1. Measurement condition :

Ambient temperature T_A: 23 °C
Input power level: 0 dBm.
Terminating impedances at f_C *) : for input: 50 Ω ‖ - 37,5 pF.
for output: 50 Ω ‖ - 32,5 pF.

2. Characteristics :

Remark:
Reference level for the relative attenuation **a_{rel}** of the **TFS 70N** 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 **20 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		**typ. value**		**tolerance / limit**
Insertion loss (Reference level)	**a_e**	20,6	dB	max. 24 dB
Centre frequency at ambient temperature T_A (**f_{CAT}**)	**f_C**	70,0	MHz	70,0 ± 0,1 MHz
Pass band (-2 dB) at ambient temperature T_A **:**	**PB**			f_C - 4,8 MHz ... f_C + 4,8 MHz
Amplitude ripple in PB (p-p) :		0,7	dB	max. 2,0 dB
Bandwidth at ambient temperature T_A **:**				
1 dB - band width		9,92	MHz	
2 dB - band width		9,98	MHz	min. 9,60 MHz
3 dB - band width		10,12	MHz	min. 10,00 MHz
20 dB - band width		10,60	MHz	
35 dB - band width		10,77	MHz	max. 10,80 MHz
45 dB - band width		10,84	MHz	max. 11,20 MHz
50 dB - band width		10,90	MHz	max. 12,00 MHz
Relative attenuation at ambient temperature T_A **:**	**a_{rel}**			
f_C ... f_C ± 4,8 MHz				max. 2 dB
f_C ± 4,8 MHz ... f_C ± 5,0 MHz		-		max. 3 dB
f_C ± 5,4 MHz ... f_C ± 5,6 MHz		40	dB	min. 35 dB
f_C ± 5,6 MHz ... f_C ± 6 MHz		55	dB	min. 45 dB
f_C ± 6 MHz ... f_C ± 35 MHz		55...65	dB	min. 50 dB
Group delay (mean value in PB):		3,74	µs	max. 4,5 µs
Group delay ripple in PB (p-p):		140	ns	max. 200 ns
Deviation from linear phase in PB (p-p):		5,5 °		
Triple transit attenuation compared to main signal :		50	dB	
Crosstalk :		70	dB	
Temperature coefficient of frequency :	**Tc_f**	- 87	ppm/K	
Frequency deviation of f_C over temperature :	$\Delta f_C(Hz) = Tc_f(ppm/K) \times (T - T_A) \times f_{CAT}$ (MHz)			
Operating temperature range :				0 °C ... + 60 °C
Storage temperature range :				- 25 °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.

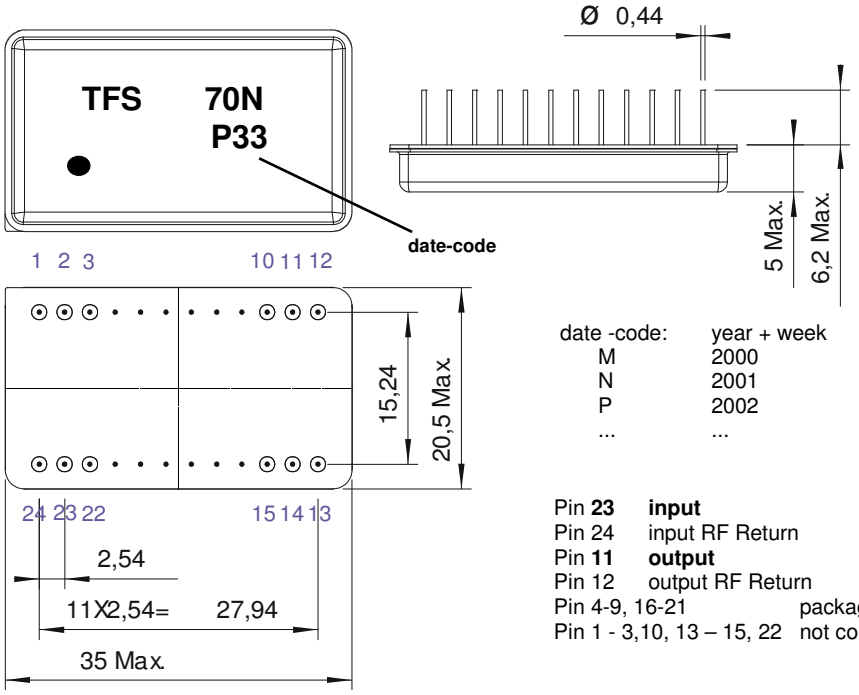
Generated: **Dunzow W.P.**

Checked / approved: **Dr. Bert 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

3. Construction and pin connection

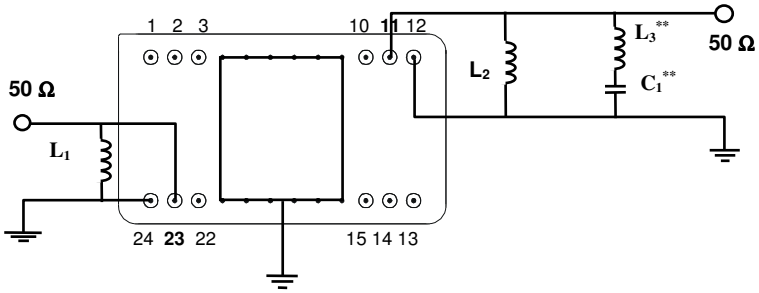
(all dimensions in mm)
pin grid 2,54 mm



date -code:	year + week
M	2000
N	2001
P	2002
...	...

Pin **23** **input**
Pin 24 input RF Return
Pin **11** **output**
Pin 12 output RF Return
Pin 4-9, 16-21 package ground
Pin 1 - 3,10, 13 – 15, 22 not connected.

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



Theoretical values of matching elements :

L1 = 125 nH
L2 = 60 nH
C1 = 27 pF.
**) **L3** ≈ 85 ± 5 nH : $L_3 C_1 = 1/\sqrt{2\pi f_1}$ where $f_1 = 94{,}3 \pm 0{,}3\ Mhz$
L3 has to be adjusted on your board design.

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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

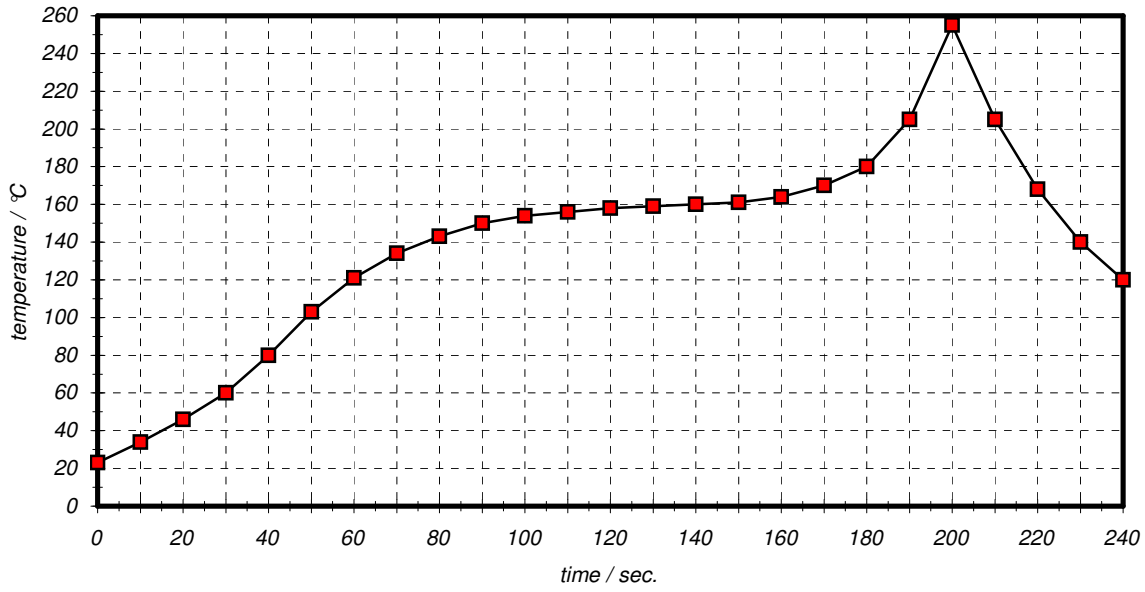

Table for temperature vs. time during the air reflow process

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 development specification according to customer requirements.	Dunzow W.	18.11.1998
1.1...1.6	- write typical values of filter.	Dunzow W.	
1.7	- change package. - correct termination impedances.	Dunzow W.	20.11.2001
1.8	- change package drawing.	Dunzow W.	30.08.2002

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