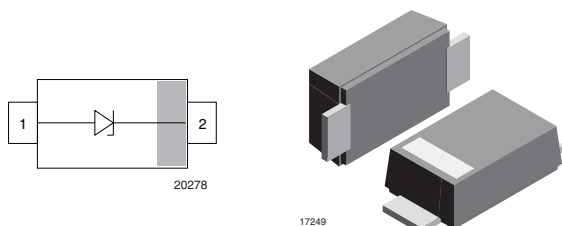
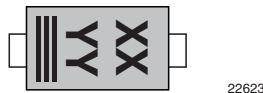


# 400 W TransZorb® Transient Voltage Suppressor (TVS) Diode in SMF-Package



| PRIMARY CHARACTERISTICS |                 |
|-------------------------|-----------------|
| $V_{BR}$                | 6.4 V to 78.2 V |
| $V_{WM}$                | 5.0 V to 63 V   |
| $P_{PPM}$               | 400 W           |
| $T_J$ max.              | 175 °C          |
| Polarity                | Uni-directional |
| Package                 | DO-219AB (SMF)  |

## MARKING (example only)



Bar = cathode marking

YY = type code (see table below)

XX = date code

## FEATURES

- 400 W peak pulse power capability with a 10/1000  $\mu$ s waveform
- Tolerance of the avalanche breakdown voltage  
 $\pm 5\%$  VTVSxxxA...  
 $\pm 2\%$  VTVSxxxG...
- Low-profile package
- Wave and reflow solderable
- ESD-protection acc. IEC 61000-4-2  
 $\pm 30$  kV contact discharge  
 $\pm 30$  kV air discharge
- Excellent clamping capability
- "Low-Noise" technology - very fast response time
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



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

| ORDERING INFORMATION     |                       |                                |                                                    |               |                                                       |                                                         |                            |
|--------------------------|-----------------------|--------------------------------|----------------------------------------------------|---------------|-------------------------------------------------------|---------------------------------------------------------|----------------------------|
| PART NUMBER<br>(EXAMPLE) | TOLERANCE<br>$V_{BR}$ | ENVIRONMENTAL AND QUALITY CODE |                                                    |               | PACKAGING CODE                                        |                                                         | ORDERING CODE<br>(EXAMPLE) |
|                          |                       | AEC-Q101<br>QUALIFIED          | RoHS-COMPLIANT +<br>LEAD (Pb)-FREE<br>TERMINATIONS | TIN<br>PLATED | 3K PER<br>7" REEL<br>(8 mm TAPE),<br>30K/BOX =<br>MOQ | 10K PER<br>13" REEL<br>(8 mm TAPE),<br>50K/BOX =<br>MOQ |                            |
| VTVS5V0ASMF-             | $\pm 5\%$             |                                | M                                                  | 3             | -08                                                   |                                                         | VTVS5V0ASMF-M3-08          |
| VTVS5V0ASMF-             | $\pm 5\%$             | H                              | M                                                  | 3             | -08                                                   |                                                         | VTVS5V0ASMF-HM3-08         |
| VTVS5V0ASMF-             | $\pm 5\%$             |                                | M                                                  | 3             |                                                       | -18                                                     | VTVS5V0ASMF-M3-18          |
| VTVS5V0ASMF-             | $\pm 5\%$             | H                              | M                                                  | 3             |                                                       | -18                                                     | VTVS5V0ASMF-HM3-18         |
| VTVS5V0GSMF-             | $\pm 2\%$             |                                | M                                                  | 3             | -08                                                   |                                                         | VTVS5V0GSMF-M3-08          |
| VTVS5V0GSMF-             | $\pm 2\%$             | H                              | M                                                  | 3             | -08                                                   |                                                         | VTVS5V0GSMF-HM3-08         |
| VTVS5V0GSMF-             | $\pm 2\%$             |                                | M                                                  | 3             |                                                       | -18                                                     | VTVS5V0GSMF-M3-18          |
| VTVS5V0GSMF-             | $\pm 2\%$             | H                              | M                                                  | 3             |                                                       | -18                                                     | VTVS5V0GSMF-HM3-18         |

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

**ABSOLUTE MAXIMUM RATINGS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

| PARAMETER                | TEST CONDITIONS                                 | SYMBOL     | VALUE                            | UNIT               |
|--------------------------|-------------------------------------------------|------------|----------------------------------|--------------------|
| Peak pulse current       | $t_p = 10/1000\text{ }\mu\text{s}$ waveform     | $I_{PPM}$  | see "Electrical Characteristics" | A                  |
| Peak pulse power         | $t_p = 10/1000\text{ }\mu\text{s}$ waveform     | $P_{PP}$   | 400                              | W                  |
| ESD immunity             | Contact discharge acc. IEC 61000-4-2; 10 pulses | $V_{ESD}$  | $\pm 30$                         | kV                 |
|                          | Air discharge acc. IEC 61000-4-2; 10 pulses     |            | $\pm 30$                         | kV                 |
| Thermal resistance       | Mounted on infinite heat sink                   | $R_{thJL}$ | 20                               | K/W                |
| Forward clamping voltage | $I_F = 50\text{ A}$ , $t_p = 1\text{ ms}$       | $V_F$      | 1.8                              | V                  |
| Operating temperature    | Junction temperature                            | $T_J$      | -55 to +175                      | $^{\circ}\text{C}$ |
| Storage temperature      |                                                 | $T_{STG}$  | -55 to +175                      | $^{\circ}\text{C}$ |

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

| PART NUMBER | TYPE CODE    | REVERSE BREAKDOWN VOLTAGE at $T_J = 25\text{ }^{\circ}\text{C}$ , $I_T = 1\text{ mA}$ |                   | STAND-OFF VOLTAGE | REVERSE CURRENT at $V_{RWM}$ | PEAK PULSE CURRENT $t_p = 10/1000\text{ }\mu\text{s}$ | REVERSE CLAMPING VOLTAGE at $I_{PPM}$ | CAP. at $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ | PROTECTION PATHS |
|-------------|--------------|---------------------------------------------------------------------------------------|-------------------|-------------------|------------------------------|-------------------------------------------------------|---------------------------------------|-------------------------------------------------|------------------|
|             | HALOGEN-FREE | $V_{BR}$ (V) MIN.                                                                     | $V_{BR}$ (V) MAX. | $V_{RWM}$ (V)     | $I_R$ ( $\mu\text{A}$ )      | $I_{PPM}$ (A)                                         | $V_C$ MAX. (V)                        | $C_D$ TYP. (pF)                                 | $N_{channel}$    |
| VTVS5V0ASMF | 905          | 6.4                                                                                   | 7.0               | 5.00              | 5                            | 42.95                                                 | 8.9                                   | 2095                                            | 1                |
| VTVS8V5ASMF | 915          | 9.5                                                                                   | 10.5              | 8.50              | 0.1                          | 28.24                                                 | 13.5                                  | 1270                                            | 1                |
| VTVS9V4ASMF | 925          | 10.5                                                                                  | 11.6              | 9.40              | 0.1                          | 25.48                                                 | 14.9                                  | 1130                                            | 1                |
| VTVS10ASMF  | 935          | 11.4                                                                                  | 12.7              | 10.30             | 0.05                         | 23.20                                                 | 16.3                                  | 988                                             | 1                |
| VTVS11ASMF  | 945          | 12.6                                                                                  | 13.9              | 11.20             | 0.05                         | 21.13                                                 | 18.0                                  | 910                                             | 1                |
| VTVS12ASMF  | 955          | 14.0                                                                                  | 15.4              | 12.40             | 0.05                         | 19.01                                                 | 20.1                                  | 807                                             | 1                |
| VTVS14ASMF  | 965          | 15.4                                                                                  | 17.0              | 13.80             | 0.05                         | 17.16                                                 | 22.2                                  | 752                                             | 1                |
| VTVS15ASMF  | 975          | 17.1                                                                                  | 18.8              | 15.10             | 0.05                         | 15.47                                                 | 25                                    | 684                                             | 1                |
| VTVS17ASMF  | 985          | 19.0                                                                                  | 21.0              | 16.90             | 0.05                         | 13.79                                                 | 28                                    | 606                                             | 1                |
| VTVS19ASMF  | 995          | 20.9                                                                                  | 23.2              | 18.70             | 0.05                         | 12.44                                                 | 31                                    | 558                                             | 1                |
| VTVS21ASMF  | 9A5          | 23.0                                                                                  | 25.4              | 20.50             | 0.05                         | 11.33                                                 | 34                                    | 513                                             | 1                |
| VTVS23ASMF  | 9B5          | 25.7                                                                                  | 28.4              | 22.60             | 0.05                         | 10.09                                                 | 38                                    | 480                                             | 1                |
| VTVS25ASMF  | 9C5          | 28.5                                                                                  | 31.5              | 25.20             | 0.05                         | 9.07                                                  | 42                                    | 433                                             | 1                |
| VTVS28ASMF  | 9D5          | 31.4                                                                                  | 34.7              | 27.90             | 0.05                         | 8.21                                                  | 47                                    | 412                                             | 1                |
| VTVS31ASMF  | 9E5          | 34.2                                                                                  | 37.8              | 30.60             | 0.05                         | 7.51                                                  | 51                                    | 380                                             | 1                |
| VTVS33ASMF  | 9F5          | 37.1                                                                                  | 41.0              | 33.30             | 0.05                         | 6.91                                                  | 55                                    | 379                                             | 1                |
| VTVS36ASMF  | 9G5          | 40.9                                                                                  | 45.2              | 36.00             | 0.05                         | 6.24                                                  | 61                                    | 342                                             | 1                |
| VTVS40ASMF  | 9H5          | 44.7                                                                                  | 49.4              | 39.60             | 0.05                         | 5.70                                                  | 67                                    | 309                                             | 1                |
| VTVS43ASMF  | 9J5          | 48.5                                                                                  | 53.6              | 43.20             | 0.05                         | 5.23                                                  | 73                                    | 292                                             | 1                |
| VTVS47ASMF  | 9K5          | 53.2                                                                                  | 58.8              | 46.80             | 0.05                         | 4.76                                                  | 80                                    | 293                                             | 1                |
| VTVS52ASMF  | 9L5          | 58.9                                                                                  | 65.1              | 52.20             | 0.05                         | 4.28                                                  | 89                                    | 242                                             | 1                |
| VTVS58ASMF  | 9M5          | 64.6                                                                                  | 71.4              | 57.60             | 0.05                         | 3.89                                                  | 98                                    | 245                                             | 1                |
| VTVS63ASMF  | 9N5          | 70.8                                                                                  | 78.2              | 63.00             | 0.05                         | 3.54                                                  | 108                                   | 227                                             | 1                |

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

| PART NUMBER | TYPE CODE    | REVERSE BREAKDOWN VOLTAGE at $T_J = 25\text{ }^{\circ}\text{C}$ , $I_T = 1\text{ mA}$ |                   | STAND-OFF VOLTAGE | REVERSE CURRENT at $V_{RWM}$ | PEAK PULSE CURRENT $t_p = 10/1000\text{ }\mu\text{s}$ | REVERSE CLAMPING VOLTAGE at $I_{PPM}$ | CAP. at $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ | PROTECTION PATHS |
|-------------|--------------|---------------------------------------------------------------------------------------|-------------------|-------------------|------------------------------|-------------------------------------------------------|---------------------------------------|-------------------------------------------------|------------------|
|             | HALOGEN-FREE | $V_{BR}$ (V) MIN.                                                                     | $V_{BR}$ (V) MAX. | $V_{RWM}$ (V)     | $I_R$ ( $\mu\text{A}$ )      | $I_{PPM}$ (A)                                         | $V_C$ MAX. (V)                        | $C_D$ TYP. (pF)                                 | $N_{channel}$    |
| VTVS5V0GSMF | 902          | 6.57                                                                                  | 6.84              | 5.00              | 5                            | 43.99                                                 | 8.9                                   | 2095                                            | 1                |
| VTVS8V5GSMF | 912          | 9.80                                                                                  | 10.20             | 8.50              | 0.1                          | 29.10                                                 | 13.5                                  | 1270                                            | 1                |
| VTVS9V4GSMF | 922          | 10.83                                                                                 | 11.28             | 9.40              | 0.1                          | 26.23                                                 | 14.9                                  | 1130                                            | 1                |
| VTVS10GSMF  | 932          | 11.81                                                                                 | 12.30             | 10.30             | 0.05                         | 23.98                                                 | 16.3                                  | 988                                             | 1                |
| VTVS11GSMF  | 942          | 12.99                                                                                 | 13.52             | 11.20             | 0.05                         | 21.75                                                 | 18.0                                  | 910                                             | 1                |
| VTVS12GSMF  | 952          | 14.41                                                                                 | 15.00             | 12.40             | 0.05                         | 19.53                                                 | 20.1                                  | 807                                             | 1                |
| VTVS14GSMF  | 962          | 15.88                                                                                 | 16.53             | 13.80             | 0.05                         | 17.67                                                 | 22.2                                  | 752                                             | 1                |
| VTVS15GSMF  | 972          | 17.60                                                                                 | 18.31             | 15.10             | 0.05                         | 15.89                                                 | 25                                    | 684                                             | 1                |
| VTVS17GSMF  | 982          | 19.60                                                                                 | 20.40             | 16.90             | 0.05                         | 14.21                                                 | 28                                    | 606                                             | 1                |
| VTVS19GSMF  | 992          | 21.61                                                                                 | 22.50             | 18.70             | 0.05                         | 12.84                                                 | 31                                    | 558                                             | 1                |
| VTVS21GSMF  | 9A2          | 23.72                                                                                 | 24.69             | 20.50             | 0.05                         | 11.67                                                 | 34                                    | 513                                             | 1                |
| VTVS23GSMF  | 9B2          | 26.51                                                                                 | 27.60             | 22.60             | 0.05                         | 10.40                                                 | 38                                    | 480                                             | 1                |
| VTVS25GSMF  | 9C2          | 29.40                                                                                 | 30.60             | 25.20             | 0.05                         | 9.35                                                  | 42                                    | 433                                             | 1                |
| VTVS28GSMF  | 9D2          | 32.39                                                                                 | 33.72             | 27.90             | 0.05                         | 8.45                                                  | 47                                    | 412                                             | 1                |
| VTVS31GSMF  | 9E2          | 35.28                                                                                 | 36.72             | 30.60             | 0.05                         | 7.74                                                  | 51                                    | 380                                             | 1                |
| VTVS33GSMF  | 9F2          | 38.27                                                                                 | 39.84             | 33.30             | 0.05                         | 7.11                                                  | 55                                    | 379                                             | 1                |
| VTVS36GSMF  | 9G2          | 42.19                                                                                 | 43.92             | 36.00             | 0.05                         | 6.43                                                  | 61                                    | 342                                             | 1                |
| VTVS40GSMF  | 9H2          | 46.11                                                                                 | 48.00             | 39.60             | 0.05                         | 5.87                                                  | 67                                    | 309                                             | 1                |
| VTVS43GSMF  | 9J2          | 50.03                                                                                 | 52.08             | 43.20             | 0.05                         | 5.39                                                  | 73                                    | 292                                             | 1                |
| VTVS47GSMF  | 9K2          | 54.88                                                                                 | 57.12             | 46.80             | 0.05                         | 4.90                                                  | 80                                    | 293                                             | 1                |
| VTVS52GSMF  | 9L2          | 60.76                                                                                 | 63.24             | 52.20             | 0.05                         | 4.41                                                  | 89                                    | 242                                             | 1                |
| VTVS58GSMF  | 9M2          | 66.64                                                                                 | 69.36             | 57.60             | 0.05                         | 4.01                                                  | 98                                    | 245                                             | 1                |
| VTVS63GSMF  | 9N2          | 73.01                                                                                 | 75.99             | 63.00             | 0.05                         | 3.65                                                  | 108                                   | 227                                             | 1                |



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

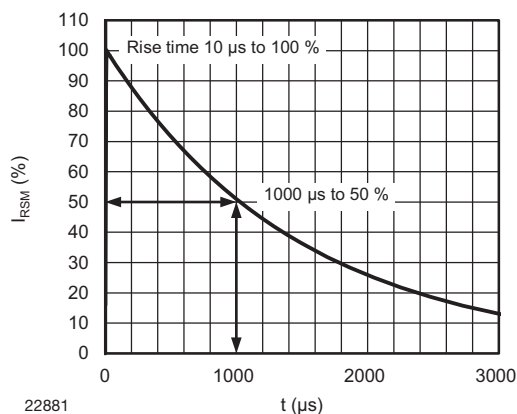


Fig. 1 - 10/1000  $\mu\text{s}$  Peak Pulse Current Wave Form

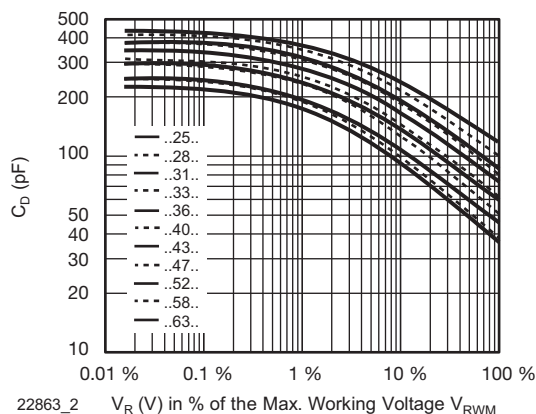


Fig. 4 - Typical Capacitance  $C_D$  vs. Reverse Voltage  $V_R$

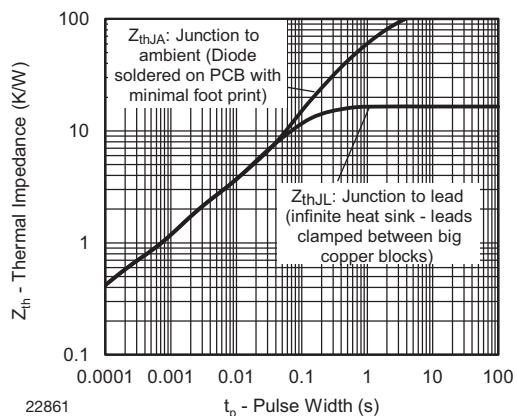


Fig. 2 - Thermal Impedance vs. Time

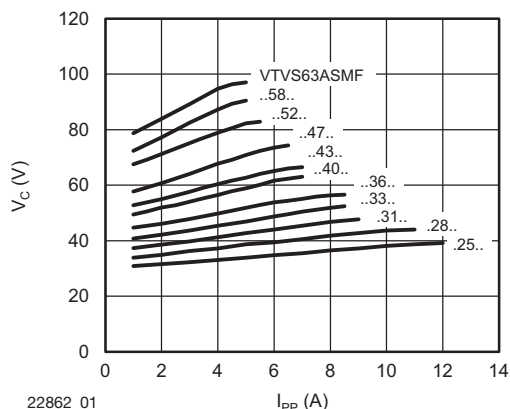


Fig. 5 - Typical Peak Clamping Voltage vs. Peak Pulse Current

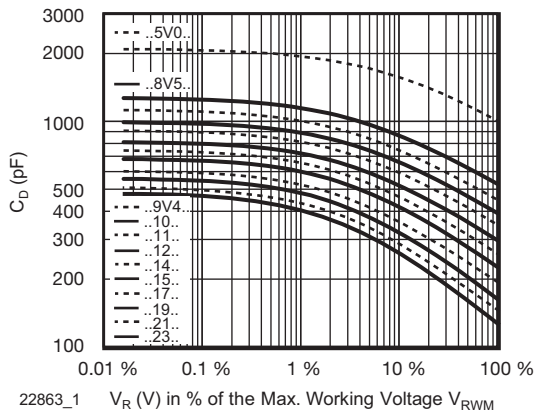


Fig. 3 - Typical Capacitance  $C_D$  vs. Reverse Voltage  $V_R$

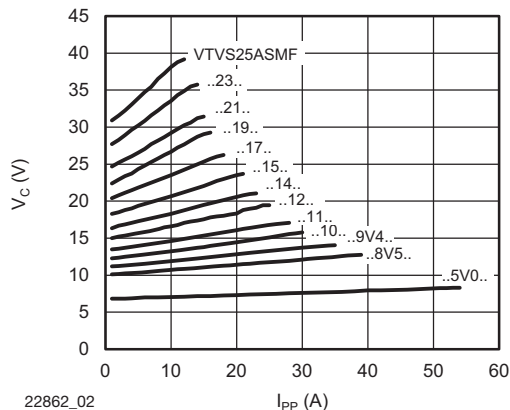
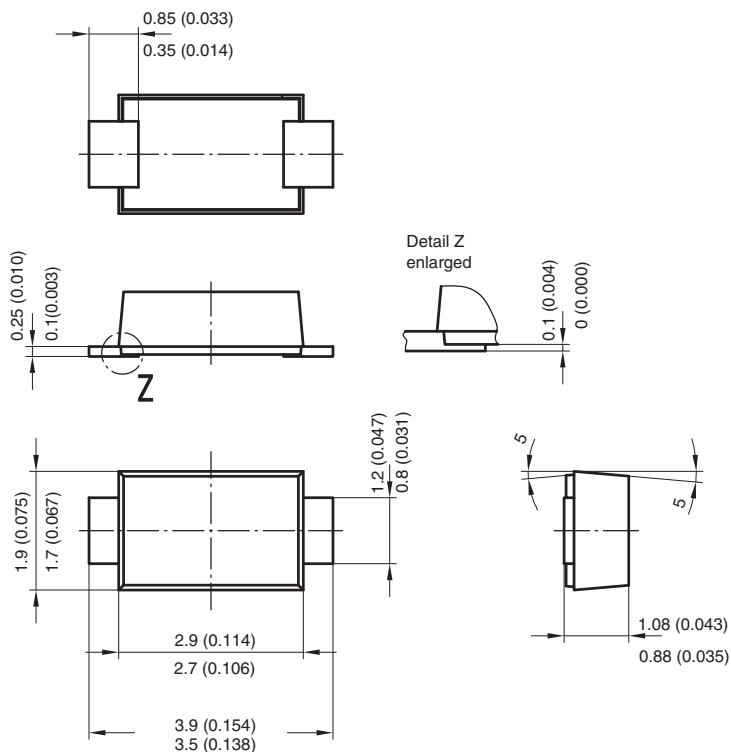


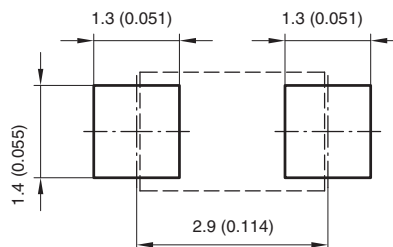
Fig. 6 - Typical Peak Clamping Voltage vs. Peak Pulse Current



## PACKAGE DIMENSIONS in millimeters (inches): SMF



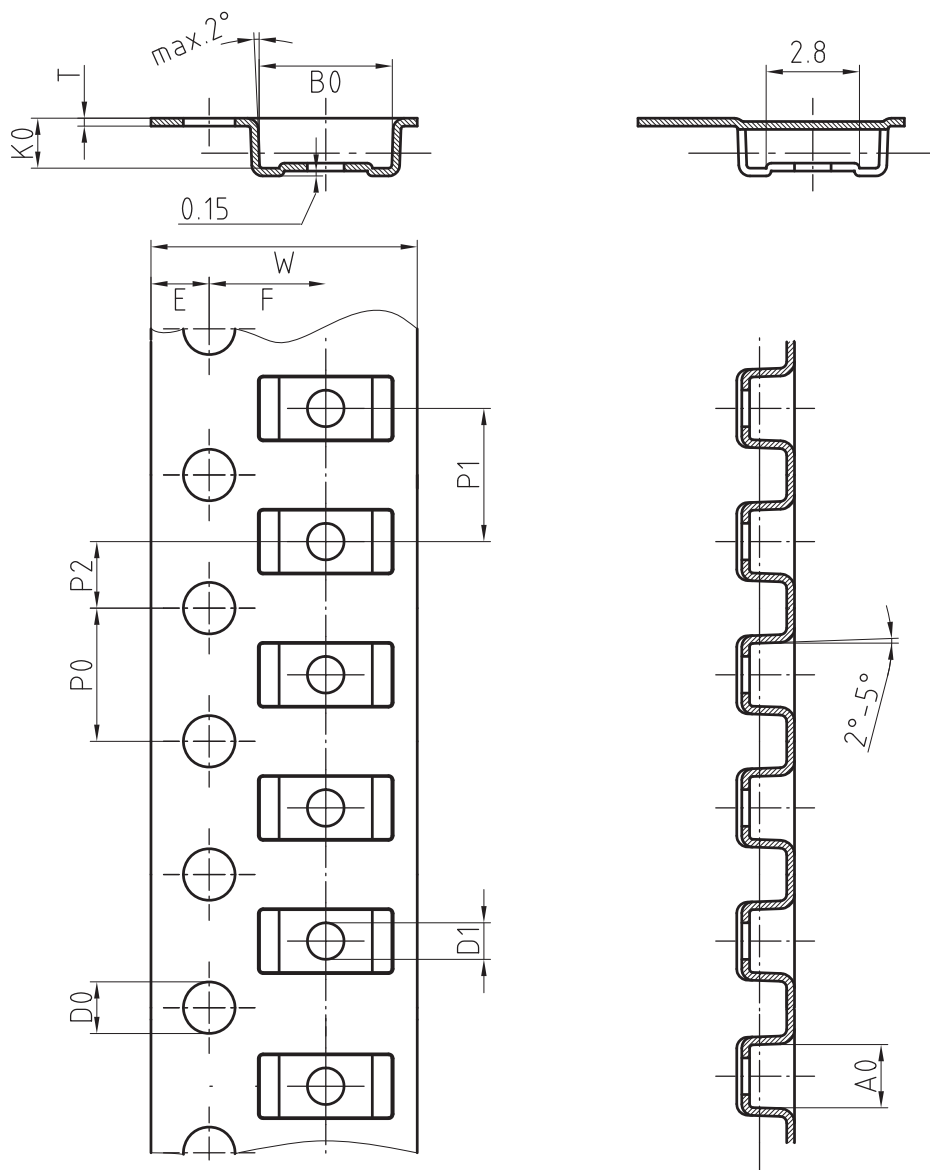
Foot print recommendation:



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



## BLISTER TAPE DIMENSIONS in millimeters (inches)



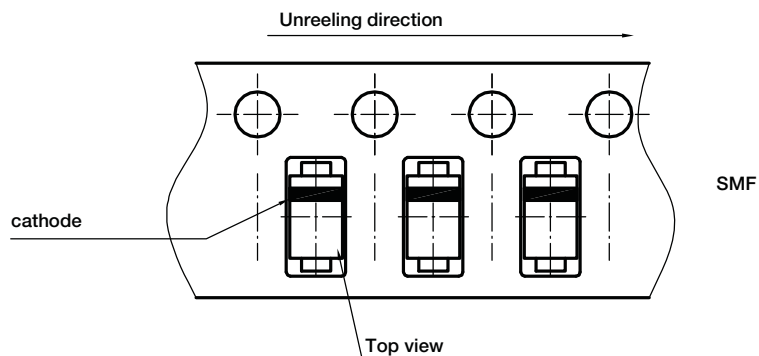
| Mat: | A0  | B0  | K0  | W   | T     | P0  | P2  | P1  | D0  | D1 | E    | F   |
|------|-----|-----|-----|-----|-------|-----|-----|-----|-----|----|------|-----|
| PS   | 1.9 | 4.0 | 1.5 | 8.0 | 0.235 | 4.0 | 2.0 | 4.0 | 1.5 | 1  | 1.75 | 3.5 |

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



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