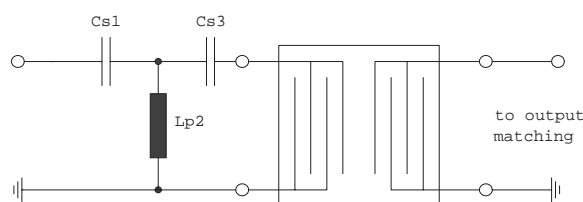


**Fig. 1 MLC varistor plus ESD matching**



**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”.


**References**

<b>Type</b>	B3522
<b>Ordering code</b>	B39162B3522U410
<b>Marking and package</b>	C61157-A7-A67
<b>Packaging</b>	F61074-V8168-Z000
<b>Date codes</b>	L_1126
<b>S-parameters</b>	B3522_NB.s2p, B3522_WB.s2p 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.
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<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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