

**VI TELEFILTER**

**Filter specification**

**TFS 224A**

**Measurement condition :**

Ambient temperature  $T_A$ : 23 °C  
 Input power level: 0 dBm  
 Terminating impedances at  $f_C$  \*): for input: 1200  $\Omega$  | - 5,32 pF  
 for output:: 1200  $\Omega$  | - 5,25 pF

**Characteristics**

Remark:

The reference level for the relative attenuation  $a_{rel}$  of the TFS 224A is the minimum of the pass band attenuation. This value is defined as the insertion loss  $a_e$ . The nominal frequency  $f_N$  is fixed at 224,88 MHz without any tolerance. The values of relative attenuation  $a_{rel}$  are guaranteed for the whole operating temperature range. The frequency shift of the filter in the operating temperature range is included in the production tolerance scheme.

<b>D a t a</b>		<b>typ. value</b>		<b>tolerance / limit</b>
<b>Insertion loss</b> (reference level)	$a_e$	6,5	dB	max. 9 dB
<b>Nominal frequency</b>	$f_N$	-		224,88 MHz
<b>Passband</b>		-		$f_N \pm 0,3$ MHz
<b>Pass band ripple</b>		0,5	dB	max. 1 dB
<b>Relative attenuation</b>	$a_{rel}$			
$f_N$	... $f_N \pm 0,3$ MHz	-		max. 1 dB
$f_N \pm 0,75$ MHz	... $f_N \pm 2,4$ MHz	-		min. 3 dB
$f_N \pm 2,4$ MHz	... $f_N \pm 8$ MHz	40	dB	min. 33 dB
$f_N \pm 8$ MHz	... $f_N \pm 15$ MHz	47	dB	min. 40 dB
$f_N \pm 15$ MHz	... $f_N \pm 50$ MHz	52	dB	min. 45 dB
<b>Group delay</b>	mean value in PB	765	ns	$765 \pm 10$ ns
<b>Group delay ripple within PB</b>		50	ns	-
<b>Deviation from linear phase</b>				
	$f_N \pm 0,675$ MHz	1,7	° rms	max. 3,5 ° rms
<b>VSWR within PB</b>		1,5	: 1	max. 2 : 1
<b>Operating temperature range</b>	OTR	-		- 30 °C ... + 80 °C
<b>Storage temperature range</b>		-		- 40 °C ... + 85 °C
<b>Frequency inversion temperature</b>		25	°C	-
<b>Temperature coefficient of frequency</b>	$TC_f$ **	-0,03	ppm/K <sup>2</sup>	-

\*) The terminating impedances depend on parasites 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.

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

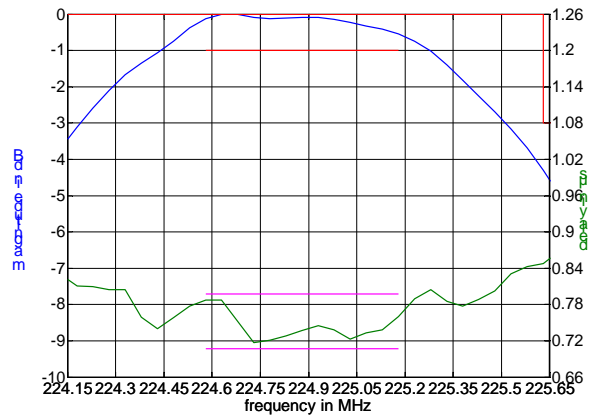
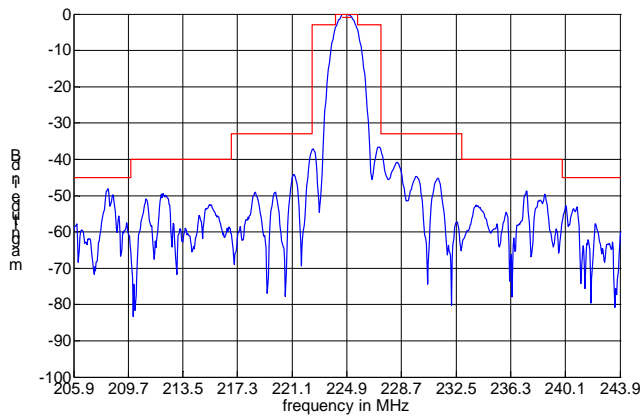
**Generated:**

**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](mailto:tft@telefilter.com)

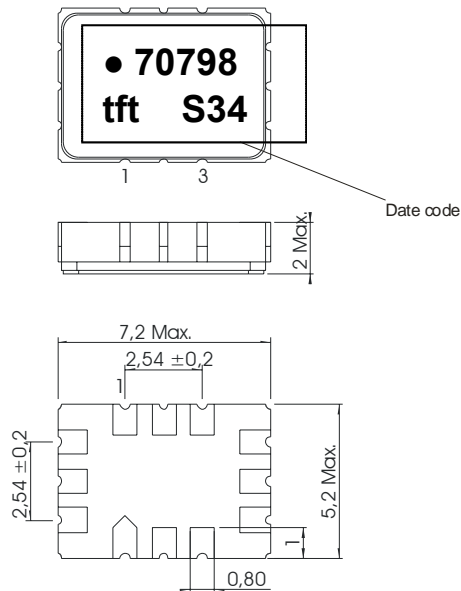
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**Filter characteristic**



**Construction and pin connection**

(All dimensions in mm)

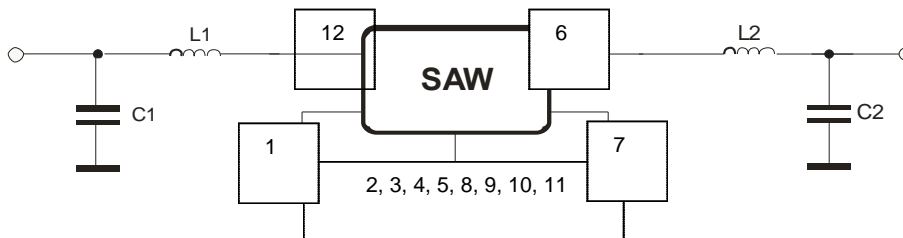


1	Input RF Return
2	Ground
3	Ground
4	Ground
5	Ground
6	Output
7	Output RF Return
8	Ground
9	Ground
10	Ground
11	Ground
12	Input

Date code:	Year + week
S	2004
T	2005
U	2006
...	

**50 Ω Test circuit**



**Tele Filter GmbH**  
 Potsdamer Straße 18  
 D 14 513 TELTOW / Germany  
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 E-Mail: [tft@telefilter.com](mailto:tft@telefilter.com)

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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. 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 refer to the attached "Air reflow temperature conditions" on page 4;

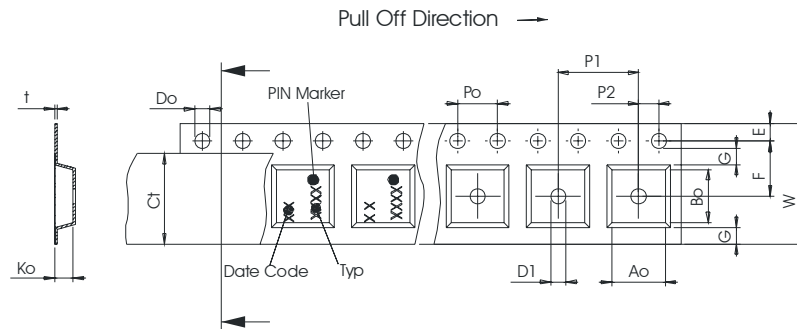
**Packing**

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 peer 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

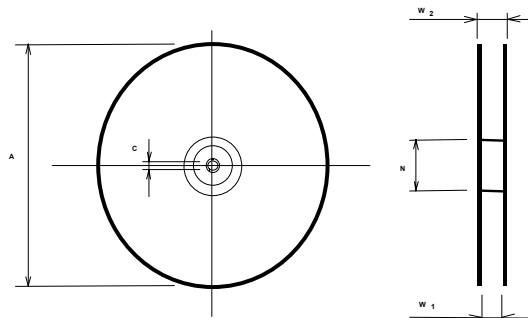
**Tape (all dimensions in mm)**

- 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.

**Air reflow temperature conditions**

**Tele Filter GmbH**  
**Potsdamer Straße 18**  
**D 14 513 TELTOW / Germany**  
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**E-Mail: [tft@telefilter.com](mailto:tft@telefilter.com)**

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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**

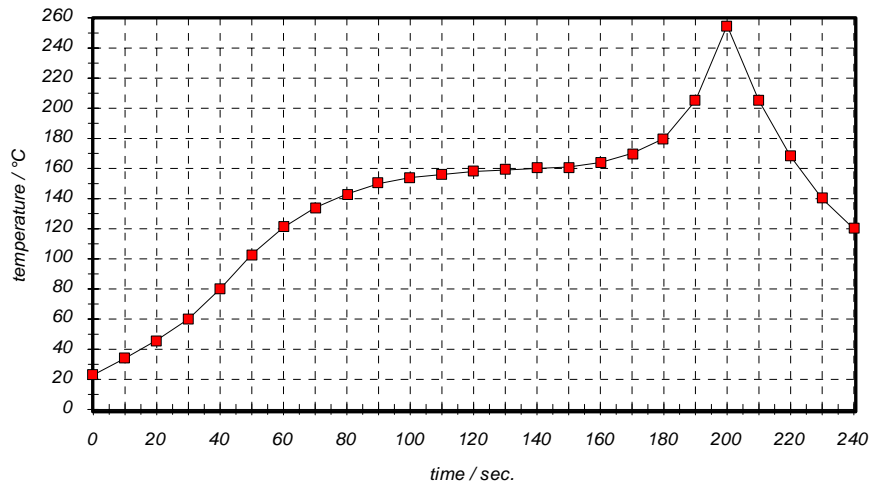


Table for temperature vs. time during the air reflow process

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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**VI TELEFILTER****Filter specification****TFS 224A****5/5****History**

<b>Version</b>	<b>Reason of changes</b>	<b>Name</b>	<b>Date</b>
1.1...1.5	- generate filter specification of TFS 224A.	Dunzow W.	11.02.2000.
1.6	- change limit values of group delay ( mean value in pass band ) from $763 \pm 10$ ns to $765 \pm 10$ ns according to customer requirement.	Dunzow W.	12.09.2000.
1.7	- change marking. - correct termination impedance.	Dunzow W.	29.10.2002.
1.8	- labelling changed - filter characteristic added - change remark - remove centre frequency	Pfeiffer	16.08.2004
1.9	- labelling corrected	Steiner	03.09.2004

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