

**VI TELEFILTER****Filter specification****TFS 300 C****1/5****1. Measurement condition :**

|                                     |                                       |  |
|-------------------------------------|---------------------------------------|--|
| Ambient temperature $T_A$ :         | 25 °C                                 |  |
| Input power level:                  | 0 dBm                                 |  |
| Terminating impedances at $f_C$ *): | for input: 176 $\Omega$   - 6,19 pF.  |  |
|                                     | for output: 775 $\Omega$   - 3,52 pF. |  |

**2. Characteristics**

Remark: Reference level for the relative attenuation  $a_{rel}$  of the **TFS 300C** 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 nominal frequency  $f_N$  is fixed on 300 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 also 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  $f_C$ .

| Data   | typ. value  | tolerance / limit                     |
|--|---|---------------------------------------|
| <b>Insertion loss (Reference level) <math>a_e</math></b>                               | 17 dB   | max. 20 dB                            |
| <b>Nominal frequency <math>f_N</math></b>  | -   | 300 MHz                               |
| <b>Centre frequency <math>f_C</math> at ambient temperature (<math>f_{CTA}</math>)</b> | 300,02 MHz  |                                       |
| <b>Pass band (PB) :</b>  |   | $f_N - 2,05$ MHz ... $f_N + 2,05$ MHz |
| <b>Amplitude ripple in PB (p-p) :</b>  | 0,8 dB  | max. 1 dB                             |
| <b>Bandwidth :</b>   |   |                                       |
| 1 dB   | 4,55 MHz  | min. 4,1 MHz                          |
| 3 dB   | 5,25 MHz  | min. 5,0 MHz                          |
| 3 dB   | 5,25 MHz  | max. 5,5 MHz                          |
| 20 dB  | 6,96 MHz  |                                       |
| 40 dB  | 9,30 MHz  | max. 10 MHz                           |
| <b>Relative attenuation <math>a_{rel}</math></b>                                       |   |                                       |
| $f_N \pm 2,05$ MHz   | -   | max. 1 dB                             |
| $f_N \pm 2,5$ MHz  | -   | max. 3 dB                             |
| $f_N \pm 2,75$ MHz   | -   | min. 3 dB                             |
| $f_N \pm 5$ MHz  | 43...45 dB  | min. 40 dB                            |
| $f_N - 25$ MHz   | 49...54 dB  | min. 45 dB                            |
| $f_N + 7$ MHz  | 49...54 dB  | min. 43 dB                            |
| $f_N \pm 25$ MHz   | 55...70 dB  | min. 50 dB                            |
| $f_N - 290$ MHz  | 90 dB   |                                       |
| $f_N + 100$ MHz  | 90 dB   |                                       |
| <b>Group delay ( mean value in PB ):</b>   | 1,1 $\mu$ s   | max. 1,5 $\mu$ s                      |
| <b>Group delay ripple (p-p) in :</b>   | $f_N \dots f_N \pm 2,2$ MHz   | max. 100 ns                           |
| <b>Deviation from linear phase (p-p)</b>   | $f_N \dots f_N \pm 1,8$ (2,5) MHz   | 2° (2,6°)                             |
| <b>Triple transit attenuation compared to main signal</b>                              | 39 dB   |                                       |
| <b>Crosstalk</b>   | 60...65 dB  |                                       |
| <b>Substrate material</b>  | Quartz  |                                       |
| <b>Frequency inversion temperature (<math>T_o</math>)</b>                              | 30 °C   |                                       |
| <b>Temperature coefficient of frequency (<math>TC_f</math>)</b>                        | -0,030 ppm/K <sup>2</sup>   |                                       |
| <b>Frequency deviation of <math>f_C</math> over temperature: **)</b>                   | $\Delta f_C(\text{Hz}) = TC_f(\text{ppm/K}) \times (T - T_o)^2 \times f_{r0}(\text{MHz})$ |                                       |
| <b>Operating temperature range</b>   |   | - 20 °C ... + 70 °C                   |
| <b>Storage temperature range</b>   |   | - 40 °C ... + 85 °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.

\*\*)  $f_0 = f_{r0}$  is reference frequency  $f_C$  at frequency inversion temperature ( $T_o$ )

**Generated:** Dunzow W.

**Checked / approved:** Dr. Bert Wall

**VI TELEFILTER**

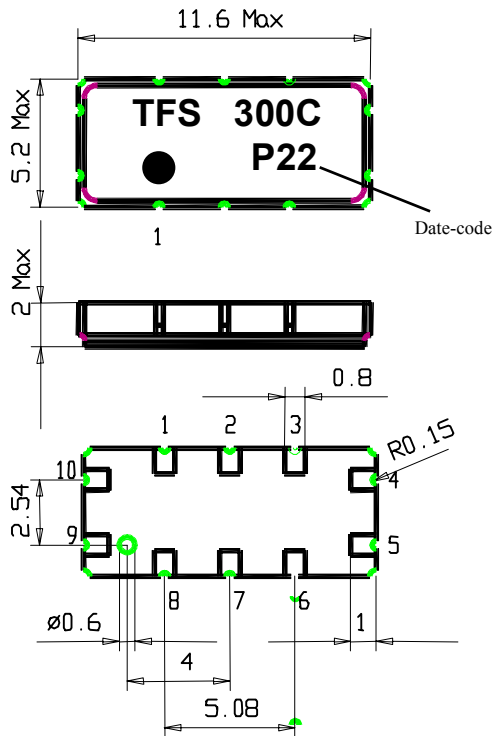
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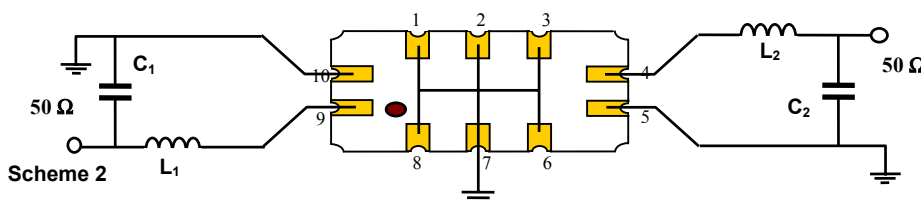
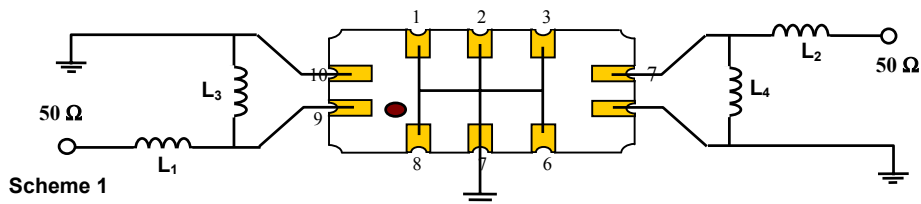
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**3. Package, pin grid 2,54 mm**

**Pin 9 - Input.**  
Pin 10 - Input RF Return.  
**Pin 4 - Output.**  
Pin 5 - Output RF Return.  
Pin 1-3, 6-8 - Package Ground.

**4. 50  $\Omega$  matching network ( please refer to the application note for further details ) :**

For final test we use scheme 2.

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**5. 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;

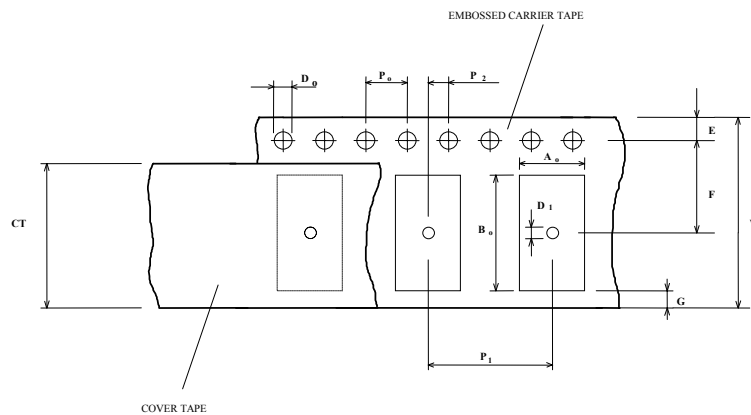
**6. Packing**

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;

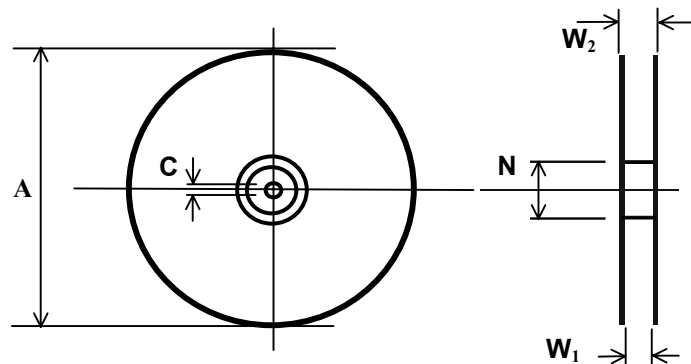
max. pieces of filters per reel: 1700  
reel of empty components at start: min 300 mm  
reel of empty components at start including leader: min 500 mm  
Trailer: min 300 mm

**Tape (all dimensions in mm)**

|         |              |
|---------|--------------|
| W       | : 24± 0,3    |
| Po      | : 4 ± 0,1    |
| Do      | : 1,5 + 0,1  |
| E       | : 1,75 ± 0,1 |
| F       | : 7,5 ± 0,1  |
| G (min) | : 0,6        |
| P2      | : 2 ± 0,1    |
| P1      | : 8 ± 0,1    |
| D1(min) | : 1,5        |
| Ao      | : 5,6 ± 0,1  |
| Bo      | : 11,8 ± 0,  |
| CT      | : 21,5 ± 0,1 |

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

|         |                    |
|---------|--------------------|
| A       | : 330              |
| W1      | : 24,4 + 2/-0      |
| W2(max) | : 30,4             |
| N(min)  | : 60               |
| C       | : 13,0 +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. Markings on the filters can be read if the upper side of the carrier tape is regarded with the sprocket holes on its right.

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**7. Air reflow temperature conditions :**

1st and 2nd air reflow profile

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

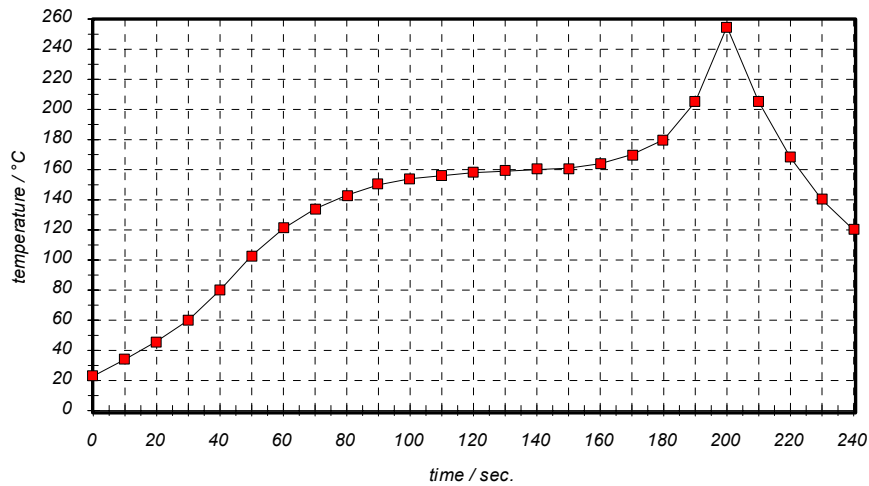
**Chip-mount air reflow profile**

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              |

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**VI TELEFILTER****Filter specification****TFS 300 C****5/5****History :**

| <b>Version</b> | <b>Reason of Changes</b>   | <b>Name</b> | <b>Date</b> |
|----------------|--|-------------|-------------|
| 1.0            | Generate preliminary specification according to customer requirements  | Dunzow W.   | 18.06.2001  |
| 1.1            | - change " Relative attenuation ( $a_{rel}$ ) "<br>from $f_N \pm 7 \text{ MHz} \dots f_N \pm 25 \text{ MHz}$ min. 47 dB<br>to $f_N - 25 \text{ MHz} \dots f_N - 7 \text{ MHz}$ min. 45 dB<br>$f_N + 7 \text{ MHz} \dots f_N + 25 \text{ MHz}$ min. 43 dB<br>- change termination impedance from :<br>from for input: $215 \Omega$   - 6,1 pF.<br>for output: $1190 \Omega$   - 3,3 pF.<br>to for input: $176 \Omega$   - 6,19 pF.<br>for output: $775 \Omega$   - 3,52 pF. | Dunzow W.   | 08.04.2002  |

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