

**Vectron International****Filter specification****TFS 868N****1/5****Measurement condition**

|                           |              |         |
|---------------------------|--------------|---------|
| Ambient temperature:      | 23           | °C      |
| Input power level:        | 0            | dBm     |
| Terminating impedance: *) |              |         |
| Input:                    | 130 $\Omega$ | -2.3 pF |
| Output:                   | 130 $\Omega$ | -2.3 pF |

**Characteristics****Remark:**

Reference level for the relative attenuation  $a_{rel}$  of the TFS 868N 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 center 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 868.3 MHz without tolerance. The given values for the relative attenuation  $a_{rel}$  have to be reached at the frequencies given below even if the center 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 center frequency  $f_C$ .

| <b>D a t a</b>                                      |                 | <b>typ. value</b>         | <b>tolerance / limit</b> |                    |            |
|-----------------------------------------------------|-----------------|---------------------------|--------------------------|--------------------|------------|
| <b>Insertion loss</b><br>(reference level)          | $a_e^{**})$     | 3.3 dB                    | max.                     | 3.8                | dB         |
| <b>Nominal frequency</b>                            | $f_N$           | -                         |                          | 868.3              | MHz        |
| <b>Center frequency</b>                             | $f_C$           | 868.3 MHz                 |                          | -                  |            |
| <b>Passband</b>                                     | PB              | -                         | min.                     | ±300               | kHz        |
| <b>Passband ripple</b>                              | p-p             | 0.6 dB                    | max.                     | 3                  | dB         |
| <b>Amplitude ripple <math>f_N \pm 200</math>kHz</b> | p-p             | 0.4 dB                    | max.                     | 2                  | dB         |
| <b>Relative attenuation</b>                         | $a_{rel}$       |                           |                          |                    |            |
| $f_N$                                               | ...             | $f_N \pm 200.0$ kHz       |                          | 0.6 dB             | max. 2 dB  |
| $f_N \pm 200.0$ kHz                                 | ...             | $f_N \pm 300.0$ kHz       |                          | 0.6 dB             | max. 3 dB  |
| $f_N - 858.3$ MHz                                   | ...             | $f_N - 12.3$ MHz          |                          | 42 dB              | min. 38 dB |
| $f_N - 12.3$ MHz                                    | ...             | $f_N - 2.8$ MHz           |                          | 32 dB              | min. 30 dB |
| $f_N + 2.7$ MHz                                     | ...             | $f_N + 11.7$ MHz          |                          | 32 dB              | min. 30 dB |
| $f_N + 11.7$ MHz                                    | ...             | $f_N + 21.7$ MHz          |                          | 37 dB              | min. 33 dB |
| $f_N + 21.7$ MHz                                    | ...             | $f_N + 131.7$ MHz         |                          | 40 dB              | min. 36 dB |
| <b>Input power level</b>                            | ***))           | -                         | max.                     | 17                 | dBm        |
| <b>Operating temperature range</b>                  | OTR             | -                         |                          | -45 °C ... +120 °C |            |
| <b>Storage temperature range</b>                    |                 | -                         |                          | -45 °C ... +120 °C |            |
| <b>Frequency inversion temperature</b>              |                 | 44 °C                     |                          | -                  |            |
| <b>Temperature coefficient of frequency</b>         | $TC_f^{****)})$ | -0.034 ppm/K <sup>2</sup> |                          | -                  |            |

\*) 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.

\*\*)) maximum 3.8dB at 23°C, maximum 4.5dB at +120°C.

\*\*\*)) 17dBm for duty cycle 1:1000 @ 23°C, 8dBm for continuous power over 15yrs lifetime @ 23°C, 2dBm for continuous power over 15yrs lifetime @ 85°C.

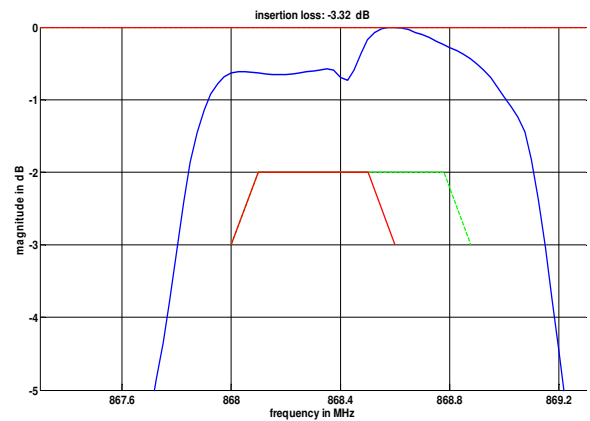
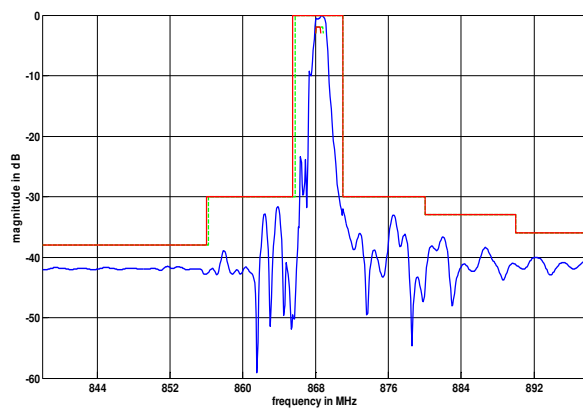
\*\*\*\*))  $\Delta f(\text{Hz}) = TC_f(\text{ppm/K}) \times (T - T_0)^2 \times f_{T0}(\text{MHz})$

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

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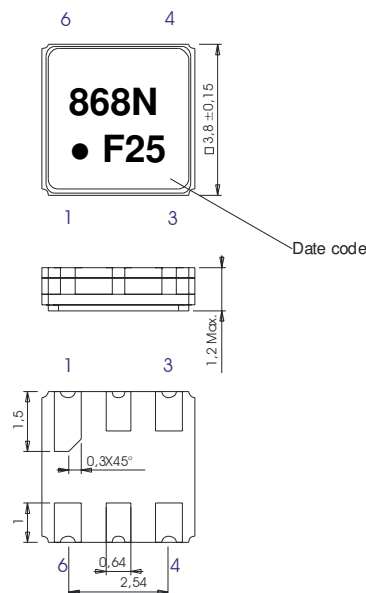
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## Filter characteristic



## Construction and pin connection

(All dimensions in mm)



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

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

50  $\Omega$  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 / 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;

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

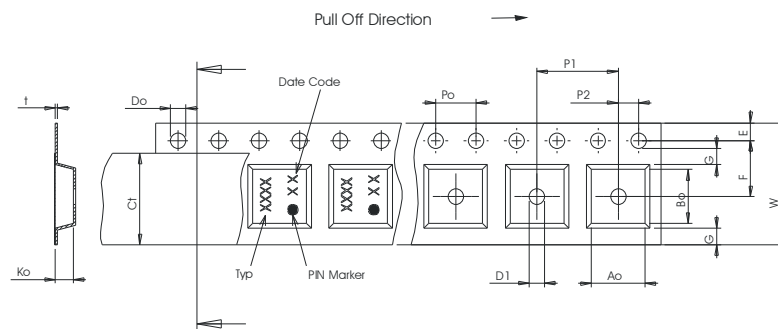
**Packing**

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;

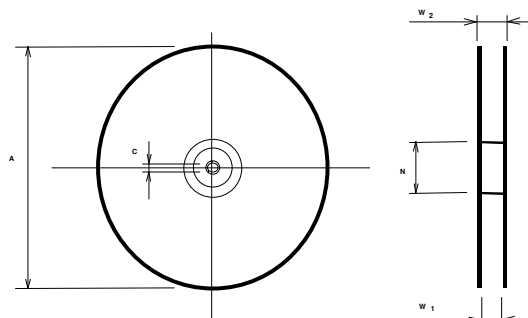
|                                                     |             |
|-----------------------------------------------------|-------------|
| max. pieces of filters per reel:                    | 3000        |
| reel of empty components at start:                  | min. 300 mm |
| reel of empty components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

**Tape (all dimensions in mm)**

|         |                |
|---------|----------------|
| W       | : 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    |

**Reel (all dimensions in mm)**

|         |                  |
|---------|------------------|
| A       | : 330 or 180     |
| W1      | : 12,4 +2/-0     |
| W2(max) | : 18,4           |
| N(min)  | : 50             |
| C       | : 13,0 +0,5/-0,2 |



The minimum bending radius is 45 mm.

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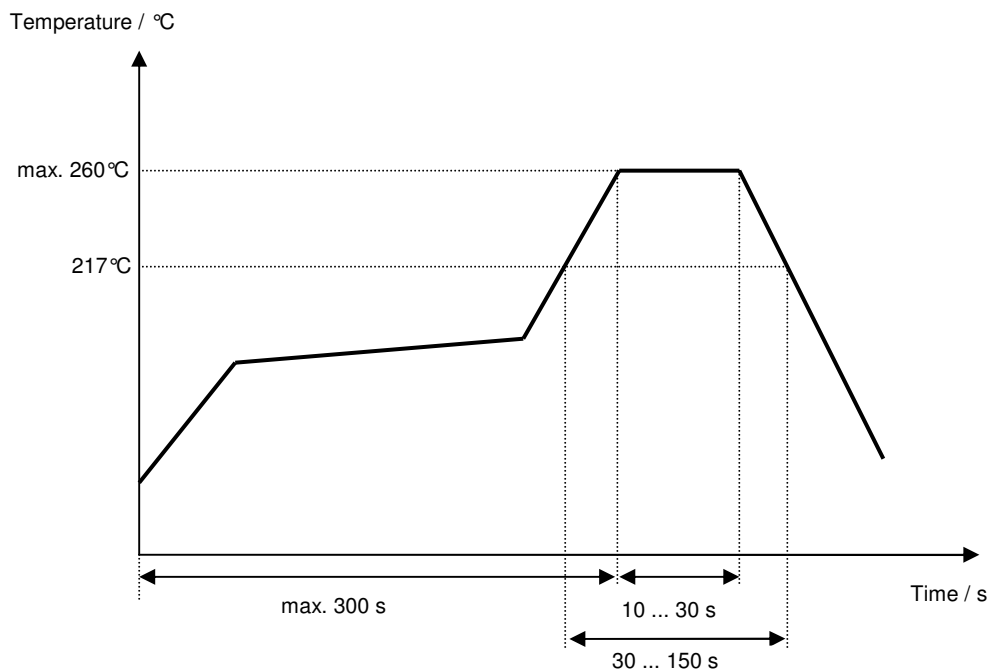
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**Air reflow temperature conditions**

| <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 868N****5/5****History**

| <b>Version</b> | <b>Reason of Changes</b>                                                                                                                                                      | <b>Name</b> | <b>Date</b> |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|
| 1.0            | - generation of development specification                                                                                                                                     | Strehl      | 06.10.2005  |
| 1.1            | - change construction and pin connection to 8 pin<br>- change stability characteristics to stability characteristics, reliability                                             | Channaa     | 15.11.2005  |
| 1.2            | - change of rejection in stop band and package                                                                                                                                | Sabah       | 12.12.2005  |
| 1.3            | - Change of rejection in stop band<br>- Add filter characteristic, add typical values<br>- generation of filter specification<br>- add of test circuit                        | Channaa     | 16.01.2006  |
| 1.4            | - Change attenuation according to limit line in filter characteristic                                                                                                         | Channaa     | 05.05.2006  |
| 2.0            | - Relaxation of stop band attenuation between 871MHz and 880MHz<br>from 36dB to 33dB introduced<br>- Remarks in data table, typical values and filter characteristics updated | Schönbein   | 16.06.2015  |

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