

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

Ambient temperature T_A : 25 °C
 Input power level: 0 dBm.
 Terminating impedances at f_C *) : for input: t.b.m. Ω | t.b.m. pF.
 for output: t.b.m. Ω | t.b.m. pF.

2. Characteristics :

Remark: The reference level for the relative attenuation a_{rel} of **TFS 133A** 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)	$a_e = a_{min}$	5...6	dB (***)	max.	7 (***) dB
Nominal frequency	f_N	-		133	MHz
Centre frequency at $T_A = 23^\circ\text{C}$:	f_{CTA}	133,04	MHz		
Centre frequency at $T_A = 37^\circ\text{C}$:	f_C	133,00	MHz		
Pass band	PB	-		$f_N \pm 0,2$	MHz
Amplitude ripple within PB (p-p)		0,2	dB	max.	0,4 dB
Bandwidth at ambient temperature $T_A = 23^\circ\text{C}$:					
0,4	dB	850...950	kHz	min.	630 kHz
1	dB	1220...1290	kHz		
3	dB	1810...1840	kHz		
5	dB	2190	kHz		
10	dB	2680	kHz		
20	dB	3250	kHz	max.	3370 kHz
Relative attenuation a_{rel}					
f_N	$f_N \pm 0,2$	MHz	-	max.	0,4 dB
$f_N \pm 1,8$	$f_N \pm 6$	MHz	24...28	min.	20 dB
$f_N \pm 6$	$f_N \pm 39$	MHz	37...45	min.	35 dB
$f_N - 132$	$f_N - 39$	MHz	60	min.	20 dB
$f_N + 39$	$f_N + 887$	MHz	60...70	min.	20 dB
Return loss in PB :	S_{11} / S_{22}	12...15	dB	min.	10 dB
Group delay mean value	within $f_N \pm 50$	kHz	0,630	max.	1 μs
Group delay variation	within $f_N \pm 50$	kHz	20	max.	100 ns
Input power level			-	max.	10 dBm
Temperature coefficient of frequency TC_f (**)			- 20		ppm / K
Operating temperature range			-	- 5 ... + 80	$^\circ\text{C}$
Storage temperature range			-	-40 ... + 85	$^\circ\text{C}$

*) 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.

**) $\Delta f(\text{Hz}) = TC_f(\text{ppm/K}) \times (T - T_0) \times f_{TA}(\text{MHz})$

***) matching components: for inductance, a Q-value of about 30 is to use

generated: Dunzow W.

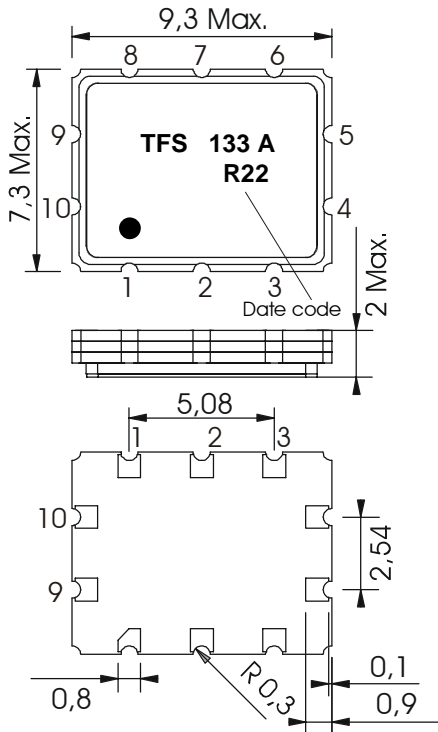
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3. Construction and pin connection :

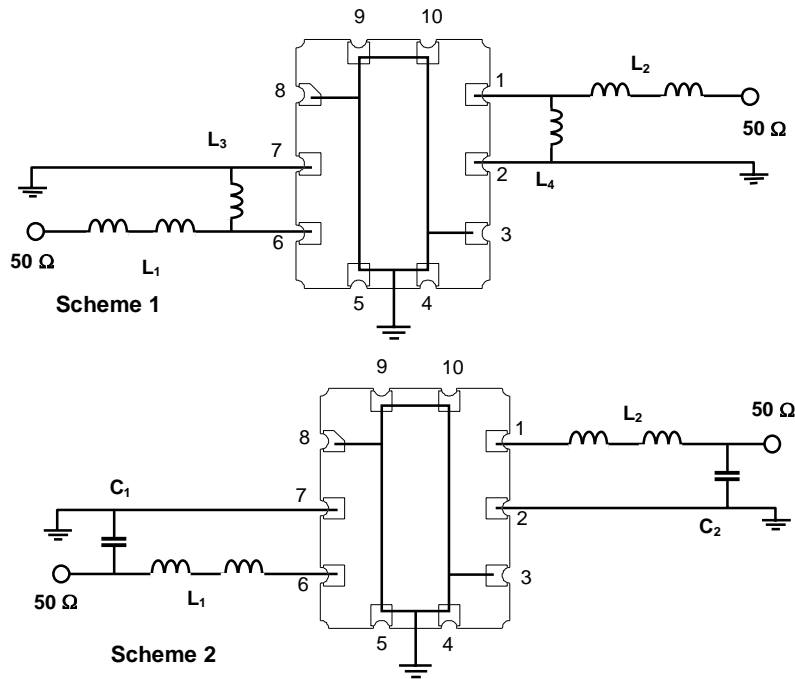
(All dimensions in mm)



Date code: Year+week
 N 2001
 P 2002
 R 2003

Pin 6 Input.
Pin 7 Input RF Return.
Pin 1 Output.
Pin 2 Output RF Return.
Pin 3-5, 8-10 Package Ground.

4. 50 Ω matching network (details refer to application note) :



For final test we use scheme 1.

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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;

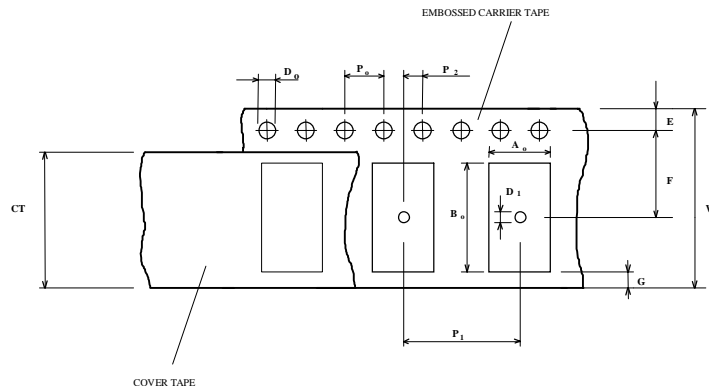
6. Packing :

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;

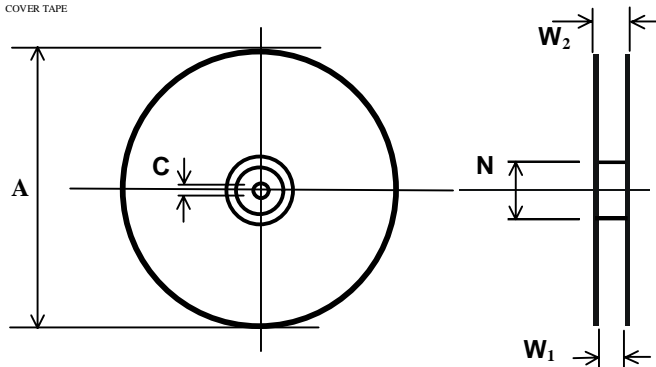
max. pieces of filters per reel:	2000
reel of empty components at start:	min 300 mm
reel of empty components at start including leader:	min 500 mm
trailer	min 300 mm

Tape (all dimensions in mm)

W	: 16	± 0,3
Po	: 4	± 0,1
Do	: 1,5	+ 0,1
E	: 1,75	± 0,1
F	: 7,5	± 0,1
G (min)	: 0,6	
P2	: 2	± 0,1
P1	: 12	± 0,1
D1(min)	: 1,5	
Ao	: 7,6	± 0,1
Bo	: 9,6	± 0,1
CT	: 13,5	± 0,1

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

A	: 330
W1	: 16,4 + 2
W2(max)	: 22,4
N(min)	: 60
C	: 12,8 ± 0,1



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

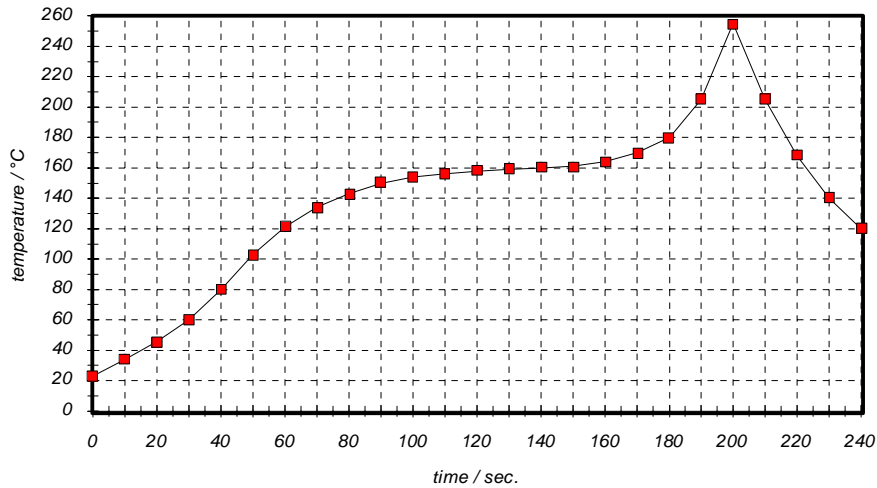


Table for temperature vs. time during the air reflow process

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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8. History :

Version	Reason of Changes	Name	Date
1.0	- generation of specification according to customer requirements.	Dunzow W.	20.09.2002
1.1	- generate filter specification ; - add typical values of filter after 2 nd iteration .	Dunzow W.	28.01.2003
1.2	- change package according to customer requirements.	Dunzow W.	06.03.2003