1. Measurement condition :

Ambient temperature T_A: 45 °C
Input power level: 0 dBm
Terminating impedances in f_C : for input: 50 Ω | 0 pF.
for output: 50 Ω | 0 pF.

2. Characteristics :

Remark: Reference level for the relative attenuation a_{rel} of the **TFS 140 L** 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 centre frequency f_C is the arithmetic mean value of the upper and lower frequencies at the 6 **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.

Data		**typ. value**		**tolerance / limit**	
Insertion loss : (Reference level)	a_e	28,8	dB	max. 31	dB
Centre frequency at ambient temperature :	f_C	140,0	MHz	140,00 ± 0,25	MHz
Centre frequency at room temperature T = 23°C :		140,230	MHz	140,23 ± 0,25	MHz
Pass band : (see theoretical [1] frequency response)	**PB**				
Pass band tilt in : f_C ... f_C ± 9,992 MHz		0,02	dB/MHz		
Deviation from theoretical frequency response [1] (p-p) :	Δα				
f_C ... $f_C \pm f_Y$ (1-a) or f_C ... f_C ± 9,992 MHz		± 0,15	dB	± max. 0,2	dB
$f_C \pm f_Y$ (1-a) ... $f_C \pm f_Y$ or f_C ± 9,992 MHz ... f_C ± 12,1 MHz		± 0,25	dB	± max. 0,5	dB
Deviation from theoretical phase response [2] (p-p):	Δφ				
f_C .... $f_C \pm f_Y$ or f_C ... f_C ± 12,1 MHz		± 1°		± max. 2	degree
Relative attenuation at ambient temperature :	a_{rel}				
f_C ± 15 MHz .... f_C ± 120 MHz		55	dB	min. 40	dB
Group delay at f_C	τ_C	1,5	µs		
Reflected attenuation compared to main signal		55	dB	min. 45	dB
Crosstalk attenuation compared to main signal		60	dB	min. 45	dB
Nyquist frequency	f_Y	12,10	MHz		
Roll-off factor	**a**	0,18			
Partitioning factor	**p**	0,5			
Phase coefficients :	p_3 = 0,4388	p_5 = 0,6160	p_7 = - 0,2765		
	p_9 = - 0,1531	p_{11} = 0,2762	p_{13} = - 0,07817		
Input power level	-			max. 15	dBm
Temperature coefficient of frequency :	Tc_f	- 75	ppm/K		
Frequency deviation of f_C over temperature :	$\Delta f_C(Hz) = Tc_f(ppm/K) \times (T - T_A) \times f_C\,(MHz)$				
Operating temperature range (OgTR) :				+ 45 °C	
Operable temperature range (OTR) :				- 40 °C ... + 85 °C	
Storage temperature range (STR) :				- 40 °C ... + 85 °C	

[1] Theoretical frequency response :

$$H(x) = (S(x))^p; \quad \text{where} \quad x = \frac{f - f_C}{f_Y}$$

$$S(x) = \begin{cases} 1, & \text{for} \quad |x| \le (1 - a) \\ \frac{1}{2} + \frac{1}{2}\cos\left(\frac{\pi\,(|x| - 1 + a)}{2a}\right), & \text{for} \quad (1 - a) \le |x| \le (1 + a), \\ 0 & \text{for} \quad (1 + a) \le |x| \end{cases}$$

[2] Theoretical phase response :

$$Ph(y) = [\,p_3 y^3 + p_5 y^5 + p_7 y^7 + p_9 y^9 + p_{11} y^{11} + p_{13} y^{13}\,]\left(\frac{180}{\pi}\right) \quad [\text{deg}], \quad \text{where} \quad y = \frac{f - f_C}{10}[\,MHz\,]$$

Generated: **W. Dunzow**

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

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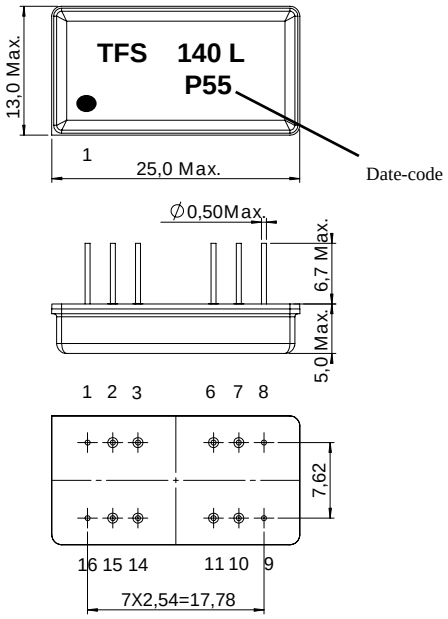
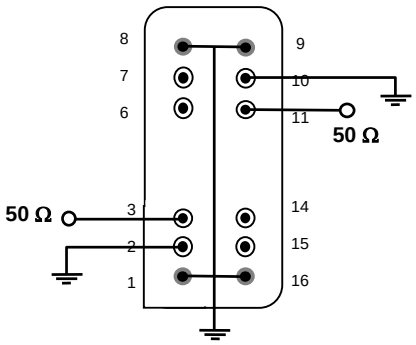
3. Construction and pin connection : (All dimensions in mm)
pin grid 2,54 mm



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

Pin **3**	**input**
Pin 2	input RF Return
Pin **11**	**output**
Pin 10	output RF Return
Pin 1, 8, 9, 16	package ground
Pin 6, 7, 14, 15	not connected

4. 50 Ω - Matching network :



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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. Soldering temperature conditions :

1st and 2nd soldering temperature 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.	

Soldering temperature profile

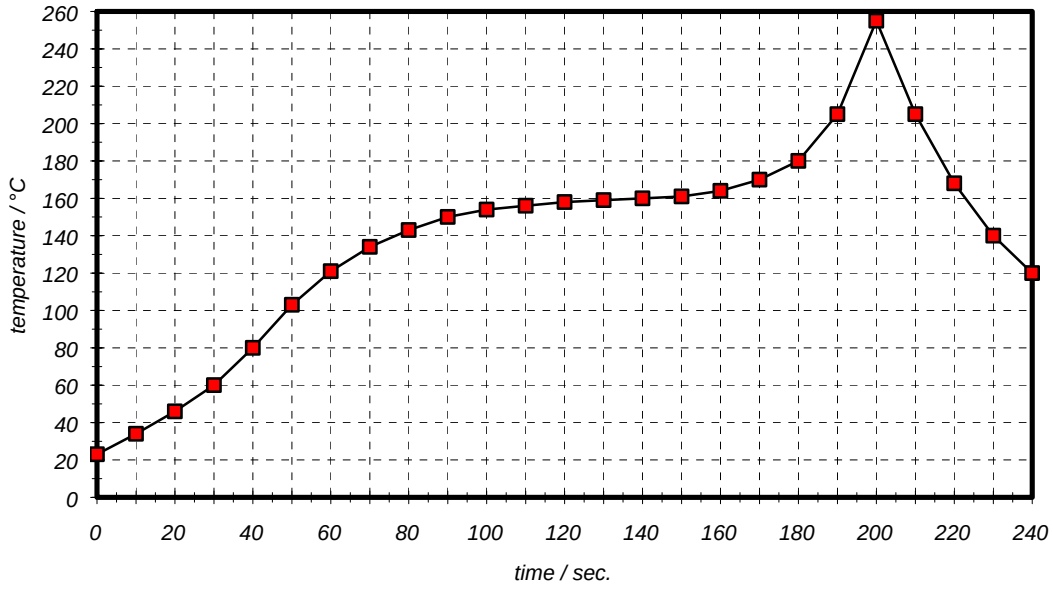

Table for temperature vs. time during the soldering process

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 development specification according to customer requirements.	W. Dunzow	05.11.2001
1.1	Generate preliminary specification after 1st iteration. Add typical values for filter after 1st iteration.	W. Dunzow	17.05.2002
1.2	Package drawing correction. Delete tolerance value for tilt in pass band.	W. Dunzow	28.06.2002

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