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:
The reference level for the relative attenuation a_{rel} of TFS 402 is the minimum of the pass band attenuation a_{min}. This value 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 nominal frequency f_N is fixed on **402,76 MHz** without tolerance.

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 ± 1 MHz
Pass band (-1 dB):				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 ± 15,25 MHz	-	max. 1 dB
f_N ± 24,5 MHz		f_N ± 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 µs	-
Deviation from linear phase in pass band (p-p):				max. 4,5 °
The part will not show any critical pyroelecric effect for temperature changes of				0,5 °C / min
Temperature coefficient of frequency (Tc_f)				- 72 ppm/°C
Frequency deviation of f_C over temperature T:			$\Delta f_C(Hz) = Tc_f(ppm/K) \times (T - T_A) \times f_{CTA}$ (MHz)	
Operating temperature range				- 40 °C ... + 85 °C
Storage temperature range				- 40 °C ... + 85 °C

Generated: _____

Checked / approved : _____

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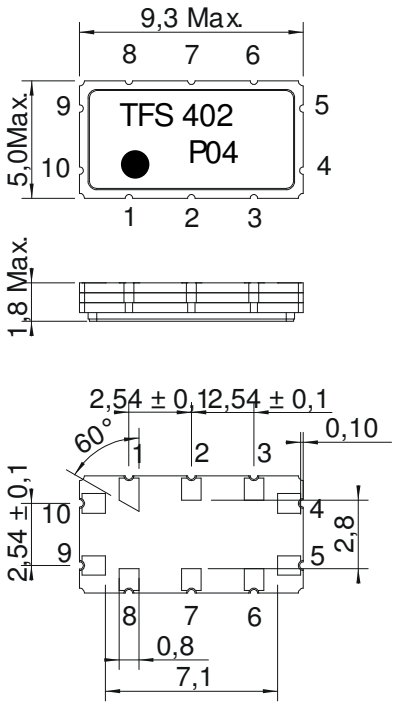
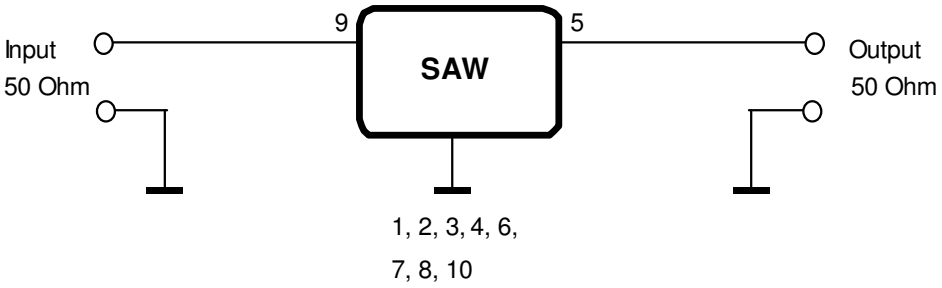
3. Package, pin grid 2,54 mm (All dimensions in mm)



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

Datecode:	Year+week
M	2000
N	2001
P	2002
...	

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. 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, please refer to the attached "Air reflow temperature conditions" on page 4;

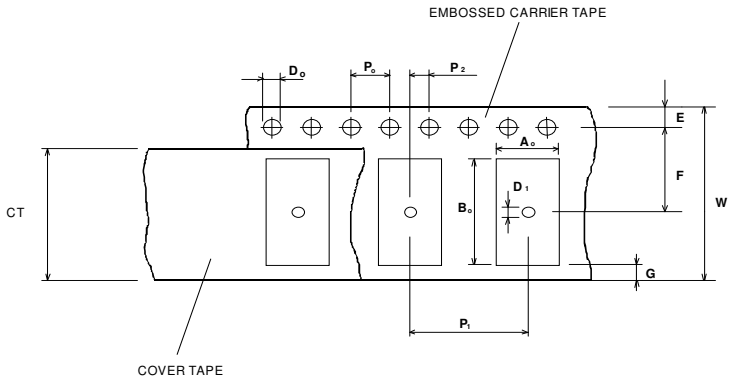
Packing

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

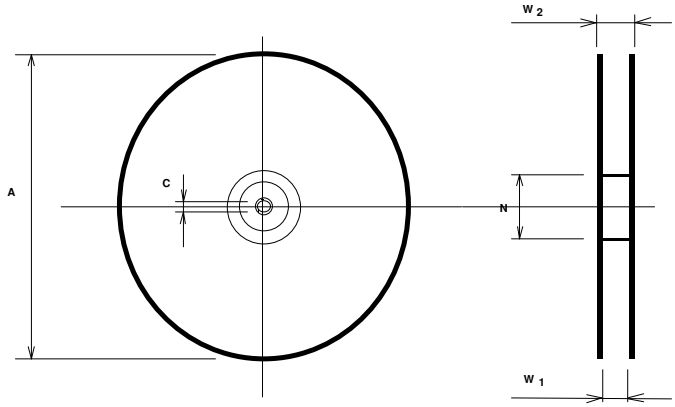
Tape (all dimensions in mm)

W	:	16 ± 0,3
Po	:	4 ± 0,1
Do	:	1,5 + 0,1
E	:	1,75 ± 0,1
F	:	7,5 ± 0,1
G (min)	:	0,60
P2	:	2 ± 0,1
P1	:	8 ± 0,1
D1(min)	:	1,5
Ao	:	5,30 ± 0,1
Bo	:	9,70 ± 0,1
CT	:	13,5 ± 0,1



Reel (all dimensions in mm):

A	:	330
W1	:	16,40 +2,0
W2 (max)	:	22,4
N (min)	:	50
C	:	13,0 + 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. Markings on the filters can be read if the upper side of the carrier tape is regarded with the sprocket holes on its right.

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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

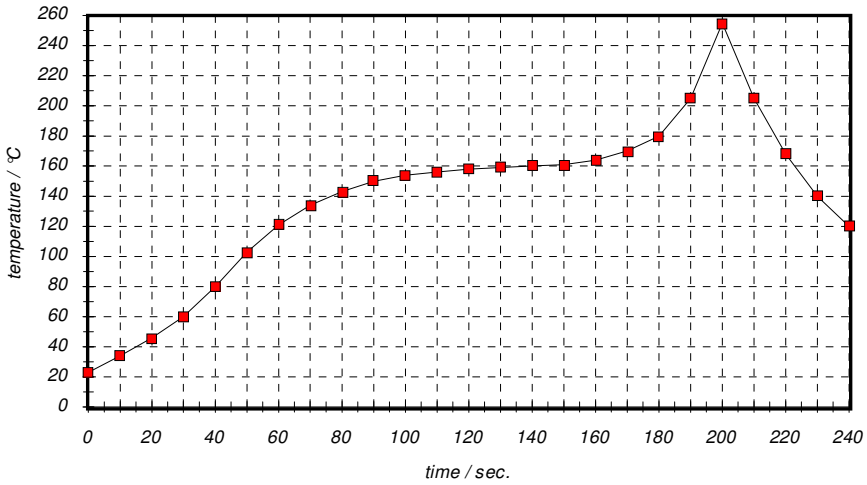

Table for temperature vs. time during the air reflow process

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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History

Version	Reason of Changes	Name	Date
2.0	(former development specification version1.2 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
3.0	new package with Pin 1 marking introduced	Steiner	24.01.2002
4.0	definition of performance over temperature redefined	Steiner	12.02.2002

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