

**Vectron International****Filter specification****TFS 96B****1/5****Measurement condition**

|                             |              |        |
|-----------------------------|--------------|--------|
| Ambient temperature $T_A$ : | 25           | °C     |
| Input power level:          | 0            | dBm    |
| Terminating impedance: *    |              |        |
| Input:                      | 556 $\Omega$ | -18 pF |
| Output:                     | 528 $\Omega$ | -19 pF |

**Characteristics**

## Remark:

The reference level for the relative attenuation  $a_{rel}$  of the TFS 96B 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 96 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><br>(reference level)  |          | $a_e$      |                 | max.                | 6.5        | dB         |
| <b>Nominal frequency</b>                    |          | $f_N$      |                 |                     | 96.0       | MHz        |
| <b>Passband</b>                             |          | PB         | -               | $f_N$               | $\pm$ 0.05 | MHz        |
| <b>Pass band ripple</b>                     |          |            | 0 dB            | max.                | 3          | dB         |
| <b>Relative attenuation</b>                 |          | $a_{rel}$  |                 |                     |            |            |
| $f_N$                                       | ...      | $f_N \pm$  | 0.05 MHz        | 1.5                 | dB         | max. 3 dB  |
| $f_N \pm$                                   | 0.75 MHz | ...        | $f_N \pm$ 5 MHz | 28                  | dB         | min. 20 dB |
| <b>Absolute group delay within PB</b>       |          |            | 1.2 $\mu$ s     | max.                | 2          | $\mu$ s    |
| <b>Group delay variation within PB</b>      |          |            | 60 ns           | max.                | 100        | ns         |
| <b>Phase linearity within PB</b>            |          |            | 0.996 deg       | max.                | 6.75       | deg        |
| <b>Operating temperature range</b>          |          | OTR        | -               | - 20 °C ... + 85°C  |            |            |
| <b>Storage temperature range</b>            |          |            | -               | - 55 °C ... + 125°C |            |            |
| <b>Temperature coefficient of frequency</b> |          | $TC_f$ **  | -17 ppm/K       | -                   |            |            |

\*) 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.

\*\*)  $\Delta f = TC_f(T - T_A)f_N$

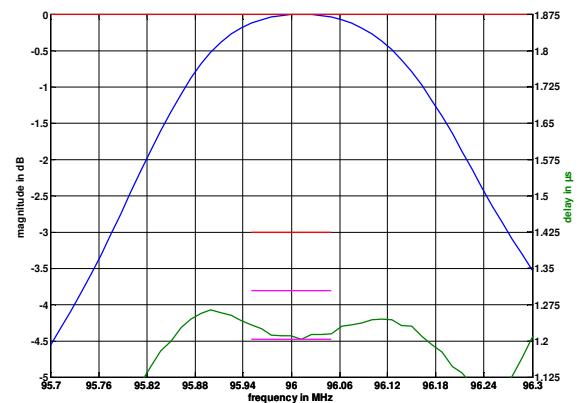
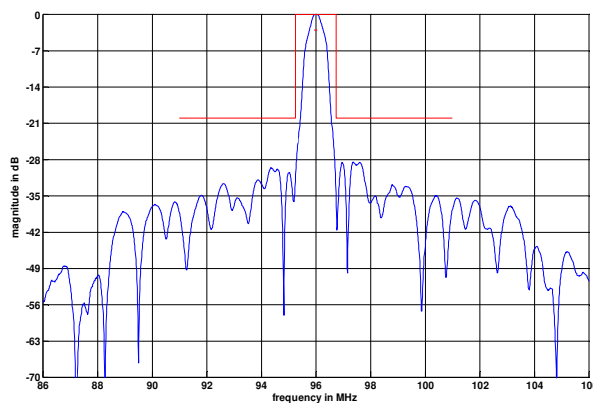
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Checked / Approved:

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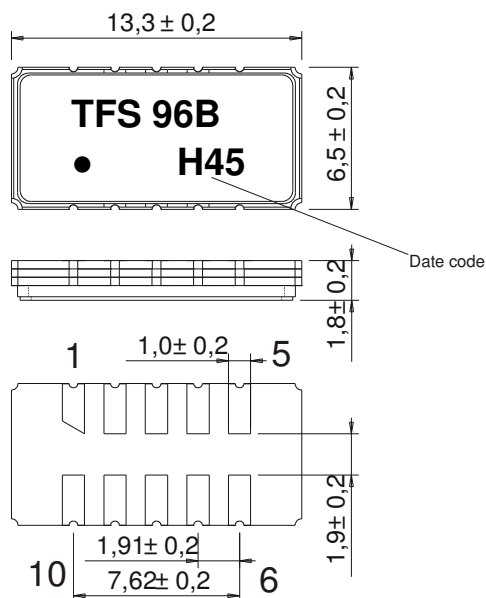
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## Filter characteristic



## Construction and pin connection

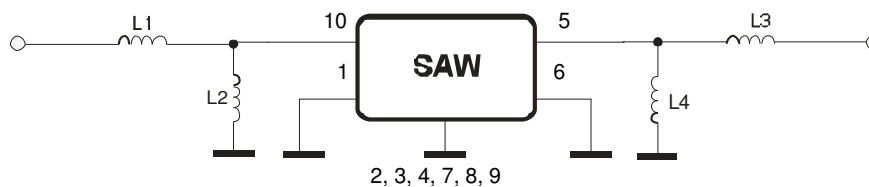
(All dimensions in mm)



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

Date code: Year + week  
H 2016  
J 2017  
K 2018  
...

## 50 Ω Test 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 60068 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 60068 T2 - 6
3. Change of temperature: -55 °C to 125 °C / 15 min. each / 100 cycles  
DIN IEC 60068 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;

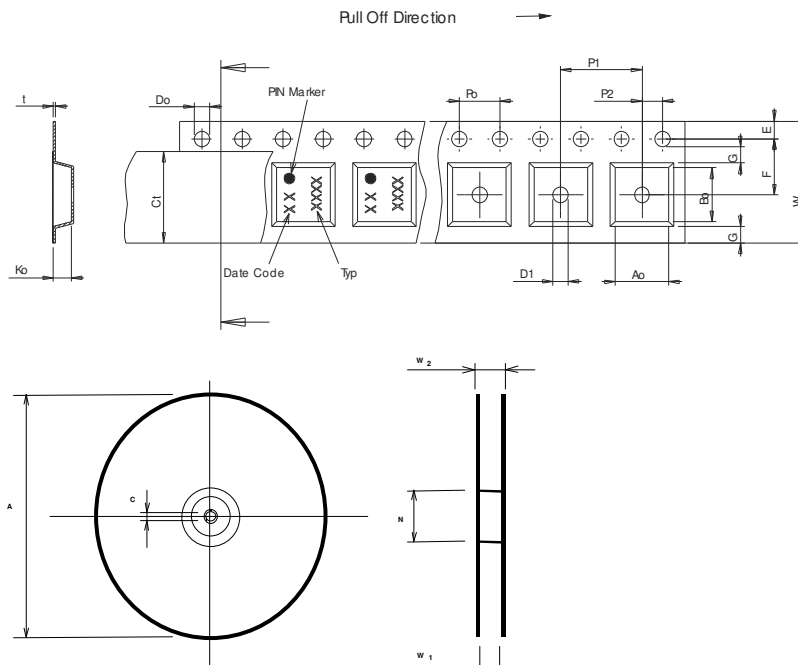
|                                                     |             |
|-----------------------------------------------------|-------------|
| max. pieces of filters per reel:                    | 1700        |
| reel of empty components at start:                  | min. 300 mm |
| reel of empty components 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      | : 7.00 ±0.10        |
| Bo      | : 13.80 ±0.10       |
| Ct      | : 21.00 ±0.1        |
| Ko      | : 2.10 ±0.10        |
| t       | : 0.30 ±0.05        |

**Reel (all dimensions in mm)**

|         |                  |
|---------|------------------|
| A       | : 330 or 180     |
| W1      | : 24.4 +2/-0     |
| W2(max) | : 30.40          |
| N(min)  | : 60.00          |
| C       | : 13.0 +0.5/-0.2 |



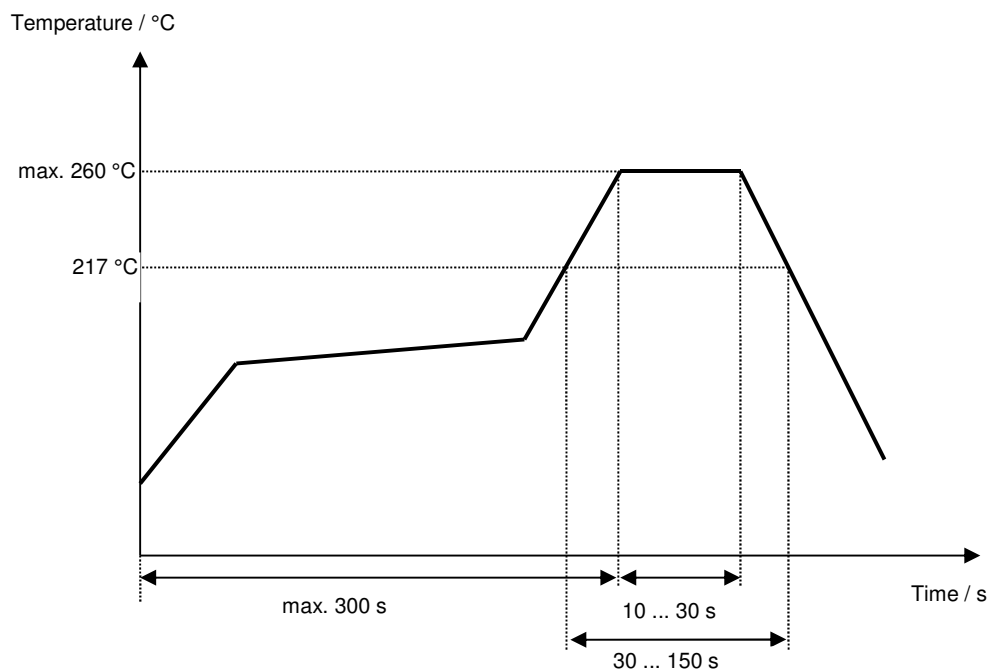
The minimum bending radius is 45 mm.

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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 96B****5/5****History**

| <b>Version</b> | <b>Reason of Changes</b>                                                                                                                                                                                                                                                                   | <b>Name</b> | <b>Date</b> |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|
| 1.0            | - Generation of development specification                                                                                                                                                                                                                                                  | Strehl      | 17.07.2007  |
| 1.1            | - Change from development specification to filter specification<br>- Correct temperature coefficient of frequency unit<br>- Delete frequency inversion temperature<br>- Add terminating impedance values<br>- Add typical values<br>- Add filter characteristics<br>- Add matching circuit | Alawneh     | 18.07.2008  |
| 2.0            | - Change tape & reel dimensions<br>- Update header and footer sections<br>- Update data section<br>- Update storage temperature range<br>- Update stability characteristics, reliability                                                                                                   | Bonnen      | 04.11.2016  |

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