

**VI TELEFILTER****Filter specification****TFS 110 C - 1/5****Measurement condition**

Ambient temperature : 23° C  
 Input power level : 0 dBm  
 Terminating impedances : for input: 890 Ω || - 5,6 pF  
 for output: 680 Ω || - 5,9 pF

**Characteristics**

Remark: Reference level for the relative attenuation  $a_{rel}$  of the **TFS 110 C** 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 (reference) 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  $a_e$ .

Data	typ. value	tolerance / limit
<b>Insertion loss (Reference level)</b> $a_e$	11,9 dB	max. 13 dB
<b>Centre frequency</b> $f_c$ at ambient temperature $T_A$ ( $f_{CAT}$ )		110,592 ± 0,035 MHz
<b>Pass band shape</b> (3 dB-BW)		Gaussian
<b>Bandwidth</b> at ambient temperature:		
3 dB bandwidth	965 kHz	min. 900 kHz
10 dB bandwidth	1695 kHz	min. 1600 kHz
20 dB bandwidth	2255 kHz	max. 2420 kHz
30 dB bandwidth	2600 kHz	max. 2700 kHz
40 dB bandwidth	2840 kHz	max. 3070 kHz
<b>Relative attenuation</b> $a_{rel}$		
$f_c \pm 450$ kHz		max. 3 dB
$f_c \pm 450$ kHz ... $f_c \pm 800$ kHz		max. 10 dB
$f_c \pm 1210$ kHz ... $f_c \pm 1395$ kHz		min. 20 dB
$f_c \pm 1395$ kHz ... $f_c \pm 1535$ kHz		min. 30 dB
$f_c \pm 1535$ kHz ... $f_c \pm 10$ MHz	45...55 dB	min. 40 dB
<b>Group delay ( mean value ) :</b>	1,2 µs	
<b>Group delay ripple (p-p) :</b> $f_c$ ... $f_c \pm 800$ kHz	160 ns	max. 300 ns
<b>Deviation from linear phase (p-p):</b> $f_c$ ... $f_c \pm 800$ kHz	3 °	
<b>Frequency inversion temperature ( <math>T_o</math> )</b>	10° C	
<b>Temperature coefficient:</b> 1-st order [ $T_{C1}(1)$ ]	+ 1,7 ppm/K	
2-st order [ $T_{C1}(2)$ ]	- 0,06 ppm/K <sup>2</sup>	
<b>Frequency deviation of <math>f_c</math> over temperature: * )</b>	$\Delta f_c(\text{Hz}) = [ T_{C1}(1) \times (T - T_o) + T_{C1}(2) \times (T - T_o)^2 ] \times f_{T_o} (\text{MHz})$	
<b>Operating temperature range</b>	- 10 °C ... + 60 °C	
<b>Storage temperature range</b>	- 40 °C ... + 85 °C	
<b>Input power level</b>		max. 10 dBm.
<b>Permissible DC voltage</b> $V_{DC}$	-	12 V
<b>Permissible AC voltage</b> $V_{pp}$	-	10 V

\* )  $f_{T_o}$  is reference frequency  $f_c$  at frequency inversion temperature ( $T_o$ )

Generated: Dunzow W.P.

Checked/Approved: Dr. Bert Wall

**VI TELEFILTER**  
 Potsdamer Straße 18  
 D 14 513 TELTOW / Germany  
 Tel: (+49) 3328 4784-52 / Fax: (+49) 3328 4784-30  
 E-Mail: tft@telefilter.com

**Vectron International, Inc.**  
 267 Lowell Road  
 Hudson, NH 03051 / USA  
 Tel: (603) 598-0070 Fax: (603) 598-0075  
 E-Mail: vti@vtinh.com

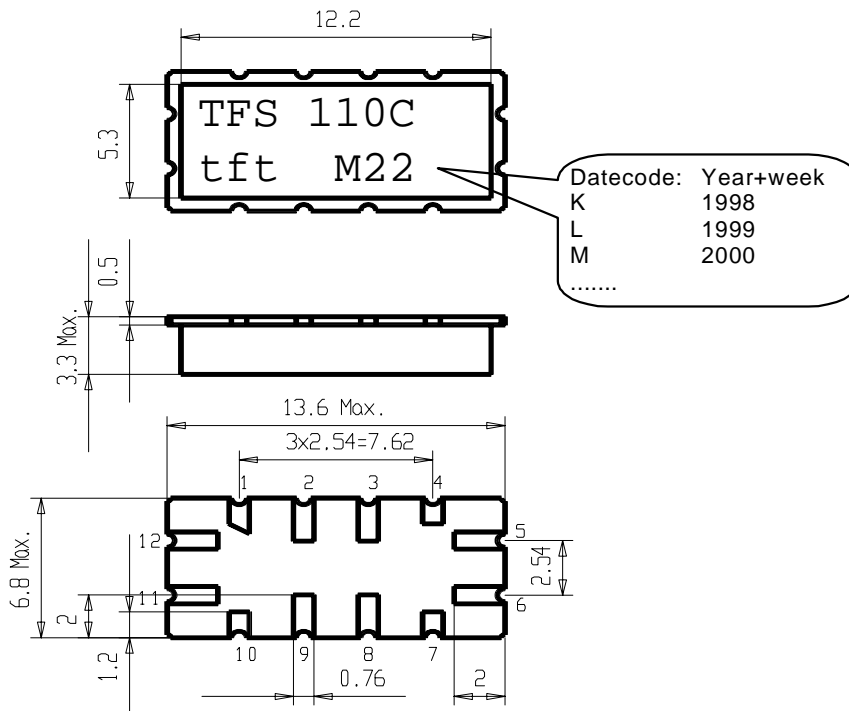
VI TELEFILTER reserves the right to make changes to the product(s) and/or information contained herein without notice. No liability is assumed as a result of their use or application. No rights under any patent accompany the sale of any such product(s) or information.

**VI TELEFILTER**

**Filter specification**

**TFS 110 C - 2/5**

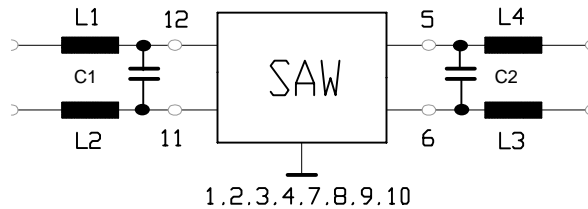
**Package** (All dimensions in mm)



**4. 50 Ω matching network**

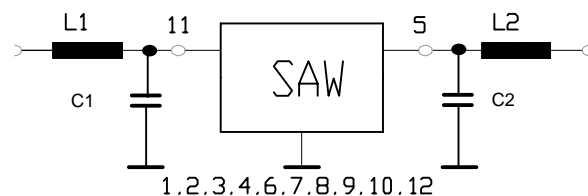
Balanced

- |                         |                  |                  |
|-------------------------|------------------|------------------|
| 1 Not Connected Ground  | 2 Package Ground | 3 Package Ground |
| 4 Not Connected Ground  | 5 Sym.Output     | 6 Sym.Output     |
| 7 Not Connected Ground  | 8 Package Ground | 9 Package Ground |
| 10 Not Connected Ground | 11 Sym.Input     | 12 Sym.Input     |



Unbalanced

- |                         |                  |                    |
|-------------------------|------------------|--------------------|
| 1 Not Connected Ground  | 2 Package Gound  | 3 Package Ground   |
| 4 Not Connected Ground  | 5 Output         | 6 Output RF-Return |
| 7 Not Connected Ground  | 8 Package Ground | 9 Package Ground   |
| 10 Not Connected Ground | 11 Input         | 12 Input RF-Return |



**VI TELEFILTER**  
 Potsdamer Straße 18  
 D 14 513 TELTOW / Germany  
 Tel: (+49) 3328 4784-52 / Fax: (+49) 3328 4784-30  
 E-Mail: tft@telefilter.com

**Vectron International, Inc.**  
 267 Lowell Road  
 Hudson, NH 03051 / USA  
 Tel: (603) 598-0070 Fax: (603) 598-0075  
 E-Mail: vti@vtinh.com

VI TELEFILTER reserves the right to make changes to the product(s) and/or information contained herein without notice. No liability is assumed as a result of their use or application. No rights under any patent accompany the sale of any such product(s) or information.

**VI TELEFILTER****Filter specification****TFS 110 C - 3/5****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;

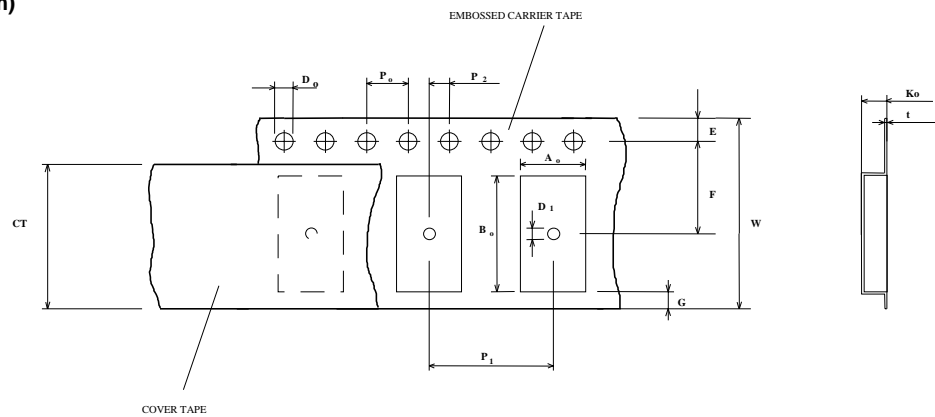
**Packing**

Tape & Reel: 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;

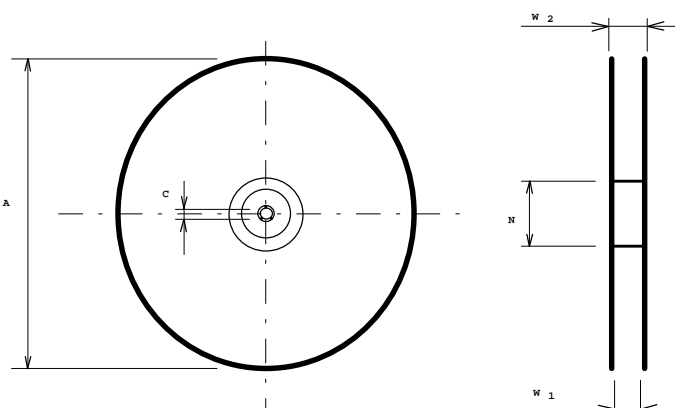
max. pieces of filters per reel:	1700
Reel of empty components at start:	min 300 mm
Reel of empty components at start including leader:	min 500 mm
Trailer	min 300 mm

**Tape (all dimensions in mm)**

W	: 24 ± 0,3
Po	: 4 ± 0,1
Do	: 1,5 ± 0,1
E	: 1,75 ± 0,1
F	: 11,5 ± 0,1
G (min)	: 0,6
P2	: 2 ± 0,1
P1	: 12 ± 0,1
D1(min)	: 1,5
Ao	: 7,1 ± 0,1
Bo	: 13,9 ± 0,2
Ko	: 2,1 ± 0,1
t	: 0,3 ± 0,05
CT	: 21,5 ± 0,1

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

A	: 330
W1	: 24,4 +2 / 0
W2 (max)	: 30,4
N (min)	: 60
C	: 13 +0,5 / -0,2 <sup>A</sup>



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 tap

**VI TELEFILTER**

Potsdamer Straße 18

D 14 513 TELTOW / Germany

Tel: (+49) 3328 4784-52 / Fax: (+49) 3328 4784-30

E-Mail: [tft@telefilter.com](mailto:tft@telefilter.com)

**Vectron International, Inc.**

267 Lowell Road

Hudson, NH 03051 / USA

Tel: (603) 598-0070 Fax: (603) 598-0075

E-Mail: [vti@vtinh.com](mailto:vti@vtinh.com)

VI TELEFILTER reserves the right to make changes to the product(s) and/or information contained herein without notice. No liability is assumed as a result of their use or application. No rights under any patent accompany the sale of any such product(s) or information.

**VI TELEFILTER****Filter specification****TFS 110 C - 4/5****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	230 °C ± 5 °C
Time:	60 sec. - 90 sec.	20 sec. - 25 sec.	

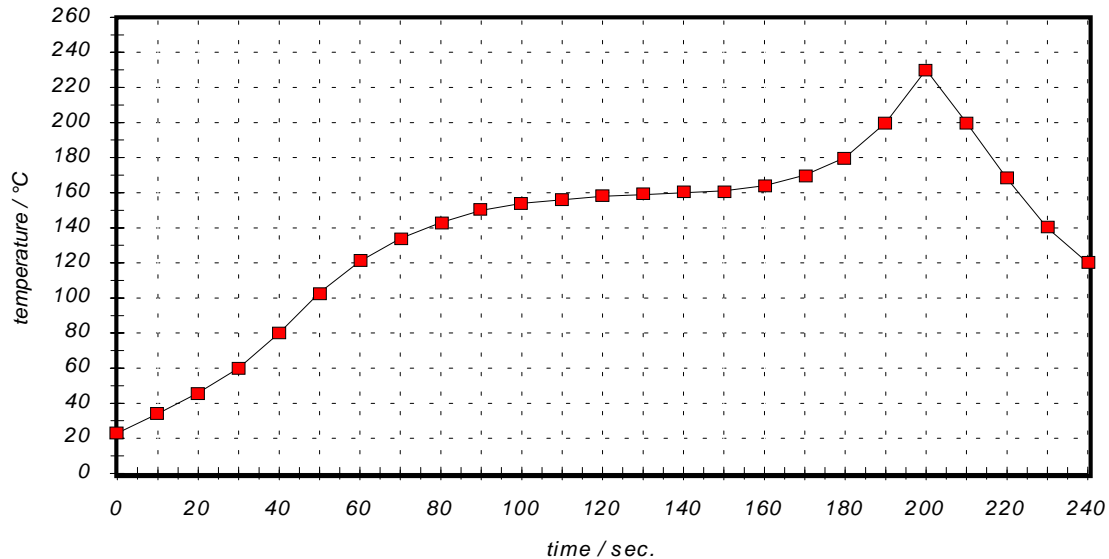
**Chip-mount air reflow profile**

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	200
60	121	195	220
70	134	200	230
80	143	205	220
90	150	210	200
100	154	215	180
110	156	220	165
120	158	230	140
130	159	240	120

**VI TELEFILTER**  
 Potsdamer Straße 18  
 D 14 513 TELTOW / Germany  
 Tel: (+49) 3328 4784-52 / Fax: (+49) 3328 4784-30  
 E-Mail: tft@telefilter.com

**Vectron International, Inc.**  
 267 Lowell Road  
 Hudson, NH 03051 / USA  
 Tel: (603) 598-0070 Fax: (603) 598-0075  
 E-Mail: vti@vtinh.com

VI TELEFILTER reserves the right to make changes to the product(s) and/or information contained herein without notice. No liability is assumed as a result of their use or application. No rights under any patent accompany the sale of any such product(s) or information.

**VI TELEFILTER****Filter specification****TFS 110 C - 5/5**

---

**History**

<b>Version</b>	<b>Reason of Changes</b>	<b>Name</b>	<b>Date</b>
1.2	Generate specification according to customer requirements.	Dunzow W.	07.04.2000
1.3	Correct error in <b>Relative attenuation</b> : in $f_c \pm 1210$ kHz ... $f_c \pm 1395$ kHz from max. 20 dB to min. 20 dB Correct <b>Stability characteristics</b> . Correct <b>Packing</b> . Add typical value of <b>Deviation from linear phase</b> . Add formula for temperature dependence. Add <b>Datecode</b> .	Dunzow W.	07.06.2000

---

**VI TELEFILTER**  
**Potsdamer Straße 18**  
**D 14 513 TELTOW / Germany**  
**Tel: (+49) 3328 4784-52 / Fax: (+49) 3328 4784-30**  
**E-Mail: tft@telefilter.com**

---

**Vectron International, Inc.**  
**267 Lowell Road**  
**Hudson, NH 03051 / USA**  
**Tel: (603) 598-0070 Fax: (603) 598-0075**  
**E-Mail: vti@vtinh.com**

---

VI TELEFILTER reserves the right to make changes to the product(s) and/or information contained herein without notice. No liability is assumed as a result of their use or application. No rights under any patent accompany the sale of any such product(s) or information.