



SAW Filters for Automotive Electronics

Series/Type: B3511

The following products presented in this data sheet are being withdrawn.

Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
B39192B3511U810		2013-05-10	2013-08-31	2013-11-30

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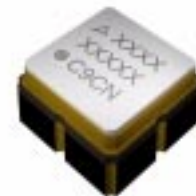
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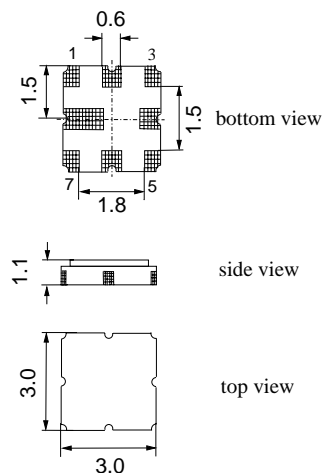
Data sheet


Application

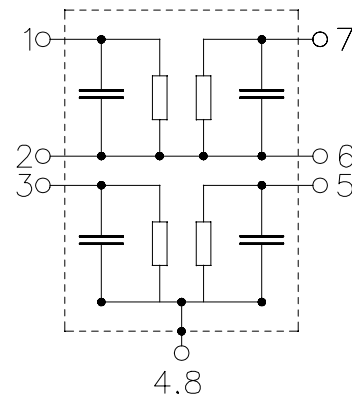
- Low-loss 2-in1-RF filter for mobile telephone PCS systems, transmit path
- Device with two integrated Tx-filter
- Usable passband of Tx-filter 1 30 MHz
- Usable passband of Tx-filter 2 30 MHz
- Extended temperature range for automotive application
- No matching network required for operation at 50 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
- Passivation layer Elpas
- AEC-Q200 qualified component family
- **Electrostatic Sensitive Device (ESD)**


Pin configuration¹⁾

- 1 Input Tx-filter 1
- 7 Output Tx-filter 1
- 2,6 To be grounded
- 3 Input Tx-filter 2
- 5 Output Tx-filter 2
- 4,8 Case/Ground, to be grounded



1) The recommended pin configuration usually offers best suppression of electrical crosstalk. The filter characteristics refer to this configuration.

Data sheet


Characteristics of Tx-filter 1

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.	
Center frequency	f_C	—	1865.0	—	MHz
Maximum insertion attenuation	α_{\max}				
1850.0 ... 1880.0 MHz		—	1.8	3.0	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
1850.0 ... 1880.0 MHz		—	0.7	1.7	dB
Input return loss					
1850.0 ... 1880.0 MHz		9.0	10.0	—	dB
Output return loss					
1850.0 ... 1880.0 MHz		9.0	10.0	—	dB
Attenuation	α				
10.0 ... 1770.0 MHz		24	26	—	dB
1770.0 ... 1800.0 MHz		26	30	—	dB
1930.0 ... 1960.0 MHz		36	41	—	dB
2113.0 ... 2174.0 MHz		32	34	—	dB
2200.0 ... 3000.0 MHz		20	26	—	dB

Data sheet


Characteristics of Tx-filter 2

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.	
Center frequency	f_C	—	1895.0	—	MHz
Maximum insertion attenuation	α_{\max}	—	1.8	3.0	dB
1880.0 ... 1910.0 MHz					
Amplitude ripple (p-p)	$\Delta\alpha$	—	0.7	1.7	dB
1880.0 ... 1910.0 MHz					
Input return loss		9.0	10.0	—	dB
1880.0 ... 1910.0 MHz					
Output return loss		9.0	10.0	—	dB
1880.0 ... 1910.0 MHz					
Attenuation	α	24	26	—	dB
10.0 ... 1800.0 MHz					
		26	29	—	dB
1800.0 ... 1830.0 MHz					
		36	41	—	dB
1960.0 ... 1990.0 MHz					
		32	34	—	dB
2113.0 ... 2174.0 MHz					
		20	26	—	dB
2200.0 ... 3000.0 MHz					


Maximum ratings

Operable temperature range	T	-45/+125	°C	
Storage temperature range	T _{stg}	-45/+125	°C	
DC voltage	V _{DC}	6	V	
Input power max. 1850.0 ... 1910.0 MHz	P _{IN}	10	dBm	source and load impedance 50 Ω continuous wave



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.

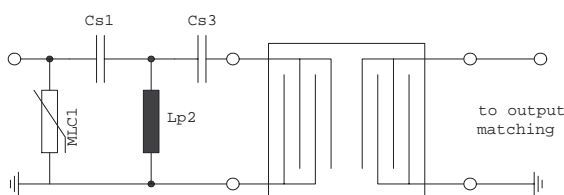


Fig. 1 MLC varistor plus ESD matching

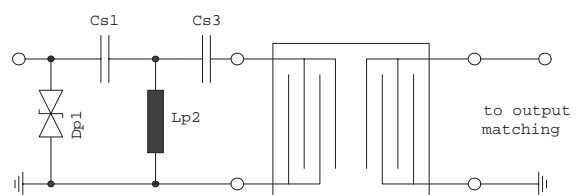


Fig. 2 Suppressor diode plus ESD matching

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

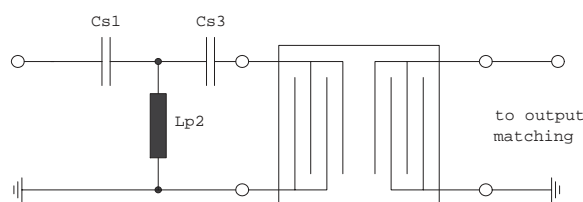


Fig. 3 3rd order high-pass structure for basic ESD protection

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”.


References

Type	B3511
Ordering code	B39192B3511U810
Marking and package	C61157-A7-A72
Packaging	F61074-V8168-Z000
Date codes	L_1126
S-parameters	B3511_NB.s2p, B3511_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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