

**VI TELEFILTER****Filter Specification****TFS 249A****1/5****Measurement condition**

|                                  |                            |
|----------------------------------|----------------------------|
| Ambient temperature $T_A$ :      | 23 °C                      |
| Input power level:               | 0 dBm                      |
| Terminating impedance at $f_c$ : |                            |
| input:                           | 1,15 k $\Omega$    -6,5 pF |
| output:                          | 1,05 k $\Omega$    -6,5 pF |

**Characteristics**

Remark:

Reference level for the relative attenuation  $a_{rel}$  of the **TFS 249A** is the minimum of the pass band attenuation  $a_{min}$ . It 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 **3 dB** filter attenuation level relative to the insertion loss  $a_e$ . The nominal frequency  $f_N$  is fixed on **249,6 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 the temperature coefficient of frequency  $TC_f$  in the operating temperature range and due to a production tolerance for the centre frequency  $f_c$ .

| Data                                              |                       | typ. value |                     | tolerance / limit |                     |     |
|---------------------------------------------------|-----------------------|------------|---------------------|-------------------|---------------------|-----|
| Insertion loss (Reference level)                  | $a_e$                 | 14,0       | dB                  | max.              | 20,0                | dB  |
| Nominal frequency                                 | $f_N$                 | -          |                     |                   | 249,6               | MHz |
| Centre frequency                                  | $f_c$                 | 249,6      | MHz                 |                   |                     |     |
| 1 dB Bandwidth                                    |                       | 4,72       | MHz                 | min.              | 3,84                | MHz |
| 3 dB Bandwidth                                    |                       | 5,71       | MHz                 |                   | -                   |     |
| 30 dB Bandwidth                                   |                       | 9,08       | MHz                 |                   | -                   |     |
| 40 dB Bandwidth                                   |                       | 9,60       | MHz                 | max.              | 11,0                | MHz |
| Passband ripple                                   | within $\pm 1,92$ MHz | -          |                     | min.              | 1,0                 | dB  |
| Relative attenuation                              | $a_{rel}$             |            |                     |                   |                     |     |
| $f_N \pm 1,92$ MHz                                | $f_N \pm 1,92$ MHz    | 0,4        | dB                  | max.              | 1,0                 | dB  |
| $f_N \pm 3,08$ MHz                                | $f_N \pm 5,5$ MHz     | 10         | dB                  | min.              | 3,0                 | dB  |
| $f_N \pm 5,5$ MHz                                 | $f_N \pm 15$ MHz      | 48         | dB                  | min.              | 40,0                | dB  |
| $f_N \pm 15$ MHz                                  | $f_N \pm 30$ MHz      | 60         | dB                  | min.              | 50,0                | dB  |
| Group delay ripple                                | within $\pm 1,92$ MHz | 35         | ns                  | max.              | 50,0                | ns  |
| Return loss:                                      | within $\pm 1,92$ MHz | 16         | dB                  | min.              | 10,0                | dB  |
| Operating temperature range                       |                       |            |                     |                   | - 10 °C ... + 80 °C |     |
| Temperature coefficient of frequency ( $TC_f$ ) * |                       | 0,032      | ppm/ K <sup>2</sup> |                   |                     |     |
| Frequency inversion temperature $T_0$             |                       | 32         | °C                  |                   |                     |     |
| Storage temperature range                         |                       |            |                     |                   | - 30 °C ... + 85 °C |     |

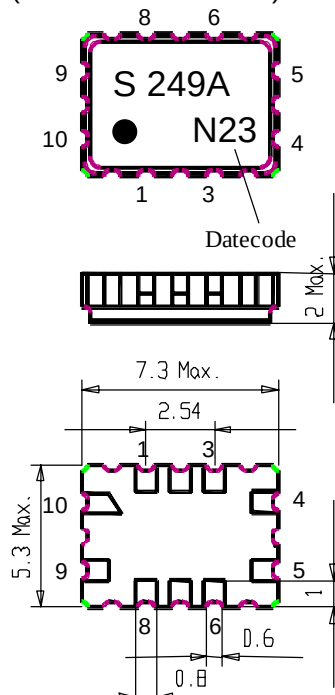
\*)  $\Delta f_c(\text{Hz}) = TC_f(\text{ppm/K}^2) \times (T_0 - T_A)^2 \times f_{T0}(\text{MHz})$

**Generated:****Checked/Approved:****VI TELEFILTER****Potsdamer Straße 18****D 14 513 TELTOW / Germany****Tel: (+49) 3328 4784-52 / Fax: (+49) 3328 4784-30****E-Mail: [tft@telefilter.com](mailto:tft@telefilter.com)****Vectron International, Inc.****267 Lowell Road****Hudson, NH 03051 / USA****Tel: (603) 598-0070 Fax: (603) 598-0075****E-Mail: [vti@vtinh.com](mailto:vti@vtinh.com)**

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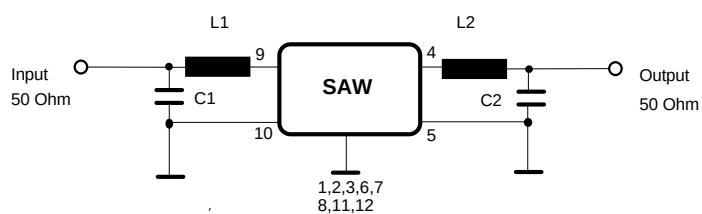
**VI TELEFILTER****Filter Specification****TFS 249A****2/5****Construction and pin connection**

(All dimensions in mm)



|    |                 |
|----|-----------------|
| 1  | Ground          |
| 2  | Ground          |
| 3  | Ground          |
| 4  | Output          |
| 5  | OutputRF Return |
| 6  | Ground          |
| 7  | Ground          |
| 8  | Ground          |
| 9  | Input           |
| 10 | Input RF Return |

|           |           |
|-----------|-----------|
| Datecode: | Year+week |
| L         | 1999      |
| M         | 2000      |
| N         | 2001      |
| ...       |           |

**50  $\Omega$  matching network:****VI TELEFILTER**

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**VI TELEFILTER****Filter Specification****TFS 249A****3/5****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. 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;

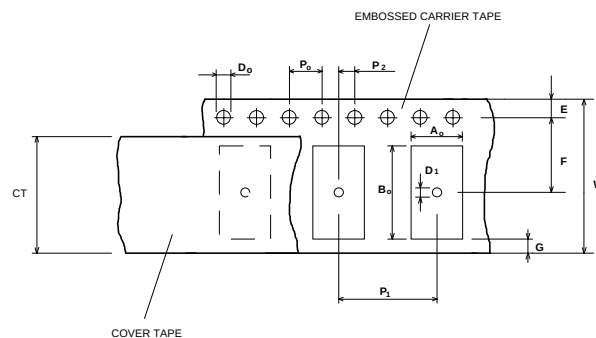
**Packing**

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;

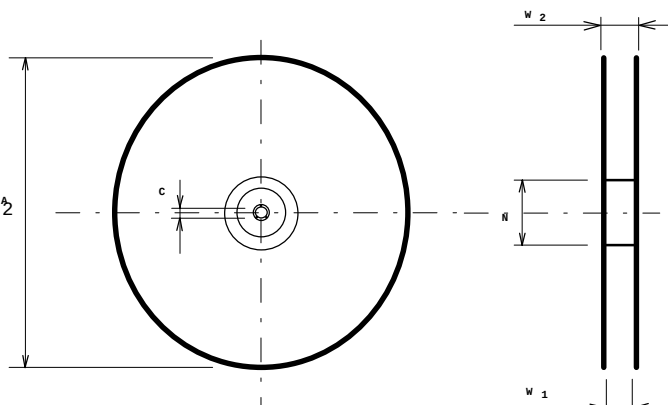
max. pieces of filters per reel: 3000  
Reel of empty components at start: min 300 mm  
Reel of empty components at start including leader: min 500 mm  
Trailer min 300 mm

**Tape (all dimensions in mm)**

W : 16 ± 0,3  
Po : 4 ± 0,1  
Do : 1,5 ± 0,1  
E : 1,75 ± 0,1  
F : 7,5 ± 0,1  
G (min) : 0,60  
P2 : 2 ± 0,10  
P1 : 8 ± 0,10  
D1(min) : 1,5  
Ao : 5,5 ± 0,1  
Bo : 7,5 ± 0,1  
CT : 13,5 ± 0,1

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

A : 330  
W1 : 16,4 +2,0  
W2 (max) : 22,4  
N (min) : 50  
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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**VI TELEFILTER****Filter Specification****TFS 249A****4/5****Air reflow temperature conditions**

1st and 2nd air reflow profile

|                     |                     |                      |                  |
|---------------------|---------------------|----------------------|------------------|
| <b>Name:</b>        | pre-heating periods | main-heating periods | peak temperature |
| <b>Temperature:</b> | 150 °C - 170 °C     | over 200 °C          | 255 °C ± 5 °C    |
| <b>Time:</b>        | 60 sec. - 90 sec.   | 20 sec. - 25 sec.    |                  |

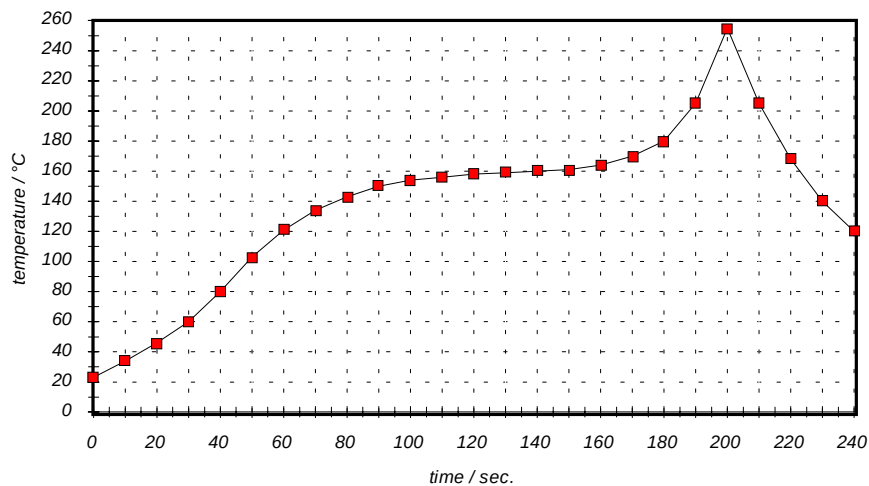
**Chip-mount air reflow profile**

Table for temperature vs. time during the air reflow process

Tolerance of temperatures: ± 5 °C

| <u>time / sec.</u> | <u>temperature / °C</u> | <u>time / sec.</u> | <u>temperature / °C</u> |
|--------------------|-------------------------|--------------------|-------------------------|
| 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 249A****5/5**

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**History**

| Version                          | Reason of Changes                                 | Name                 | Date       |
|----------------------------------|---------------------------------------------------|----------------------|------------|
| <b>Development specification</b> |                                                   |                      |            |
| 1.0                              | - generated according to Hudson's specification   | Dr. Sabah            | 30.08.2000 |
| 1.1                              | - Changed: group delay ripple:100ns 50ns          | Dr. Sabah<br>Steiner | 07.09.2000 |
|                                  | - Changed: terminating impedance                  |                      | 28.05.2001 |
| 1.2                              | - change the 40 dB bandwidth to max 11 MHz        |                      |            |
| <b>Filter specification</b>      |                                                   |                      |            |
| 2.0                              | final filter specification                        | Steiner              | 08.06.2001 |
|                                  | - typical values and terminating impedances added |                      |            |

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