

**VI TELEFILTER****Filter Specification****TFS 321****1/5****Measurement condition**

Ambient temperature: 23 °C  
 Input power level: 0 dBm  
 Terminating impedances \*  
   input: 490 Ohm // -1.6 pF  
   output: 490 Ohm // -1.6 pF  
   External coil: 175 nH

**Characteristics****Remark:**

Reference level for the relative attenuation  $a_{rel}$  of the TFS 321 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 on 321,4 MHz without tolerance. The given values for the relative attenuation  $a_{rel}$  and for the group delay ripple have to be reached at the frequencies given below also 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  $f_c$ .

<b>D a t a</b>		<b>typ. value</b>	<b>tolerance/limit</b>
<b>Insertion loss</b> (Reference level)	$a_e = a_{min}$	-	max. 6,5 dB
<b>Nominal frequency</b>	$f_N$	-	321,400 MHz
<b>Centre frequency</b>	$f_c$	321,41	
<b>Usable signal bandwidth</b>		-	min. 140 kHz
<b>3 dB bandwidth</b>	BW	-	min. 280 kHz
<b>Relative attenuation</b>	$a_{rel}$		
$f_N \pm 400$ kHz		-	min. 15 dB
$f_N \pm 400$ kHz ... $f_N \pm 600$ kHz		-	min. 27 dB
$f_N \pm 600$ kHz ... $f_N \pm 13$ MHz		-	min. 35 dB
<b>Group delay ripple</b>	GD		
$f_N \pm 70$ kHz		-	max. 2 $\mu$ s
<b>Input power level</b>		-	max. 13 dBm
<b>Operating temperature range</b>			-20 °C ... +70 °C
<b>Temperature coefficient of frequency</b>	TC **	-0.036	ppm/K <sup>2</sup>
<b>Frequency inversion temperature <math>T_0</math></b>		+ 20	°C

\*) 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.

\*\*\*)  $\Delta f(\text{Hz}) = TC_f(\text{ppm/K}^2) \times (T - T_0)^2 \times f_{T0}(\text{MHz})$

**Generated:****Checked / approved:**

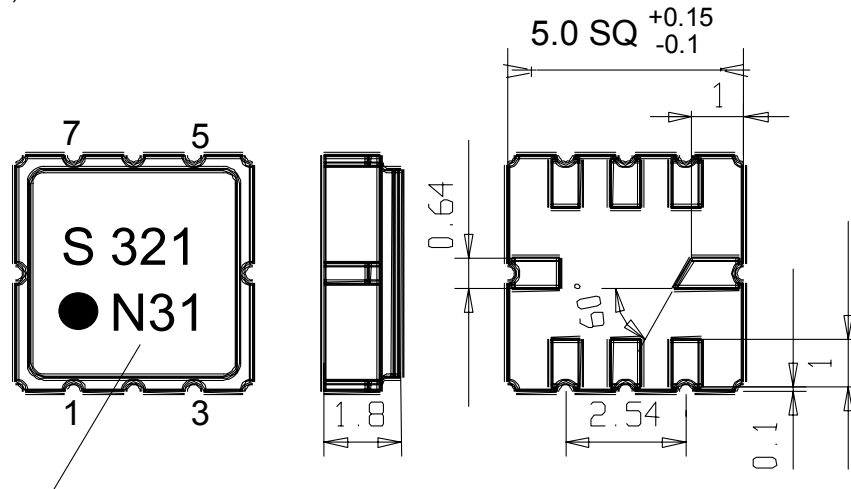
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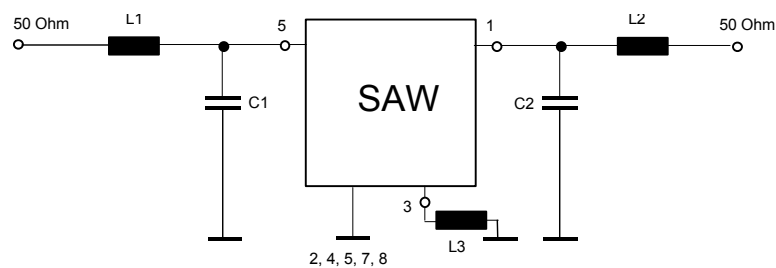
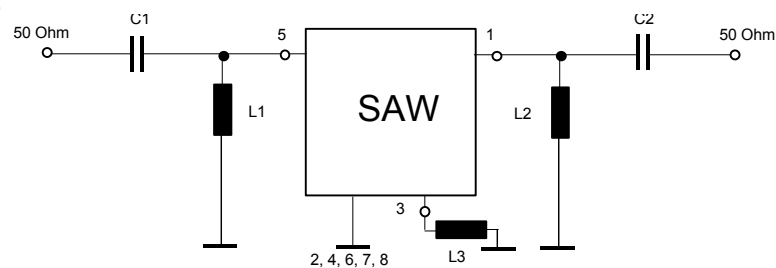
**Construction, pin configuration and 50 Ω - matching network**

(All dimensions in mm)

**Date code**

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

Datecode:	Year+week
L	1999
M	2000
N	2001
...	

**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, 1,5 mm or 20g 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): max. 2 times reflow process;  
for temperature conditions refer to the attached "Air reflow temperature conditions" on page 4;

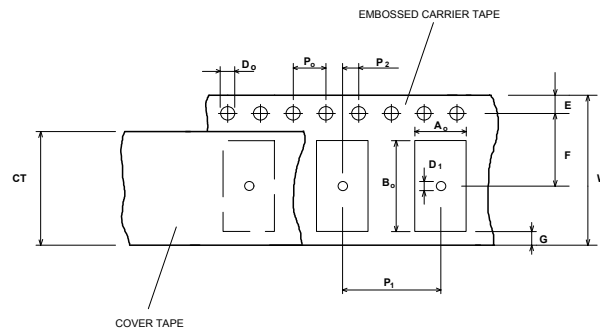
**Packing**

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;

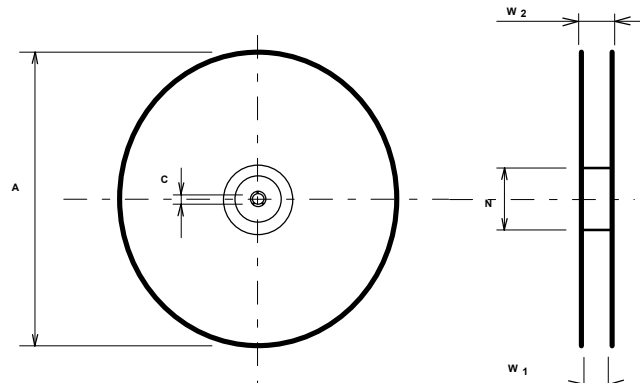
max. pieces of filters per reel: 3000  
reel of empty components at start: min 300 mm  
reel of empty components at start including leader: min 500 mm  
trailer: min 300 mm

**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

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

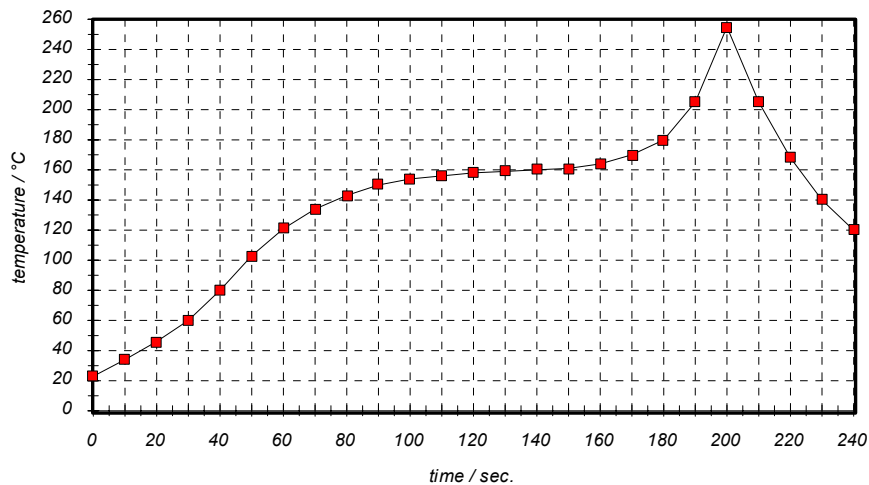
**Chip-mount air reflow profile**

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

**History**

<b>Version</b>	<b>Reason of Changes</b>	<b>Name</b>	<b>Date</b>
1.0	Generation of specification according to customer requirements.	Dr. Wall	22.03.2001
1.1	Change matching from balanced driven to unbalanced driven. Remove termination impedance values.	Dr. Wall	28.03.2001
1.2	Change from development specification to filter specification. Add values for terminating impedance and coupling coil.	Dr. Wall	18.06.2001
1.3	Use harder conditions for vibration and damp heat Increase input power level from 10 dBm to 13 dBm	Herrler	30.07.2001