

**Vectron International****Filter specification****TFS 433AG****1/5****Measurement condition**

|                             |                         |     |
|-----------------------------|-------------------------|-----|
| Ambient temperature $T_A$ : | 23                      | °C  |
| Input power level:          | 0                       | dBm |
| Terminating impedance:      |                         |     |
| Input:                      | 240 $\Omega$    -2.5 pF |     |
| Output:                     | 240 $\Omega$    -2.5 pF |     |

**Characteristics****Remark:**

The reference level for the relative attenuation  $a_{rel}$  of the TFS 433AG 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 433.92 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.

| <b>D a t a</b>                              |   |            |     |       |              | <b>typ. value</b> |                          | <b>tolerance / limit</b> |                |     |
|---------------------------------------------|---|------------|-----|-------|--------------|-------------------|--------------------------|--------------------------|----------------|-----|
| <b>Insertion loss</b><br>(reference level)  |   |            |     |       |              | $a_e = a_{min}$   | 1.78 dB                  | max.                     | 3.0            | dB  |
| <b>Nominal frequency</b>                    |   |            |     |       |              | $f_N$             | -                        |                          | 433.92         | MHz |
| <b>Centre frequency 3dB</b>                 |   |            |     |       |              | $f_C$             | 433.92 MHz               |                          | -              |     |
| <b>Passband</b>                             |   |            |     |       |              | PB                |                          |                          | $f_N \pm 0.16$ | MHz |
| <b>Relative attenuation</b>                 |   |            |     |       |              | $a_{rel}$         |                          |                          |                |     |
| $f_N$                                       | - | 0.16 MHz   | ... | $f_N$ | + 0.16 MHz   |                   | 0.45 dB                  | max.                     | 2              | dB  |
| $f_N$                                       | - | 0.18 MHz   | ... | $f_N$ | + 0.18 MHz   |                   | 0.50 dB                  | max.                     | 3              | dB  |
| $f_N$                                       | - | 0.22 MHz   | ... | $f_N$ | + 0.22 MHz   |                   | 0.70 dB                  | max.                     | 6              | dB  |
| $f_N$                                       | - | 423.92 MHz | ... | $f_N$ | - 19.92 MHz  |                   | 58 dB                    | min.                     | 52             | dB  |
| $f_N$                                       | - | 19.92 MHz  | ... | $f_N$ | - 10.42 MHz  |                   | 56 dB                    | min.                     | 48             | dB  |
| $f_N$                                       | - | 10.42 MHz  | ... | $f_N$ | - 2.20 MHz   |                   | 46 dB                    | min.                     | 29             | dB  |
| $f_N$                                       | - | 2.20 MHz   | ... | $f_N$ | - 1.80 MHz   |                   | 46 dB                    | min.                     | 26             | dB  |
| $f_N$                                       | - | 1.80 MHz   | ... | $f_N$ | - 0.82 MHz   |                   | 18 dB                    | min.                     | 17             | dB  |
| $f_N$                                       | + | 1.00 MHz   | ... | $f_N$ | + 8.08 MHz   |                   | 40 dB                    | min.                     | 18             | dB  |
| $f_N$                                       | + | 8.08 MHz   | ... | $f_N$ | + 66.08 MHz  |                   | 47 dB                    | min.                     | 40             | dB  |
| $f_N$                                       | + | 66.08 MHz  | ... | $f_N$ | + 266.08 MHz |                   | 65 dB                    | min.                     | 50             | dB  |
| $f_N$                                       | + | 266.08 MHz | ... | $f_N$ | + 371.08 MHz |                   | 52 dB                    | min.                     | 45             | dB  |
| $f_N$                                       | + | 371.08 MHz | ... | $f_N$ | + 566.08 MHz |                   | 62 dB                    | min.                     | 60             | dB  |
| <b>DC voltage</b>                           |   |            |     |       |              | $V_{DC}$          | -                        | max.                     | 6              | V   |
| <b>Input power level</b>                    |   |            |     |       |              |                   | -                        | max.                     | 10             | dBm |
| <b>Operating temperature range</b>          |   |            |     |       |              | OTR               | -                        |                          | -40 ... +95    | °C  |
| <b>Storage temperature range</b>            |   |            |     |       |              |                   | -                        |                          | -55 ... +125   | °C  |
| <b>Temperature coefficient of frequency</b> |   |            |     |       |              | $TC_f^*)$         | -0.03 ppm/K <sup>2</sup> |                          |                |     |

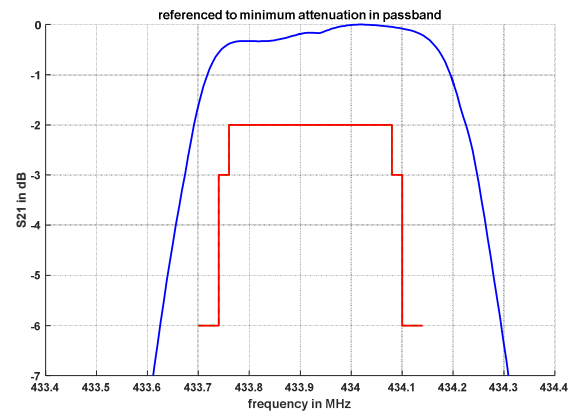
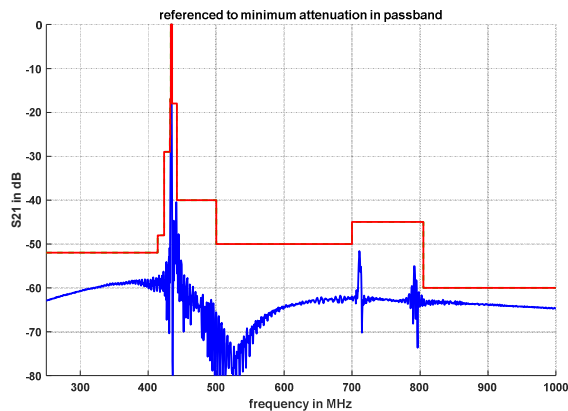
\*)  $\Delta f = TC_f(T - T_0)^2 f_N$

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

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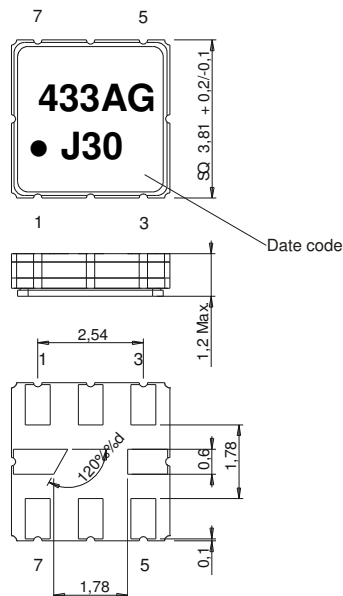
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## Filter characteristic



## Construction and pin connection

(All dimensions in mm)



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

Date code: Year + week

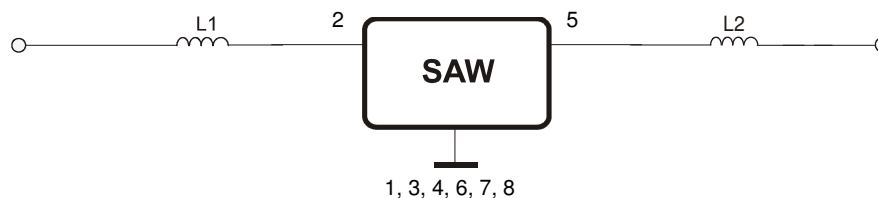
J 2017

K 2018

L 2019

...

## 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;

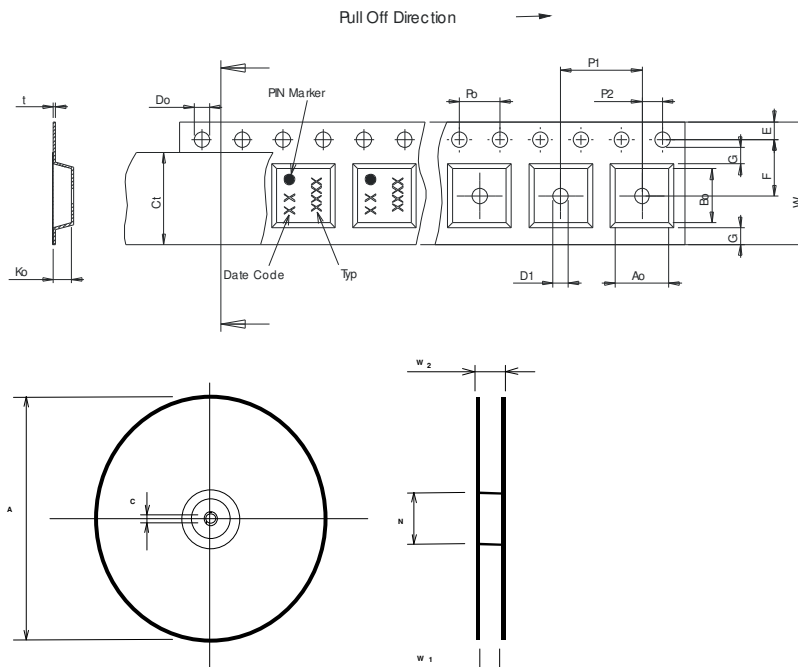
reel of empty components at start: min. 300 mm  
reel of empty components at start including leader: min. 500 mm  
trailer: min. 300 mm

**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 |



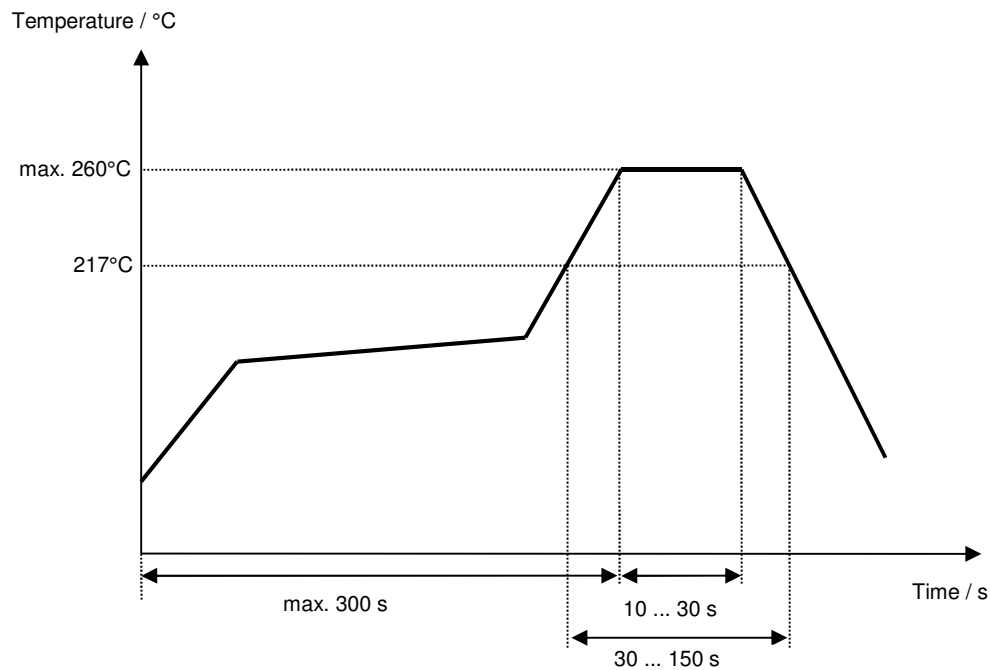
The minimum bending radius is 45 mm.

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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****TFS 433AG****5/5**

| <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 connection and pin connection<br>update 50 Ohm test circuit<br>update tape & reel<br>update typos | Schönbein   | 26.07.2017  |

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