

**Vectron International****Filter specification****TFS 153C****1/5****Measurement condition**

Ambient temperature:	23	°C
Input power level:	0	dBm
Terminating impedance: *		
Input:	63 $\Omega$	-34 pF
Output:	55 $\Omega$	-44 pF

**Characteristics**

## Remark:

The nominal frequency  $f_N$  is fixed at 153,6. The insertion loss  $a_e$  is defined as loss value determined at  $f_N$ . Reference level for the relative attenuation  $a_{rel}$  of the TFS153C 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.

<b>D a t a</b>	<b>typ. value</b>		<b>tolerance / limit</b>			
<b>Insertion loss</b> (reference level)	$a_e$	11.5	dB	max. 12.5	dB	
<b>Nominal frequency</b>	$f_N$			153,6	MHz	
<b>Passband PB</b>		-		$f_N \pm$	10	MHz
<b>Ripple within PB</b>	p-p	0,2	dB	max.	1	dB
<b>Relative attenuation</b>	$a_{rel}$					
$f_N - 152,6$ MHz ... $f_N - 15$ MHz		45	dB	min.	35	dB
$f_N + 15$ MHz ... $f_N + 138,6$ MHz		40	dB	min.	35	dB
$f_N + 138,6$ MHz ... $f_N + 168,6$ MHz		70	dB	min.	20	dB
$f_N + 168,6$ MHz ... $f_N + 346,4$ MHz		70	dB	min.	35	dB
<b>Group delay ripple</b>	p-p					
$f_N - 10$ MHz ... $f_N + 10$ MHz		45	ns	max.	60	ns
<b>Phase linearity</b>	p-p					
$f_N - 10$ MHz ... $f_N + 10$ MHz		4	deg	max.	5	deg
<b>Triple transit response suppression</b>		70	dB	min.	35	dB
<b>Input power level</b>		-		max.	17	dBm
<b>Third order intercept</b>	IIP3**	42	dBm	min.	35	dBm
<b>Input /Output return loss</b>						
$f_N - 4$ MHz ... $f_N + 4$ MHz		12	dB	min.	10	dB
$f_N - 10$ MHz ... $f_N + 10$ MHz		9	dB	min.	8	dB
<b>Operating temperature range</b>	OTR	-		-25 °C.....	+85 °C	
<b>Storage temperature range</b>		-		-40 °C.....	+85 °C	
<b>Temperature coefficient of frequency</b>	TC <sub>f</sub> ***	-87	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.

\*\*) Measured with tones spaced at 5 MHz and 10 MHz above and below  $f_c$

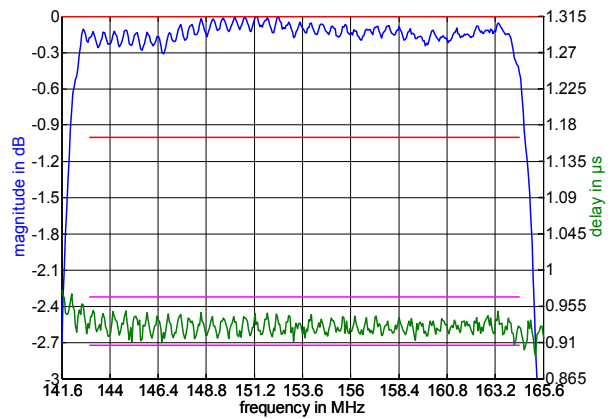
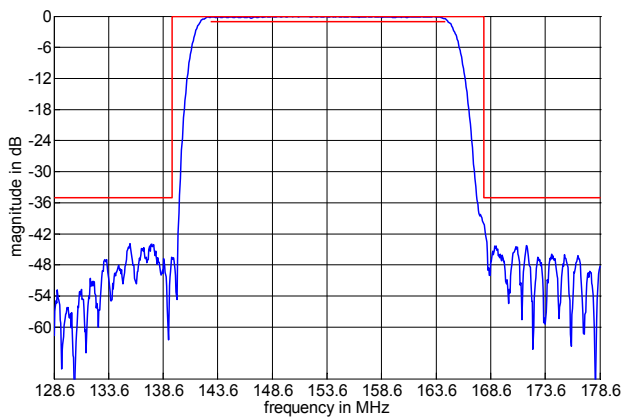
\*\*\*)  $\Delta f_c(\text{Hz}) = TC_f(\text{ppm/K}) \times (T - T_o) \times f_{CAT}(\text{MHz})$ .

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

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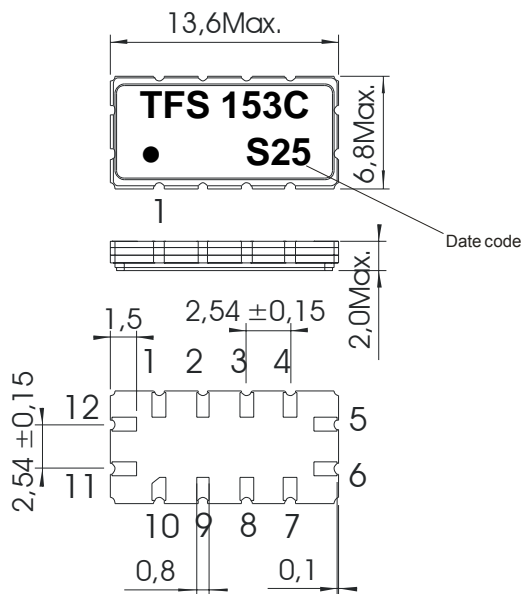
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**Filter characteristic**



**Construction and pin connection**

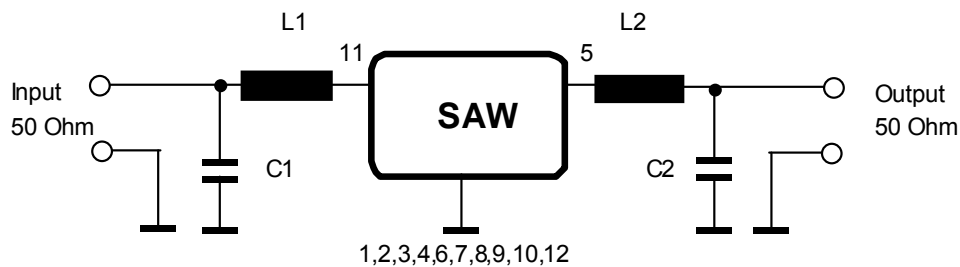
(All dimensions in mm)



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

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

**50 Ohm Test circuit**



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**Stability characteristics**

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

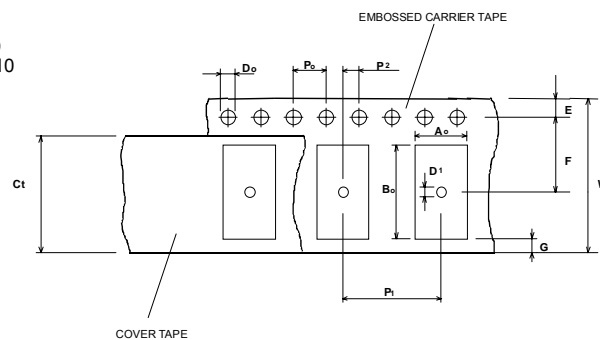
1. Shock: 500g, 18 ms, half sine wave, 3 shocks each plane;  
DIN IEC 68 T2 - 27
2. Vibration: 10 Hz to 500 Hz, 0,35 mm or g respectively, 1 octave per min, 10 cycles per plan, 3 plans;  
DIN IEC 68 T2 - 6
3. Change of temperature: -55 °C to 125°C / 30 min. each / 10 cycles  
DIN IEC 68 part 2 – 14 Test 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**

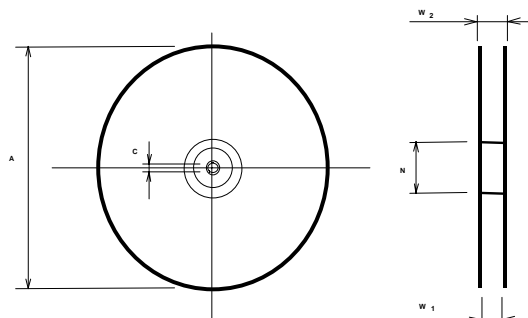
Tape & Reel: IEC 286 – 3, with exeption of value for N and minimum bending radius;  
tape type II, embossed carrier tape with top cover tape on the upper side;

max. pieces of filters peer reel:	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. The mounting surface of the filters faces the bottom side of the embossed carrier tape. Marking of the filters can be read if the upper side of the carrier tape is regarded with the sprocket holes on the right.

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**Air reflow temperature conditions**

1st and 2nd air reflow profile

<b>Name:</b>	pre-heating periods	main-heating periods	peak temperature
<b>Temperature:</b>	150 °C - 170 °C	over 200 °C	255 °C ± 5 °C
<b>Time:</b>	60 sec. - 90 sec.	20 sec. - 25 sec.	

**Chip-mount air reflow profile**

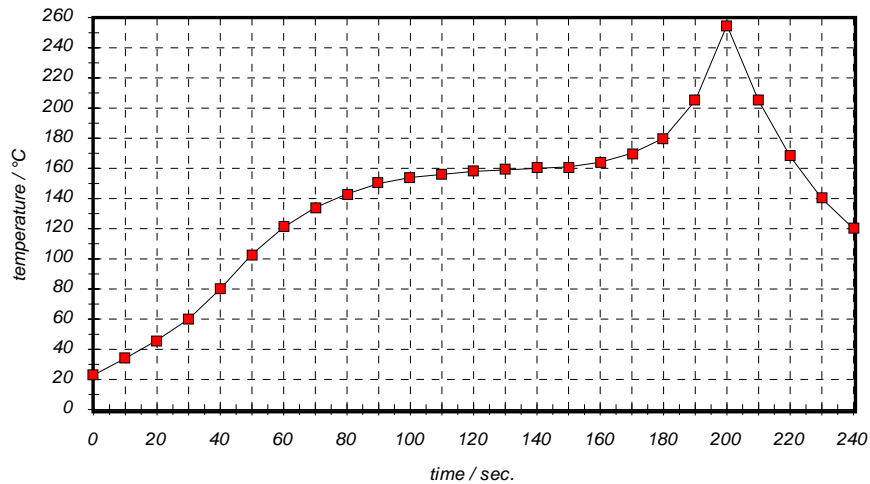


Table for temperature vs. time during the air reflow process

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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**History**

<b>Version</b>	<b>Reason of Changes</b>	<b>Name</b>	<b>Date</b>
1.0	- generation of specification according to customer requirements	Roizengaft	02.02.2004
1.1	- generated filter specification - added termination impedances - added typical values - changed insertion loss - changed group delay ripple - changed phase linearity - changed input/output return loss - changed IP3 description - changed storage temperature range - deleted description for power level - added filter characteristic - changed construction and pin connection - added test circuit - changed packing	Chilla	15.06.2004
1.2	- added temperature coefficient of frequency	Chilla	23.09.2005
1.3	- added IIP3	Chilla	27.02.2009
1.4	- changed temperature coefficient	Chilla	06.04.2009