

**VI TELEFILTER**

**Filter Specification**

**TFS 86 C**

**1/5**

**Measurement condition**

Ambient temperature: 23°  
 Input power level: 0 dBm  
 Terminating impedance: \*)  
     Input: 825 Ω || -1,75 pF  
     Output: 825 Ω || -1,75 pF

**Characteristics**

**Remark:**

Reference level for the relative attenuation  $a_{rel}$  of the TFS 86 C 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 3dB filter attenuation level relative to the insertion loss  $a_e$ . The nominal frequency  $f_N$  is fixed at 86,46 MHz without any 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 even 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  $f_c$ .

<b>D a t a</b>		<b>typ. value</b>	<b>tolerance / limit</b>
<b>Insertion loss</b> (Reference level)	$a_e = a_{min}$	3,7 dB	max. 5 dB
<b>Nominal frequency</b>	$f_N$	-	86,46 MHz
<b>Centre frequency</b>	$f_c$	86,463 MHz	-
<b>Pass band ripple</b> $f_N \pm 13$ kHz		0,7 dB	max. 2,0 dB
<b>Relative attenuation</b> $f_N \pm 14$ kHz	$a_{rel}$	0,9 dB	max. 3 dB
$f_N - 1000$ kHz ... $f_N - 880$ kHz		64 dB	min. 50 dB
$f_N - 880$ kHz ... $f_N - 120$ kHz		51 - 60 dB	min. 40 dB
$f_N - 120$ kHz ... $f_N - 60$ kHz		24 dB	min. 20 dB
$f_N + 60$ kHz ... $f_N + 120$ kHz		24 dB	min. 20 dB
$f_N + 120$ kHz ... $f_N + 1000$ kHz		45 - 60 dB	min. 40 dB
<b>Group delay distortion</b> $f_N \pm 11$ kHz	GDD	3,8 μs	max. 10 μs
<b>Intermodulation **)</b>		-	max. - 80 dBm
<b>Operating temperature range</b>			- 20 °C ... + 70 °C
<b>Storage temperature range</b>			- 40 °C ... + 85 °C
<b>Temperature coefficient of frequency ***)</b> $TC_f$		- 0,036 ppm/K <sup>2</sup>	
<b>Frequency inversion temperature</b> $T_0$		25 °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.

\*\*) Intermodulation in the composite signal by  $f_N \pm 60$  kHz and  $f_N \pm 120$  kHz each of -20 dBm

\*\*\*)  $\Delta f_c(\text{Hz}) = TC_f(\text{ppm/K}) \times (T - T_0)^2 \times f_{r0}(\text{MHz})$

**Generated:** \_\_\_\_\_

**Checked / approved:** \_\_\_\_\_

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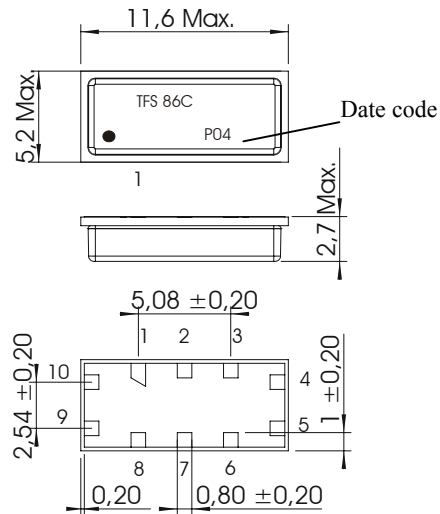
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**Filter Specification**

**TFS 86 C**

**Construction, pin configuration and 50 Ω - matching network**

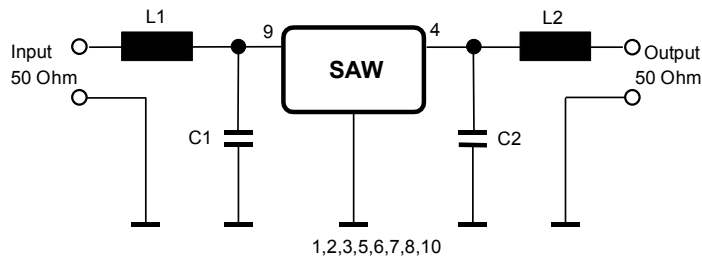
(All dimensions in mm)



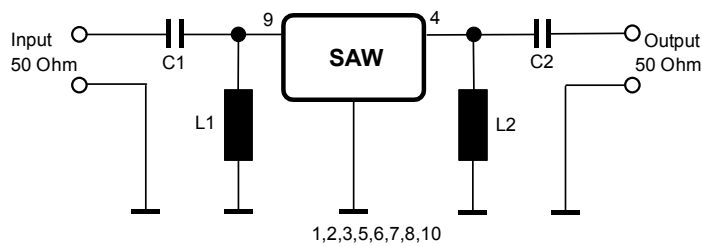
Pin 9	Input
Pin 10	Input RF return
Pin 4	Output
Pin 5	Output RF return
Pin 1	Ground
Pin 2	Ground
Pin 3	Ground
Pin 6	Ground
Pin 7	Ground
Pin 8	Ground

Date code:	Year+week
M	2000
N	2001
P	2002
...	

**50 Ω matching network 1**



**50 Ω matching network 2**



Note: The filter operates in the matching network in the same manner if the filter is inserted with a rotation of 180 °.

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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, 1,5 mm or 20g 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;

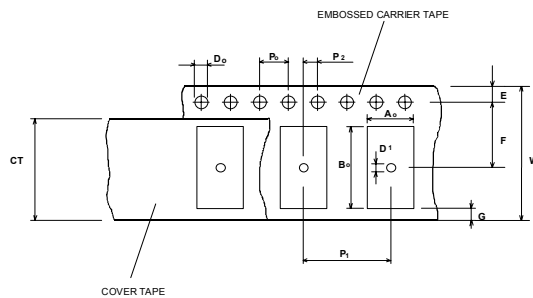
**Packing**

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: 2500  
reel of empty components at start: min 300 mm  
reel of empty components at start including leader: min 500 mm  
trailer: min 300 mm

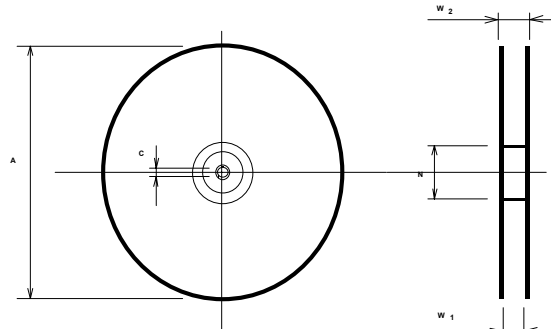
**Tape (all dimensions in mm)**

- W : 24 ± 0,3
- Po : 4 ± 0,1
- Do : 1,5 + 0,1
- E : 1,75 ± 0,1
- F : 11,5 ± 0,1
- G (min) : 0,6
- P2 : 2 ± 0,1
- P1 : 8 ± 0,1
- D1(min) : 1,5
- Ao : 5,5 ± 0,1
- Bo : 11,9 ± 0,1
- CT : 21,5 ± 0,1



**Reel (all dimensions in mm):**

- A : 330
- W1 : 24,4 +2
- W2 (max) : 30,4
- N (min) : 60
- 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. 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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**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**

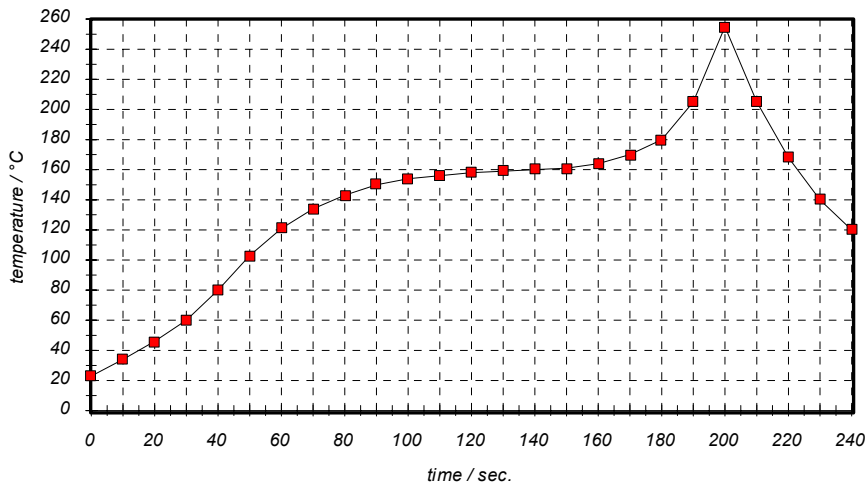


Table for temperature vs. time during the air reflow process

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

**VI TELEFILTER****Filter Specification****TFS 86 C****5/5****History**

<b>Version</b>	<b>Reason of Changes</b>	<b>Name</b>	<b>Date</b>
1.0	Generation of specification according to customer requirements.	Du Hamél	20.07.2001
1.1	Correct "package" drawing Correct "50 $\Omega$ matching network"	Herrler	03.08.2001
1.2	Add "tape and reel" information	Herrler	07.08.2001
1.3	Change of construction drawing. Adjust termination impedance.	Dr. Sabah	13.11.2001
1.4	Add typical values. Add commentary for termination impedances. Change number of pieces per reel.	Dr. Wall	21.01.2001

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