

VI TELEFILTER**Filter specification****TFS 149****1 / 5****1. Measurement condition :**

Ambient temperature T_A :	23 °C		
Input power level:	0 dBm		
Terminating impedances in f_C *) :	for input:	50 Ω - 20,75 pF.	(typical value)
	for output:	50 Ω - 20,75 pF.	(typical value)

2. Characteristics

Remark: Reference level for the relative attenuation a_{rel} of the **TFS149** 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 (f_{3dB+}) and lower (f_{3dB-}) 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	20 dB	max. 23 dB
Centre frequency at ambient temperature	f_C	149,05 MHz	149,05 \pm 0,1 MHz
Pass band in OTR :	PB		($BW_3 - 0,30$) MHz
Amplitude ripple in PB (p-p)		0,8 dB	max. 1,2 dB
Bandwidth at ambient temperature T_A :	BW		
1,2 dB		22,26 MHz	
3 dB		22,50 MHz	22,50 \pm 0,050 MHz
3 dB (BW_3) in OTR :			22,50 \pm 0,160 MHz
20 dB		23,24 MHz	
32 dB		23,46 MHz	
42 dB		23,80 MHz	
Relative attenuation in OTR :	a_{rel}		
$f_{3dB+} + 0,15$ MHz ... $f_{3dB+} - 0,15$ MHz		0,8 dB	max. 1,2dB
$f_{3dB+} + 0,4$ MHz ... $f_{3dB+} + 0,6$ MHz		22 dB	min. 20 dB
$f_{3dB-} - 0,6$ MHz ... $f_{3dB-} - 0,4$ MHz		22 dB	min. 20 dB
$f_{3dB+} + 0,6$ MHz ... $f_{3dB+} + 1,0$ MHz		42 dB	min. 32 dB
$f_{3dB-} - 1,0$ MHz ... $f_{3dB-} - 0,6$ MHz		37 dB	min. 32 dB
$f_{3dB+} + 1$ MHz ... $f_{3dB+} + 5$ MHz		50 dB	min. 42 dB
$f_{3dB-} - 5$ MHz ... $f_{3dB-} - 1$ MHz		50 dB	min. 42 dB
$f_{3dB+} + 5$ MHz ... $f_{3dB+} + 25$ MHz		52 dB	min. 49 dB
$f_{3dB-} - 25$ MHz ... $f_{3dB-} - 5$ MHz		52 dB	min. 49 dB
$f_{3dB+} + 25$ MHz ... $f_{3dB+} + 35$ MHz		48 dB	min. 47 dB
$f_{3dB-} - 35$ MHz ... $f_{3dB-} - 25$ MHz		49 dB	min. 47 dB
$f_{3dB-} - 100$ MHz ... $f_{3dB-} - 35$ MHz		80...55 dB	min. 52 dB
$f_{3dB+} + 35$ MHz ... $f_{3dB+} + 100$ MHz		55...65 dB	min. 52 dB
Group delay (mean value in PB)		2,19 μ s	max. 3 μ s
Group delay ripple (p-p) in ($BW_3 - 0,24$)		85 ns	max. 150 ns
Deviation from linear phase in PB		(12° p-p) / (2° r.m.s.)	
Input/Output return loss with matching network (S11/S22)		6 / 6 dB	
Triple transit attenuation compared to main signal		46 dB	
Crosstalk attenuation compared to main signal		65 dB	
Temperature coefficient of frequency (T_{Cf})		- 87ppm/K	-94 ppm/K
Frequency deviation of f_C over temperature		$\Delta f_C(\text{Hz}) = T_{Cf}(\text{ppm/K}) \times (T - T_A) \times f_{CTA}(\text{MHz})$	
Operating temperature range (OTR)		- 25 °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.

Generated: Dunzow W.

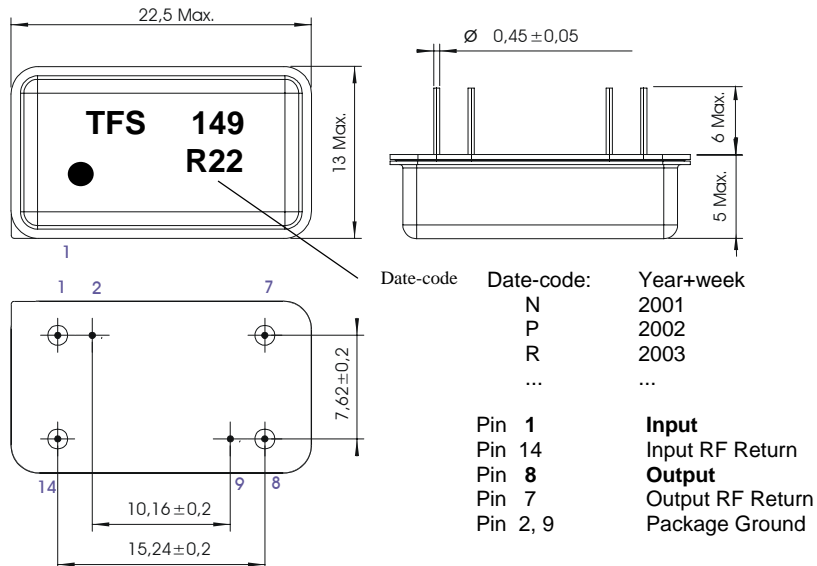
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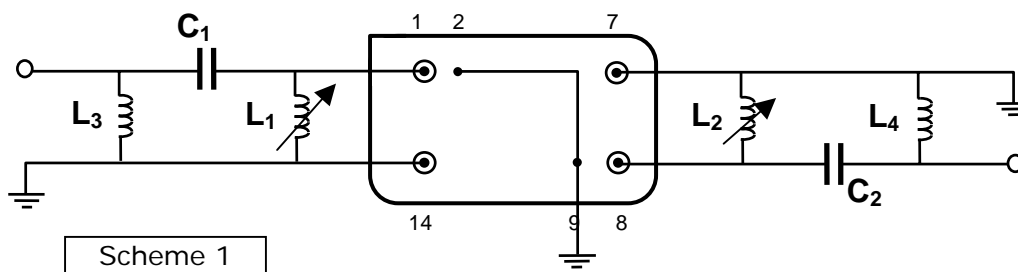
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3. Construction and pin connection

(All dimensions in mm)



4. 50 Ω matching network (for details about other schemes refer to application note):



For final test we use scheme 1 (with variable coils L_1 and L_2 .)

Influence of inductors L_1 and L_2 on filter slope is stronger , as of L_3 and L_4 (please, refer to Application Note).

For this reason, it is possible to match the filter to minimum slope changing L_3 and L_4 using fixed E12 series inductor values (SMD-elements) and no changing L_1 and L_2 .

If you use variable coils, then better to use scheme 1 with variable coils L_1 and L_2 ,

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:	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.	

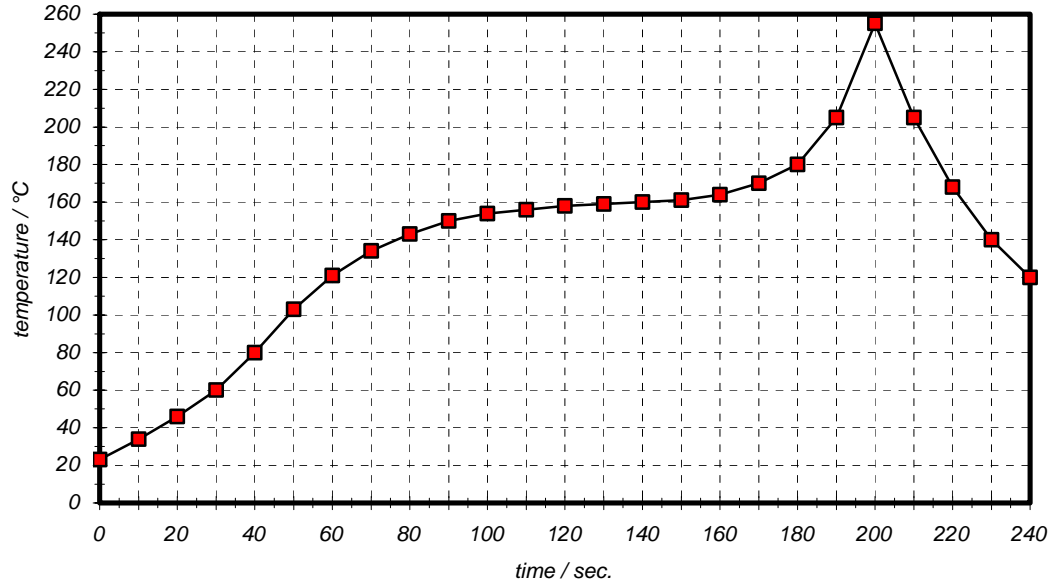
Air reflow profile

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 preliminary development specification	Dunzow W.	05.03.2001
1.1	<ul style="list-style-type: none">- add measured termination impedances.- define configurations of matching networks.- change centre freq. from 149 MHz to 149,05 MHz.- change package from DIP18 to DIP14.- change limit lines in stop band.- add "Stability characteristics".- change 3 dB bandwidth from 22,55 MHz to 22,5 MHz.	Dunzow W.	18.06.2001
1.2	<ul style="list-style-type: none">- add typical values of band widths at ambient temperature.;- write new limit lines.	Dunzow W.	19.07.2001
1.3	<ul style="list-style-type: none">- correct package drawing.	Dunzow W.	27.02.2003