

**Vectron International****Filter specification****TFS 110AD****1/5****Measurement condition**

Ambient temperature:	25	°C
Input power level:	0	dBm
Terminating impedance: *		
Input:	420 Ω	- 19pF
Output:	464 Ω	- 16 pF

**Characteristics**

Remark:

The reference level for the relative attenuation  $a_{rel}$  of the TFS110AD 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 110.5 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.	9.5	dB
<b>Insertion loss</b> within 2.5dB BW	$a_e + 2.5dB$	9.0		max.	12	dB
<b>Nominal frequency</b>	$f_N$				110.5	MHz
<b>Passband</b>	PB	-		$f_N \pm$	1.5	MHz
<b>Pass band ripple within PB</b>		1.9	dB	max.	2.5	dB
<b>Relative attenuation</b>	$a_{rel}$					
$f_N - 1.5$ MHz ... $f_N + 1.5$ MHz		1.9	dB	max.	2.5	dB
$f_N - 2.5$ MHz ... $f_N - 3.5$ MHz		16	dB	min.	8	dB
$f_N - 3.5$ MHz ... $f_N - 12$ MHz		37	dB	min.	31	dB
$f_N - 12$ MHz ... $f_N - 22$ MHz		57	dB	min.	40	dB
$f_N + 2.5$ MHz ... $f_N + 3.5$ MHz		15	dB	min.	4	dB
$f_N + 3.5$ MHz ... $f_N + 12$ MHz		45	dB	min.	20	dB
$f_N + 12$ MHz ... $f_N + 33.5$ MHz		52	dB	min.	40	dB
$f_N + 33.5$ MHz ... $f_N + 43.5$ MHz		63	dB	min.	45	dB
$f_N + 43.5$ MHz ... $f_N + 141.5$ MHz		59	dB	min.	40	dB
$f_N + 141.5$ MHz ... $f_N + 151.5$ MHz		80	dB	min.	45	dB
<b>Group delay ripple within PB</b>	GDR	75	ns	max.	1000	ns
<b>IIP3</b>		-		min.	30	dBm
<b>Triple transit attenuation</b>		42	dB	min.	38	dB
<b>Return loss within <math>f_N \pm 1.2MHz</math></b>		15	dB	min.	10	dB
<b>Input power</b>		-		max	10	dBm
<b>Operating temperature range</b>	OTR				- 40 °C ... + 85 °C	
<b>Operable temperature range</b>					- 55 °C ... + 85 °C	
<b>Storage temperature range</b>					- 55 °C ... + 85 °C	
<b>Temperature coefficient of frequency</b>	$TC_f$ **	-18	ppm/K			

\*) 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.

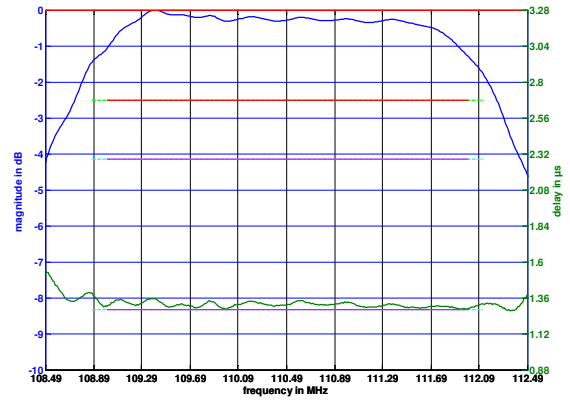
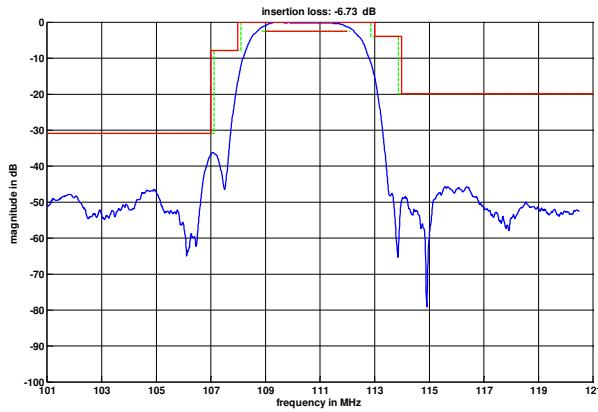
\*\*)  $\Delta f(\text{Hz}) = TC_f(\text{ppm/K}) \times (T - T_0) \times f_{cat}(\text{MHz})$ .

**Generated:****Checked / Approved:**

**Vectron International GmbH**  
**Potsdamer Straße 18**  
**D 14 513 TELTOW / Germany**  
**Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30**  
**E-Mail: [tft@vectron.com](mailto:tft@vectron.com)**

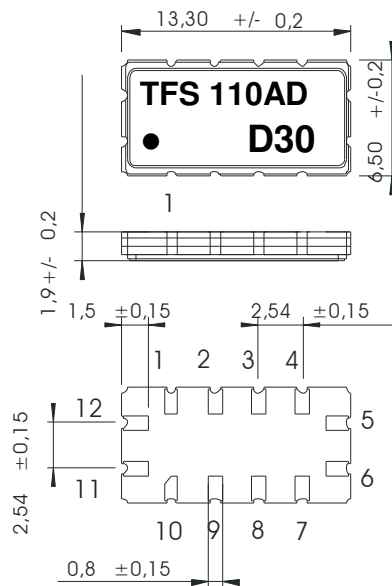
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**Filter characteristic**



**Construction and pin connection**

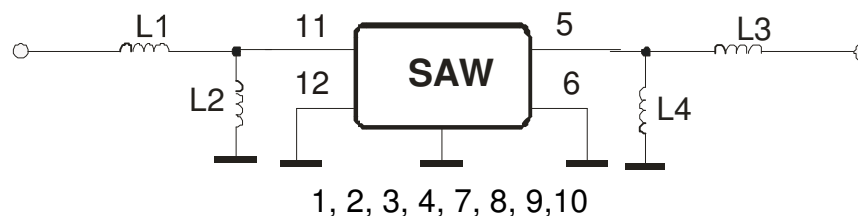
(All dimensions in mm)



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

Date code: Year + week  
 D 2013  
 E 2014  
 F 2015  
 ...

**50 Ω Test circuit**



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 Potsdamer Straße 18  
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 E-Mail: [tft@vectron.com](mailto:tft@vectron.com)

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**Stability characteristics, reliability**

After the following tests the filter shall meet the whole specification:

1. Shock: 500g, 1 ms, half sine wave, 3 shocks each plane;  
DIN IEC 68 T2 - 27
2. Vibration: 10 Hz to 500 Hz, 0,35 mm or 5 g respectively, 1 octave per min, 10 cycles per plane, 3 planes;  
DIN IEC 68 T2 - 6
3. Change of temperature: -55 °C to 125°C / 15 min. each / 100 cycles  
DIN IEC 68 part 2 – 14 Test N
4. Resistance to solder heat (reflow): reflow possible: three times max.;  
for temperature conditions refer to the attached "Air reflow temperature conditions" on page 4;
5. ESD ANSI/ESD S20.20-1999, class 1A for HBM

This filter is RoHS compliant (2011/65/EU)

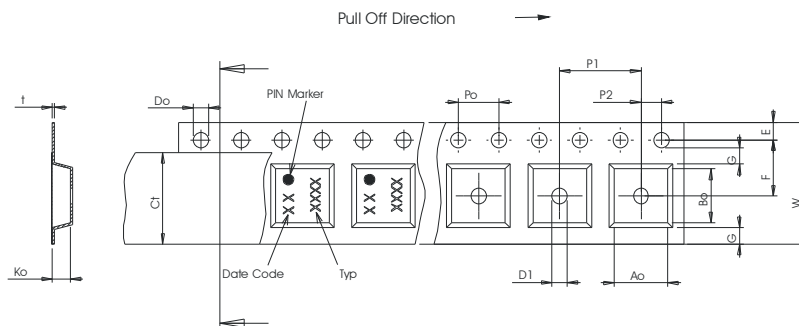
**Packing**

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:	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

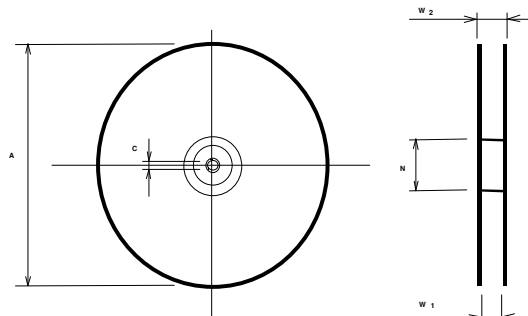
**Tape (all dimensions in mm)**

- W : 24,00 +0,30/-0,10
- Po : 4,00 ± 0,1
- Do : 1,50 +0,1/-0
- E : 1,75 ± 0,10
- F : 11,50 ± 0,10
- G(min) : 0,60
- P2 : 2,00 ± 0,1
- P1 : 12,00 ± 0,1
- D1(min) : 1,50
- Ao : 7,10 ± 0,10
- Bo : 13,90 ± 0,10
- 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 +0,5/-0,2



The minimum bending radius is 45 mm.

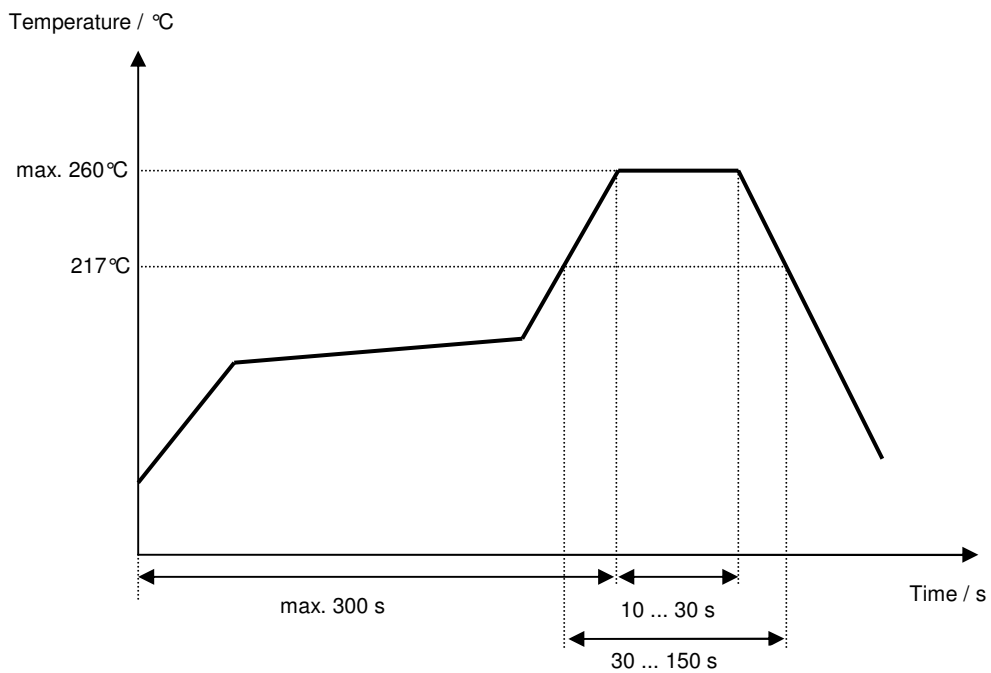
**Vectron International GmbH**  
**Potsdamer Straße 18**  
**D 14 513 TELTOW / Germany**  
**Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30**  
**E-Mail: [tft@vectron.com](mailto:tft@vectron.com)**

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**Air reflow temperature conditions**

<b>Conditions</b>	<b>Exposure</b>
Average ramp-up rate (30°C to 217°C)	less than 3°C/second
> 100°C	between 300 and 600 seconds
> 150°C	between 240 and 500 seconds
> 217°C	between 30 and 150 seconds
Peak temperature	max. 260°C
Time within 5°C of actual peak temperature	between 10 and 30 seconds
Cool-down rate (Peak to 50°C)	less than 6°C/second
Time from 30°C to Peak temperature	no greater than 300 seconds

**Chip-mount air reflow profile**



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**History**

<b>Version</b>	<b>Reason of changes</b>	<b>Name</b>	<b>Date</b>
1.0	Generation of development specification	TCUK	26.07.2013
1.1	Added characteristic plots, typical values and 50Ω test circuit	TCUK	26.11.2013

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