

**Vectron International**

**Filter specification**

**TFS 115K**

**1/5**

**Measurement condition**

Ambient temperature: 23 °C  
 Input power level: 0 dBm  
 Terminating impedance: \*  
     Input: 1076,00 Ω || - 11,82 pF  
     Output: 1049,50 Ω || - 10,82 pF

**Characteristics**

Remark:

The reference level for the relative attenuation  $a_{rel}$  of the TFS115K 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 115,2 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.

D a t a		typ. value	tolerance / limit		
<b>Insertion loss ****</b> (reference level)		$a_e$	5,6	max.	8,5 dB
<b>Nominal frequency</b>		$f_N$	-		115,2 MHz
<b>Passband</b>		PB	-	$f_N \pm$	0,1 MHz
Pass band ripple (pk-pk)			0,5	max.	1 dB
Pass band ripple $f_N \pm 0,025$ (pk-pk)			0,01	max.	0,10 dB
Pass band ripple $f_N \pm 0,025 \dots f_N \pm 0,05$ (pk-pk)			0,07	max.	0,15 dB
<b>Bandwidth ***</b>					
1 dB			0,26 MHz	min.	0,2 MHz
20 dB			0,67 MHz	max.	0,8 MHz
<b>Relative attenuation</b>		$a_{rel}$			
$f_N$	... $f_N \pm$	0,1 MHz	0,5	max.	1 dB
$f_N \pm$	0,4 MHz ... $f_N \pm$	0,8 MHz	25	min.	20 dB
$f_N \pm$	0,8 MHz ... $f_N \pm$	5,0 MHz	29	min.	25 dB
$f_N \pm$	5,0 MHz ... $f_N \pm$	10,0 MHz	53	min.	35 dB
$f_N \pm$	10,0 MHz ... $f_N \pm$	15,0 MHz	61	min.	45 dB
$f_N \pm$	15,0 MHz ... $f_N \pm$	25,0 MHz	67	min.	50 dB
<b>Average group delay within PB</b>			1,92	max.	2,4 µs
<b>Group delay ripple within PB</b>		pk-pk	361	max.	600 ns
<b>Return loss within PB</b>			13,7	min.	10 dB
<b>OIP3</b>		*****	35	min.	30 dBm
<b>Input power level</b>			-	max.	15 dBm
<b>Operating temperature range</b>		OTR	-		- 30 °C ... + 75 °C
<b>Storage temperature range</b>			-		- 30 °C ... + 75 °C
<b>Temperature coefficient of frequency</b>		$TC_f$ **	-0,036 ppm/K		-

\*) 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.

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

\*\*\*) Measured at ambient temperature.

\*\*\*\*) 7dB max at ambient temperature (using our test fixture).

\*\*\*\*\*)  $f_{in1} = 115,185 \text{ MHz}$ ;  $f_{in2} = 115,215 \text{ MHz}$ ;  $f_{measurement1} = 115,155 \text{ MHz}$ ;  $f_{measurement2} = 115,245 \text{ MHz}$ ;  $P_{in} = 0 \text{ dBm}$

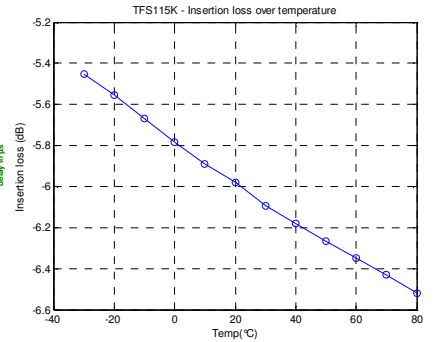
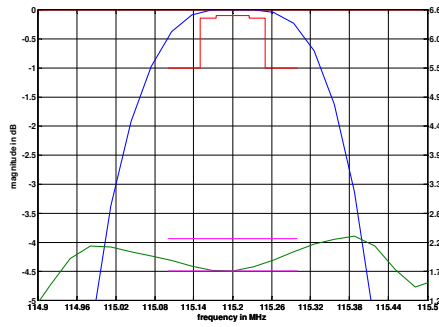
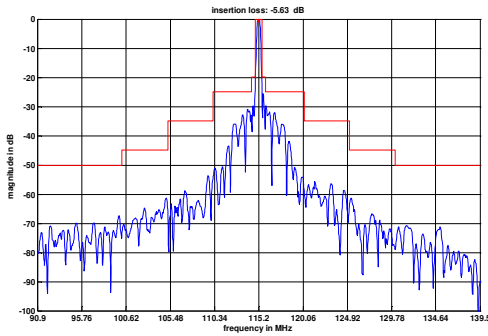
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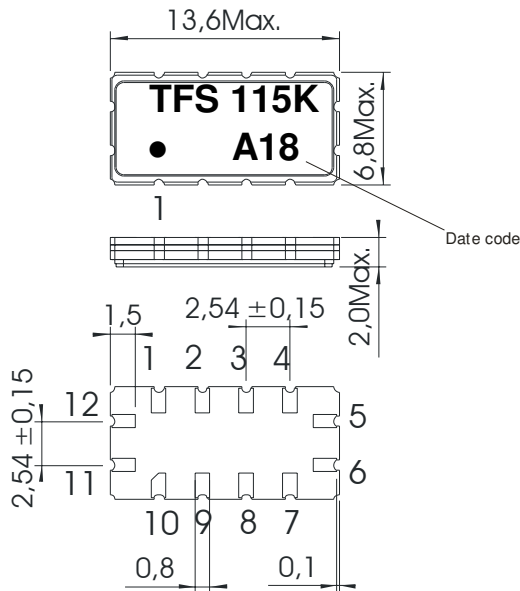
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**Filter characteristic**



**Construction and pin connection**

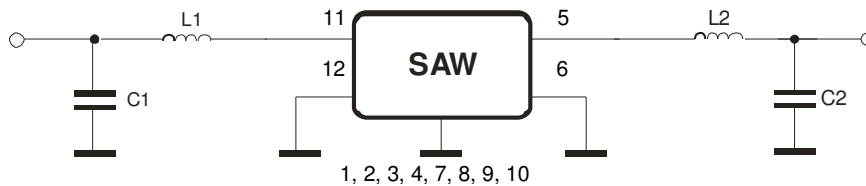
(All dimensions in mm)



- 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  
 A 2010  
 B 2011  
 C 2012  
 ...

**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 / 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;

This filter is RoHS compliant (2002/95/EG, 2005/618/EG)

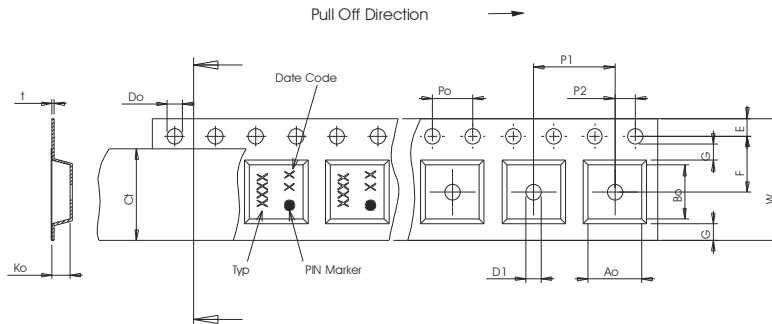
**Packing**

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:	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

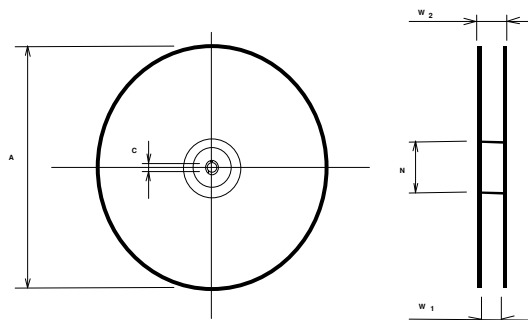
**Tape (all dimensions in mm)**

- 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.

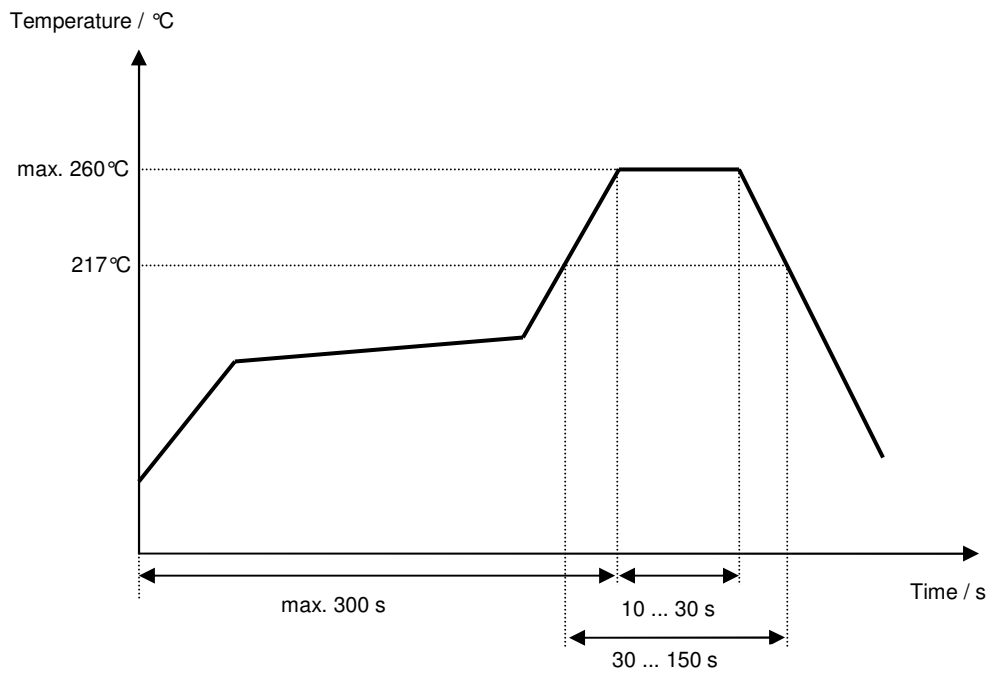
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**Air reflow temperature conditions**

<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	Hodkin	24.05.2010
1.1	- Bandwidth adjusted to 200kHz	Hodkin	25.05.2010
1.2	- Narrower typical bw & now Fc definition. - Changed input power level & average group delay within PB. - Included typical values from simulation for customer discussion.	Jaffer	25.05.2010
1.3	- Introduced amplitude ripple over 50 & 100kHz ranges, IP3 included.	Jaffer	25.05.2010
2.0	- Converted to Fn definition.	Jaffer	05.11.2010
2.1	- Add plots, typ values from measurements (of 11/3/11) → filter specification.	Jaffer	15.03.2011
2.2	- Add typ values for IP3 (our measurements are based on OIP3)	Jaffer	04.12.2012