

VI TELEFILTER**Filter Specification****TFS 200 D****1/5****1. Measurement condition :**

Ambient temperature T_A : 25 °C
 Input power level: 0 dBm
 Terminating impedances in f_C *) :
 for input: 592 Ω | - 6,05 pF.
 for output: 1130 Ω | - 4,04 pF.

2. Characteristics

Remark: Reference level for the relative attenuation a_{rel} of the **TFS 200 D** 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 3 dB filter attenuation level relative to the insertion loss a_e . The nominal frequency f_N is fixed on 200 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 also 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 .

Data	typ. value	tolerance / limit
Insertion loss (Reference level) a_e	17...18 dB	max. 20 dB
Nominal frequency f_N		200 MHz
Centre frequency f_C at ambient temperature (f_{CTA})	200,02 MHz	
Pass band (PB) :	$f_N - 2,05 \text{ MHz} \dots f_N + 2,05 \text{ MHz}$	
Amplitude ripple in PB (p-p):	0,2...0,6 dB	max. 1,0 dB
Bandwidth :		
1 dB - band width	4,47 MHz	min. 4,1 MHz
3 dB - band width	5,33 MHz	min. 5,0 MHz
3 dB - band width	5,33 MHz	max. 5,5 MHz
10 dB - band width	6,52 MHz	
20 dB - band width	7,43 MHz	
30 dB - band width	7,90 MHz	max. 10 MHz
Relative attenuation a_{rel}		
f_N $f_N \pm 2,05$ MHz	-	max. 1 dB
$f_N \pm 2,05$ MHz $f_N \pm 2,5$ MHz	-	max. 3 dB
$f_N \pm 2,75$ MHz $f_N \pm 5,0$ MHz	-	min. 3 dB
$f_N \pm 5,0$ MHz $f_N \pm 20$ MHz	33...40 dB	min. 30 dB
$f_N \pm 20$ MHz $f_N \pm 100$ MHz	45...55 dB	min. 40 dB
Group delay (mean value in PB):	0,93 μ s	max. 1,5 μ s
Group delay ripple in PB (p-p):	40 ns	max. 100 ns
Deviation from linear phase in $f_N \dots f_N \pm 2,5$ MHz	2,5 ° (r.m.s. 0,5 °)	
Triple transit attenuation compared to main signal :	44 dB	
Crosstalk :	60 dB	
Input/Output return loss with matching network (S11/S22):	4 / 6 dB	
Frequency inversion temperature (T_o) :	0 °C	
Temperature coefficient of frequency (TC_f) :	-0,036 ppm/K ²	
Frequency deviation of f_C over temperature: **)	$\Delta f_C(\text{Hz}) = TC_f(\text{ppm/K}) \times (T - T_o)^2 \times f_{T_o} \text{ (MHz)}$	
Operating temperature range (OTR) :	- 20 °C ... + 70 °C	
Storage temperature range :	- 40 °C ... + 85 °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.

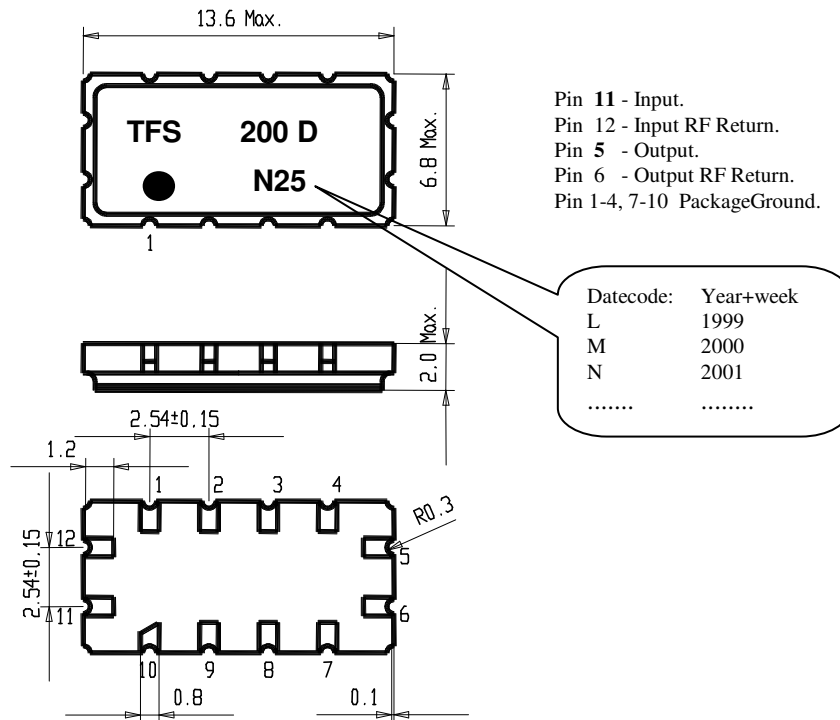
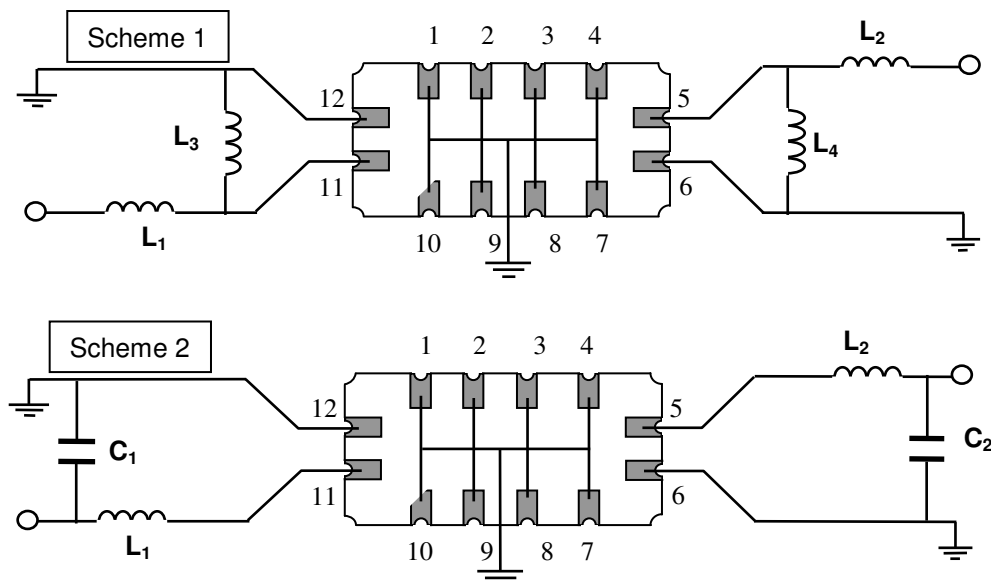
**) f_{T_o} is reference frequency f_C at frequency inversion temperature (T_o)

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3. Package, pin grid 2,54 mm**4. 50 Ω matching network (see Application Note):**

For final test we use scheme 1.

About matching element values see Application Note.

5. 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. Damp heat:
(cycle) 25 °C to 55 °C / 95% r.H. / 10 cycles
DIN IEC 68 - 2 – 30 Db
4. Resistance to
solder heat (reflow): max. 2 times reflow process;
for temperature conditions refer to the attached "Air reflow temperature conditions" on page 4;

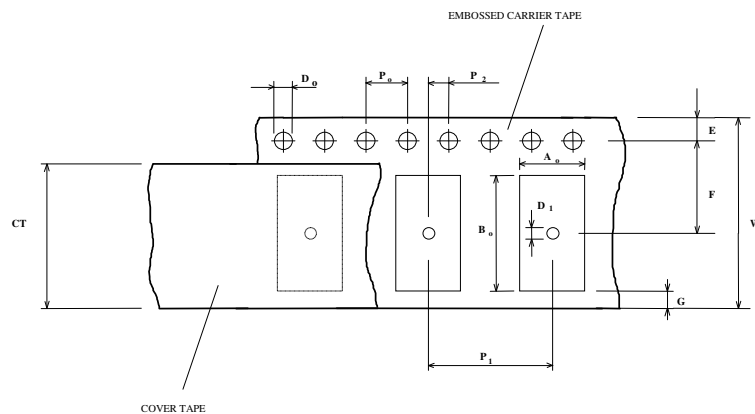
6. Packing

Tape & Reel: DIN 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;

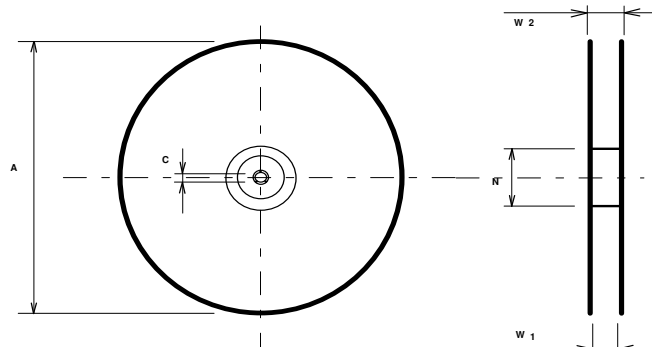
max. pieces of filters per reel: 1700
reel of empty components at start: min 300 mm
reel of empty components at start including leader: min 500 mm
Trailer min 300 mm

Tape (all dimensions in mm)

W	:	24 ± 0,3
Po	:	4 ± 0,1
Do	:	1,5 ± 0,1
E	:	1,75 ± 0,1
F	:	11,5 ± 0,1
G (min)	:	0,6
P2	:	2 ± 0,1
P1	:	12 ± 0,1
D1 (min)	:	1,5
Ao	:	7,1 ± 0,2
Bo	:	13,9 ± 0,2
CT	:	21,5 ± 0,1

**Reel (all dimensions in mm):**

A	:	330
W1	:	24,4 +2
W2 (max)	:	30,4
N (min)	:	60
C	:	13 +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. The marking of the filters is able to read if the view is directed on the upper side of the carrier tape with the sprocket holes on the right side of the tape.

7. 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.	

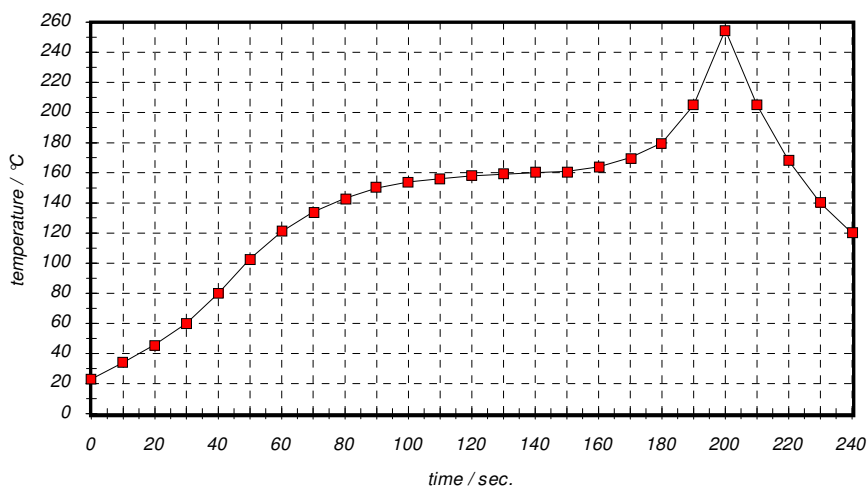
Chip-mount air reflow profile

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

VI TELEFILTER**Filter Specification****TFS 200 D****5/5****8. History :**

Version	Reason of Changes	Name	Date
1.0	Generate specification according to customer requirements.	Dunzow W.	10.05.1999
1.1	Add theoretical matching network scheme.	Dunzow W.	21.05.1999
1.2	Add typical values.	Dunzow W.	20.07.2000
1.3	Correct errors in matching network schemes.	Dunzow W.	09.07.2001

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