### Measurement condition

Ambient temperature: 23 °C
Input power level: 0 dBm
Terminating impedance: *
Input: 280 Ω || -9,6 pF
Output: 290 Ω || -9,3 pF

### Characteristics

Remark:
The reference level for the relative attenuation arel of the TFS533 is the minimum of the pass band attenuation amin. The minimum of the pass band attenuation amin is defined as the insertion loss ae. The centre frequency fc is the arithmetic mean value of the upper and lower frequencies at the 30 dB filter attenuation level relative to the insertion loss ae. The temperature coefficient of frequency Tcf is valid for both the reference frequency fc and the frequency response of the filter within the operating temperature range. The frequency shift of the filter within the operating temperature range is not included in the production tolerance scheme.

| **D a t a** | | **typ. value** | | **tolerance / limit** | | |
|---|---|---|---|---|---|---|
| **Insertion loss** (reference level) | $a_e$ | 10.2 | dB | max. | 11 | dB |
| **Nominal frequency** | $f_N$ | - | | | 533 | MHz |
| **Centre frequency ***** | $f_C$ | 533 | MHz | ± | 0.4 | MHz |
| **Passband** | PB | - | | $f_c$ ± | 2 | MHz |
| **Pass band variation** | | 1 | dB | max. | 1.5 | dB |
| **Relative attenuation** | $a_{rel}$ | | | | | |
| $f_C$ ... $f_C$ ± 2 MHz | | 0.2 | dB | max. | 1.5 | dB |
| $f_C$ ± 2 MHz ... $f_C$ ± 3.75 MHz | | 1.2 | dB | max. | 3 | dB |
| $f_C$ ± 7.5 MHz ... $f_C$ ± 50 MHz | | 38 | dB | min. | 30 | dB |
| **Group delay ripple within $f_C$ ± 2.5 MHz** | | 52 | ns | max. | 75 | ns |
| **Operating temperature range** | OTR | - | | - 40 °C ... + 85 °C | | |
| **Storage temperature range** | | - | | - 55 °C ... + 85 °C | | |
| **Temperature coefficient of frequency** | $TC_f$ ** | - 20 | ppm/K | | - | |

*) 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.
**) $\Delta f_C$(Hz) = $Tc_f$(ppm/K) x (T - $T_0$) x $f_{CAT}$ (MHz).
***) at ambient temperature only

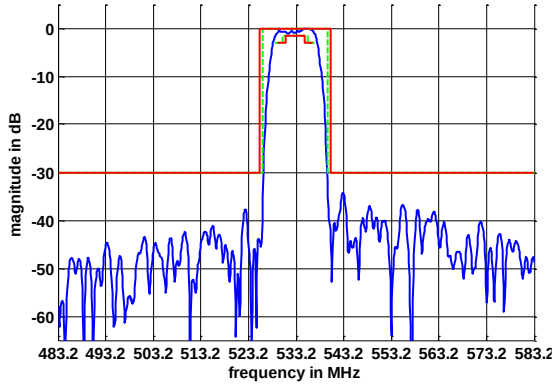
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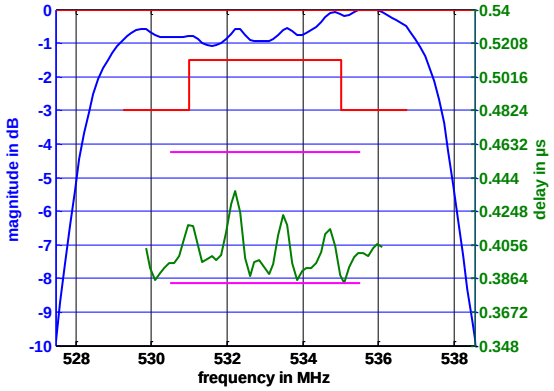
**Checked / Approved:**

**Microchip Frequency Technology GmbH**
**Potsdamer Straße 18**
**D 14 513 TELTOW / Germany**
**Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30**

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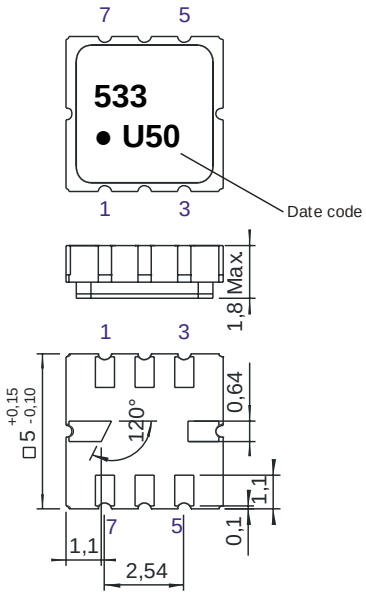
## Filter characteristic




## Construction and pin connection

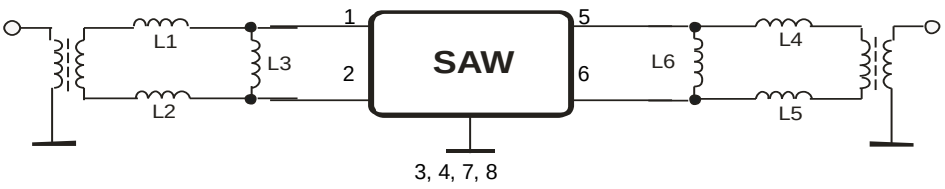
(All dimensions in mm)




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

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

## 50 Ω Test circuit




**Microchip Frequency Technology GmbH**
**Potsdamer Straße 18**
**D 14 513 TELTOW / Germany**
**Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30**

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### 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 plane, 3 planes;
   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

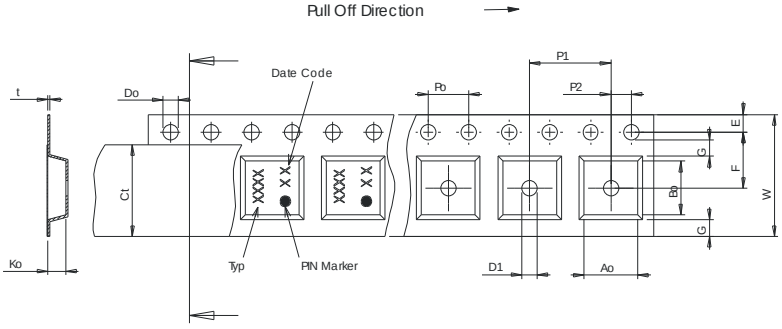
4. Resistance to solder heat (reflow): reflow possible: three times max.;
   for temperature conditions refer to the attached "Air reflow temperature conditions" on page 4;

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

### Packing

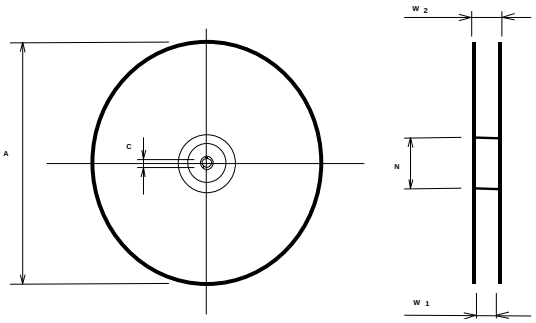
Tape & Reel: IEC 286 – 3, with exception of value for N and minimum bending radius;
tape type II, embossed carrier tape with top cover tape on the upper side;

| | |
|---|---|
| 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 | : | 12,00 ± 0,3 |
| Po | : | 4,00 ± 0,1 |
| Do | : | 1,50 +0,1/-0 |
| E | : | 1,75 ± 0,1 |
| F | : | 5,50 ± 0,05 |
| G(min) | : | 0,75 |
| P2 | : | 2,00 ± 0,05 |
| P1 | : | 8,00 ± 0,1 |
| D1(min) | : | 1,50 |
| Ao | : | 5,30 ± 0,1 |
| Bo | : | 5,30 ± 0,1 |
| Ct | : | 9,5 ± 0,1 |




**Reel (all dimensions in mm)**

| | | |
|---|---|---|
| A | : | 330 |
| W1 | : | 12,4 +2/-0 |
| W2(max) | : | 18,4 |
| N(min) | : | 50 |
| C | : | 13,0 +0,5/-0,2 |

The minimum bending radius is 45 mm.

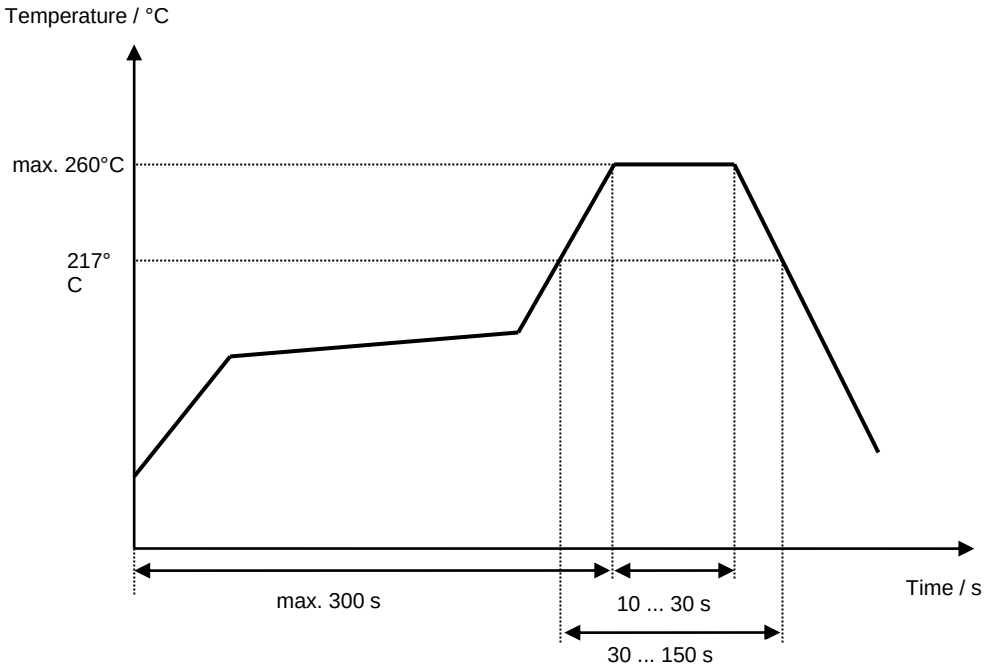
**Microchip Frequency Technology GmbH**
**Potsdamer Straße 18**
**D 14 513 TELTOW / Germany**
**Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30**

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**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**




**Microchip Frequency Technology GmbH**
**Potsdamer Straße 18**
**D 14 513 TELTOW / Germany**
**Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30**

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## History

| Version | Reason of Changes | Name | Date |
|---|---|---|---|
| 1.0 | - generation of development specification | Pfeiffer | 29.07.2003 |
| 1.1 | - terminating impedance (preliminary values), typical values and matching configuration added<br>- pinning changed<br>- frequency limits at 30 dB changed to 7,65 MHz | Pfeiffer | 15.12.2003 |
| 1.2 | - frequency limits at 30 dB changed to 7,50 MHz<br>- terminating impedance fixed | Pfeiffer | 25.02.2004 |
| 1.3 | - change stability characteristics and packing | Strehl | 13.12.2006 |
| 2.0 | - change typos. relative atten. $f_C$ +/- 2MHz , max 1.5dB & passband = $f_C$ +/-2MHz, update plots. | Hodkin | 18.11.2010 |
| 2.1 | - change typos. centre frequency at ambient temperature & update the remark | Jaffer | 16.06.2011 |
| 2.2 | - storage temp. extended (as request) from -40°C...+85°C to -55°C...+85°C | TCUK | 28.05.2012 |

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