

**Vectron International****Filter specification****TFS 240H****1/5****Measurement condition**

Ambient temperature:	23	°C
Input power level:	0	dBm
Terminating impedance: *		
Input:	360 Ω	-9,6 pF
Output:	360 Ω	-10,0 pF

**Characteristics**

## Remark:

The reference level for the relative attenuation  $a_{rel}$  of TFS 240H is the minimum of the pass band attenuation  $a_{min}$ . This value 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 25 dB filter attenuation level relative to the insertion loss  $a_e$ . The given values for the relative attenuation  $a_{rel}$  and 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	
<b>Insertion loss</b> (reference level)		$a_e$	5,2 dB	max.	9,0 dB
<b>Centre frequency</b> (reference frequency at ambient temperature)		$f_c$	240 MHz	±	25 kHz
<b>Passband</b>		PB	-	$f_c$ ±	100 kHz
<b>Pass band ripple</b>		p-p	0,2 dB	max.	0,5 dB
<b>Relative attenuation</b>		$a_{rel}$			
$f_c$	...	$f_c$ ± 0,100 MHz	0,2 dB	max.	0,5 dB
$f_c$ ± 0,100 MHz	...	$f_c$ ± 0,150 MHz	0,5 dB	max.	1 dB
$f_c$ ± 0,375 MHz	...	$f_c$ ± 0,575 MHz	35 dB	min.	25 dB
$f_c$ ± 0,575 MHz	...	$f_c$ ± 0,975 MHz	40 dB	min.	30 dB
$f_c$ ± 0,975 MHz	...	$f_c$ ± 5,000 MHz	40 dB	min.	35 dB
	10,000 MHz	...	$f_c$ - 5,000 MHz	min.	38 dB
$f_c$ ± 5,000 MHz	...	$f_c$ + 360,000 MHz	48 dB	min.	38 dB
<b>Average group delay within PB</b>			1,8 µs	max.	2,4 µs
<b>Group delay ripple within PB</b>			250 ns	max.	400 ns
<b>Triple transit response suppression</b>			18 dB	min.	15 dB
<b>Return loss within <math>f_c</math> ± 150 kHz</b>			12 dB	min.	7 dB
<b>Input power level</b>			-	max.	20 dBm***
<b>Operating temperature range</b>		OTR	-	- 30 °C ... + 80 °C	
<b>Storage temperature range</b>			-	- 40 °C ... + 85 °C	
<b>Frequency inversion temperature</b>			28 °C	-	
<b>Temperature coefficient of frequency</b>		$TC_f$ **	-0,04 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.

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

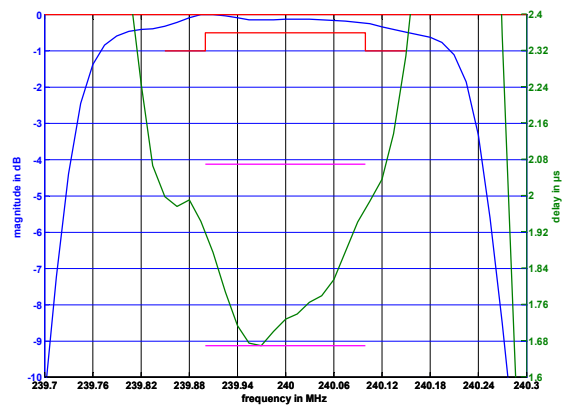
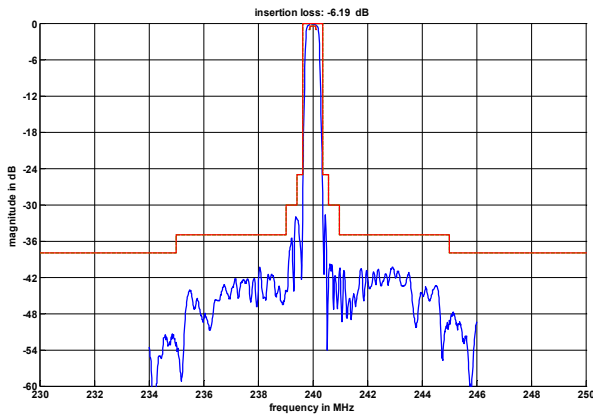
\*\*\*) This power level is allowed for short term operation (10% of life time) only, the max. input power for continuous operation is 15 dBm

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

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

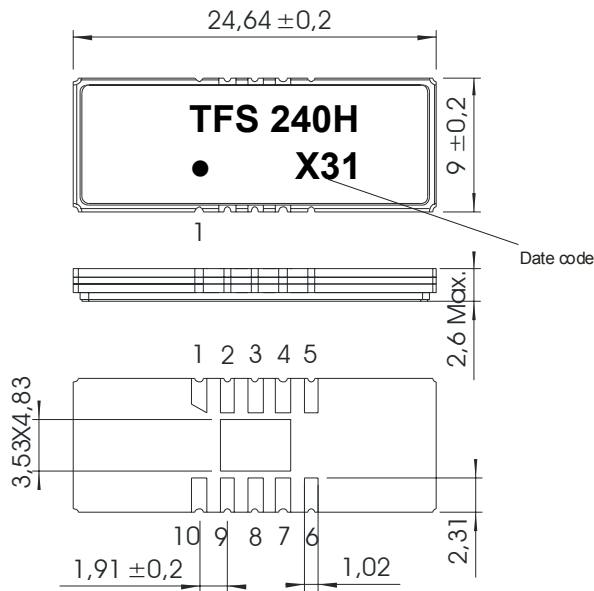
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**Filter characteristic**



**Construction and pin connection**

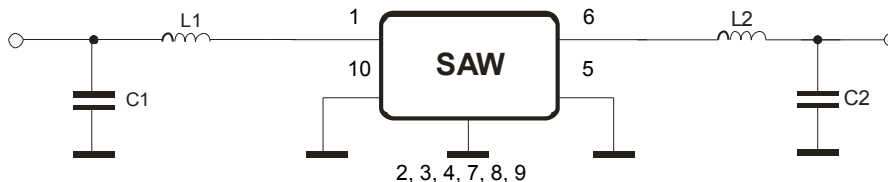
(All dimensions in mm)



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

Date code: Year + week  
 X 2009  
 A 2010  
 B 2011  
 ...

**50 Ω Test circuit**



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 E-Mail: [ift@vectron.com](mailto:ift@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 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: 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 (2002/95/EG, 2005/618/EG)

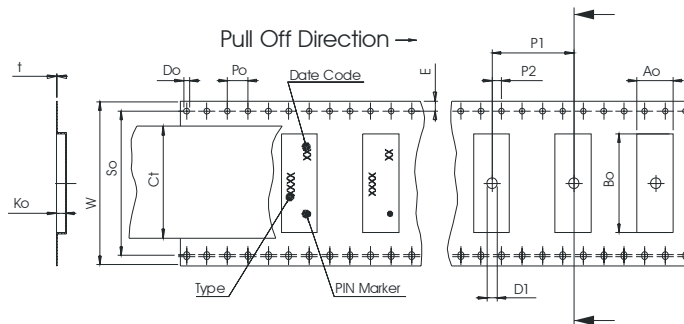
**Packing**

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:	1000
reel of empty components at start:	min. 300 mm
reel of empty components at start including leader:	min. 500 mm
trailer:	min. 300 mm

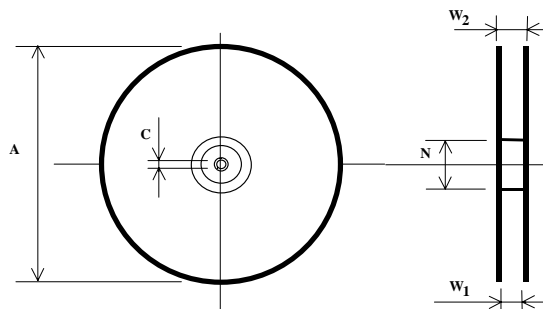
**Tape (all dimensions in mm)**

- W : 44,00 ± 0,3
- Po : 4,00 ± 0,1
- Do : 1,50 +0,1/-0
- E : 1,75 ± 0,1
- F : 20,20 ± 0,15
- P2 : 2,00 ± 0,15
- P1 : 16,00 ± 0,1
- D1(min) : 2,00
- Ao : 9,30 ± 0,1
- Bo : 24,90 ± 0,1
- So : 40,40 ± 0,1
- Ct : 38,0 ± 0,1



**Reel (all dimensions in mm)**

- A : 330
- W1 : 44,4 +2/-0
- W2(max) : 50,4
- N(min) : 100
- C : 13,0 +0,5/-0,2



The minimum bending radius is 45 mm.

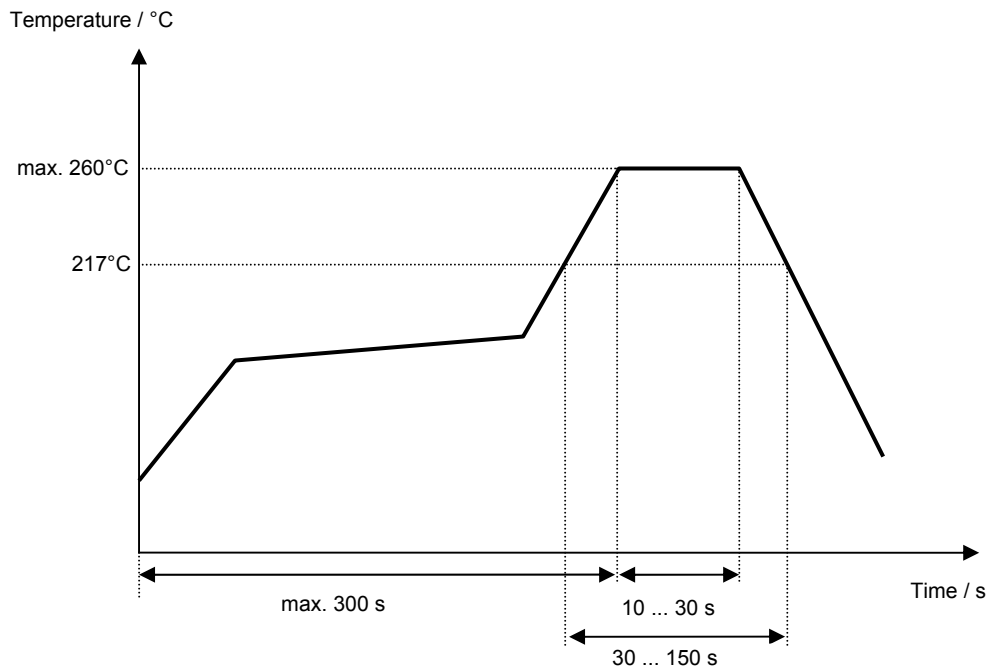
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**Potsdamer Straße 18**  
**D 14 513 TELTOW / Germany**  
**Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30**  
**E-Mail: [ift@vectron.com](mailto:ift@vectron.com)**

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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	Pfeiffer	25.02.2003
2.0	typical values, matching configuration and terminating impedances added package changed	Pfeiffer	13.06.2003
2.1.	terminating impedances changed, typical values corrected	Pfeiffer	05.02.2004
2.2	- package drawing corrected - stability characteristics, packing information and air reflow conditions updated	Pfeiffer	31.07.2009