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
Pass band	PB	-			f_N ± 75	kHz
Amplitude variation in PB		0,3	dB	max.	1	dB
Amplitude ripple in PB	p-p	0,25	dB	max.	0,5	dB
Relative attenuation	a_{rel}					
f_N ± 0,4 MHz ... f_N ± 0,6	MHz	9,0	dB	min.	5	dB
f_N ± 0,6 MHz ... f_N ± 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 in PB		1,75	µs	max.	2,0	µs
Group delay ripple in PB		210	ns	max.	300	ns
Intermodulation ratio For two – 20dBm input signals						
@ f_N + 0,800 MHz and f_N + 1,600	MHz	110	dB	min.	100	dB
@ f_N - 0,800 MHz and f_N - 1,600	MHz	110	dB	min.	100	dB
Input Return loss		18,0	dB	min.	15,0	dB
Output Return loss		19,0	dB	min.	10,0	dB
Input power level		-		max.	22	dBm
Temperature coefficient of frequency Tc_f **		-0,046	ppm/K²		-	
Frequency inversion temperature		20	°C		-	
Operating temperature range		-		- 5 °C .. +	85	°C
Storage temperature range		-		- 40 °C.. +	90	°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.
**) $\Delta f_C(Hz) = Tc_f(ppm/K^2) \times (T - T_o)^2 \times f_{CAT}$ (MHz).

generated:

checked / approved:

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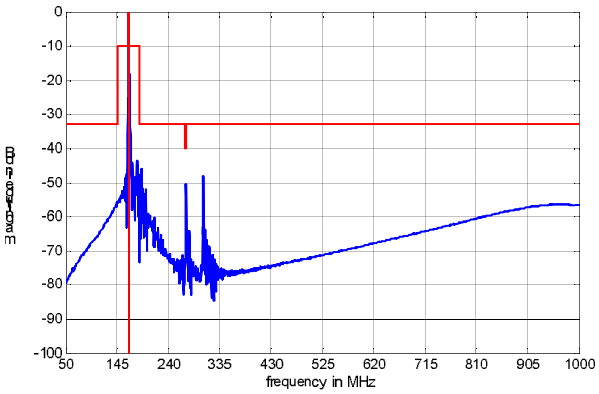
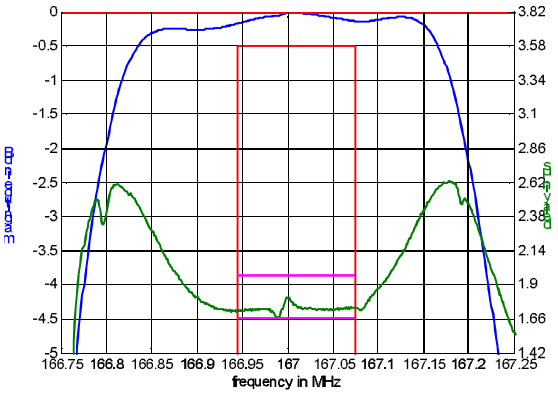
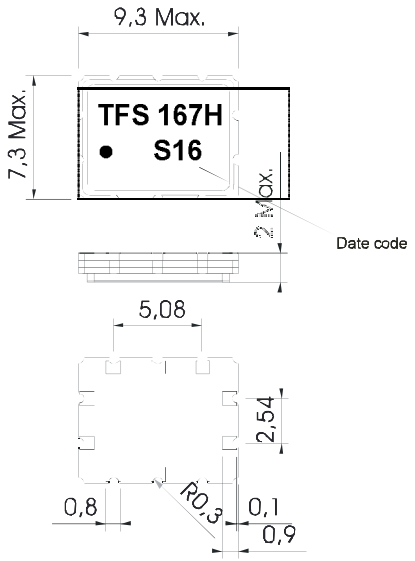
Filter characteristic





Construction and pin connection

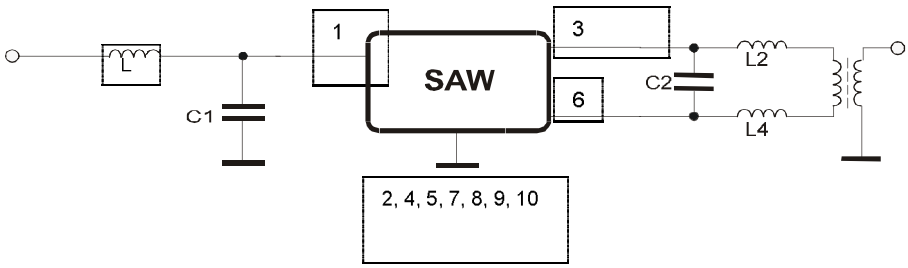
(All dimensions in mm)



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

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

50 Ω Test circuit



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Stability characteristics

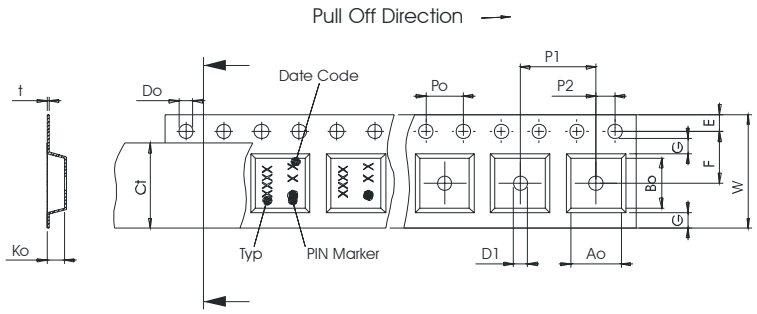
After the following tests the filter shall meet the whole specification:

1. Shock:	500g, 18 ms, half sine wave, 3 shocks each plane; 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: twice max.; for temperature conditions refer to the attached "Air reflow temperature conditions" on page 4;
5. ESD	MIL-STD-883E using coupling network of ISO 10605 and EN 6100-4-2 HBM:500V; MM:500V;

Packing

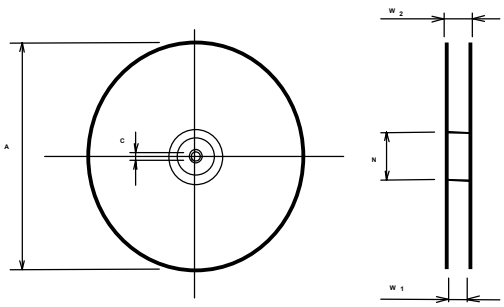
Tape & Reel: IEC 286 – 3, with exeption of value for N and minimum bending radius;
tape type II, embossed carrier tape with top cover tape on the upper side;

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 ± 0,10
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	:	18,0
W2(max)	:	22,0
N(min)	:	100
C	:	13,0

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

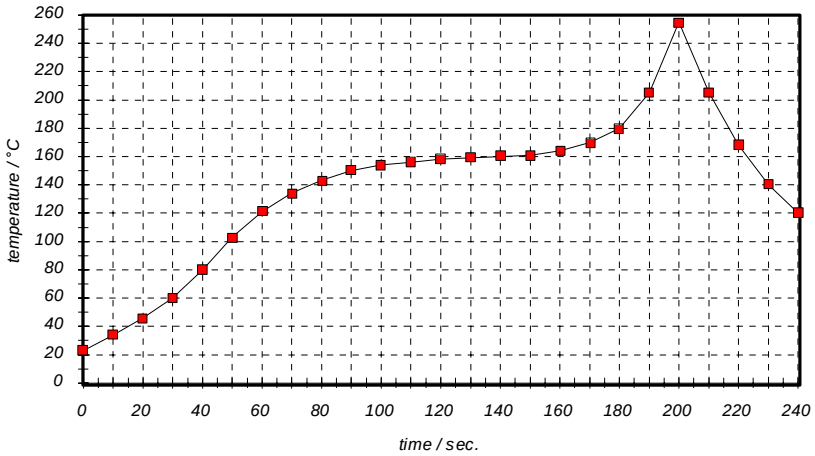

Table for temperature vs. time during the air reflow process

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	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

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