SAW Components

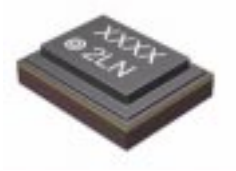
SAW Tx filter

Automotive telematics

Series/type:	**B4315**
Ordering code:	**B39182B4315P810**
Date:	January 16, 2012
Version:	2.0

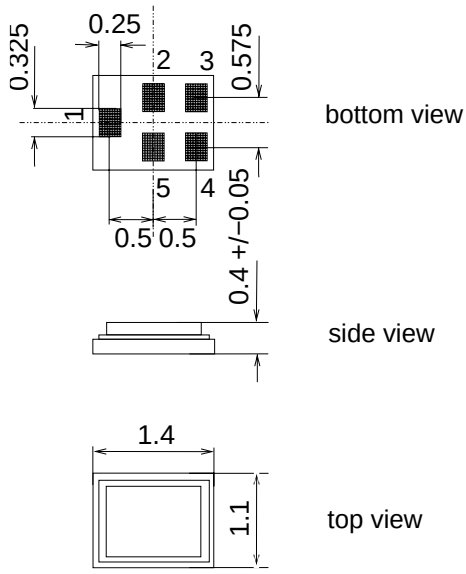
Application

- Low-loss RF filter for mobile telephone PCS, transmit path (TX)
- No matching network required for operation at 50 Ω
- Usable passband 58.75 MHz



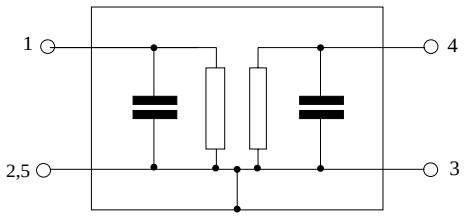
Features

- Package size 1.4 x1.1 x 0.4 mm³
- Package code QCS5M
- RoHS compatible
- Approximate weight 0.003 g
- Package for **S**urface **M**ount **T**echnology (**SMT**)
- Ni, gold-plated terminals
- AEC-Q200 qualified component family (operable temperature range -40˚C to +85˚C)
- **E**lectrostatic **S**ensitive **D**evice (**ESD**)



Pin configuration

- 1 Input
- 4 Output
- 2,3,5 To be grounded



Characteristics

Temperature range for specification: T = –30 ˚C to +85 ˚C
Terminating source impedance: Z_S = 50 Ω
Terminating load impedance: Z_L = 50 Ω

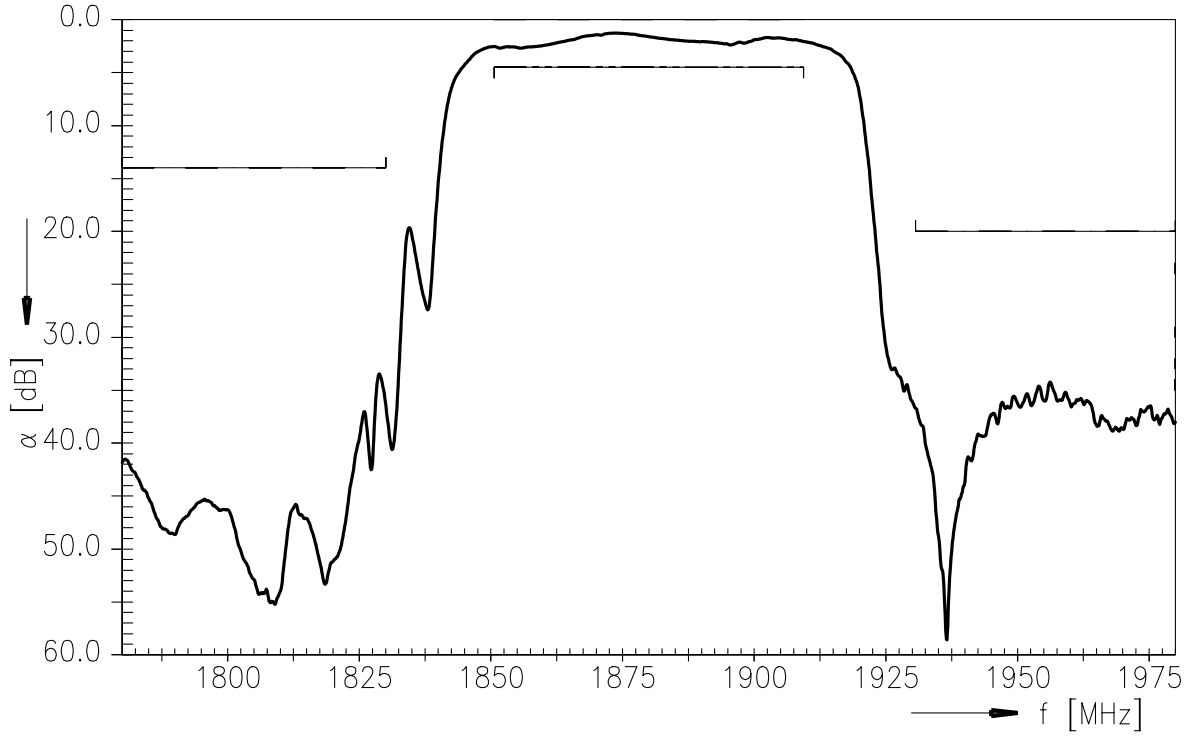
		min.	typ. @ 25 ˚C	max.	
Center frequency	f_C	—	1880.0	—	MHz
Maximum insertion attenuation	α_{max}				
1850.625 ...1909.375 MHz		—	3.2	4.5	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
1850.625 ...1909.375 MHz		—	2.0	3.2	dB
VSWR					
Input 1850.625 ...1909.375 MHz		—	2.2	2.8	
Output 1850.625 ...1909.375 MHz		—	2.4	2.8	
Attenuation	α				
0.0 ... 1550.0 MHz		32	39	—	dB
1550.0 ... 1580.0 MHz		35	40	—	dB
1580.0 ... 1770.0 MHz		30	38	—	dB
1770.0 ... 1830.0 MHz		14	26	—	dB
1930.625... 1990.0 MHz		20	32	—	dB
1990.0 ... 2032.0 MHz		35	40	—	dB
2032.0 ... 2500.0 MHz		33	38	—	dB
2500.0 ... 3700.0 MHz		30	37	—	dB
3700.0 ... 3820.0 MHz		35	50	—	dB
3820.0 ... 6000.0 MHz		24	40	—	dB

Maximum ratings

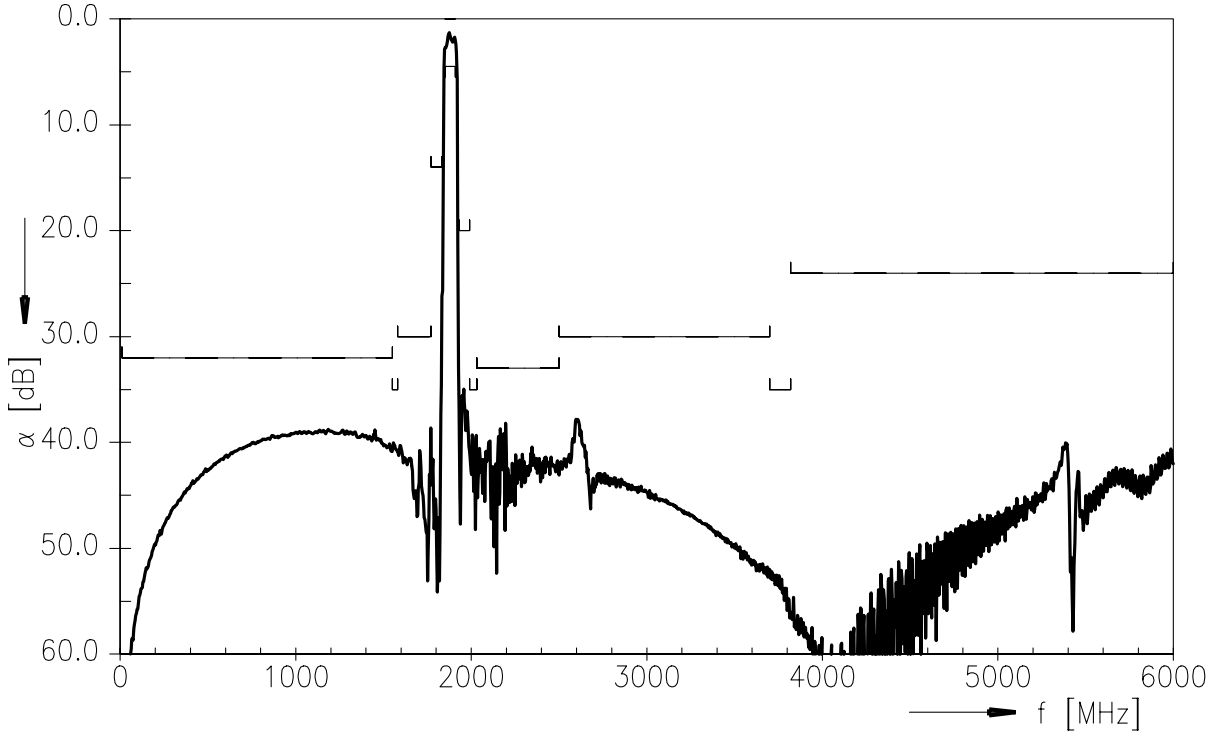
Operable temperature range	T	–40/+85	˚C	
Storage temperature range	T_{stg}	–40/+85	˚C	
DC voltage	V_{DC}	0	V	
ESD voltage	V_{ESD}	100[1)]	V	machine model, 10 pulses
Input power at				
GSM850, GSM900	P_{IN}	15	dBm	effective power in the on-state,
GSM1800, GSM1900	P_{IN}	15	dBm	duty cycle 4:8
Tx bands				

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

Frequency response (narrowband)

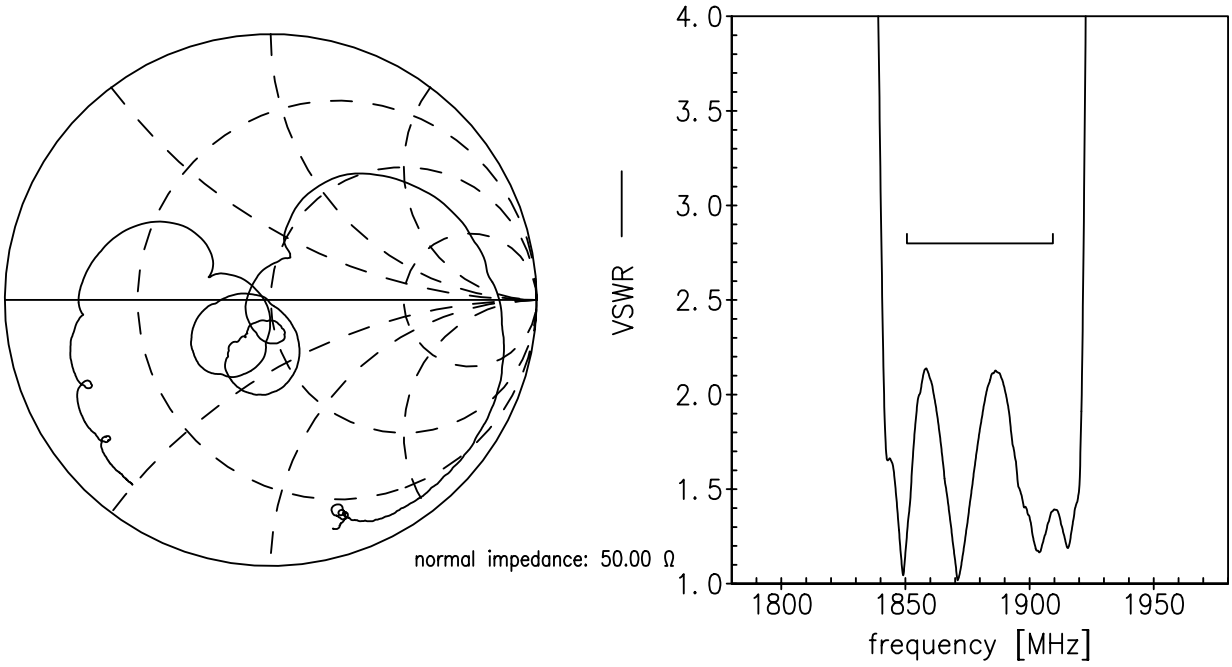


Frequency response (wideband)

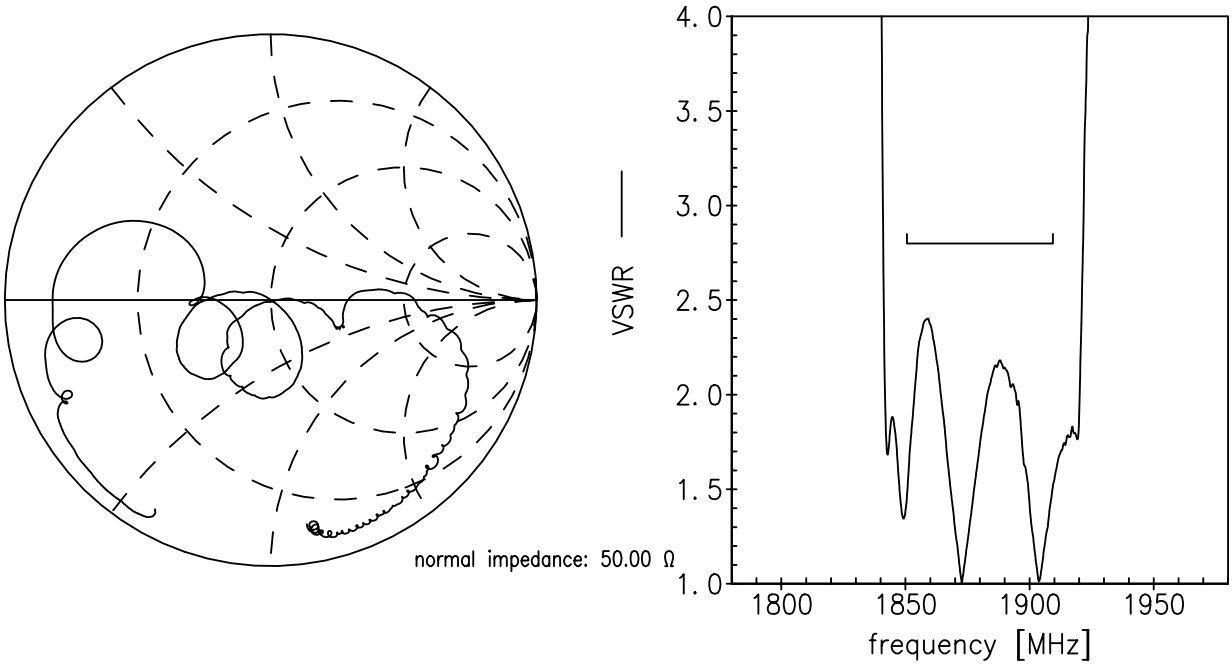


Smith chart

S_{11} function



S_{22} function



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.

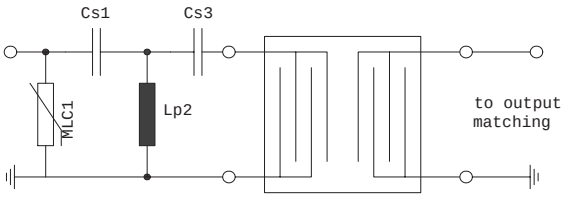


Fig. 1 MLC varistor plus ESD matching

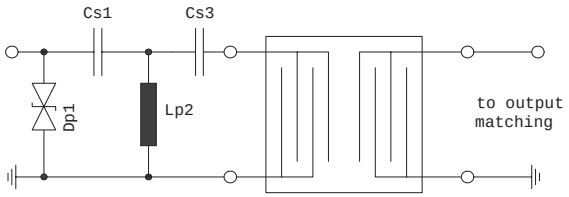


Fig. 2 Suppressor diode plus ESD matching

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

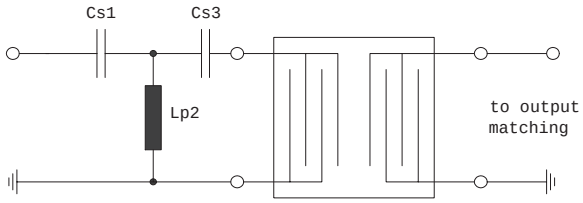


Fig. 3 3rd order high-pass structure for basic ESD protection

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	B4315
Ordering code	B39182B4315P810
Marking and package	C61157-A8-A8
Packaging	F61074-V8212-Z000
Date codes	L_1126
S-parameters	B4315_NB.s2p, B4315_WB.s2p See file header for port/pin assignment table.
Soldering profile	S_6001
RoHS compatible	defined as compatible with the following documents: "DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment. 2005/618/EC from April 18th, 2005, amending Directive 2002/95/EC of the European Parliament and of the Council for the purposes of establishing the maximum concentration values for certain hazardous substances in electrical and electronic equipment."
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