

**Vectron International****Filter specification****TFS433AK****1/5****Measurement condition**

|                             |    |          |
|-----------------------------|----|----------|
| Ambient temperature $T_A$ : | 23 | °C       |
| Input power level:          | 0  | dBm      |
| Terminating impedance:      |    |          |
| Input:                      | 50 | $\Omega$ |
| Output:                     | 50 | $\Omega$ |

**Characteristics****Remark:**

The reference level for the relative attenuation  $a_{rel}$  of the TFS433AK is the minimum of the pass band attenuation. This value is defined as the insertion loss  $a_0$ . The nominal frequency  $f_N$  is fixed at 433.92 MHz without any tolerance. The values of relative attenuation  $a_{rel}$  are guaranteed over the whole operating temperature range. The frequency shift of the filter within the operating temperature range is included in the production tolerance scheme.

| <b>D a t a</b>                              |           | <b>typ. value</b> |       | <b>tolerance / limit</b> |          |
|---------------------------------------------|-----------|-------------------|-------|--------------------------|----------|
| <b>Insertion loss</b>                       | $a_e$     | 2.75              | dB    | 3.80                     | dB       |
| (reference level)                           |           | -                 |       | -                        |          |
| <b>Nominal frequency</b>                    | $f_N$     | -                 |       | 433.92                   | MHz      |
| <b>Centre frequency</b>                     | $f_C$     | 433.96            | MHz   | -                        |          |
| <b>Passband</b>                             | PB        |                   |       |                          |          |
| 1 dB                                        |           | 6.4               | MHz   | min.                     | 1.71 MHz |
| <b>Relative attenuation</b>                 | $a_{rel}$ |                   |       |                          |          |
| $f_N - 0.92$ MHz ... $f_N + 0.79$ MHz       |           | 0.4               | dB    | max.                     | 1 dB     |
| $f_N - 8.42$ MHz ... $f_N - 18.92$ MHz      |           | 58                | dB    | min.                     | 37 dB    |
| $f_N - 18.92$ MHz ... $f_N - 25.92$ MHz     |           | 63                | dB    | min.                     | 52 dB    |
| $f_N - 25.92$ MHz ... $f_N - 40.92$ MHz     |           | 65                | dB    | min.                     | 42 dB    |
| $f_N - 40.92$ MHz ... $f_N - 83.92$ MHz     |           | 74                | dB    | min.                     | 52 dB    |
| $f_N - 83.92$ MHz ... $f_N - 423.92$ MHz    |           | 71                | dB    | min.                     | 37 dB    |
| $f_N + 9.58$ MHz ... $f_N + 20.08$ MHz      |           | 26                | dB    | min.                     | 12 dB    |
| $f_N + 20.08$ MHz ... $f_N + 41.08$ MHz     |           | 55                | dB    | min.                     | 34 dB    |
| $f_N + 41.08$ MHz ... $f_N + 141.08$ MHz    |           | 68                | dB    | min.                     | 50 dB    |
| $f_N + 141.08$ MHz ... $f_N + 566.08$ MHz   |           | 50                | dB    | min.                     | 40 dB    |
| <b>Input power level</b>                    |           | -                 |       | max.                     | 5 dBm    |
| <b>Operating temperature range</b>          | OTR       | -                 |       | - 40 °C ... + 85 °C      |          |
| <b>Storage temperature range</b>            |           | -                 |       | - 55 °C ... + 125 °C     |          |
| <b>Temperature coefficient of frequency</b> | $TC_f$ *) | -35               | ppm/K | -                        |          |

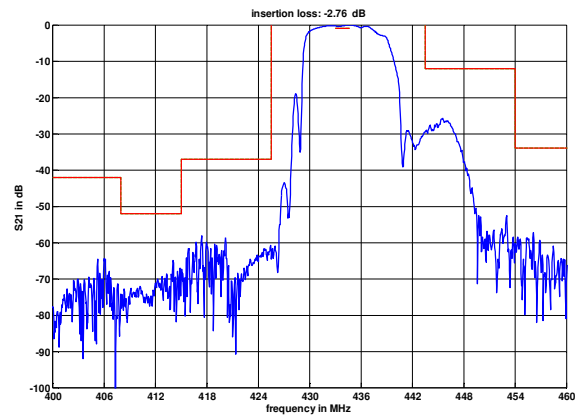
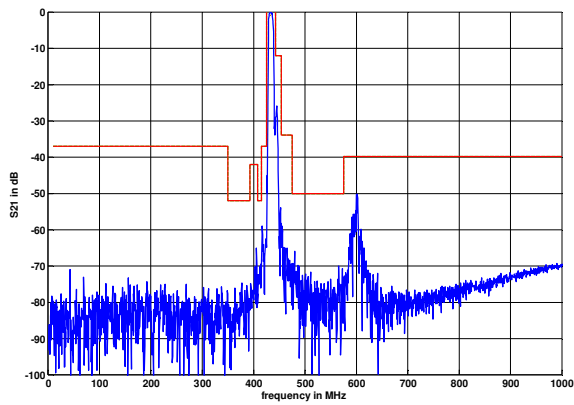
\*)  $\Delta f = TC_f(T - T_A)f_N$

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

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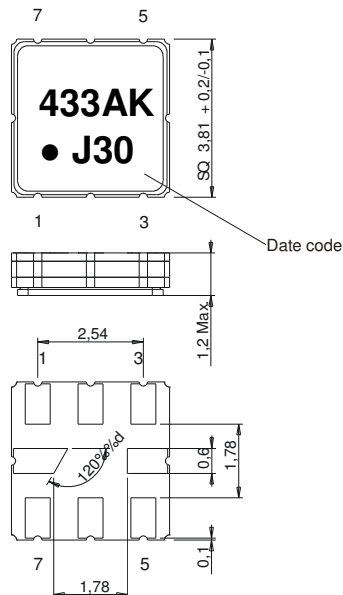
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## Filter characteristic



## Construction and pin connection

(All dimensions in mm)



|   |        |
|---|--------|
| 1 | Ground |
| 2 | Output |
| 3 | Ground |
| 4 | Ground |
| 5 | Ground |
| 6 | Input  |
| 7 | Ground |
| 8 | Ground |

Date code: Year + week

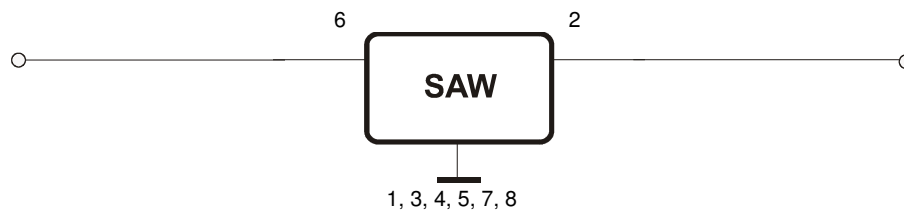
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K 2018

L 2019

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## 50 Ohm 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;

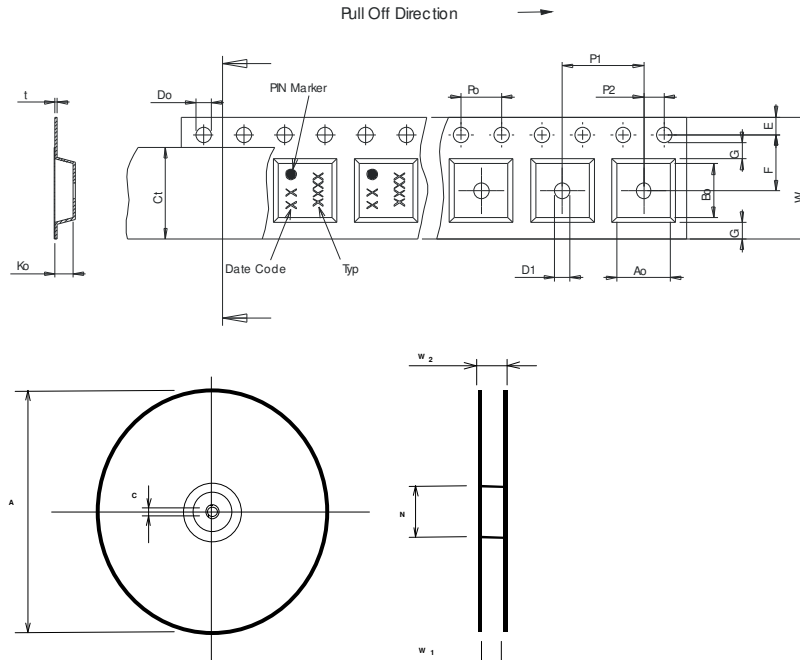
|                                                     |             |
|-----------------------------------------------------|-------------|
| reel of empty components at start:                  | min. 300 mm |
| reel of empty components at start including leader: | min. 500 mm |
| trailer:          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

**Tape (all dimensions in mm)**

|         |                |
|---------|----------------|
| W       | : 12.00 ±0.3   |
| Po      | : 4.00 ±0.1    |
| Do      | : 1.50 +0.1/-0 |
| E       | : 1.75 ±0.1    |
| F       | : 5.50 ±0.05   |
| G(min)  | : 0.75         |
| P2      | : 2.00 ±0.05   |
| P1      | : 8.00 ±0.1    |
| D1(min) | : 1.50         |
| Ao      | : 4.30 ±0.1    |
| Bo      | : 4.30 ±0.1    |
| Ct      | : 9.2 ±0.1     |
| Ko      | : 1.80 ±0.1    |
| t       | : 0.30 ±0.05   |

**Reel (all dimensions in mm)**

|         |                  |
|---------|------------------|
| A       | : 330 or 180     |
| W1      | : 12.4 +2/-0     |
| W2(max) | : 18.40          |
| N(min)  | : 50.00          |
| C       | : 13.0 +0.5/-0.2 |



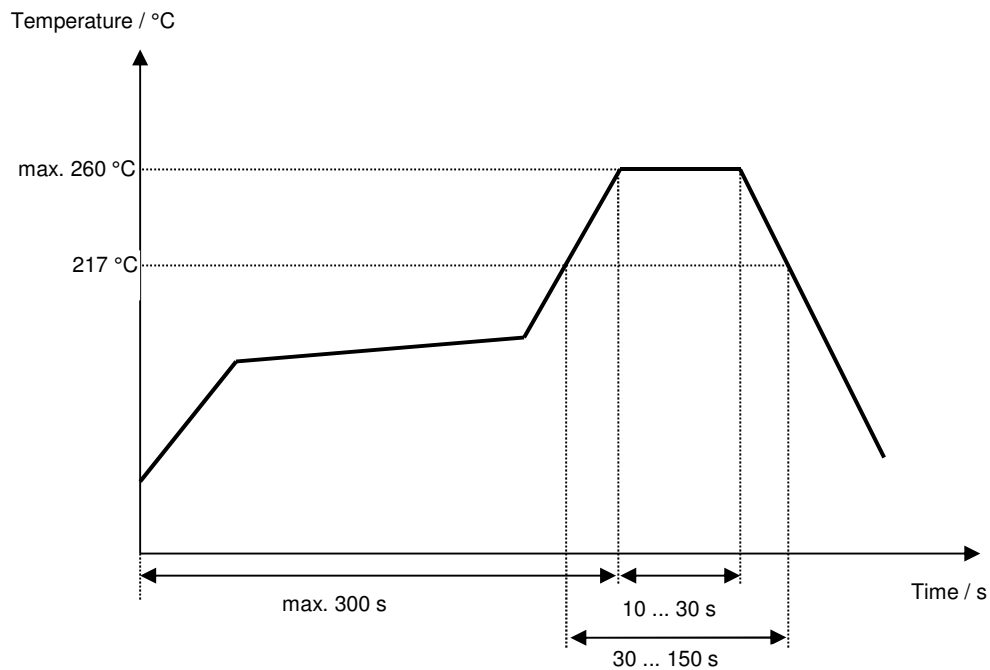
The minimum bending radius is 45 mm.

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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**

**Vectron International****Filter specification****TFS433AK****5/5****History**

| <b>Version</b> | <b>Reason of Changes</b>                                                                                                                            | <b>Name</b> | <b>Date</b> |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|
| 1.0            | Generation of filter specification.                                                                                                                 | Abutaimah   | 09.03.2017  |
| 1.1            | Update storage temperature range<br>Update construction and pin connection<br>Update 50 $\Omega$ test circuit<br>Update tape & reel<br>Update typos | P. Jaster   | 27.07.2017  |

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