

Measurement condition

Ambient temperature:	23	°C
Input power level:	0	dBm
Terminating impedance: *		
Input:	348 Ω -7,2 pF	
Output:	348 Ω -7,2 pF	

Characteristics

Remark:

The reference level for the relative attenuation a_{rel} of the TFS 167H is the maximum attenuation in the pass band. The maximum attenuation in the pass band is defined as the insertion loss a_e . The nominal frequency f_N is fixed at 167,0 MHz without any tolerance or limit. 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	1,4 dB	max.	3,0 dB
Nominal frequency		f_N	-		167,0 MHz
Passband		PB	-	$f_N \pm$	75 kHz
Pass band ripple		p-p	0,25 dB	max.	0,5 dB
Pass band variation			0,3 dB	max.	1 dB
Relative attenuation		a_{rel}			
$f_N \pm 0,4$ MHz	...	$f_N \pm 0,6$ MHz	9,0 dB	min.	5 dB
$f_N \pm 0,6$ MHz	...	$f_N \pm 20,0$ MHz	18,0 dB	min.	10 dB
$f_N - 20$ MHz	...	$f_N - 137$ MHz	56 dB	min.	33 dB
$f_N + 20$ MHz	...	$f_N + 103$ MHz	43 dB	min.	33 dB
$f_N + 103$ MHz	...	$f_N + 105$ MHz	65 dB	min.	40 dB
$f_N + 105$ MHz	...	$f_N + 833$ MHz	46 dB	min.	33 dB
Absolute group delay within PB			1,75 μs	max.	2,0 μs
Group delay ripple within PB			210 ns	max.	300 ns
Input return loss			18,0 dB	min.	15,0 dB
Output return loss			19,0 dB	min.	10,0 dB
Intermodulation ratio		**	110 dB	min.	100 dB
Input power level				max.	7 dBm
Operating temperature range		OTR	-		- 5 °C ... + 85 °C
Storage temperature range			-		- 40 °C ... + 90 °C
Frequency inversion temperature			20 °C		
Temperature coefficient of frequency		TC _f ***	-0,046 ppm/K ²		-

*) 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.

**) $f_{in1} = f_N + 0,800\text{MHz}$; $f_{in2} = f_N + 1,600\text{MHz}$; $P_{in} = -20\text{dBm}$ $f_{measurement} = f_N$ and $f_{in1} = f_N - 0,800\text{MHz}$; $f_{in2} = f_N - 1,600\text{MHz}$; $P_{in} = -20\text{dBm}$ $f_{measurement} = f_N$

***) $\Delta f_c(\text{Hz}) = TC_f(\text{ppm/K}^2) \times (T - T_0)^2 \times f_{T0}(\text{MHz})$.

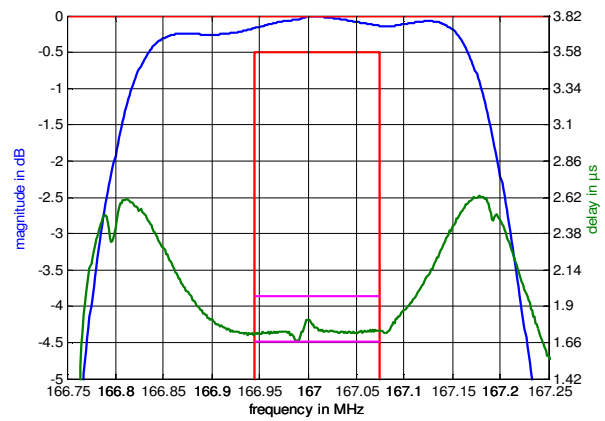
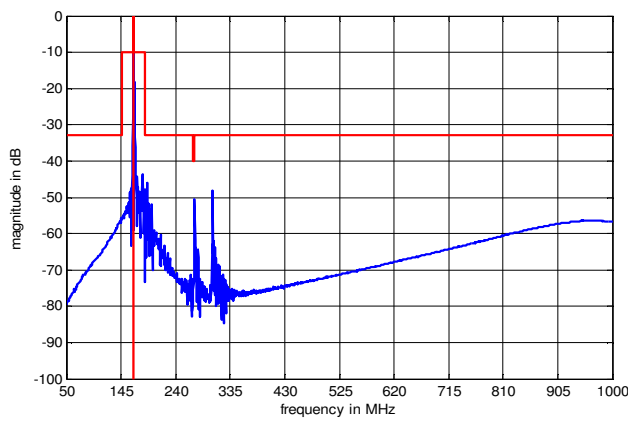
Generated:

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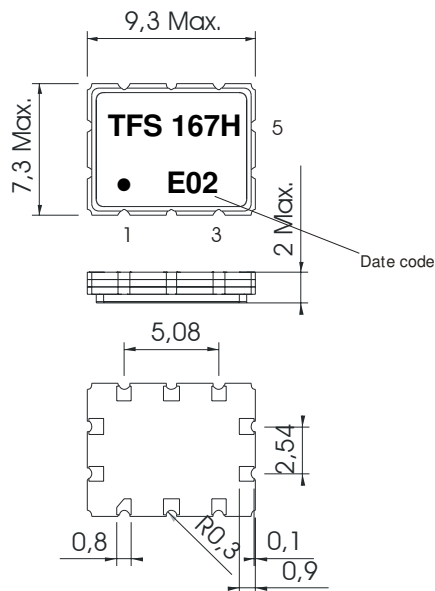
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Filter characteristic



Construction and pin connection

(All dimensions in mm)

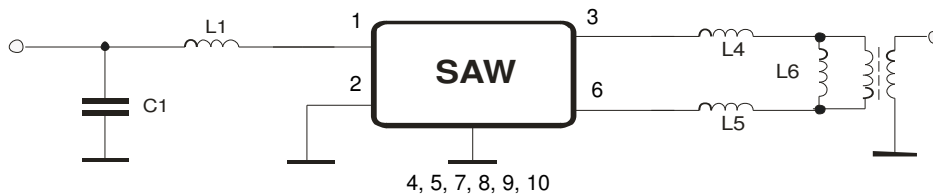


1	Input
2	Ground
3	Output
4	Ground
5	Ground
6	Output
7	Ground
8	Ground
9	Ground
10	Ground

Date code: Year + week

E	2014
F	2015
G	2016
...	

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 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 / 15 min. each / 100 cycles
DIN IEC 68 part 2 – 14 Test N
4. Resistance to solder heat (reflow): reflow possible: three times max.;
for temperature conditions, see page 4: "Air reflow temperature conditions"

This filter is RoHS compliant (2011/65/EU)

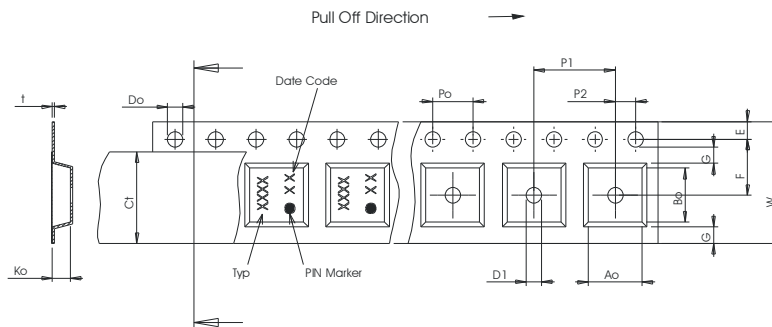
Packing

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: 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

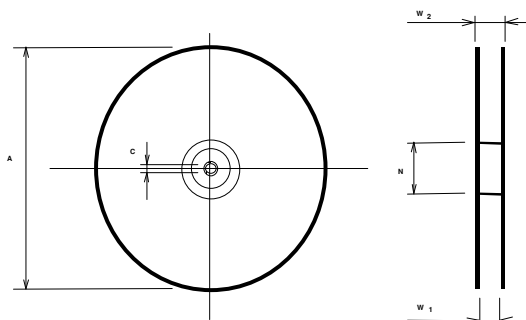
Tape (all dimensions in mm)

- W : 16,00 ± 0,3
- Po : 4,00 ± 0,1
- Do : 1,50 +0,1/-0
- E : 1,75 ± 0,10
- F : 7,50 ± 0,10
- G(min) : 0,60
- P2 : 2,00 ± 0,1
- P1 : 12,00 ± 0,1
- D1(min) : 1,50
- Ao : 7,60 ± 0,10
- Bo : 9,60 ± 0,10
- Ct : 13,5



Reel (all dimensions in mm)

- A : 330
- W1 : 16,4
- W2(max) : 22,4
- N(min) : 50
- C : 13,0



The minimum bending radius is 45 mm.

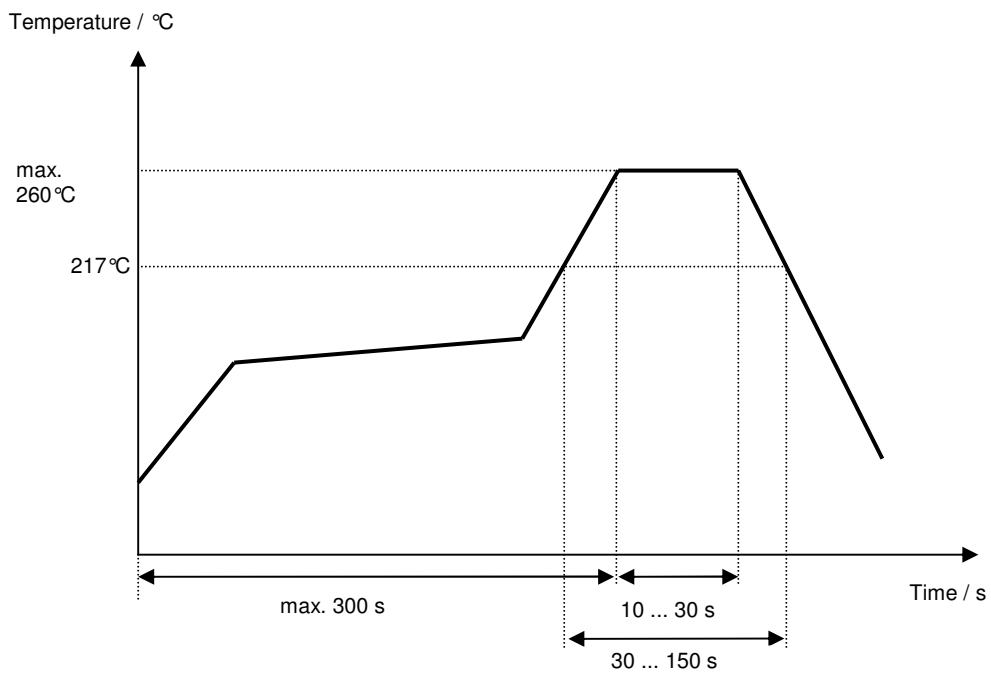
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Air reflow temperature conditions

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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History

Version	Reason of Changes	Name	Date
1.0	generate preliminary specification	Roizengaft	18.11.2003
1.1	generation of filter specification add terminating impedance add filter characteristic change circuit test change packing (tape and reel)	Noack	16.04.2004
1.2	correction terminating impedance add typical value for amplitude ripple amplitude variation change packing (tape) change temperature coefficient	Noack	18.06.2004
1.3	change limit of relative attenuation from 30 dB to 33dB update typical value and filter characteristic	Noack	16.07.2004
1.4	add ESD stability characteristics change drawing of packing (tape and reel)	Noack	19.08.2004
1.5	changed air reflow profile and test circuit layout	Martens	01.11.2004
1.6	change stability characteristics and packing	Strehl	24.07.2006
1.7	add pin marker	Strehl	08.05.2008
1.8	maximum input power updated	Kortenbeutel	06.01.2014