

VI TELEFILTER**Filter specification****TFH 70E****1/5****1. Measurement condition :**

Ambient temperature T_A : 23 °C
 Input power level: 0 dBm.
 Terminating impedances at f_C *): for input: 1287 Ω | - 6,97 pF.
 for output: 1227 Ω | - 7,18 pF.

2. Characteristics :

Remark: Reference level for the relative attenuation a_{rel} of the **TFH 70E** 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 nominal frequency f_N is fixed at **70,00 MHz** without tolerance. 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 included in the production tolerance scheme.

D a t a	typ. value		tolerance / limit		
Insertion loss (Reference level)	a_e	25 dB		max.	27 dB
Nominal frequency	f_N				70 MHz
Centre frequency at ambient temperature T_A : f_C		70,01 MHz			$70,0 \pm 0,09$ MHz
Pass band at ambient temperature T_A :	PB				$f_N \dots f_N \pm 1,5$ MHz
Amplitude ripple in O.T.R. (p-p) in :	$f_N \dots f_N \pm 1,4$ MHz	0,5 dB		max.	0,8 dB
Bandwidth in O.T.R. :					
0,8 dB		3,19 MHz		min.	2,8 MHz
1 dB		3,22 MHz		min.	3,0 MHz
3 dB		3,61 MHz		min.	3,5 MHz
20 dB		4,66 MHz			
40 dB		5,21 MHz		max.	5,6 MHz
45 dB		5,31 MHz			
Relative attenuation	a_{rel}				
	$f_N \dots f_N \pm 1,4$ MHz	0,5 dB		max.	0,8 dB
	$f_N \pm 1,4$ MHz ... $f_N \pm 1,5$ MHz	0,7 dB		max.	1 dB
	$f_N \pm 1,5$ MHz ... $f_N \pm 1,75$ MHz	2,5 dB		max.	3 dB
	$f_N \pm 2,8$ MHz ... $f_N \pm 5,0$ MHz	44...53 dB		min.	40 dB
	$f_N \pm 5,0$ MHz ... $f_N \pm 20$ MHz	53...65 dB		min.	50 dB
	$f_N - 65$ MHz ... $f_N - 20$ MHz	75...65 dB			-
	$f_N + 35$ MHz ... $f_N + 63$ MHz	42...45 dB			-
	$f_N + 63$ MHz ... $f_N + 200$ MHz	65...70 dB			-
Group delay (mean value in PB):		2,76 μ s			-
Group delay ripple in PB (p-p):		45 ns		max.	100 ns
Deviation from linear phase in PB band (p-p):		2,6° (r.m.s. 0,6°)		max.	6°
(S11) / (S22) in PB :		3 / 3 dB			-
Triple transit attenuation compared to main signal		59 dB			-
Crosstalk		52 dB			-
Frequency inversion temperature (T_o)		30 °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 (O.T.R.)		-			0 °C ... + 70 °C
Storage temperature range		-			-40 °C ... + 85 °C

*) The terminating impedances and insertion loss 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)

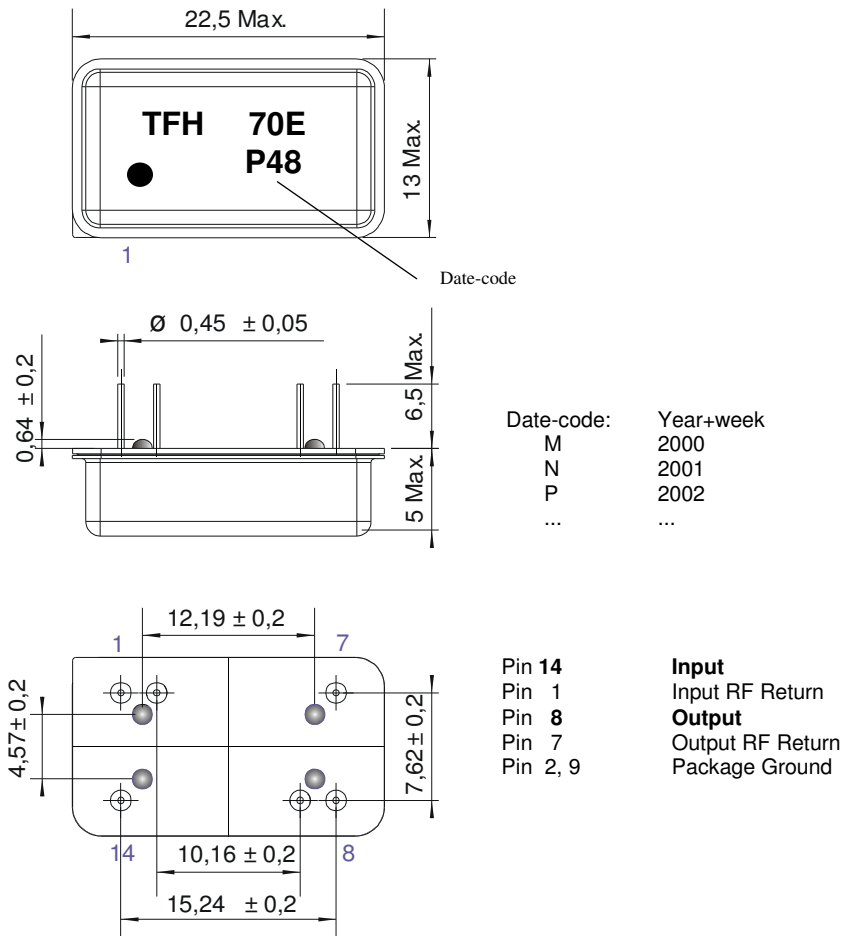
Generated: Dunzow W.

Checked / approved: Dr. Wall

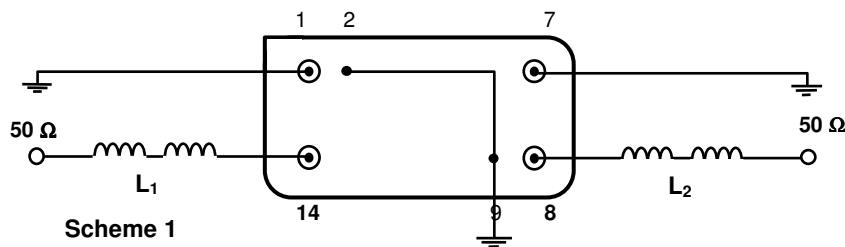
VI TELEFILTER**Potsdamer Straße 18****D 14 513 TELTOW / Germany****Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30****e-mail: tft@telefilter.com**

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3. Package and pin connection : (All dimensions in mm)



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



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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;

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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

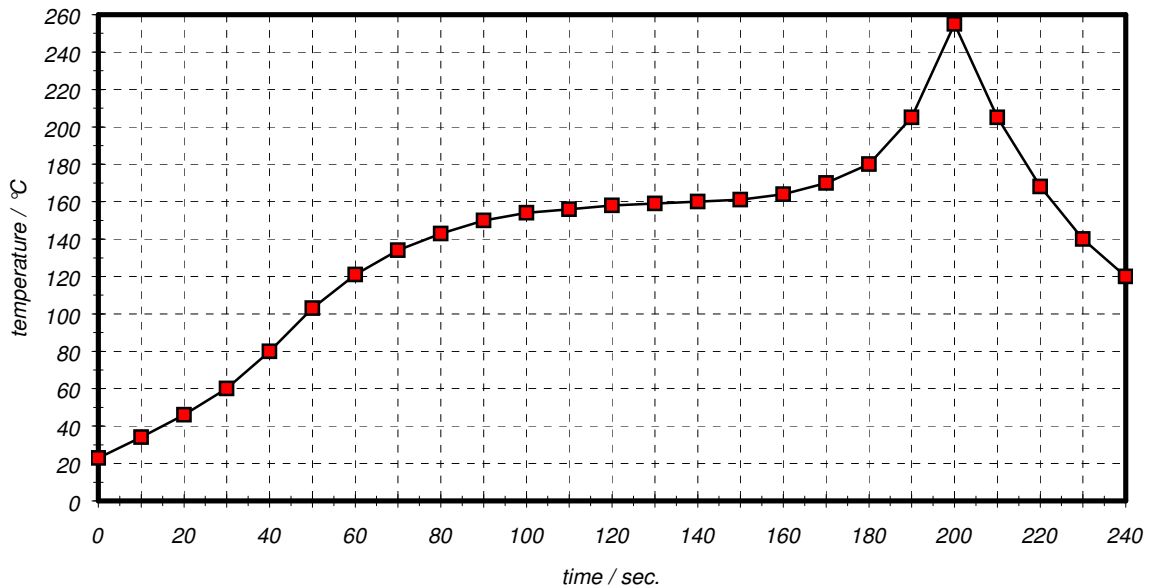


Table for temperature vs. time during the air reflow process

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

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7. History :

Version	Reason of changes	Name	Date
1.0	- generate Filter Specification of TFS 70V :	Dunzow W.	06.12.2000
1.1	- change name from TFS 70V to TFH70E .	Dunzow / Wall	08.03.2001
1.2	- correct definition of insertion loss. - correct typical filter data. - reduce max. pass band ripple from 1 db to 0,8 dB. - correct termination impedances .	Dunzow / Wall	09.03.2001
1.3	- change package drawing.	Dunzow W.	29.11.2001

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