1. Measurement condition :

Ambient temperature T_A: 23 °C
Input power level: 0 dBm.
Terminating impedances at f_N *) : for input: 460 Ω ‖ - 11,2 pF.
for output: 440 Ω ‖ - 13,0 pF. (typical value.)

2. Characteristics :

Remark: Reference level for the relative attenuation a_{rel} of the **TFS 120** 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 **25 dB** filter attenuation level relative to the insertion loss a_e. The nominal frequency f_N is fixed on **120 MHz** without tolerance. The given values for the relative attenuation a_{rel} and for the group delay ripple have to be reached at the frequencies given below also if the centre frequency f_c is shifted due to the temperature coefficient of frequency Tc_f in the operating temperature range and due to a production tolerance for the centre frequency f_c.

Data		**typ. value**		**tolerance / limit**	
Insertion loss (Reference level)	a_e	12,5	dB	max. 15	dB
Nominal frequency :	f_N			120	MHz
Centre frequency at ambient temperature T_A (f_{CAT})	f_c	120,01	MHz		
Pass band at ambient temperature T_A: **PB**				f_N – 100 kHz ... f_N + 100 kHz	
Amplitude ripple in PB (p-p):		0,7	dB	max. 1,0	dB
Bandwidth :					
1 dB		260...280	kHz	min. 200	kHz
3 dB		400...410	kHz		
10 dB		590	kHz		
25 dB		764	kHz	max. 800	MHz
30 dB		790	kHz		
Relative attenuation	a_{rel} :				
f_N ... f_N ± 100 kHz		0,7	dB	max. 1	dB
f_N ± 400 kHz ... f_N ± 600 kHz		30	dB	min. 25	dB
f_N ± 600 kHz ... f_N ± 1000 kHz		40	dB	min. 35	dB
f_N ± 1 MHz ...f_N ± 35 MHz		50...60	dB	min. 45	dB
Group delay (mean value in pass band) :		3,77	µs	max. 4,0	µs
Group delay ripple in pass band (p-p) :		150	ns	max. 200	ns
Deviation from linear phase in PB (p-p) :		2°			
S11 in PB :		5	dB		
S22 in PB :		10...14	dB		
Triple transit attenuation compared to main signal		45	dB	min. 40	dB
Crosstalk		55	dB		
Substrate material		Quartz			
Frequency inversion temperature (T_o)		25° C			
Temperature coefficient of frequency (Tc_f)		-0,042	ppm/K²		
Frequency deviation of f_c over temperature: **)		$\Delta f_C(Hz) = Tc_f(ppm/K) \times (T - T_o)^2 \times f_{To}$ (MHz)			
Operating temperature range				- 20 °C ... + 75 °C	
Storage temperature range				- 40 °C ... + 85 °C	
Permissible DC voltage (V_{DC})		-		12	V
Permissible AC voltage (V_{pp})		-		10	V

*) 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.**

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

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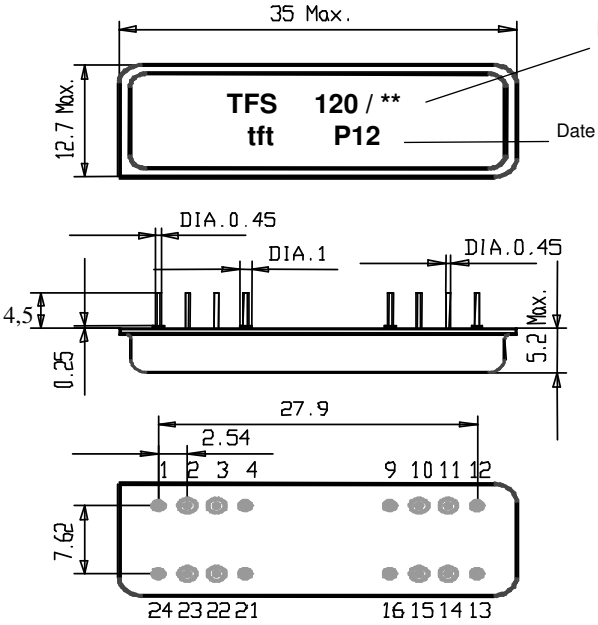
3. Construction and pin connection :

pin grid 2,54 mm
(All dimensions in mm)



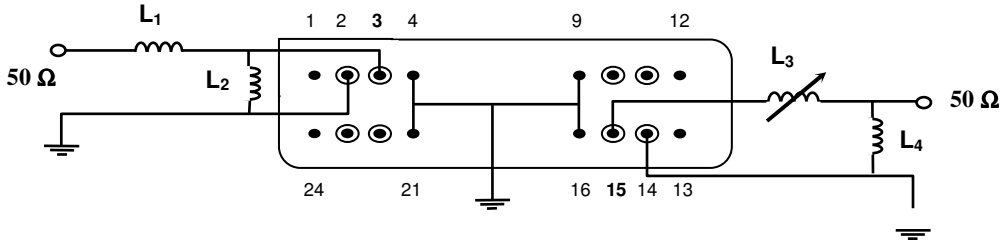
Date code:
Year+week

M	2001
N	2001
P	2002

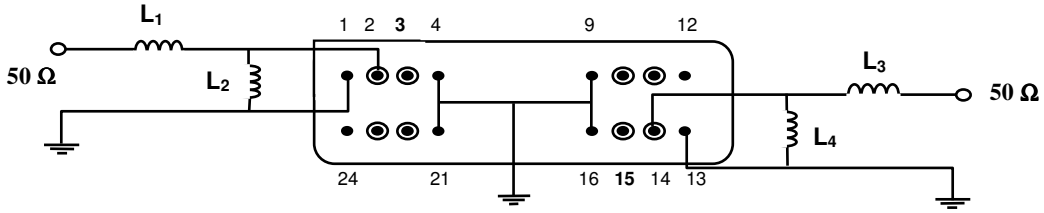
Pin **3** - Input.
Pin 2 - Input RF Return.
Pin **15** - Output.
Pin 14 - Output RF Return.
Pin 1,4,9,12,13,16,21,24 Package Ground.
Pin 10, 11, 22, 23, Not connected.

4. 50 Ω - Matching network (see Application Note):

Scheme 1



Scheme 2



For final test we use scheme 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

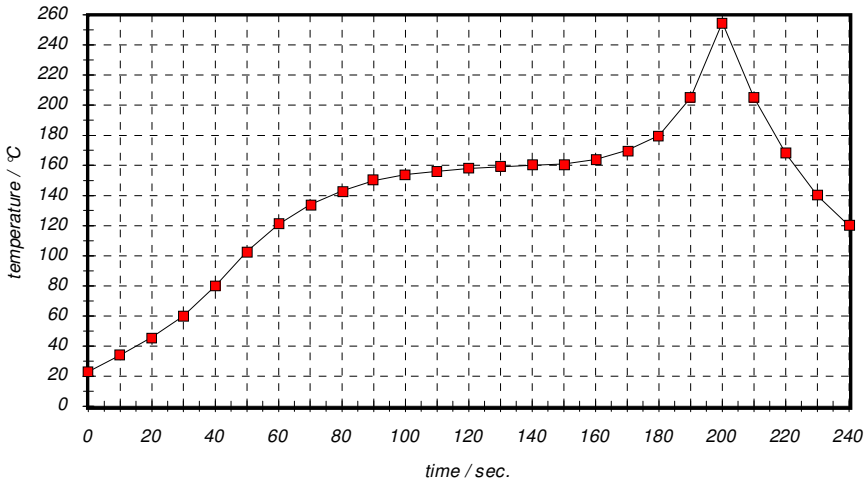

Table for temperature vs. time during the air reflow process

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	.....	Roßbach R.	03.09.1996.
1.1	Delete balanced matching network.	Weinberg R.	29.06.1999.
1.2	- add definition of centre frequency $\mathbf{f_C}$; - remove information about source and load impedances ; - remove information about termination impedances ; - add "**Bandwidth"** , "**Amplitude ripple"** and "**Frequency deviation of f_C over temperature T "** to characteristics ; - mark $\mathbf{L_3}$ of matching network as adjustable; - change style of picture of matching network ;	Dunzow W.	23.03.2000.
1.3	- correct filter stamp ; - add more stable (without variable elements) matching network (scheme 2). - add " **Stability characteristics** ".	Dunzow W.	01.02.2002.

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