

**Vectron International****Filter specification****TFS 150AP****1/5****Measurement condition**

Ambient temperature:	23	°C
Input power level:	0	dBm
Terminating impedance: *		
Input:	281 $\Omega$	-19.8 pF
Output:	312 $\Omega$	-18.8 pF

**Characteristics**

## Remark:

The nominal frequency  $f_N$  is fixed at 150.0MHz. The insertion loss  $a_e$  is defined as loss value determined at  $f_N$ . Reference level for the relative attenuation  $a_{rel}$  of the TFS150AP is the insertion loss  $a_e$ . The centre 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  $a_e$ . All specified data are met within the operating temperature range.

D a t a		typ. value		tolerance / limit		
<b>Insertion loss</b> (reference level)	$a_e$	17.2	dB	max.	18.5	dB
<b>Nominal frequency</b>	$f_N$	-			150.0	MHz
<b>Centre frequency at ambient temperature</b>	$f_C$	150.0	MHz	$\pm$	0.05	MHz
<b>Passband</b>	PB			$f_N$	$\pm$	0.70 MHz
<b>Pass band ripple (<math>f_N \pm 0.70</math>MHz)</b>	p-p	0.55	dB	max.	1	dB
<b>Bandwidth ***</b>	BW					
3	dB	1.94	MHz	min.	1.8	MHz
20	dB	2.53	MHz	max.	2.6	MHz
30	dB	2.68	MHz	max.	2.9	MHz
35	dB	2.72	MHz	max.	3.7	MHz
<b>Relative attenuation</b>	$a_{rel}$					
$f_N$	$\dots f_N \pm 0.70$ MHz	0.55	dB	max.	1	dB
$f_N \pm 0.70$ MHz	$\dots f_N \pm 0.90$ MHz	1.7	dB	max.	3	dB
$f_N \pm 1.30$ MHz	$\dots f_N \pm 1.45$ MHz	24	dB	min.	20	dB
$f_N \pm 1.45$ MHz	$\dots f_N \pm 1.85$ MHz	45	dB	min.	30	dB
$f_N \pm 1.85$ MHz	$\dots f_N \pm 5.85$ MHz	50	dB	min.	35	dB
$f_N \pm 5.85$ MHz	$\dots f_N \pm 20.0$ MHz	51	dB	min.	45	dB
<b>Group delay</b>	mean value in PB	2.75	$\mu$ s	max.	4	$\mu$ s
<b>Group delay ripple within PB</b>		230	ns	max.	350	ns
<b>Return loss within PB</b>		19	dB	min.	8	dB
<b>Operating temperature range</b>	OTR	-			0 °C ... + 85 °C	
<b>Storage temperature range</b>		-			- 40 °C ... + 85 °C	
<b>Temperature coefficient of frequency</b>	$TC_f$ **	- 0.036	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.

\*\*)  $\Delta f(\text{Hz}) = TC_f(\text{ppm/K}^2) \times (T - T_0)^2 \times f_{T0}(\text{MHz})$ .

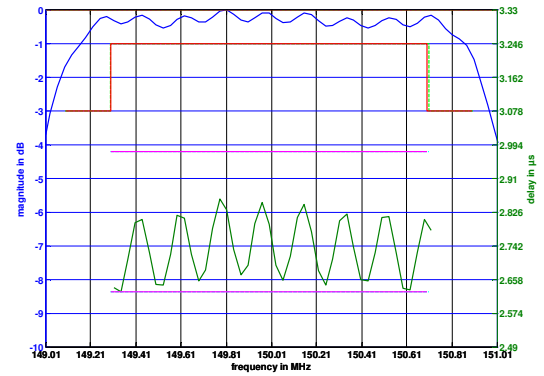
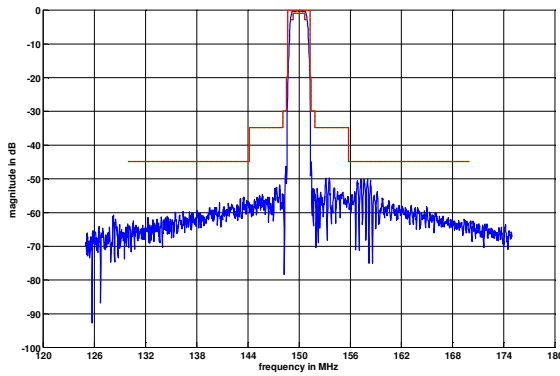
\*\*\*) To be measured at ambient temperature only.

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

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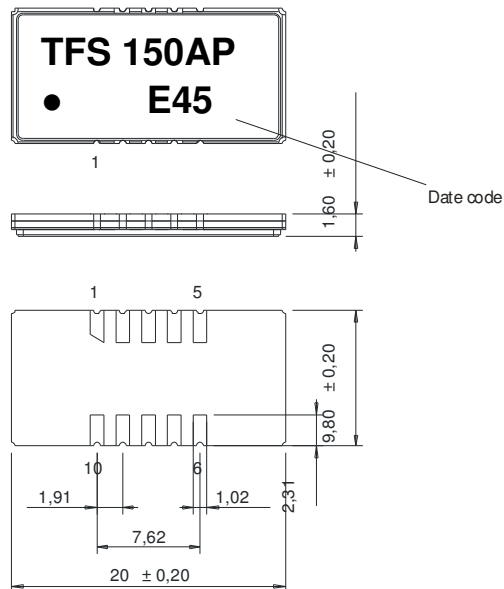
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**Filter characteristic**



**Construction and pin connection**

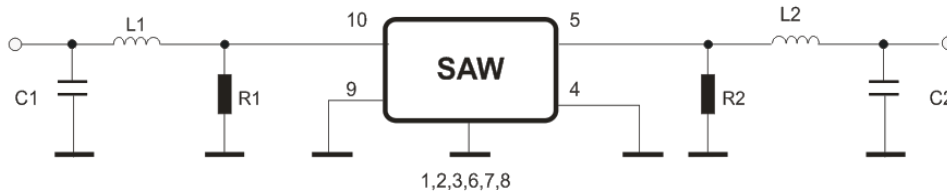
(All dimensions in mm)



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

Date code: Year + week  
 E 2014  
 F 2015  
 G 2016  
 ...

**50 Ohm Test circuit**



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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 MIL-STD-883E using coupling network of ISO 10605 and EN 6100-4-2  
HBM:250V;

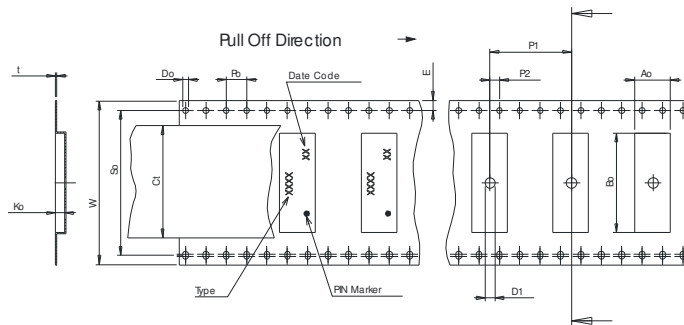
This filter is RoHS compliant (2011/65/EU)

**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:  
reel of empty components at start: min. 300 mm  
reel of empty components at start including leader: min. 500 mm  
trailer: min. 300 mm

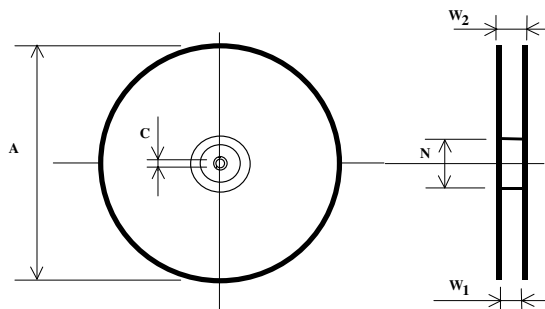
**Tape (all dimensions in mm)**

W	:32,00
Po	:4,00 ± 0,1
Do	:1,50 +0,1/-0
E	:1,75 ± 0,1
F	:14,20 ± 0,1
G(min)	:
P2	:2,00 ± 0,1
P1	:16,00 ± 0,1
D1(min)	:2,00
Ao	:10,25 ± 0,1
Bo	:20,45
Ct	:25,5



**Reel (all dimensions in mm)**

A	:330
W1	:32,4
W2(max)	:38,4
N(min)	:100
C	:13,0



The minimum bending radius is 45 mm.

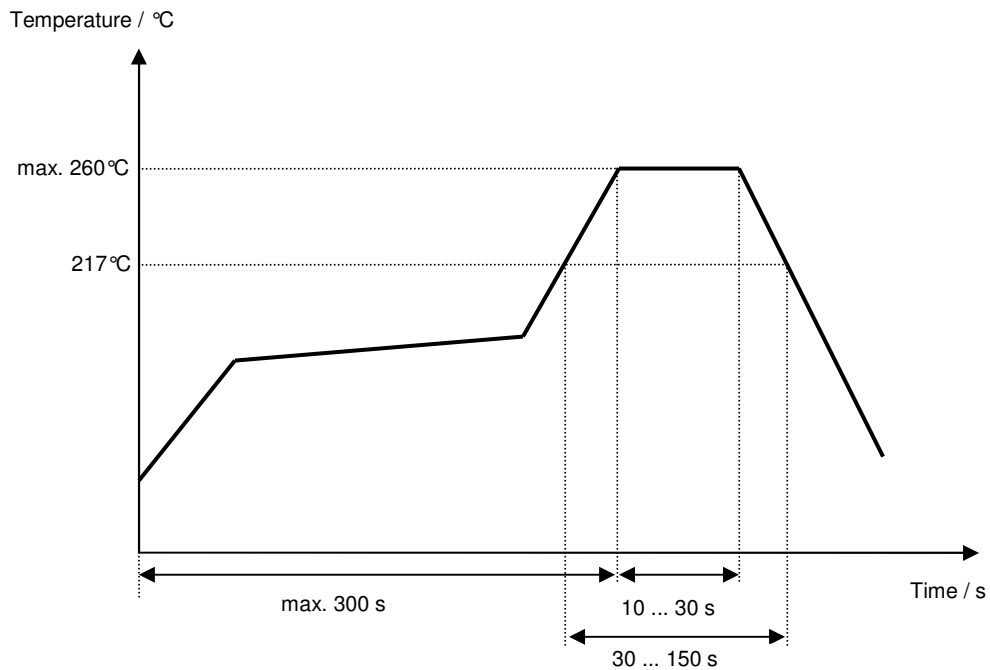
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## Air reflow temperature conditions

Conditions	Exposure
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	Hodkin	22.11.2010
2.0	- Customer request to increase passband and 3dB bw by 100kHz, changed: - passband from $f_N \pm 0.65\text{MHz}$ to $f_N \pm 0.70\text{MHz}$ . - 3dB bw from 1.7MHz min to 1.8MHz min. - increase 20dB bw from 2.5MHz max to 2.6MHz max. - tidy up headers and footers.	TCUK	22.10.2013
2.1	- Add typical values, move from development to filter specification.	TCUK	20.12.2013