

Microchip**Filter specification****TFS199G****1/5****Measurement condition**

Ambient temperature T_A :	25	°C
Input power level:	0	dBm
Terminating impedance: *		
Input:	119 Ω -22.2 pF	
Output:	97 Ω -25.9 pF	

Characteristics

Remark:

The reference level for the relative attenuation a_{rel} of the TFS 199G 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 1 dB filter attenuation level relative to the insertion loss a_e . The nominal frequency f_N is fixed at 199.68 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		
Insertion loss (reference level)	a_e	14.1	dB	max.	15.0	dB
		-				
Nominal frequency	f_N				199.68	MHz
Pass band	PB	-		f_N	$\pm$ 4.42	MHz
Amplitude ripple **	p-p	0.3	dB	max.	1	dB
Relative attenuation	a_{rel}					
f_N - 4.42 MHz ... f_N + 4.42 MHz		0.3	dB	max.	1	dB
f_N - 199 MHz ... f_N - 14.68 MHz		55	dB	min.	45	dB
f_N - 14.68 MHz ... f_N - 9.42 MHz		48	dB	min.	30	dB
f_N - 9.42 MHz ... f_N - 5.98 MHz		4	dB	min.	3	dB
f_N + 5.98 MHz ... f_N + 9.42 MHz		4	dB	min.	3	dB
f_N + 9.42 MHz ... f_N + 14.2 MHz		47	dB	min.	30	dB
f_N + 14.2 MHz ... f_N + 300 MHz		58	dB	min.	45	dB
Absolute group delay		0.985	μ s		-	
Group delay ripple **	p-p	30	ns	max.	100	ns
Phase linearity **	p-p	2	deg	max.	8	deg
Triple transit response suppression		60	dB	min.	35	dB
Third order intercept ***	IP3	40	dBm	min.	35	dBm
Input /Output return loss **		15	dB	min.	10	dB
Input power level ****				max.	23	dBm
Operating temperature range	OTR	-			-25 °C ... + 85 °C	
Storage temperature range		-			-55 °C ... + 125 °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.

**) Applies over any 3.84MHz in PB

***) Measured with tones spaced at 7.5 MHz and 17.5 MHz above and below f_c

****) This power level is allowed for short term operation (10% of life time) only, the max. input power for continuous operation is 10 dBm.

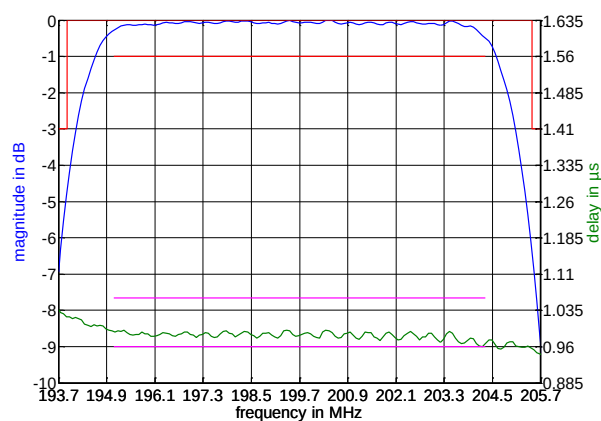
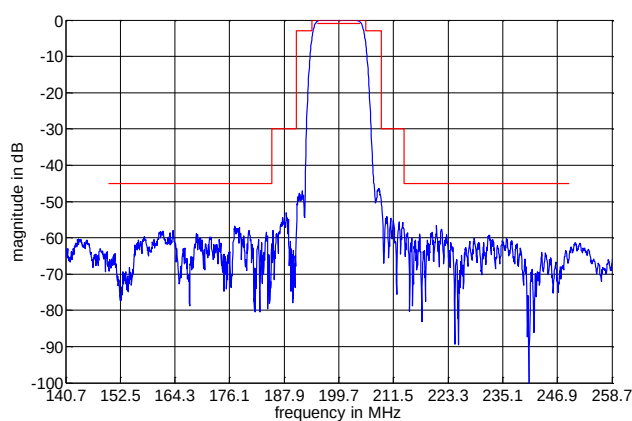
*****) $\Delta f = TC_f(T - T_A)f_N$

Generated:**Checked / Approved:**

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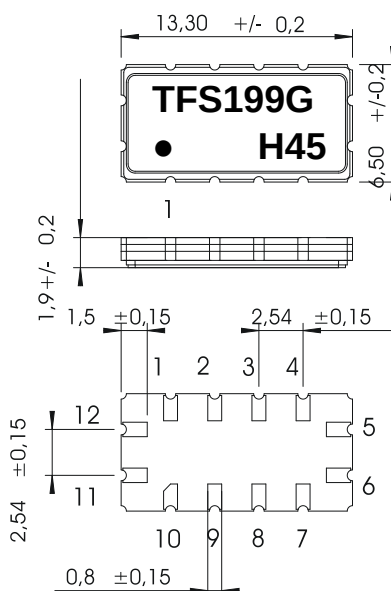
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Filter characteristic



Construction and pin connection

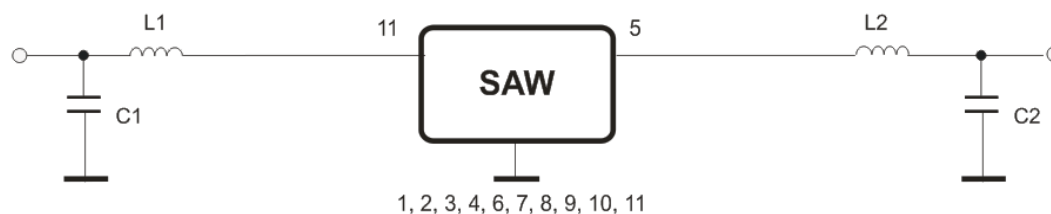
(All dimensions in mm)



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

Date code: Year + week
H 2016
J 2017
K 2018
...

50 Ω Test circuit



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Stability characteristics, reliability

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

1. Shock: 500 g, 1 ms, half sine wave, 3 shocks each plane;
DIN IEC 60068 T2 - 27
2. Vibration: 10 Hz to 2000 Hz, 0.35 mm or 5 g respectively, 1 octave per min, 10 cycles per plane, 3 planes; DIN IEC 60068 T2 - 6
3. Change of temperature: -55 °C to 125 °C / 15 min. each / 100 cycles
DIN IEC 60068 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;
5. SAW devices are Electrostatic Discharge (ESD) sensitive devices.

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;

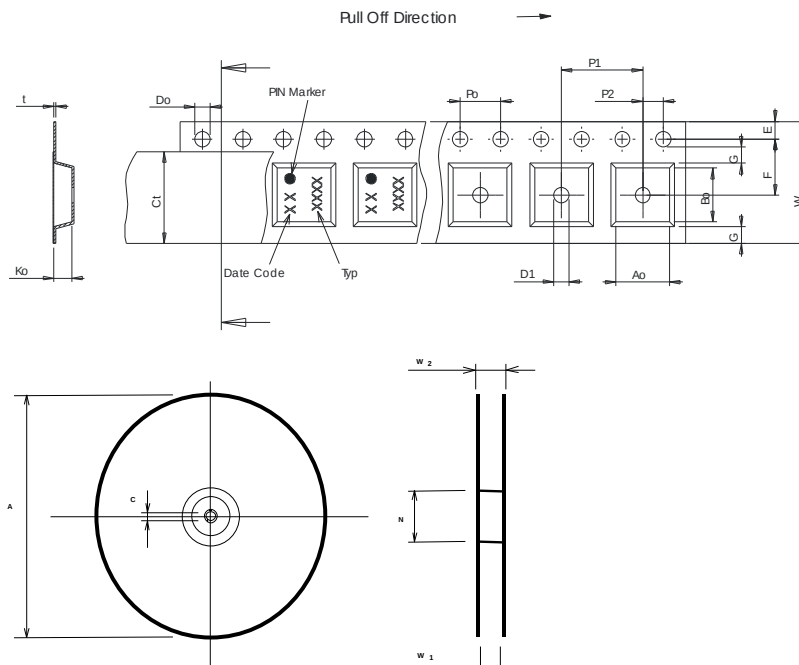
max. pieces of filters per reel:	1700
reel of empty components at start:	min. 300 mm
reel of empty components at start including leader:	min. 500 mm
trailer:	min. 300 mm

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	: 7.00 ±0.10
Bo	: 13.80 ±0.10
Ct	: 21.00 ±0.1
Ko	: 2.10 ±0.10
t	: 0.30 ±0.05

Reel (all dimensions in mm)

A	: 330 or 180
W1	: 24.4 +2/-0
W2(max)	: 30.40
N(min)	: 60.00
C	: 13.0 +0.5/-0.2



The minimum bending radius is 45 mm.

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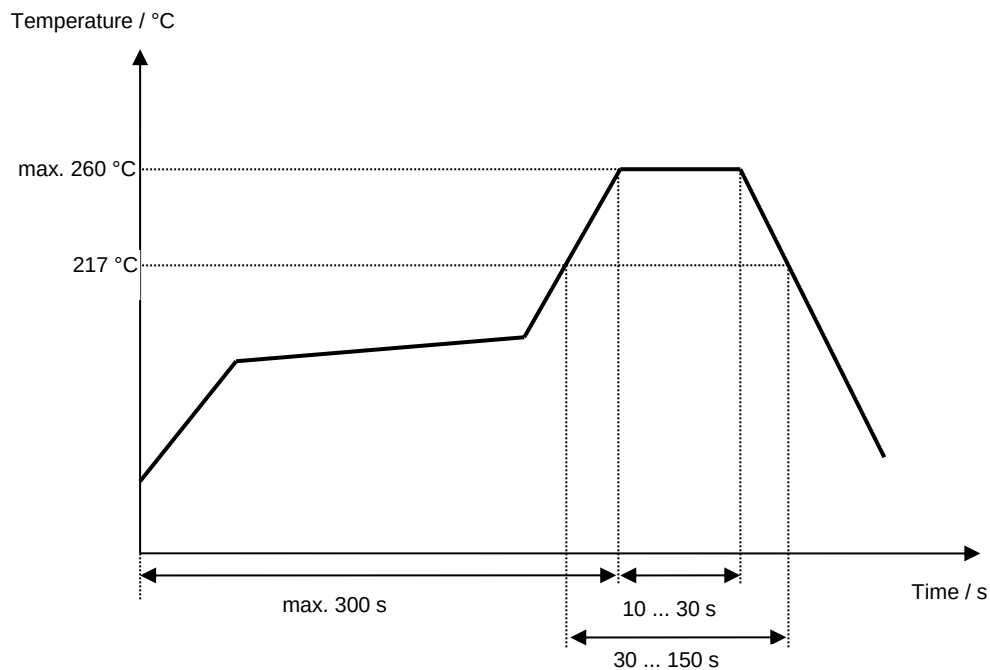
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Air reflow temperature conditions

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**Filter specification****TFS199G****5/5****History**

Version	Reason of Changes	Name	Date
1.0	- generated specification according to customer requirement	Chilla	25.06.2004
1.1	- changed centre frequency and frequency units in relative attenuation	Chilla	16.07.2004
1.2	- created filter specification - added terminating impedance - added typical values - added filter characteristic - added test circuit - modified packing - modified air reflow temperature conditions	Chilla	30.11.2004
1.3	- added typical values of third order intercept - changed operating bandwidth to passband in explanation **) - deleted typical value for passband	Chilla	06.01.2005
2.0	- Change tape & reel dimensions - Update header and footer sections - Update data section - Update storage temperature range - Update stability characteristics, reliability	Bonnen	04.11.2016