### Measurement condition

Ambient temperature: 23 °C
Input power level: 10 dBm
Terminating impedance: *
Input: 375 Ω II -1.9 pF
Output: 375 Ω II -1.9 pF
External coil: 47 nH

### Characteristics

Remark:
Reference level for the relative attenuation $a_{rel}$ of the TFS400K 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 1 dB filter attenuation level relative to the insertion loss $a_e$. The nominal frequency $f_N$ is fixed at 400 MHz without tolerance. The given values for the relative attenuation $a_{rel}$ and for the group delay ripple have to be reached at the frequencies given below even if the centre 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 centre frequency $f_c$.

| **D a t a** | | **typ. value** | | **tolerance / limit** | |
|---|---|---|---|---|---|
| **Insertion Loss** (reference level) | $a_e$ | 4,5 | dB | max. 6,5 | dB |
| **Nominal Frequency** | $f_N$ | 400,04 | MHz | 400 | MHz |
| **Bandwidth** | B W | | | | |
| 3 dB | | T.B.D. | | - | |
| **Relative Attenuation** | $a_{rel}$ | | | | |
| $f_N$ ... $f_N$ ± 82,5 kHz | | 0,4 | dB | max. 1 | dB |
| $f_N$ ± 500 kHz ... $f_N$ ± 700 kHz | | 28 | dB | min. 15 | dB |
| $f_N$ ± 700 kHz ... $f_N$ ± 1 MHz | | 43 | dB | min. 27 | dB |
| $f_N$ ± 1 MHz ... $f_N$ ± 13 MHz | | 50 | dB | min. 40 | dB |
| **Group Delay Ripple** | | | | | |
| $f_N$ ± 82,5 kHz | | 0,6 | µs | max. 1 | µs |
| **Operating Temperature Range** | OTR | - | | -40 °C ... + 85 °C | |
| **Storage Temperature Range** | | - | | - 40 °C ... + 85°C | |
| **Frequency Inversion Temperature** | | 20 | °C | - | |
| **Temperature Coefficient of Frequency** | $TC_f$ ** | -0,036 | ppm/K² | - | |

*) 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. These values have to be confirmed by balanced s-parameter measurement.
**) $\triangle f(Hz) = TC_f(ppm/K) \times (T-T_0)^2 \times f_{To}(MHz)$.

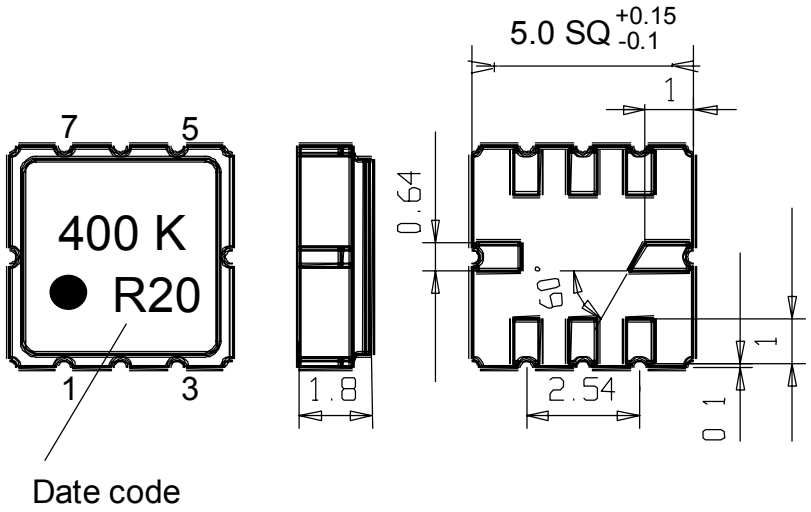
**Generated:**

**Checked / Approved:**

**TELEFILTER GmbH**
**Potsdamer Straße 18**
**D 14 513 TELTOW / Germany**
**Tel: (+49) 3328 4784-52 / Fax: (+49) 3328 4784-30**
**E-Mail:** tft@telefilter.com

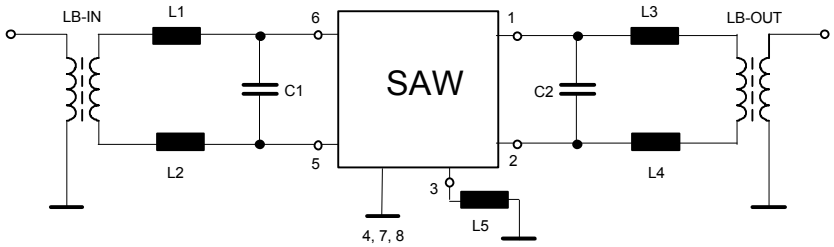
VI TELEFILTER reserves the right to make changes to the product(s) and/or information contained herein without notice. No liability is assumed as a result of their use or application. No rights under any patent accompany the sale of any such product(s) or information.

**Construction, pin configuration and 50 Ω - matching network**
(all dimensions in mm)

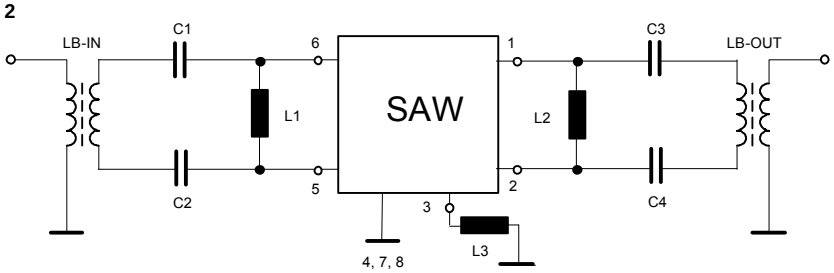



| | | | | | |
|---|---|---|---|---|---|
| Pin 1 | Sym. Output | Pin 5 | Sym. Input | Date code: | Year + week |
| Pin 2 | Sym. Output | Pin 6 | Sym. Input | N | 2001 |
| Pin 3 | External Coil | Pin 7 | Ground | P | 2002 |
| Pin 4,8 | Package Ground | | | R | 2003 |
| | | | | ... | |

**50 Ohm Test circuit 1**




**50 Ohm Test circuit 2**




**TELEFILTER GmbH**
**Potsdamer Straße 18**
**D 14 513 TELTOW / Germany**
**Tel: (+49) 3328 4784-52 / Fax: (+49) 3328 4784-30**
**E-Mail:** tft@telefilter.com

VI TELEFILTER reserves the right to make changes to the product(s) and/or information contained herein without notice. No liability is assumed as a result of their use or application. No rights under any patent accompany the sale of any such product(s) or information.

### 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;<br>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;<br>DIN IEC 68 T2 - 6 |
| 3. Change of temperature: | -55 °C to 125°C / 30 min. each / 10 cycles<br>DIN IEC 68 part 2 – 14 Test N |
| 4. Resistance to older heat (reflow): | reflow possible: twice max.;<br>for temperature conditions, please refer to the attached "Air reflow temperature conditions" on page 4 |

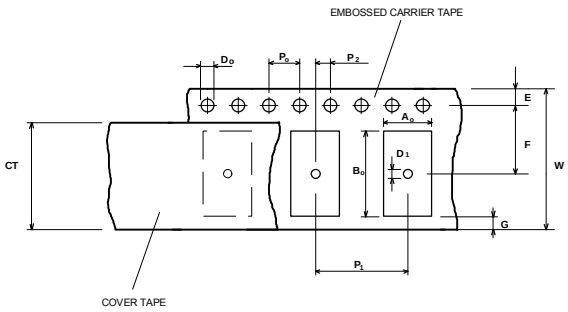
### Packing

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 |

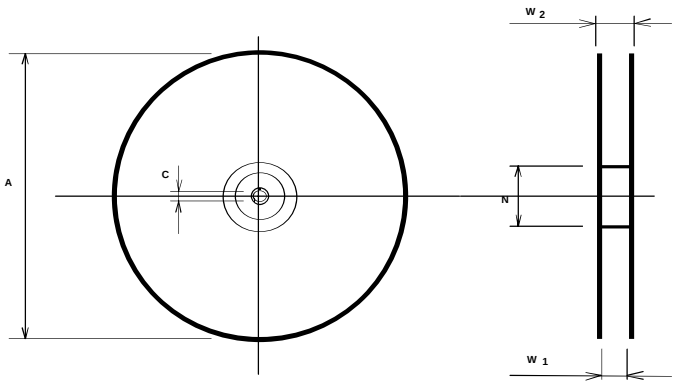
**Tape (all dimensions in mm)**

| | | |
|---|---|---|
| W | : 12 | ± 0,3 |
| Po | : 4 | ± 0,1 |
| Do | : 1,5 | + 0,1 |
| E | : 1,75 | ± 0,1 |
| F | : 5,5 | ± 0,05 |
| G (min) | : 0,75 | |
| P2 | : 2 | ± 0,05 |
| P1 | : 8 | ± 0,1 |
| D1(min) | : 1,5 | |
| Ao | : 5,3 | ± 0,1 |
| Bo | : 5,3 | ± 0,1 |
| CT | : 9,5 | ± 0,1 |




**Reel (all dimensions in mm):**

| | | |
|---|---|---|
| A | : 330 | |
| W1 | : 12,4 | + 2 |
| W2 (max) | : 18,4 | |
| N (min) | : 50 | |
| 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 with the sprocket holes on the right side of the tape.

**TELEFILTER GmbH**
**Potsdamer Straße 18**
**D 14 513 TELTOW / Germany**
**Tel: (+49) 3328 4784-52 / Fax: (+49) 3328 4784-30**
**E-Mail:** tft@telefilter.com

VI TELEFILTER reserves the right to make changes to the product(s) and/or information contained herein without notice. No liability is assumed as a result of their use or application. No rights under any patent accompany the sale of any such product(s) or information.

**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. | |

**Chip-mount air reflow profile**

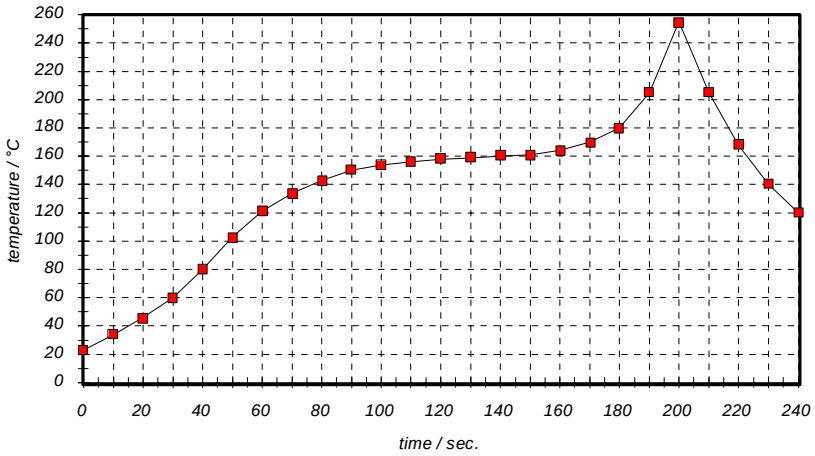



Table for temperature vs. time during the air reflow process

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 |

**TELEFILTER GmbH**
**Potsdamer Straße 18**
**D 14 513 TELTOW / Germany**
**Tel: (+49) 3328 4784-52 / Fax: (+49) 3328 4784-30**
**E-Mail:** tft@telefilter.com

VI TELEFILTER reserves the right to make changes to the product(s) and/or information contained herein without notice. No liability is assumed as a result of their use or application. No rights under any patent accompany the sale of any such product(s) or information.

## History

| Version | Reason of Changes | Name | Date |
|---|---|---|---|
| 1.0 | - Generate development specification. | Pfeiffer | 12.05.2003 |
| 2.0 | - Modification of electrical data based on TFS400B to support a group delay ripple of 1 µs maximum.<br>- Correct reel dimensions. | Dr. Wall | 11.06.2003 |
| 3.0 | - Add 1 dB pass band of 160 kHz.<br>- Shift 15 dB limit line to +-500 kHz<br>- Shift 27 dB limit line to +-700 kHz<br>- Remove values for termination impedances and coupling coil.<br>- Add 50 Ohm test circuit configuration. | Dr. Wall | 19.06.2003 |
| 3.1 | - Change frequency band for 1 dB pass band and group delay ripple requirement | Dr. Wall | 03.07.2003 |
| 3.2 | - Change from development specification to preliminary specification<br>- Add preliminary values for termination impedances<br>- Add typical values | Dr. Wall | 01.12.2003 |

**TELEFILTER GmbH**
**Potsdamer Straße 18**
**D 14 513 TELTOW / Germany**
**Tel: (+49) 3328 4784-52 / Fax: (+49) 3328 4784-30**
**E-Mail:** tft@telefilter.com

VI TELEFILTER reserves the right to make changes to the product(s) and/or information contained herein without notice. No liability is assumed as a result of their use or application. No rights under any patent accompany the sale of any such product(s) or information.