Measurement condition

Ambient temperature: 23 °C
Input power level: 0 dBm
Terminating impedance: *
Input: 731,5 Ω || -4,5 pF
Output: 809,5 Ω || -3,8 pF

Characteristics

Remark:
The reference level for the relative attenuation a_{rel} of the TFS 309A is the minimum of the pass band attenuation a_{min}. The minimum of the pass band attenuation a_{min} is defined as the insertion loss a_e. The centre frequency f_c is the arithmetic mean value of the upper and lower frequencies at the 3 dB filter attenuation level relative to the insertion loss a_e. The nominal frequency f_N is fixed at 309,4 MHz without any tolerance. The given values for both the relative attenuation a_{rel} and the group delay ripple have to be achieved at the frequencies given below even if the centre frequency f_c is shifted due to the temperature coefficient of frequency TC_f in the operating temperature range and due to a production tolerance for the centre frequency f_c.

D a t a		typ. value		tolerance / limit		
Insertion loss (reference level)	a_e	5,3	dB	max.	7,6	dB
Nominal frequency	f_N	-			309,4	MHz
Centre frequency	f_C	309,4	MHz		-	
Passband	PB	-		f_N ±	0,25	MHz
Pass band ripple		0	dB	max.	0,5	dB
Relative attenuation	a_{rel}					
f_N … f_N ± 0,25 MHz		0,40	dB	max.	0,5	dB
f_N ± 0,75 MHz … f_N ± 1,5 MHz		13	dB	min.	10	dB
f_N ± 1,5 MHz … f_N ± 3,0 MHz		46	dB	min.	40	dB
f_N ± 3,0 MHz … f_N ± 4,5 MHz		53	dB	min.	50	dB
f_N - 21,4 MHz		64	dB	min.	60	dB
f_N ± 50,0 MHz … f_N ± 300,0 MHz		57	dB	min.	50	dB
Group delay ripple within PB		166	ns	max.	500	ns
IIP3	**	33	dBm	min.	30	dBm
Input power level		-		max.	15	dBm
Operating temperature range	OTR	-		- 40 °C ... + 85°C		
Storage temperature range		-		- 55 °C ... +105°C		
Frequency inversion temperature		23	°C			
Temperature coefficient of frequency	TC_f ***	-0,043	ppm/K²			

*) The terminating impedances depend on parasitics and q-values of matching elements and the board used, and are to be understood as reference values only. Should there be additional questions do not hesitate to ask for an application note or contact our design team.
**) f_{in1}= 309,35 MHz; f_{in2}= 309,3 MHz; P_{in}= -10 dBm $f_{measurement}$ = 309,4 MHz and f_{in1}= 309,45 MHz; f_{in2}= 304,5 MHz; P_{in}= - 10 dBm $f_{measurement}$ = 309,4 MHz.
***) $\Delta f(Hz) = TC_f(ppm/K^2) \times (T-T_0)^2 \times f_{To}(MHz)$

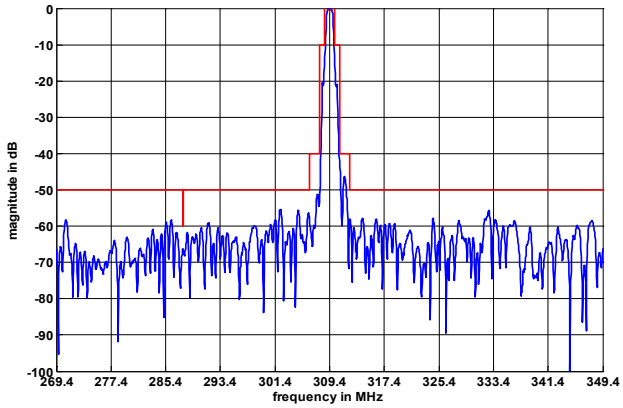
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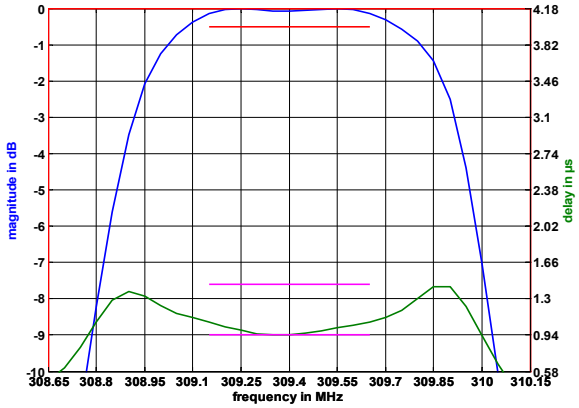
Checked / Approved:

Tele Filter GmbH
Potsdamer Straße 18
D 14 513 TELTOW / Germany
Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30
E-Mail: tft@telefilter.com

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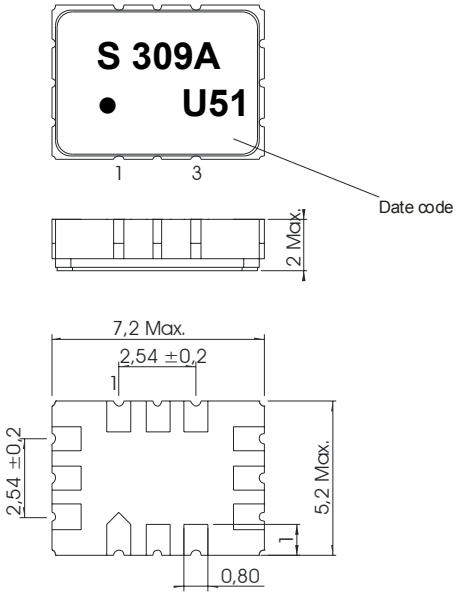
Filter characteristic





Construction and pin connection

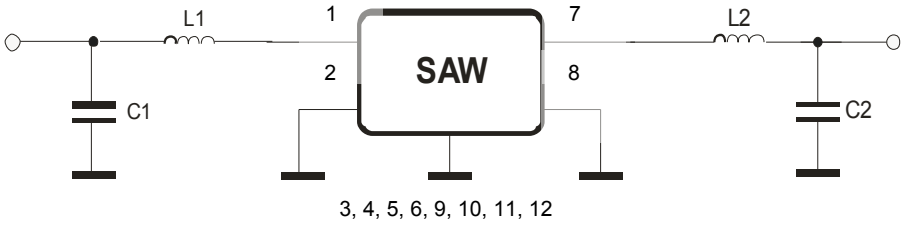
(All dimensions in mm)



1	Input
2	Input RF Return
3	Ground
4	Ground
5	Ground
6	Ground
7	Output
8	Output RF Return
9	Ground
10	Ground
11	Ground
12	Ground

Date code:	Year + week
U	2006
V	2007
W	2008
...	

50 Ω Test circuit



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Stability characteristics, reliability

After the following tests the filter shall meet the whole specification:

1. Shock:	500g, 1 ms, half sine wave, 3 shocks each plane; DIN IEC 68 T2 - 27
2. Vibration:	10 Hz to 500 Hz, 0,35 mm or 5 g respectively, 1 octave per min, 10 cycles per plan, 3 plans; DIN IEC 68 T2 - 6
3. Change of temperature:	-55 °C to 125°C / 30 min. each / 10 cycles DIN IEC 68 part 2 – 14 Test N
4. Resistance to solder heat (reflow):	reflow possible: three times max.; for temperature conditions refer to the attached "Air reflow temperature conditions" on page 4;

This filter is RoHS compliant (2002/95/EG, 2005/618/EG)

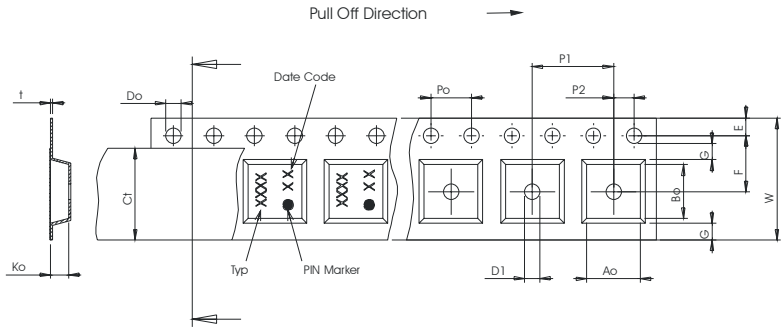
Packing

Tape & Reel: IEC 286 – 3, with exception of value for N and minimum bending radius;
tape type II, embossed carrier tape with top cover tape on the upper side;

max. pieces of filters per reel:	3000
reel of empty components at start:	min. 300 mm
reel of empty components at start including leader:	min. 500 mm
trailer:	min. 300 mm

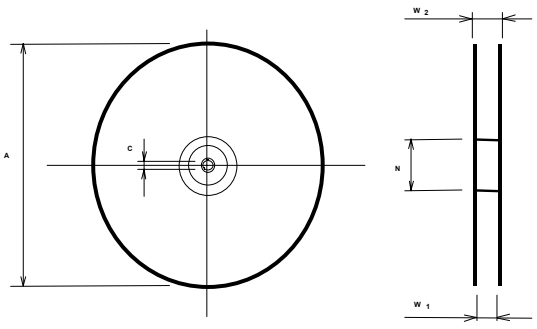
Tape (all dimensions in mm)

W	: 16,00	± 0,3
Po	: 4,00	± 0,1
Do	: 1,50	+0,1/-0
E	: 1,75	± 0,1
F	: 7,50	± 0,1
G(min)	: 0,60	
P2	: 2,00	± 0,1
P1	: 8,00	± 0,1
D1(min)	: 1,50	
Ao	: 5,50	± 0,1
Bo	: 7,50	± 0,1
Ct	: 13,5	± 0,1



Reel (all dimensions in mm)

A	:330	
W1	: 16,4	+2/-0
W2(max)	: 22,4	
N(min)	: 50	
C	: 13,0	+0,5/-0,2



The minimum bending radius is 45 mm.

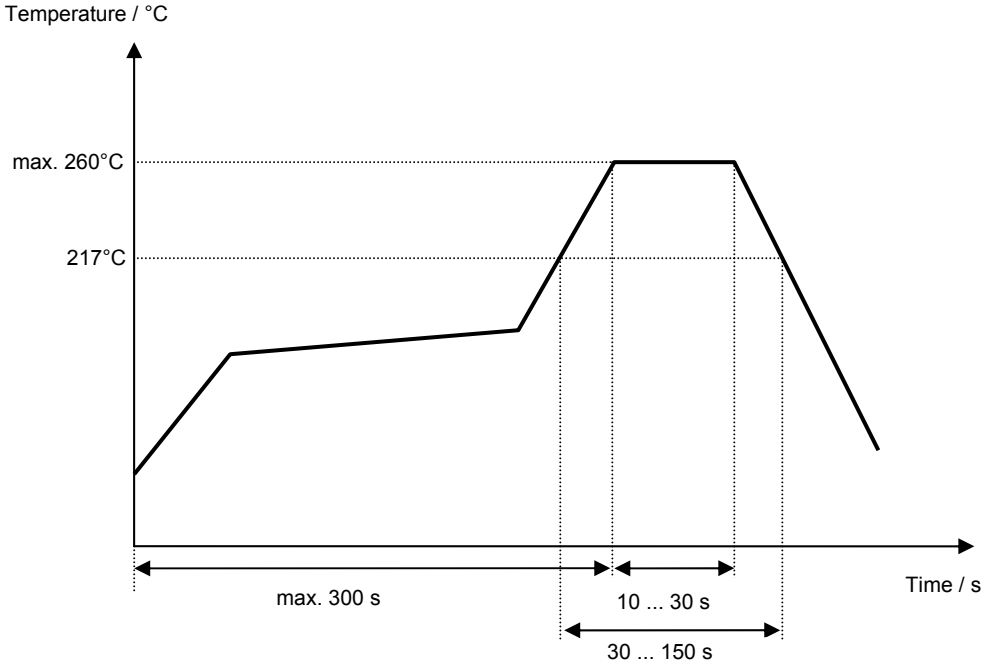
Tele Filter GmbH
Potsdamer Straße 18
D 14 513 TELTOW / Germany
Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30
E-Mail: tft@telefilter.com

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Air reflow temperature conditions

Conditions	Exposure
Average ramp-up rate (30°C to 217°C)	less than 3°C/second
> 100°C	between 300 and 600 seconds
> 150°C	between 240 and 500 seconds
> 217°C	between 30 and 150 seconds
Peak temperature	max. 260°C
Time within 5°C of actual peak temperature	between 10 and 30 seconds
Cool-down rate (Peak to 50°C)	less than 6°C/second
Time from 30°C to Peak temperature	no greater than 300 seconds

Chip-mount air reflow profile



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History

Version	Reason of Changes	Name	Date
1.0	- Generation of development specification	Strehl	20.02.2006
1.1	- Change input power level and storage temperature range	Strehl	23.03.2006
1.2	- Change from development specification to filter specification - Change Intermodulation value - Add terminating impedance value - Add typical values - Add filter characteristics - Add matching circuit	Alawneh	08.11.2007

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