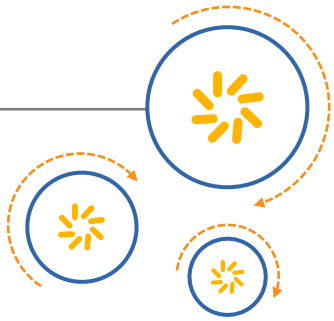
RF360 Europe GmbH

A Qualcomm – TDK Joint Venture



SAW Components

SAW Tx Filter

Automotive telematics

Series/type:	B4319
Ordering code:	B39781B4319P810
Date:	April 23, 2015
Version:	2.1

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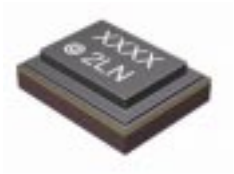
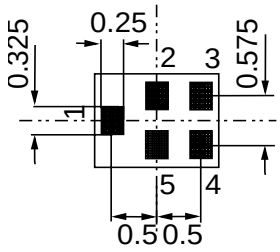
Application

- Low-loss RF filter for LTE Band 13 systems (Tx)
- No matching network required for operation at 50 Ω
- Unbalanced to unbalanced operation
- Usable passband 10 MHz

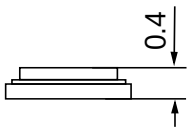


Features

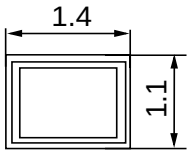
- Package size 1.4 x1.1 x 0.4 mm³
- Package code QCS5P
- RoHS compatible
- Approximate weight 0.003 g
- Package for **S**urface **M**ount **T**echnology (**SMT**)
- Ni, gold-plated terminals
- AEC-Q200 qualified component family (operable temperature range -40˚C to +85˚C)
- **E**lectrostatic **S**ensitive **D**evice (**ESD**)



bottom view



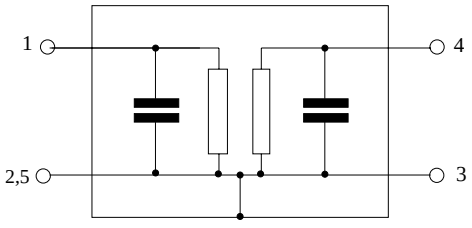
side view



top view

Pin configuration

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



Data sheet SMD

Characteristics

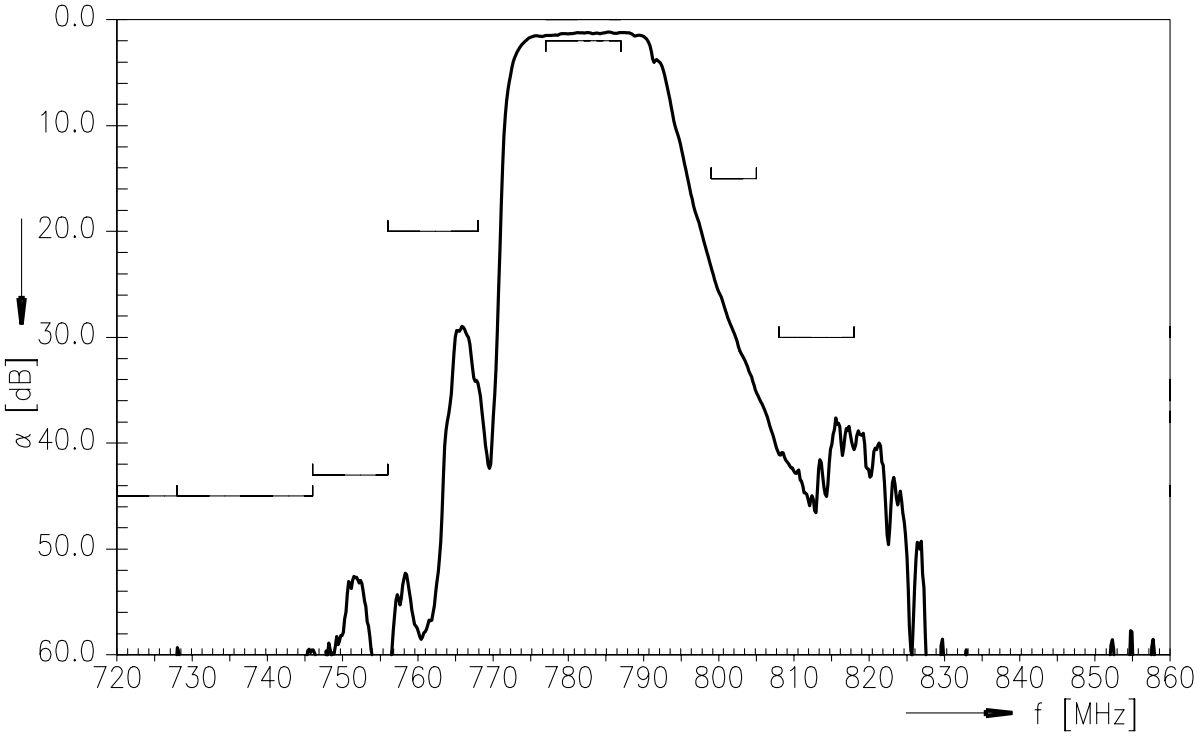
Temperature range for specification: T = –30 °C to +85 °C
Terminating source impedance: Z_S = 50 Ω
Terminating load impedance: Z_L = 50 Ω

		min.	typ. @ 25 °C	max.	
Center frequency	f_C	—	782.00	—	MHz
Maximum insertion attenuation	α_{max}				
777.0 ... 787.0 MHz		—	1.5	2.0	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
777.0 ... 787.0 MHz		—	0.5	1.0	dB
VSWR					
777.0 ... 787.0 MHz		—	1.4	2.0	
Attenuation	α				
50.0 ... 716.0 MHz		45	62	—	dB
716.0 ... 728.0 MHz		45	60	—	dB
728.0 ... 746.0 MHz		45	58	—	dB
746.0 ... 756.0 MHz		43	49	—	dB
756.0 ... 768.0 MHz		20	27	—	dB
799.0 ... 805.0 MHz		15	20	—	dB
808.0 ... 818.0 MHz		30	36	—	dB
869.0 ... 894.0 MHz		30	64	—	dB
1554.0 ... 1565.0 MHz		45	53	—	dB
1565.0 ... 1585.0 MHz		45	52	—	dB
1597.0 ... 1607.0 MHz		45	52	—	dB
1805.0 ... 1880.0 MHz		38	50	—	dB
1930.0 ... 1990.0 MHz		36	48	—	dB
2110.0 ... 2170.0 MHz		35	47	—	dB
2331.0 ... 2361.0 MHz		35	45	—	dB
2400.0 ... 2484.0 MHz		35	46	—	dB
3108.0 ... 3148.0 MHz		35	44	—	dB

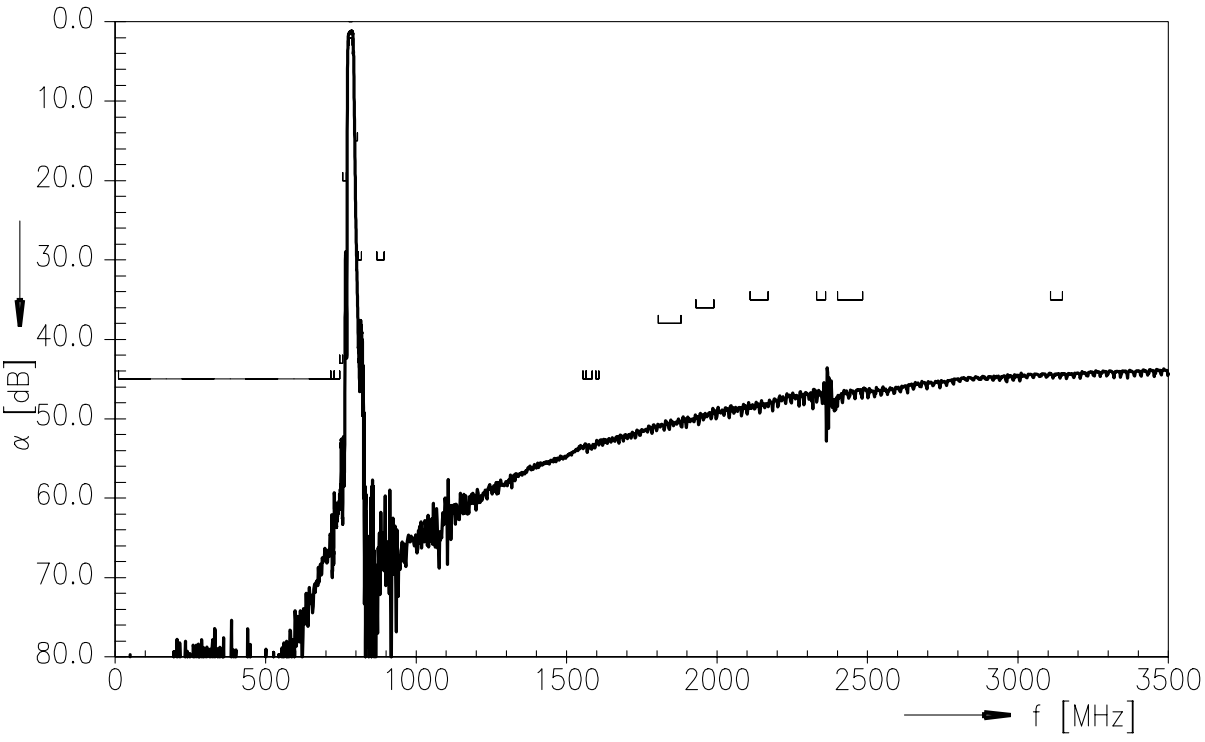
Maximum ratings

Operable temperature range	T	–40/+85	˚C	
Storage temperature range	T_{stg}	–40/+85	˚C	
DC voltage	V_{DC}	0	V	
Input power at				
777.0 ... 787.0 MHz	P_{IN}	12	dBm	SC-FDMA Signal, 85°C, 8000hrs
824.0 ... 849.0 MHz	P_{IN}	28	dBm	Band 5 Tx GSM 1:8 Signal, 85°C, 8000hrs

Frequency response (narrowband)

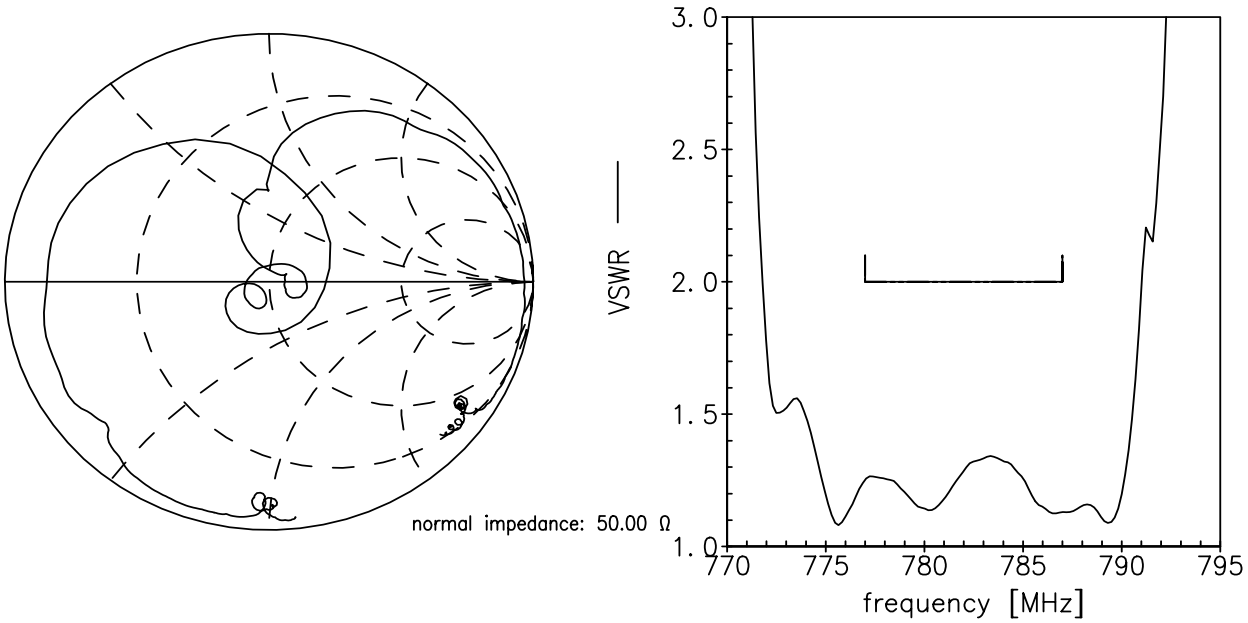


Frequency response (wideband)

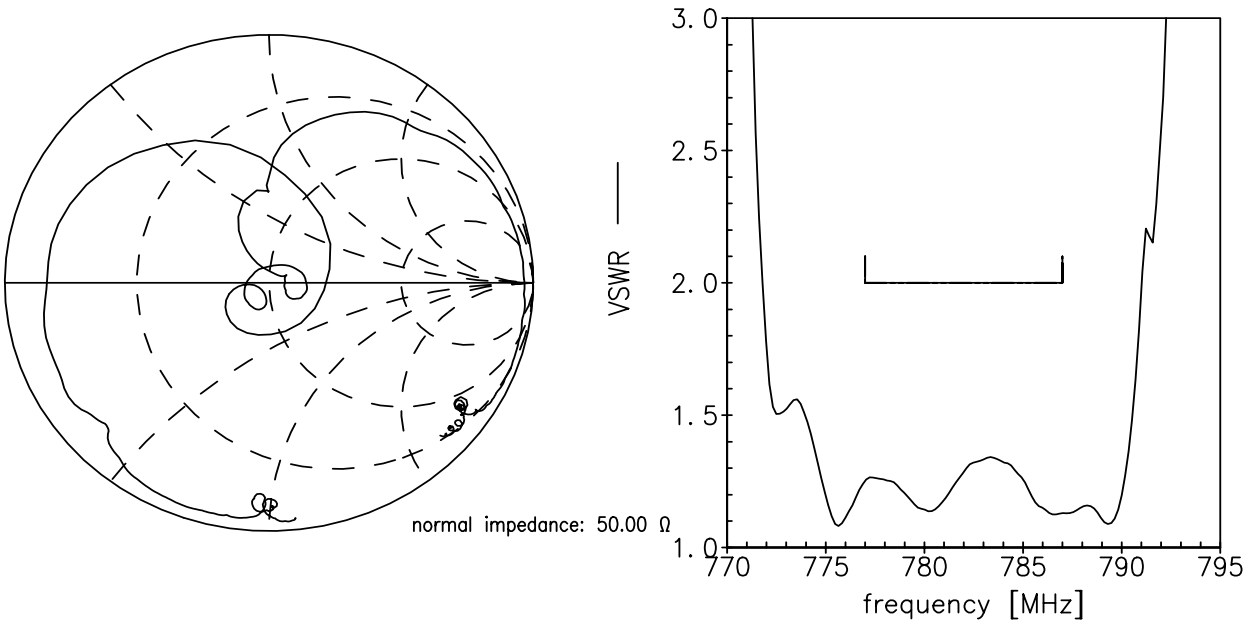


Smith chart

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.

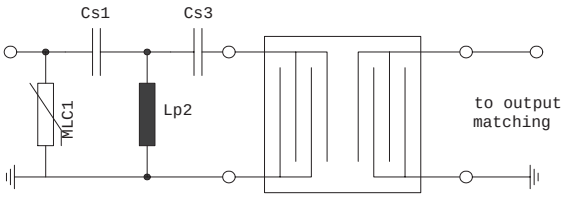


Fig. 1 MLC varistor plus ESD matching

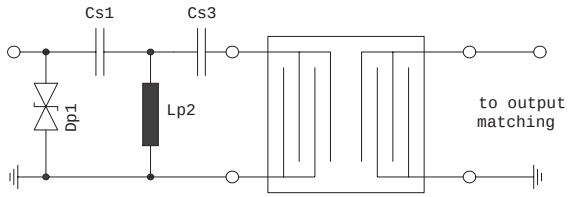


Fig. 2 Suppressor diode plus ESD matching

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

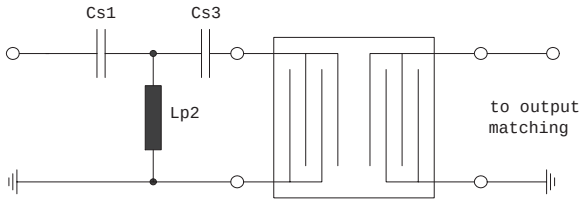


Fig. 3 3rd order high-pass structure for basic ESD protection

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	B4319
Ordering code	B39781B4319P810
Marking and package	C61157-A8-A9
Packaging	F61074-V8212-Z000
Date codes	L_1126
S-parameters	B4319_NB.s2p, B4319_WB.s2p 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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