

VI TELEFILTER**Filter Specification****TFS 133****1/5****1. Measurement condition :**

Ambient temperature T_A :	23	°C
Input power level:	0	dBm
Terminating impedances in f_C *) :	for input:	1656 Ω - 7,292 pF.
	for output:	2084 Ω - 6,964 pF.

2. Characteristics :

Remark: Reference level for the relative attenuation a_{rel} of the **TFS 133** 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 nominal frequency f_N is fixed to **133.0 MHz**. The centre frequency f_C is the arithmetic mean value of the upper and lower frequencies at the **20 dB** filter attenuation level relative to the insertion loss a_e . All specified parameters have to be reached in the operating temperature range (**OTR**) .

Data		typ. value	tolerance / limit
Insertion loss (Reference level) a_e		7,2...8,2 *)	dB
			max. 9 dB
Nominal frequency f_N		-	133 MHz
Centre frequency f_C in OTR		-	133±0,025 MHz
Centre frequency f_C at ambient temperature $T_A = 23$ °C		133,007	MHz
			133,007±0,018MHz
Amplitude ripple in $f_N \pm 80$ kHz (p-p):		-	max. 0,2 dB
Amplitude ripple in $f_N \pm 200$ kHz (p-p):		-	max. 0,4 dB
Bandwidth in OTR :			
0,2 dB - band width		350...400	kHz
			min. 0,16 MHz
0,4 dB - band width		500...580	kHz
			min. 0,40 MHz
20 dB - band width		2720	kHz
			max. 3,6 MHz
Relative attenuation a_{rel}			
f_N $f_N \pm 80$ kHz		0,1	dB
			max. 0,2 dB
$f_N \pm 80$ kHz $f_N \pm 200$ kHz		0,2	dB
			max. 0,4 dB
$f_N \pm 1,8$ MHz $f_N \pm 6$ MHz		35	dB
			min. 20 dB
$f_N \pm 6$ MHz $f_N \pm 39$ MHz		45	dB
			min. 35 dB
$f_N - 132$ MHz $f_N - 39$ MHz		70	dB
			min. 20 dB
$f_N + 39$ MHz $f_N + 887$ MHz		70...50	dB
			min. 20 dB
Group delay (mean value) $f_N \pm 50$ kHz		0,78	μ s
			max. 1 μ s
Group delay ripple $f_N \pm 50$ kHz (p-p)		60	ns
			max. 1 μ s
Return loss with matching network (S11 / S22) in $f_N \pm 100$ kHz:		15	dB
			min. 10 dB
Input power level		-	max. 10 dBm
Frequency inversion temperature (T_o) :		37 °	C
Temperature coefficient of frequency (T_c) :		- 0,036	ppm/K ²
Frequency deviation of f_C over temperature: **)		$\Delta f_C(\text{Hz}) = T_c(\text{ppm/K}) \times (T - T_o)^2 \times f_o (\text{MHz})$	
Operating temperature range (OTR) :		- 5 °C ... + 80 °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.

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

Generated:**Wadim Duzow****Checked/Approved:**

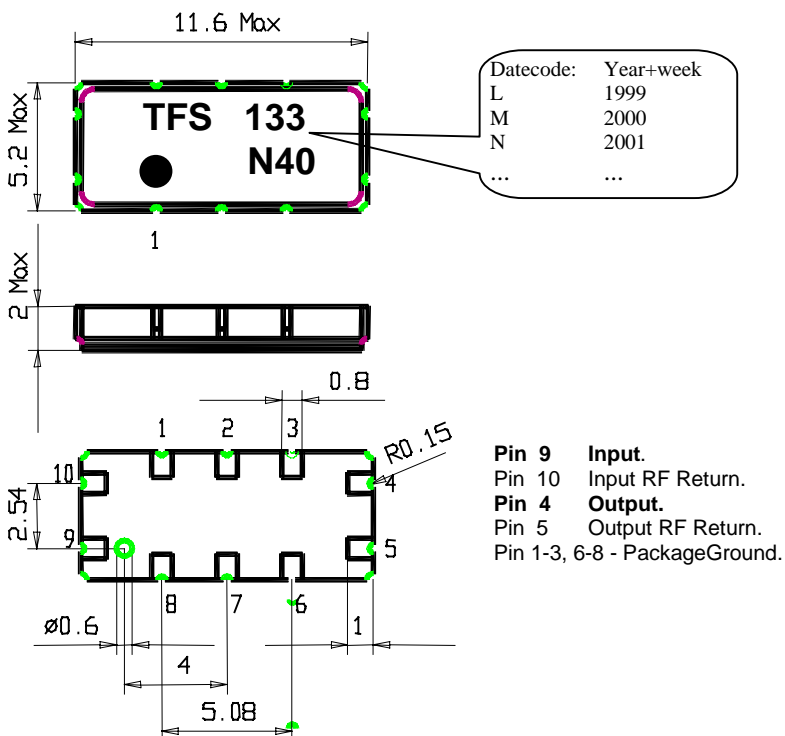
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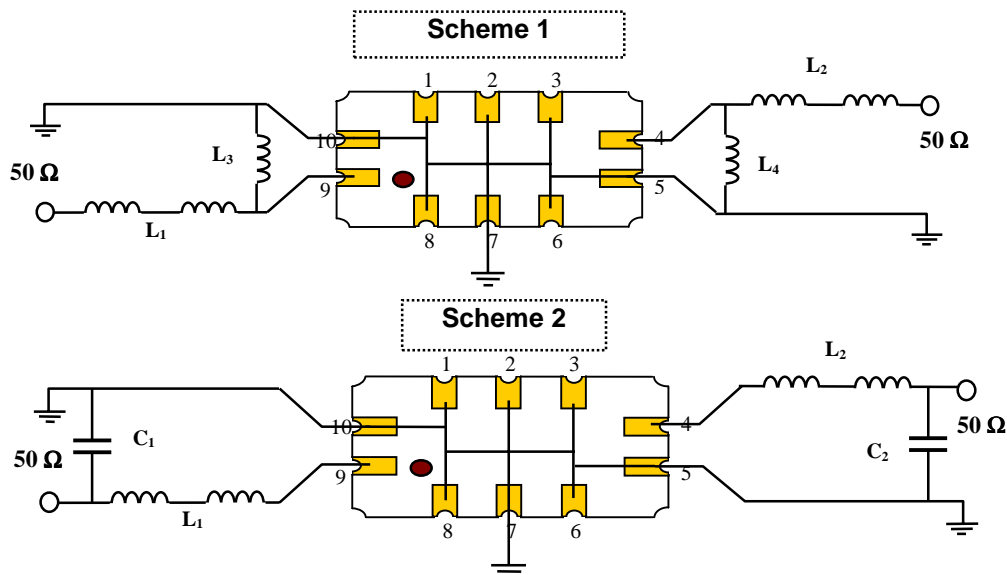
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3. Construction and Pin Connection

(All dimensions in mm)



4. 50 Ω matching network (about matching element values see Application Note.) :



For final test we use scheme 1.

5. Stability characteristics :

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

- Shock: 500g, 18 ms, half sine wave, 3 shocks each plane;
DIN IEC 68 T2 - 27
- 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
- Change of temperature: -55 °C to 125°C / 30 min. each / 10 cycles
DIN IEC 68 part 2 – 14 Test N
- Resistance to solder heat (reflow): max. 2 times reflow process;
for temperature conditions refer to the attached "Air reflow temperature conditions" on page 4;

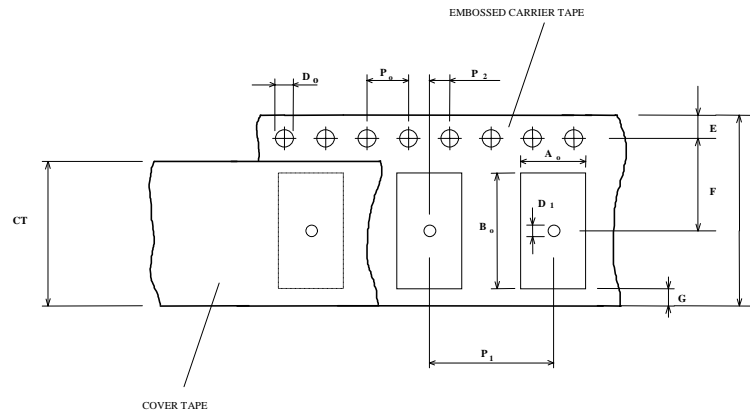
6. Packing :

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;

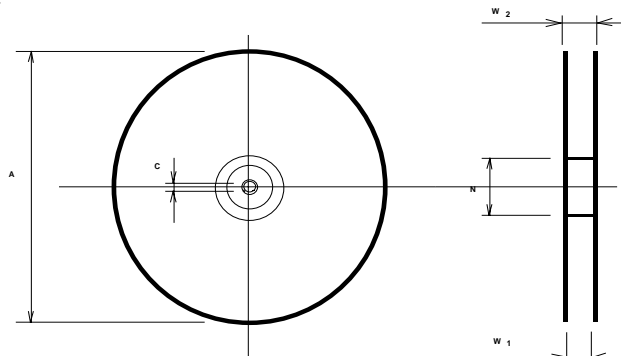
max. pieces of filters per reel:	3000
reel of empty components at start:	min 300 mm
reel of empty components at start including leader:	min 500 mm
trailer	min 300 mm

Tape (all dimensions in mm)

W	:	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	:	8 ± 0,1
D1 (min)	:	1,5
Ao	:	5,6 ± 0,1
Bo	:	11,8 ± 0,1
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 +0,5/-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.

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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.	

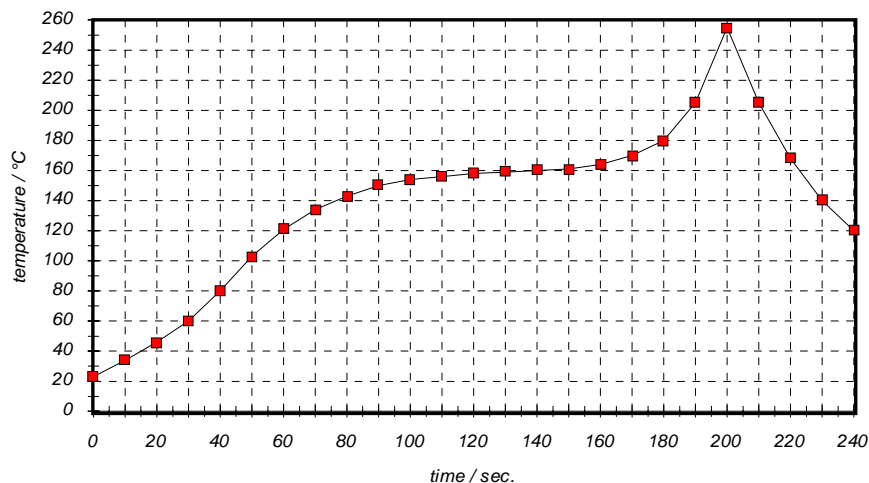
Chip-mount air reflow profile

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

8. History :

Version	Reason of Changes	Name	Date
1.0	Generation of specification according to customer requirements.	M. Senior	18.05.2001
1.1	Add maximum value for insertion loss of 9 dB. Correct tape and reel information.	Dr. Wall	01.06.2001
1.2	Change package. Add possible configuration of matching networks. Change definition of centre frequency : from 3 dB to 20 dB (see : 2. "Characteristics - Remark ")	Dunzow W.	21.06.2001
1.3	Add requirement for ILo in OTR. Correct OTR according to customer requirements. Correct frequency range for return loss .	Dunzow W.	09.07.2001
1.4	- add typical values of filter and termination impedances; - change name of specification : from "Preliminary specification" to "Filter specification".	Dunzow W.	10.10.2001

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