

VI TELEFILTER**Filter Specification****TFS 110D****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 D** 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
Insertion loss (Reference level) a_e	11,9 dB	max. 13 dB
Centre frequency f_c at ambient temperature T_A (f_{CAT})		110,592 ± 0,035 MHz
Pass band shape (3 dB-BW)		Gaussian
Bandwidth 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
Relative attenuation a_{rel}		
f_c $f_c ± 450$ kHz	2,5 dB	max. 3 dB
$f_c ± 450$ kHz ... $f_c ± 800$ kHz	8 dB	max. 10 dB
$f_c ± 1210$ kHz ... $f_c ± 1395$ kHz	22 dB	min. 20 dB
$f_c ± 1395$ kHz ... $f_c ± 1535$ kHz	32 dB	min. 30 dB
$f_c ± 1535$ kHz ... $f_c ± 5,50$ MHz	45 dB	min. 40 dB
$f_c + 5,5$ kHz ... $f_c + 10,0$ MHz	40...42 dB	min. 38 dB
$f_c - 10,0$ MHz ... $f_c - 5,5$ MHz	55...45 dB	min. 40 dB
Group delay (mean value) :	1,2 μs	
Group delay ripple (p-p) : f_c ... $f_c ± 800$ kHz	160 ns	max. 300 ns
Deviation from linear phase (p-p): f_c ... $f_c ± 800$ kHz	3 °	
Frequency inversion temperature (T_o)	20 °C	
Temperature coefficient ($Tc1_f$) 1st order *)	0 ppm/K	max. ± 7,5 ppm/K
Temperature coefficient ($Tc2_f$) 2nd order **)	- 0,036 ppm/K ²	-
Operating temperature range		- 20 °C ... + 85 °C
Storage temperature range		- 25 °C ... + 90 °C
Input power level	-	max. 10 dBm
Permissible DC voltage V_{DC}	-	12 V
Permissible AC voltage V_{pp}	-	10 V

*) $\Delta f_c(\text{Hz}) = Tc1_f(\text{ppm/K}) \times (T - T_o) \times f_{T_o}(\text{MHz})$

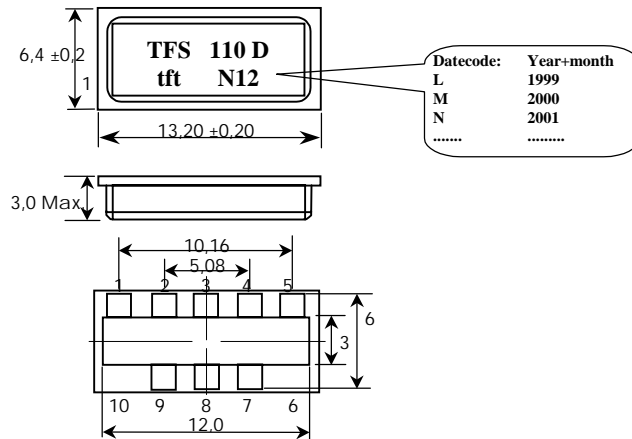
***) $\Delta f_c(\text{Hz}) = Tc2_f(\text{ppm/K}^2) \times (T - T_o)^2 \times f_{T_o}(\text{MHz})$

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

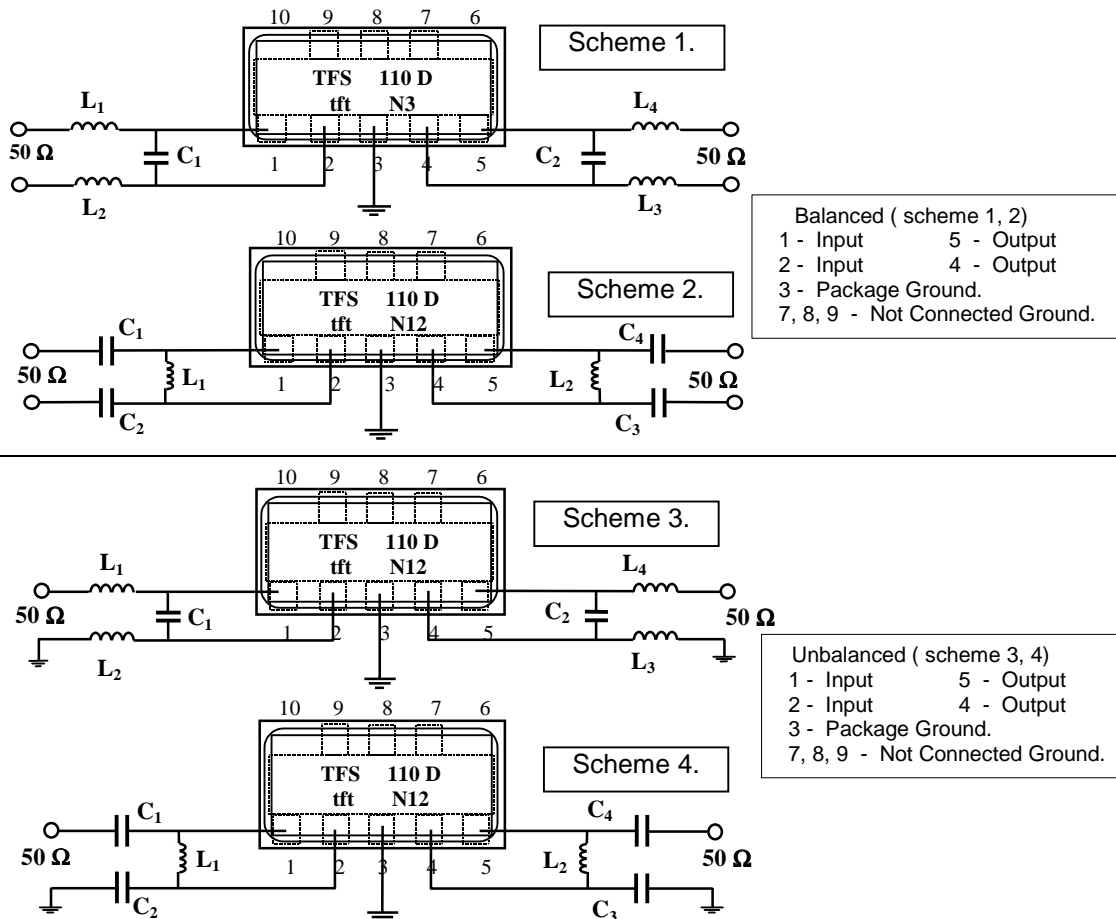
Generated:**Dunzow W.****Checked/Approved:****Dr. Bert Wall****VI TELEFILTER****Potsdamer Straße 18****D 14 513 TELTOW / Germany****Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30****e-mail: tft@telefilter.com****Vectron International, Inc.****267 Lowell Road****Hudson, NH 03051 / USA****Tel: (603) 598-0070 Fax: (603) 598-0075****e-mail: vti@vtinh.com**

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3. Package : (All dimensions in mm)



4. 50 Ω - matching network (Principal schemes) :



For final test we use scheme 1.

About matching element values see Application Note.

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. Resistance to solder heat (reflow): max. 2 times reflow process;
for temperature conditions refer to the attached "Air reflow temperature conditions" on page 4;

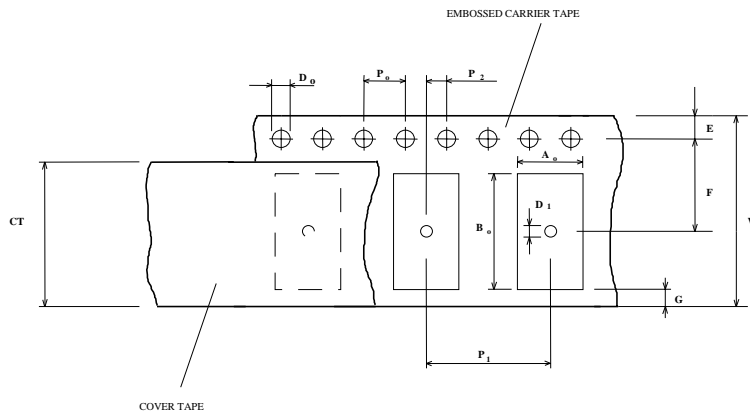
6. Packing :

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;

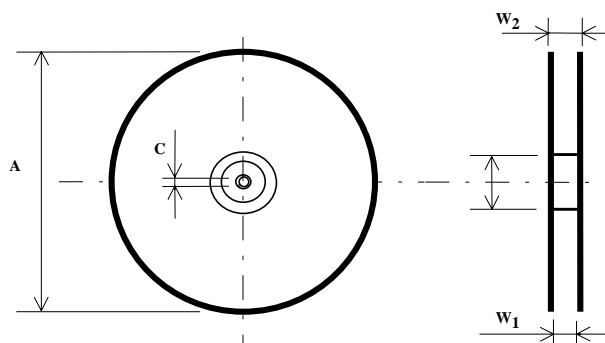
max. pieces of filters per reel:	1700
reel of empty components at start:	min 300 mm
reel of empty components at start including leader:	min 500 mm
Trailer	min 300 mm

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	± 0,2
Bo	:	13,9	± 0,2
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 ± 0,2



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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7. 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.	

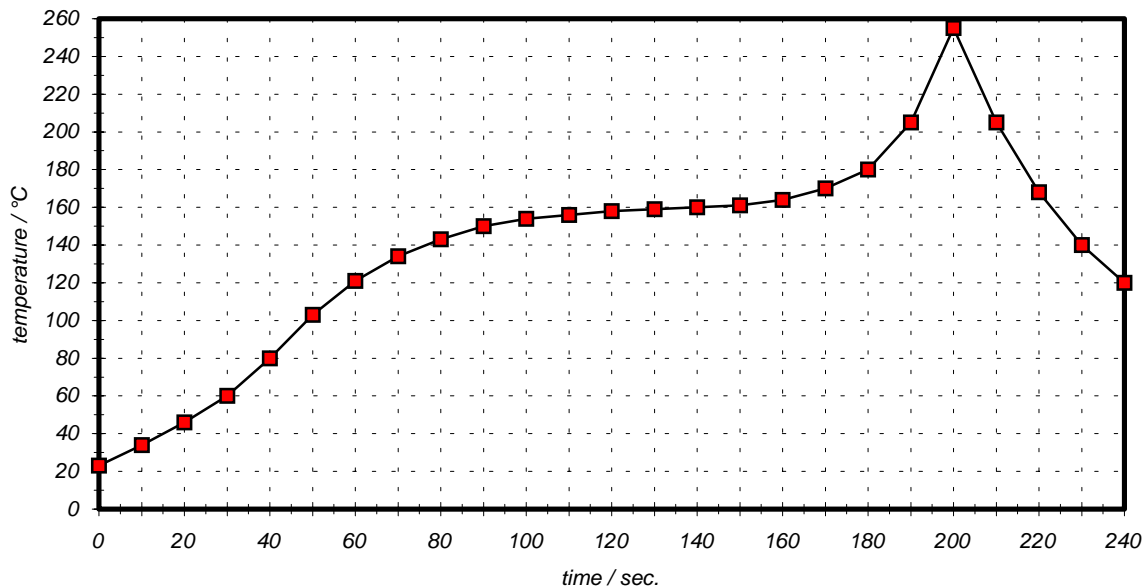
Air reflow profile

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

8. History :

Version	Reason of Changes	Name	Date
1.0	Generate filter specification according to customer requirements.	Dunzow W.	15.03.2001