Preliminary Data Sheet

Microwave Ceramics

2-Pole Filter for DAB

1472 MHz SMD B69812-N1477-A540

Index

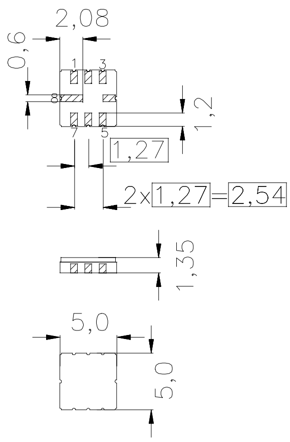
Revision History

Issue	Detail of change	Date	Name
P3		03.07.97	Salz
P4	Component drawing, recommended footprint, tape	24.10.97	Salz

SAW Components

Data Sheet B3550

Ceramic package **QCC8C**



typ. dimensions in mm, approx. weight 0,1 g

Features

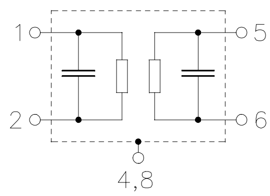
- RF low-loss filter for remote control receivers
- Package for **S**urface **M**ounted **T**echnology (**SMT**)
- Balanced and unbalanced operation possible

Terminals

- Ni, gold plated

Pin configuration

1	Input Ground
2	Input
5	Output
6	Output Ground
4,8	Case - Ground
3,7	to be grounded



Type	**Ordering code**	**Marking and package according to**	**Packing according to**
B3550	B39431-B3550-U310	C61157-A7-A56	F61074-V8070-Z000

Electrostactic **S**ensitive **D**evice (**ESD**)

Maximum ratings

Operable temperature range	T_A	–45/+120	˚C	
Storage temperature range	T_{stg}	–45/+120	˚C	
DC voltage	V_{DC}	0	V	
Source power	P_S	10	dBm	source impedance 50 Ω

Characteristics

Reference temperature: T_A = 25 °C
Terminating source impedance: Z_S = 50 Ω and matching network t. b. d.
Terminating load impedance: Z_L = 50 Ω and matching network t. b. d.

		min.	typ.	max.	
Center frequency (center frequency between 3 dB points)	f_C	—	433,96	—	MHz
Minimum insertion attenuation	α_{min}				
433,80 ... 434,12 MHz		—	2,0	3,5	dB
Pass band (relative to α_{min})					
433,76 ... 434,16 MHz		—	1,0	2,0	dB
433,74 ... 434,18 MHz		—	1,0	3,0	dB
433,68 ... 434,24 MHz		—	1,5	6,0	dB
Relative attenuation (relative to α_{min})	α_{rel}				
10,00 ... 414,00 MHz		45	50	—	dB
414,00 ... 428,00 MHz		40	45	—	dB
428,00 ... 432,92 MHz		15	20	—	dB
434,92 ... 442,00 MHz		10	15	—	dB
442,00 ... 550,00 MHz		35	40	—	dB
550,00 ...1000,00 MHz		45	50	—	dB
Impedance for pass band matching 2)					
Input: $Z_{IN} = R_{IN} \parallel C_{IN}$		—	270 ‖ 2,67	—	Ω ‖ pF
Output: $Z_{OUT} = R_{OUT} \parallel C_{OUT}$		—	250 ‖ 3,20	—	Ω ‖ pF
Temperature coefficient of frequency 1)	TC_f	—	–0,03	—	ppm/K^2
Frequency inversion point	T_0	10	—	30	°C

1) Temperature dependence of f_C: $f_C(T_A) = f_C(T_0)\,(1 + TC_f(T_A - T_0)^2)$

2) Impedance for passband matching bases on an ideal, perfect matching of the SAW filter to source- and to load impedance (here 50 Ohm). After the SAW filter is removed and input impedance into the input matching / 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.

Characteristics

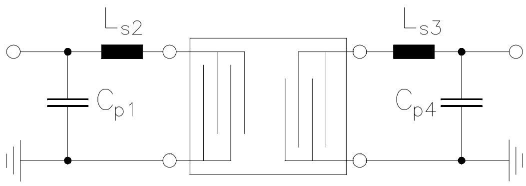
Reference temperature: T_A = –45 ... 95˚C
Terminating source impedance: Z_S = 50 Ω and matching network
Terminating load impedance: Z_L = 50 Ω and matching network

		min.	typ.	max.	
Center frequency (center frequency between 3 dB points)	f_C	—	433,92	—	MHz
Minimum insertion attenuation	α_{min}				
433,80 ... 434,12 MHz		—	2,0	4,0	dB
Pass band (relative to α_{min})					
433,76 ... 434,08 MHz		—	1,0	2,0	dB
433,74 ... 434,10 MHz		—	1,0	3,0	dB
433,68 ... 434,16 MHz		—	1,5	6,0	dB
Pass bandwidth					
$\alpha_{rel} \leq 3$ dB		0,67	0,73	0,79	MHz
Relative attenuation (relative to α_{min})	α_{rel}				
10,00 ... 414,00 MHz		45	50	—	dB
414,00 ... 428,00 MHz		40	45	—	dB
428,00 ... 432,84 MHz		15	20	—	dB
434,92 ... 442,00 MHz		10	15	—	dB
442,00 ... 550,00 MHz		35	40	—	dB
550,00 ...1000,00 MHz		45	50	—	dB
Impedance for pass band matching 2)					
Input: $Z_{IN} = R_{IN} \parallel C_{IN}$		—	270 ‖ 2,67	—	Ω ‖ pF
Output: $Z_{OUT} = R_{OUT} \parallel C_{OUT}$		—	250 ‖ 3,20	—	Ω ‖ pF

2) Impedance for passband matching bases on an ideal, perfect matching of the SAW filter to source- and to load impedance (here 50 Ohm). After the SAW filter is removed and input impedance into the input matching / 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.

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



C_{p1} = 5,6 pF
L_{s2} = 33 nH
L_{s3} = 33 nH
C_{p4} = 5,6 pF

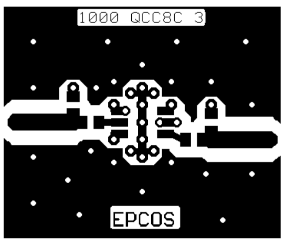
<u>Minimising the crosstalk</u>

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.

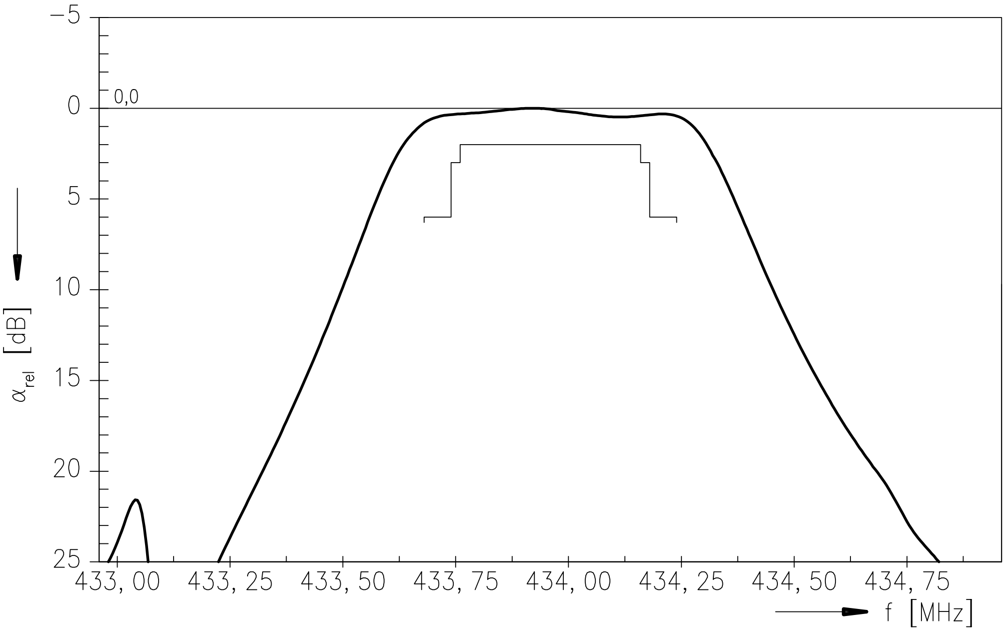


Optimised PCB layout for SAW filters in QCC8C package, pinning 2,5 (top side, scale 1:1)

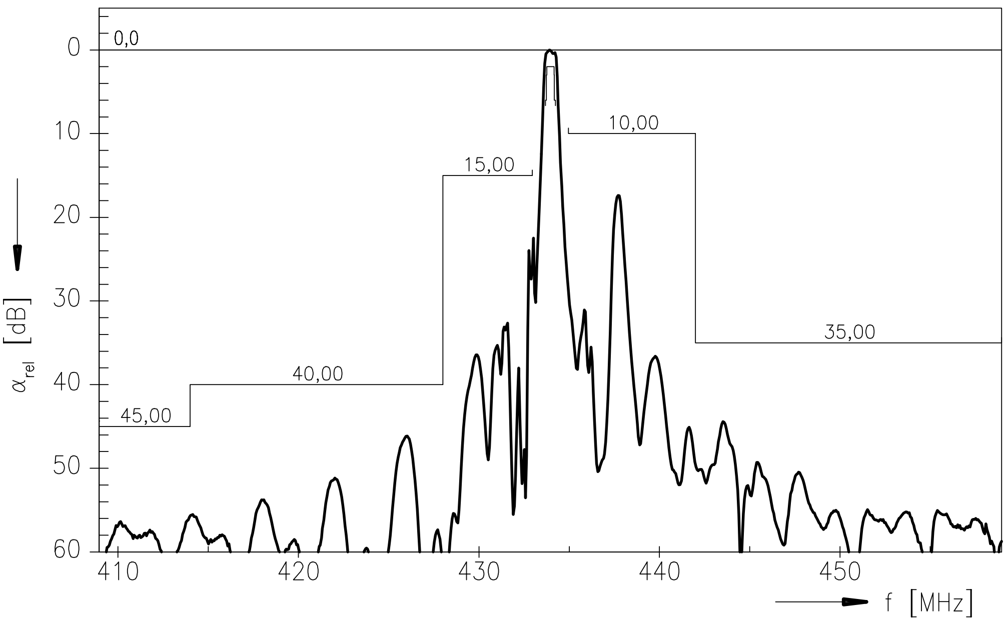
The bottom side is a copper plane (system ground area). The input and output grounding pins are isolated and connected to the common ground by separated via holes.

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

Normalized frequency response



Normalized frequency response (wideband)



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SAW Components

Data Sheet R 708

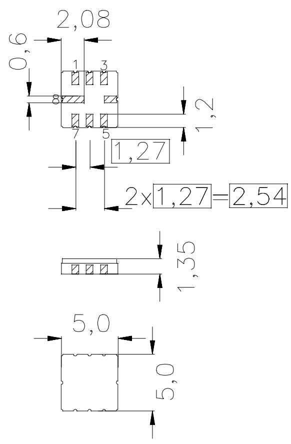
Ceramic package **QCC8C**

Features

- 1-port resonator
- Provides reliable, fundamental mode, quartz frequency stabilization i.e. in transmitters or local oscillators

Terminals

- Ni, gold plated



Dimensions in mm, approx. weight 0,1 g

Pin configuration

2	Input
6	Output, grounded in 1-port conf.
4,8	Ground (case)
1,3	float
5,7	float / ground

Type	Ordering code	Marking and Package
		according to
		according to

Electrostatic **S**ensitive **D**evice (**ESD**)

Characteristics

Reference temperature: T_A = 25 ˚C
Terminating source impedance: Z_S = 50 Ω
Terminating load impedance: Z_L = 50 Ω

		min.	typ.	max.	
Center frequency [1]	f_c	433,345	433,42	433,52	MHz
Minimum insertion attenuation	α_{min}	—	1,2	1,8	dB
Unloaded quality factor	Q_U	6000	12500	—	
Ageing of f_c		—	—	± 50	ppm
Equivalent circuit elements					
Motional capacitance	C_1	—	1,98	—	fF
Motional inductance	L_1	—	68,1	—	µH
Motional resistance	R_1	—	14	—	Ω
Parallel capacitance [2]	C_0	—	3,4	—	pF
Temperature coefficient of frequency [3]	TC_f	—	– 0,03	—	ppm/K²
Turnover temperature	T_0	0	—	30	˚C

[1] Center frequency is defined as maximum of the real part of the admittance

[2] If used in two port configuration (pin 2-input, pin 6-output) C_0 is reduced by approx. 0,3 pF.

[3] Temperature dependence of f_c: $f_c(T_A) = f_c(T_0)(1 + TC_f(T_A - T_0)^2)$

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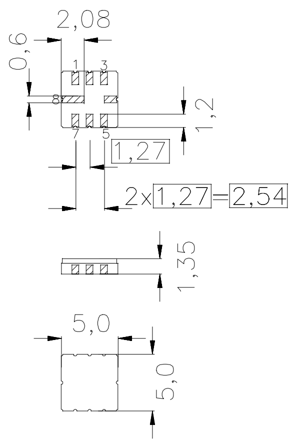
SAW Components

Data Sheet R 706

Data Sheet

Ceramic package **QCC8C**



Dimensions in mm, approx. weight 0,1 g

Features

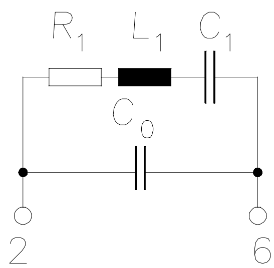
- 1-port resonator
- Provides reliable, fundamental mode, quartz frequency stabilization i.e. in transmitters or local oscillators

Terminals

- Ni, gold plated

Pin configuration

2	Input
6	Output, grounded in 1-port conf.
4,8	Ground (case)
1,3	float
5,7	float / ground



Type	Ordering code	Marking and Package according to	Packing according to
R 706	B39311-R 706-U310	C61157-A7-A56	F61074-V8070-Z000

Electrostatic **S**ensitive **D**evice (**ESD**)

Maximum ratings

Operable temperature range	T_A	–45/+120	˚C	
Storage temperature range	T_{stg}	–45/+120	˚C	
DC voltage	V_{DC}	12	V	between any terminals
Source power	P_s	0	dBm	

Characteristics

Reference temperature: T_A = 25 ˚C
Terminating source impedance: Z_S = 50 Ω
Terminating load impedance: Z_L = 50 Ω

		min.	typ.	max.	
Center frequency [1]	f_c	314,415	314,5	304,600	MHz
Minimum insertion attenuation	α_{min}	—	1,5	2,0	dB
Unloaded quality factor	Q_U	8000	16000	—	
Ageing of f_c		—	—	± 50	ppm
Equivalent circuit elements					
Motional capacitance	C_1	—	1,939	—	fF
Motional inductance	L_1	—	132,1	—	µH
Motional resistance	R_1	—	19	—	Ω
Parallel capacitance [2]	C_0	—	3,2	—	pF
Temperature coefficient of frequency [3]	TC_f	—	– 0,03	—	ppm/K²
Turnover temperature	T_0	25	—	55	˚C

[1] Center frequency is defined as maximum of the real part of the admittance

[2] If used in two port configuration (pin 2-input, pin 6-output) C_0 is reduced by approx. 0,3 pF.

[3]Temperature dependence of f_c: $f_c(T_A) = f_c(T_0)(1 + TC_f(T_A - T_0)^2)$

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SAW Components

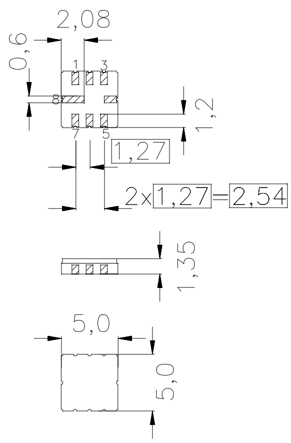
Data Sheet R 705

SAW Components R 705

Resonator 315,00 MHz

Data Sheet

Ceramic package **QCC8C**



Dimensions in mm, approx. weight 0,1 g

Features

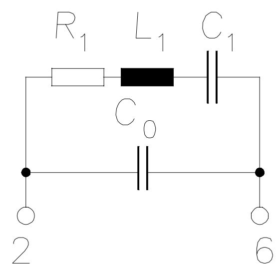
- 1-port resonator
- Provides reliable, fundamental mode, quartz frequency stabilization i.e. in transmitters or local oscillators

Terminals

- Ni, gold plated

Pin configuration

2	Input
6	Output, grounded in 1-port conf.
4,8	Ground (case)
1,3	float
5,7	float / ground



Type	Ordering code	Marking and Package according to	Packing according to
R 705	B39321-R 705-U310	C61157-A7-A56	F61074-V8070-Z000

Electrostatic **S**ensitive **D**evice (**ESD**)

Maximum ratings

Operable temperature range	T_A	–45/+120	˚C	
Storage temperature range	T_{stg}	–45/+120	˚C	
DC voltage	V_{DC}	12	V	between any terminals
Source power	P_s	0	dBm	

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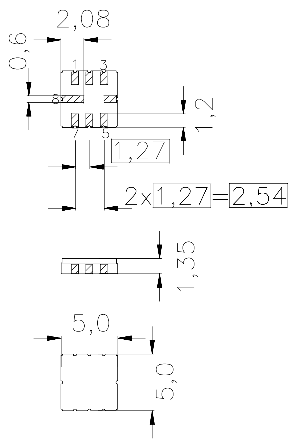
SAW Components

Data Sheet R 2709

SAW Components | R 2709
Resonator | 868,30 MHz

Data Sheet

SMD Ceramic package **QCC8C**



Dimensions in mm, approx. weight 0,1 g

Features

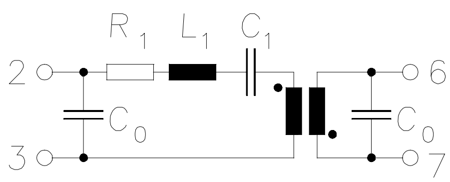
- 2-port resonator
- nominal 180˚-phase at resonance
- Provides reliable, fundamental mode, quartz frequency stabilization i.e. in transmitters or local oscillators

Terminals

- Ni, gold plated

Pin configuration

2	Input / Ouptput
6	Output / Input
7	Ground (Input / Output)
3	Ground (Output / Input)
4,8	Ground (case)



Type	Ordering code	Marking and Package according to	Packing according to
R2709	B39871-R2709-U310	C61157-A7-A56	F61074-V8070-Z000

Electrostatic **S**ensitive **D**evice (**ESD**)

Maximum ratings

Operable temperature range	T_A	–45/+85	˚C	
Storage temperature range	T_{stg}	–45/+85	˚C	
DC voltage	V_{DC}	0	V	between any terminals
Source power	P_s	0	dBm	

Characteristics

Reference temperature:	T_A	$= 25\,^\circ C$
Terminating Source impedance:	Z_S	$= 50\ \Omega$
Terminating Load impedance:	Z_L	$= 50\ \Omega$

		min.	typ.	max.	
Center frequency (center frequency between 3 dB points)	f_c	868,10	868,30	868,50	MHz
Minimum insertion attenuation	α_{min}	—	7,0	9,0	dB
Phase at f_c	φ	—	130	—	° el.
Loaded quality factor	Q_L	3000	3600	—	
Unloaded quality factor	Q_U	5500	6600	—	
Ageing of f_c		—	—	–10/+40	ppm
Equivalent circuit elements					
Motional capacitance	C_1	—	0,279	—	fF
Motional inductance	L_1	—	120,4	—	µH
Motional resistance	R_1	—	100	—	Ω
Input / Output capacitance	C_0	—	1,9	—	pF
Temperature coefficient of frequency [1)]	TC_f	—	–0,03	—	ppm/K^2
Turnover temperature	T_0	15	—	35	°C

[1)] Temperature dependence of f_c: $f_c(T_A) = f_c(T_0)(1 + TC_f(T_A - T_0)^2)$

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SAW Components

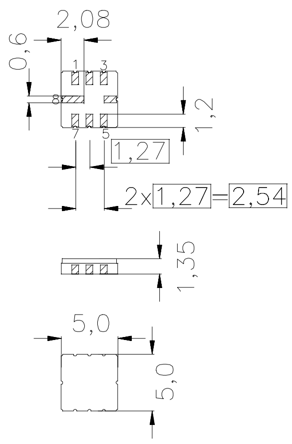
Data Sheet R 2706

SAW Components — R 2706

Resonator — 915,00 MHz

Data Sheet

SMD Ceramic package **QCC8C**



Dimensions in mm, approx. weight 0,1 g

Features

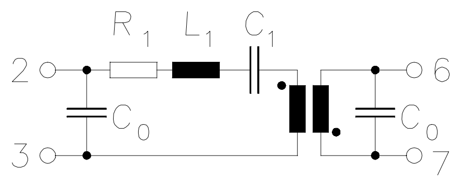
- 2-port resonator
- nominal 180˚-phase at resonance
- Provides reliable, fundamental mode, quartz frequency stabilization i.e. in transmitters or local oscillators

Terminals

- Ni, gold plated

Pin configuration

2	Input / Ouptput
6	Output / Input
7	Ground (Input / Output)
3	Ground (Output / Input)
4,8	Ground (case)



Type	Ordering code	Marking and Package according to	Packing according to
R2706	B39921-R2706-U310	C61157-A7-A56	F61074-V8070-Z000

Electrostatic **S**ensitive **D**evice (**ESD**)

Maximum ratings

Operable temperature range	T_A	–45/+85	˚C	
Storage temperature range	T_{stg}	–45/+85	˚C	
DC voltage	V_{DC}	0	V	between any terminals
Source power	P_s	0	dBm	

Characteristics

Reference temperature: T_A = 25 ˚C
Terminating Source impedance: Z_S = 50 Ω
Terminating Load impedance: Z_L = 50 Ω

		min.	typ.	max.	
Center frequency (center frequency between 3 dB points)	f_c	914,65	915,00	915,35	MHz
Minimum insertion attenuation	α_{min}	—	7,0	9,0	dB
Phase at f_c	φ	—	130	—	˚ el.
Loaded quality factor	Q_L	3500	4300	—	
Unloaded quality factor	Q_U	6000	7600	—	
Ageing of f_c		—	—	± 50	ppm
Equivalent circuit elements					
Motional capacitance	C_1	—	0,225	—	fF
Motional inductance	L_1	—	134,5	—	µH
Motional resistance	R_1	—	100	—	Ω
Input / Output capacitance	C_0	—	1,9	—	pF
Temperature coefficient of frequency [1]	TC_f	—	–0,03	—	ppm/K²
Turnover temperature	T_0	0	—	30	˚C

[1] Temperature dependence of f_c: $f_c(T_A) = f_c(T_0)(1 + TC_f(T_A - T_0)^2)$

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SAW Components

Data Sheet R 2701

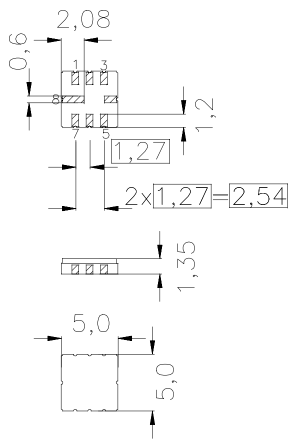
SMD Ceramic package **QCC8C**

Features

- 2-port resonator
- nominal 180˚-phase at resonance
- Provides reliable, fundamental mode, quartz frequency stabilization i.e. in transmitters or local oscillators

Terminals

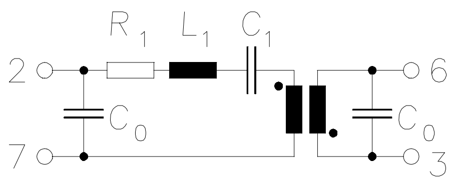
- Ni, gold plated



Dimensions in mm, approx. weight 0,1 g

Pin configuration

2	Input / Ouptput
6	Output / Input
7	Ground (Input / Output)
3	Ground (Output / Input)



Type	Ordering code	Marking and Package according to	Packing according to
R2701	B39431-R2701-U310	C61157-A7-A56	F61074-V8070-Z000

Electrostatic **S**ensitive **D**evice (**ESD**)

Maximum ratings

Operable temperature range	T_A	–45/+85	˚C	
Storage temperature range	T_{stg}	–45/+85	˚C	
DC voltage	V_{DC}	12	V	between any terminals
Source power	P_s	0	dBm	

Data Sheet

Characteristics

Reference temperature: T_A = 25 ˚C
Terminating Source impedance: Z_S = 50 Ω
Terminating Load impedance: Z_L = 50 Ω

		min.	typ.	max.	
Center frequency	f_c	433,845	433,920	433,995	MHz
(center frequency between 3 dB points)					
Minimum insertion attenuation	α_{min}	—	9,2	10,5	dB
Phase at f_c	φ	—	160	—	˚ el.
Loaded quality factor	Q_L	5000	7800	—	
Unloaded quality factor	Q_U	8000	11200	—	
Ageing of f_c		—	—	±50	ppm
Equivalent circuit elements					
Motional capacitance	C_1	—	0,141	—	fF
Motional inductance	L_1	—	954	—	µH
Motional resistance	R_1	—	230	—	Ω
Input / Output capacitance	C_0	—	2,3	—	pF
Temperature coefficient of frequency 1)	TC_f	—	–0,03	—	ppm/K^2
Turnover temperature	T_0	—	40	—	˚C

1) Temperature dependence of f_c: $f_c(T_A) = f_c(T_0)(1 + TC_f(T_A - T_0)^2)$

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Siemens Matsushita Components

Preliminary Data Sheet

Microwave Ceramics

2-Pole Filter for W-LAN

2.45 GHz SMD B69812-N2457-D501

Index

Revision History

Issue	Detail of change	Date	Name
P1		09.07.98	Salz
P2	Change of passband	02.09.98	Salz
P3	Center frequency	09.12.98	Salz

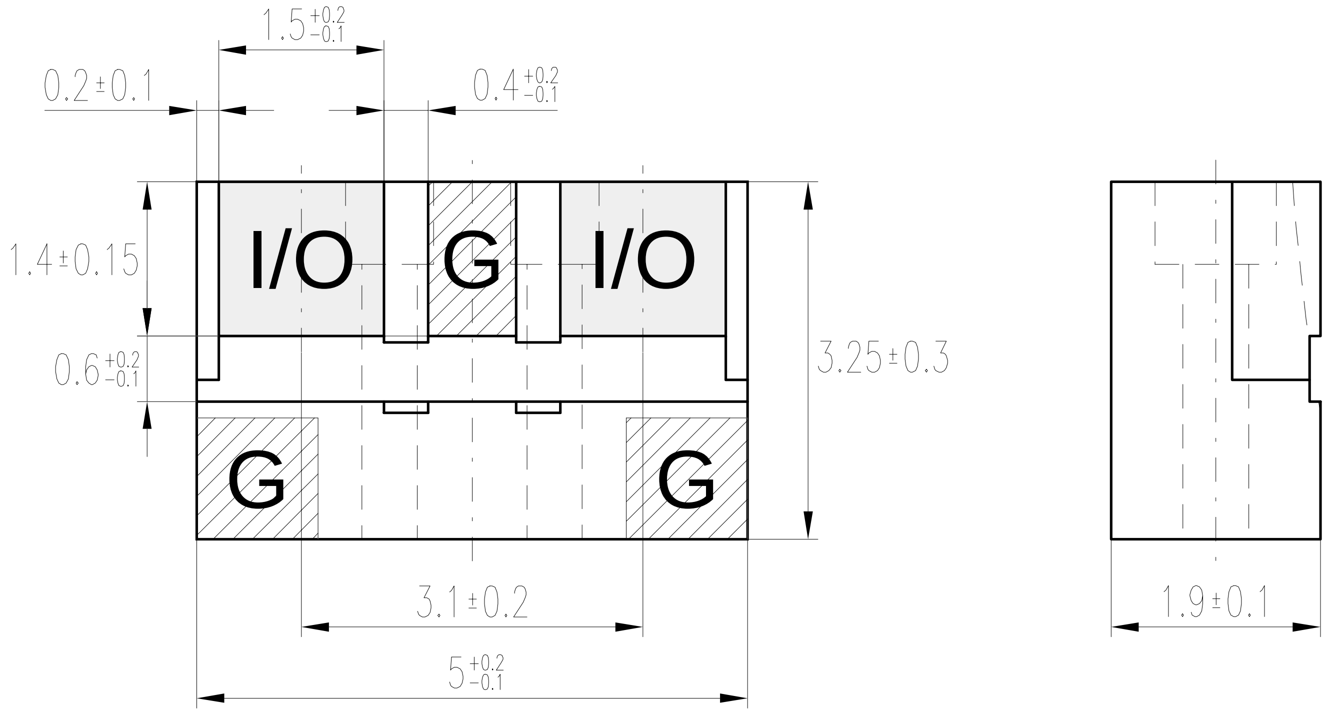
Application

- RF filter for W-LAN (Wireless Local Area Network)

Features

- SMD filter consisting of coupled resonators with stepped impedances
- $(NdBa)TiO_3$ (ε_r = 88 / TC_f =0±10 ppm/K) with a coating of copper (10µm) and tin (>5µm)
- Excellent reflow solderability, no migration effect due to copper/tin metallization

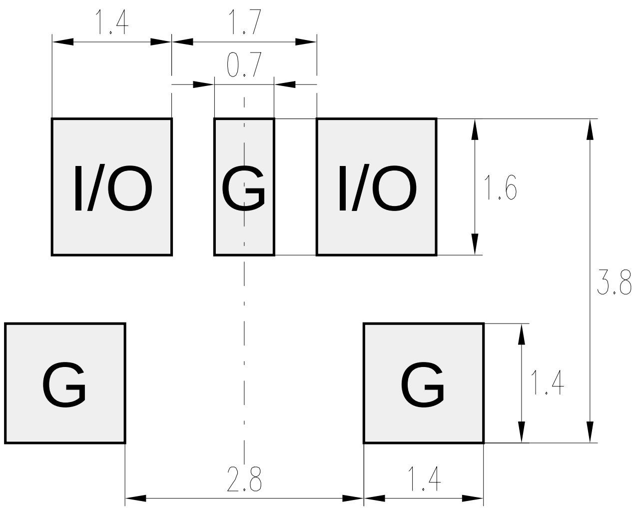
Component drawing



View from below onto the solder terminals and view from beside

S2I211.DOC

Recommended footprint



FPS3I211.DOC

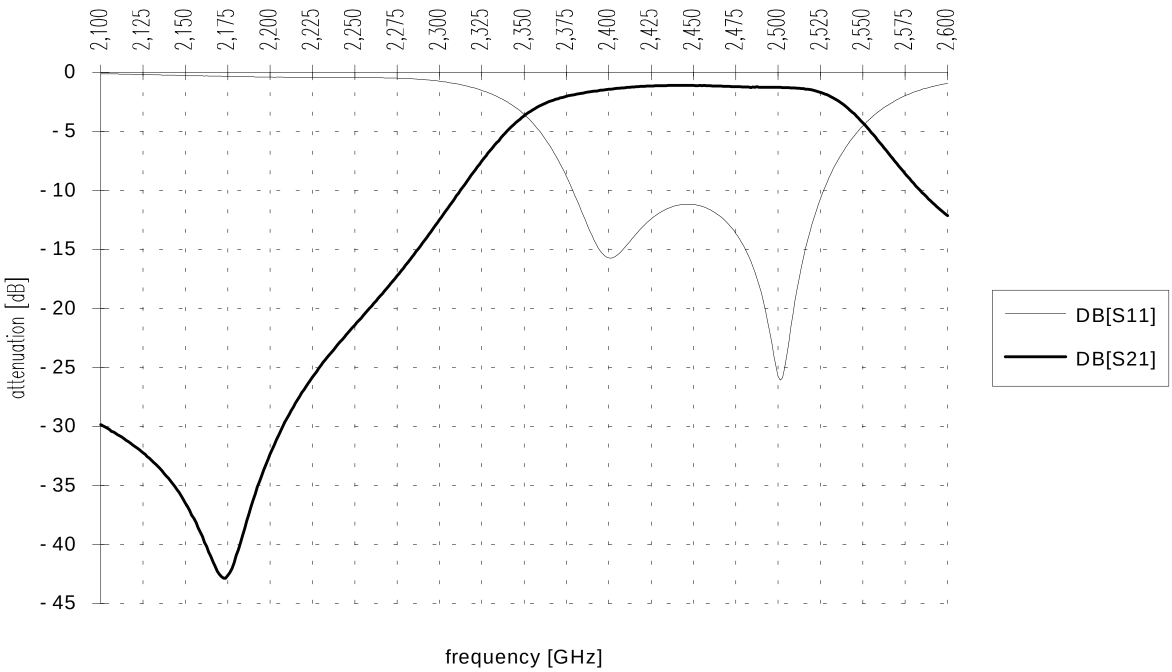
Characteristics

		min.	typ.	max.	
Center frequency	f_C	-	2.4415	-	GHz
Insertion loss	α_{IL}		0.6	1.3	dB
Passband	B	83			MHz
Amplitude ripple (peak - peak)	$\Delta\alpha$		0.4	0.8	dB
Standing wave ratio	SWR		1.5	2.0	
Impedance	Z		50		Ω
Attenuation at 2150 MHz	α	35	40		dB

Maximum ratings

IEC climatic category (IEC 68-1)		- 40/+ 90/56	
Operating temperature	T_{op}	- 20 / + 85	°C

Typical passband characteristic



S2I211.DOC

Processing information

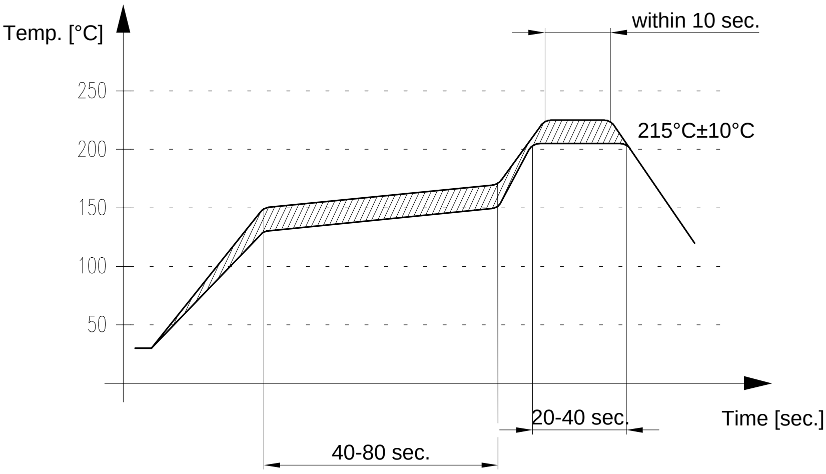
ZNr.: 368 (FILT95_2)

- Wettability to IEC 68-2-58: ≥ 75% (after aging)

Soldering requirements

Soldering type	reflow	
Maximum soldering temperature (measuring point on top surface of the component)	235 (max. 2 sec.) 225 (max. 10 sec.)	°C °C

Recommended soldering conditions (infrared):



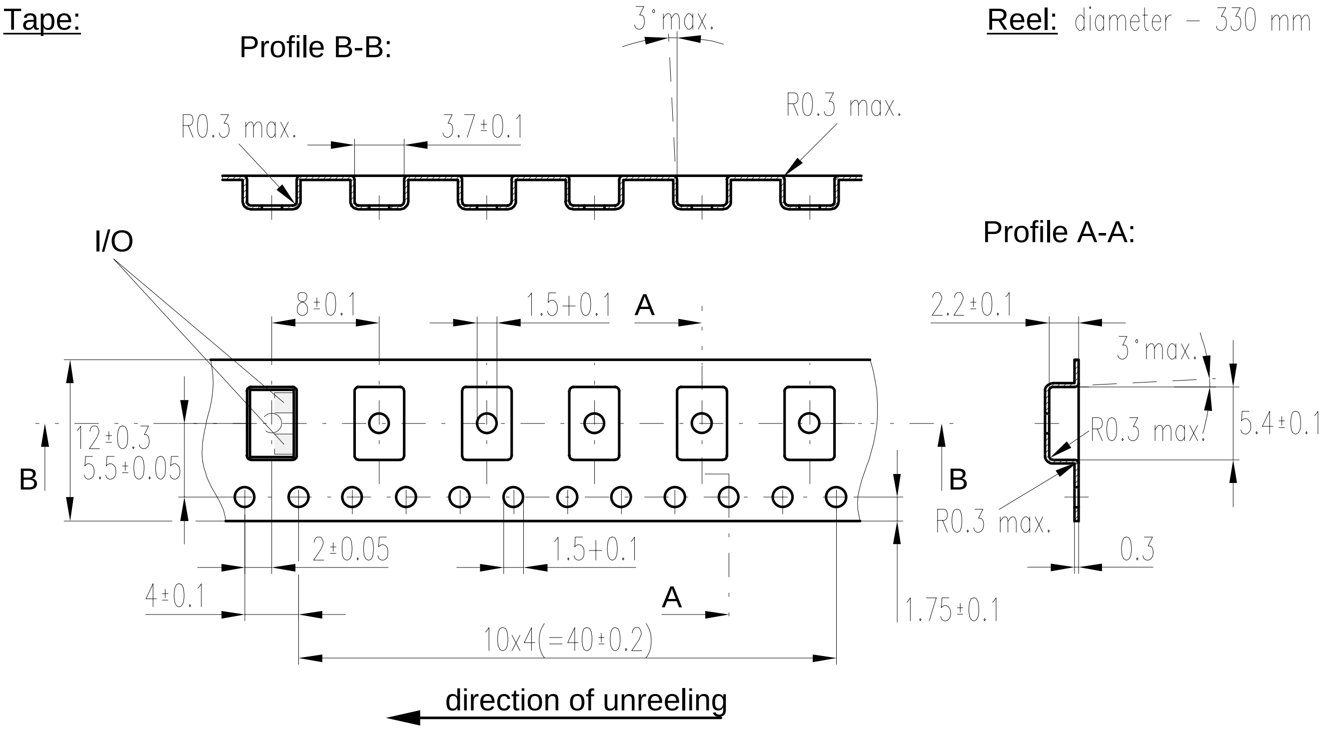
LOETPROF.DOC

Delivery mode

- Blister tape to IEC 286-3, polyester, grey
- Pieces/tape: 3000

Tape:

Reel: diameter – 330 mm



TAPS3I21.DOC

SAW Components

Data Sheet B3581

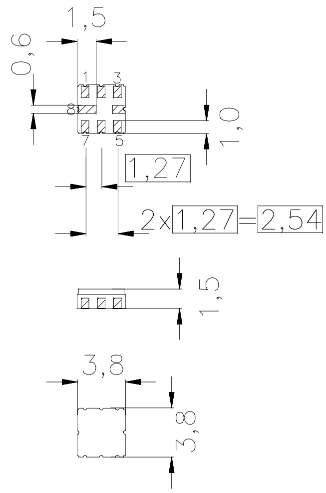
Ceramic package **QCC8B**

Features

- RF low-loss filter for remote control receivers
- Package for **S**urface **M**ounted **T**echnology (**SMT**)
- Hermetically sealed ceramic package
- No matching network required for operation at 50 Ω

Terminals

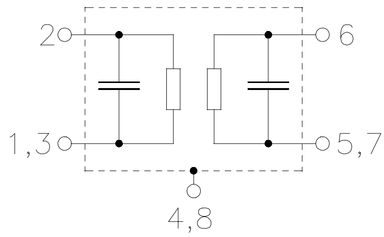
- Ni, gold plated



Dimensions in mm, approx. weight 0,07 g

Pin configuration

2	Input
1,3	Input Ground
6	Output
5,7	Output Ground
4,8	to be grounded



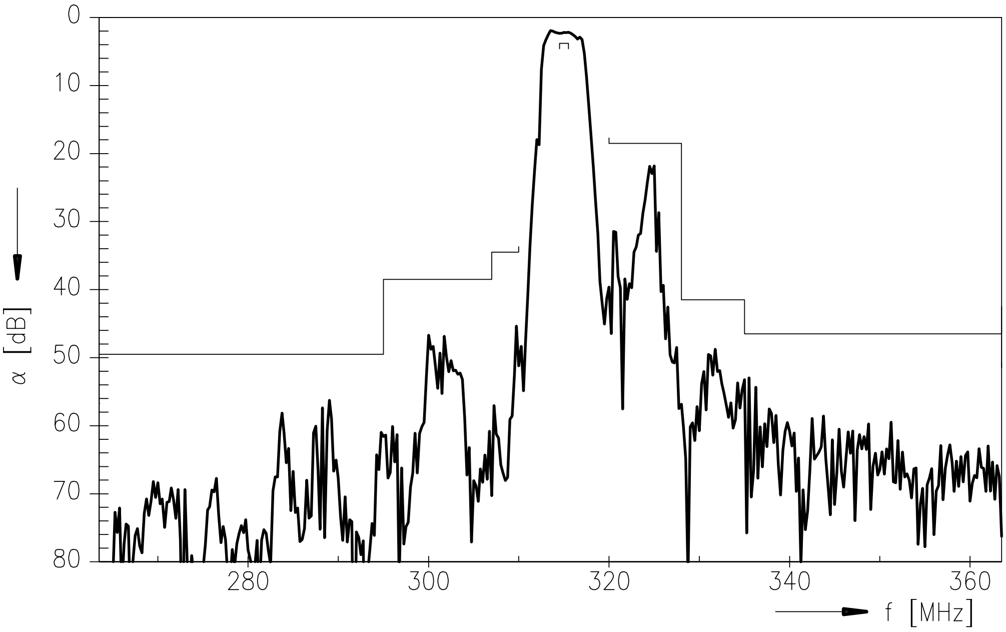
Type	Ordering code	Marking and Package according to	Packing according to
B3581	B39321-B3581-Z810	C61157-A7-A46	F61074-V8037-Z000

Electrostatic **S**ensitive **D**evice (**ESD**)

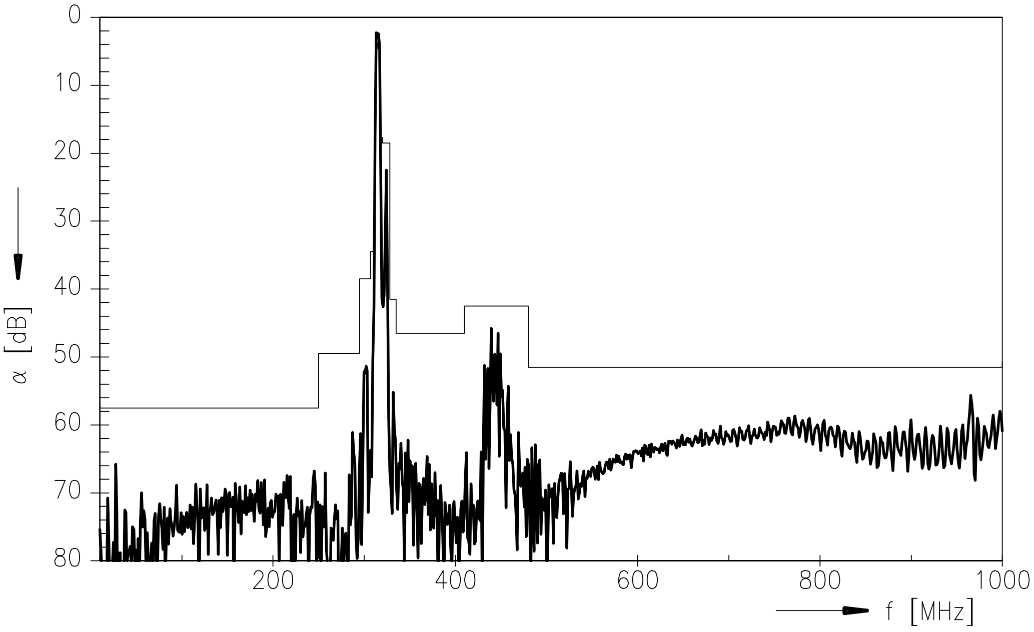
Maximum ratings

Operable temperature range	T	–40/+85	˚C	
Storage temperature range	T_{stg}	–45/+90	˚C	
DC voltage	V_{DC}	0	V	
Source power	P_S	10	dBm	source impedance 50 Ω

Transfer function



Transfer function (wideband)



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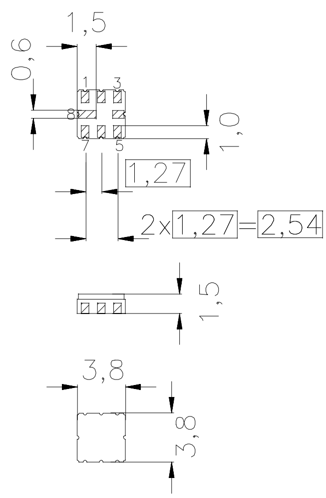
SAW Components

Data Sheet B3580

Data Sheet

Ceramic package **QCC8B**



Dimensions in mm, approx. weight 0,07 g

Features

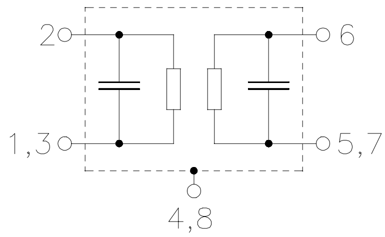
- RF low-loss filter for remote control receivers
- Package for **S**urface **M**ounted **T**echnology (**SMT**)
- Hermetically sealed ceramic package
- No matching network required for operation at 50 Ω

Terminals

- Ni, gold plated

Pin configuration

2	Input
1,3	Input Ground
6	Output
5,7	Output Ground
4,8	to be grounded



Type	Ordering code	Marking and Package according to	Packing according to
B3580	B39431-B3580-Z810	C61157-A7-A46	F61074-V8037-Z000

Electrostatic **S**ensitive **D**evice (**ESD**)

Maximum ratings

Operable temperature range	T	–40/+85	˚C	
Storage temperature range	T_{stg}	–45/+90	˚C	
DC voltage	V_{DC}	0	V	
Source power	P_S	10	dBm	source impedance 50 Ω

Characteristics

Operating temperature range: T = –40˚C to 85˚C
Terminating source impedance: Z_S = 50 Ω
Terminating load impedance: Z_L = 50 Ω

		min.	typ.	max.	
Center frequency	f_c	—	433,92	—	MHz
Maximum insertion attenuation	α_{max}				
433,00 ... 434,71 MHz		—	2,8	3,8	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
433,00 ... 434,71 MHz		—	0,3	1,0	dB
Relative attenuation (relative to α_{max})	α_{rel}				
10,00 ... 350,00 MHz		60	65	—	dB
350,00 ... 393,00 MHz		52	57	—	dB
393,00 ... 408,00 MHz		42	47	—	dB
408,00 ... 415,00 MHz		52	57	—	dB
415,00 ... 425,50 MHz		37	45	—	dB
443,50 ... 454,00 MHz		12	16	—	dB
454,00 ... 475,00 MHz		34	39	—	dB
475,00 ... 650,00 MHz		50	55	—	dB
650,00 ...1000,00 MHz		45	49	—	dB
Temperature coefficient of frequency	TC_f	—	-30	—	ppm/K

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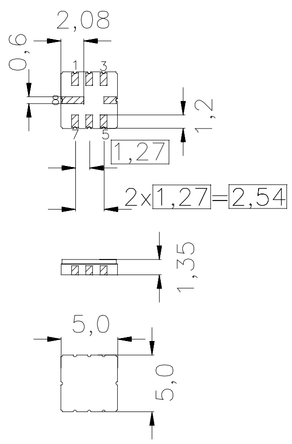
SAW Components

Data Sheet B3576

Ceramic package **QCC8C**



typ. dimensions in mm, approx. weight 0,1 g

Features

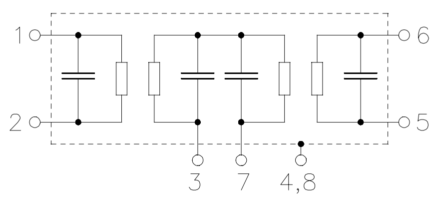
- RF low-loss filter for remote control receivers
- Package for **S**urface **M**ounted **T**echnology (**SMT**)
- Balanced and unbalanced operation possible

Terminals

- Ni, gold plated

Pin configuration

1	Input
2	Input Ground or balanced input
5	Output
6	Output Ground or balanced output
7	External coupling coil
4,8	Case-Ground
3	to be grounded



Type	Ordering code	Marking and package according too	Packing according to
B3576	B39321-B3576-U310	C61157–A7–A56	F61074–V8070–Z000

Electrostactic **S**ensitive **D**evice (**ESD**)

Maximum ratings

Operable temperature range	T_A	– 45/+ 95	˚C	
Storage temperature range	T_{stg}	– 45/+ 95	˚C	
DC voltage	V_{DC}	0	V	
Source power	P_S	10	dBm	

Characteristics

Reference temperature: T_A = -45 ... 95 ˚C
Terminating source impedance: Z_S = 50 Ω and matching network
Terminating load impedance: Z_L = 50 Ω and matching network

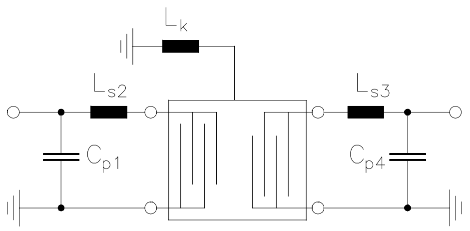
		min.	typ.	max.	
Center frequency (center frequency between 3 dB points)	f_C	—	315,00	—	MHz
Minimum insertion attenuation	α_{min}				
314,90 ... 315,10 MHz (including loss in matching coils)		—	3,3	4,8	dB
Amplitude ripple (p-p)					
314,92 ... 315,08 MHz		—	0,7	2,0	dB
314,90 ... 315,10 MHz		—	1,0	3,0	dB
Relative attenuation (relative to α_{min})	α_{rel}				
10,00 ... 230,00 MHz		65	70	—	dB
230,00 ... 290,00 MHz		40	45	—	dB
290,00 ... 310,00 MHz		50	55	—	dB
310,00 ... 314,10 MHz		42	47	—	dB
315,90 ... 317,00 MHz		21	26	—	dB
317,00 ... 322,00 MHz		38	43	—	dB
322,00 ...1000,00 MHz		55	60	—	dB
Impedance for pass band matching [2]					
Input: $Z_{IN} = R_{IN} \parallel C_{IN}$		—	470 ‖ 2,0	—	Ω ‖ pF
Output: $Z_{OUT} = R_{OUT} \parallel C_{OUT}$		—	470 ‖ 2,0	—	Ω ‖ pF
Temperature coefficient of frequency [1]	TC_f	—	-0,03	—	ppm/K^2
Frequency inversion point	T_0	10	—	40	°C

[1] Temperature dependance of f_C: $f_C(T_A) = f_C(T_0)\,(1 + TC_f(T_A - T_0)^2)$

[2] Impedance for passband matching bases on an ideal, perfect matching of the SAW filter to source- and to load impedance (here 50 Ohm). After the SAW filter is removed and input impedance into the input matching / 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.

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



C_{p1} = 1,2 pF
L_{s2} = 82 nH
L_{s3} = 82 nH
C_{p4} = 1,2 pF
L_k = 56 nH

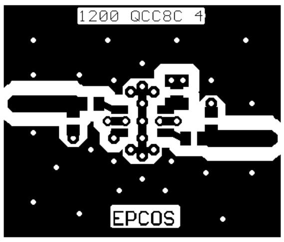
Minimising the crosstalk

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.



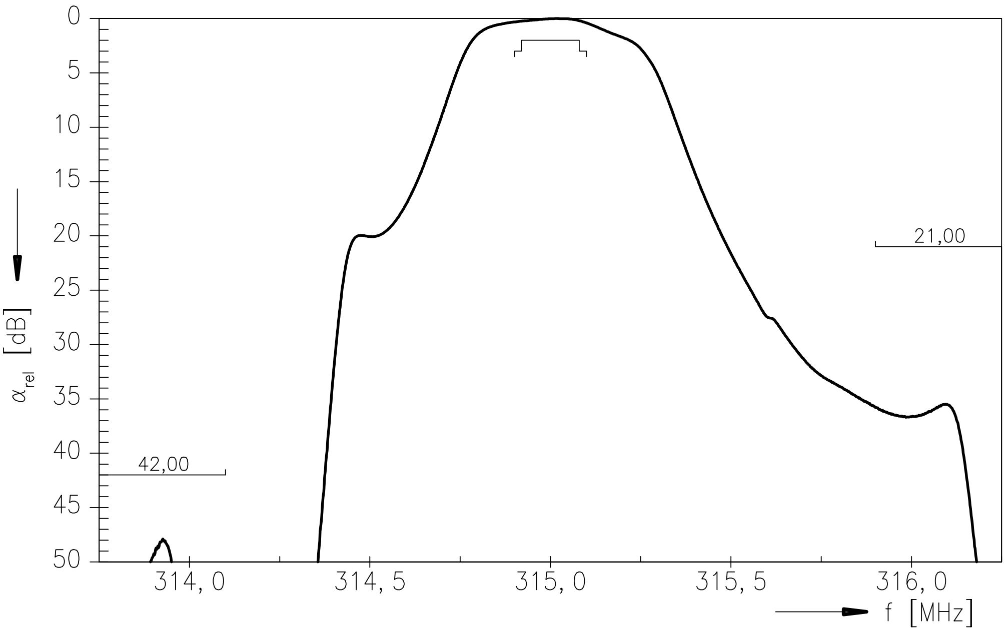
Optimised PCB layout for SAW filters in QCC8C package, pinning 1,5 (top side, scale 1:1)

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.

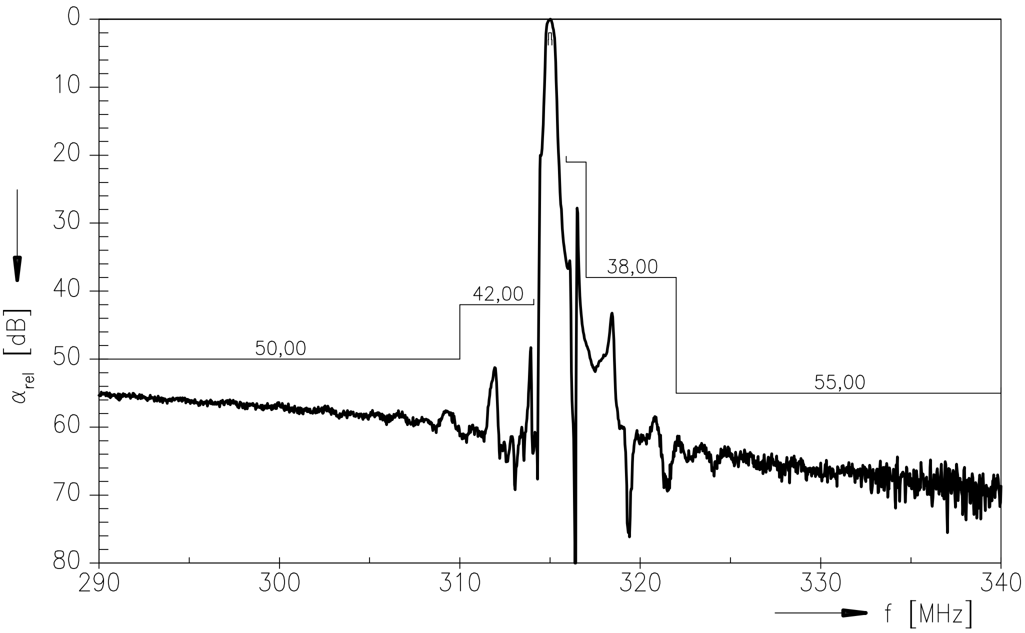
For good contact of the upper grounding area with the lower side it is necessary to place enough via holes.

EPCOS

Normalized frequency response



Normalized frequency response (wideband)



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SAW Components

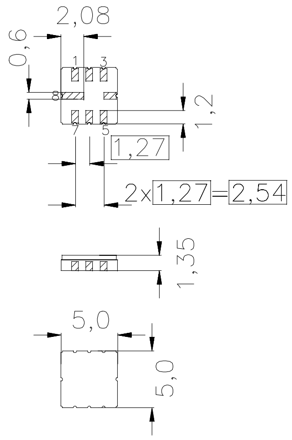
Data Sheet B3575

SAW Components **B3575**

Low Loss Filter **433,92 MHz**

Data Sheet

Ceramic package **QCC8C**



typ. dimensions in mm, approx. weight 0,1 g

Features

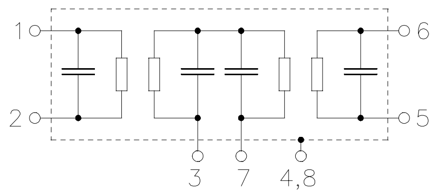
- RF low-loss filter for remote control receivers
- Package for **S**urface **M**ounted **T**echnology (**SMT**)
- Balanced and unbalanced operation possible

Terminals

- Ni, gold plated

Pin configuration

1	Input
2	Input Ground or balanced input
5	Output
6	Output Ground or balanced output
7	External coupling coil
4,8	Case-Ground
3	to be grounded



Type	Ordering code	Marking and package according too	Packing according to
B3575	B39431–B3575–U310	C61157–A7–A56	F61074–V8070–Z000

Electrostactic **S**ensitive **D**evice (**ESD**)

Maximum ratings

Operable temperature range	T_A	– 45/+ 95	˚C	
Storage temperature range	T_{stg}	– 45/+ 95	˚C	
DC voltage	V_{DC}	0	V	
Source power	P_S	10	dBm	

Characteristics

Reference temperature: T_A = -45 ... 95 ˚C
Terminating source impedance: Z_S = 50 Ω and matching network
Terminating load impedance: Z_L = 50 Ω and matching network

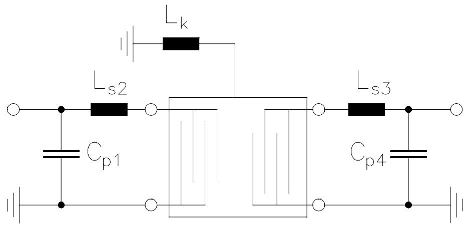
		min.	typ.	max.	
Center frequency (center frequency between 3 dB points)	f_C	—	433,92	—	MHz
Minimum insertion attenuation	α_{min}				
433,83 ... 434,01 MHz (including loss in matching coils)		—	3,4	4,7	dB
Amplitude ripple (p-p)					
433,83 ... 434,01 MHz		—	0,5	2,0	dB
433,81 ... 434,03 MHz		—	0,7	3,0	dB
Relative attenuation (relative to α_{min})	α_{rel}				
10,00 ... 300,00 MHz		60	70	—	dB
300,00 ... 400,00 MHz		50	55	—	dB
400,00 ... 424,00 MHz		60	65	—	dB
424,00 ... 430,00 MHz		55	60	—	dB
430,00 ... 433,02 MHz		40	45	—	dB
434,92 ... 439,00 MHz		30	35	—	dB
439,00 ...1000,00 MHz		58	63	—	dB
Impedance for pass band matching 2)					
Input: $Z_{IN} = R_{IN} \parallel C_{IN}$		—	360 || 2,0	—	Ω || pF
Output: $Z_{OUT} = R_{OUT} \parallel C_{OUT}$		—	360 || 2,1	—	Ω || pF
Temperature coefficient of frequency 1)	TC_f	—	-0,03	—	ppm/K²
Frequency inversion point	T_0	10	—	40	°C

1) Temperature dependance of f_C: $f_C(T_A) = f_C(T_0)\,(1 + TC_f(T_A - T_0)^2)$

2) Impedance for passband matching bases on an ideal, perfect matching of the SAW filter to source- and to load impedance (here 50 Ohm). After the SAW filter is removed and input impedance into the input matching / 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.

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



C_{p1} = 3,3 pF
L_{s2} = 47 nH
L_{s3} = 47 nH
C_{p4} = 3,3 pF
L_k = 33 nH

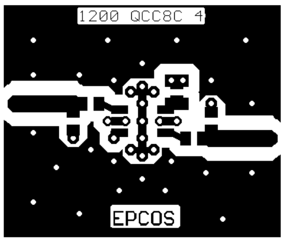
Minimising the crosstalk

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.

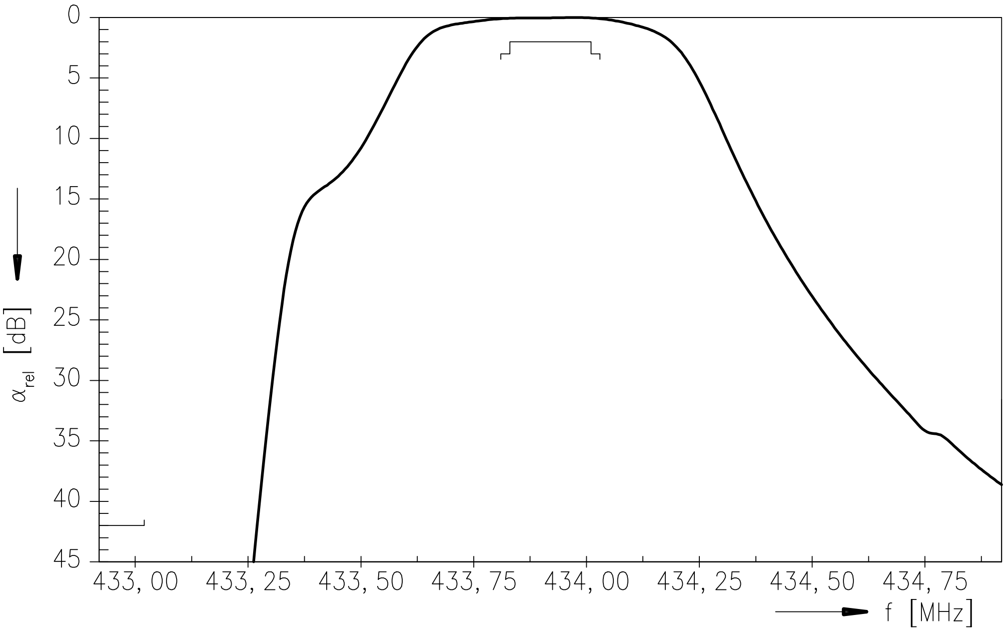


Optimised PCB layout for SAW filters in QCC8C package, pinning 1,5 (top side, scale 1:1)

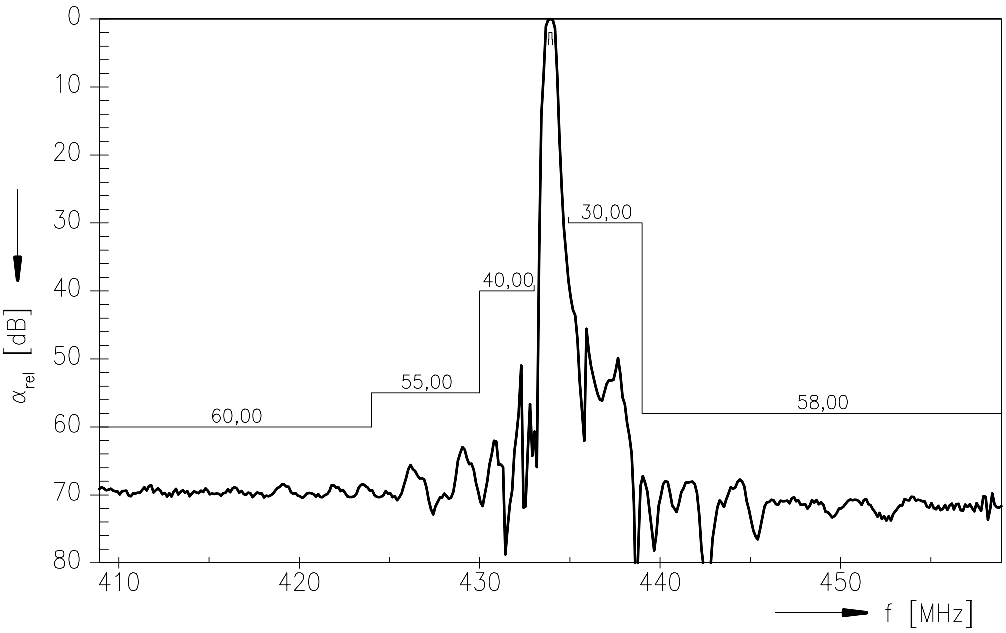
The bottom side is a copper plane (system ground area). The input and output grounding pins are isolated and connected to the common ground by separated via holes.

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

Normalized frequency response



Normalized frequency response (wideband)



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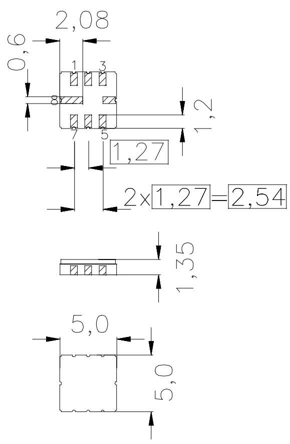
SAW Components

Preliminary Data B3574 (LD25A)

Features

- RF low-loss filter for remote control receivers
- Package for **S**urface **M**ounted **T**echnology (**SMT**)
- Balanced and unbalanced operation possible



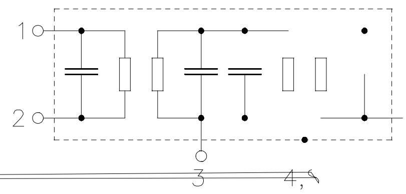
Terminals

- Ni, gold plated

typ. dimensions in mm, approx. weight 0,1 gCeramic package **QCC8C**

Pin configuration

1	Input
2	Input Ground or balanced input
5	Output
6	Output Ground or balanced output
7	External coupling coil
4,8	Case-Ground
3	to be grounded



Type	Ordering code	Marking and package according too	Packing according to
LD25A		C61157–A7–A56	F61074–V8070–Z000

Electrostactic **S**ensitive **D**evice (**ESD**)

Maximum ratings

Operable temperature range	T_A	– 45/+ 95	˚C	
Storage temperature range	T_{stg}	– 45/+ 95	˚C	
DC voltage	V_{DC}	0	V	
Source power	P_S	0	dBm	

Preliminary Data

Characteristics

Reference temperature: T_A = -45 ... 95 ˚C
Terminating source impedance: Z_S = 50 Ω and matching network
Terminating load impedance: Z_L = 50 Ω and matching network

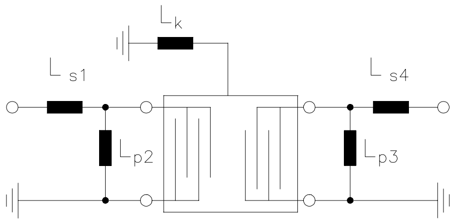
		min.	typ.	max.	
Center frequency (center frequency between 3 dB points)	f_C	—	868,30	—	MHz
Minimum insertion attenuation	α_{min}				
868,20 ... 868,40 MHz (including loss in matching coils)		—	4,2	5,7	dB
Amplitude ripple (p-p)					
868,20 ... 868,40 MHz		—	0,5	2,0	dB
868,16 ... 868,44 MHz		—	0,7	3,0	dB
Relative attenuation (relative to α_{min})	α_{rel}				
10,00 ... 600,00 MHz		60	65	—	dB
600,00 ... 800,00 MHz		42	47	—	dB
800,00 ... 848,00 MHz		54	59	—	dB
848,00 ... 863,00 MHz		51	56	—	dB
863,00 ... 866,80 MHz		37	42	—	dB
870,00 ... 872,00 MHz		30	35	—	dB
872,00 ... 882,00 MHz		47	52	—	dB
882,00 ...1000,00 MHz		50	55	—	dB
Impedance for pass band matching [2]					
Input: $Z_{IN} = R_{IN} \parallel C_{IN}$		—	360 || 1,3	—	Ω || pF
Output: $Z_{OUT} = R_{OUT} \parallel C_{OUT}$		—	380 || 1,3	—	Ω || pF
Temperature coefficient of frequency [1]	TC_f	—	-0,03	—	ppm/K²
Frequency inversion point	T_0	10	—	40	°C

[1]Temperature dependance of f_C: $f_C(T_A) = f_C(T_0)\,(1 + TC_f(T_A - T_0)^2)$

[2] Impedance for passband matching bases on an ideal, perfect matching of the SAW filter to source- and to load impedance (here 50 Ohm). After the SAW filter is removed and input impedance into the input matching / 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.

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



L_{s1} = 18 nH
L_{p2} = 39 nH
L_{p3} = 39 nH
L_{s4} = 18 nH
L_k = 12 nH

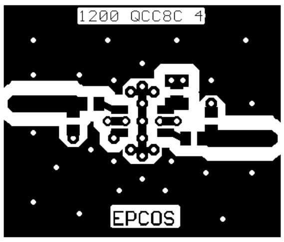
Minimising the crosstalk

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.



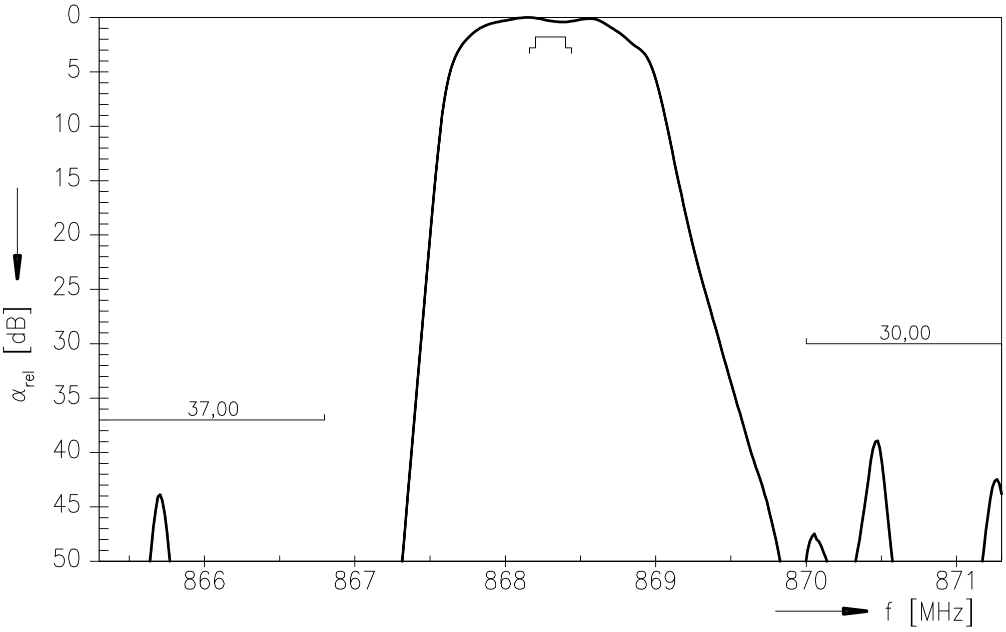
Optimised PCB layout for SAW filters in QCC8C package, pinning 1,5 (top side, scale 1:1)

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.

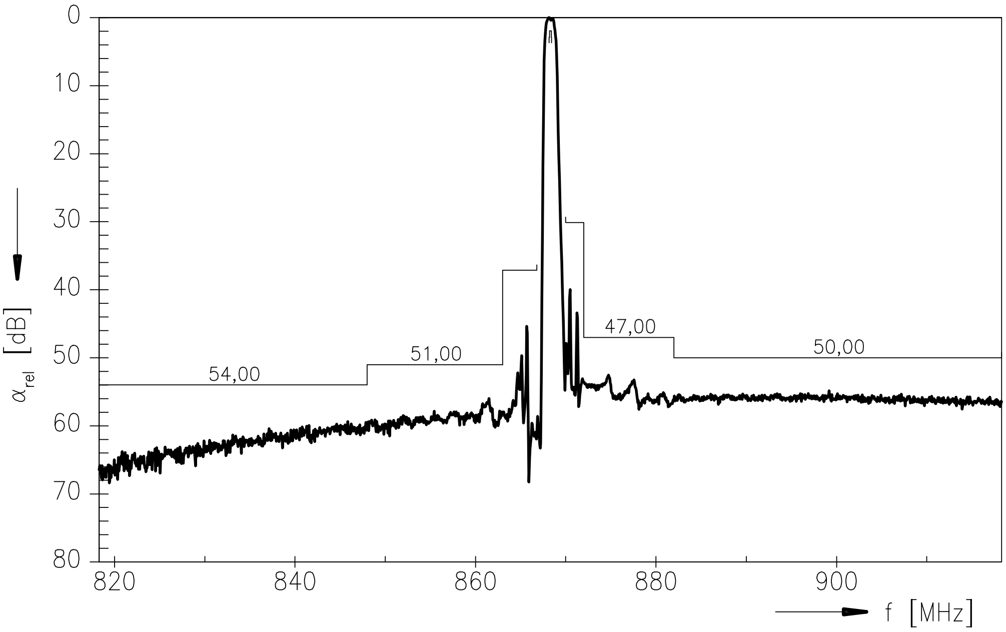
For good contact of the upper grounding area with the lower side it is necessary to place enough via holes.

Preliminary Data

Normalized frequency response



Normalized frequency response (wideband)



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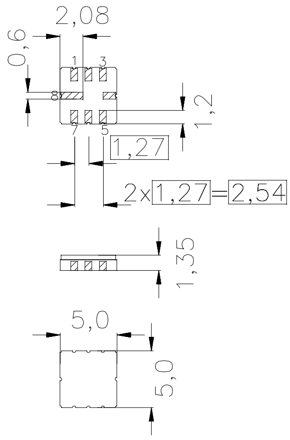
SAW Components

Data Sheet B3570

Data Sheet

Ceramic package **QCC8C**



typ. dimensions in mm, approx. weight 0,1 g

Features

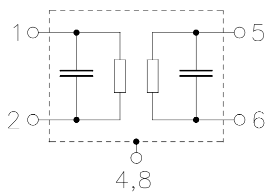
- RF low-loss filter for remote control receivers
- Package for **S**urface **M**ounted **T**echnology (**SMT**)

Terminals

- Ni, gold plated

Pin configuration

1	Input
2,7	Input Ground
5	Output
3,6	Output Ground
4,8	Case - Ground



Type	Ordering code	Marking and package according to	Packing according to
B3570	B39871-B3570-U310	C61157-A7-A56	F61074-V8070-Z000

Electrostactic **S**ensitive **D**evice (**ESD**)

Maximum ratings

Operable temperature range	T_A	–45/+90	˚C	
Storage temperature range	T_{stg}	–45/+90	˚C	
DC voltage	V_{DC}	0	V	
Source power	P_S	0	dBm	source impedance 50 Ω

Characteristics

Reference temperature: T_A = 25 ˚C
Terminating source impedance: Z_S = 50 Ω and matching network
Terminating load impedance: Z_L = 50 Ω and matching network

		min.	typ.	max.	
Center frequency (center frequency between 3 dB points)	f_C	—	868,39	—	MHz
Minimum insertion attenuation	α_{min}				
868,00 ... 868,78 MHz		—	2,7	4,2	dB
Pass band (relative to α_{min})					
868,00 ... 868,78 MHz		—	1,0	3,0	dB
867,90 ... 868,88 MHz		—	1,5	6,0	dB
Relative attenuation (relative to α_{min})	α_{rel}				
10,00 ... 700,00 MHz		50	55	—	dB
700,00 ... 830,00 MHz		35	45	—	dB
830,00 ... 850,00 MHz		32	40	—	dB
850,00 ... 865,20 MHz		25	30	—	dB
871,00 ... 874,50 MHz		11	16	—	dB
874,50 ... 883,00 MHz		22	27	—	dB
883,00 ... 900,00 MHz		30	35	—	dB
900,00 ...1000,00 MHz		35	40	—	dB
Impedance for pass band matching 2)					
Input: $Z_{IN} = R_{IN} \parallel C_{IN}$		—	216 ‖ 2,20	—	Ω ‖ pF
Output: $Z_{OUT} = R_{OUT} \parallel C_{OUT}$		—	222 ‖ 2,20	—	Ω ‖ pF
Temperature coefficient of frequency 1)	TC_f	—	–0,03	—	ppm/K^2
Frequency inversion point	T_0	15	—	35	°C

1) Temperature dependence of f_C: $f_C(T_A) = f_C(T_0)\ (1 + TC_f(T_A - T_0)^2)$

2) Impedance for passband matching bases on an ideal, perfect matching of the SAW filter to source- and to load impedance (here 50 Ohm). After the SAW filter is removed and input impedance into the input matching / 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.

Characteristics

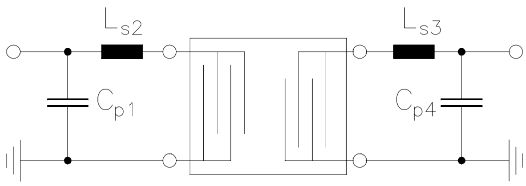
Reference temperature: T_A = –45 ... 90 ˚C
Terminating source impedance: Z_S = 50 Ω and matching network
Terminating load impedance: Z_L = 50 Ω and matching network

		min.	typ.	max.	
Center frequency (center frequency between 3 dB points)	f_C	—	868,30	—	MHz
Minimum insertion attenuation	α_{min}				
868,00 ... 868,78 MHz		—	2,7	4,7	dB
Pass band (relative to α_{min})					
868,00 ... 868,60 MHz		—	1,0	3,0	dB
867,90 ... 868,70 MHz		—	1,5	6,0	dB
Relative attenuation (relative to α_{min})	α_{rel}				
10,00 ... 700,00 MHz		50	55	—	dB
700,00 ... 830,00 MHz		35	45	—	dB
830,00 ... 850,00 MHz		32	40	—	dB
850,00 ... 865,02 MHz		25	30	—	dB
871,00 ... 874,50 MHz		11	16	—	dB
874,50 ... 883,00 MHz		22	27	—	dB
883,00 ... 900,00 MHz		30	35	—	dB
900,00 ...1000,00 MHz		35	40	—	dB
Impedance for pass band matching [2)]					
Input: $Z_{IN} = R_{IN} \parallel C_{IN}$		—	216 ‖ 2,20	—	Ω ‖ pF
Output: $Z_{OUT} = R_{OUT} \parallel C_{OUT}$		—	222 ‖ 2,20	—	Ω ‖ pF

[2)] Impedance for passband matching bases on an ideal, perfect matching of the SAW filter to source- and to load impedance (here 50 Ohm). After the SAW filter is removed and input impedance into the input matching / 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.

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



C_{p1} = 3,3 pF
L_{s2} = 12 nH
L_{s3} = 12 nH
C_{p4} = 3,3 pF

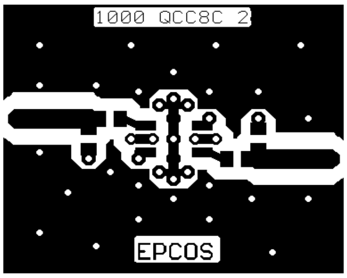
Minimising the crosstalk

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.

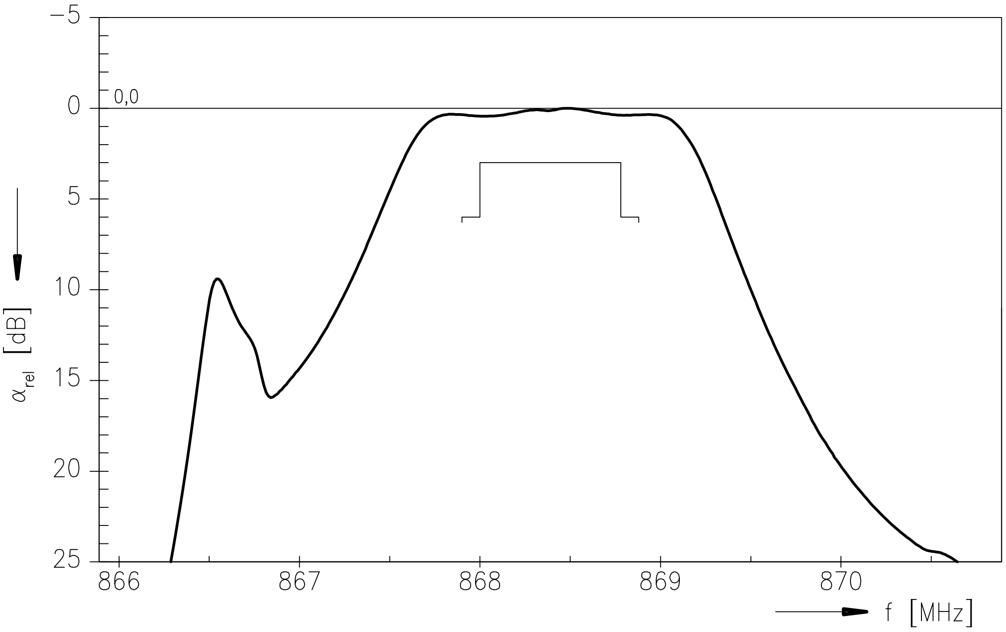


Optimised PCB layout for SAW filters in QCC8C package, pinning 1,5 (top side, scale 1:1)

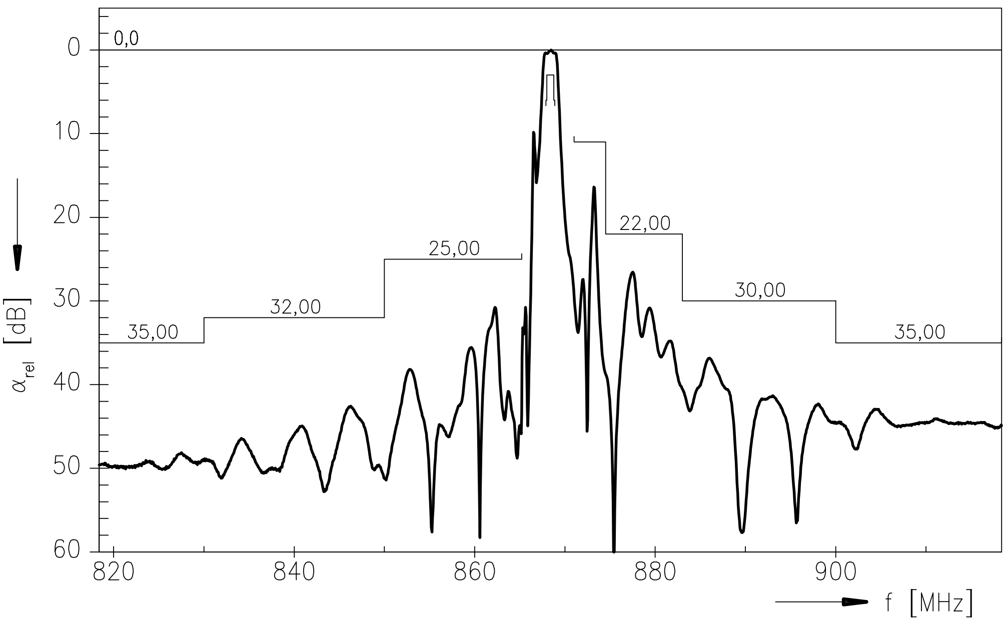
The bottom side is a copper plane (system ground area). The input and output grounding pins are isolated and connected to the common ground by separated via holes.

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

Normalized frequency response



Normalized frequency response (wideband)



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SAW Components

Data Sheet B3569

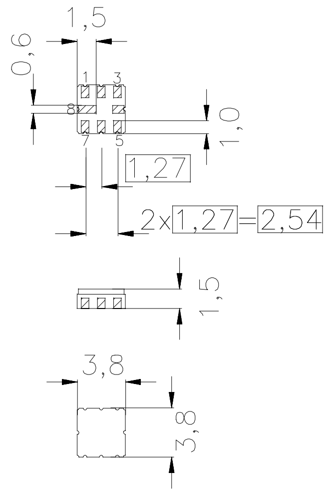
Ceramic package **QCC8B**

Features

- RF low-loss filter for remote control receivers
- Package for **S**urface **M**ounted **T**echnology (**SMT**)
- Hermetically sealed ceramic package
- No matching network required for operation at 50 Ω

Terminals

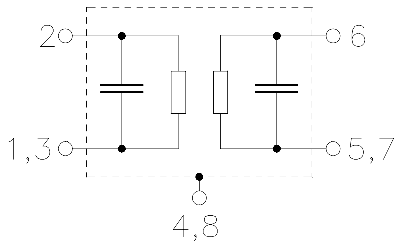
- Ni, gold plated



Dimensions in mm, approx. weight 0,07 g

Pin configuration

1,3	Input Ground
2	Input
5,7	Output Ground
6	Output
4,8	to be grounded



Type	Ordering code	Marking and Package according to	Packing according to
B3569	B39911-B3569-Z810	C61157-A7-A46	F61074-V8037-Z000

Electrostatic **S**ensitive **D**evice (**ESD**)

Maximum ratings

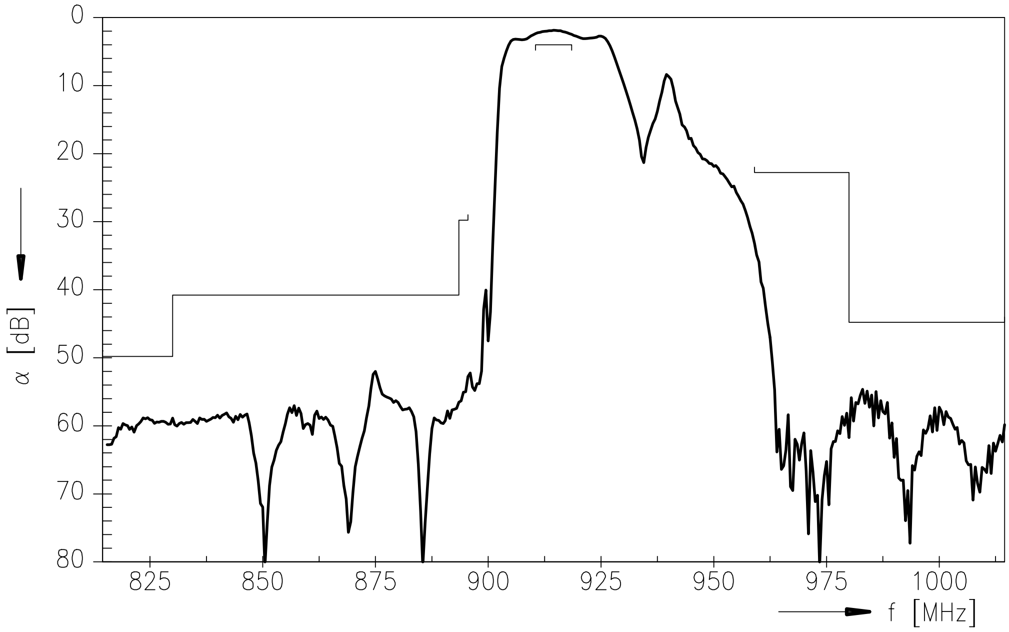
Operable temperature range	T	-20/+ 65	˚C	
Storage temperature range	T_{stg}	-45/+ 90	˚C	
DC voltage	V_{DC}	0	V	
Source power	P_S	10	dBm	source impedance 50 Ω

Characteristics

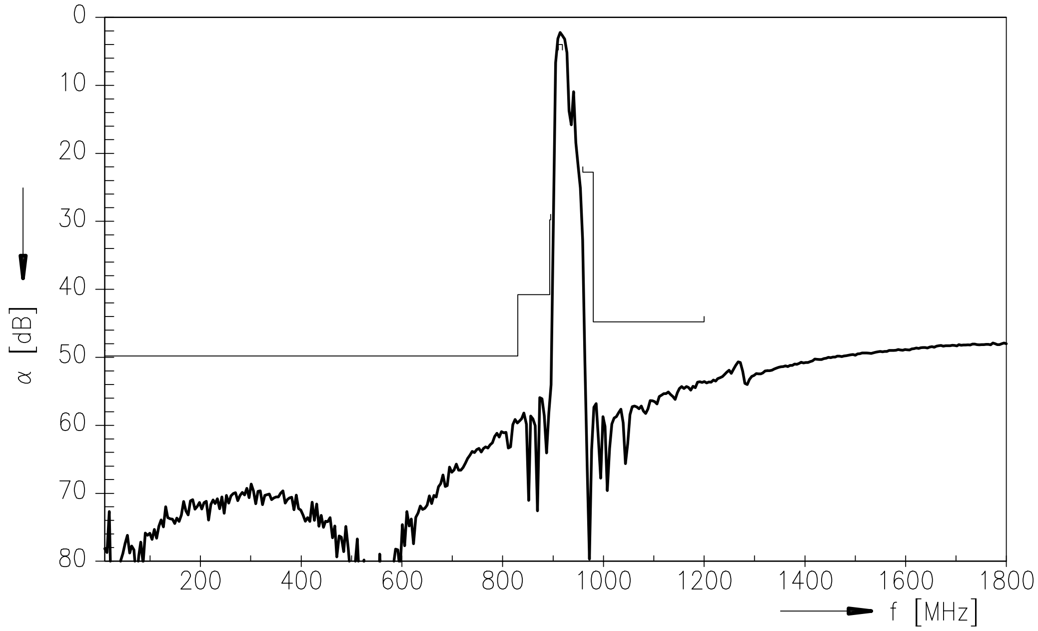
Operating temperature range: T = -20˚C to 65˚C
Terminating source impedance: Z_S = 50 Ω
Terminating load impedance: Z_L = 50 Ω

		min.	typ.	max.	
Center frequency	f_c	—	914,50	—	MHz
Maximum insertion attenuation	α_{max}				
910,50 ... 918,50 MHz		—	3,0	4,0	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
910,50 ... 918,50 MHz		—	1,0	2,0	dB
Relative attenuation (relative to α_{max})	α_{rel}				
10,00 ... 830,00 MHz		47	52	—	dB
830,00 ... 893,50 MHz		38	43	—	dB
893,50 ... 895,50 MHz		27	40	—	dB
959,00 ... 980,00 MHz		20	25	—	dB
980,00 ...1200,00 MHz		42	47	—	dB
Temperature coefficient of frequency	TC_f	—	-30	—	ppm/K

Transfer function



Transfer function (wideband)



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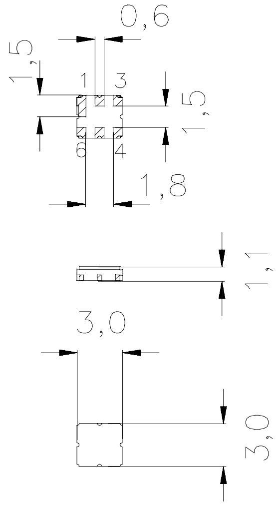
SAW Components

Data Sheet B3568

Ceramic package **DCC6C**



Dimensions in mm, approx. weight 0,037 g

Features

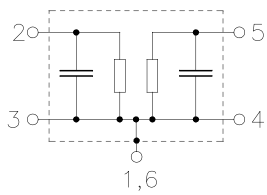
- Low loss RF filter for remote control application
- Low amplitude ripple
- High image frequency suppression
- No matching network required for operation at 50 Ω
- Package for **S**urface **M**ounted **T**echnology **(SMT)**

Terminals

- Ni, gold-plated

Pin configuration

2	Input
5	Output
1, 3, 4, 6	Ground



Type	Ordering code	Marking and Package according to	Packing according to
B3568	B39871-B3568-U410	C61157-A7-A67	F61074-V8088-Z000

Electrostatic **S**ensitive **D**evice (**ESD**)

Maximum ratings

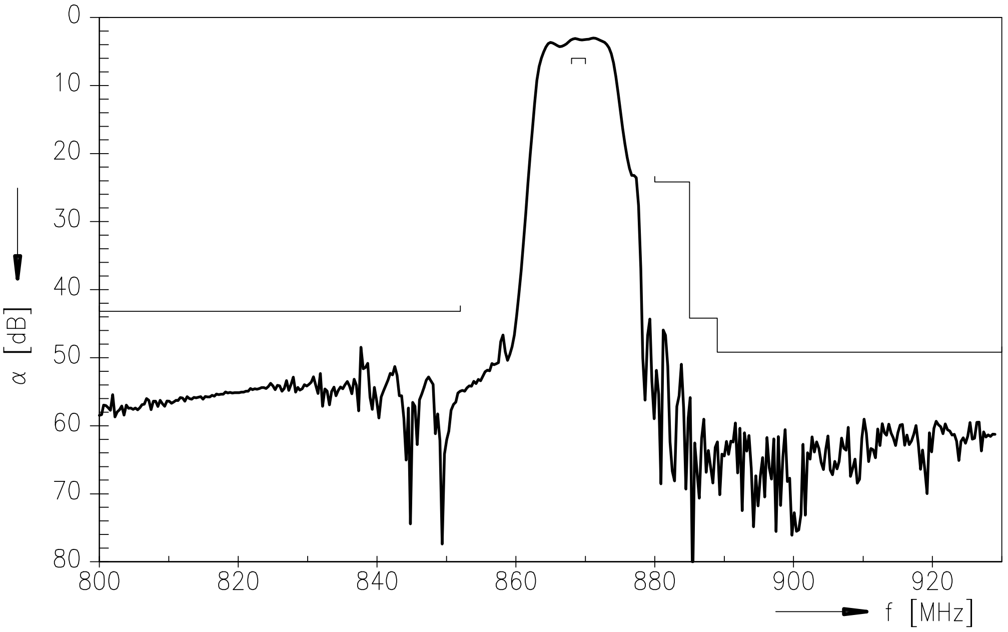
Operable temperature range	T	-10/+ 60	˚C	
Storage temperature range	T_{stg}	-40/+ 85	˚C	
DC voltage	V_{DC}	0	V	
Source power	P_S	0	dBm	source impedance 50 Ω

Characteristics

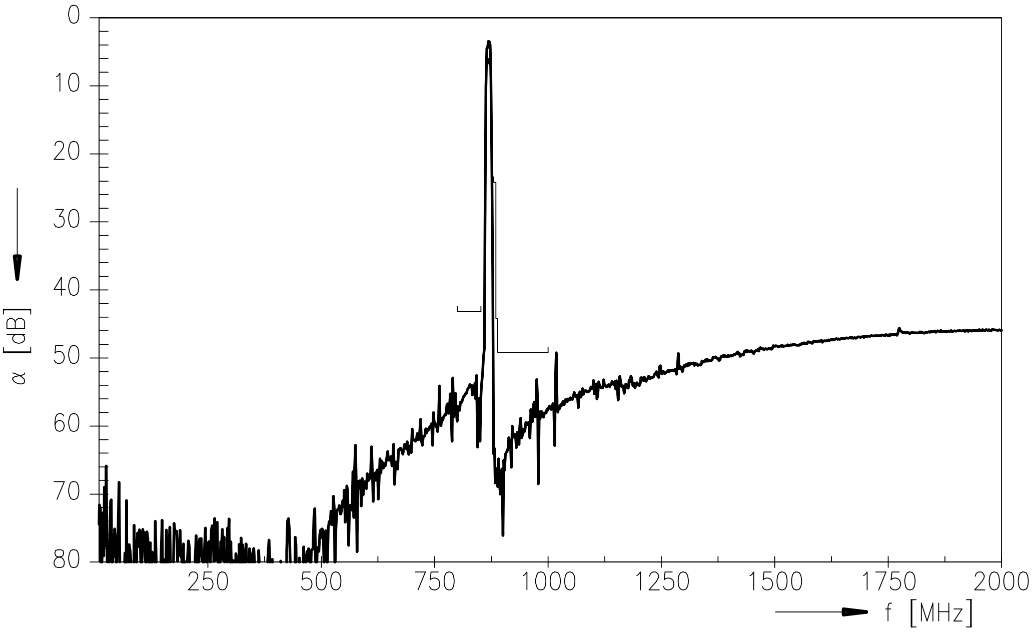
Operating temperature range: T = -10 ... 60 ˚C
Terminating source impedance: Z_S = 50 Ω
Terminating load impedance: Z_L = 50 Ω

		min.	typ.	max.	
Center frequency	f_c	—	869,00	—	MHz
Maximum insertion attenuation	α_{max}				
868,00 ... 870,00 MHz		—	4,0	6,0	dB
Amplitude ripple	$\Delta\alpha$				
868,00 ... 870,00 MHz		—	1,5	2,5	dB
Relative attenuation (relative to α_{max})	α_{rel}				
800,00 ... 852,00 MHz		39,0	44,0	—	dB
880,00 ... 885,00 MHz		20,0	35,0	—	dB
885,00 ... 889,00 MHz		40,0	45,0	—	dB
889,00 ...1000,00 MHz		45,0	50,0	—	dB
Temperature coefficient of frequency	TC_f	—	-30	—	ppm/K

Transfer function



Transfer function (wideband)



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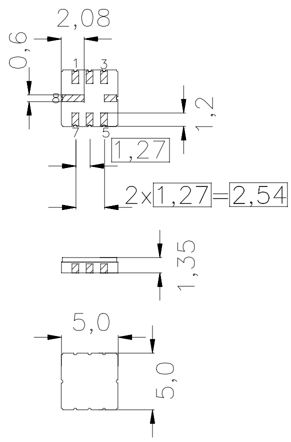
SAW Components

Data Sheet B3555

Ceramic package **QCC8C**



typ. dimensions in mm, approx. weight 0,1 g

Features

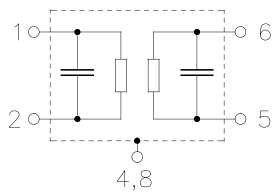
- RF low-loss filter for remote control receivers
- Package for **S**urface **M**ounted **T**echnology (**SMT**)
- Balanced and unbalanced operation possible

Terminals

- Ni, gold plated

Pin configuration

1	Input Ground
2	Input
5	Output
6	Output Ground
3,4,7,8	Case - Ground



Type	Ordering code	Marking and package according to	Packing according to
B3555	B39431-B3555-U310	C61157-A7-A356	F61074-V8070-Z000

Electrostactic **S**ensitive **D**evice (**ESD**)

Maximum ratings

Operable temperature range	T_A	–45/+120	˚C	
Storage temperature range	T_{stg}	–45/+120	˚C	
DC voltage	V_{DC}	0	V	
Source power	P_S	10	dBm	source impedance 50 Ω

Data Sheet

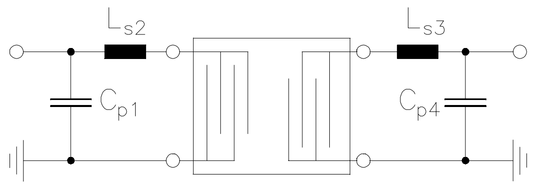
Characteristics

Reference temperature: T_A = 25 °C
Terminating source impedance: Z_S = 50 Ω and matching network
Terminating load impedance: Z_L = 50 Ω and matching network

		min.	typ.	max.	
Center frequency (center frequency between 3 dB points)	f_C	—	433,96	—	MHz
Minimum insertion attenuation	α_{min}				
433,80 ... 434,12 MHz		—	2,2	4,0	dB
Pass band (relative to α_{min})					
433,715 ... 434,205 MHz		—	1,0	2,0	dB
433,675 ... 434,245 MHz		—	1,0	3,0	dB
433,615 ... 434,305 MHz		—	2,0	6,0	dB
Relative attenuation (relative to α_{min})	α_{rel}				
10,00 ... 400,00 MHz		40	50	—	dB
400,00 ... 429,10 MHz		38	45	—	dB
429,10 ... 430,70 MHz		20	30	—	dB
430,70 ... 432,00 MHz		35	45	—	dB
435,30 ... 436,80 MHz		15	25	—	dB
436,80 ... 438,40 MHz		8	13	—	dB
438,40 ... 450,00 MHz		24	32	—	dB
450,00 ... 600,00 MHz		38	48	—	dB
Impedance for pass band matching					
Input: $Z_{IN} = R_{IN} \parallel C_{IN}$		—	225 ǁ 3,4	—	Ω ǁ pF
Output: $Z_{OUT} = R_{OUT} \parallel C_{OUT}$		—	225 ǁ 3,4	—	Ω ǁ pF
Temperature coefficient of frequency 1)	TC_f	—	–0,03	—	ppm/K²
Frequency inversion point	T_0	—	25	—	°C

1)Temperature dependence of f_C: $f_C(T_A) = f_C(T_0)\,(1 + TC_f(T_A - T_0)^2)$

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



C_{p1} = 6,8 pF
L_{s2} = 33 nH
L_{s3} = 33 nH
C_{p4} = 6,8 pF

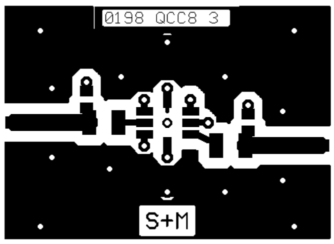
<u>Minimising the crosstalk</u>

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.

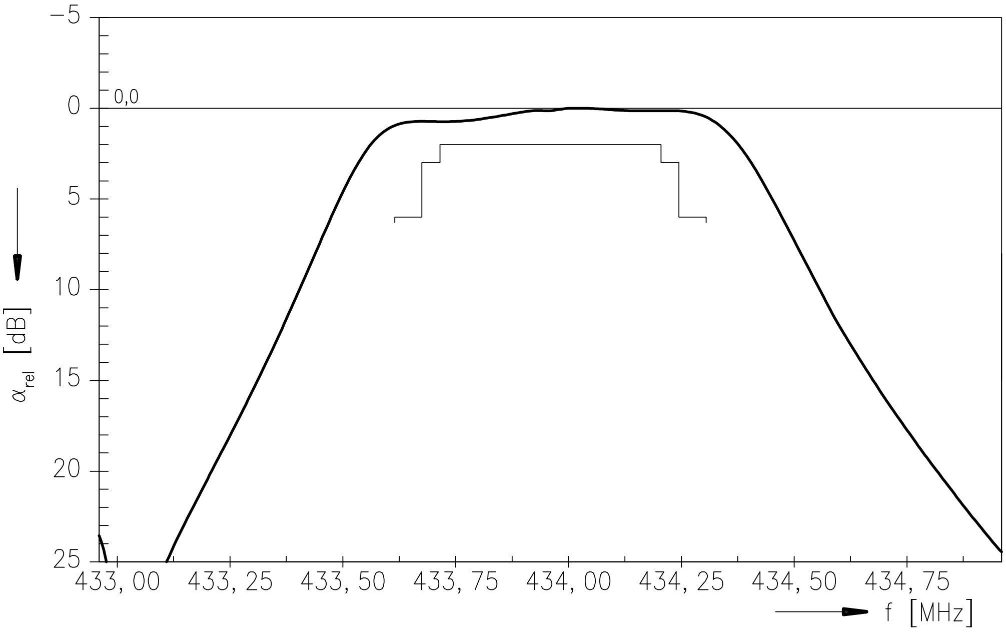


Optimised PCB layout for SAW filters in QCC8C package, pinning 2,5 (top side, scale 1:1)

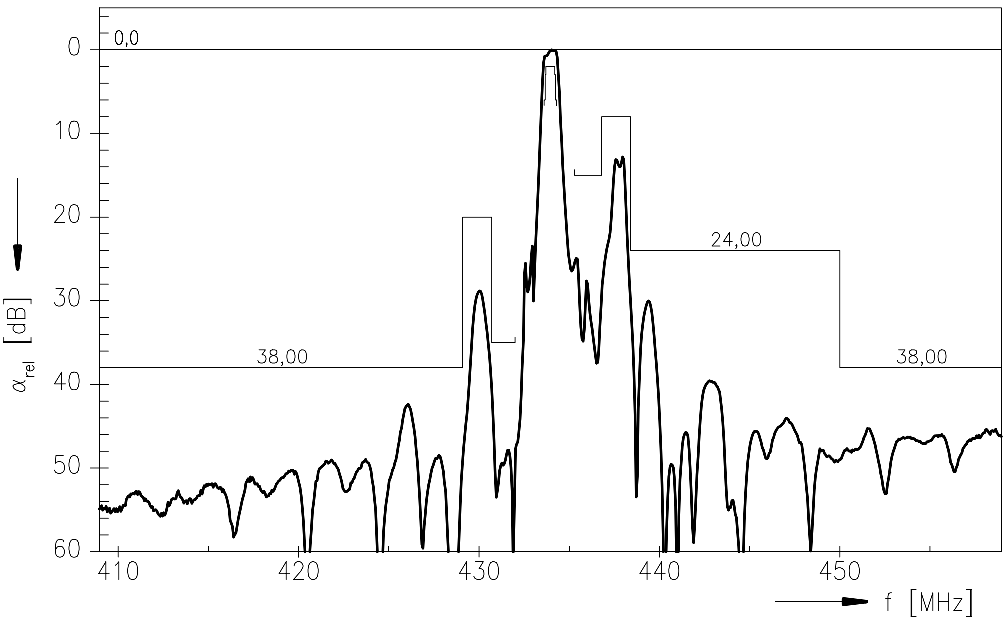
The bottom side is a copper plane (system ground area). The input and output grounding pins are isolated and connected to the common ground by separated via holes.

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

Normalized frequency response



Normalized frequency response (wideband)



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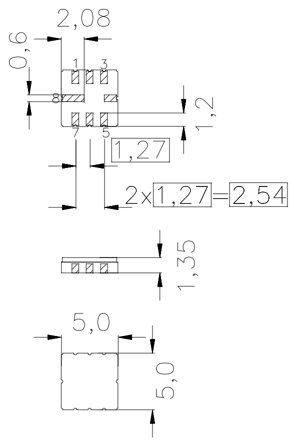
SAW Components

Data Sheet B3551

SAW Components	B3551
Low-loss Filter	**315,00 MHz**

Data Sheet

Ceramic package **QCC8C**



typ. dimensions in mm, approx. weight 0,1 g

Features

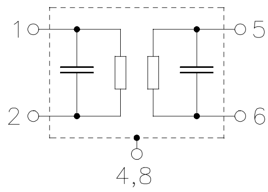
- RF low-loss filter for remote control receivers
- Package for **S**urface **M**ounted **T**echnology (**SMT**)

Terminals

- Ni, gold plated

Pin configuration

1	Input
2	Input Ground
5	Output
6	Output Ground
4,8	Case - Ground
3,7	to be grounded



Type	Ordering code	Marking and package according to	Packing according to
B3551	B39321-B3551-U310	C61157-A7-A356	F61074-V8070-Z000

Electrostactic **S**ensitive **D**evice (**ESD**)

Maximum ratings

Operable temperature range	T_A	– 45/+120	˚C	
Storage temperature range	T_{stg}	– 45/+120	˚C	
DC voltage	V_{DC}	0	V	
Source power	P_S	10	dBm	source impedance 50 Ω

Characteristics

Reference temperature: T_A = 25 ˚C
Terminating source impedance: Z_S = 50 Ω and matching network
Terminating load impedance: Z_L = 50 Ω and matching network

		min.	typ.	max.	
Center frequency (center frequency between 3 dB points)	f_C	—	315,02	—	MHz
Minimum insertion attenuation	α_{min}				
314,82 ... 315,22 MHz		—	3,0	4,5	dB
Pass band (relative to α_{min})					
314,77 ... 315,26 MHz		—	1,5	3,0	dB
314,71 ... 315,32 MHz		—	2,0	6,0	dB
Relative attenuation (relative to α_{min})	α_{rel}				
10,00 ... 270,00 MHz		45	50	—	dB
270,00 ... 309,00 MHz		35	40	—	dB
309,00 ... 314,00 MHz		15	20	—	dB
316,00 ... 335,00 MHz		10	15	—	dB
335,00 ... 400,00 MHz		35	40	—	dB
400,00 ...1000,00 MHz		45	50	—	dB
Impedance for pass band matching [2]					
Input: $Z_{IN} = R_{IN} \parallel C_{IN}$		—	950 ‖ 3,18	—	Ω ‖ pF
Output: $Z_{OUT} = R_{OUT} \parallel C_{OUT}$		—	960 ‖ 3,14	—	Ω ‖ pF
Temperature coefficient of frequency [1]	TC_f	—	–0,03	—	ppm/K²
Frequency inversion point	T_0	5	—	35	°C

[1] Temperature dependence of f_C: $f_C(T_A) = f_C(T_0)\,(1 + TC_f(T_A - T_0)^2)$

[2] Impedance for passband matching bases on an ideal, perfect matching of the SAW filter to source- and to load impedance (here 50 Ohm). After the SAW filter is removed and input impedance into the input matching / 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.

Characteristics

Reference temperature: T_A = –45 ... 95°C
Terminating source impedance: Z_S = 50 Ω and matching network
Terminating load impedance: Z_L = 50 Ω and matching network

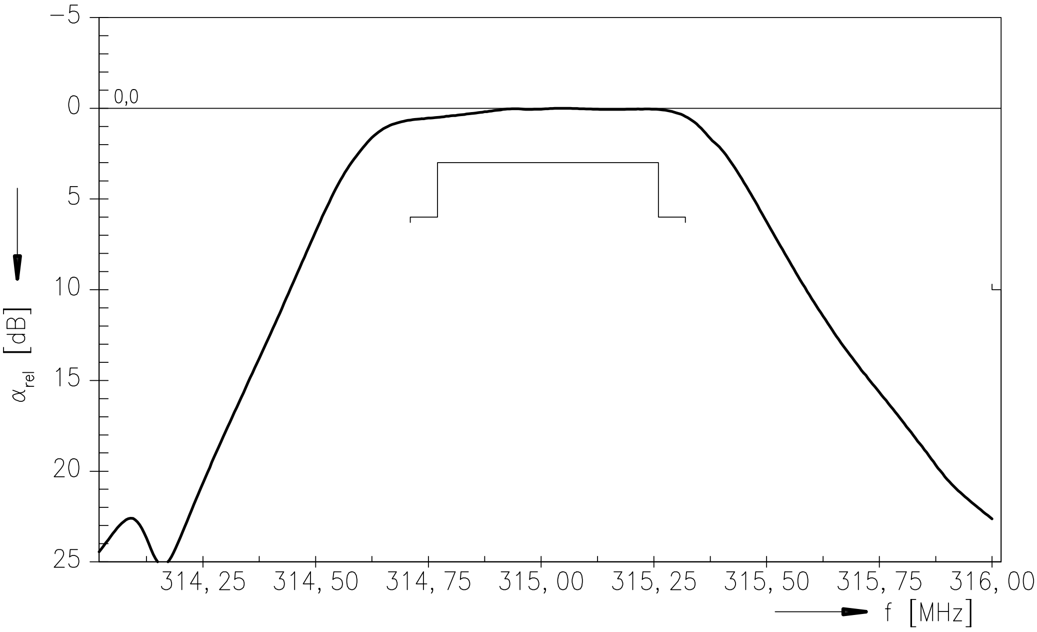
		min.	typ.	max.	
Center frequency (center frequency between 3 dB points)	f_C	—	315,00	—	MHz
Minimum insertion attenuation	α_{min}				
314,82 ... 315,22 MHz		—	3,0	5,0	dB
Pass band (relative to α_{min})					
314,77 ... 315,20 MHz		—	1,5	3,0	dB
314,71 ... 315,26 MHz		—	2,0	6,0	dB
Pass bandwidth					
$\alpha_{rel} \leq 3$ dB		0,80	0,86	0,92	MHz
Relative attenuation (relative to α_{min})	α_{rel}				
10,00 ... 270,00 MHz		45	50	—	dB
270,00 ... 309,00 MHz		35	40	—	dB
309,00 ... 313,94 MHz		15	20	—	dB
316,00 ... 335,00 MHz		10	15	—	dB
335,00 ... 400,00 MHz		35	40	—	dB
400,00 ...1000,00 MHz		45	50	—	dB
Impedance for pass band matching [2)]					
Input: $Z_{IN} = R_{IN} \parallel C_{IN}$		—	950 ‖ 3,18	—	Ω ‖ pF
Output: $Z_{OUT} = R_{OUT} \parallel C_{OUT}$		—	960 ‖ 3,14	—	Ω ‖ pF

[2)] Impedance for passband matching bases on an ideal, perfect matching of the SAW filter to source- and to load impedance (here 50 Ohm). After the SAW filter is removed and input impedance into the input matching / output matching network is calculated.

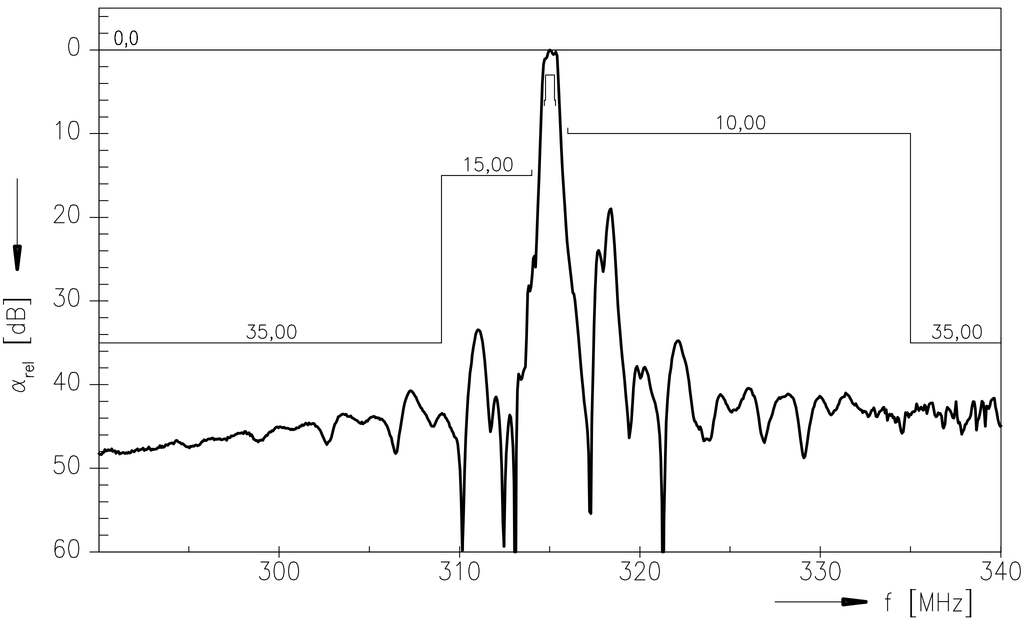
The conjugate complex value of these characteristic impedances are the input and output impedances for flat passband. For more details, we refer to EPCOS application note #4.

- [redacted] [redacted]
- -

Normalized frequency response



Normalized frequency response (wideband)



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SAW Components

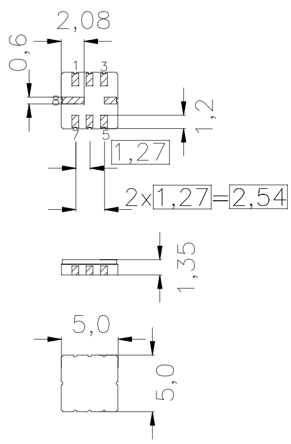
Data Sheet R 727

EPCOS

SAW Components	R 727
Resonator	**433,92 MHz**

Data Sheet

Ceramic package **QCC8C**



Dimensions in mm, approx. weight 0,1 g

Features

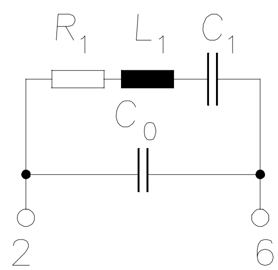
- 1-port resonator
- Provides reliable, fundamental mode, quartz frequency stabilization i.e. in transmitters or local oscillators

Terminals

- Ni, gold plated

Pin configuration

2	Input
6	Output, grounded in 1-port conf.
4,8	Ground (case)
1,3	float
5,7	float / ground



Type	Ordering code	Marking and Package according to	Packing according to
R 727	B39431-R 727-U310	C61157-A7-A56	F61074-V8070-Z000

Electrostatic **S**ensitive **D**evice (**ESD**)

Maximum ratings

Operable temperature range	T_A	–45/+120	˚C	
Storage temperature range	T_{stg}	–45/+120	˚C	
DC voltage	V_{DC}	12	V	between any terminals
Source power	P_s	0	dBm	

Characteristics

Reference temperature: T_A = 25 ˚C
Terminating source impedance: Z_S = 50 Ω
Terminating Load impedance: Z_L = 50 Ω

		min.	typ.	max.	
Center frequency[1]	f_c	433,845	433,92	433,995	MHz
Minimum insertion attenuation	α_{min}	—	1,0	1,7	dB
Unloaded quality factor	Q_U	8000	14500	—	
Ageing of f_c		—	—	± 50	ppm
Equivalent circuit elements					
Motional capacitance	C_1	—	1,95	—	fF
Motional inductance	L_1	—	69	—	µH
Motional resistance	R_1	—	12	23	Ω
Parallel capacitance [2]	C_0	—	2,7	—	pF
Temperature coefficient of frequency [3]	TC_f	—	– 0,03	—	ppm/K²
Turnover temperature	T_0	0	—	30	˚C

[1] Center frequency is defined as maximum of the real part of the admittance

[2] If used in two port configuration (pin 2-input, pin 6-output) C_0 is reduced by approx. 0,3 pF.

[3]Temperature dependence of f_c: $f_c(T_A) = f_c(T_0)(1 + TC_f(T_A - T_0)^2)$

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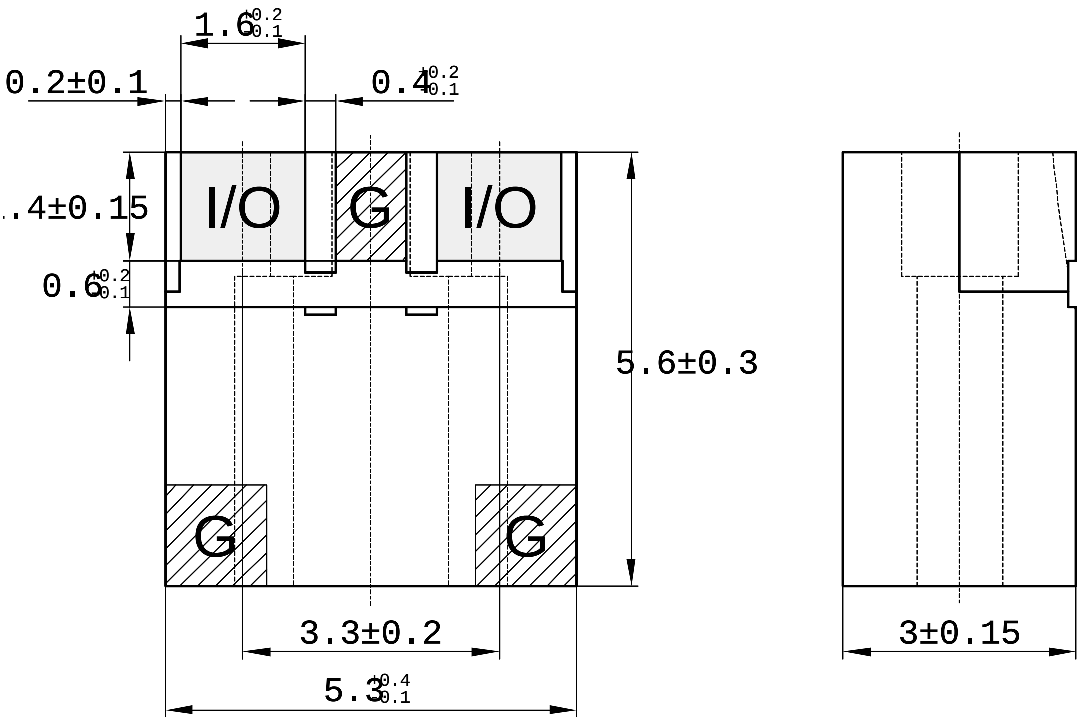
Application

- RF filter for DAB (Digital Audio Broadcast)

Features

- SMD filter consisting of coupled resonators with stepped impedances
- (NdBa)TiO_3 (ε_r = 88 / TC_f = 0±10 ppm/K) with a coating of copper (10µm) and tin (>5µm)
- Excellent reflow solderability, no migration effect due to copper/tin metallization

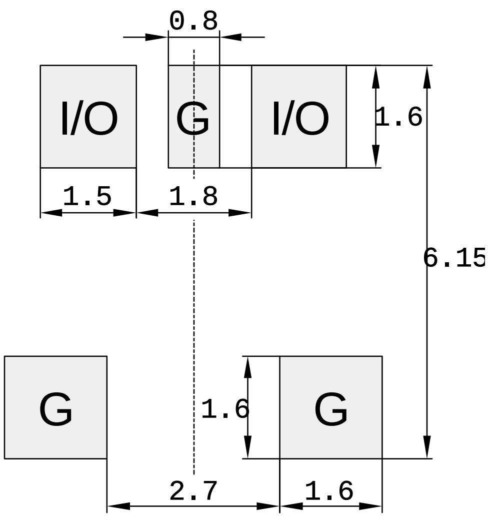
Component drawing



View from below onto the solder terminals and view from beside

S2T331.DOC

Recommended footprint



FPS2T331.DOC

Characteristics

		min.	typ.	max.	
Center frequency	f_C	-	1472	-	MHz
Insertion loss	α_{IL}		0.9	1.5	dB
Passband	B	40			MHz
Amplitude ripple (peak - peak)	$\Delta\alpha$		0.3	1.0	dB
Standing wave ratio	SWR		1.5	2.0	
Impedance	Z		50		Ω
Attenuation at 1242 MHz	α	40	45		dB

Maximum ratings

IEC climatic category (IEC 68-1)		- 40/+ 90/56	
Operating temperature	T_{op}	- 40 / + 90	°C

Typical passband characteristic

S2T331.DOC

Processing information

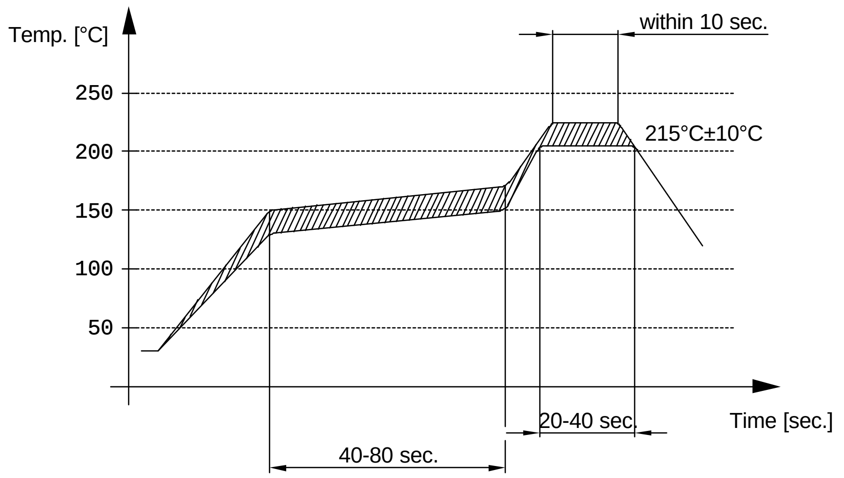
ZNr.: 321 (FILT95_2)

- Wettability to IEC 68-2-58: ≥ 75% (after aging)

Soldering requirements

Soldering type	reflow	
Maximum soldering temperature (measuring point on top surface of the component)	235 (max. 2 sec.) 225 (max. 10 sec.)	°C °C

Recommended soldering conditions (infrared):



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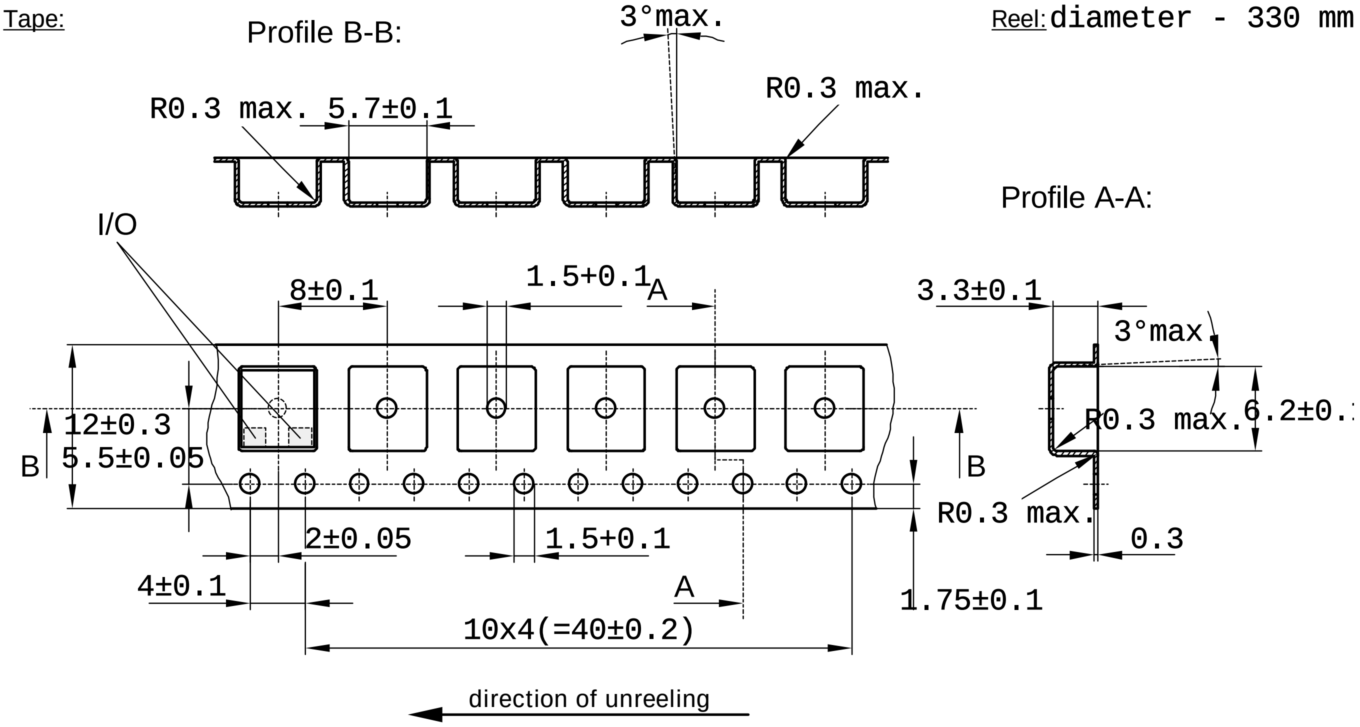
Delivery mode

- Blister tape to IEC 286-3, polyester, grey
- Pieces/tape: 2000

Tape: Reel: diameter - 330 mm



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