1. Measurement condition :

Ambient temperature T_A:	25 °C	
Input power level:	0 dBm.	
Terminating impedances at f_C *) :	for input:	390 Ω ‖ -13.6 pF.
	for output:	375 Ω ‖ 16.4 pF.

2. Characteristics :

Remark:
The reference level for the relative attenuation a_{rel} of **TFS 133B** is the minimum of the pass band attenuation a_{min}. This minimum is defined as the insertion loss a_e. The nominal frequency f_N is fixed at **133 MHz** without any tolerance. . 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. 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**		**limit / tolerance**		
Insertion loss (reference level)	$a_e = a_{min}$	4,6	dB	max.	7 ***)	dB
Nominal frequency	f_N				133	MHz
Centre frequency f_C at ambient temperature T_A = 23 °C		133	MHz			
Pass band	**PB**			f_N ±	0,2	MHz
Amplitude ripple within PB (p-p)		0,2	dB	max.	0,4	dB
Relative attenuation	a_{rel}					
f_N ... f_N ± 0,2	MHz	0,2	dB	max.	0,4	dB
f_N ± 1,8 MHz ... f_N ± 6	MHz	24	dB	min.	20	dB
f_N ± 6 MHz ... f_N ± 39	MHz	39	dB	min.	35	dB
f_N - 132 MHz ... f_N - 39	MHz	45	dB	min.	20	dB
f_N + 39 MHz ... f_N + 887	MHz	45	dB	min.	20	dB
Return loss		20	dB	min.	10	dB
Group delay mean value	within f_N + 50 kHz	0,5	µs	max.	1	µs
Group delay variation	within f_N + 50 kHz	50	ns	max.	100	ns
Input power lewel				max.	10	dBm
Temperature coefficient of frequency TC_f **)		- 20	ppm / K			
Operating temperature range				- 5 ... + 80		°C
Storage temperature range				-40 ... + 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.
**) $\Delta f(Hz) = TC_f(ppm/K) \times (T-T_0) \times f_{TA}(MHz)$
***) matching components: for inductance, a Q-value of about 30 is to use

Generated: _____

Checked / approved: _____

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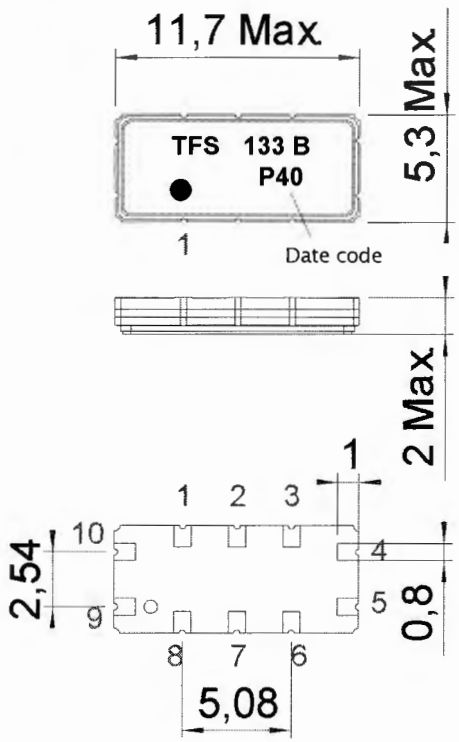
3. Construction and pin connection :

(All dimensions in mm)

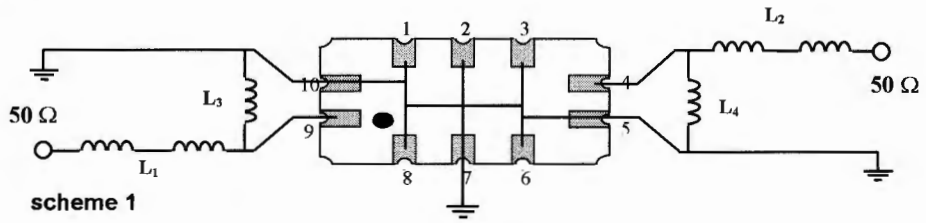


Date code: Year+week

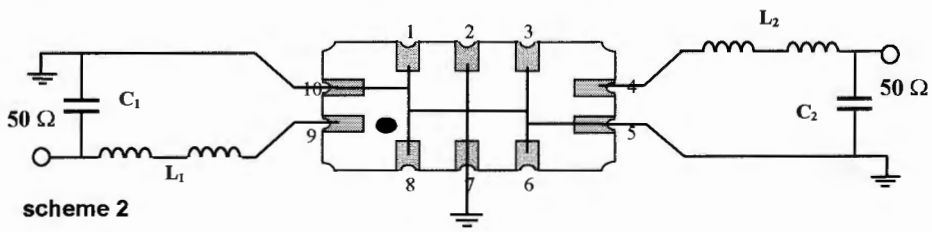
M	2000
N	2001
P	2002
....	....

Pin 9 Input.
Pin 10 Input RF Return.
Pin 4 Output.
Pin 5 Output RF Return.
Pin 1-3, 6-8 - PackageGround.

4. 50 Ω matching network:



scheme 1



scheme 2

For final test we use scheme 2.

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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. 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;

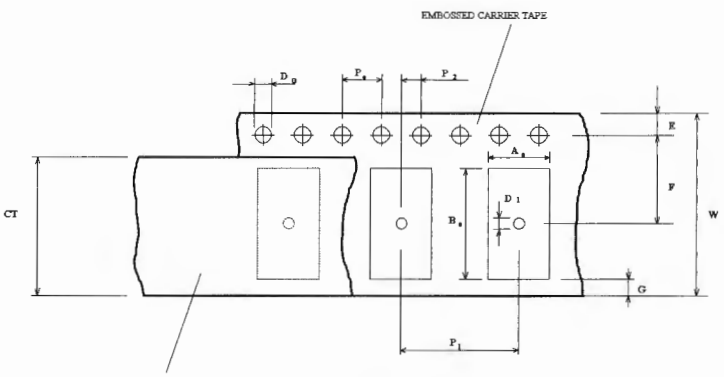
6. Packing :

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

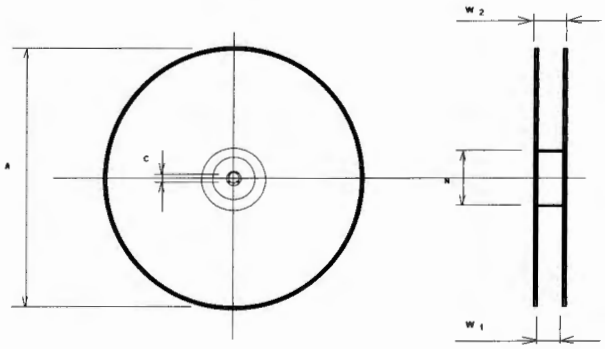
Tape (all dimensions in mm)

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. Markings on the filters can be read if the upper side of the carrier tape is regarded with the sprocket holes on its right.

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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

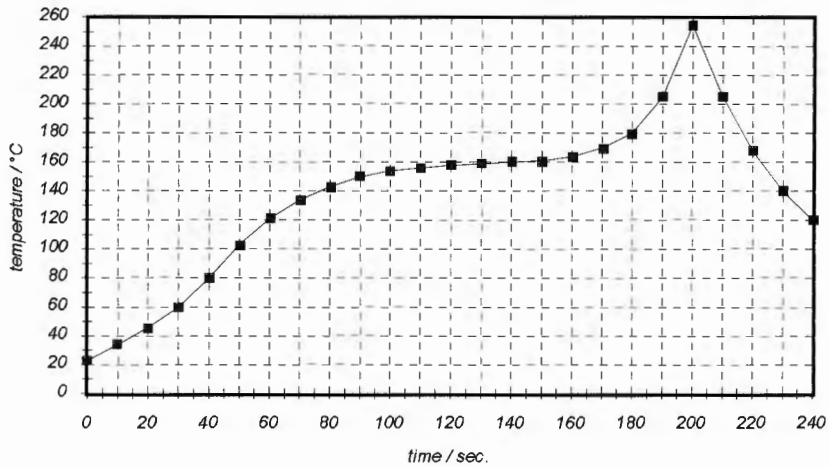

Table for temperature vs. time during the air reflow process

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

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