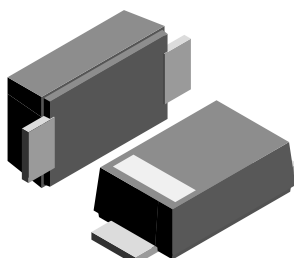
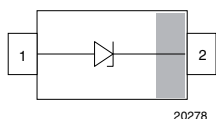


# 400 W TransZorb® Transient Voltage Suppressor (TVS) Diode in SMF-Package

## eSMP® Series



SMF (DO-219AB)

## MARKING (example only)



Bar = cathode marking

YYY = 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 available
- Compatible to SOD-123W package case outline or SOD-123F and SOD-123FL
- 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**

## LINKS TO ADDITIONAL RESOURCES



3D Models



Simulation Tools

**SPICE**

Models

## PRIMARY CHARACTERISTICS

|            |                 |
|------------|-----------------|
| $V_{BR}$   | 6.4 V to 78.2 V |
| $V_{WM}$   | 3.3 V to 63 V   |
| $P_{PPM}$  | 400 W           |
| $T_J$ max. | 175 °C          |
| Polarity   | Unidirectional  |
| Package    | SMF (DO-219AB)  |

## ORDERING INFORMATION

| PART NUMBER<br>(EXAMPLE) | TOLERANC<br>E V <sub>BR</sub> | ENVIRONMENTAL AND QUALITY CODE |                                                       |               | PACKAGING CODE                                    |                                                     | ORDERING CODE<br>(EXAMPLE) |
|--------------------------|-------------------------------|--------------------------------|-------------------------------------------------------|---------------|---------------------------------------------------|-----------------------------------------------------|----------------------------|
|                          |                               | AEC-Q101<br>QUALIFIED          | RoHS-COMPLIANT<br>+<br>LEAD (Pb)-FREE<br>TERMINATIONS | TIN<br>PLATED | 3K PER<br>7" REEL<br>(8 mm<br>TAPE), MOQ<br>= 30K | 10K PER<br>13" REEL<br>(8 mm<br>TAPE), MOQ<br>= 50K |                            |
|                          |                               |                                | HALOGEN-FREE                                          |               |                                                   |                                                     |                            |
| VTVS5V0ASMF-             | ± 5 %                         |                                | M                                                     | 3             | -08                                               |                                                     | VTVS5V0ASMF-M3-08          |
| VTVS5V0ASMF-             | ± 5 %                         | H                              | M                                                     | 3             | -08                                               |                                                     | VTVS5V0ASMF-HM3-08         |
| VTVS5V0ASMF-             | ± 5 %                         |                                | M                                                     | 3             |                                                   | -18                                                 | VTVS5V0ASMF-M3-18          |
| VTVS5V0ASMF-             | ± 5 %                         | H                              | M                                                     | 3             |                                                   | -18                                                 | VTVS5V0ASMF-HM3-18         |
| VTVS5V0GSMF-             | ± 2 %                         |                                | M                                                     | 3             | -08                                               |                                                     | VTVS5V0GSMF-M3-08          |
| VTVS5V0GSMF-             | ± 2 %                         | H                              | M                                                     | 3             | -08                                               |                                                     | VTVS5V0GSMF-HM3-08         |
| VTVS5V0GSMF-             | ± 2 %                         |                                | M                                                     | 3             |                                                   | -18                                                 | VTVS5V0GSMF-M3-18          |
| VTVS5V0GSMF-             | ± 2 %                         | H                              | M                                                     | 3             |                                                   | -18                                                 | VTVS5V0GSMF-HM3-18         |

**PACKAGE DATA**

| PACKAGE NAME   | MOLDING COMPOUND | WEIGHT (mg) | HEIGHT MAX. (mm) | LENGTH MAX. (mm) | WIDTH H MAX. (mm) | MOLDING COMPOUND FLAMMABILITY RATING | MOISTURE SENSITIVITY LEVEL   | WHISKER TEST ACC. JESD 201 | SOLDERING CONDITIONS         |
|----------------|------------------|-------------|------------------|------------------|-------------------|--------------------------------------|------------------------------|----------------------------|------------------------------|
| SMF (DO-219AB) | Halogen-free     | 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 |

**ABSOLUTE MAXIMUM RATINGS** ( $T_{amb} = 25\text{ °C}$ , 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                      | °C   |
| Storage temperature      |                                                 | $T_{STG}$  | -55 to +175                      | °C   |

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

| PART NUMBER | TYPE CODE    | REVERSE BREAKDOWN VOLTAGE at $T_J = 25\text{ °C}$ , $I_T = 1\text{ mA}$ |                  | STAND-OFF VOLTAGE | MAXIMUM REVERSE CURRENT at $V_{RWM}$ | MAXIMUM PEAK PULSE CURRENT $t_p = 10/1000\text{ }\mu\text{s}$ | MAXIMUM REVERSE CLAMPING VOLTAGE at $I_{PPM}$ | TYPICAL CAP. at $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ | PROTECTION PATHS |
|-------------|--------------|-------------------------------------------------------------------------|------------------|-------------------|--------------------------------------|---------------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------|------------------|
|             | HALOGEN-FREE | $V_{BR}(V)$ MIN.                                                        | $V_{BR}(V)$ MAX. | $V_{RWM}(V)$      | $I_R(\mu A)$                         | $I_{PPM}(A)$                                                  | $V_C(V)$                                      | $C_D(pF)$                                               | $N_{channel}$    |
| VTVS3V3ASMF | 9Z5          | 6.4                                                                     | 7.0              | 3.3               | 0.05                                 | 42.95                                                         | 8.9                                           | 2095                                                    | 1                |
| 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 | MAXIMUM REVERSE CURRENT at $V_{RWM}$ | MAXIMUM PEAK PULSE CURRENT $t_p = 10/1000\text{ }\mu\text{s}$ | MAXIMUM REVERSE CLAMPING VOLTAGE at $I_{PPM}$ | TYPICAL 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)                                                 | $V_C$ (V)                                     | $C_D$ (pF)                                              | $N_{channel}$    |
| VTVS3V3GSMF | 9Z2          | 6.57                                                                                  | 6.84              | 3.3               | 0.05                                 | 43.99                                                         | 8.9                                           | 2095                                                    | 1                |
| 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                |

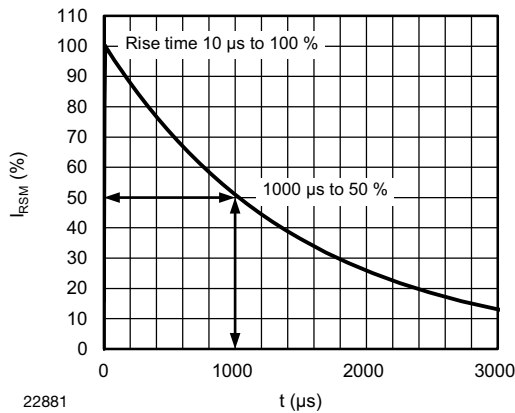
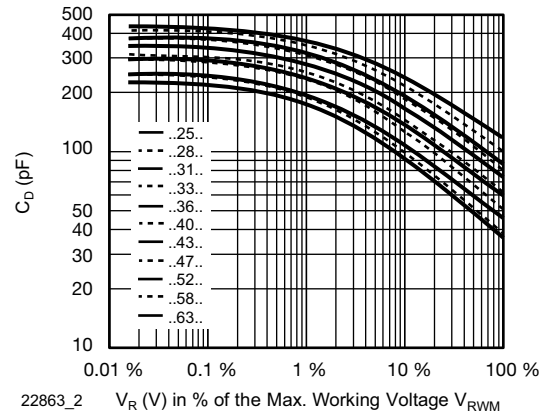
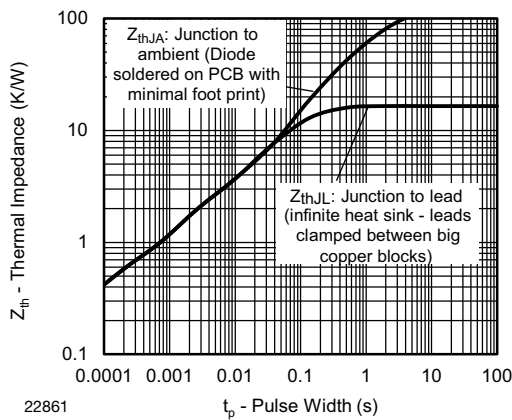
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

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

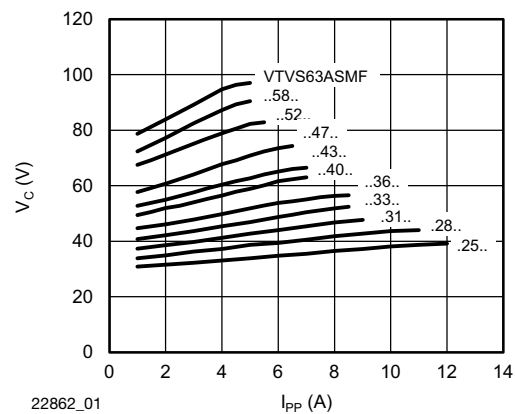


Fig. 5 - Typical Peak Clamping Voltage vs. Peak Pulse Current

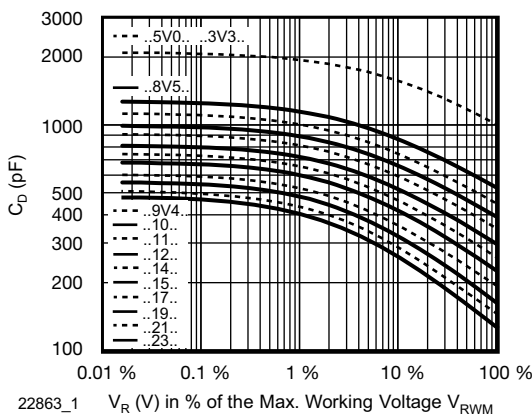
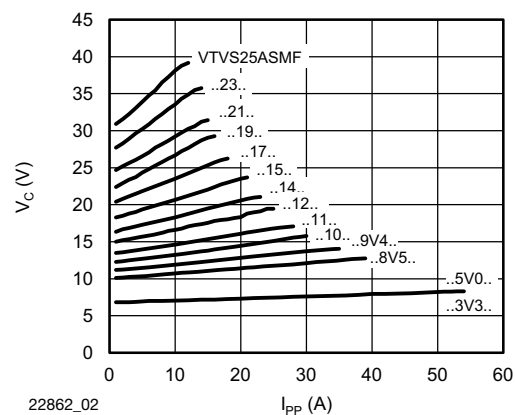
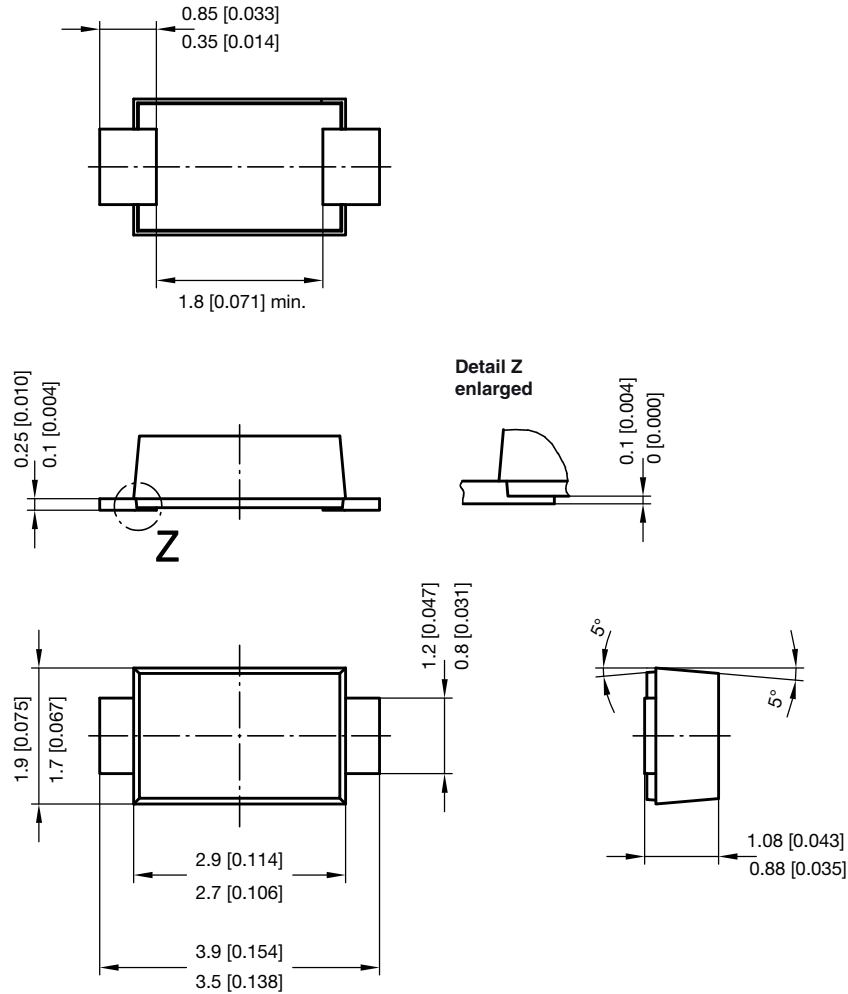
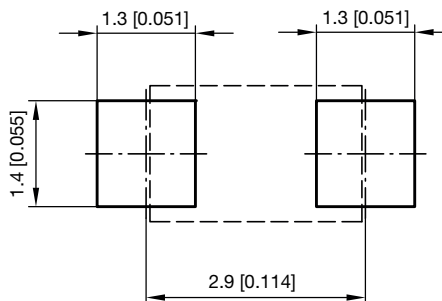

Fig. 3 - Typical Capacitance  $C_D$  vs. Reverse Voltage  $V_R$ 


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

**PACKAGE DIMENSIONS** in millimeters (inches): **SMF (DO-219AB)**


foot print recommendation:

Reflow soldering



Created - Date: 15. February 2005

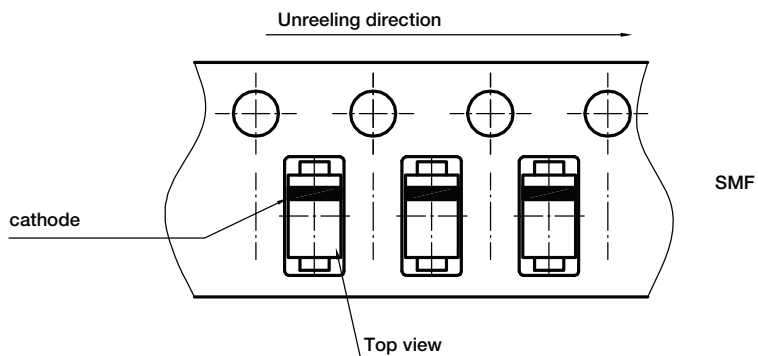
Rev. 6 - Date: 24.Feb.2021

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## ORIENTATION IN CARRIER TAPE - SMF



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