Measurement condition

Ambient temperature: 23 °C
Input power level: 0 dBm
Terminating impedances at f_C *: input: 869 Ω | -8,5 pF
output: 1058 Ω | -5,9 pF

Characteristics

Remark:
Reference level for the relative attenuation a_{rel} of the TFS 167F is the minimum of the pass band attenuation a_{min}. The maximum of the pass band attenuation 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 2 dB filter attenuation level relative to the insertion loss a_e. The nominal frequency f_N is fixed at 167 MHz without tolerance. The given values for the relative attenuation a_{rel} and for the group delay ripple have to be reached 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		Limit		
Insertion loss	a_e	5,8	dB	max. 7		dB
Nominal frequency	f_N	-		167		MHz
Passband	PB	-		f_N ± 75		kHz
Amplitude variation in PB	p-p	0,7	dB	max. 1,5		dB
Amplitude ripple in PB	p-p	0,05	dB	max. 1		dB
Relative Attenuation	a_{rel}					
f_N ± 0,2 MHz ... f_N ± 0,4	MHz	3,5	dB	min. 2		dB
f_N ± 0,4 MHz ... f_N ± 0,6	MHz	25	dB	min. 17		dB
f_N ± 0,6 MHz ... f_N ± 0,8	MHz	43	dB	min. 36		dB
f_N ± 0,8 MHz ... f_N ± 1,6	MHz	45	dB	min. 41		dB
f_N ± 1,6 MHz ... f_N ± 20	MHz	47	dB	min. 41		dB
f_N - 137 MHz ... f_N - 20	MHz	73	dB	min. 67		dB
f_N + 20 MHz ... f_N + 103	MHz	73	dB	min. 67		dB
f_N +103 MHz ... f_N + 105	MHz	67	dB	min. 60		dB
f_N +105 MHz ... f_N + 1	GHz	75	dB	min. 67		dB
Group delay variation in PB		200	ns	max. 400		ns
Group delay in PB		2,4	µs	max. 2,6		µs
Input return loss in PB		20	dB	min. 15		dB
Output return loss in PB		18	dB	min. 10		dB
Input Power Level		-		max. 22		dBm**)
Temperature coefficient of frequency Tc_f		- 0,036	ppm/K²	-		
Frequency inversion temperature T_0		35	°C	-		
Operating temperature range		-		- 5 °C .. + 85		°C
Storage temperature range		-		- 40 °C.. + 90		°C
Intermodulation ratio		120	dB	min. 100		dB

input signals at 167 + 0,8 MHz and 167 + 1,6 MHz or at 167 - 0,8 MHz and 167 - 1,6 MHz, each at -20 dBm

*) 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.
**) This power level is only allowed for short term operation (1% of the life time), the max. input power for continuous operation is max.15dBm only

generated: _____

checked / approved: _____

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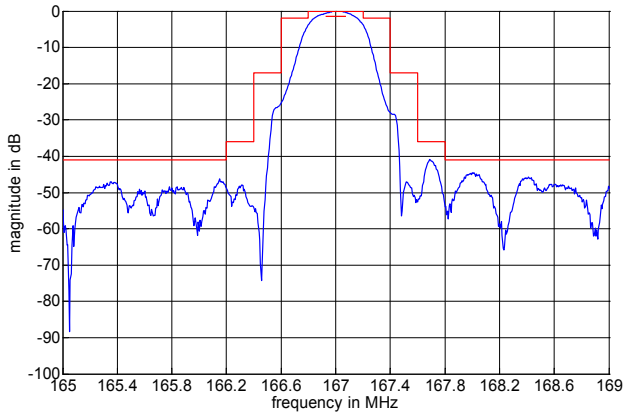
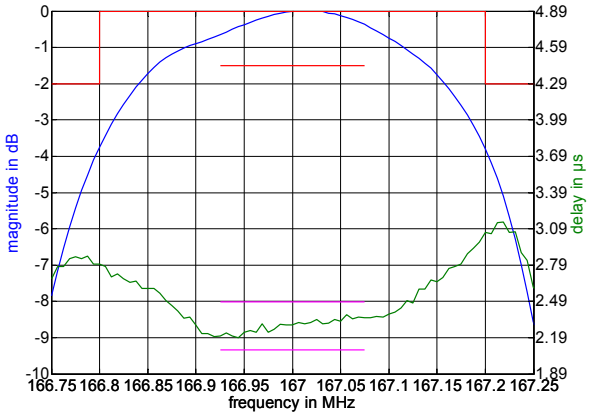
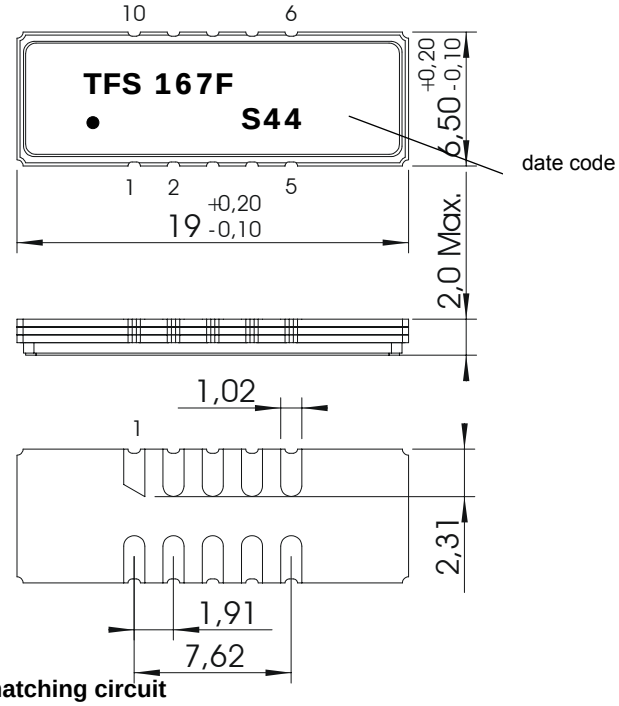
Filter characteristic





Construction and Pin Connection

(All dimensions in mm)



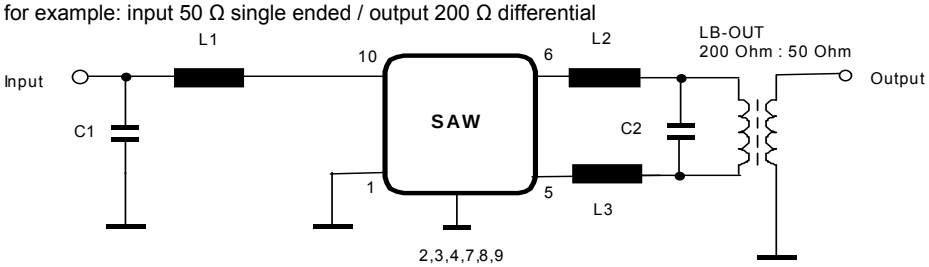
data code: year + week

S	2004
T	2005
U	2006
.....	

pin 1	input (rf return)
pin 2	ground
pin 3	ground
pin 4	ground
pin 5	output (rf return)
pin 6	output
pin 7	ground
pin 8	ground
pin 9	ground
pin 10	input

matching circuit

for example: input 50 Ω single ended / output 200 Ω differential



other options possible:

- 200 Ω differential in / out
- 50 Ω single ended in / out

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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 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;

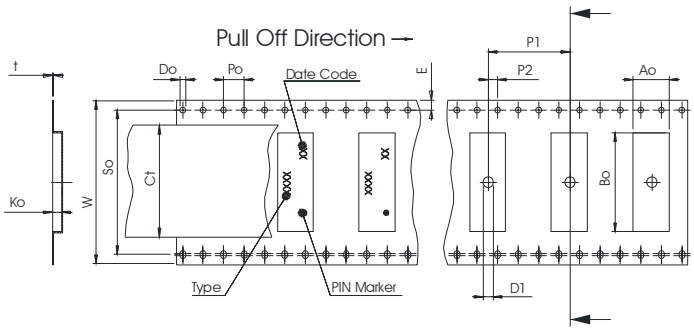
Packing

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:	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

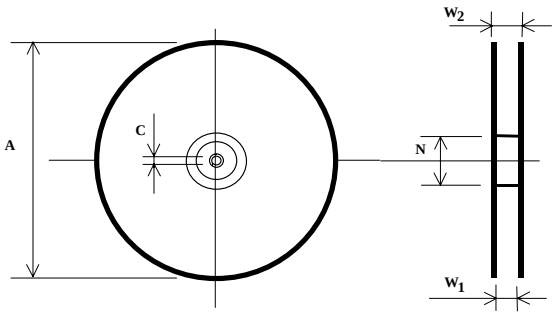
Tape (all dimensions in mm)

W	:	32,00 ± 0,3
Po	:	4,00 ± 0,1
Do	:	1,50 +0,1/-0
E	:	1,75 ± 0,1
F	:	14,20 ± 0,1
P2	:	2,00 ± 0,1
P1	:	12,00 ± 0,1
D1(min)	:	2,00
Ao	:	7,10 ± 0,1
Bo	:	19,60 ± 0,1
So	:	28,40 ± 0,1
Ct	:	25,5 ± 0,1
Ko	:	2,5 ± 0,1
t	:	0,35 ± 0,35



Reel (all dimensions in mm)

A	:	330
W1	:	34
W2(max)	:	38
N(min)	:	100
C	:	13



The minimum bending radius is 45 mm.

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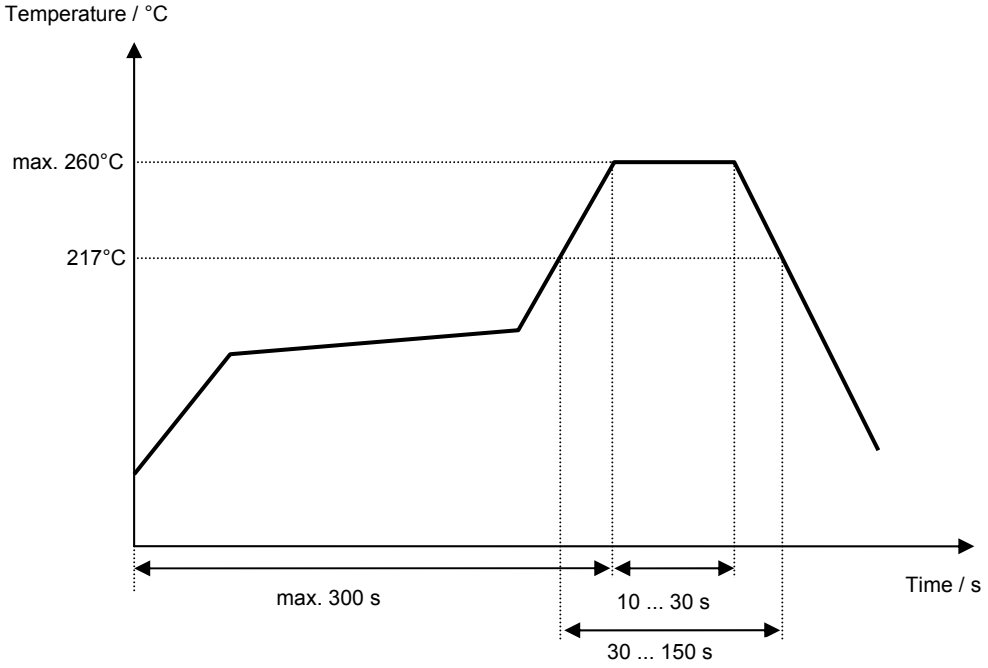
Air reflow temperature conditions

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	generation of “Development specification” according to customer requirements	Pfeiffer	24.04.2003
1.1	return loss limits specified	Pfeiffer	30.04.2003
1.2	terminating impedance fixed typical values and matching configuration added frequency range for 50 dB stopband limit changed to f_N +103 MHz ... f_N + 105 MHz	Pfeiffer	07.08.2003
1.3	limit of relative attenuation in f_N +103 MHz ... f_N + 105 MHz changed to 60dB	Pfeiffer	17.10.2003
1.4	type error within relative attenuation for pass band corrected	Steiner	12.11.2003
1.5	delete relative attenuation in pass band	Wall	18.11.2003
1.6	tape and reel dimensions corrected filter characteristic added	Pfeiffer	19.05.2004
1.7	relaxation in ultimate rejection	Noack	15.07.2004
1.8	ESD limits added	Pfeiffer	19.08.2004
1.9	conditions for input power level modified	Pfeiffer	10.09.2004
2.0	air reflow temperature conditions modified	Pfeiffer	29.10.2004

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