

**Vectron International****Filter specification****TFS 500****1/5****Measurement condition**

Ambient temperature:	23	°C
Input power level:	0	dBm
Terminating impedance: *		
Input:	415 Ω    -1 pF	
Output:	415 Ω    -1 pF	
External Coil:	33	nH

**Characteristics**

## Remark:

The reference level for the relative attenuation  $a_{rel}$  of the TFS 500 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 500,0 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)	$a_e$	4,4 dB	max. 5,0 dB
<b>Nominal frequency</b>	$f_N$		500,0 MHz
<b>Passband</b>	PB	390 kHz	$f_N \pm 0,1$ MHz
<b>Pass band variation</b>		1,3 dB	max. 2,0 dB
<b>Relative attenuation</b>	$a_{rel}$		
$f_N - 100$ MHz ... $f_N - 90$ MHz		48 dB	min. 40 dB
$f_N - 90$ MHz ... $f_N - 60$ MHz		42 dB	min. 38 dB
$f_N - 60$ MHz ... $f_N - 1$ MHz		47 dB	min. 40 dB
$f_N + 1$ MHz ... $f_N + 100$ MHz		42 dB	min. 40 dB
<b>Input power level</b>		-	max. 0 dBm
<b>Operating temperature range</b>	OTR	-	- 40 °C ... + 85 °C
<b>Storage temperature range</b>		-	- 40 °C ... + 85 °C
<b>Frequency inversion temperature</b>		41 °C	
<b>Temperature coefficient of frequency</b>	$TC_f^{**}$	- 0,036 ppm/K <sup>2</sup>	

\*) 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.

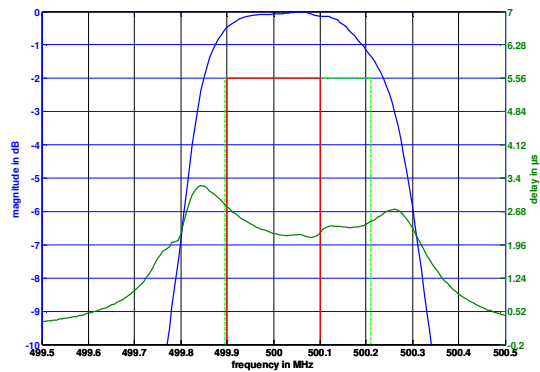
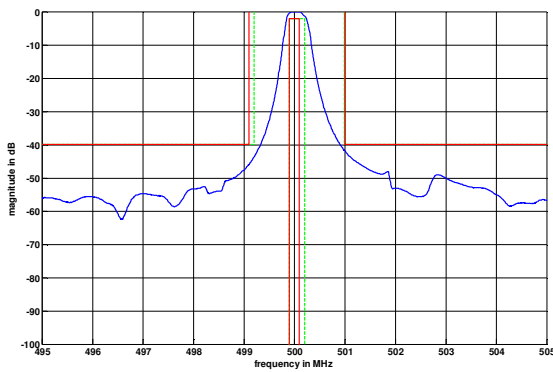
\*\*)  $\Delta f_c(\text{Hz}) = TC_f(\text{ppm/K}^2) \times (T - T_o)^2 \times f_{T_o}(\text{MHz})$ .

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

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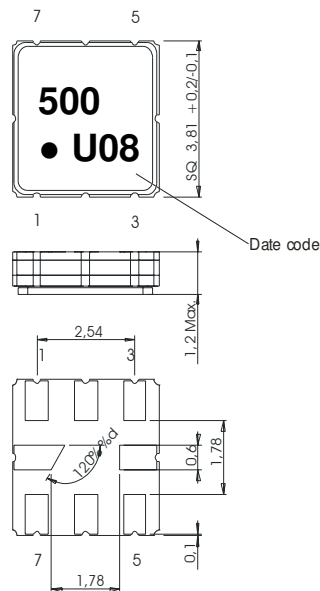
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**Filter characteristic**



**Construction and pin connection**

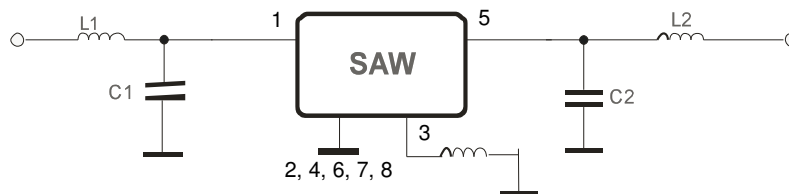
(All dimensions in mm)



- 1 Input
- 2 Input RF Return
- 3 External Coil
- 4 Ground
- 5 Output
- 6 Output RF Return
- 7 Ground
- 8 Ground

Date code: Year + week  
 T 2005  
 U 2006  
 V 2007  
 ...

**50 Ω 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, see page 4: "Air reflow temperature conditions"
5. ESD ANSI/ESD S20.20-1999, class 1A for HBM

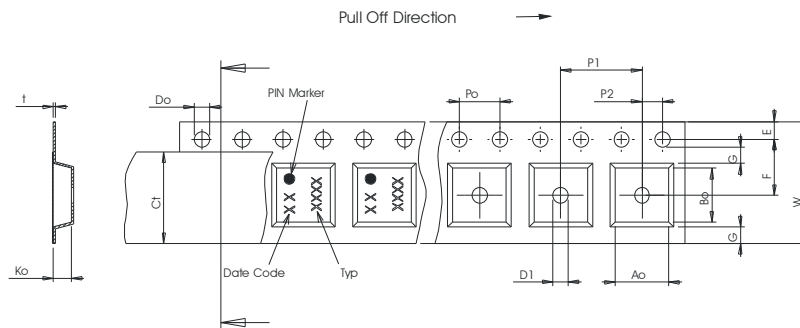
This filter is RoHS compliant (2011/65/EU)

**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: 3000  
 reel of empty components at start: min. 300 mm  
 reel of empty components at start including leader: min. 500 mm  
 trailer: min. 300 mm

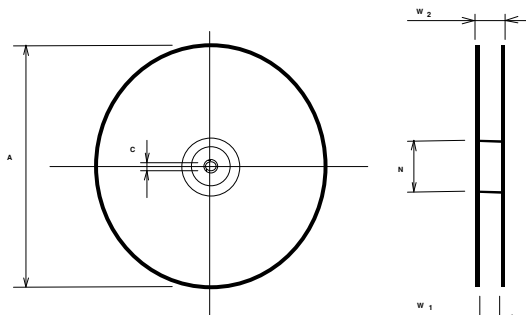
**Tape (all dimensions in mm)**

- W : 12,00 ± 0,3
- Po : 4,00 ± 0,1
- Do : 1,50 +0,1/-0
- E : 1,75 ± 0,1
- F : 5,50 ± 0,05
- G(min) : 0,75
- P2 : 2,00 ± 0,05
- P1 : 8,00 ± 0,1
- D1(min) : 1,50
- Ao : 4,30 ± 0,1
- Bo : 4,30 ± 0,1
- Ct : 9,2 ± 0,1



**Reel (all dimensions in mm)**

- A : 330 or 180
- W1 : 12,4 +2/-0
- W2(max) : 18,4
- N(min) : 50
- C : 13,0 +0,5/-0,2



The minimum bending radius is 45 mm.

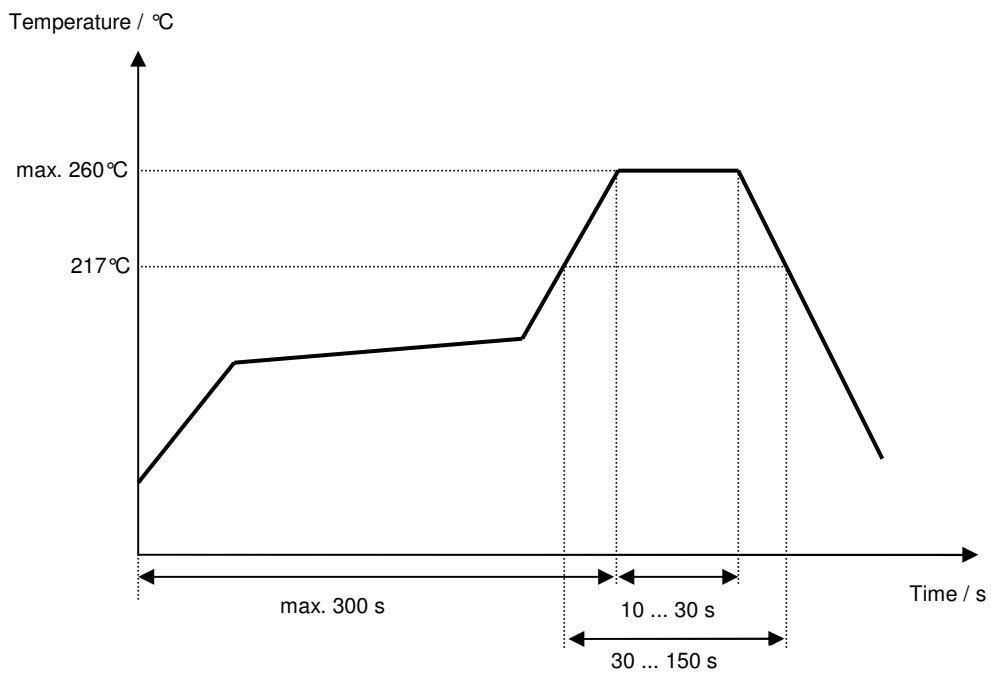
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**Air reflow temperature conditions**

<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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**Vectron International****Filter specification****TFS 500****5/5****History**

<b>Version</b>	<b>Reason of Changes</b>	<b>Name</b>	<b>Date</b>
1.0	- Generation of development specification	Strehl	10.11.2005
1.1	- Add operating temperature range - Add frequency inversion temperature	Channaa	21.11.2005
1.2	- Add typical values - Add filter characteristic - Add test circuit - Add terminating impedances	Martens	23.02.2006
1.3	- Change from development specification to filter specification - Change relative attenuation	Alawneh	28.04.2006
1.4	- Updated header and footer to current standards	Raura	08.11.2012
1.5	- Change Input power level - Update Reel dimensions - Update Stability characteristics, reliability - Update Filter characteristic - Add ESD	Bonnen	17.06.2014

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