## Measurement Condition

Ambient temperature $T_A$:                    23  °C

Input power level:                     0  dBm

Terminating impedances: *)

    Input:                              1,7 k$\Omega$ || - 13,9 pF

    Output:                            2,2 k$\Omega$ || - 14,1 pF

## Characteristics

Remark:

The reference level for the relative attenuation $a_{rel}$ is the pass band attenuation at the nominal frequency $f_N$. This value 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 given values for the centre frequency, the relative attenuation $a_{rel}$ and 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 | | Variation / Limitation | | | |
|---|---|---|---|---|---|---|---|
| **Insertion Loss** (Reference Level) | $a_e$ | 5,0 | dB | | max | 8,0 | dB |
| **Nominal frequency** | $f_N$ | - | | | | 71,0 | MHz |
| **Center frequency** | $f_C$ | - | | 71,0 | MHz $\pm$ | 20 | kHz |
| **3 dB - Bandwidth** | BW | 310 | kHz | | min. | 200 | kHz |
| **Pass band ripple** $f_N$ - 80 kHz ... $f_N$ + 80 kHz | | 0,5 | dB | | max. | $\pm$ 0,75 | dB |
| **Relative Attenuation** $a_{rel}$ ***) | | | | | | | |
| $f_N \pm$ 200 kHz ... $f_N \pm$ 400 kHz | | 9 | dB | | min. | 3 | dB |
| $f_N \pm$ 400 kHz ... $f_N \pm$ 600 kHz | | 35 | dB | | min. | 25 | dB |
| $f_N \pm$ 600 kHz ... $f_N \pm$ 1,0 MHz | | 38 | dB | | min. | 35 | dB |
| $f_N$ - 1,0 MHz ... $f_N$ - 1,2 MHz | | 48 | dB | | min. | 42 | dB |
| $f_N$ - 1,2 MHz ... $f_N$ - 1,4 MHz | | 48 | dB | | min. | 40 | dB |
| $f_N$ - 1,4 MHz ... $f_N$ - 40 MHz | | 47 | dB | | min. | 35 | dB |
| $f_N$ + 1,0 MHz ... $f_N$ + 40 MHz | | 40 | dB | | min. | 35 | dB |
| **Group delay** $f_N$ | | 3,1 | µs | | max. | 5 | µs |
| **Group delay ripple** in $f_N$ - 80 kHz ... $f_N$ + 80 kHz | | 350 | ns | | max. | 1 | µs |
| **Input Intermodulation** **) | | - | | | max. | - 81 | dBm |
| **Input power level** | | - | | | max. | 20 | dBm |
| $f_N \pm$ 800 kHz ... $f_N \pm$ 3 MHz | | - | | | max. | 22 | dBm |
| $f_N \pm$ 3 MHz ... $f_N \pm$ 40 MHz | | - | | | max. | 25 | dBm |
| **Operating Temperature Range** | | - | | | | 5 °C ... + 70 °C | |
| **Storage Temperature Range** | | - | | | | - 40°C ... + 85 °C | |
| **Temperature Coefficient** $TC_f$ **** | | -0,032 | ppm/K$^2$ | | | | |
| **Frequency inversion temperature** $T_0$ | | + 25 | °C | | | | |

*)   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

**)  first measurement:      $f_{in1}$=70.2MHz; $f_{in2}$= 69,4 MHz; $P_{in}$=-5 dBm $f_{measurement}$ = 71,0MHz

      second measurement:     $f_{in1}$=71.8MHz; $f_{in2}$= 72,6 MHz; $P_{in}$=-5 dBm $f_{measurement}$ = 71,0MHz

***) It is allowed to have max. 3 spurious responses in the high frequency stop band range of less than 100 kHz bandwidth (3dB) with a rejection of 10 dB less than specified here

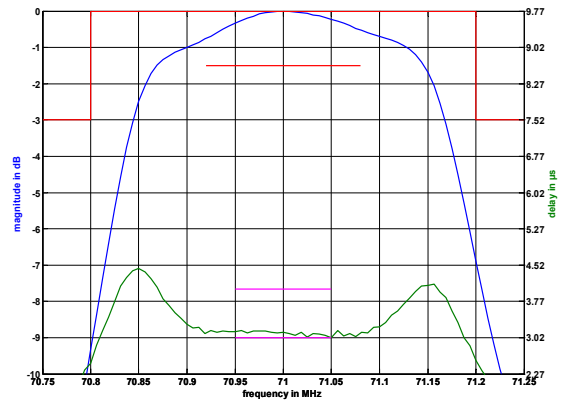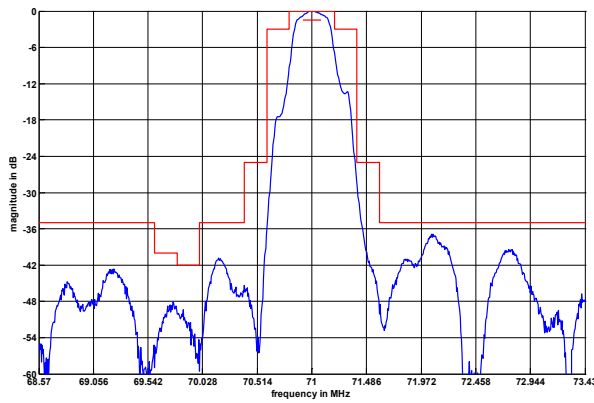****) $\Delta f(Hz) = TC_f(ppm/K^2)$ x $(T-T_0)^2$ x $f_{T0}(MHz)$

**Generated:**

**Checked / Approved:**

**VI TELEFILTER**  **Filter specification**  **TFS 71F**  **2/5**

## Filter characteristic



## Construction and pin connection

(All dimensions in mm)
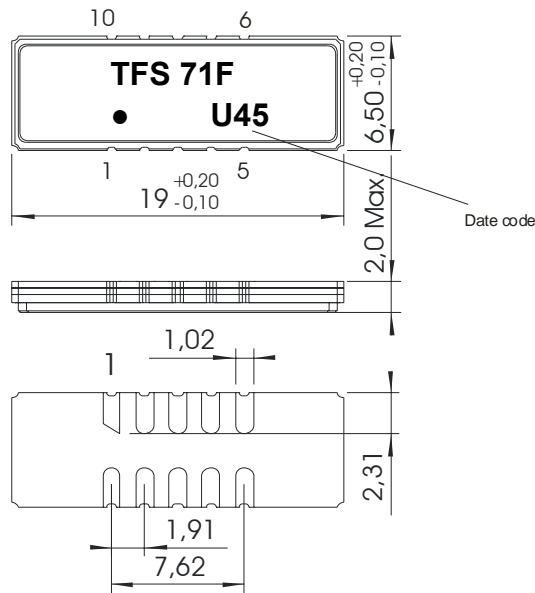


| 1 | Input |
|---|---|
| 2 | Ground |
| 3 | Ground |
| 4 | Ground |
| 5 | Output RF Return |
| 6 | Output |
| 7 | Ground |
| 8 | Ground |
| 9 | Ground |
| 10 | Input RF Return |

| Date code: | Year + week |
|---|---|
| U | 2006 |
| V | 2007 |
| W | 2008 |
| ... | |

## 50 Ω Test circuit
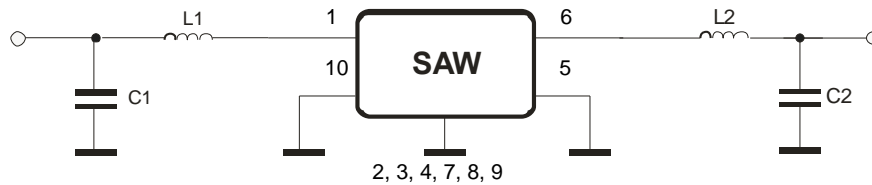
## Stability characteristics, reliability

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 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: three times max.;
                             for temperature conditions refer to the attached "Air reflow temperature conditions" on page 4;

This filter is RoHS compliant (2002/95/EG, 2005/618/EG)
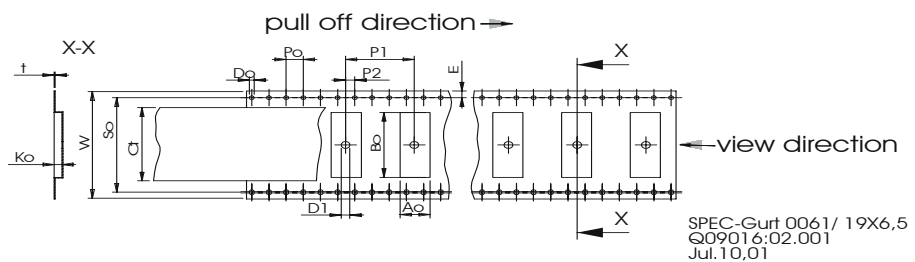
## Packing

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 |



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

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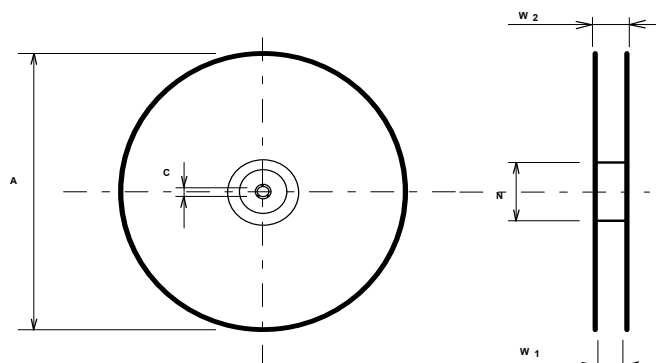


The minimum bending radius is 45 mm. The mounting surface of the filters faces the bottom side of the embossed carrier tape. The marking of the filters is able to read if the view is directed on the upper side of the carrier tape in the above shown direction.

### Air reflow temperature conditions

| Conditions | Exposure |
|---|---|
| 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**
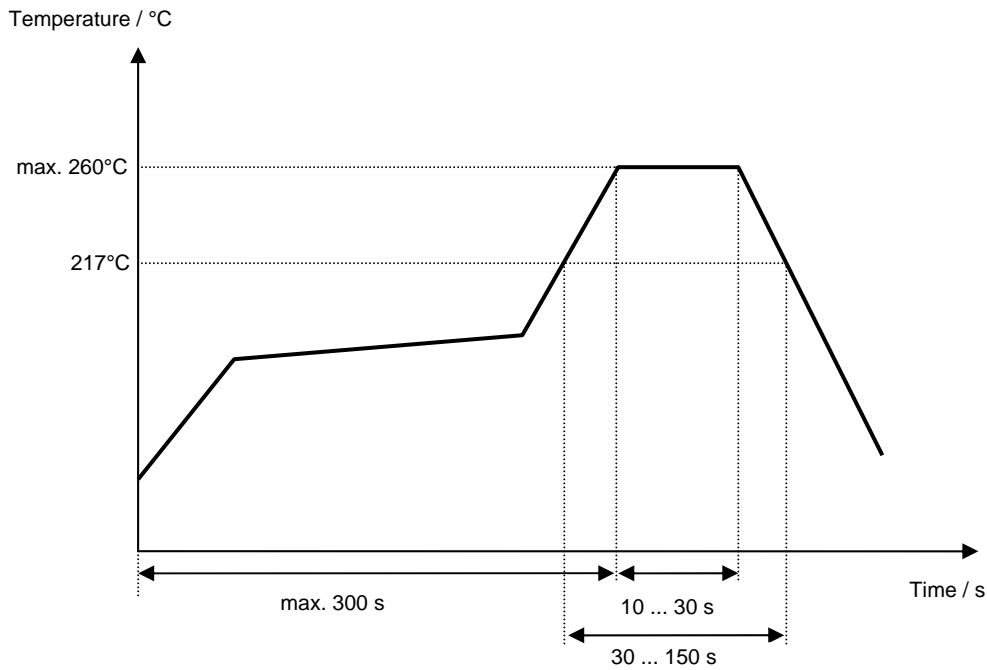
**VI TELEFILTER**            **Filter specification**            **TFS 71F**            **5/5**

## History

| Version | Reason of Changes | Name | Date |
|---------|-------------------|------|------|
| **Filter specification** | | | |
| 2.0 | - typical values and terminating impedances added<br>- tape and reel section corrected | Steiner | 19.03.2003 |
| 2.1 | - group delay corrected | Steiner | 04.04.2002 |
| 2.2 | - additional limits for the 3dB centre frequency introduced | Steiner | 16.04.2003 |
| 2.3 | - limit of input power level changed<br>- add of filter characteristics<br>- stability characteristics and air reflow temperature conditions modified | Pfeiffer | 07.11.2006 |