

**VI TELEFILTER**

**Filter specification**

**TFS 110 T**

**1/5**

**Measurement condition**

Ambient temperature: 23 °C  
 Input power level : 0 dBm  
 Terminating impedances at fc \*: for input: 930 Ω || - 13,5 pF  
 for output: 940 Ω || - 15,2 pF

**Characteristics**

**Remark:**

Reference level for the relative attenuation  $a_{rel}$  of the TFS 110 T 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 3dB filter attenuation level relative to the insertion loss  $a_e$ . The nominal frequency  $f_N$  is fixed on 110.592 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)	$a_e = a_{min}$	7,5 dB	max. 14,0 dB
<b>Nominal frequency</b>	$f_N$	-	110,592 MHz
<b>Centre frequency</b>	$f_c$	110,592 MHz	
<b>Relative attenuation</b> $a_{rel}$			
$f_N$	... $f_N \pm 0,3$ MHz	-	max. 3 dB
$f_N \pm 0,6$ MHz	... $f_N \pm 5$ MHz	38 dB	min. 30 dB
<b>Group delay ripple in PB</b>		380 ns	max. 800 nsec
<b>Temperature coefficient</b>		0,032 ppm/K <sup>2</sup>	
<b>Operating temperature range</b>			- 40 °C ... + 85 °C
<b>Storage temperature range</b>			- 40 °C ... + 85 °C
<b>Input power</b>			max. 10 dBm

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\*) 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.

**Generated:** \_\_\_\_\_

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

**Construction and Pin Connection**

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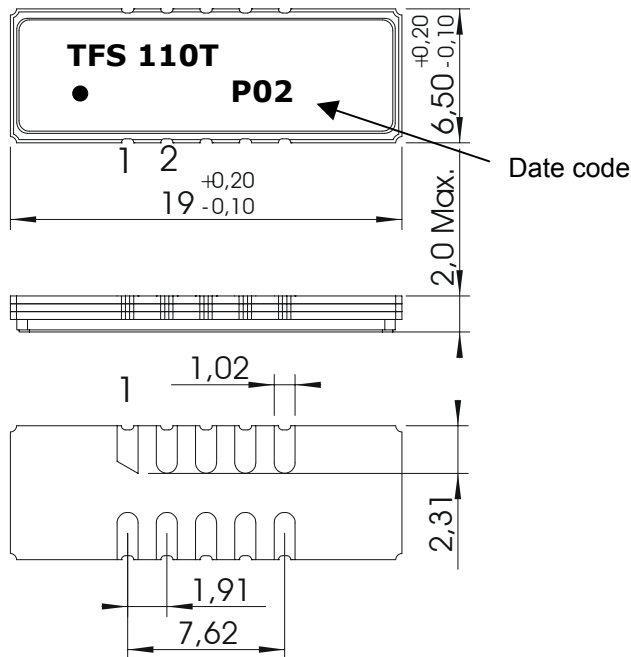
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**VI TELEFILTER**

**Filter specification**

**TFS 110 T**

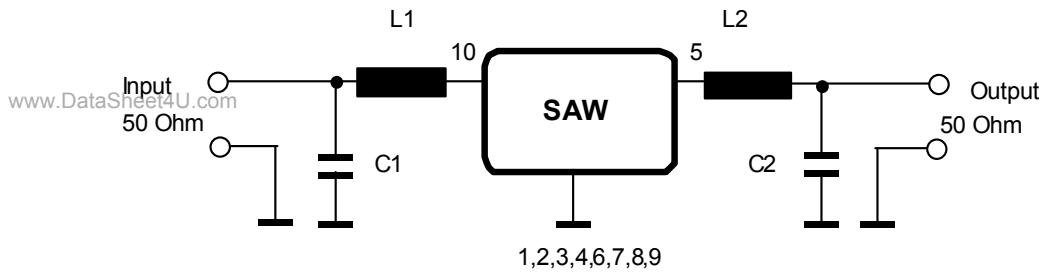
(All dimensions in mm)



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

Date code:	Year+week
M	2000
N	2001
P	2002
...	

**50 Ω test circuit**



**Stability characteristics**

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**Filter specification**

**TFS 110 T**

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. 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: twice max. ;  
for temperature conditions, please refer to the attached "Air reflow temperature conditions" on page 4;

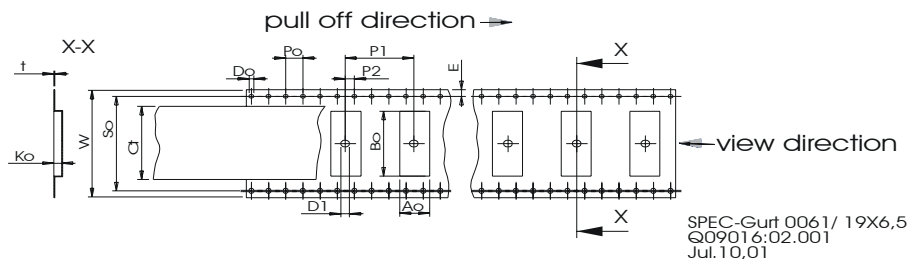
**Packing**

Tape & Reel: DIN 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: 2000  
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)**

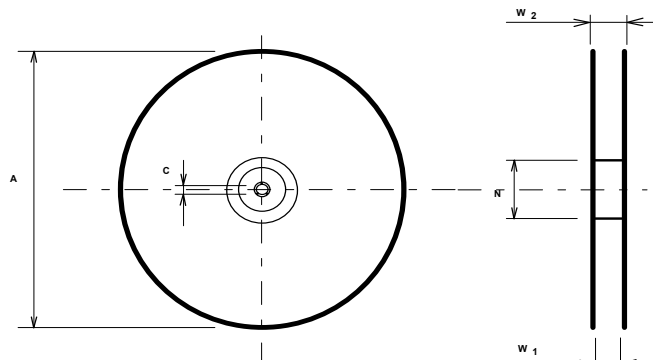
- W : 32 ± 0,3
- Po : 4 ± 0,1
- Do : 1,5 + 0,5
- E : 1,75 ± 0,1
- S0 : 28,4 ± 0,1
- P2 : 2 ± 0,1
- P1 : 12 ± 0,1
- D1(min) : 1,5
- Ao : 7,1 ± 0,1
- Bo : 19,6 ± 0,1
- Ko : 2,0 ± 0,1
- t : 0,35 ± 0,05
- Ct : 25,5 ± 0,1



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

- A : 330
- W1 : 32,4 +2
- W2 (max) : 38,4
- N (min) : 100
- C : 13 +0,5/-0,2



The minimum bending radius is 45 mm. The mounting surface of the filters faces the bottom side of the embossed carrier tape. Markings on the filters can be read if the upper side of the carrier tape is regarded with the sprocket holes on its right.

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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**

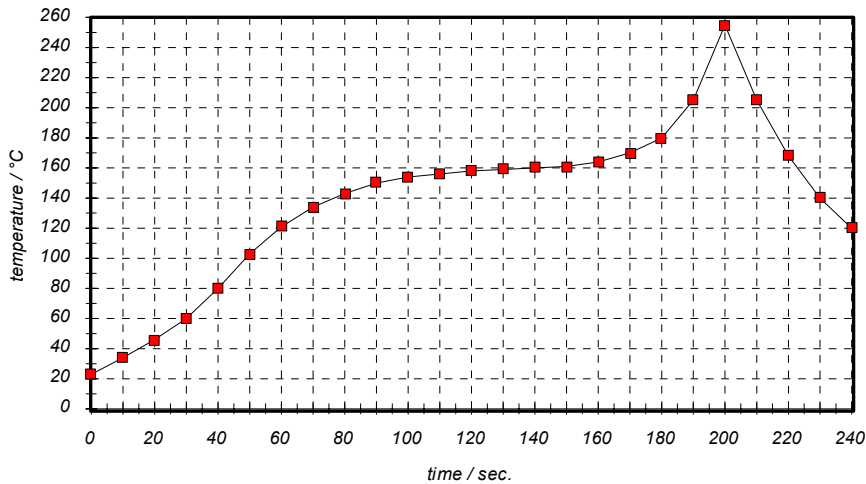


Table for temperature vs. time during the air reflow process

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

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**History**

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<b>Version</b>	<b>Reason of Changes</b>	<b>Name</b>	<b>Date</b>
1.0	- identical with specification from hudson	Sabah	06.01.2000
1.1	- history added	Steiner	13.07.2000
1.2	- Change package to 15mm x 6mm - use harder conditions for "Stability characteristics"	Herrler	17.08.2001
1.3	- change to centre frequency reference for attenuation - add additional attenuation requirements	Steiner	29.08.2001

**development specification**

2.0	changes requested by customer introduced - wider passband - 10dB/20dB attenuation demands removed - temperature range corrected according to TFS110B specification - change 30 dB edge frequencies	Steiner	23.11.2001
2.1	- changed values of rejection, group delay, operating temperature - changed package	Pfeiffer	10.01.2002
2.2	- terminating impedance added - typical values added	Pfeiffer	12.03.2002
2.3	- limit of max. input power added	Pfeiffer	13.03.2002