



SAW Components

SAW RF filter

GPS

Series/type:	B4060
Ordering code:	B39162B4060U810
Date:	January 31, 2013
Version:	2.2

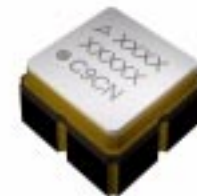
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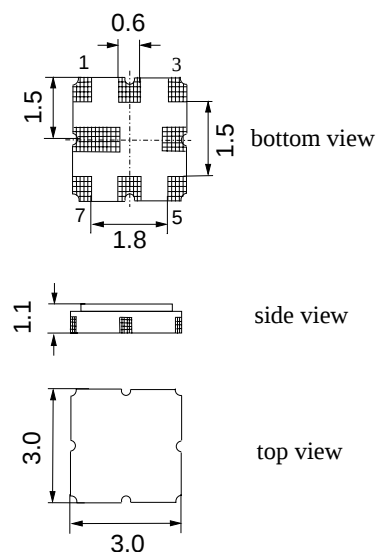
Data sheet

Application

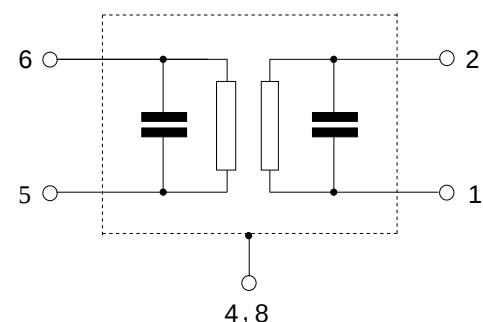
- Low-loss RF filter for GPS application
- Unbalanced to unbalanced operation or unbalanced to balanced operation
- Hermetically sealed ceramic package
- No matching network required for operation at 50 Ω


Features

- Package size 3.0 x 3.0 x 1.1 mm³
- Package code QCC8D
- 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

- 6 Input
- 5 Input ground
- 2 Output
- 1 Output (bal.) or output ground (unbal.)
- 3, 7 To be grounded
- 4, 8 Case - ground



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B4060
SAW RF filter
1575.42 MHz
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Characteristics

Temperature range for specification: $T_A = -40\text{ }^{\circ}\text{C}$ to $+105\text{ }^{\circ}\text{C}$
 Terminating source impedance: $Z_S = 50\text{ }\Omega$ unbal.
 Terminating load impedance: $Z_L = 50\text{ }\Omega$ unbal.

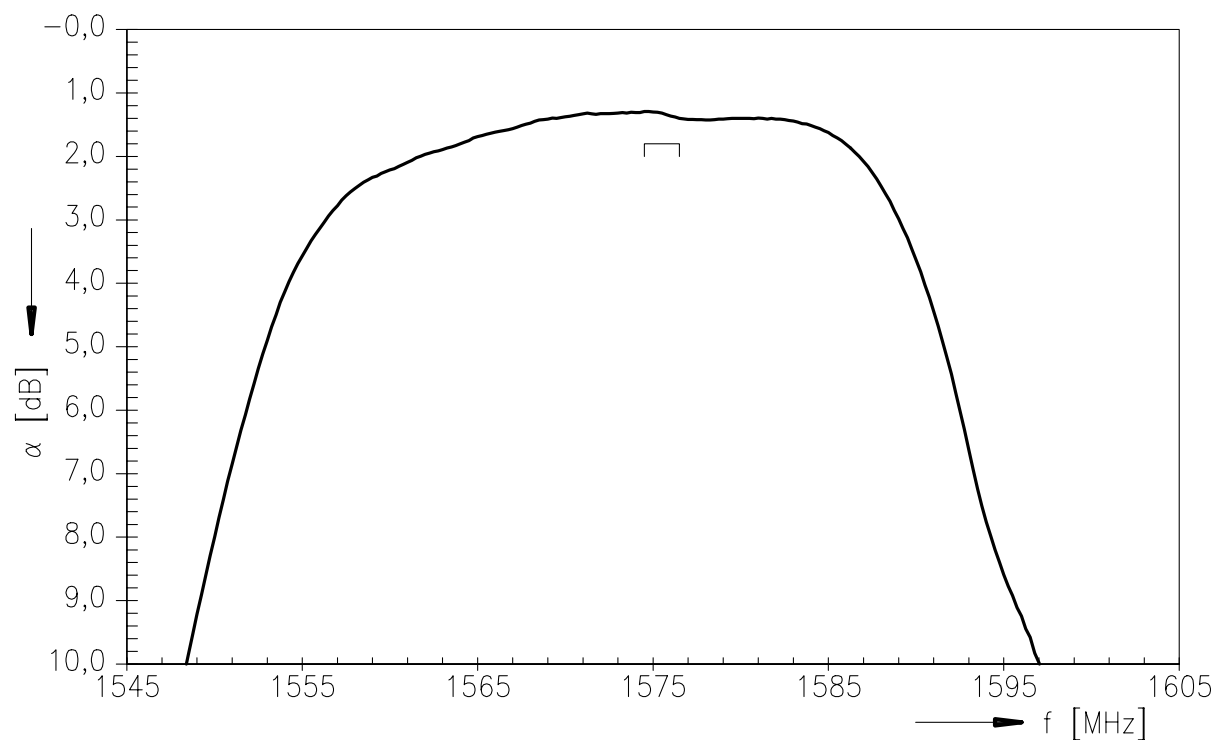
		min.	typ. @25°C	max.	
Nominal frequency	f_N	—	1575.42	—	MHz
Maximum insertion attenuation	$\alpha_{\max}$	—	1.3	2.0 ¹⁾	dB
1574.22 ... 1576.62 MHz					
Amplitude ripple in passband (p-p)	$\Delta\alpha$	—	0.1	1.0	dB
1574.22 ... 1576.62 MHz					
Attenuation	α				
100.00 ... 1450.00 MHz		40	44	—	dB
1450.00 ... 1520.00 MHz		30	34	—	dB
1625.00 ... 1640.00 MHz		20	25	—	dB
1640.00 ... 1710.00 MHz		25	30	—	dB
1710.00 ... 1805.00 MHz		35	43	—	dB
1805.00 ... 1910.00 MHz		45	52	—	dB
1910.00 ... 2000.00 MHz		40	45	—	dB

1) $T = -45\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$: 1.8 dB

Maximum ratings

Operable temperature range	T	$-45/+125$	$^{\circ}\text{C}$	
Storage temperature range	T_{stg}	$-45/+125$	$^{\circ}\text{C}$	
DC voltage	V_{DC}	6	V	
Source power	P_S	10	dBm	source impedance 50 Ω , c. w.
		20	dBm	824 MHz to 849 MHz, 890 MHz to 915 MHz, 1710 MHz to 1785 MHz


Transfer function

Transfer function (passband)




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 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.

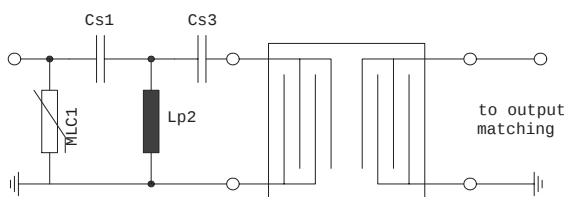


Fig. 1 MLC varistor plus ESD matching

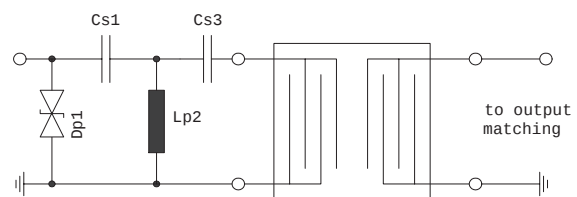


Fig. 2 Suppressor diode plus ESD matching

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

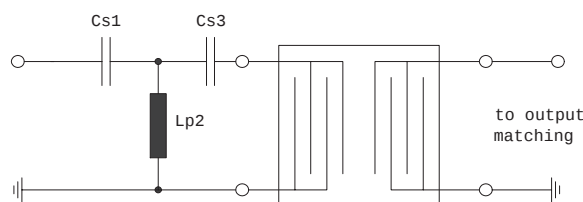


Fig. 3 3rd order high-pass structure for basic ESD protection

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. Click on “Applications Notes”.

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References

Type	B4060
Ordering code	B39162B4060U810
Marking and package	C61157-A7-A72
Packaging	F61074-V8168-Z000
Date codes	L_1126
S-parameters	B4060_NB.s2p, B4060_WB.s2p See file header for port/pin assignment table.
Soldering profile	S_6001
RoHS compatible	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 th , 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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Matching coils	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

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