

**Vectron International****Filter specification****TFS140E****1/5****Measurement condition**

Ambient temperature  $T_0$ : 23 °C  
 Input power level: 0 dBm  
 Terminating impedance: \*  
     Input: 860  $\Omega$  || -1.2 pF  
     Output: 860  $\Omega$  || -1.2 pF

**Characteristics****Remark:**

Reference level for the relative attenuation  $a_{rel}$  of the TFS140E 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 140.455 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  $f_c$ .

<b>D a t a</b>		<b>typ. value</b>	<b>tolerance / limit</b>
<b>Insertion Loss</b> (reference level)	$a_e$	2.9 dB	max. 5 dB -
<b>Nominal Frequency</b>	$f_N$	-	140.455 MHz
<b>Relative Attenuation</b>	$a_{rel}$		
$f_N \pm 25$ kHz		0.4 dB	max. 3 dB
$f_N \pm 75$ kHz ... $f_N \pm 125$ kHz		15 dB	min. 8 dB
$f_N \pm 125$ kHz ... $f_N \pm 455$ kHz		35 dB	min. 20 dB
$f_N \pm 455$ kHz		68 dB	min. 60 dB
<b>Intermodulation ***</b>		-	max. -88 dB
<b>Input power</b>		-	max. 5 dBm
<b>Operating Temperature Range</b>	OTR	-	- 40 °C ... + 85 °C
<b>Frequency Inversion Temperature</b>		25 °C	-
<b>Temperature Coefficient of Frequency</b>	$TC_f$ **	-0.035 ppm/K <sup>2</sup>	-
<b>Storage Temperature Range</b>		-	- 54 °C ... + 100 °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.

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

\*\*\*) For two - 20dBm input signals

@  $f_N + 0.060$  MHz and  $f_N + 0.120$  MHz

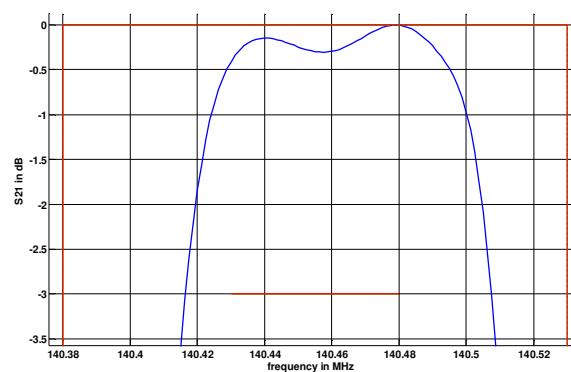
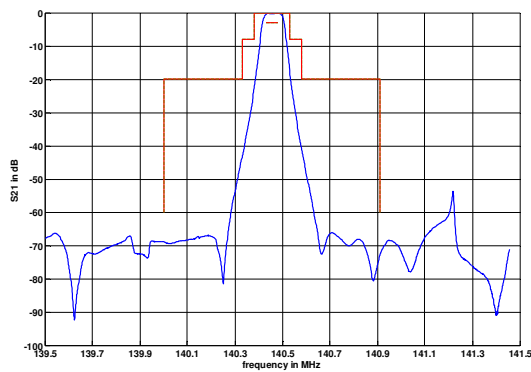
@  $f_N - 0.060$  MHz and  $f_N - 0.120$  MHz

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

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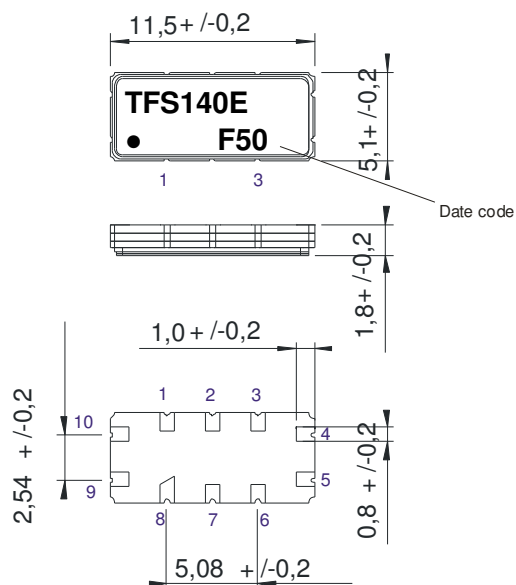
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## Filter characteristic



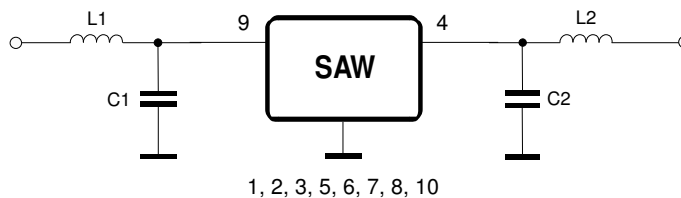
## Construction and pin connection

(All dimensions in mm)



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

Date code: Year + week  
 F 2015  
 G 2016  
 H 2017  
 ...

50  $\Omega$  matching circuit

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**Stability characteristics, reliability**

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

1. Shock: 500 g, 1 ms, half sine wave, 3 shocks each plane;  
DIN IEC 68 T2 - 27
2. Vibration: 10 Hz to 2000 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 refer to the attached "Air reflow temperature conditions" on page 4;
5. SAW devices are Electrostatic Discharge (ESD) sensitive devices.

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

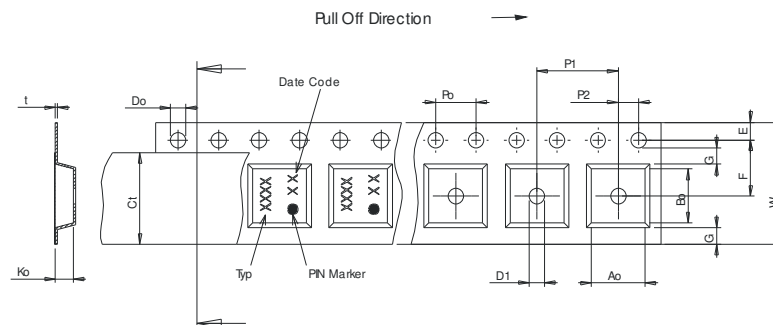
**Packing**

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;

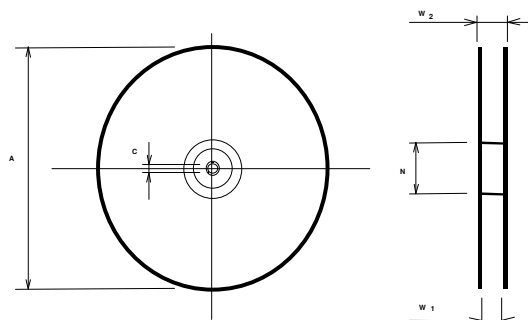
max. pieces of filters per reel: 3000  
reel of empty components at start: min. 300 mm  
reel of empty components at start including leader: min. 500 mm  
trailer: min. 300 mm

**Tape (all dimensions in mm)**

W	: 24.00 ± 0.3
Po	: 4.00 ± 0.1
Do	: 1.50 +0.1/-0
E	: 1.75 ± 0.1
F	: 11.50 ± 0.1
G(min)	: 0.60
P2	: 2.00 ± 0.1
P1	: 8.00 ± 0.1
D1(min)	: 1.50
Ao	: 5.60 ± 0.1
Bo	: 11.80 ± 0.1
Ct	: 21 ± 0.1

**Reel (all dimensions in mm)**

A	: 330 or 180
W1	: 24.4 +2/-0
W2(max)	: 30.4
N(min)	: 60
C	: 13.0 +0.5/-0.2



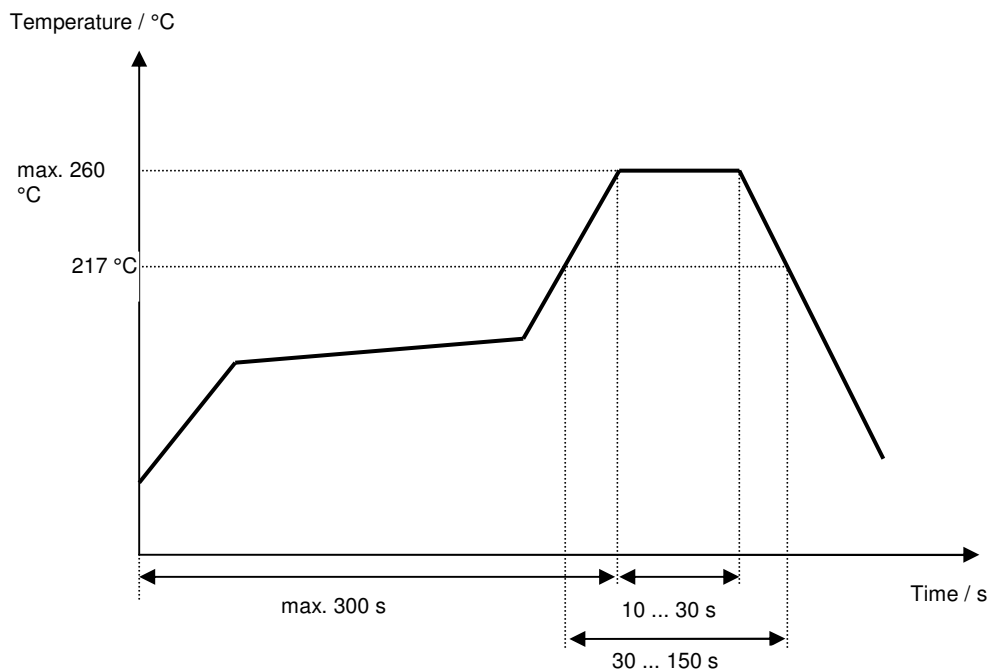
The minimum bending radius is 45 mm.

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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**

**Vectron International****Filter specification****TFS140E****5/5****History**

<b>Version</b>	<b>Reason of Changes</b>	<b>Name</b>	<b>Date</b>
1.4	<ul style="list-style-type: none"><li>- Add history</li><li>- Change date code from month to week.</li><li>- Change pin 1 marker from tft to a filled point.</li><li>- Change stability characteristics.</li><li>- Change packing information.</li><li>- Add maximum input power.</li></ul>	Dr. Wall	19.05.2003
1.5	<ul style="list-style-type: none"><li>- Add typical plots</li><li>- Update header and footer</li><li>- Add typical values</li></ul>	Bonnen	07.12.2015