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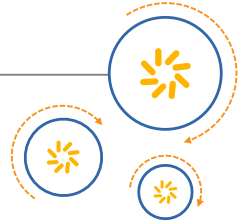
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RF360 Europe GmbH

A Qualcomm – TDK Joint Venture



## SAW Components

### SAW filter

GPS / GALILEO / GLONASS

Series/type: B3401  
Ordering code: B39162B3401B710

Date: March 25, 2014  
Version: 2.1

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# SAW Components

## SAW filter

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Date:	March 25, 2014
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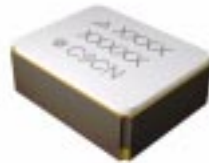
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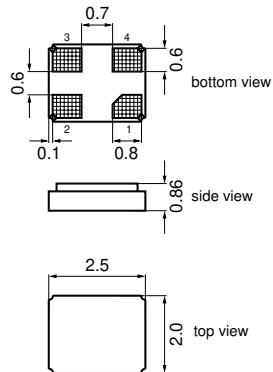
Data sheet


**Application**

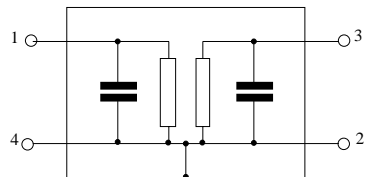
- Low-loss RF filter for GPS / GALILEO / GLONASS application


**Features**

- Package size 2.5 x 2.0 x 0.86 mm<sup>3</sup>
- Package code DCC4A
- RoHS compatible
- Approximate weight 0.014 g
- Package for **Surface Mount Technology (SMT)**
- Ni, gold-plated terminals
- AEC-Q200 qualified component family
- Lead free soldering compatible with J - STD20C
- **Electrostatic Sensitive Device (ESD)**


**Pin configuration**

- 1            Input
- 3            Output
- 2,4         Case ground



<b>SAW Components</b>	<b>B3401</b>
<b>SAW filter</b>	<b>1588.65 MHz</b>

Data sheet



**Characteristics**

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

		min.	typ. @ 25 °C	max.	
<b>Center frequency</b>	$f_C$	—	1588.65	—	MHz
<b>Maximum insertion attenuation</b>	$\alpha_{max}$				
1573.42 ... 1577.42 MHz		—	1.3	1.7	dB
1571.42 ... 1605.89 MHz		—	1.6	1.9	dB
<b>Amplitude ripple (p-p)</b>	$\Delta\alpha$				
1573.42 ... 1577.42 MHz		—	0.2	1.2	dB
1571.42 ... 1605.89 MHz		—	0.5	2.0	dB
<b>VSWR Input</b>					
1573.42 ... 1577.42 MHz		—	1.4	2.0	
1597.55 ... 1605.89 MHz		—	1.4	2.0	
<b>VSWR Output</b>					
1573.42 ... 1577.42 MHz		—	1.4	2.0	
1597.55 ... 1605.89 MHz		—	1.4	2.0	
<b>Group delay ripple<sup>1)</sup> (p-p)</b>	$\Delta\tau$				
1573.42 ... 1577.42 MHz		—	1.3	8	ns
1597.55 ... 1605.89 MHz		—	2.4	12	ns
Deviation within GLONASS band relative to L1 1575.42 MHz		—	2.0	—	ns
<b>Attenuation</b>	$\alpha$				
100.00 ... 690.00 MHz		44	49	—	dB
690.00 ... 800.00 MHz		48	54	—	dB
800.00 ... 960.00 MHz		42	49	—	dB
960.00 ... 1420.00 MHz		32	36	—	dB
1420.00 ... 1500.00 MHz		26	32	—	dB
1500.00 ... 1525.00 MHz		20	27	—	dB
1625.00 ... 1660.00 MHz		1	3	—	dB
1660.00 ... 1710.00 MHz		30	36	—	dB
1710.00 ... 1850.00 MHz		27	32	—	dB
1850.00 ... 1980.00 MHz		25	30	—	dB
1980.00 ... 2570.00 MHz		20	26	—	dB

<sup>1)</sup> measured with an aperture of 2 MHz

<b>SAW Components</b>	<b>B3401</b>
<b>SAW filter</b>	<b>1588.65 MHz</b>

Data sheet



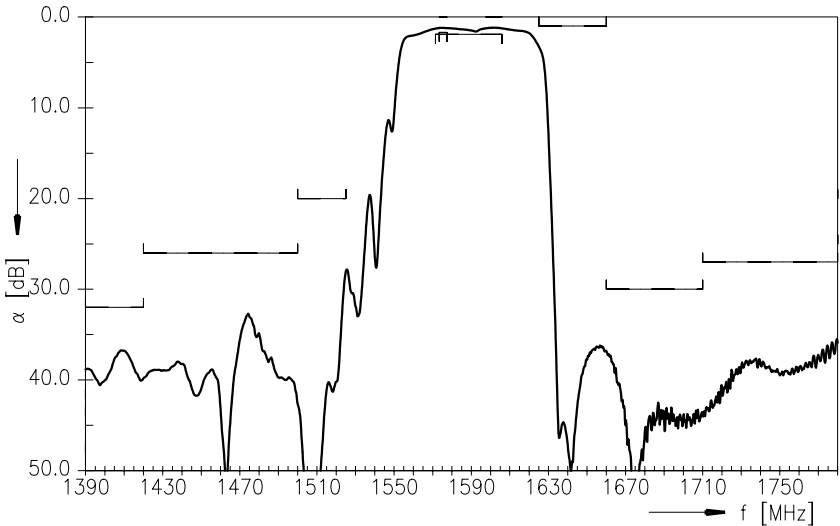
**Maximum ratings**

Operable temperature range	T	-45/+125	°C	source impedance 50 Ω
Storage temperature range	T <sub>stg</sub>	-45/+125	°C	
DC voltage	V <sub>DC</sub>	6	V	
Input power at	P <sub>in</sub>			
1571.42 to 1605.89 MHz		10	dBm	
700.00 to 915.00 MHz		20	dBm	
1710.00 to 1980.00 MHz		20	dBm	

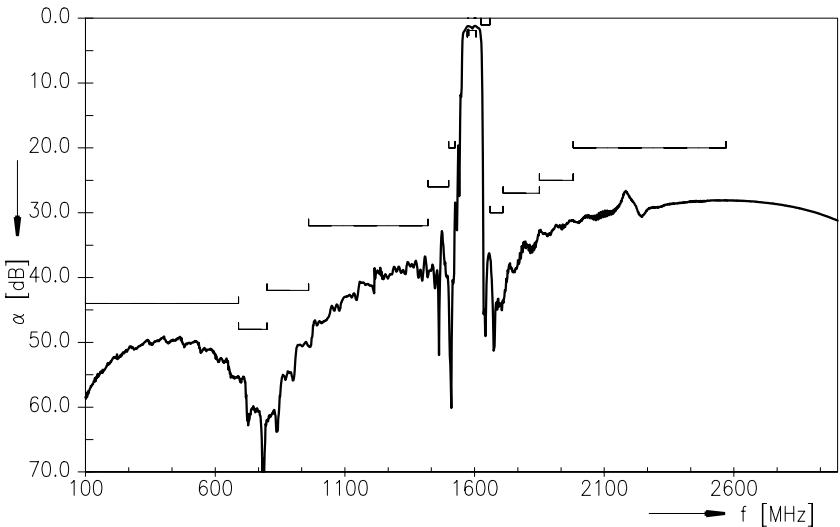
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**Transfer function**



**Transfer function (wideband)**

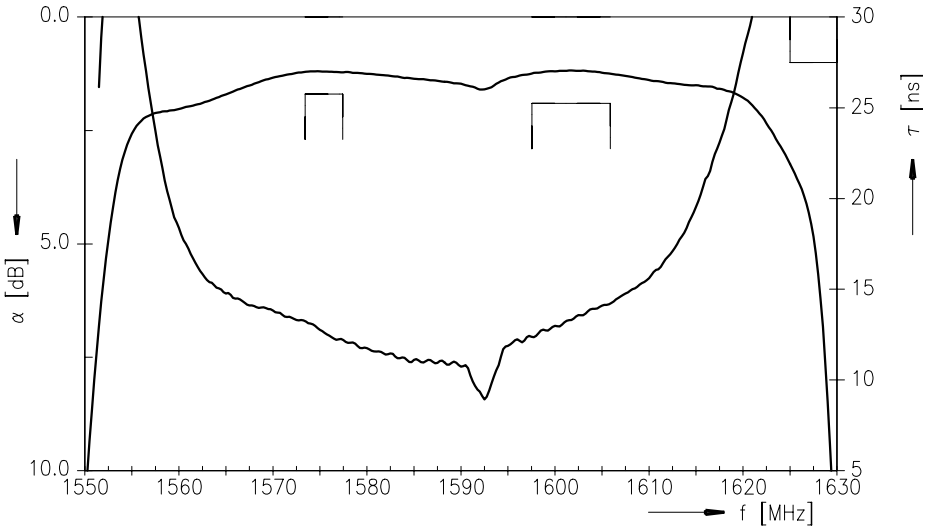




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**Group delay**



Data sheet



**ESD protection of SAW filters**

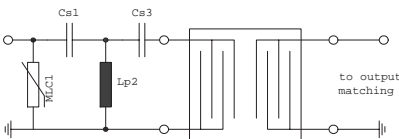
SAW filters are **E**lectro **S**tatic **D**ischarge sensitive devices. To reduce the probability of damages caused by ESD, special matching topologies have to be applied.

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

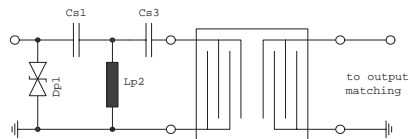
Electrostatic discharges predominantly appear at the antenna input of RF receivers. Therefore only the input matching of the SAW filter has to be designed to short circuit or to block the ESD pulse.

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.

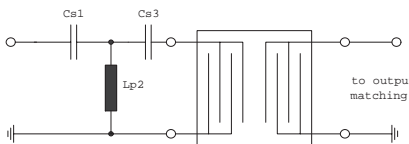


**Fig. 1 MLC varistor plus ESD matching**



**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”.

<b>SAW Components</b>	<b>B3401</b>
<b>SAW filter</b>	<b>1588.65 MHz</b>

Data sheet



## References

<b>Type</b>	B3401
<b>Ordering code</b>	B39162B3401B710
<b>Marking and package</b>	C61157-A7-A168
<b>Packaging</b>	F61074-V8239-Z000
<b>Date codes</b>	L_1126
<b>S-parameters</b>	B3401_NB.s2p, B3401_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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