

**VI TELEFILTER****Filter Specification****TFS 309****1/5****Measurement condition**

Ambient temperature: 23 °C  
 Input power level: 0 dBm  
 Terminating impedances  
     for input: 540 Ohm // -1,7 pF  
     for output: 540 Ohm // -1,7 pF  
 External coil: 116 nH

**Characteristics****Remark:**

Reference level for the relative attenuation  $a_{rel}$  of the TFS 309 is the insertion loss. The insertion loss  $a_e$  is defined as the insertion loss at the nominal frequency  $f_N$ . 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 on 309,6 MHz without tolerance. The specified values have to be reached in operating temperature range.

<b>D a t a</b>		<b>typ.value</b>	<b>tolerance/limit</b>
<b>Insertion loss</b> (Reference level)	$a_e$	2,75 dB	2,1 ... 4,1 dB
<b>Nominal frequency</b>	$f_N$	-	309,600 MHz
<b>Centre frequency</b>	$f_C$	309,62 MHz	-
<b>1 dB bandwidth</b>	BW	270 kHz	-
<b>Relative attenuation</b>	$a_{rel}$		
$f_N \pm 1,8$ MHz ... $f_N \pm 6$ MHz		47 dB	min. 30 dB
$f_N \pm 6$ MHz ... $f_N \pm 100$ MHz		28...65 dB	min. 20 dB
<b>VSWR</b>			
@ $f_N$		1,2:1	min. 1,8 : 1
<b>Group delay</b>	GD		
@ $f_N$		2,6 $\mu$ s	max. 4,6 $\mu$ s
<b>Input power</b>		-	max. 10 dBm
<b>Operating temperature range</b>			-5 °C ... +80 °C
<b>Temperature coefficient of frequency</b>	TC	ca. -0,036 ppm/K <sup>2</sup>	
<b>Frequency inversion temperature</b>		+25 °C	

**Generated:** \_\_\_\_\_**Checked / approved:** \_\_\_\_\_

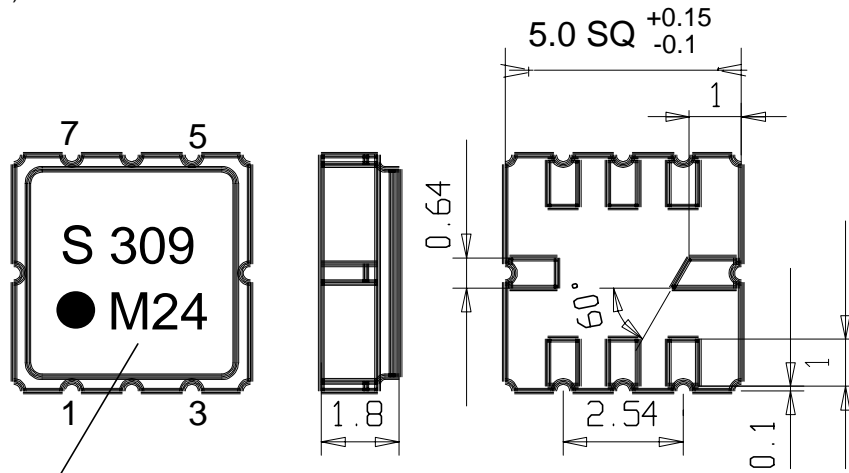
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**Construction, pin configuration and 50 Ω - matching network**

(All dimensions in mm)

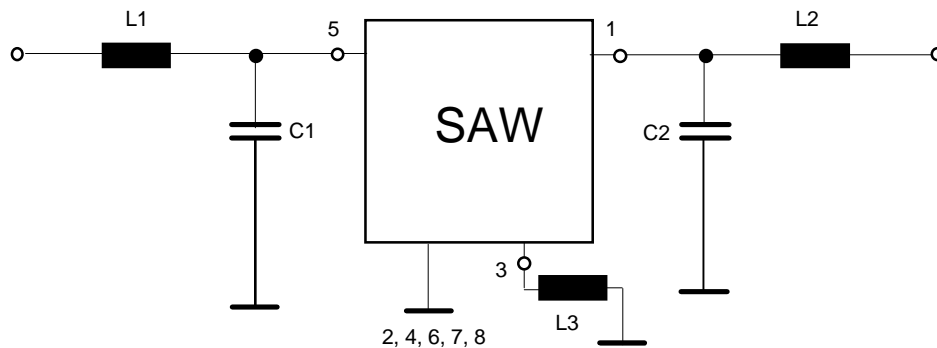


**Date code**

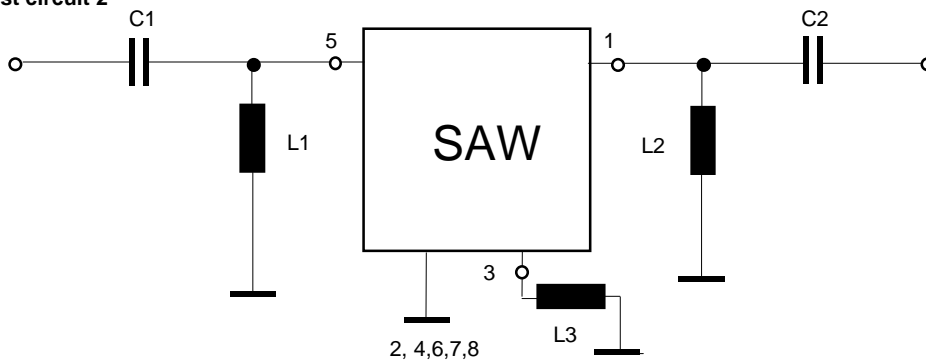
Pin 1	Output
Pin 2,6,7	Ground
Pin 3	External Coil
Pin 4,8	Package Ground
Pin 5	Input

Datecode:	Year+week
K	1998
L	1999
M	2000
...	

**50 Ohm Test circuit 1**



**50 Ohm Test circuit 2**



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**Stability Characteristics**

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

1. Shock: 500g, 18 ms, half sine wave, 3 shocks each plane;  
DIN IEC 68 T2 - 27
2. Vibration: 10 Hz to 500 Hz, 0,35 mm or 5g respectively, 1 octave per min, 10 cycles per plan, 3 plans;  
DIN IEC 68 T2 - 6
3. Damp heat: 25 °C to 55°C / 95% r.H. / 10 cycles  
(cycle) DIN IEC 68 - 2 – 30 Db
4. Resistance to solder heat (reflow): max. 2 times reflow process;  
for temperature conditions refer to the attached "Air reflow temperature conditions" on page 4;

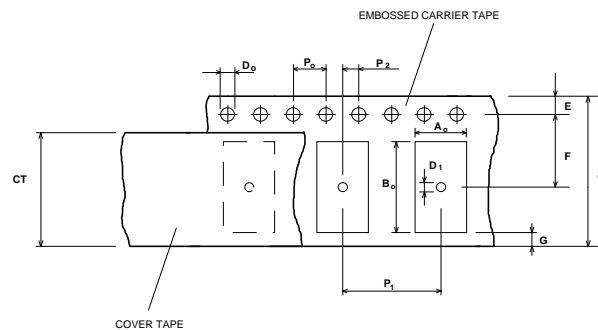
**Packing**

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;

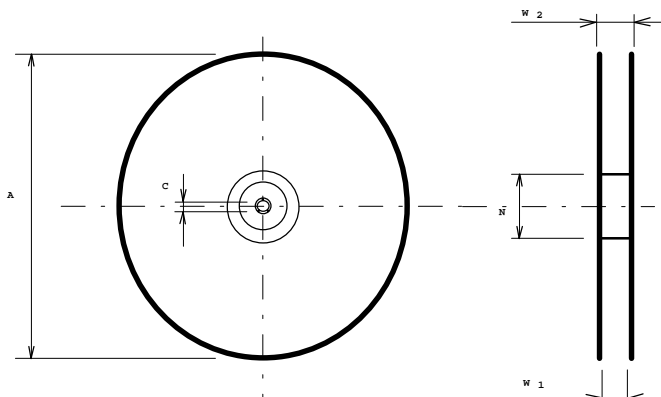
max. pieces of filters per reel: 3000  
Reel of empty components at start: min 300 mm  
Reel of empty components at start including leader: min 500 mm  
Trailer: min 300 mm

**Tape (all dimensions in mm)**

W : 12 ± 0,3  
Po : 4 ± 0,1  
Do : 1,5 + 0,1  
E : 1,75 ± 0,1  
F : 5,5 ± 0,05  
G (min) : 0,75  
P2 : 2 ± 0,05  
P1 : 8 ± 0,1  
D1(min) : 1,5  
Ao : 5,3 ± 0,1  
Bo : 5,3 ± 0,1  
CT : 9,5 ± 0,1

**Reel (all dimensions in mm):**

A : 330  
W1 : 12,4 + 0,2  
W2 (max) : 18,4  
N (min) : 50  
C : 13 ± 0,2



The minimum bending radius is 45 mm. The mounting surface of the filters faces the bottom side of the embossed carrier tape. The marking of the filters is able to read if the view is directed on the upper side of the carrier tape with the sprocket holes on the right side of the tape.

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**Air reflow temperature conditions**

## 1st and 2nd air reflow profile

<b>Name:</b>	pre-heating periods	main-heating periods	peak temperature
<b>Temperature:</b>	150 °C - 170 °C	over 200 °C	255 °C ± 5 °C
<b>Time:</b>	60 sec. - 90 sec.	20 sec. - 25 sec.	

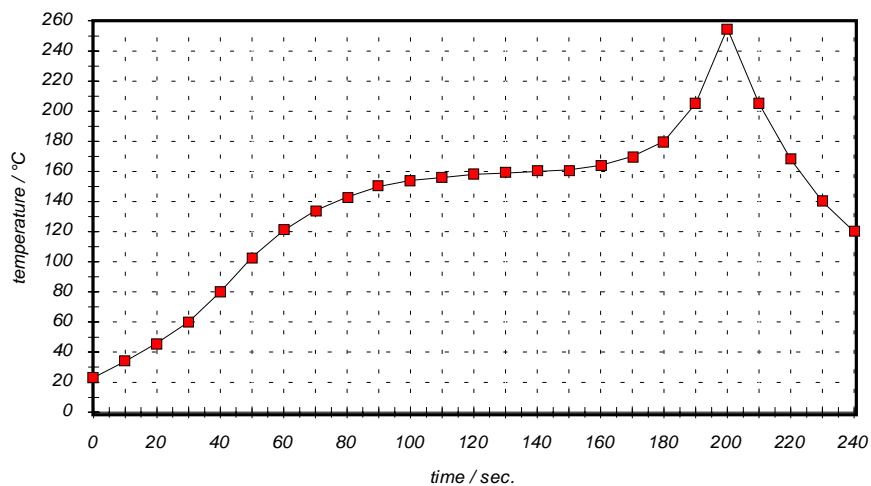
**Chip-mount air reflow profile**

Table for temperature vs. time during the air reflow process

Tolerance of temperatures: ± 5 °C

time / sec.	temperature / °C	time / sec.	temperature / °C
0	23	140	160
10	34	150	161
20	46	160	164
30	60	170	170
40	80	180	180
50	103	190	205
60	121	195	230
70	134	200	255
80	143	205	230
90	150	210	205
100	154	215	180
110	156	220	165
120	158	230	140
130	159	240	120

**VI TELEFILTER****Filter Specification****TFS 309****5/5****History**

<b>Version</b>	<b>Reason of Changes</b>	<b>Name</b>	<b>Date</b>
1.2	Add preliminary values for termination impedance Add history Modify monthly date code into weekly date code	Dr. Wall	09.05.2000
1.3	Correct tape and reel information Add limit values for package dimensions Add final termination conditions Add typical filter data Add limits for insertion loss	Dr. Wall	15.06.2000
1.4	Add maximum input power Add relative attenuation value for $F_N \pm 6$ MHz ... $F_N \pm 100$ MHz Add group delay Notice 1 dB bandwidth instead of 3 dB bandwidth Increase window for insertion loss to two dB	Dr. Wall	28.06.2000
1.5	Maximum input power changed to 10 dBm	Dr. Wall	13.07.2000

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