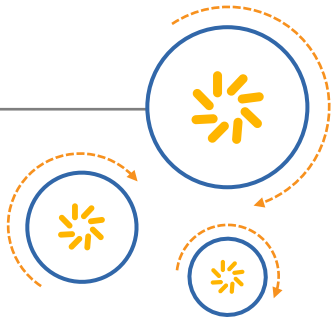
RF360 Europe GmbH

A Qualcomm – TDK Joint Venture



SAW Components

SAW RF filter

Automotive telematics

Series/type:	B3517
Ordering code:	B39162B3517U510
Date:	January 30, 2013
Version:	2.3

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Series/type:	**B3517**
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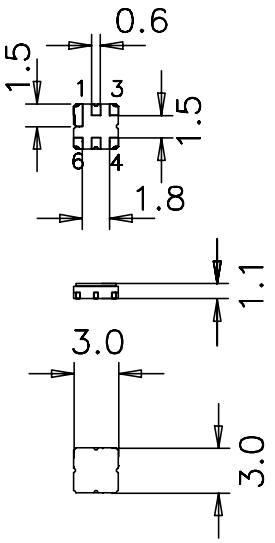
EPCOS AG is a TDK Group Company.

Application

- Low-loss RF filter for automotive telematics applications
- Unbalanced to balanced operation
- Low insertion attenuation
- Low amplitude ripple
- Usable passband 42.0 MHz

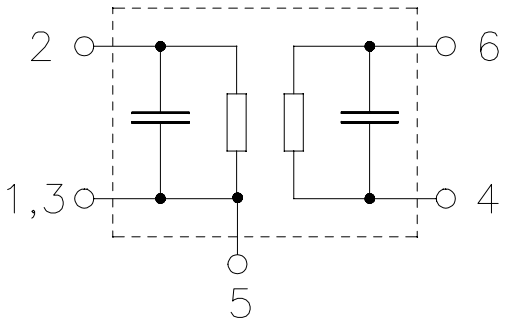
Features

- Package size 3.0 x 3.0 x 1.1 mm³
- Package code DCC6D
- RoHS compatible
- Approximate weight 0.037 g
- Package for **S**urface **M**ount **T**echnology (**SMT**)
- Ni, gold-plated terminals
- Lead free soldering compatible with J - STD20C
- **E**lectrostatic **S**ensitive **D**evice (**ESD**)



Pin configuration

- 2 Input unbalanced
- 4,6 Output balanced
- 1,3,5 Case ground (to be grounded)



Data sheet SMD

Characteristics

Temperature range for specification: T = –40 ˚C to +85 ˚C
Terminating source impedance: Z_S = 50 Ω
Terminating load impedance: Z_L = 100 Ω ||18nH (balanced)

		min.	typ.	max.	
Center frequency	f_C	—	1586	—	MHz
Maximum insertion attenuation	α_{max}				
1565.0 ... 1607.0 MHz		—	1.9	2.5	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
1565.0 ... 1607.0 MHz		—	0.7	1.4	dB
Input VSWR					
1565.0 ... 1607.0 MHz		—	1.7	2.4	
Output VSWR					
1565.0 ... 1607.0 MHz		—	1.7	2.3	
Group delay ripple[1)] (p-p)					
1565.0 ... 1607.0 MHz		—	9	20	ns
1597.0 ... 1607.0 MHz		—	7	14	ns
Attenuation	α				
10.0 ... 960.0 MHz		52	57	—	dB
960.0 ... 1463.0 MHz		47	52	—	dB
1710.0 ... 1785.0 MHz		39	43	—	dB
1785.0 ... 1850.0 MHz		42	47	—	dB
1850.0 ... 1910.0 MHz		45	50	—	dB
1910.0 ... 2050.0 MHz		50	53	—	dB
2050.0 ... 2300.0 MHz		38	41	—	dB
2300.0 ... 2400.0 MHz		45	55	—	dB
2400.0 ... 2500.0 MHz		53	57	—	dB

1) Averaged over 500 kHz

Data sheet SMD

Characteristics

Temperature range for specification: T = –40 ˚C to+125 ˚C
Terminating source impedance: Z_S = 50 Ω
Terminating load impedance: Z_L = 100 Ω ||18nH (balanced)

		min.	typ.	max.	
Center frequency	f_C	—	1586	—	MHz
Maximum insertion attenuation	α_{max}				
1565.0 ... 1607.0 MHz		—	1.9	2.7	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
1565.0 ... 1607.0 MHz		—	0.7	1.6	dB
Input VSWR					
1565.0 ... 1607.0 MHz		—	1.7	2.4	
Output VSWR					
1565.0 ... 1607.0 MHz		—	1.7	2.4	
Group delay ripple[1)] (p-p)					
1565.0 ... 1607.0 MHz		—	9	22	ns
1597.0 ... 1607.0 MHz		—	7	16	ns
Attenuation	α				
10.0 ... 960.0 MHz		52	57	—	dB
960.0 ... 1463.0 MHz		42	52	—	dB
1710.0 ... 1785.0 MHz		39	43	—	dB
1785.0 ... 1850.0 MHz		42	47	—	dB
1850.0 ... 1910.0 MHz		45	50	—	dB
1910.0 ... 2050.0 MHz		50	53	—	dB
2050.0 ... 2300.0 MHz		38	41	—	dB
2300.0 ... 2400.0 MHz		45	55	—	dB
2400.0 ... 2500.0 MHz		53	57	—	dB

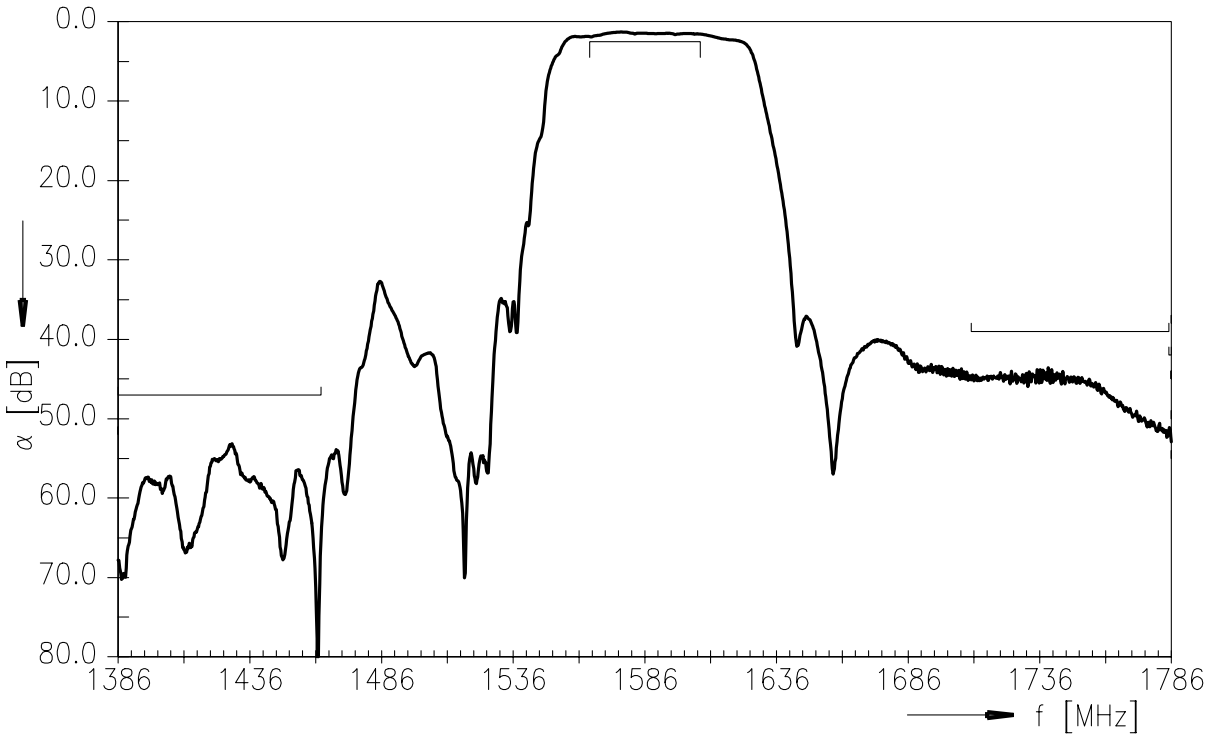
1) Averaged over 500 kHz

Maximum ratings

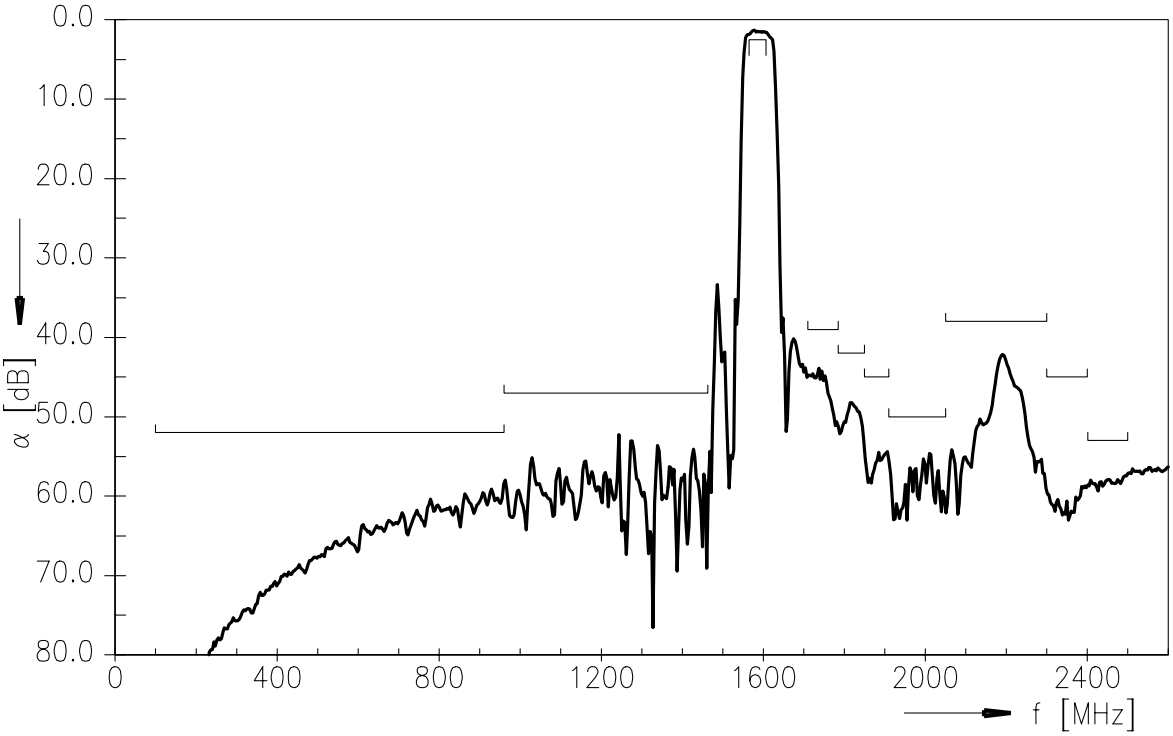
Operable temperature range	T	–45/+125	˚C	
Storage temperature range	T_{stg}	–45/+125	˚C	
DC voltage	V_{DC}	6	V	
ESD voltage	V_{ESD}	50[1)]	V	machine model, 10 pulses
Input power at				source 50Ω, load100Ω ||18nH
1565.0 ... 1607.0 MHz	P_{IN}	5	dBm	cw
2400 ... 2483.5 MHz	P_{IN}	20	dBm	cw
824...960, 1710...2170 MHz	P_{IN}	20	dBm	cw
960...1525 MHz	P_{IN}	10	dBm	cw

1) acc. to JESD22-A115A (machine model), 10 negative & 10 positive pulses.

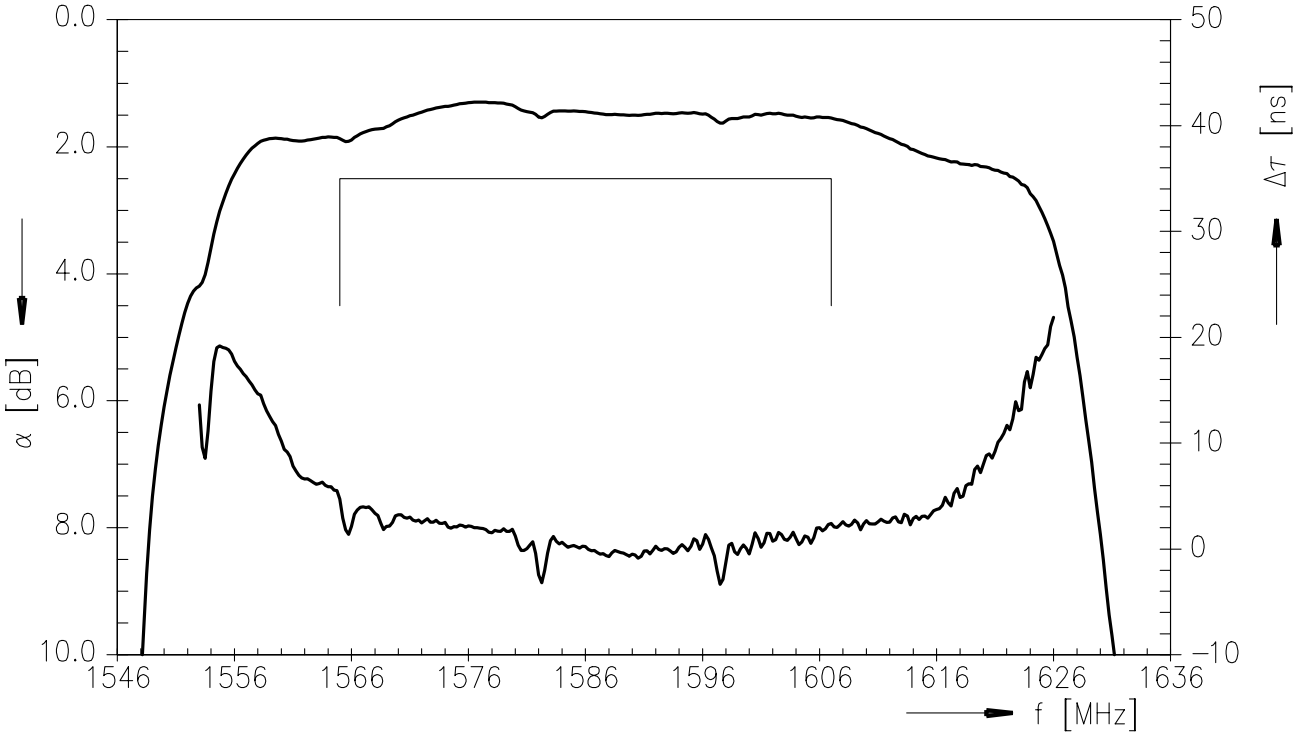
Transfer function



Transfer function (wideband)



Group delay time



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.

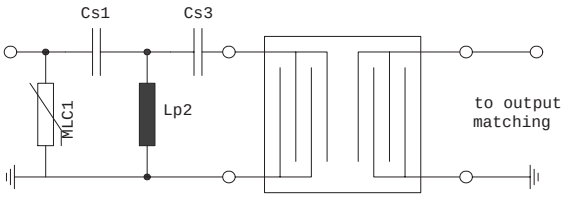


Fig. 1 MLC varistor plus ESD matching

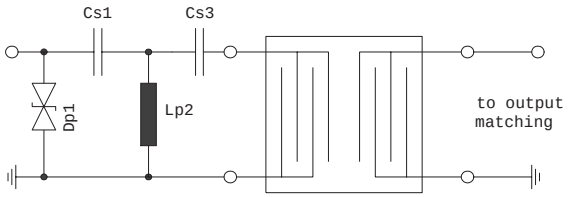


Fig. 2 Suppressor diode plus ESD matching

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

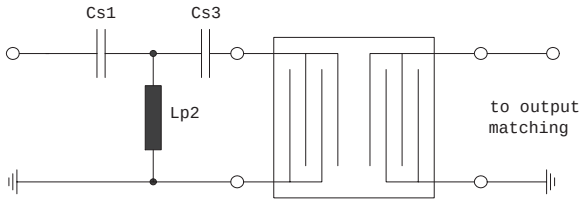


Fig. 3 3rd order high-pass structure for basic ESD protection

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	B3517
Ordering code	B39162B3517U510
Marking and package	C61157-A7-A68
Packaging	F61074-V8228-Z000
Date codes	L_1126
S-parameters	B3517_NB.s3p, B3517_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 8th, 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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