Measurement condition

Ambient temperature: 23 °C
Input power level: 0 dBm
Terminating impedance: *
Input: 116 Ω || -16,2 pF
Output: 116 Ω || -16,2 pF

Characteristics

Remark:
The reference level for the relative attenuation a_{rel} of TFS190N is the minimum of the pass band attenuation a_{min}. This value 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 given values for the relative attenuation a_{rel} and 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		tolerance / limit		
Insertion loss (reference level)	a_e	7,8 -	dB	max.	9,5	dB
Nominal frequency	f_N	-			190	MHz
Centre frequency	f_C	190	MHz		-	
Passband	PB	-		f_N	± 7,12	MHz
Ripple in PB (p-p)		0,4	dB	max.	0,8	dB
(over any 3,84 MHz span)		-				
Phase ripple in PB (p-p)		2,9	deg	max.	4	deg
(over any 3,84 MHz span)		-				
Relative attenuation	a_{rel}					
f_N ... f_N ± 7,3 MHz		0,7	dB	max.	1	dB
f_N ± 14,14 MHz ... f_N ± 100 MHz		36	dB	min.	34	dB
f_N + 100 MHz ... f_N + 810 MHz		50	dB	min.	40	dB
Absolute group delay variation in PB **		7	ns	max.	9	ns
Group delay ripple within PB		35	ns	max.	50	ns
Input power level ***		-		max.	21	dBm
Operating temperature range	OTR	-		- 10 °C .... + 85°C		
Storage temperature range		-		- 40 °C .... + 85°C		
Temperature coefficient of frequency	TC_f ****	-87	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.
**) Maximum variation of the mean value messured from 182,88 MHz to 197,12 MHz within operating temperature range.
***) Maximum value for 10 years operation.
****) $\Delta f_C(Hz) = Tc_f(ppm/K) \times (T - T_o) \times f_{CAT}$ (MHz).

Generated:

Checked / Approved:

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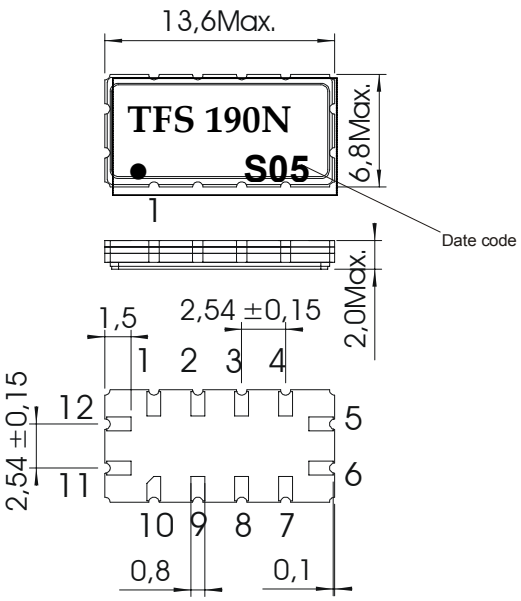
Construction and pin connection

(All dimensions in mm)



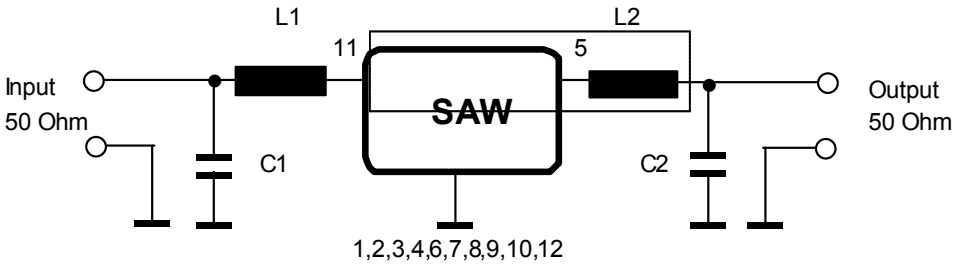
1	Ground
2	Ground
3	Ground
4	Ground
5	Output
6	Output RF Return
7	Ground
8	Ground
9	Ground
10	Ground
11	Input
12	Input RF Return

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 5g 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;

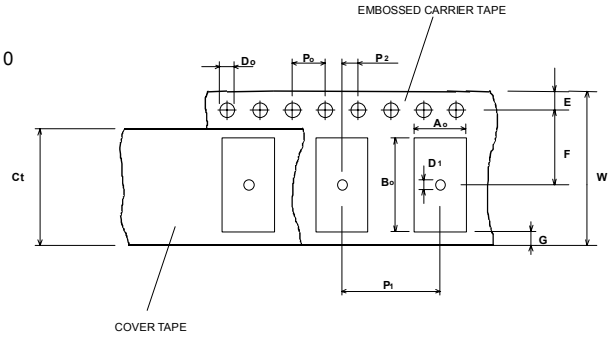
Packing

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:	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

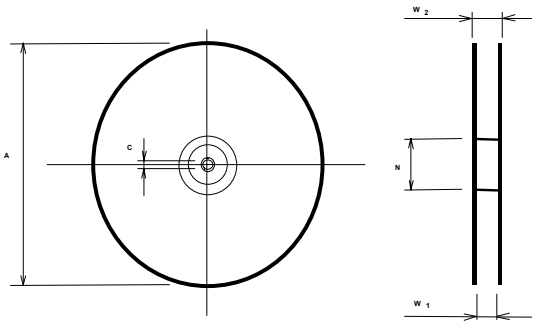
Tape (all dimensions in mm)

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. The mounting surface of the filters faces the bottom side of the embossed carrier tape. Marking of the filters can be read if the upper side of the carrier tape is regarded with the sprocket holes on the right.

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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

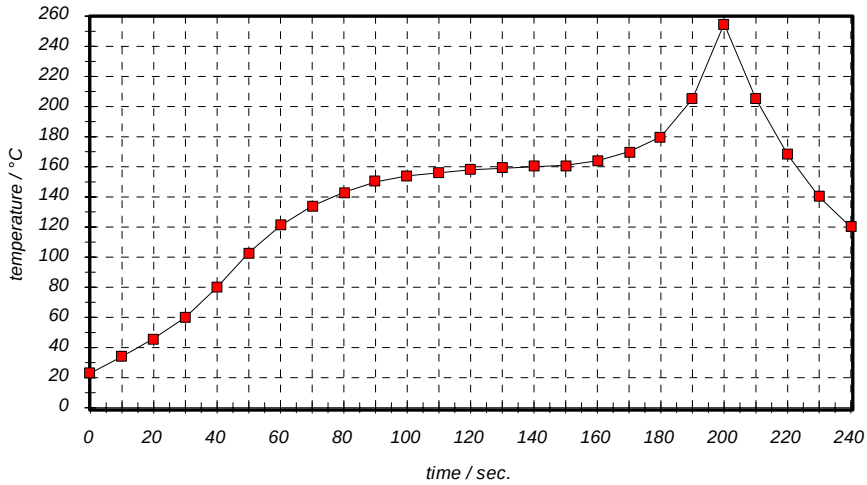

Table for temperature vs. time during the air reflow process

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	generation of development specification	Pfeiffer	19.08.2003
1.1	insertion loss changed 1 dB passband changed relative attenuation changed amplitude and phase ripple added absolute group delay variation added operation temperature range changed temperature coefficient of frequency added frequency inversion temperature removed explanation of TCF changed pinning changed	Chilla	20.10.2003
1.2	pin 11 and pin 12 exchanged	Chilla	22.10.2003
1.3	terminating impedances added typical values added Absolute group delay variation added Group delay ripple added max. input power level added date code changed test circuit added relative attenuation f_N +100 MHz ... f_N +810 MHz added	Chilla	03.02.2004
1.4	added peak to peak (p-p) to the “ripple in passband” and “phase ripple in passband”	Strehl	20.08.2004

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