

RF360 Europe GmbH

A Qualcomm – TDK Joint Venture

SAW Components

SAW Rx filter

Automotive telematics

Series/type: B4305
Ordering code: B39202B4305F210

Date: January 30, 2013
Version: 2.1

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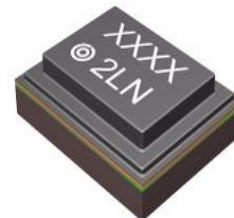
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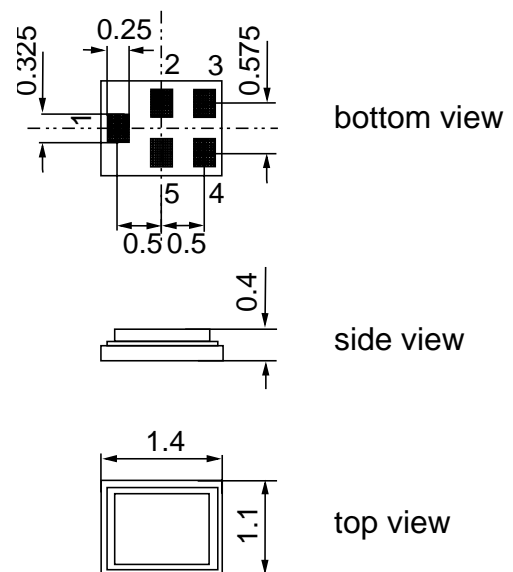
Data sheet


Application

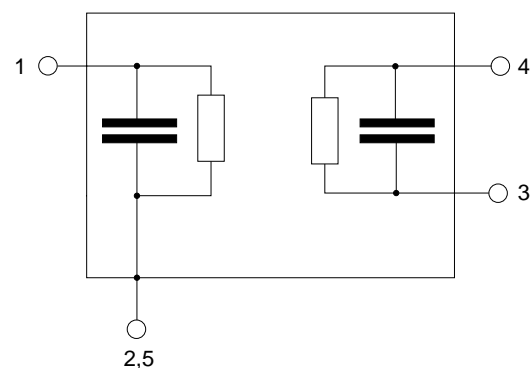
- Low-loss RF filter for PCS systems, receive path (RX)
- Impedance transform from 50 Ω to 150 Ω
- Unbalanced to balanced operation
- Very low insertion attenuation
- Low amplitude ripple
- Usable passband 60 MHz
- Suitable for GPRS class 1 to 12


Features

- Package size 1.4 x 1.1 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
- 3,4 Output, balanced
- 2,5 To be grounded



Data sheet


Characteristics

Operating temperature range: $T = -20$ to $+75$ °C
 Terminating source impedance: $Z_S = 50\Omega$
 Terminating load impedance: $Z_L = 150\Omega \parallel 15$ nH (balanced)

				min.	typ. @ 25°C	max.	
Center frequency		f_C		—	1960	—	MHz
Maximum insertion attenuation		α_{\max}		—	1.7	2.6	dB
	1930.0 ... 1990.0	MHz					
Amplitude ripple (p-p)		$\Delta\alpha$		—	0.7	1.7	dB
	1930.0 ... 1990.0	MHz					
VSWR				—	1.7	2.4	
	1930.0 ... 1990.0	MHz					
CMRR ($ S_{21}-S_{31} / S_{21}+S_{31} $)				19 ¹⁾	26	—	dB
	1930.0 ... 1990.0	MHz					
Attenuation		α					
	0.0 ... 1500.0	MHz		40	44	—	dB
	1500.0 ... 1830.0	MHz		30	37	—	dB
	1830.0 ... 1850.0	MHz		26	32	—	dB
	1850.0 ... 1890.0	MHz		23	28	—	dB
	1890.0 ... 1910.0	MHz		11	18	—	dB
	2010.0 ... 2070.0	MHz		4 ²⁾	14	—	dB
	2070.0 ... 2400.0	MHz		26	30	—	dB
	2400.0 ... 2500.0	MHz		34	40	—	dB
	2500.0 ... 3860.0	MHz		28	33	—	dB
	3860.0 ... 3980.0	MHz		40	49	—	dB
	3980.0 ... 5790.0	MHz		28	41	—	dB
	5790.0 ... 6000.0	MHz		34	42	—	dB

1) A CMRR of 19.6 dB corresponds to a phase imbalance of $\pm 10^\circ$ together with an amplitude imbalance of ± 1.0 dB.

2) 11.5dB at 25°C


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}	50 ¹⁾	V	machine model, 10 pulses
Input Power at GSM850, GSM900	P _{IN}	15	dBm	peak power of GSM signal, duty cycle 4:8
GSM1800, GSM1900	P _{IN}	15	dBm	
Tx bands				

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



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.

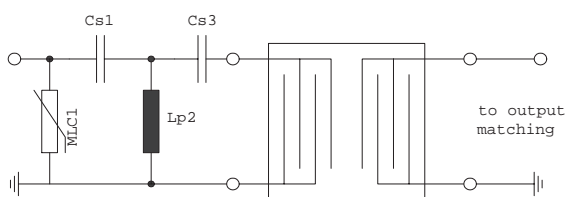


Fig. 1 MLC varistor plus ESD matching

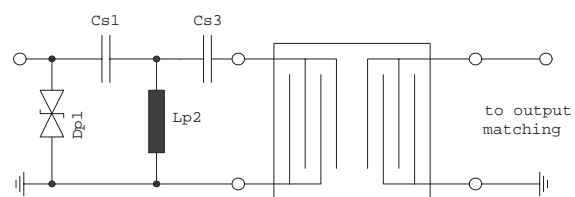


Fig. 2 Suppressor diode plus ESD matching

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

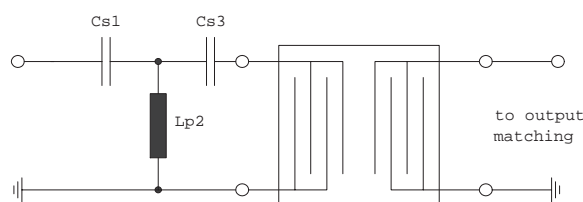


Fig. 3 3rd order high-pass structure for basic ESD protection

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:

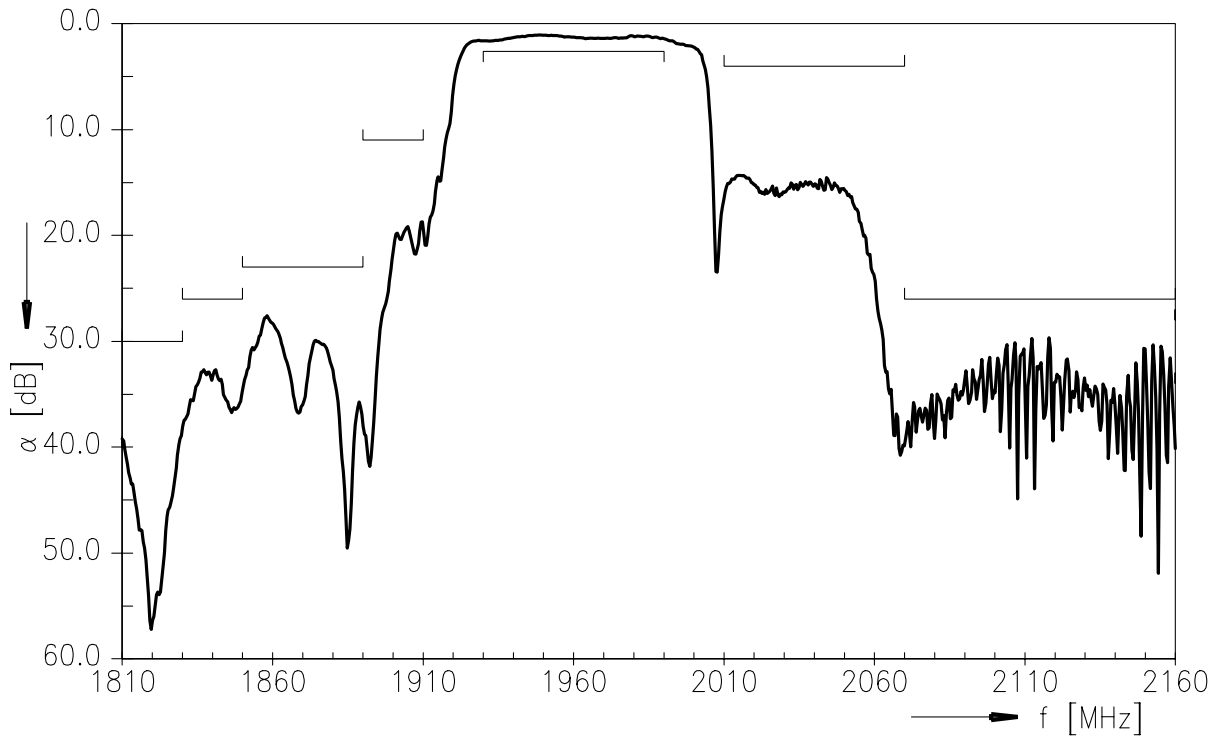
“ESD protection for SAW filters”.

This report can be found under www.epcos.com/rke. Click on “Applications Notes”.

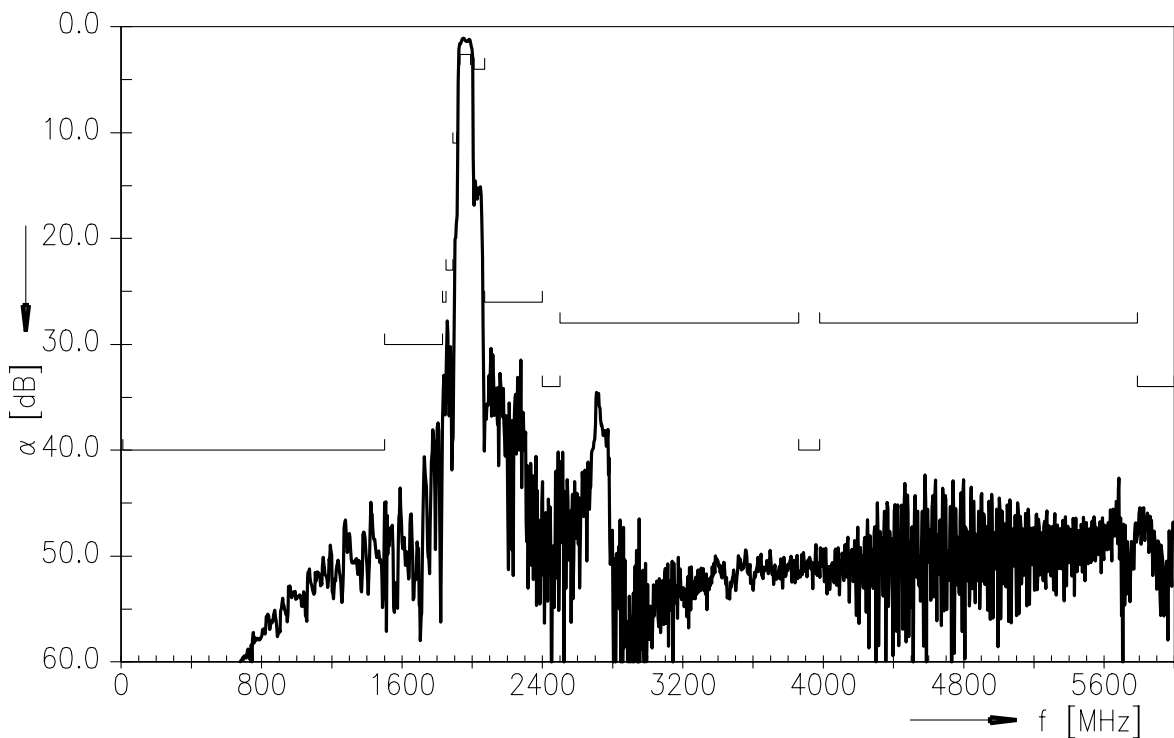
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Transfer function



Transfer function (wideband)

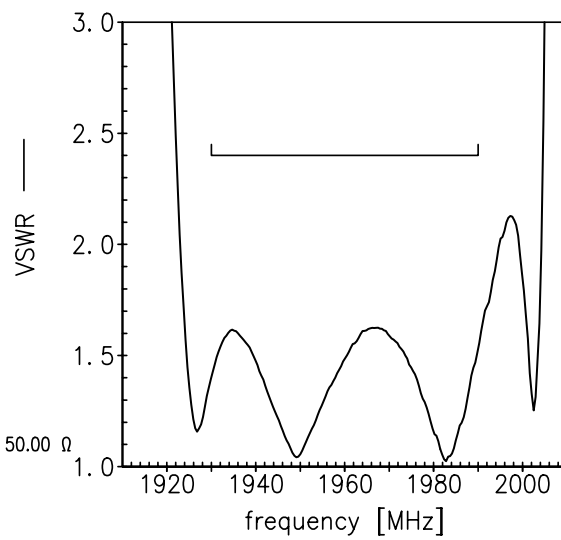
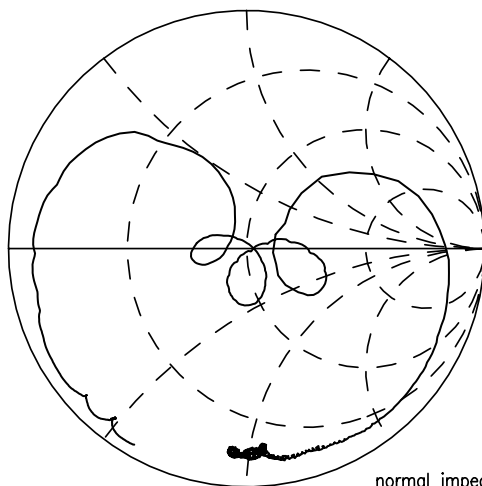


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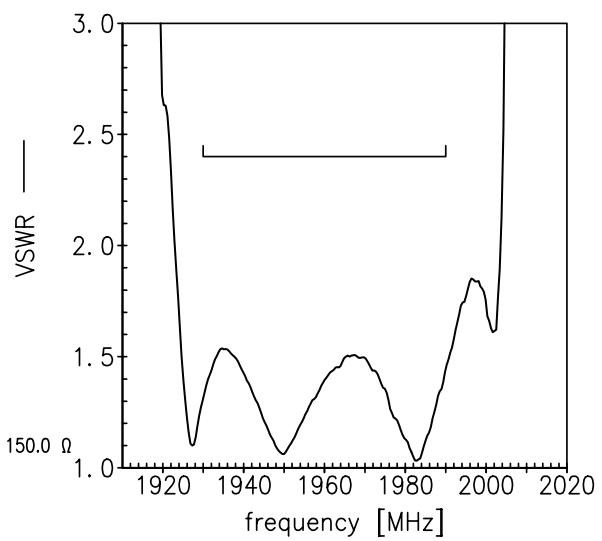
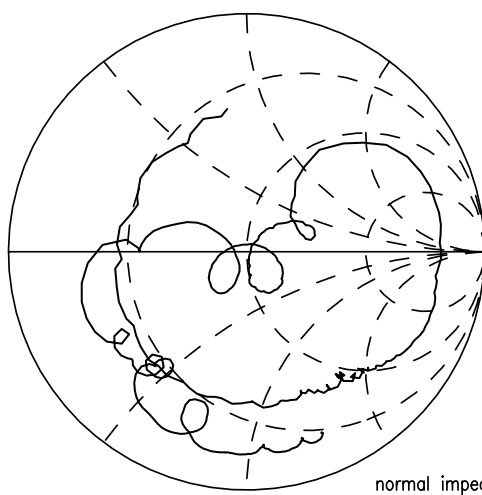


Smith chart

S₁₁ function



S₂₂ function



Data sheet


References

Type	B4305
Ordering code	B39202B4305F210
Marking and package	C61157-A8-A8
Packaging	F61074-V8212-Z000
Date codes	L_1126
S-parameters	B4305_NB.s3p, B4305_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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