

**VI TELEFILTER**

**Filter specification**

**TFS 336D**

**Measurement condition**

Ambient temperature: 25 °C  
 Input power level: 0 dBm  
 Terminating impedance: \*  
     Input: 555 Ω || -6,7 pF  
     Output: 710 Ω || -6,5 pF

**Characteristics**

**Remark:**

The reference level for the relative attenuation  $a_{rel}$  of the TFS 336D 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 at 336,00 MHz without any tolerance. The given values for both the relative attenuation  $a_{rel}$  and the group delay ripple have to be achieved 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	
<b>Insertion loss</b> (reference level)		$a_e$	12,0 dB	max.	16,0 dB
<b>Insertion loss variation over OTR</b>			0,8 dB	max.	± 1,0 dB
<b>Nominal frequency</b>		$f_N$	-		336,00 MHz
<b>Centre frequency</b>		$f_c$	336,00 MHz		-
<b>Passband</b>		PB	-	$f_N$ ±	2,37 MHz
<b>Pass band ripple</b> (p-p)			0,5 dB	max.	1,5 dB
<b>Relative attenuation</b>		$a_{rel}$			
$f_N$	± 2,37 MHz		0,8 dB	max.	1,5 dB
$f_N$	± 50 MHz		46 dB	min.	40 dB
$f_N$	- 12 MHz		41 dB	min.	36 dB
$f_N$	- 3,3 MHz		36 dB	min.	32 dB
$f_N$	+ 3,15 MHz		35 dB	min.	32 dB
$f_N$	+ 4,3 MHz		40 dB	min.	36 dB
<b>Average group delay</b>			1094 ns	max.	1750 ns
<b>Group delay ripple within PB</b>			85 ns	max.	150 ns
<b>Triple transit response suppression</b>			47 dB	min.	40 dB
<b>Return loss</b>			16 dB	min.	10 dB
<b>Operating temperature range</b>		OTR	-		- 20 °C ... + 85 °C
<b>Storage temperature range</b>			-		- 40 °C ... + 85 °C
<b>Frequency inversion temperature</b>			38 °C		-
<b>Temperature coefficient of frequency</b>		$TC_f$ **	-0,04 ppm/K <sup>2</sup>		-

\*) 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.

\*\*\*)  $\Delta f_c(\text{Hz}) = TC_f(\text{ppm/K}^2) \times (T - T_A)^2 \times f_{CAT}(\text{MHz})$

**Generated:**

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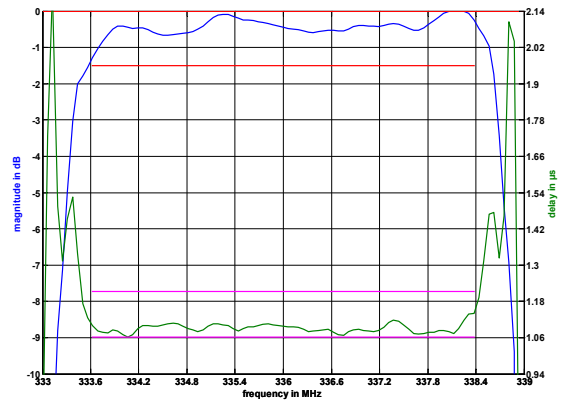
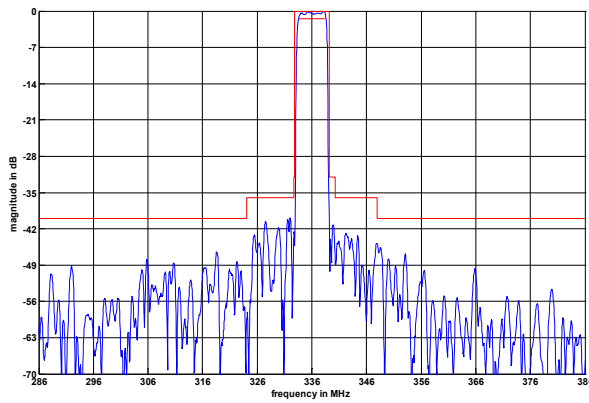
**Checked / Approved:**

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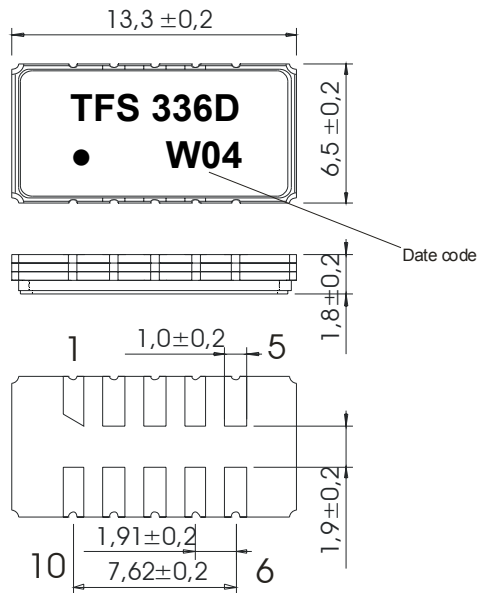
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**Filter characteristic**



**Construction and pin connection**

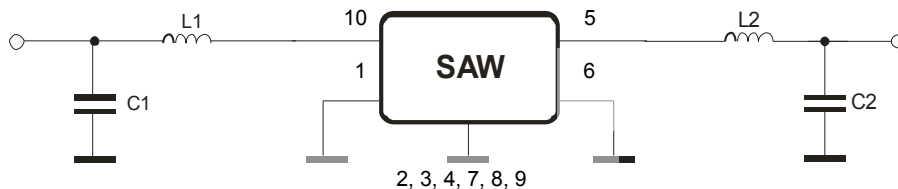
(All dimensions in mm)



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

Date code: Year + week  
 W 2008  
 X 2009  
 A 2010  
 ...

**50 Ω Test circuit**



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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 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)

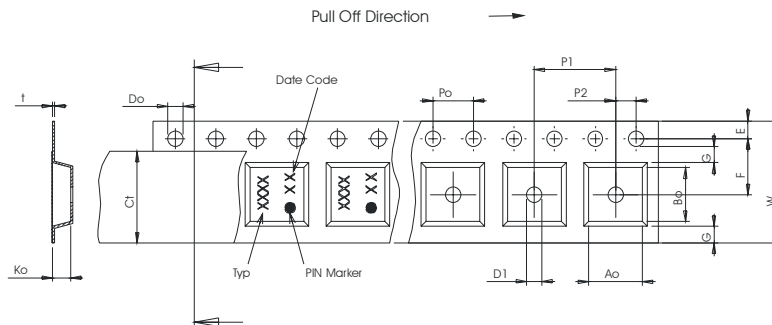
**Packing**

Tape & Reel: 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

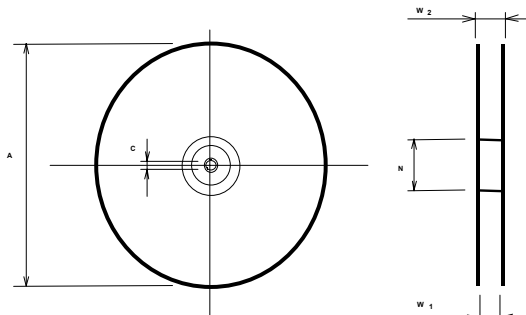
**Tape (all dimensions in mm)**

- W : 24,00 +0,30/-0,10
- Po : 4,00 ± 0,1
- Do : 1,50 +0,1/-0
- E : 1,75 ± 0,10
- F : 11,50 ± 0,10
- G(min) : 0,60
- P2 : 2,00 ± 0,1
- P1 : 12,00 ± 0,1
- D1(min) : 1,50
- Ao : 7,10 ± 0,10
- Bo : 13,90 ± 0,10
- 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.

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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**



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**VI TELEFILTER****Filter specification****TFS 336D****5/5****History**

<b>Version</b>	<b>Reason of Changes</b>	<b>Name</b>	<b>Date</b>
1.0	- Generation of development specification	Strehl	08.10.2007
1.1	- pin functions corrected	Pfeiffer	19.10.2007
1.2	- change of relative attenuation - add of terminating impedances, typical values and filter characteristics	Pfeiffer	22.01.2008
1.3	- change of terminating impedances, typical values and filter characteristics	Pfeiffer	24.01.2008

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