

VI TELEFILTER**Filter Specification****TFS 87C****1/5****Measurement condition**

Ambient temperature T_A : 23 °C
 Input power level: 0 dBm
 Terminating impedances at f_C *):
 input: 1840 Ω // -10,1 pF
 output: 2170 Ω // - 9,8 pF

Characteristics

Remark: Reference level for the relative attenuation a_{rel} of the **TFS 87C** 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 temperature coefficient of frequency TC_f is valid for both the reference frequency f_C and the frequency response of the filter in the operating temperature range.

| Data | | typ. value | tolerance / limit |
|---|-------------------|------------------------------|----------------------|
| Insertion loss (reference level) | a_e | 13,5 dB | max. 16,5 dB |
| Nominal frequency | f_N | - | 87,2 MHz |
| Centre frequency at ambient temperature | f_C | 87,2 MHz | - |
| Pass band | PB | - | $f_N \pm 0,5$ MHz |
| Amplitude ripple within PB | | 0,4 dB | max. 0,8 dB |
| In band ripple (in any 112,5 kHz increment within the PB) | | 0,15 dB | max. 0,5 dB p-p |
| Relative attenuation | a_{rel} | | |
| f_N | $f_N \pm 0,5$ MHz | 0,4 dB | max. 0,8 dB |
| $f_N \pm 1$ MHz | $f_N \pm 1,5$ MHz | 44 dB | min. 39 dB |
| $f_N \pm 1,5$ MHz | $f_N \pm 3$ MHz | 48 dB | min. 40 dB |
| DC | $f_N - 3$ MHz | 60 dB | min. 50 dB |
| $f_N + 3$ MHz | $f_N + 1,5$ GHz | 60 dB | min. 50 dB |
| Group delay at f_N | | 2,4 μ s | max. 3 μ s |
| Group delay ripple in PB (in any 112,5 kHz increment within the PB) | | 80 ns | max. 120 ns |
| Phase linearity in PB (in any 112,5 kHz increment within the PB) | | 1,5 deg | max. 5 deg p-p |
| Input power level | | - | max. 23 dBm**) |
| Operating temperature range | | - | - 40 °C ... + 70 °C |
| Storage temperature range | | - | - 40 °C ... + 100 °C |
| Turnover temperature T_0 | | 20 °C | - |
| Temperature coefficient of frequency TC_f^{***} | | - 0,036 ppm / K ² | - |

*) 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.

***) This power level is only allowed for short term operation (10% of the life time), the max. input power for continuous operation is only max. 15dBm

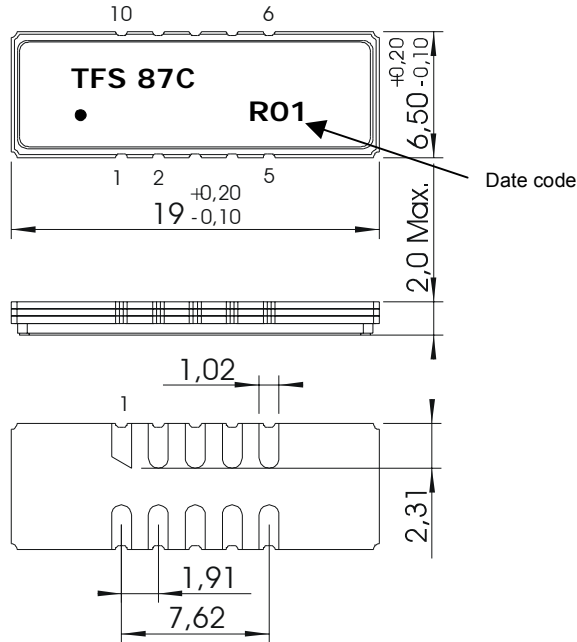
***) $\Delta f(\text{Hz}) = TC_f(\text{ppm/K}^2) \times (T - T_0)^2 \times f_{T0}(\text{MHz})$

generated:**checked / approved:****VI TELEFILTER****Potsdamer Straße 18****D 14 513 TELTOW / Germany****Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30****E-Mail: tft@telefilter.com**

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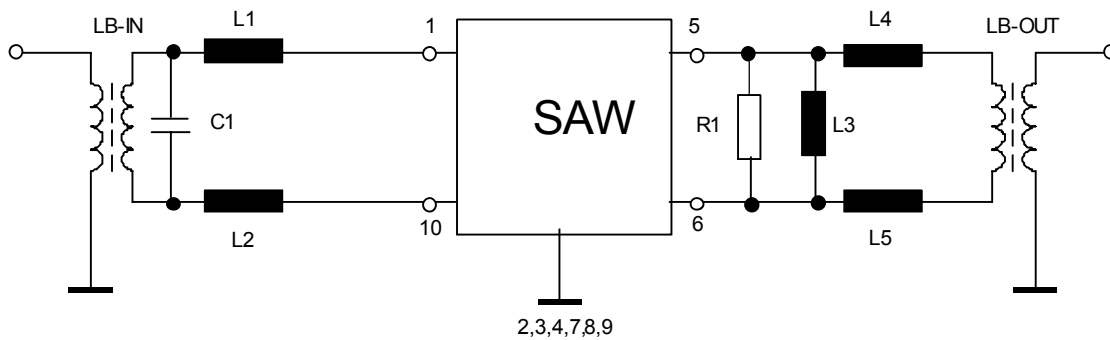
VI TELEFILTER**Filter Specification****TFS 87C****2/5****Construction and pin connection**

(All dimensions in mm)



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

| | |
|------------|-------------|
| Date code: | year + week |
| N | 2001 |
| P | 2002 |
| R | 2003 |
| ... | |

50 Ω matching network :**VI TELEFILTER****Potsdamer Straße 18****D 14 513 TELTOW / Germany****Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30****E-Mail: tff@telefilter.com**

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Stability Characteristics

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

1. Shock: 500g, 18 ms, half sine wave, 3 shocks each plane;
DIN IEC 68 T2 - 27
2. Vibration: 10 Hz to 500 Hz, 0,35 mm or 5g respectively, 1 octave per min, 10 cycles per plan, 3 plans;
DIN IEC 68 T2 - 6
3. Change of temperature: -55 °C to 125°C / 30 min. each / 10 cycles
DIN IEC 68 part 2 – 14 Test N
4. Resistance to solder heat (reflow): reflow possible: twice max.;
for temperature conditions, please refer to the attached "Air reflow temperature conditions" on page 4;

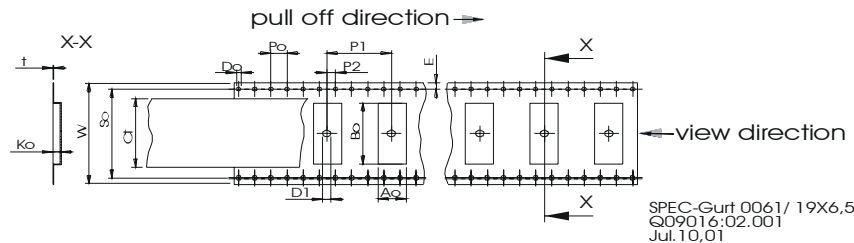
Packing

Tape & Reel: DIN 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: | 2000 |
| reel of empty components at start: | min 300 mm |
| reel of empty components at start including leader: | min 500 mm |
| trailer | min 300 mm |

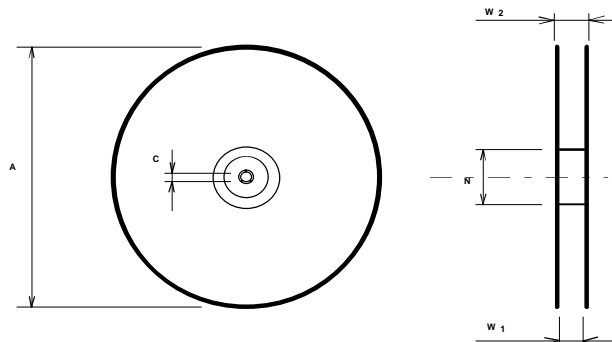
Tape (all dimensions in mm)

| | |
|---------|---------------|
| W | : 32 ± 0,3 |
| Po | : 4 ± 0,1 |
| Do | : 1,5 ± 0,5 |
| E | : 1,75 ± 0,1 |
| S0 | : 28,4 ± 0,1 |
| P2 | : 2 ± 0,1 |
| P1 | : 12 ± 0,1 |
| D1(min) | : 1,5 |
| Ao | : 7,1 ± 0,1 |
| Bo | : 19,6 ± 0,1 |
| Ko | : 2,0 ± 0,1 |
| t | : 0,35 ± 0,05 |
| Ct | : 25,5 ± 0,1 |



Reel (all dimensions in mm):

| | |
|----------|----------------|
| A | : 330 |
| W1 | : 32,4 +2 |
| W2 (max) | : 38,4 |
| N (min) | : 100 |
| C | : 13 +0,5/-0,2 |



The minimum bending radius is 45 mm. The mounting surface of the filters faces the bottom side of the embossed carrier tape. The marking of the filters is able to read if the view is directed on the upper side of the carrier tape in the above shown direction.

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Air reflow temperature conditions

1st and 2nd air reflow profile

| | | | |
|---------------------|---------------------|----------------------|------------------|
| Name: | pre-heating periods | main-heating periods | peak temperature |
| Temperature: | 150 °C - 170 °C | over 200 °C | 255 °C ± 5 °C |
| Time: | 60 sec. - 90 sec. | 20 sec. - 25 sec. | |

Air reflow profile

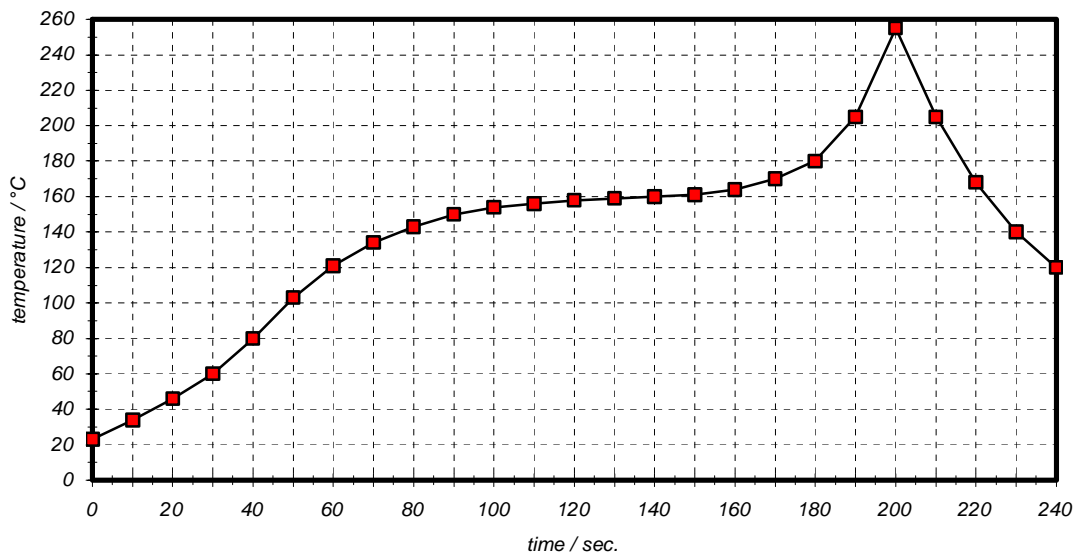


Table for temperature vs. time during the air reflow process

Tolerance of temperatures: ± 5 °C

| time / sec. | temperature / °C | time / sec. | temperature / °C |
|-------------|------------------|-------------|------------------|
| 0 | 23 | 140 | 160 |
| 10 | 34 | 150 | 161 |
| 20 | 46 | 160 | 164 |
| 30 | 60 | 170 | 170 |
| 40 | 80 | 180 | 180 |
| 50 | 103 | 190 | 205 |
| 60 | 121 | 195 | 230 |
| 70 | 134 | 200 | 255 |
| 80 | 143 | 205 | 230 |
| 90 | 150 | 210 | 205 |
| 100 | 154 | 215 | 180 |
| 110 | 156 | 220 | 165 |
| 120 | 158 | 230 | 140 |
| 130 | 159 | 240 | 120 |

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VI TELEFILTER**Filter Specification****TFS 87C****5/5**

History

| Version | Reason of Changes | Name | Date |
|----------------|--|-------------|-------------|
| 1.0 | - generate specification according to customer requirements | Pfeiffer | 16.10.2002 |
| 1.2 | - typical values added - terminated impedance added - triple transit suppression removed | Pfeiffer | 03.01.2003 |

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