



SAW Components

SAW 2in1 filter

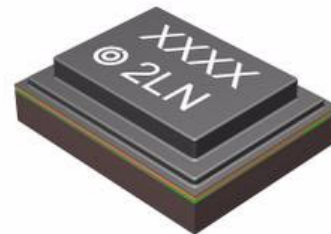
Automotive telematics

Series/type:	B4381
Ordering code:	B39202B4381P810
Date:	May 04, 2012
Version:	2.0

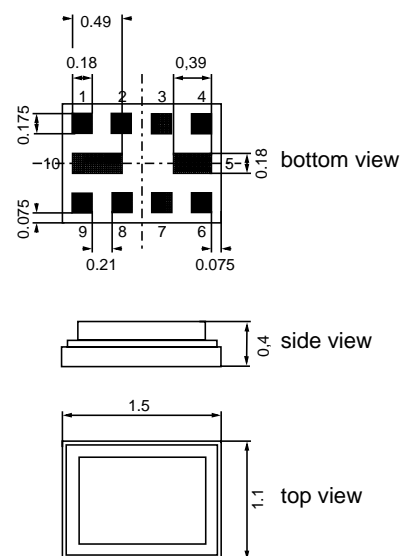
Data sheet


Application

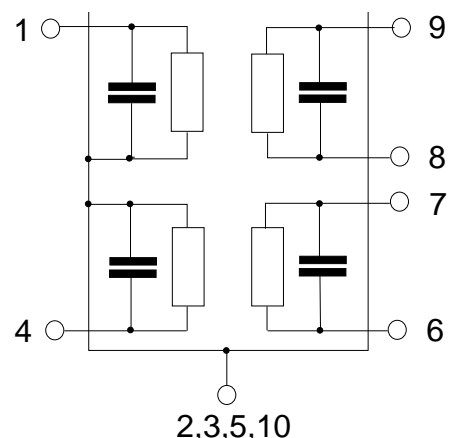
- Low-loss 2in1 RF filter for mobile telephone GSM 1900 and GSM 1800 systems, receive path (Rx)
- Usable passband:
 Filter 1 (GSM 1900): 60 MHz
 Filter 2 (GSM 1800): 75 MHz
- Unbalanced to balanced operation for all filters
- Impedance transformation from 50 Ω to 150 Ω for both filters
- Low amplitude ripple
- Suitable for GPRS class 1 to 12


Features

- Package size 1.5 x 1.1 x 0.40 mm³
- Package code QCS10W
- RoHS compatible
- Approx. weight 0.003 g.
- Package for **Surface Mount Technology (SMT)**
- Ni, gold-plated terminals
- AEC-Q200 qualified component family (operable temperature range -40°C to +85°C)
- **Electrostatic Sensitive Device (ESD)**


Pin configuration

- 1 Input [Filter 1]
- 4 Input [Filter 2]
- 6,7 Output balanced [Filter 2]
- 8,9 Output balanced [Filter 1]
- 2,3,5,10 Case ground



Data sheet


Characteristics of Filter 1 (GSM 1900)

Temperature range for specification: $T = -20\text{ °C to }+75\text{ °C}$
 Terminating source impedance: $Z_S = 50\ \Omega$
 Terminating load impedance: $Z_L = 150\ \Omega \parallel 13\text{ nH (balanced)}$

				LY67A			
				min.	typ. @25°C	max.	
Center frequency	f_C			—	1960.0	—	MHz
Maximum insertion attenuation	α_{\max}			—	1.5 ¹⁾	2.6	dB
		1930.0 ... 1990.0	MHz				
Amplitude ripple (p-p)	$\Delta\alpha$			—	0.5	1.7	dB
		1930.0 ... 1990.0	MHz				
VSWR				—	1.8	2.1	
		1930.0 ... 1990.0	MHz				
Common mode rejection ratio				18	23	—	dB
		1930.0 ... 1990.0	MHz				
Attenuation	α						
		100.0 ... 1510.0	MHz	40	44	—	dB
		1510.0 ... 1830.0	MHz	29	31	—	dB
		1830.0 ... 1850.0	MHz	23	32	—	dB
		1850.0 ... 1890.0	MHz	20	26	—	dB
		1890.0 ... 1910.0	MHz	9	17	—	dB
		2010.0 ... 2070.0	MHz	8	17	—	dB
		2070.0 ... 2400.0	MHz	18	22	—	dB
		2400.0 ... 2500.0	MHz	35	41	—	dB
		2500.0 ... 3860.0	MHz	28	32	—	dB
		3860.0 ... 3980.0	MHz	36	40	—	dB
		3980.0 ... 5790.0	MHz	30	36	—	dB
		5790.0 ... 6000.0	MHz	32	37	—	dB

1) Typical value excluding PCB losses of 0.24 dB.


Maximum ratings of Filter 1

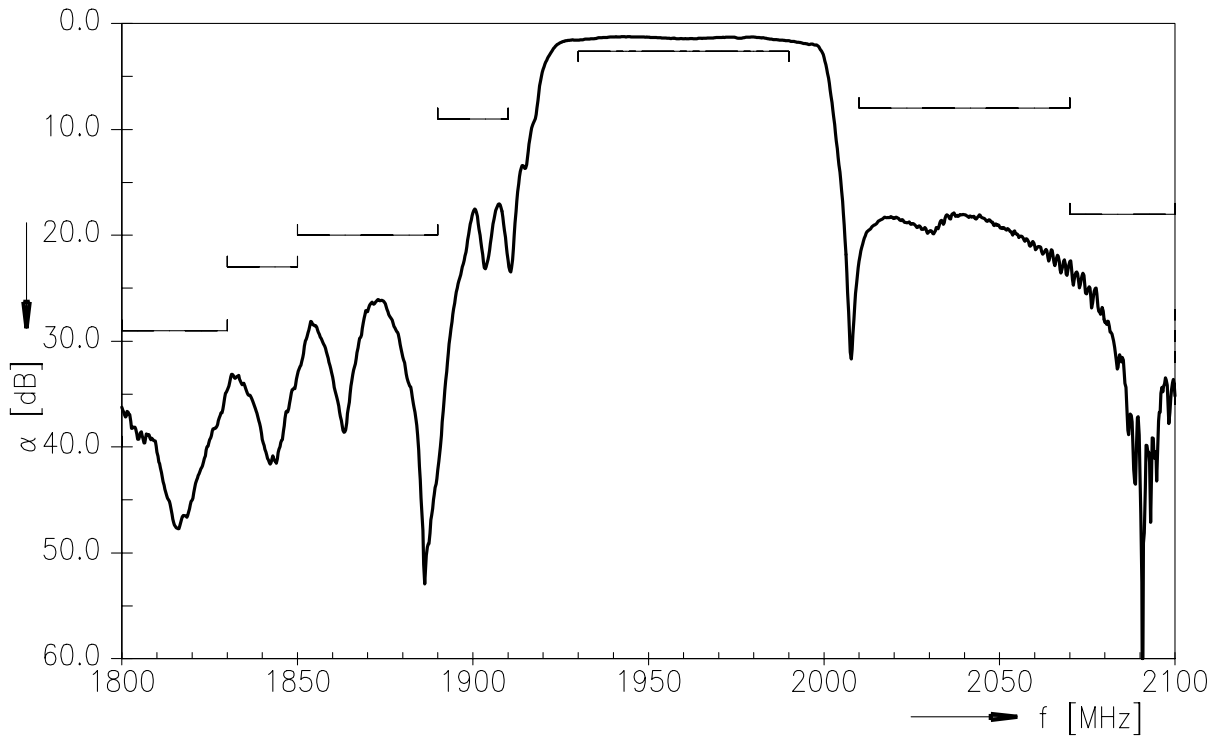
Operable temperature range	T	-40/+85	°C	
Storage temperature range	T _{stg}	-40/+85	°C	
DC voltage	V _{DC}	0	V	
ESD voltage	V _{ESD}	50 ¹⁾	V	machine model, 1 pulse
Input power at				
GSM 850, GSM 900	P _{IN}	15	dBm	effective power in the on-state, duty cycle 4:8
GSM 1800, GSM 1900	P _{IN}	15	dBm	
Tx bands				

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

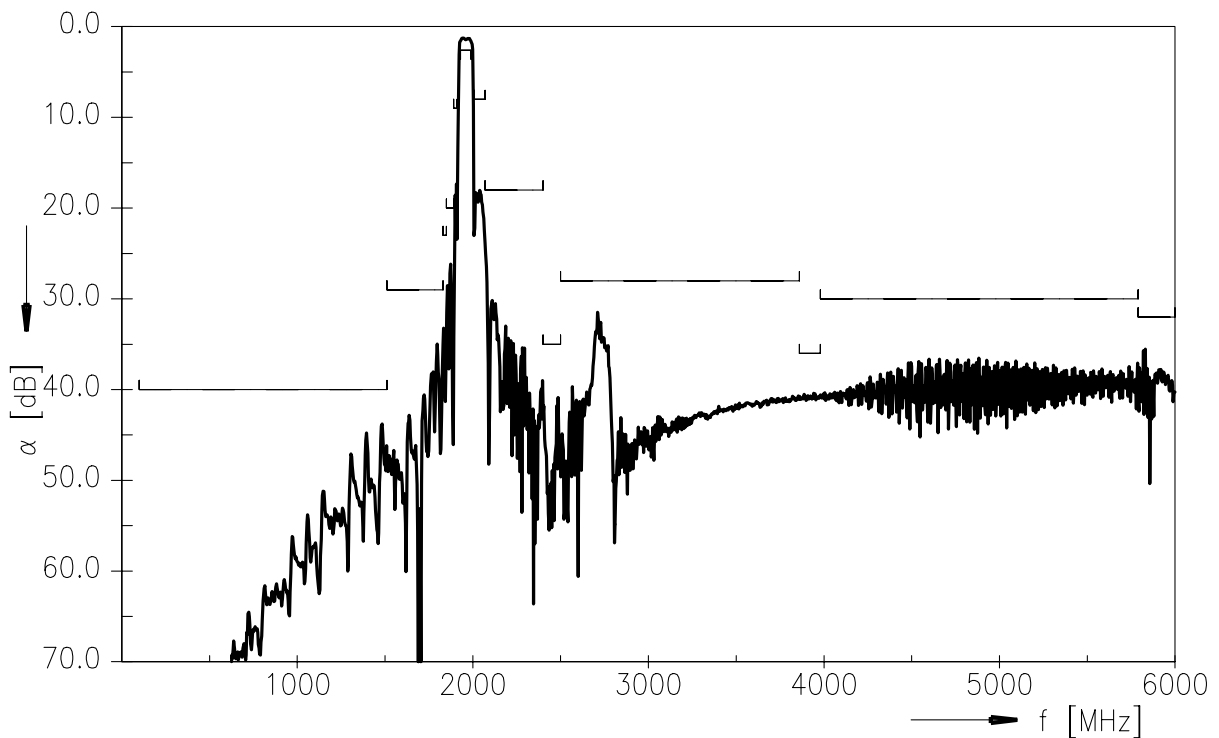
Data sheet



Transfer function of Filter 1



Transfer function of Filter 1 - wideband



Data sheet


Characteristics of Filter 2 (GSM 1800)

Temperature range for specification:	T	=	-20 °C to +75 °C
Terminating source impedance:	Z_S	=	50 Ω
Terminating load impedance:	Z_L	=	150 Ω 15 nH (balanced)

				LY67A			
				min.	typ. @25°C	max.	
Center frequency	f_C	—	1842.5	—	MHz		
Maximum insertion attenuation	α_{max}	1805.0 ... 1880.0 MHz	—	1.5 ¹⁾	2.5		dB
Amplitude ripple (p-p)	$\Delta\alpha$	1805.0 ... 1880.0 MHz	—	0.5	1.8		dB
VSWR		1805.0 ... 1880.0 MHz	—	1.8	2.1		
Common mode rejection ratio		1805.0 ... 1880.0 MHz	18	23	—		dB
Attenuation	α						
		100.0 ... 940.0 MHz	45	54	—		dB
		940.0 ... 1705.0 MHz	28	39	—		dB
		1705.0 ... 1785.0 MHz	10	17	—		dB
		1920.0 ... 1990.0 MHz	17	23	—		dB
		1990.0 ... 2030.0 MHz	24	29	—		dB
		2030.0 ... 2400.0 MHz	25	32	—		dB
		2400.0 ... 2500.0 MHz	32	38	—		dB
		2500.0 ... 2775.0 MHz	28	31	—		dB
		2775.0 ... 2880.0 MHz	38	44	—		dB
		2880.0 ... 3610.0 MHz	28	43	—		dB
		3610.0 ... 3760.0 MHz	38	42	—		dB
		3760.0 ... 5415.0 MHz	28	36	—		dB
		5415.0 ... 5640.0 MHz	32	36	—		dB
		5640.0 ... 6000.0 MHz	28	36	—		dB

1) Typical value excluding PCB losses of 0.24 dB.


Maximum ratings of Filter 2

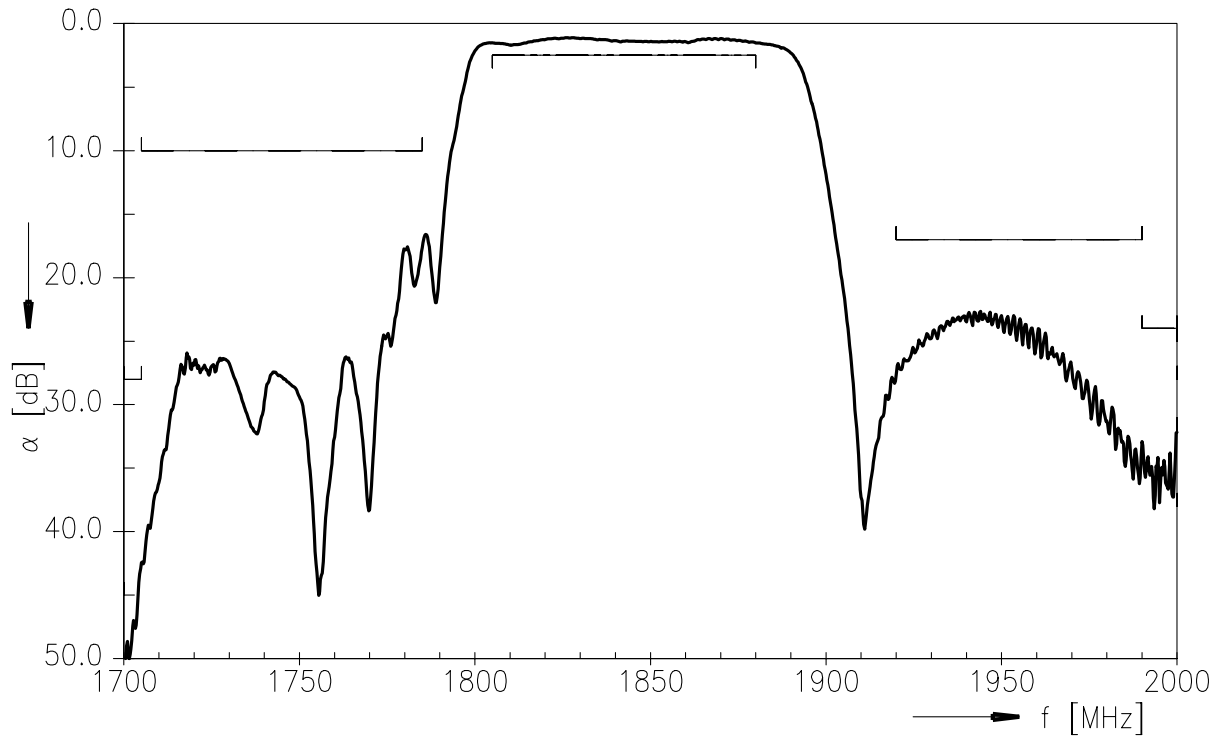
Operable temperature range	T	-40/+85	°C	
Storage temperature range	T _{stg}	-40/+85	°C	
DC voltage	V _{DC}	0	V	
ESD voltage	V _{ESD}	50 ¹⁾	V	machine model, 1 pulse
Input power at				
GSM 850, GSM 900	P _{IN}	15	dBm	effective power in the on-state, duty cycle 4:8
GSM 1800, GSM 1900	P _{IN}	15	dBm	

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

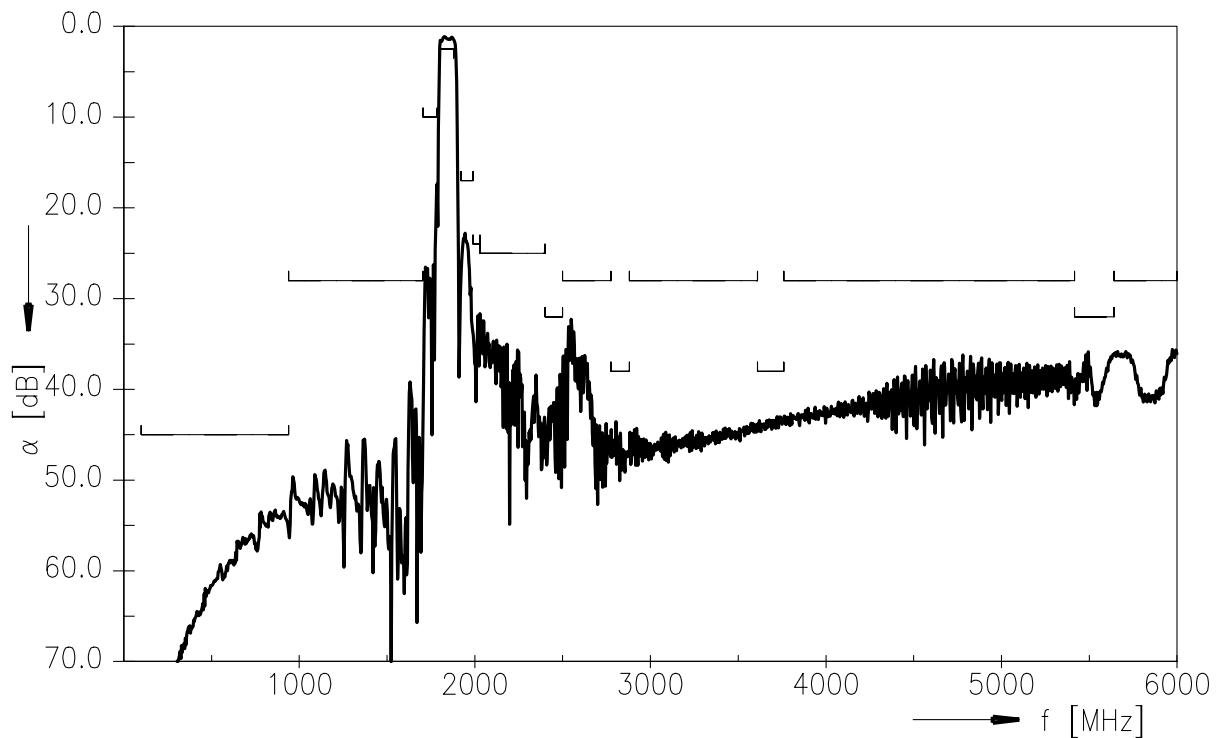
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Transfer function of Filter 2



Transfer function of Filter 2 - wideband





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.

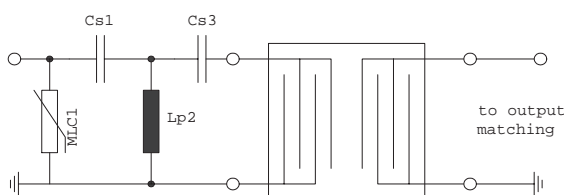


Fig. 1 MLC varistor plus ESD matching

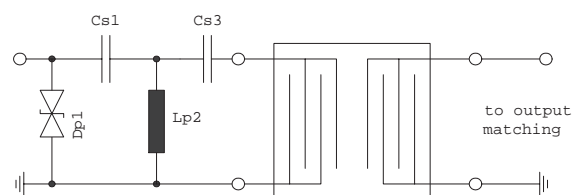


Fig. 2 Suppressor diode plus ESD matching

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

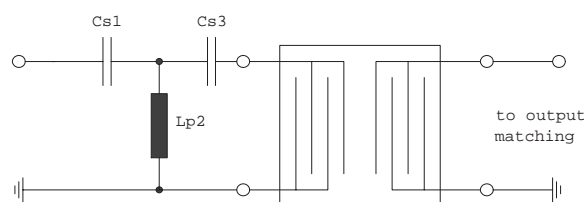


Fig. 3 3rd order high-pass structure for basic ESD protection

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”.

Data sheet


References

Type	B4381
Ordering code	B39202B4381P810
Marking and package	C61157-A8-A10
Packaging	F61074-V8227-Z000
Date codes	L_1126
S-parameters	B4381_LB_NB.s3p, B4381_LB_WB.s3p B4381_UB_NB.s3p, B4381_UB_WB.s3p 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."
Moldability	Before using in overmolding environment, please contact your EPCOS sales office.
Matching coils	See Inductor pdf-catalog http://www.tdk.co.jp/tefe02/coil.htm#aname1 and Data Library for circuit simulation http://www.tdk.co.jp/etvcl/index.htm

For further information please contact your local EPCOS sales office or visit our webpage at www.epcos.com .

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