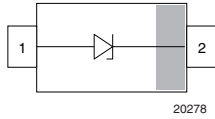
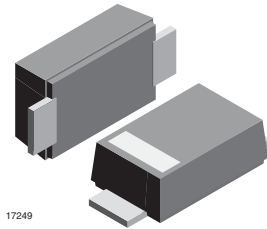


## Surface Mount ESD Protection Diodes



20278



17249

### MARKING (example only)



22623

Bar = cathode marking

YY = type code (see table below)

XX = date code

### FEATURES

- 200 W peak pulse power capability with a 10/1000  $\mu$ s waveform, repetition rate (duty cycle): 0.01 %
- Low-profile package
- Wave and reflow solderable
- ESD-protection acc. IEC 61000-4-2  $\pm$  30 kV contact discharge  $\pm$  30 kV air discharge
- ESD capability according to AEC-Q101: human body model: class H3B: > 8 kV
- Low incremental surge resistance, excellent clamping capability
- “Low-Noise” technology - very fast response time
- AEC-Q101 qualified available
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

 AUTOMOTIVE  
GRADE  
Available

**RoHS**  
COMPLIANT  
**HALOGEN**  
**FREE**  
Available

### ORDERING INFORMATION

| PART NUMBER (EXAMPLE) | ENVIRONMENTAL AND QUALITY CODE |  |              | PACKAGING CODE |   | ORDERING CODE (EXAMPLE) |   |
|-----------------------|--------------------------------|--|--------------|----------------|---|-------------------------|---|
|                       | AEC-Q101 QUALIFIED             | RoHS-COMPLIANT + LEAD (Pb)-FREE TERMINATIONS |              | TIN PLATED     | 3K PER 7" REEL (8 mm TAPE), 30K/BOX = MOQ |                         | 10K PER 13" REEL (8 mm TAPE), 50K/BOX = MOQ |
|                       |                                | STANDARD                                     | HALOGEN-FREE |                |   |                         |   |
| SMF5V0A-              |                                | E  |              | 3              | -08                                       |                         | SMF5V0A-E3-08                               |
| SMF5V0A-              |                                |  | M            | 3              | -08                                       |                         | SMF5V0A-M3-08                               |
| SMF5V0A-              | H                              | E  |              | 3              | -08                                       |                         | SMF5V0A-HE3-08                              |
| SMF5V0A-              | H                              |  | M            | 3              | -08                                       |                         | SMF5V0A-HM3-08                              |
| SMF5V0A-              |                                | E  |              | 3              |   | -18                     | SMF5V0A-E3-18                               |
| SMF5V0A-              |                                |  | M            | 3              |   | -18                     | SMF5V0A-M3-18                               |
| SMF5V0A-              | H                              | E  |              | 3              |   | -18                     | SMF5V0A-HE3-18                              |
| SMF5V0A-              | H                              |  | M            | 3              |   | -18                     | SMF5V0A-HM3-18                              |

### PACKAGE DATA

| PACKAGE NAME   | MOLDING COMPOUND | WEIGHT (mg) | HEIGHT MAX. (mm) | LENGTH MAX. (mm) | WIDTH MAX. (mm) | MOLDING COMPOUND FLAMMABILITY RATING | MOISTURE SENSITIVITY LEVEL   | WHISKER TEST ACC. JESD 201 | SOLDERING CONDITIONS         |
|----------------|------------------|-------------|------------------|------------------|-----------------|--------------------------------------|------------------------------|----------------------------|------------------------------|
| SMF (DO-219AB) | Standard         | 15          | 1.08             | 3.9              | 1.9             | UL 94 V-0                            | MSL level 1 (acc. J-STD-020) | class 2                    | Peak temperature max. 260 °C |
|                | Halogen-free     |             |                  |                  |                 |                                      |                              |                            |                              |



| ABSOLUTE MAXIMUM RATINGS (T <sub>amb</sub> = 25 °C, unless otherwise specified) |  |                   |                                  |      |
|---|--|-------------------|----------------------------------|------|
| PARAMETER   | TEST CONDITIONS  | SYMBOL            | VALUE                            | UNIT |
| Peak pulse current  | t <sub>p</sub> = 10/1000 μs waveform                                 | I <sub>PPM</sub>  | see "Electrical Characteristics" | A    |
| Peak pulse power  | t <sub>p</sub> = 8/20 μs waveform acc. IEC 61000-4-5                 | P <sub>PP</sub>   | 1000                             | W    |
|   | t <sub>p</sub> = 10/1000 μs waveform                                 |                   | 200                              | W    |
| Peak forward surge current  | 8.3 ms single half sine-wave   | I <sub>FSM</sub>  | 50                               | A    |
| ESD immunity  | Contact discharge acc. IEC 61000-4-2; 10 pulses                      | V <sub>ESD</sub>  | ± 30                             | kV   |
|   | Air discharge acc. IEC 61000-4-2; 10 pulses                          |                   | ± 30                             | kV   |
| Thermal resistance  | Mounted on epoxy glass PCB with 3 mm x 3 mm, Cu pads (≥ 40 μm thick) | R <sub>thJA</sub> | 180                              | K/W  |
| Forward clamping voltage  | I <sub>F</sub> = 50A, t <sub>p</sub> = 400 μs                        | V <sub>F</sub>    | 2.5                              | V    |
| Junction temperature  |  | T <sub>J</sub>    | 175                              | °C   |
| Storage temperature range   |  | T <sub>stg</sub>  | -65 to +175                      | °C   |
| Operating temperature range   |  | T <sub>op</sub>   | -65 to +175                      | °C   |

| ELECTRICAL CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified) |           |              |   |                     |                         |                                     |  |  |  |                      |
|---|-----------|--------------|---|---------------------|-------------------------|-------------------------------------|--|--|--|----------------------|
| PART NUMBER   | TYPE CODE |              | REVERSE BREAKDOWN VOLTAGE at I <sub>T</sub> , t <sub>p</sub> = 5 ms | TEST CURRENT        | REVERSE WORKING VOLTAGE | REVERSE CURRENT at V <sub>RWM</sub> | PEAK PULSE CURRENT t <sub>p</sub> = 10/1000 μs | REVERSE CLAMPING VOLTAGE at I <sub>PPM</sub> | CAPACITANCE at V <sub>R</sub> = 0 V, f = 1 MHz | PROTECTION PATHS     |
|   | STD.      | HALOGEN-FREE | V <sub>BR</sub> MIN. (V)  | I <sub>T</sub> (mA) | V <sub>RWM</sub> (V)    | I <sub>R</sub> (μA)                 | I <sub>PPM</sub> (A)                           | V <sub>C</sub> MAX. (V)                      | C <sub>D</sub> TYP. (pF)                       | N <sub>channel</sub> |
| SMF5V0A   | AE        | NE           | 6.40  | 10                  | 5                       | 5                                   | 21.7   | 9.2  | 1120   | 1                    |
| SMF6V0A   | AG        | NG           | 6.67  | 10                  | 6                       | 26                                  | 19.4   | 10.3   | 1063   | 1                    |
| SMF6V5A   | AK        | NK           | 7.22  | 10                  | 6.5                     | 20                                  | 17.9   | 11.2   | 938  | 1                    |
| SMF7V0A   | AM        | NM           | 7.78  | 10                  | 7                       | 3                                   | 16.7   | 12   | 843  | 1                    |
| SMF7V5A   | AP        | NP           | 8.33  | 1                   | 7.5                     | 0.1                                 | 15.5   | 12.9   | 773  | 1                    |
| SMF8V0A   | AR        | NR           | 8.89  | 1                   | 8                       | 0.1                                 | 14.7   | 13.6   | 706  | 1                    |
| SMF8V5A   | AT        | NT           | 9.44  | 1                   | 8.5                     | 0.1                                 | 13.9   | 14.4   | 674  | 1                    |
| SMF9V0A   | AV        | NV           | 10  | 1                   | 9                       | 0.1                                 | 13.5   | 15.4   | 640  | 1                    |
| SMF10A  | AX        | NX           | 11.1  | 1                   | 10                      | 0.1                                 | 11.8   | 17   | 562  | 1                    |
| SMF11A  | AZ        | NZ           | 12.2  | 1                   | 11                      | 0.1                                 | 11   | 18.2   | 509  | 1                    |
| SMF12A  | BE        | OE           | 13.3  | 1                   | 12                      | 0.1                                 | 10.1   | 19.9   | 483  | 1                    |
| SMF13A  | BG        | OG           | 14.4  | 1                   | 13                      | 0.1                                 | 9.3  | 21.5   | 423  | 1                    |
| SMF14A  | BK        | OK           | 15.6  | 1                   | 14                      | 0.1                                 | 8.6  | 23.2   | 392  | 1                    |
| SMF15A  | BM        | OM           | 16.7  | 1                   | 15                      | 0.1                                 | 8.2  | 24.4   | 367  | 1                    |
| SMF16A  | BP        | OP           | 17.8  | 1                   | 16                      | 0.1                                 | 7.7  | 26   | 343  | 1                    |
| SMF17A  | BR        | OR           | 18.9  | 1                   | 17                      | 0.1                                 | 7.2  | 27.6   | 324  | 1                    |
| SMF18A  | BT        | OT           | 20  | 1                   | 18                      | 0.1                                 | 6.8  | 29.2   | 320  | 1                    |
| SMF20A  | BV        | OV           | 22.2  | 1                   | 20                      | 0.1                                 | 6.2  | 32.4   | 283  | 1                    |
| SMF22A  | BX        | OX           | 24.4  | 1                   | 22                      | 0.1                                 | 5.6  | 35.5   | 271  | 1                    |
| SMF24A  | BZ        | OZ           | 26.7  | 1                   | 24                      | 0.1                                 | 5.1  | 38.9   | 244  | 1                    |
| SMF26A  | CE        | PE           | 28.9  | 1                   | 26                      | 0.1                                 | 4.8  | 42.1   | 230  | 1                    |
| SMF28A  | CG        | PG           | 31.1  | 1                   | 28                      | 0.1                                 | 4.4  | 45.4   | 227  | 1                    |
| SMF30A  | CK        | PK           | 33.3  | 1                   | 30                      | 0.1                                 | 4.1  | 48.4   | 207  | 1                    |
| SMF33A  | CM        | PM           | 36.7  | 1                   | 33                      | 0.1                                 | 3.8  | 53.3   | 198  | 1                    |
| SMF36A  | CP        | PP           | 40  | 1                   | 36                      | 0.1                                 | 3.4  | 58.1   | 178  | 1                    |
| SMF40A  | CR        | PR           | 44.4  | 1                   | 40                      | 0.1                                 | 3.1  | 64.5   | 172  | 1                    |
| SMF43A  | CT        | PT           | 47.8  | 1                   | 43                      | 0.1                                 | 2.9  | 69.4   | 165  | 1                    |
| SMF45A  | CV        | PV           | 50  | 1                   | 45                      | 0.1                                 | 2.8  | 72.7   | 162  | 1                    |
| SMF48A  | CX        | PX           | 53.3  | 1                   | 48                      | 0.1                                 | 2.6  | 77.4   | 161  | 1                    |
| SMF51A  | CZ        | PZ           | 56.7  | 1                   | 51                      | 0.1                                 | 2.4  | 82.4   | 151  | 1                    |
| SMF54A  | CA        | PA           | 60  | 1                   | 54                      | 0.1                                 | 2.25   | 88   | 148  | 1                    |
| SMF58A  | CC        | PC           | 64.4  | 1                   | 58                      | 0.1                                 | 2.1  | 95   | 144  | 1                    |

**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

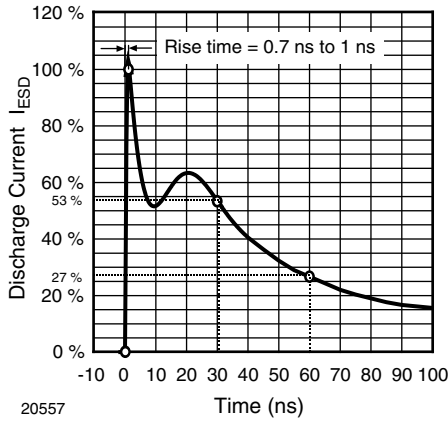


Fig. 1 - ESD Discharge Current Wave Form acc. IEC 61000-4-2 (330  $\Omega$ /150pF)

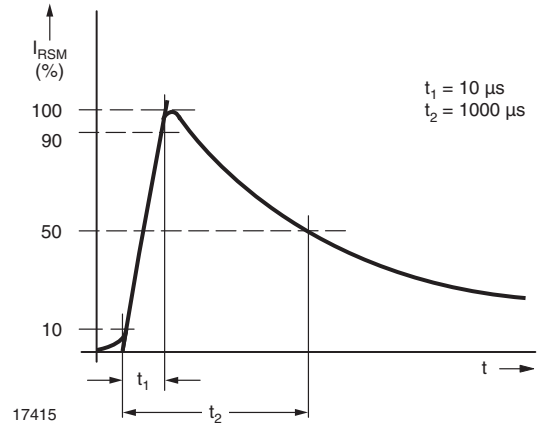


Fig. 4 - Pulse Waveform

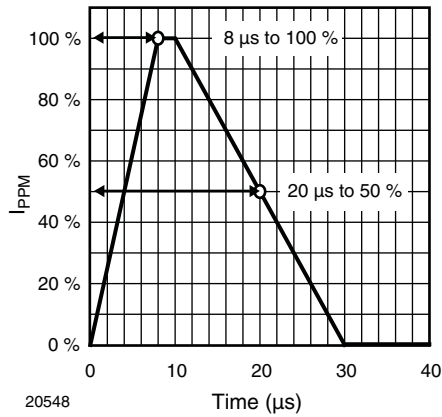


Fig. 2 - 8/20  $\mu\text{s}$  Peak Pulse Current Wave Form acc. IEC 61000-4-5

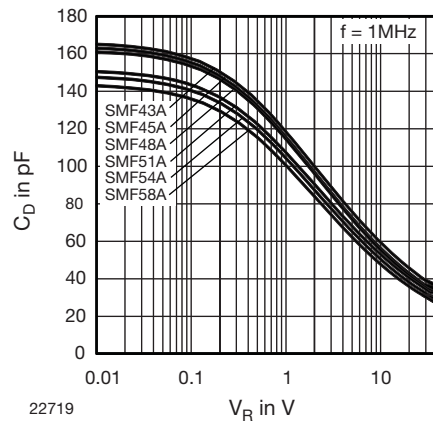


Fig. 5 - Typical Capacitance  $C_D$  vs. Reverse Voltage  $V_R$

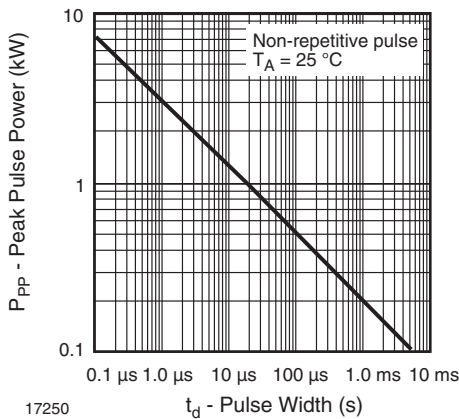


Fig. 3 - Peak Pulse Power Rating

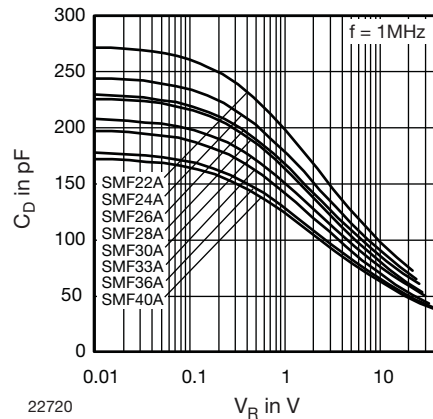


Fig. 6 - Typical Capacitance  $C_D$  vs. Reverse Voltage  $V_R$

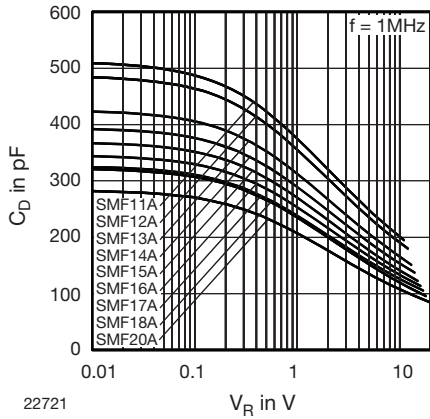


Fig. 7 - Typical Capacitance  $C_D$  vs. Reverse Voltage  $V_R$

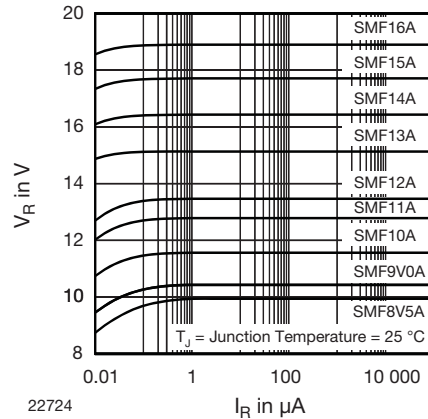


Fig. 10 - Typical Reverse Voltage  $V_R$  vs. Reverse Current  $I_R$

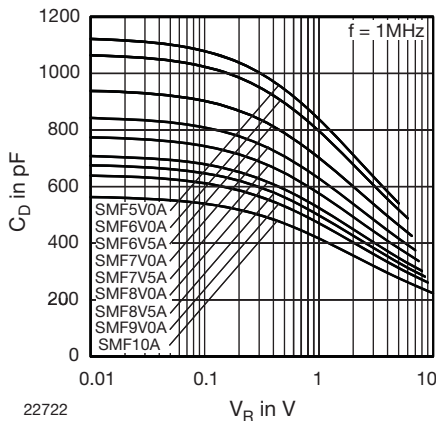


Fig. 8 - Typical Capacitance  $C_D$  vs. Reverse Voltage  $V_R$

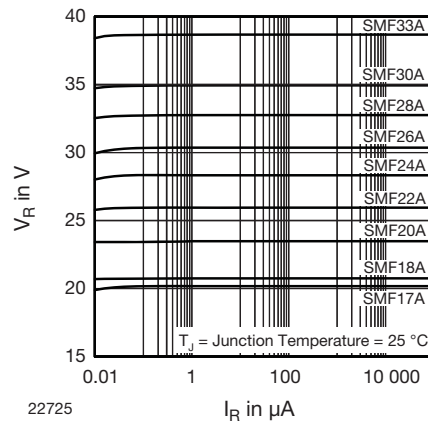


Fig. 11 - Typical Reverse Voltage  $V_R$  vs. Reverse Current  $I_R$

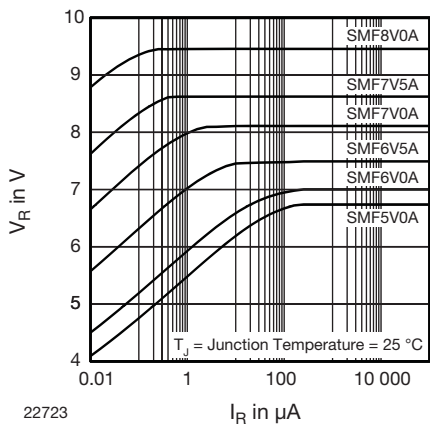


Fig. 9 - Typical Reverse Voltage  $V_R$  vs. Reverse Current  $I_R$

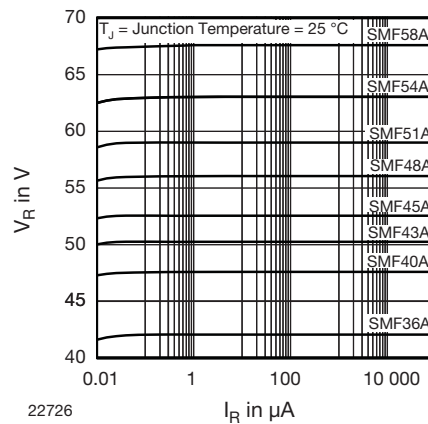
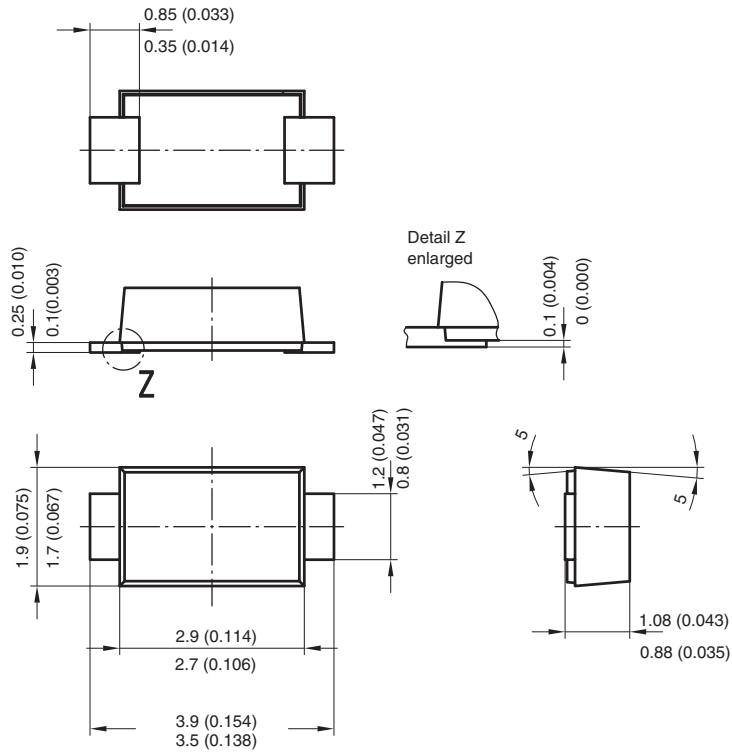


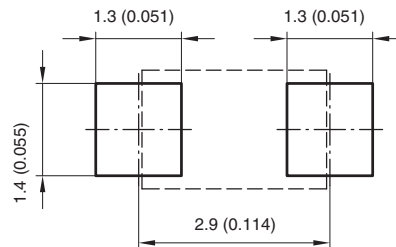
Fig. 12 - Typical Reverse Voltage  $V_R$  vs. Reverse Current  $I_R$



## PACKAGE DIMENSIONS in millimeters (inches): SMF



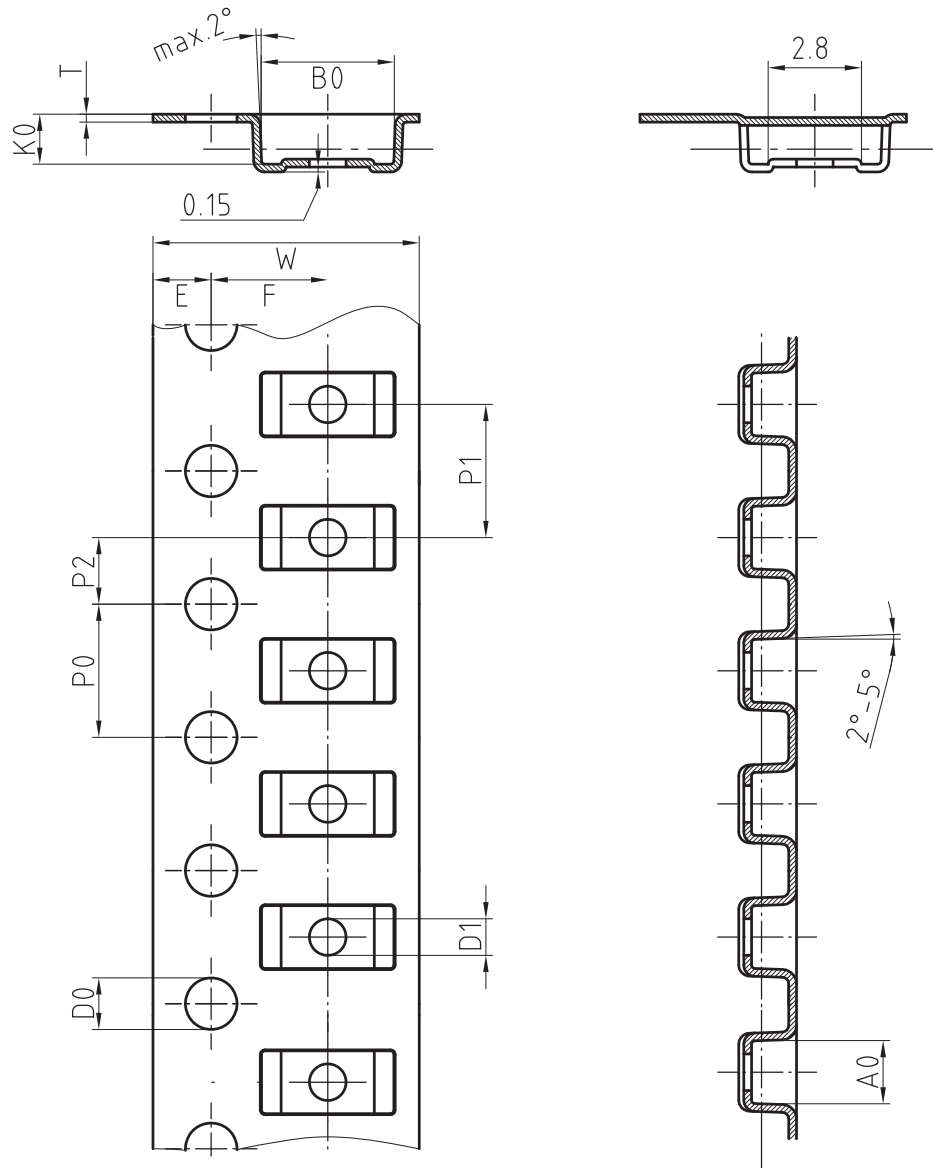
Foot print recommendation:



Created - Date: 15. February 2005  
Rev. 3 - Date: 13. March 2007  
Document no.:S8-V-3915.01-001 (4)  
17247



**BLISTERTAPE DIMENSIONS** in millimeters (inches)



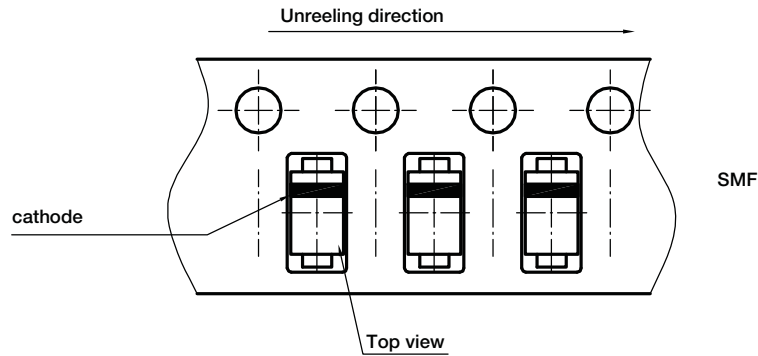
| Mat: | A0  | B0  | K0  | W   | T     | P0  | P2  | P1  | D0  | D1 | E    | F   |
|------|-----|-----|-----|-----|-------|-----|-----|-----|-----|----|------|-----|
| PS   | 1.9 | 4.0 | 1.5 | 8.0 | 0.235 | 4.0 | 2.0 | 4.0 | 1.5 | 1  | 1.75 | 3.5 |

Document-No.: S8-V-3717.02-001 (3)

18513



**ORIENTATION IN CARRIER TAPE - SMF**



Document no.: S8-V-3717.02-003 (4)  
Created - Date: 09. Feb. 2010  
22670



## **Disclaimer**

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.