SAW Components

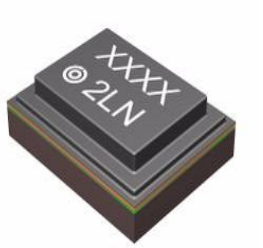
SAW Rx filter

Automotive telematics

Series/type:	**B4306**
Ordering code:	**B39182B4306F210**
Date:	January 30, 2013
Version:	2.2

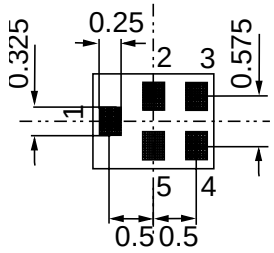
Application

- Low-loss RF filter for GSM 1800 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 75 MHz
- Suitable for GPRS class 1 to 12

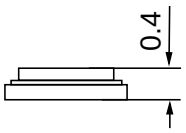


Features

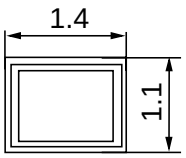
- Package size 1.4 x1.1 x 0.4 mm³
- Package code QCS5M
- RoHS compatible
- Approximate weight 0.003 g
- Package for **S**urface **M**ount **T**echnology (**SMT**)
- Ni, gold-plated terminals
- AEC-Q200 qualified component family (operable temperature range –40˚C to +85˚C)
- **E**lectrostatic **S**ensitive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



bottom view



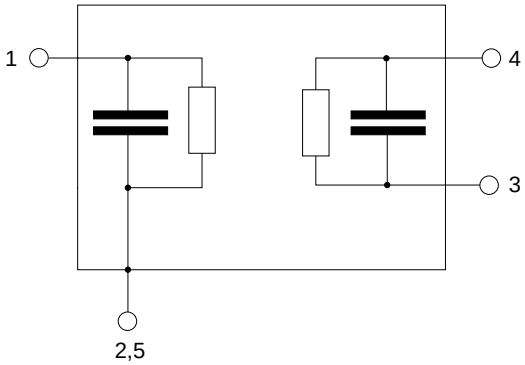
side view



top view

Pin configuration

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



Characteristics

Operating temperature range: T = –20 to +75 °C
Terminating source impedance: Z_S = 50Ω
Terminating load impedance: Z_L = 150 Ω || 18 nH (balanced)

		min.	typ. @ 25°C	max.	
Center frequency	f_C	—	1842.5	—	MHz
Maximum insertion attenuation	α_{max}				
1805.0 ... 1880.0 MHz		—	1.8	2.4	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
1805.0 ... 1880.0 MHz		—	0.7	1.5	dB
VSWR					
Input 1805.0 ... 1880.0 MHz		—	1.9	2.5	
Output 1805.0 ... 1880.0 MHz		—	1.9	2.5	
CMRR ($\lvert S_{21}-S_{31}\rvert$ / $\lvert S_{21}+S_{31}\rvert$)					
1805.0 ... 1880.0 MHz		19[1)]	24	—	dB
Attenuation	α				
0.0 ... 902.0 MHz		45	50	—	dB
902.0 ... 940.0 MHz		45	51	—	dB
940.0 ... 1440.0 MHz		35	41	—	dB
1440.0 ... 1705.0 MHz		28	36	—	dB
1705.0 ... 1785.0 MHz		12	18	—	dB
1920.0 ... 1980.0 MHz		18	23	—	dB
1980.0 ... 2030.0 MHz		23	26	—	dB
2030.0 ... 2400.0 MHz		28	31	—	dB
2400.0 ... 2500.0 MHz		30	37	—	dB
2500.0 ... 2775.0 MHz		28	32	—	dB
2775.0 ... 3760.0 MHz		40	47	—	dB
3760.0 ... 6000.0 MHz		35	40	—	dB

1) A CMRR of 19.6 dB corresponds to a phase imbalance of ±10° together with an amplitude imbalance of ±1.0 dB

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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	effecftive 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.

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.

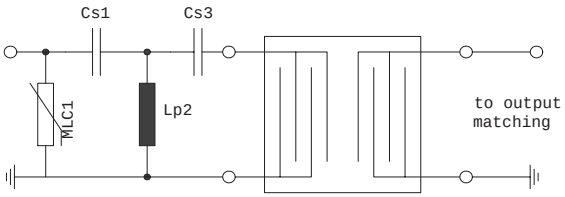


Fig. 1 MLC varistor plus ESD matching

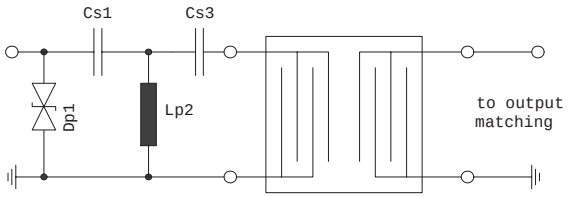


Fig. 2 Suppressor diode plus ESD matching

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

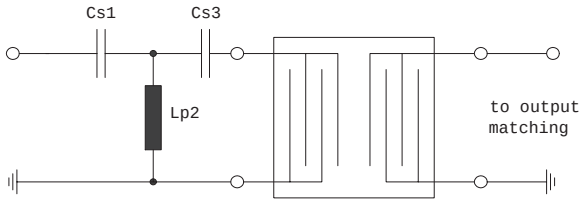


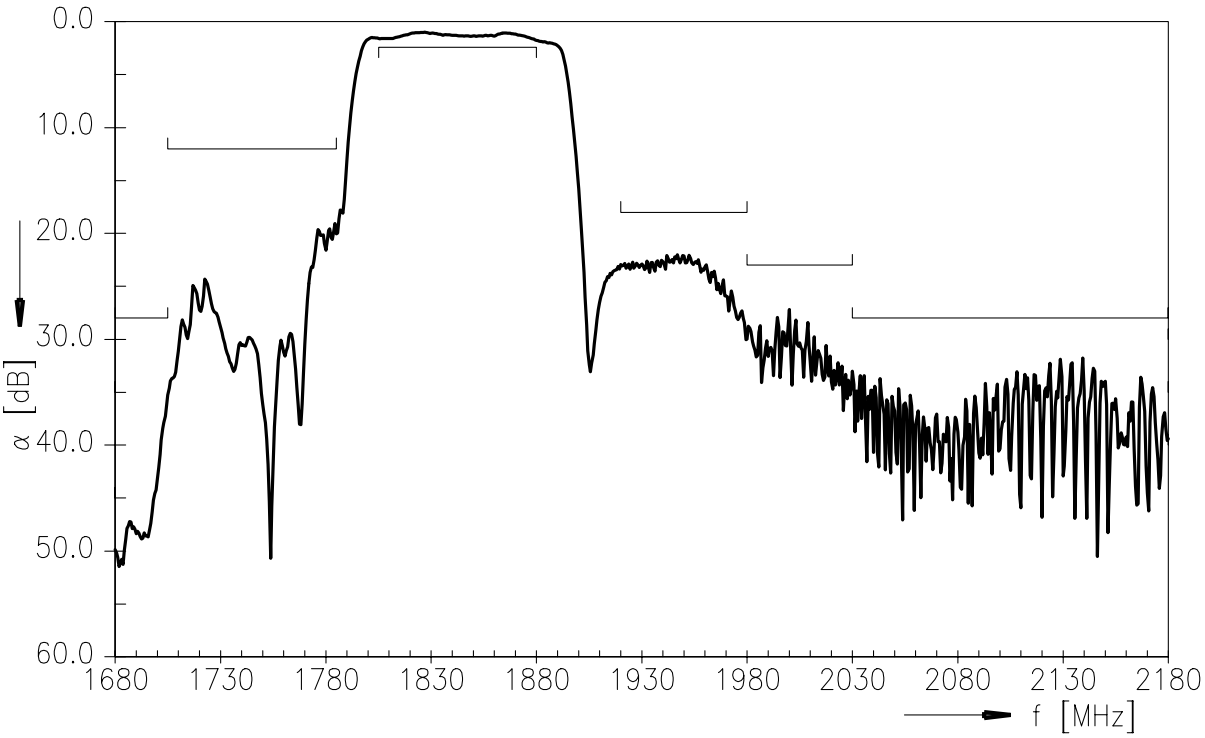
Fig. 3 3rd order high-pass structure for basic ESD protection

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.

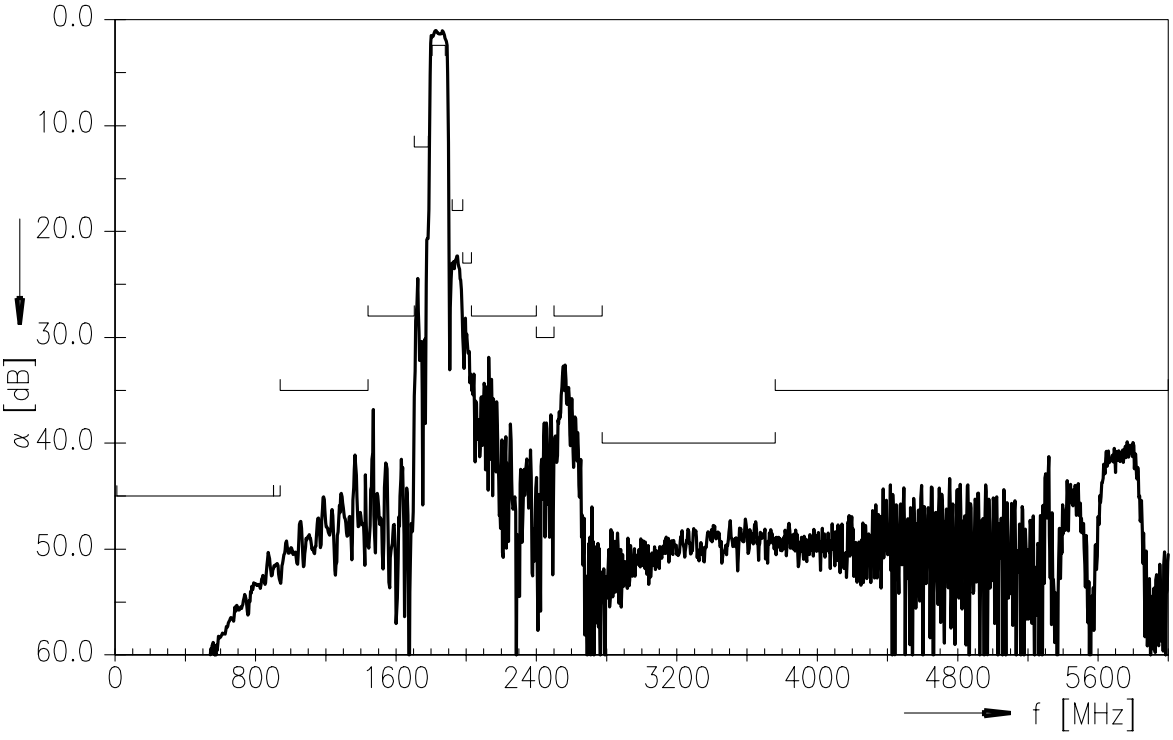
Effectiveness of the applied ESD protection has to be checked according to relevant industry standards or customer specific requirements

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”.

Transfer function

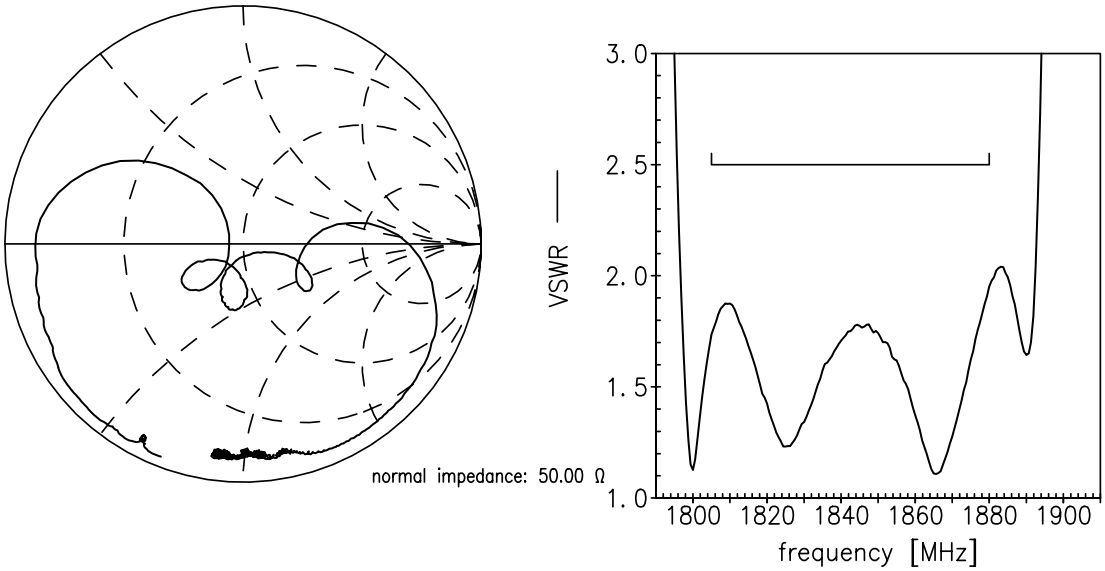


Transfer function (wideband)

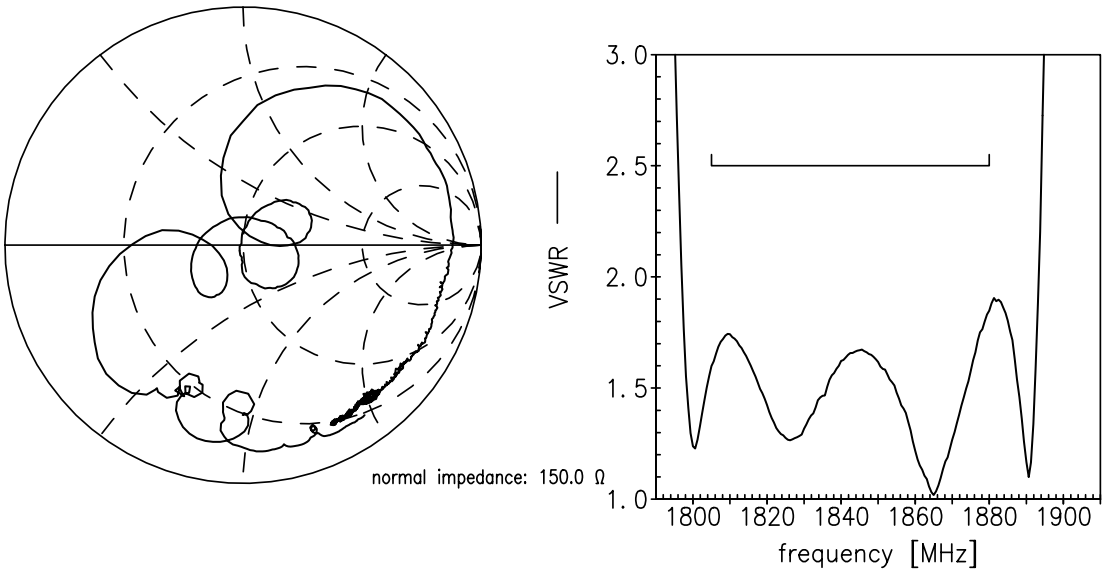


Smith chart

S_{11} function



S_{22} function



References

Type	B4306
Ordering code	B39182B4306F210
Marking and package	C61157-A8-A8
Packaging	F61074-V8212-Z000
Date codes	L_1126
S-parameters	B4306_NB.s3p, B4306_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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