

VI TELEFILTER**Filter Specification****TFS 402****1/5****1. Measurement condition**

Ambient temperature T_A :	25 °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 402** 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 **6 dB** filter attenuation level relative to the insertion loss a_e . The nominal frequency f_N is fixed on **402,76 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 a production tolerance for the centre frequency f_C .

Data	typ. value	tolerance / limit
Insertion loss (Reference level) a_e		max 24 dB
Nominal frequency f_N		402,76 MHz
Reference frequency f_C at ambient temperature (f_{CTA})		402,76 \pm 1 MHz
Pass band (-1 dB) in the operating temperature range:	$f_N - 15,25$ MHz ... $f_N + 15,25$ MHz	
Amplitude ripple in pass band (p-p):	-	max. 1,0 dB
with sliding interval 1 MHz in pass band (p-p):	-	max. 0,5 dB
Relative attenuation a_{rel}		
f_N	$f_N \pm 15,25$ MHz	- max. 1 dB
$f_N \pm 24,5$ MHz	$f_N \pm 100$ MHz	- min. 38 dB
$f_N - 401$ MHz	$f_N - 100$ MHz	- min. 25 dB
$f_N + 100$ MHz	$f_N + 600$ MHz	- min. 25 dB
Group delay	470 μ s	-
Deviation from linear phase in pass band (p-p):		max. 4,5 °
The part will not show any critical pyroelectric effect for temperature changes of		0,5 °C / min
Temperature coefficient of frequency (T_c)		- 72 ppm/°C
Frequency deviation of f_C over temperature T:	$\Delta f_C(\text{Hz}) = T_{c_f}(\text{ppm/K}) \times (T - T_A) \times f_{CTA} (\text{MHz})$	
Operating temperature range to work without damage	- 40 °C ... + 85 °C	
Storage temperature range	- 40 °C ... + 85 °C	

Responsible:

Generated: _____

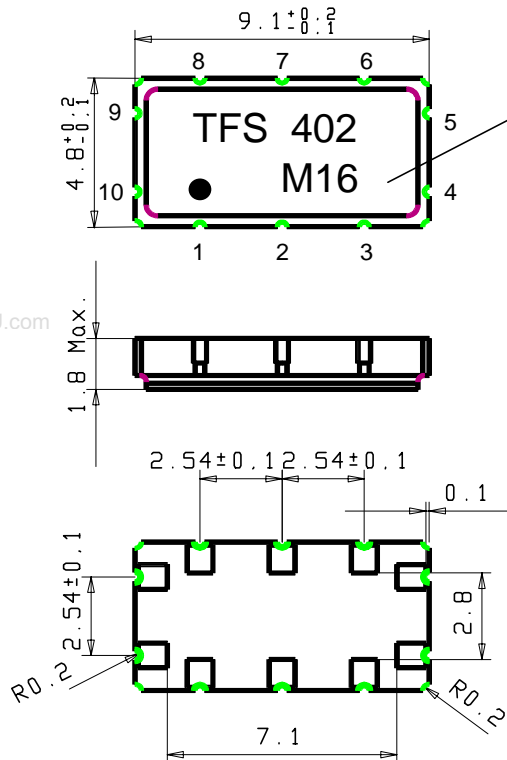
Checked / approved : _____

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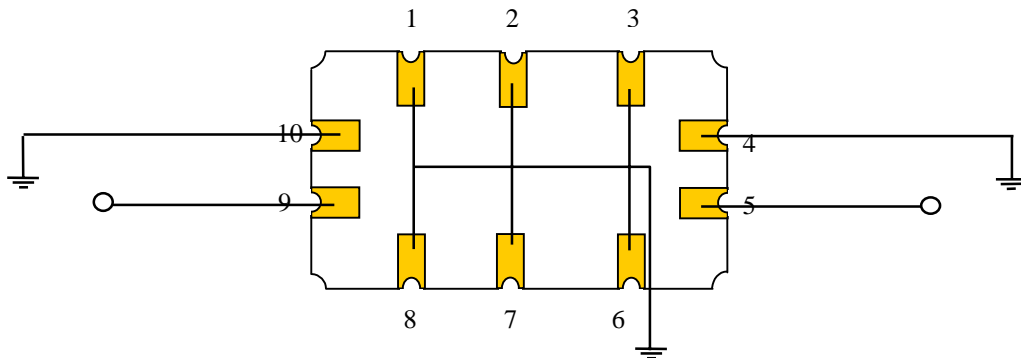
3. Package, pin grid 2,54 mm (All dimensions in mm)



1	Package Ground
2	Package Ground
3	Package Ground
4	Output RF Return
5	Output
6	Package Ground
7	Package Ground
8	Package Ground
9	Input
10	Input RF Return
11	Package Ground
12	Package Ground

Datecode:	Year+week
K	1998
L	1999
M	2000
...	

4. 50 Ω - Matching network:



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Stability Characteristics

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

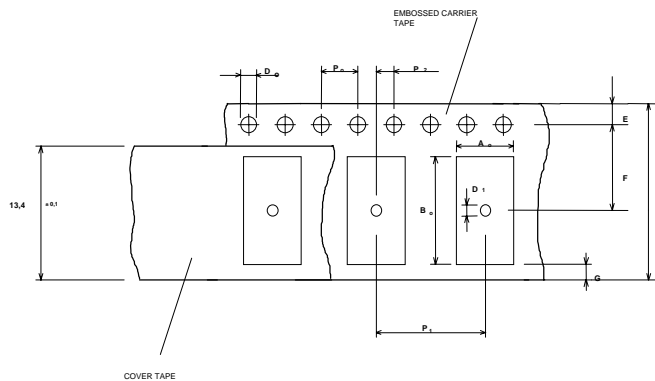
1. Shock: 500g, 18 ms, half sine wave, 3 shocks each plane;
DIN IEC 68 T2 - 27
2. Vibration: 10 Hz to 500 Hz, 0,35 mm or 5g respectively, 1 octave per min, 10 cycles per plan, 3 plans;
DIN IEC 68 T2 - 6
3. Damp heat: 25 °C to 55°C / 95% r.H. / 10 cycles
(cycle) DIN IEC 68 - 2 – 30 Db
4. Resistance to solder heat (reflow): max. 2 times reflow process;
for temperature conditions refer to the attached "Air reflow temperature conditions" on page 4;

Packing

Tape & Reel:	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:	3000
	Reel of empty components at start:	min 300 mm
	Reel of empty components at start including leader:	min 500 mm
	Trailer	min 300 mm

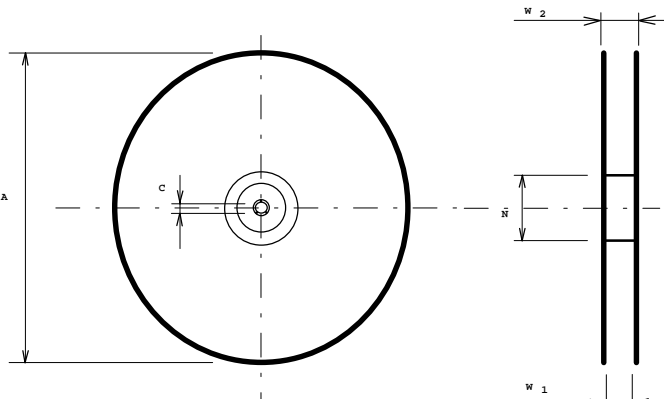
Tape (all dimensions in mm)

W	: 16 ± 0,3
Po	: 4 ± 0,1
Do	: 1,5 + 0,5
E	: 1,75 ± 0,1
F	: 7,5 ± 0,1
G (min)	: 0,75
P2	: 2 ± 0,05
P1	: 8 ± 0,1
D1 (min)	: 1,5
Ao	: 5,3 ± 0,1
Bo	: 9,7 ± 0,1



Reel (all dimensions in mm):

A	:	330
W1	:	16,4 +2
W2 (max)	:	22,4
N (min)	:	>= 90
C	:	13 ± 0,25



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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5. 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

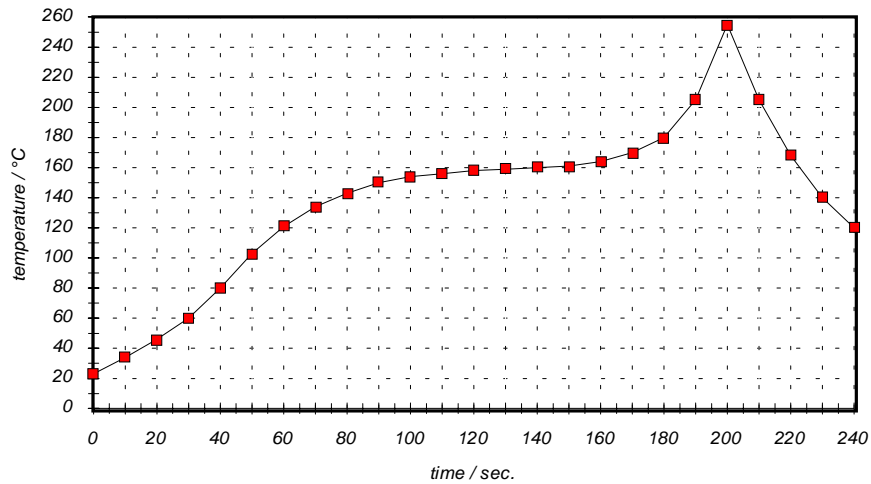


Table for temperature vs. time during the air reflow process

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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VI TELEFILTER**Filter Specification****TFS 402****5/5****History**

Version	Reason of Changes	Name	Date
2.0	(former development specification version 1.2 changed) - insertion loss, 23dB → 24dB - weekly date code introduced - pass band spec and stopband attenuation spec changed to be valid at room temperature only (frequency drift already included in customer limit scheme)	Steiner	17.04.2000

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