

Microchip	Filter specification	TFS 150N	1/5
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1. Measurement condition

Ambient temperature T_A :	23 °C
Input power level:	0 dBm.
Terminating impedances at f_C *) :	for input: 280 Ω - 22,7 pF.
	for output: 210 Ω - 27,0 pF.

2. Characteristics

Remark: Reference level for the relative attenuation a_{rel} of the **TFS 150N** 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 reference 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 temperature coefficient of frequency T_{Cf} is valid both for the reference frequency f_C and the frequency response of the filter in the operating temperature range. The frequency shift of the filter in the operating temperature range is not included in the production tolerance scheme.

D a t a	typ. value	tolerance / limit
Insertion loss (reference level) $a_e = a_{min}$	24,7 dB	max. 25 dB
Centre frequency at ambient temperature T_A f_C	150,01 MHz	150,0 $\pm$ 0,1 MHz
Pass band PB	4,50 MHz	$f_C \dots f_C \pm 2,05$ MHz
Pass band ripple (p-p) :	0,5 dB	max. 1 dB
Bandwidth at ambient temperature T_A		
1 dB	4,62 MHz	min. 4,1 MHz
3 dB	4,77 MHz	min. 4,6 MHz
25 dB	5,22 MHz	max. 5,3 MHz
40 dB	5,33 MHz	max. 6,0 MHz
45 dB	5,36 MHz	max. 6,4 MHz
Relative attenuation a_{rel}		
$f_C \dots f_C \pm 2,05$ MHz	-	max. 1 dB
$f_C \pm 2,05$ MHz $\dots f_C \pm 2,30$ MHz	-	max. 3 dB
$f_C \pm 2,65$ MHz $\dots f_C \pm 3,0$ MHz	-	min. 25 dB
$f_C \pm 3,0$ MHz $\dots f_C \pm 3,2$ MHz	46 dB	min. 40 dB
$f_C \pm 3,2$ MHz $\dots f_C \pm 100$ MHz	50...70 dB	min. 45 dB
Group delay (mean value in PB)	3,92 μ s	max. 4,5 μ s
Group delay ripple in PB:	100 ns	max. 120 ns
Deviation from linear phase in PB (p-p):	2,7 degree	-
Input VSWR (S11) in PB :	15 dB	-
Output VSWR (S22) in PB :	15 dB	-
Triple transit attenuation compared to main signal Crosstalk	50 dB	-
	60...70 dB	-
Input power level		max. 20 dBm
Frequency inversion temperature (T_o)	20 °C	-
Temperature coefficient of frequency (T_{Cf})	- 0,036 ppm/K ²	-
Frequency deviation of f_C over temperature: **)	$\Delta f_C(\text{Hz}) = T_{Cf}(\text{ppm/K}) \times (T - T_o)^2 \times f_o(\text{MHz})$	
Operating temperature range (OTR)	-	- 33 °C ... + 85 °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.

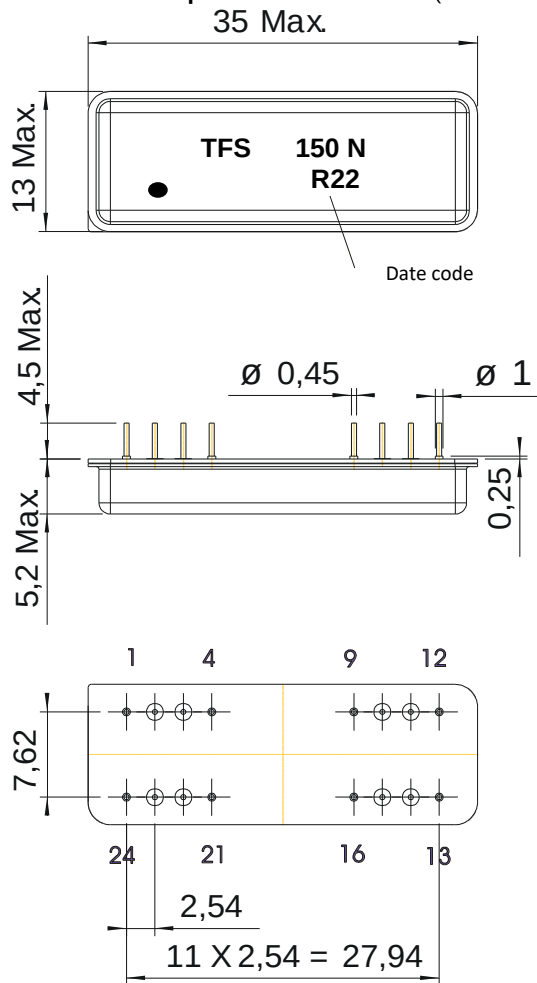
**) $f_o = f_{T_o}$ is reference frequency f_C at frequency inversion temperature (T_o)

generated: W. Dunzow

checked / approved: Dr. Bert Wall

Microchip Frequency Technology GmbH
Potsdamer Straße 18
D 14 513 TELTOW / Germany
Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30

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3 Construction and pin connection : (All dimensions in mm)

Date code: Year + week

N	2001
P	2002
R	2003
....	

Pin 2 Input.

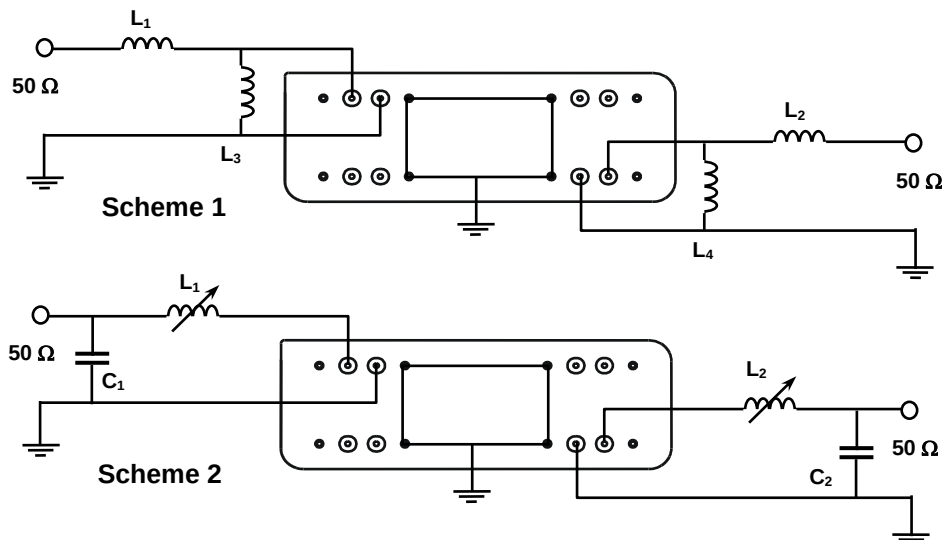
Pin 3 Input RF return.

Pin 14 Output.

Pin 15 Output RF return.

Pin 1, 4, 9, 12, 13, 16, 21, 24 –
- Package ground.

Pin 10, 11, 22, 23 not connected.

4. 50 Ω matching network (for 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. Air reflow temperature conditions :

1st and 2nd air reflow profile

Name:	<u>pre-heating periods</u>	<u>main-heating periods</u>	<u>peak temperature</u>
Temperature:	150 °C - 170 °C	over 200 °C	255 °C ± 5 °C
Time:	60 sec. - 90 sec.	20 sec. - 25 sec.	

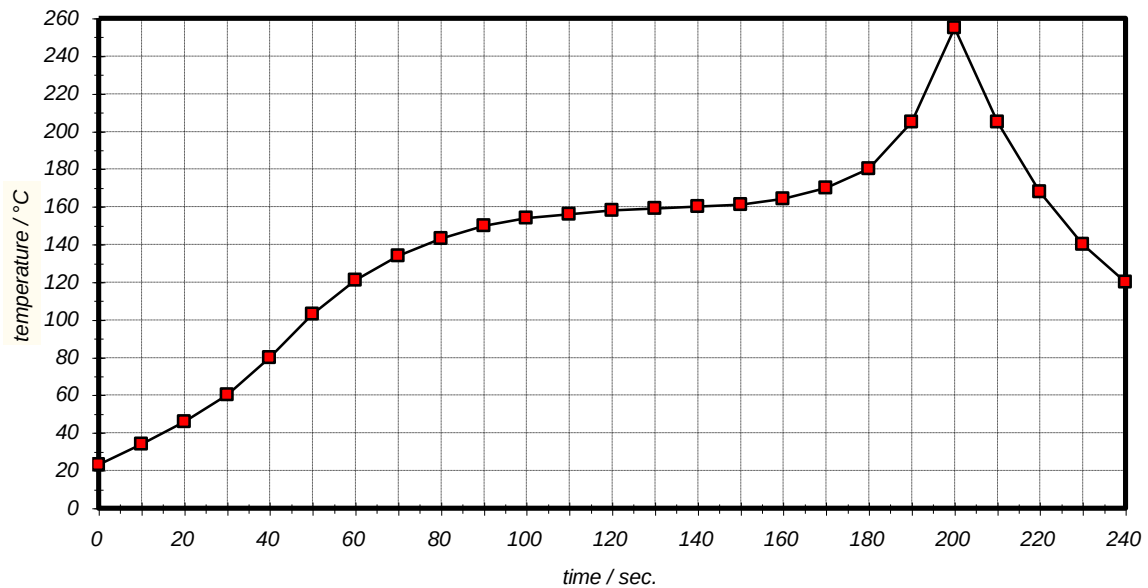
Air reflow profile

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

7. History :

Version	Reason of changes	Name	Date
1.0	- generate development specification according to customer requirements	Pfeiffer W.	02.08.2002
2.0	- incorporate 25dB bandwidth spec. - change to 35 * 13 metal package.	M. Senior	14.10.2002
2.1	- change pin connection.	W. Dunzow	29.11.2002
3.1	- generate preliminary specification ; - add typical values of filter after 1 st iteration .	W. Dunzow	07.01.2003
3.2	- generate filter specification ; - change insertion loss : from max. 24 dB to max. 25 dB. - add input power level : max. 20 dBm.	W. Dunzow	13.01.2003