

VI TELEFILTER**Filter specification****TFS 140****1/4****1. Measurement condition :**

Ambient temperature T_A : 23 °C
 Input power level: 0 dBm.
 Terminating impedances in f_c *) : for input: 1177 Ω || - 6,17 pF. (typical value)
 for output: 1330 Ω || - 5,33 pF.

2. Characteristics :

Remark: Reference level for the relative attenuation a_{rel} of the **TFS 140** 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_c 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

Data	typ. value	tolerance / limit		
Insertion loss (Reference level) a_e	22,5 dB	max.	24	dB
Centre frequency f_c at ambient temperature T_A (f_{CAT})	140,01 MHz		140,00 $\pm$ 0,10	MHz
Pass band at ambient temperature T_A : PB			$f_c - 3,0$ MHz ... $f_c + 3,0$ MHz	
Amplitude ripple (p-p): $f_c - 2,6$ MHz ... $f_c + 2,6$ MHz $f_c \pm 2,6$ MHz ... $f_c \pm 2,8$ MHz	0,5 dB	max.	1	dB
	0,7 dB	max.	1	dB
Bandwidth at ambient temperature T_A :				
1 dB	5,76 MHz	min.	5,6	MHz
3 dB	6,24 MHz	min.	6,0	MHz
3 dB	6,24 MHz	max.	6,4	MHz
20 dB	6,30 MHz			
40 dB	7,95 MHz	max.	8,2	MHz
45 dB	8...8,6 MHz	max.	9,0	MHz
Relative attenuation a_{rel}				
$f_c \pm 2,6$ MHz ... $f_c \pm 2,8$ MHz	-	max.	1	dB
$f_c \pm 2,8$ MHz ... $f_c \pm 3,0$ MHz		max.	3	dB
$f_c \pm 3,2$ MHz ... $f_c \pm 4,1$ MHz		min.	3	dB
$f_c \pm 4,1$ MHz ... $f_c \pm 4,5$ MHz	45 dB	min.	40	dB
$f_c \pm 4,5$ MHz ... $f_c \pm 12$ MHz	48...53 dB	min.	45	dB
$f_c - 65$ MHz ... $f_c - 12$ MHz	75...55 dB	min.	50	dB
$f_c + 12$ MHz ... $f_c + 75$ MHz	55...75 dB	min.	50	dB
$f_c + 75$ MHz ... $f_c + 130$ MHz	48...50 dB	min.	47	dB
$f_c + 130$ MHz ... $f_c + 460$ MHz	70 dB			
Group delay (mean value in PB):	1,84 μ s	max.	2,0	μ s
Group delay ripple in PB (p-p):	50...60 ns	max.	80	ns
Deviation from linear phase in PB band (p-p):	4..4,5 ° (r.m.s. 1,3°)			
VSWR (S11) / (S22) in PB :	(2 : 1) / (2 : 1)			
Triple transit attenuation compared to main signal	49 dB			
Crosstalk	55...60 dB			
Frequency inversion temperature (T_o)	25° C			
Temperature coefficient of frequency (T_{cf})	-0,045 ppm/K ²			
Frequency deviation of f_c over temperature: *)	$\Delta f_c(\text{Hz}) = T_{cf}(\text{ppm/K}) \times (T - T_o)^2 \times f_{T_o}(\text{MHz})$			
Operating temperature range			- 25 °C ... + 80 °C	
Storage temperature range			- 40 °C ... + 85 °C	
Input power		max.	20	dBm

*) 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_{T_o} is reference frequency f_c at frequency inversion temperature (T_o)

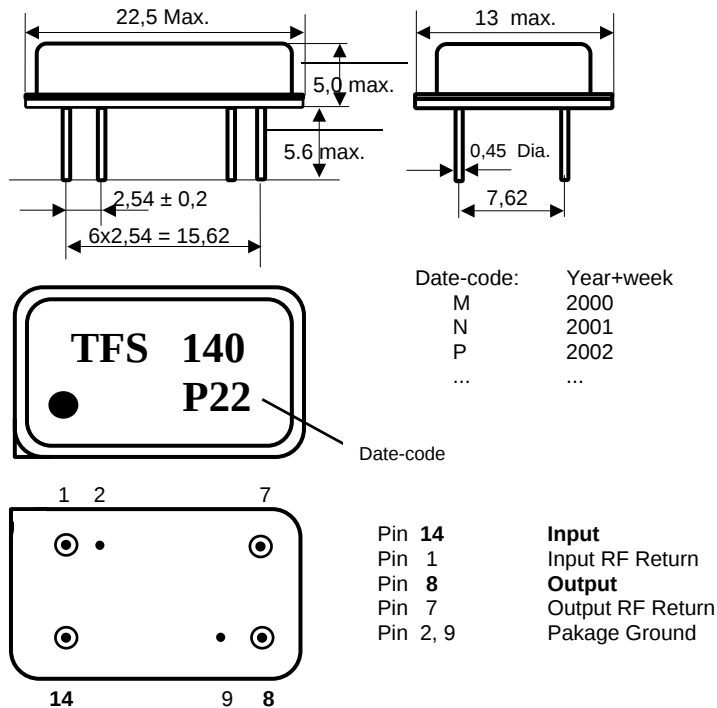
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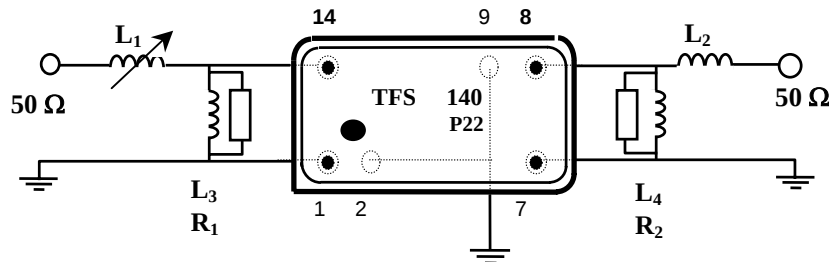
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3. Construction and pin connection : (all dimensions in mm)



4. 50 Ω matching network (please refer to the application note for further details) :



$$R_1 = R_2 = 6,2 \text{ k}\Omega .$$

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, please 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.	

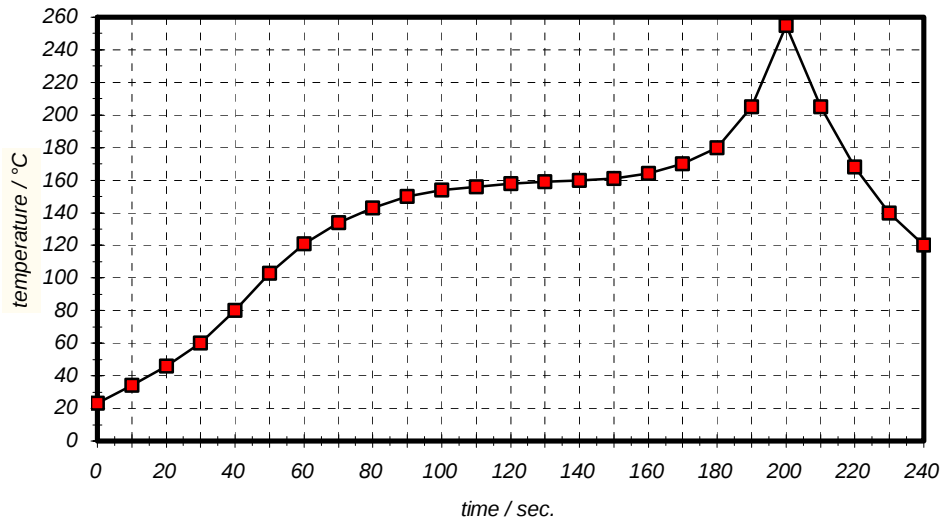
Air reflow profile

Table for temperature vs. time during the air reflow process

Tolerance of temperatures: ± 5 °C

<u>time / sec.</u>	<u>temperature / °C</u>	<u>time / sec.</u>	<u>temperature / °C</u>
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 .	Dunzow W.	20.04.1997
2.0	Generate Preliminary Specification of TFS 140.	Dunzow W.	21.09.1998.
2.1	Generate Filter Specification of TFS 140 : - edit termination impedance values and matching configuration - change matching networks ; - change limit values of ILo: from max.23 dB to max.24 dB .	Dunzow W.	11.09.2000.
2.2	Correct termination impedances .	Dunzow W.	20.11.2000
2.3	add input power : max. 20dBm.	Dunzow W.	05.03.2002.