1. Measurement condition

Ambient temperature T_A:	23 °C	
Input power level:	0 dBm.	
Terminating impedances at f_C *) :	for input:	953 Ω ‖ - 8,93 pF.
	for output:	1275 Ω ‖ - 7,32 pF.
Source impedance:	50 Ω	
Load impedance:	50 Ω	

2. Characteristics

Remark:
Reference level for the relative attenuation a_{rel} of the **TFS 70H28** 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 Tc_f 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		**typical values**	**tolerance / limit**
Insertion loss (Reference level)	a_e	< 25 dB	max. 26 dB
Centre frequency at ambient temperature T_A	f_c	70,01 MHz	70 ± 0,09 MHz
Pass band at ambient temperature T_A:	**PB**		f_C - 1,5 MHz ... f_C + 1,5 MHz
Amplitude ripple (p-p): f_C ..... f_C ± 1,20 MHz		0,35 dB	max. 0,8 dB
Bandwidth at ambient temperature**:**			
1 dB		2,75 MHz	min. 2,50 MHz
3 dB		3,15 MHz	min. 3,00 MHz
20 dB		4,41 MHz	
40 dB		4,61 MHz	max. 4,90 MHz
45 dB		4,71 MHz	
Relative attenuation :	a_{rel}		
f_C .... f_C ± 1,25 MHz		-	max. 1 dB
f_C ± 1,25 MHz .... f_C ± 1,50 MHz		-	max. 3 dB
f_C ± 2,45 MHz .... f_C ± 4,45 MHz		-	min. 40 dB
f_C ± 4,45 MHz .... f_C ± 30 MHz		-	min. 50 dB
Group delay (mean value in PB):		2,77 µs	max. 4,0 µs
Group delay ripple in PB (p-p):		50 ns	max. 90 ns
Deviation from linear phase in PB (p-p):		2,3°	max. 4°
Triple transit attenuation compared to main signal		54	
Crosstalk		60	
Substrate material		Quartz	
Frequency inversion temperature (T_o)		20°...40° C	
Temperature coefficient of frequency (Tc_f)		-0,045 ppm/K²	
Frequency deviation of f_C over temperature: **)		Δf_C(Hz) = Tc_f(ppm/K) x (T - T_o)² x f_{To} (MHz)	
Operating temperature range			- 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.
****)** f_{To} is reference frequency f_c at frequency inversion temperature (T_o)

Generated: **Dunzow W.P.**

Checked/Approved: **Dr. Bert Wall**

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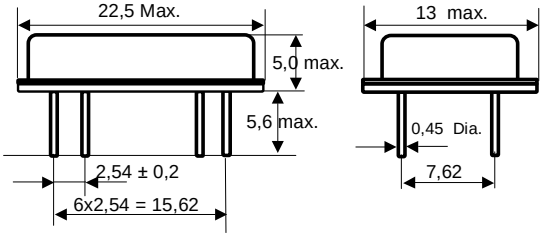
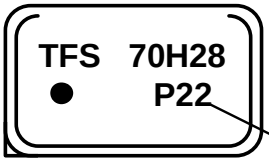
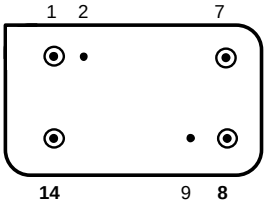
3. Construction and pin connection (all dimensions in mm)





Date-code:	Year+week
M	2000
N	2001
P	2002
...	...

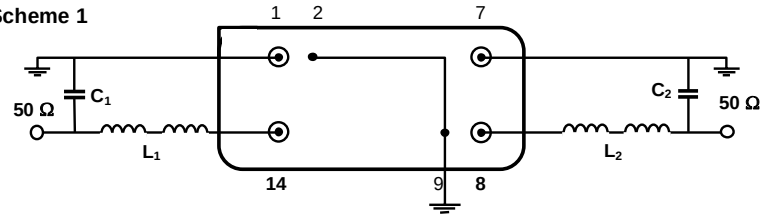


Pin **14**	**Input**
Pin 1	Input RF Return
Pin **8**	**Output**
Pin 7	Output RF Return
Pin 2, 9	Pakage Ground

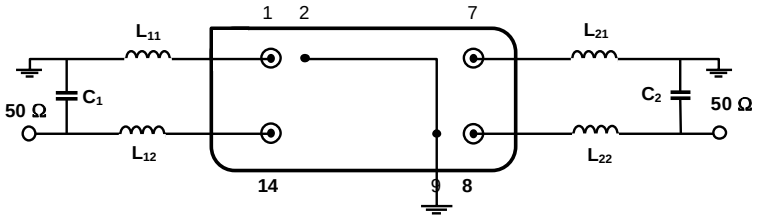
4. 50 Ω matching networks (see Application Note) :

For final test we use scheme 1.

Scheme 1



Scheme 1.1



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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;

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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.	

Chip-mount air reflow profile

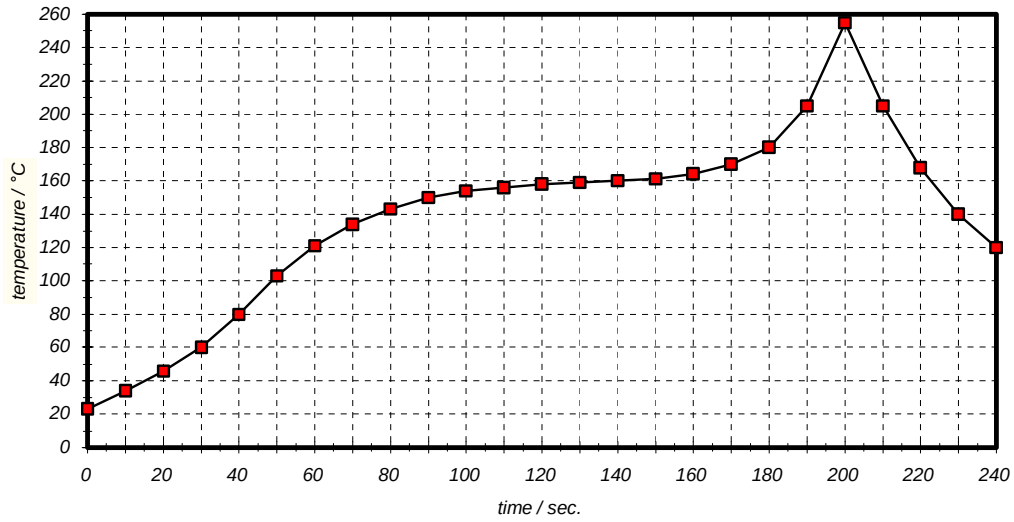

Table for temperature vs. time during the air reflow process

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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7. History

Version	Reason of Changes	Name	Date
1.0	Generate Filter specification.	Dunzow W.	03.01.2002
1.1	- correct dimensions in " **Construction and pin connection** ".	Dunzow W.	04.02.2002

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