

VI TELEFILTER**Filter Specification****TFS 140F - 1/5****1. Measurement condition**

Ambient temperature T_A :	25 °C
Input power level:	0 dBm.
Terminating impedances at f_c :	for input: 740 Ω - 8,35 pF.
	for output: 700 Ω - 9,40 pF.
Q-value of matching elements:	≥ 50

2. Characteristics

Remark:

Reference level for the relative attenuation a_{rel} of the **TFS 140F** 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 T_{c_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	18,5...19 dB	max. 20 dB
Centre frequency f_c at ambient temperature T_A (f_{CAT})	140,01 MHz	140 \pm 0,06 MHz
Pass band (PB) at ambient temperature T_A :	$f_c - 1,6$ MHz..... $f_c + 1,6$ MHz	
Amplitude ripple (p-p): f_c $f_c \pm 1,35$ MHz	0,5...0,7 dB	max. 1 dB
Bandwidth at ambient temperature:		
1 dB - band width	2,87 MHz	min. 2,70 MHz
3 dB - band width	3,23 MHz	min. 3,20 MHz
40 dB - band width	4,62 MHz	max. 4,70 MHz
45 dB - band width	4,69 MHz	
Relative attenuation a_{rel}		
f_c	$f_c \pm 1,35$ MHz	0,6 dB
$f_c \pm 1,35$ MHz	$f_c \pm 1,6$ MHz	2,5 dB
$f_c \pm 2,35$ MHz	$f_c \pm 6$ MHz	45...50 dB
$f_c \pm 6$ MHz	$f_c \pm 40$ MHz	50...70 dB
Group delay (mean value in PB):	1,69 μ s	max. 2,5 μ s
Group delay ripple in PB (p-p):	100 ns	max. 200 ns
Deviation from linear phase in PB (p-p):	4° (r.m.s. 0,9°)	max. 5°
Input VSWR (S11) in PB :	1,6 : 1	max. 2 : 1
Output VSWR (S22) in PB :	1,6 : 1	max. 2 : 1
Triple transit attenuation compared to main signal	41...42 dB	min. 40 dB
Crosstalk	50...60 dB	
Substrate material	Quartz	
Frequency inversion temperature (T_o)	28° C	
Temperature coefficient of frequency (T_{c_f})	-0,04 ppm/K ²	
Frequency deviation of f_c over temperature: *	$\Delta f_c(\text{Hz}) = T_{c_f}(\text{ppm/K}) \times (T - T_o)^2 \times f_{T_o}(\text{MHz})$	
Operating temperature range	0 °C ... + 70 °C	
Storage temperature range	- 40 °C ... + 85 °C	

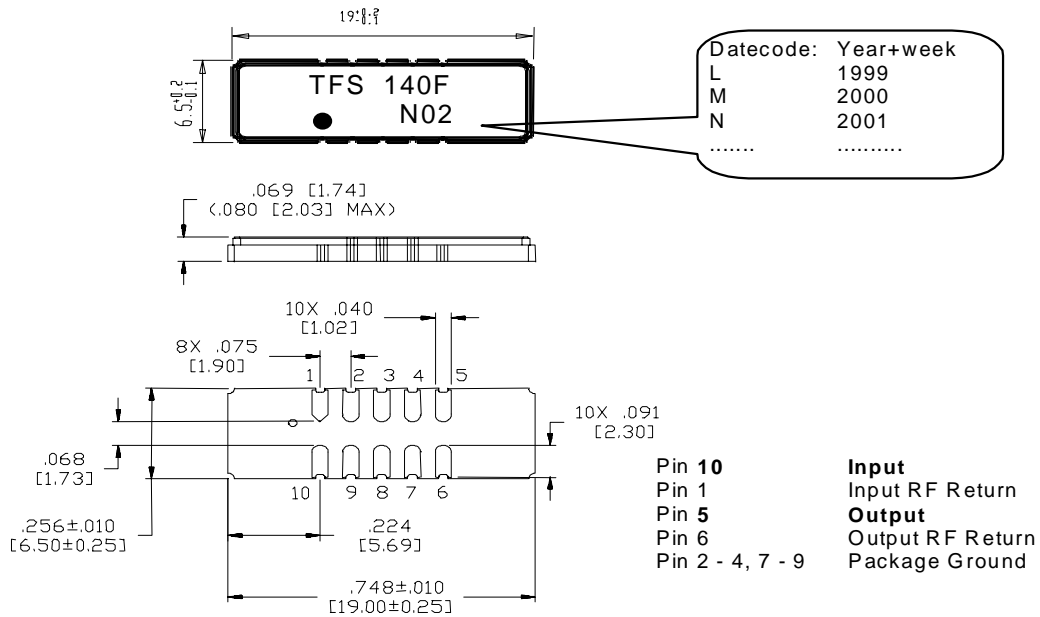
*) f_{T_o} is reference frequency f_c at frequency inversion temperature (T_o)**Generated:****Dunzow W.P.****Checked/Approved:****Dr. Bert Wall**

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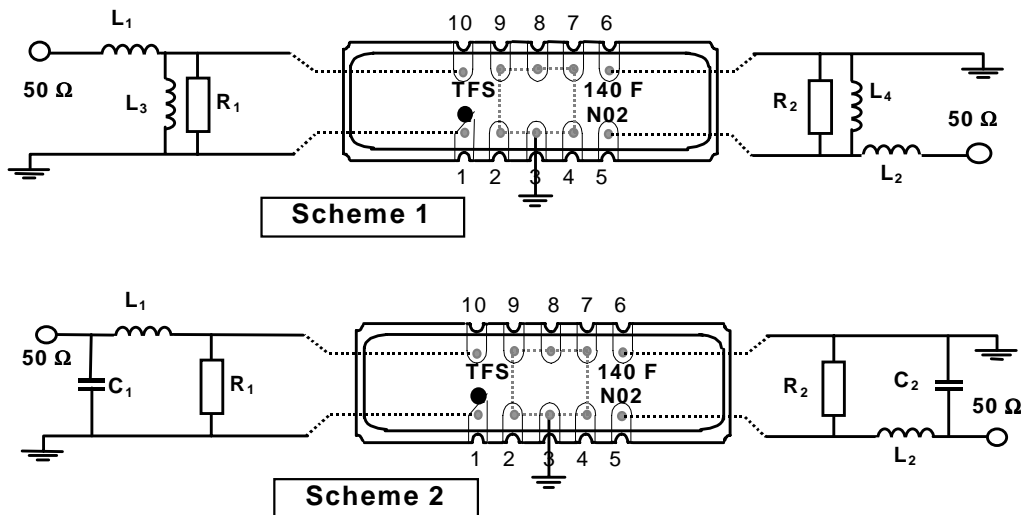
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3. Package



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



For final test we use scheme 1.

5. Stability Characteristics

After the following tests the filter shall meet the whole specification:

- Shock: 500g, 18 ms, half sine wave, 3 shocks each plane;
DIN IEC 68 T2 - 27
- 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
- Damp heat: 25 °C to 55°C / 95% r.H. / 10 cycles
(cycle) DIN IEC 68 - 2 – 30 Db
- Resistance to solder heat (reflow): max. 2 times reflow process;
for temperature conditions refer to the attached "Air reflow temperature conditions" on page 4;

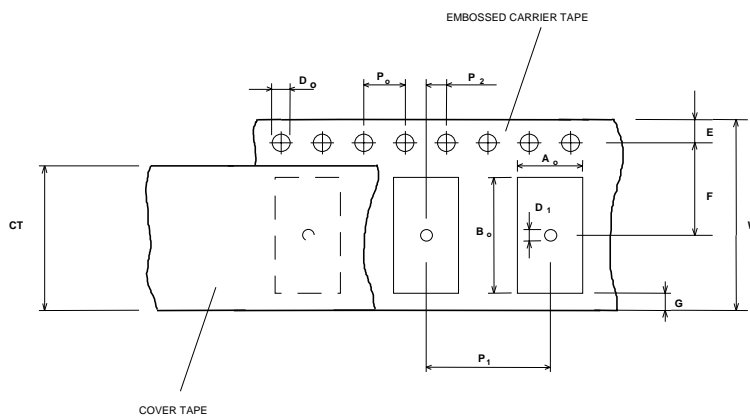
6. Packing

Tape & Reel: DIN IEC 286 - 3, with exception of value for N and minimum bending radius;
tape type II, embossed carrier tape with top cover tape on the upper side;

max. pieces of filters per reel: 2000
Reel of empty components at start: min 300 mm
Reel of empty components at start including leader: min 500 mm
Trailer: min 300 mm

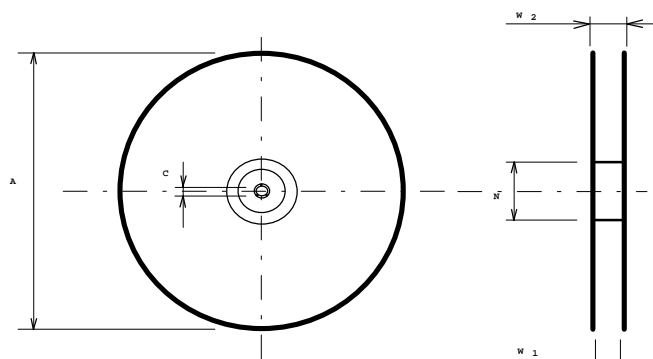
Tape (all dimensions in mm)

W	:	32	± 0,3
Po	:	4	± 0,1
Do	:	1,5	+ 0,1
E	:	1,75	± 0,1
F	:	14,2	± 0,1
G (min)	:	0,6	
P2	:	2	± 0,1
P1	:	12	± 0,1
D1(min)	:	2,0	
Ao	:	7,1	± 0,1
Bo	:	19,6	± 0,
CT	:	25,5	± 0,1



Reel (all dimensions in mm):

A	:	330
W1	:	32,4 +2
W2 (max)	:	38,4
N (min)	:	100
C	:	13 +0,5/-0,2



The minimum bending radius is 45 mm. The mounting surface of the filters faces the bottom side of the embossed carrier tape. The marking of the filters is able to read if the view is directed on the upper side of the carrier tape with the sprocket holes on the right side of the tape.

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7. 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

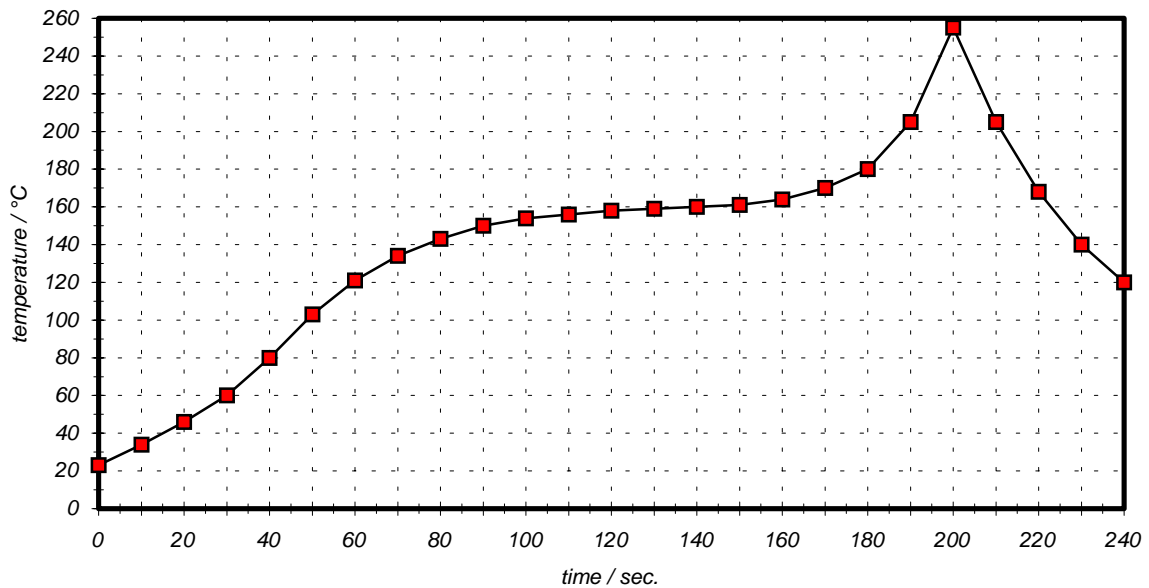


Table for temperature vs. time during the air reflow process

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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History :

Version	Reason of Changes	Name	Date
1.0	Generate specification according to customer requirements.	Dunzow W.	15.05.2000
1.1	Add theoretical matching network scheme. Change filter name from TFS 140F1 to TFS 140F Change input and output pin positions according to customer requirements.	Dunzow W.	31.05.2000
1.2	Correct errors in matching network scheme.	Dunzow W.	05.06.2000
1.3	Change limit value ILo : from ILo = max. 19 dB to ILo = max. 20 dB Correct wrong unit for limit value of TTS (ns → dB). Add VSWR according to customer requirement.	Dunzow W.	22.06.2000
1.4	Change the following parameters according to customer requirements - Ambient temperature T_A from 23 °C to 25 °C, - limit value of Pass band from $f_C \pm 1,55$ MHz to $f_C \pm 1,6$ MHz, - Amplitude ripple (p-p) section removed, - Bandwidth section removed, - Relative attenuation (3 dB) from $f_C \pm 1,55$ MHz to $f_C \pm 1,6$ MHz, - Relative attenuation (40 dB) from $f_C \pm 2,30$ MHz ... $f_C \pm 5,94$ MHz to $f_C \pm 2,35$ MHz ... $f_C \pm 6,0$ MHz, - Relative attenuation (45 dB) from $f_C \pm 5,94$ MHz ... $f_N \pm 40$ MHz to $f_C \pm 6,0$ MHz ... $f_C \pm 40$ MHz,	A Jaffer	13.09.2000
1.5	Generate Filter Specification. - add typical values; - add termination impedances; - add pass band ripple max.1 dB in f_C ... $f_C \pm 1,35$ MHz.	Dunzow W.	09.01.2000