

SAW Components

SAW RF filter

Short range devices

Series/type:	B4154
Ordering code:	B39202B4154U510
Date:	January 31, 2013
Version:	2.3

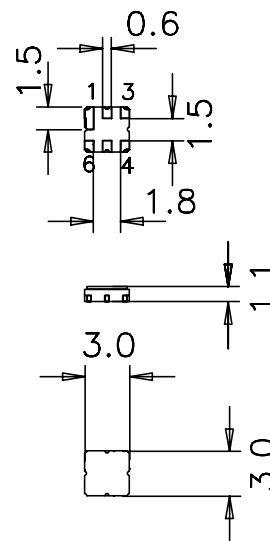
Application

- Low-loss RF filter for PCS systems, receive path
- Unbalanced and balanced operation possible



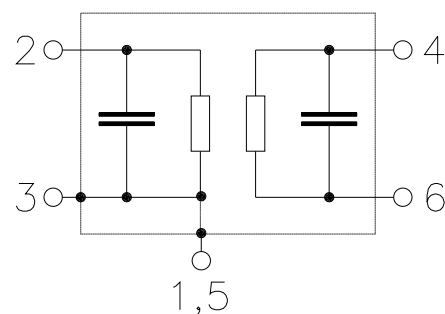
Features

- Package size 3.0 x 3.0 x 1.1 mm³
- Package code DCC6D
- 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 configuration¹⁾

- 2 Input
- 4, 6 Output, balanced
- 1, 3, 5 Ground, to be grounded



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

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Characteristics

Temperature range for specification: $T_A = -45\text{ °C to }+85\text{ °C}$
 Terminating source impedance: $Z_S = 50\ \Omega$
 Terminating load impedance: $Z_L = 50\ \Omega$ (balanced)

		min.	typ. @ 25 °C	max.	
Center frequency	f_C	—	1960.00	—	MHz
Maximum insertion attenuation	$\alpha_{\max}$				
1930.00 ... 1990.00 MHz		—	3.6	5.0 ¹⁾	dB
Amplitude ripple (p-p)					
1930.00 ... 1990.00 MHz		—	0.9	2.4 ²⁾	dB
Attenuation	α				
0.00 ... 1000.00 MHz		50	56	—	dB
1000.00 ... 1830.00 MHz		40	50	—	dB
1830.00 ... 1850.00 MHz		30	50	—	dB
1850.00 ... 1900.00 MHz		10	19	—	dB
1900.00 ... 1910.00 MHz		8	16	—	dB
2020.00 ... 2060.00 MHz		10	17	—	dB
2060.00 ... 2200.00 MHz		25	32	—	dB
2200.00 ... 2260.00 MHz		40	47	—	dB
2260.00 ... 4000.00 MHz		25	42	—	dB
4000.00 ... 4500.00 MHz		20	33	—	dB
4500.00 ... 6000.00 MHz		15	30	—	dB

1) $-30\text{ °C to }+85\text{ °C}$: 4.5 dB

2) $-30\text{ °C to }+85\text{ °C}$: 1.8 dB

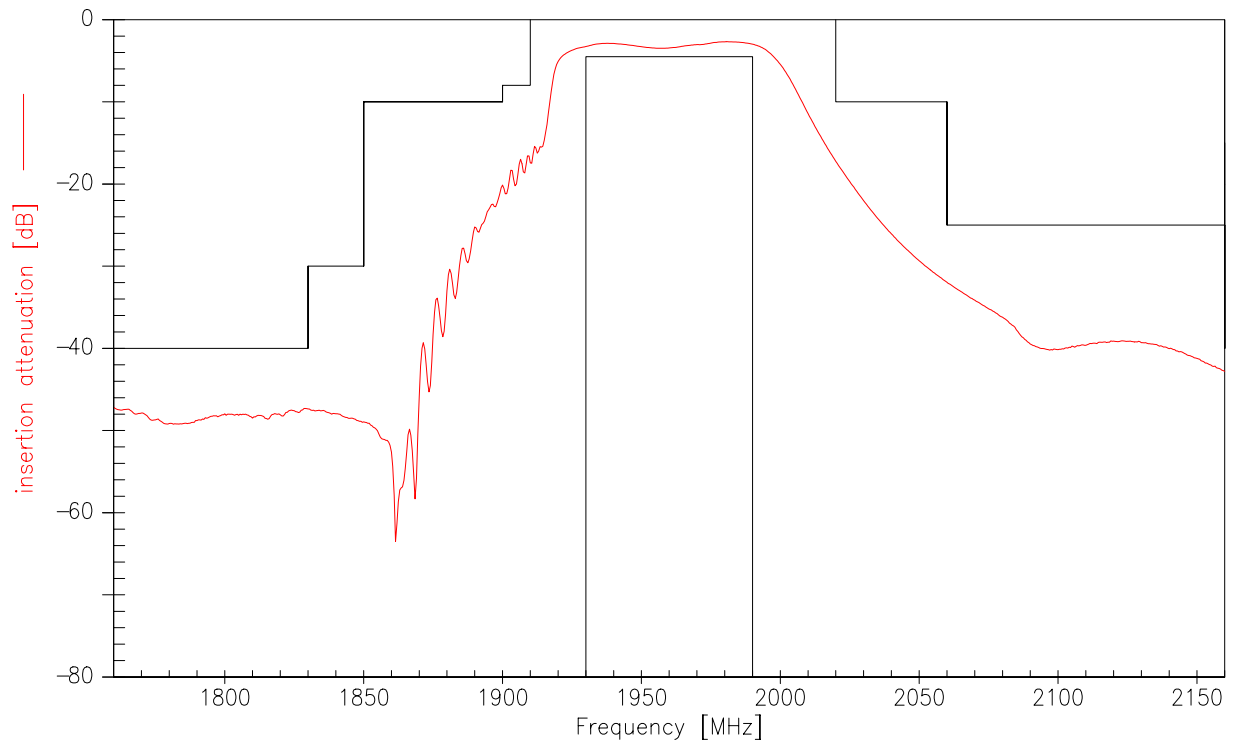
Maximum ratings

Operable temperature range	T_A	$-45/+125$	°C	
Storage temperature range	T_{stg}	$-45/+125$	°C	
DC voltage	V_{DC}	6	V	
Input power max.	P_{IN}	10	dBm	source and load impedance 50 Ω peak of TDMA signal, duty cycle 1 : 3

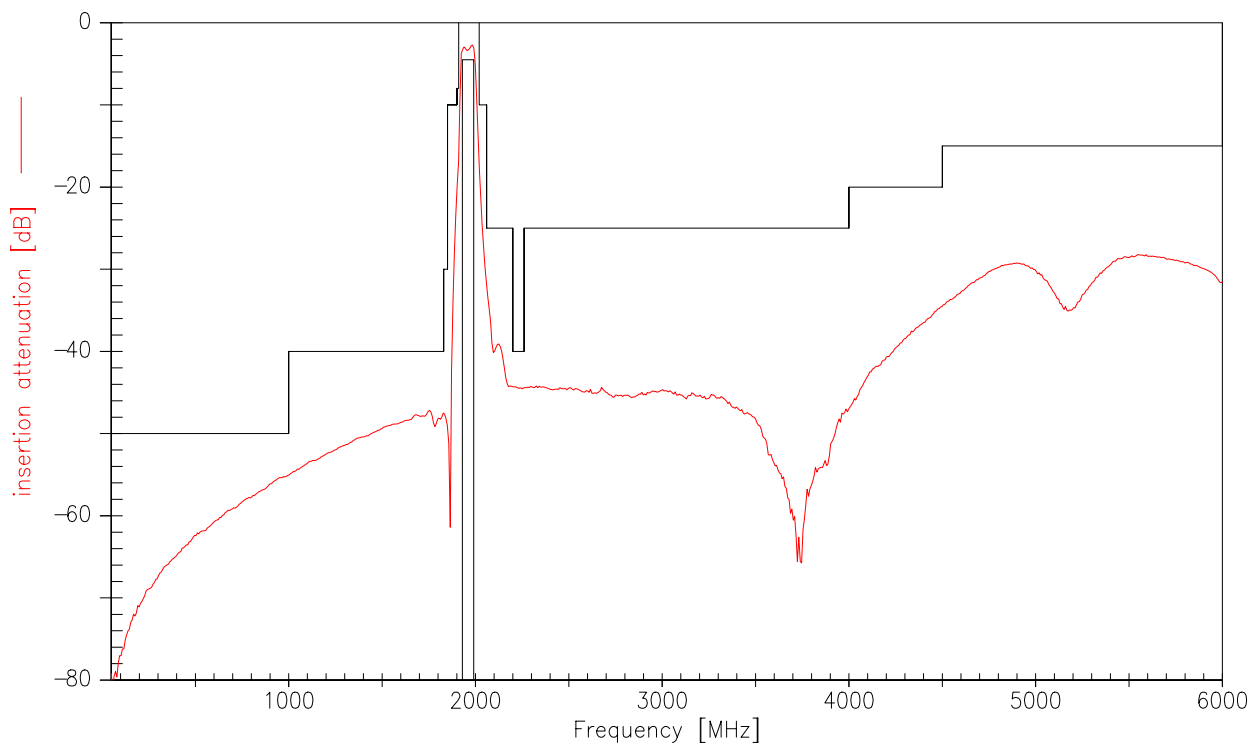
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Transfer function



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 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.

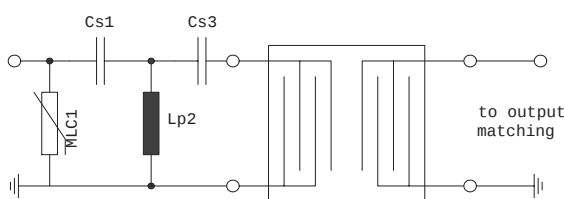


Fig. 1 MLC varistor plus ESD matching

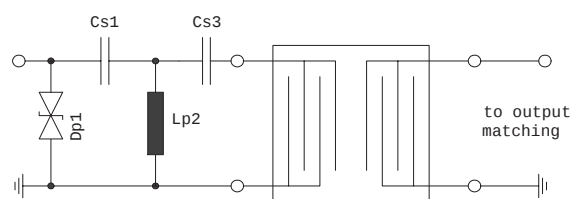


Fig. 2 Suppressor diode plus ESD matching

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

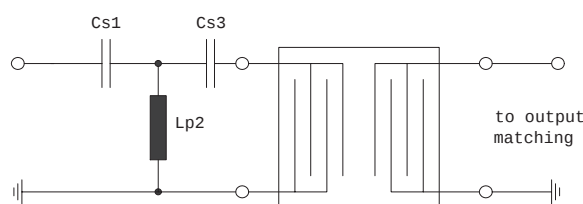


Fig. 3 3rd order high-pass structure for basic ESD protection

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	B4154
Ordering code	B39202B4154U510
Marking and package	C61157-A7-A68
Packaging	F61074-V8168-Z000
Date codes	L_1126
S-parameters	B4154_NB.s3p, B4154_WB.s3p 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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