

Vectron International**Filter specification****TFS400T****1/5****Measurement condition**

Ambient temperature:	23	°C
Input power level:	0	dBm
Terminating impedance: *		
Input:	570 Ω -1,2 pF	
Output:	570 Ω -1,2 pF	
External Coil:	97 nH	

Characteristics**Remark:**

Reference level for the relative attenuation a_{rel} of the TFS400T 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 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 . The nominal frequency f_N is fixed at 400 MHz without tolerance. The given values for the relative attenuation a_{rel} and for the group delay ripple have to be reached at the frequencies given below even if the centre frequency f_c is shifted due to the temperature coefficient of frequency TC_f in the operating temperature range and due to a production tolerance for the centre frequency f_c .

D a t a		typ. value	tolerance/limit
Insertion loss (Reference level)	$a_e = a_{min}$	4,5 dB	max. 6,5 dB
Nominal frequency	f_N	-	400,000 MHz
Centre frequency	f_c	400,008 MHz	
Guaranteed 1,5 dB signal band width	BW	270 kHz	min. 160 kHz
Relative attenuation $f_N \pm 80$ kHz	a_{rel}	0,5 dB	max. 1,5 dB
$f_N \pm 200$ kHz ... $f_N \pm 400$ kHz		5 dB	min. 2 dB
$f_N \pm 400$ kHz ... $f_N \pm 600$ kHz		30 dB	min. 25 dB
$f_N \pm 600$ kHz ... $f_N \pm 1$ MHz		50...70 dB	min. 40 dB
$f_N - 1$ MHz ... $f_N - 13$ MHz		57 dB	min. 50 dB
$f_N + 1$ MHz ... $f_N + 2$ MHz		65 dB	min. 50 dB
$f_N + 2$ MHz ... $f_N + 5$ MHz		53 dB	min. 47 dB
$f_N \pm 5$ MHz ... $f_N \pm 13$ MHz		56 dB	min. 50 dB
Group delay ripple $f_N \pm 70$ kHz	GD	0,5 μs	max. 2 μs
Input power level ***		-	max. 17 dBm
Operating temperature range			- 10 °C ... + 55 °C
Temperature coefficient of frequency	TC_f **	ca. - 0,036 ppm/K ²	
Frequency inversion temperature		+ 20 °C	

*) 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.

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

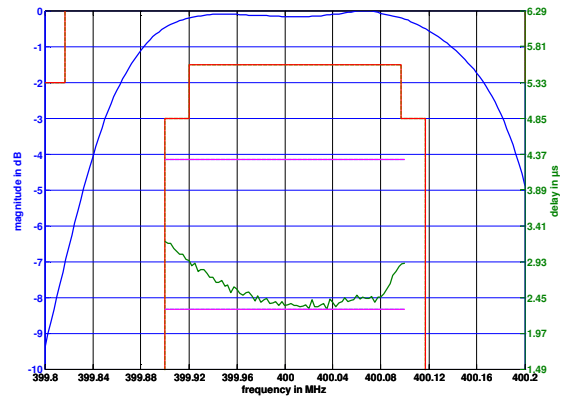
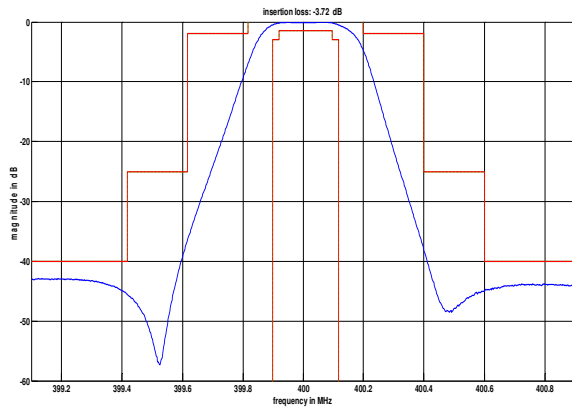
***) Input power level for operation with continuous wave signal at 400 MHz for 15 years at 55 °C

Generated:**Checked / Approved:**

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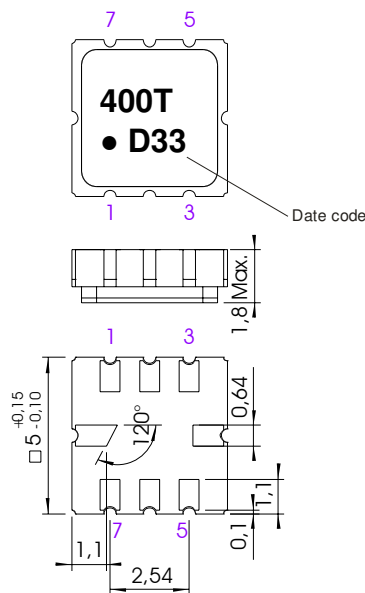
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Filter characteristic



Construction and pin connection

(All dimensions in mm)



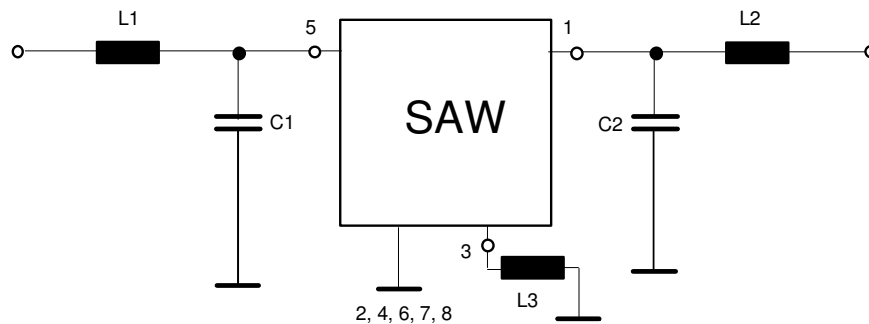
- 1 Output
- 2 Output RF Return
- 3 External Coil
- 4 Ground
- 5 Input
- 6 Input RF Return
- 7 Ground
- 8 Ground

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

Construction, pin configuration an

(All dimensions in mm)

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

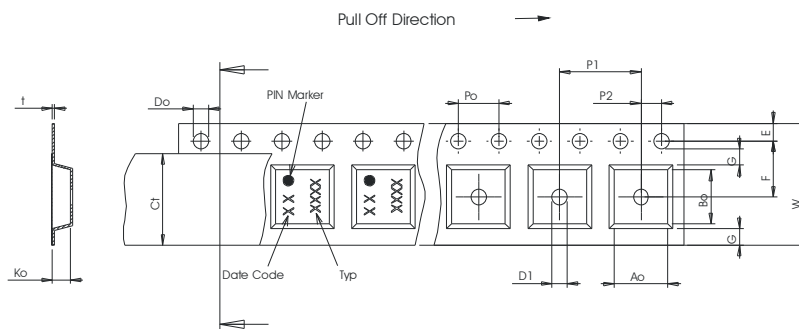
This filter is RoHS compliant (2011/65/EU)

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 |

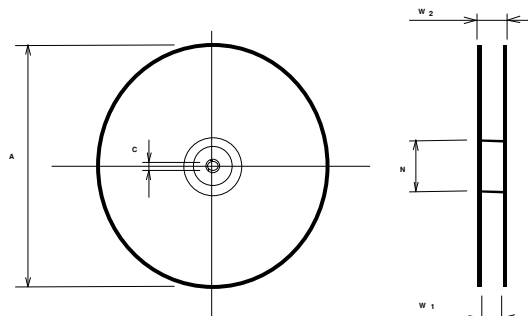
Tape (all dimensions in mm)

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



Reel (all dimensions in mm)

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



The minimum bending radius is 45 mm.

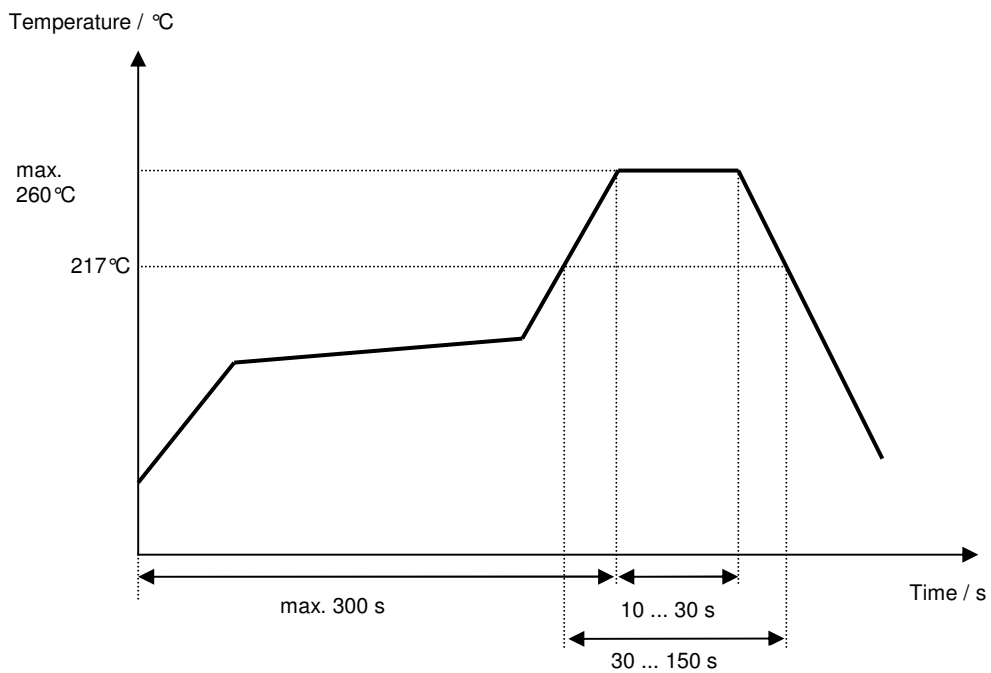
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Air reflow temperature conditions

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

Version	Reason of Changes	Name	Date
1.0	- Generation of specification	Dr. Wall	28.07.2000
1.1	- Add values for termination impedance and coupling coil - Add typical filter data - Change relative attenuation in stop band - Correct pinning and matching information	Dr. Wall	11.10.2000
1.2	- Header of page one and page two corrected	Dr. Wall	02.11.2000
1.3	- Maximum input power of 15 dBm added. - Remark concerning termination impedance added. - Remark concerning temperature of centre frequency added.	Dr. Wall	03.06.2002
1.4	- Reworked specification according to new specification layout	Martens	29.04.2011
1.5	- Change company name from "Vectron International GmbH & Co. KG" to "Vectron International GmbH" - Change maximum input power from 15 dBm to 10 dBm - Define measurement conditions for maximum input power	Dr. Wall	30.05.2013
2.0	- Code name changed from TFS400F to TFS400T for high power version - RoHS compliance updated	Dr. Wall	16.08.2013