SAW Components

SAW filter

Short range devices

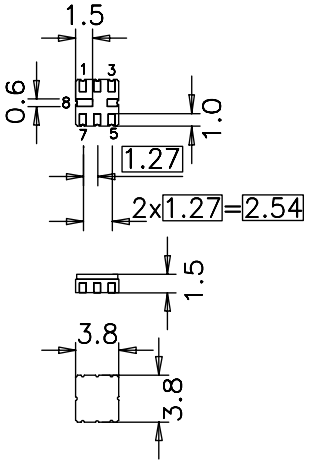
Series/type:	**B3791**
Ordering code:	**B39431B3791Z810**
Date:	December 13, 2006
Version:	2.1

Application

- Low-loss RF filter for remote control receivers
- Balanced and unbalanced operation possible

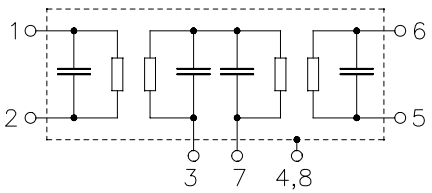
Features

- Package size 3.8 x 3.8 x 1.5 mm^3
- Package code QCC8B
- RoHS compatible
- Approximate weight 0.07 g
- Package for **S**urface **M**ount **T**echnology (**SMT**)
- Ni, gold-plated terminals
- Lead free soldering compatible with J - STD20C
- Passivation layer Elpas
- AEC-Q200 qualified component family
- **E**lectrostactic **S**ensitive **D**evice (**ESD**)



Pin configuration[1)]

- 1 Input ground (recommended) or input
- 2 Input (recommended) or input ground
- 5 Output (recommended) or output ground
- 6 Output ground (recommended) or output
- 7 External coupling coil
- 4,8 Case - ground
- 3 To be grounded



1) The recommended pin configuration usually offers best suppression of electrical crosstalk. The filter characteristics refer to this configuration.

Characteristics

Temperature range for specification: T = –20 ˚C to +80 ˚C
Terminating source impedance: Z_S = 50 Ω and matching network
Terminating load impedance: Z_L = 50 Ω and matching network

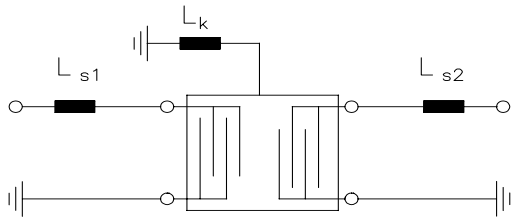
		min.	typ. @ 25 ˚C	max.	
Center frequency	f_C	—	433.42	—	MHz
Minimum insertion attenuation	α_{min}				
incl. loss in matching elements (Q_L = 47)		—	3.8	4.5	dB
excl. loss in matching elements		—	3.1	3.8	dB
Pass band (relative to α_{min})					
433.30 ... 433.54 MHz		—	1.0	3.0	dB
Relative attenuation (relative to α_{min})	α_{rel}				
10.00 ... 429.00 MHz		50	55	—	dB
429.00 ... 432.62 MHz		35	44	—	dB
433.92 ... 434.22 MHz		16	25	—	dB
434.22 ... 434.60 MHz		35	38	—	dB
434.60 ... 435.60 MHz		20	25	—	dB
435.60 ... 460.00 MHz		40	50	—	dB
460.00 ... 1000.00 MHz		50	58	—	dB
Impedance for pass band matching[1)]					
Input: $Z_{IN} = R_{IN} \parallel C_{IN}$		—	640 ‖ 1.5	—	Ω ‖ pF
Output: $Z_{OUT} = R_{OUT} \parallel C_{OUT}$		—	640 ‖ 1.5	—	Ω ‖ pF

1) Impedance for passband matching bases on an ideal, perfect matching of the SAW filter to source- and to load impedance (here 50 Ohm). After removal of the SAW filter the input impedance of the input and output matching network is calculated. The conjugate complex value of these characteristic impedances are the input and output impedances for flat passband. For more details we refer to EPCOS application note #4.

Maximum ratings

Operable temperature range	T	–20/+80	˚C	
Storage temperature range	T_{stg}	–45/+120	˚C	
DC voltage	V_{DC}	6	V	
Source power	P_S	5	dBm	source impedance 50 Ω

Matching network to 50 Ω (element values depend on pcb layout and equivalent circuit)



L_{s1} = 56 nH
L_{s2} = 56 nH
L_k = 47 nH

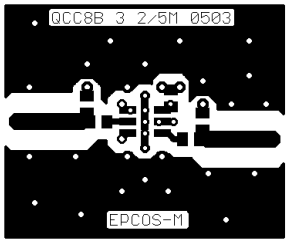
Minimising the crosstalk

For a good ultimate rejection a low crosstalk is necessary. Low crosstalk can be realised with a good RF layout. The major crosstalk mechanism is caused by the “ground-loop” problem.

Grounding loops are created if input-and output transducer GND are connected on the top-side of the PCB and fed to the system grounding plane by a common via hole. To avoid the common ground path, the ground pin of the input- and output transducer are fed to the system ground plane (bottom PCB plane) by their own via hole. The transducers’ grounding pins should be isolated from the upper grounding plane.

A common GND inductivity of 0.5nH degrades the ultimate rejection (crosstalk) by 20dB.

The optimised PCB layout, including matching network for transformation to 50 Ohm, is shown here. In this PCB layout the grounding loops are minimised to realise good ultimate rejection

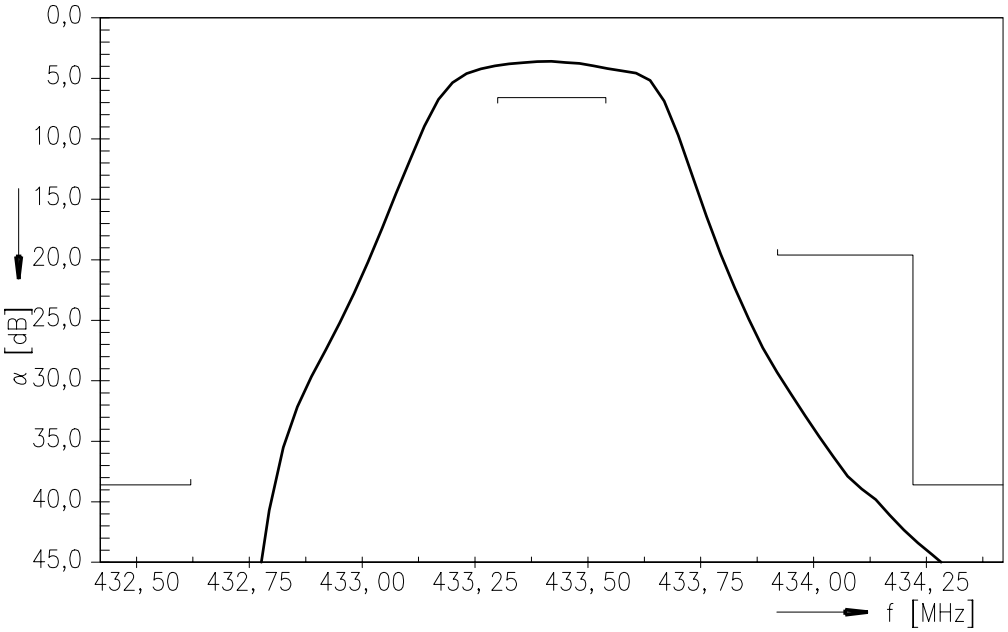


Optimised PCB layout for SAW filters in QCC8B package, pinning 2,5 (top side, scale 1:1)

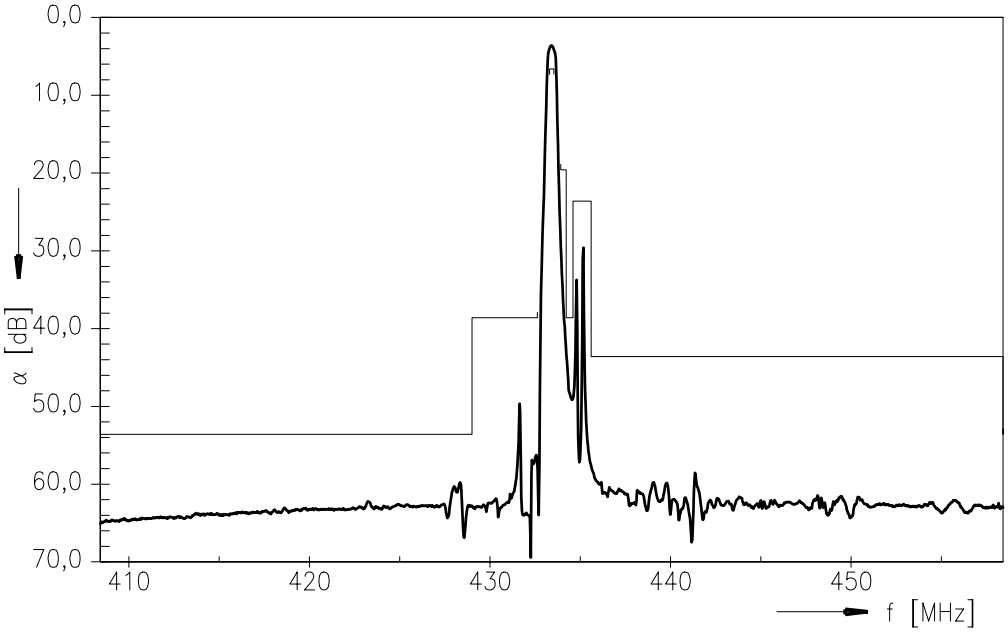
The bottom side is a copper plane (system ground area). The input and output grounding pins are isolated and connected to the common ground by separated via holes.

For good contact of the upper grounding area with the lower side it is necessary to place enough via holes.

Transfer function



Transfer function (wideband)



References

Type	B3791
Ordering code	B39431B3791Z810
Marking and package	C61157-A7-A46
Packaging	F61074-V8167-Z000
Date codes	L_1126
S-parameters	B3791_SB.s2p B3791_WB.s2p
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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