## Measurement condition

Ambient temperature: 23 °C
Input power level: 0 dBm
Terminating impedance: *
Input: 470 Ω || -12,9 pF
Output: 470 Ω || -12,9 pF

## Characteristics

Remark:
The reference level for the relative attenuation $a_{rel}$ of the TFS 130A is the minimum of the pass band attenuation. This value is defined as the insertion loss $a_e$. The nominal frequency $f_N$ is fixed at 130,38 MHz without any tolerance. The values of relative attenuation $a_{rel}$ are guaranteed for the whole operating temperature range. The frequency shift of the filter in the operating temperature range is included in the production tolerance scheme.

| D a t a | | typ. value | | tolerance / limit | |
|---|---|---|---|---|---|
| **Insertion loss** (reference level) | $a_e$ | 6,6 | dB | max. 8 | dB |
| **Nominal frequency** | $f_N$ | - | | 130,38 | MHz |
| **Passband** | | - | | $f_N$ ± 0,665 | MHz |
| **Pass band ripple** | | 0,5 | dB | max. 1 | dB |
| **Relative attenuation** | $a_{rel}$ | | | | |
| $f_N$ … $f_N$ ± 0,665 MHz | | - | | max. 1 | dB |
| $f_N$ - 20 MHz … $f_N$ - 5,75 MHz | | 45 | dB | min. 40 | dB |
| $f_N$ + 5,75 MHz … $f_N$ + 9,87 MHz | | 45 | dB | min. 40 | dB |
| $f_N$ + 9,87 MHz … $f_N$ + 10,87 MHz | | 41 | dB | min. 38 | dB |
| $f_N$ + 10,87 MHz … $f_N$ + 20 MHz | | 46 | dB | min. 38 | dB |
| **Group delay** | mean value in PB | 770 | ns | 770 ± 10 | ns |
| **Group delay ripple within PB** | | 50 | ns | - | |
| **Deviation from linear phase within PB** | | 0,7 | ° rms | max. 2,5 | ° rms |
| **VSWR within PB** | | 1,5 | : 1 | max. 2 | : 1 |
| **Operating temperature range** | OTR | - | | - 30 °C ... + 80 °C | |
| **Storage temperature range** | | - | | - 40 °C ... + 85 °C | |
| **Temperature coefficient of frequency** | $TC_f$ ** | -19 | ppm/K | - | |

*) The terminating impedances depend on parasites 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.
**) $\Delta f_C(Hz) = Tc_f(ppm/K) \times (T - T_o) \times f_{CAT}$ (MHz).

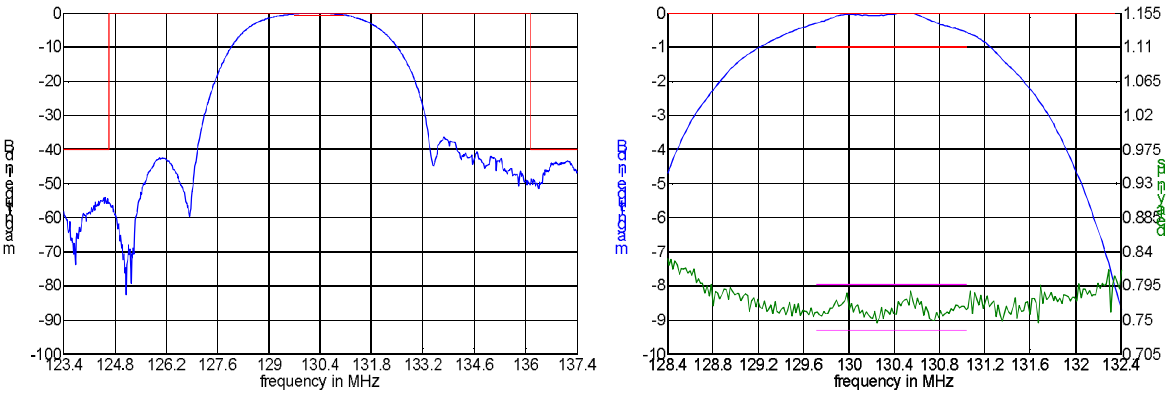
**Generated:**

**Checked / Approved:**

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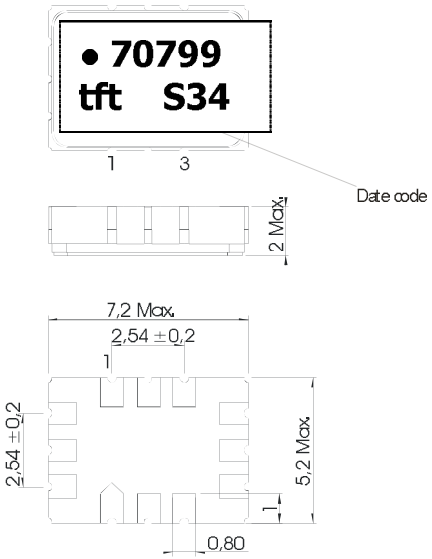
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## Filter characteristic




## Construction and pin connection

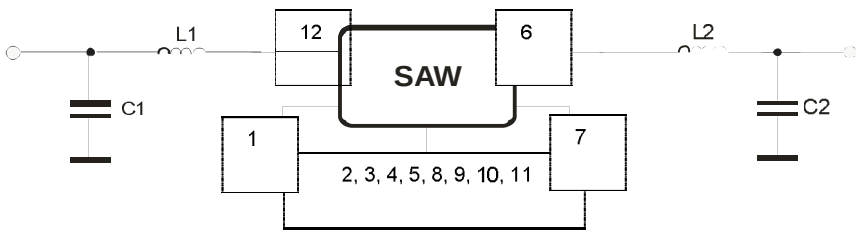
(All dimensions in mm)




| | |
|---|---|
| 1 | Input RF Return |
| 2 | Ground |
| 3 | Ground |
| 4 | Output |
| 5 | Ground |
| 6 | Output |
| 7 | Output RF Return |
| 8 | Ground |
| 9 | Ground |
| 10 | Ground |
| 11 | Ground |
| 12 | Input |

| Date code: | Year + week |
|---|---|
| S | 2004 |
| T | 2005 |
| U | 2006 |
| ... | |

## 50 Ω test circuit




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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;<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 solder heat (reflow): | reflow possible: twice max.;<br>for temperature conditions refer to the attached "Air reflow temperature conditions" on page 4; |

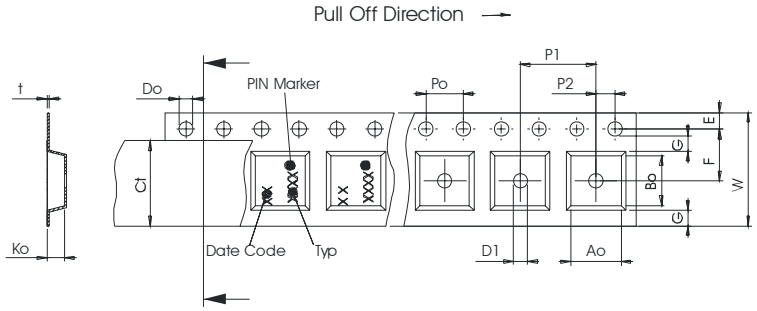
## Packing

Tape & Reel: IEC 286 – 3, with exeption 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 peer 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 |

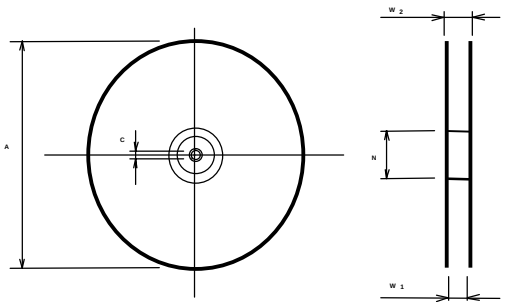
**Tape (all dimensions in mm)**

| | | |
|---|---|---|
| W | : 16,00 | ± 0,3 |
| Po | : 4,00 | ± 0,1 |
| Do | : 1,50 | +0,1/-0 |
| E | : 1,75 | ± 0,1 |
| F | : 7,50 | ± 0,1 |
| G(min) | : 0,60 | |
| P2 | : 2,00 | ± 0,1 |
| P1 | : 8,00 | ± 0,1 |
| D1(min) | : 1,50 | |
| Ao | : 5,50 | ± 0,1 |
| Bo | : 7,50 | ± 0,1 |
| Ct | : 13,5 | ± 0,1 |




**Reel (all dimensions in mm)**

| | | |
|---|---|---|
| A | :330 | |
| W1 | : 16,4 | +2/-0 |
| W2(max) | : 22,4 | |
| N(min) | : 50 | |
| C | : 13,0 | +0,5/-0,2 |




The minimum bending radius is 45 mm.

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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. | |

**Chip-mount air reflow profile**

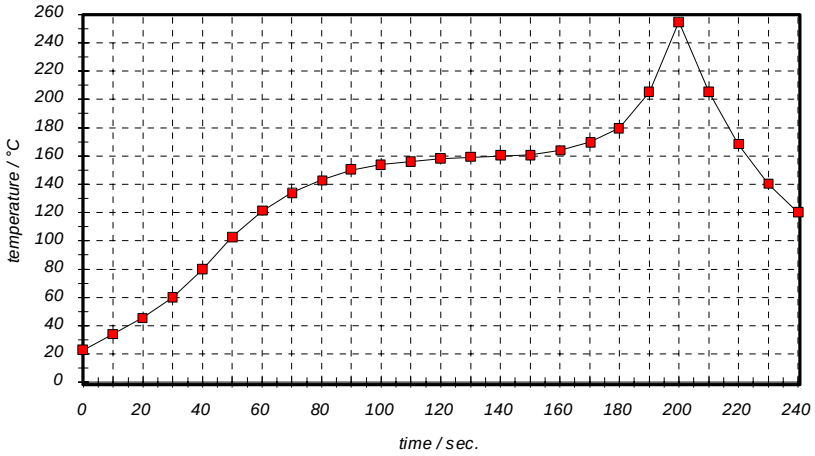



Table for temperature vs. time during the air reflow process

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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## History

| Version | Reason of Changes | Name | Date |
|---|---|---|---|
| 1.0 | Generation of preliminary specification according to customer requirements. | Dunzow W. | 03.05.1999 |
| 1.1 | Generation of filter specification.<br>Add typical values. | Dunzow W. | 18.06.1999 |
| 1.2 | Correct termination impedances.<br>Change drawing of matching networks.<br>Change tolerance values of mean value of group delay.<br>Change marking of package. | Dunzow W. | 17.05.2002 |
| 1.3 | Change marking of package. | Springfeldt M. | 30.03.2004 |
| 1.4 | - labelling changed<br>- filter characteristic added<br>- change remark<br>- remove centre frequency<br>- Change tolerance values of mean value of group delay back to version 1.1 | Pfeiffer | 17.08.2004 |
| 1.5 | - labelling corrected | Steiner | 03.09.2004 |

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