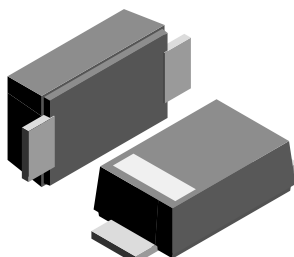
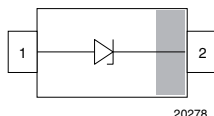
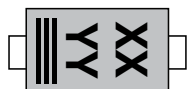


# Surface-Mount ESD Protection Diodes

## eSMP® Series


**SMF (DO-219AB)**

## 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 immunity 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
- 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)



## LINKS TO ADDITIONAL RESOURCES



3D Models



Simulation Tools



Models

## ORDERING INFORMATION

| PART<br>NUMBER<br>(EXAMPLE) | ENVIRONMENTAL AND QUALITY CODE |                                                 |              |               | PACKAGING CODE                              |                                               | ORDERING CODE<br>(EXAMPLE) |
|-----------------------------|--------------------------------|-------------------------------------------------|--------------|---------------|---------------------------------------------|-----------------------------------------------|----------------------------|
|                             | AEC-Q101<br>QUALIFIED          | RoHS-COMPLIANT +<br>LEAD (Pb)-FREE TERMINATIONS |              | TIN<br>PLATED | 3K PER 7" REEL<br>(8 mm TAPE),<br>MOQ = 30K | 10K PER 13" REEL<br>(8 mm TAPE),<br>MOQ = 50K |                            |
|                             |                                | 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** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , 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            | $t_p = 8/20\text{ }\mu\text{s}$ waveform acc. IEC 61000-4-5                                | $P_{PP}$   | 1000                             | W                  |
|                             | $t_p = 10/1000\text{ }\mu\text{s}$ waveform                                                |            | 200                              | W                  |
| Peak forward surge current  | 8.3 ms single half sine-wave                                                               | $I_{FSM}$  | 50                               | A                  |
| 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 epoxy glass PCB with 3 mm x 3 mm, Cu pads ( $\geq 40\text{ }\mu\text{m}$ thick) | $R_{thJA}$ | 180                              | K/W                |
| Forward clamping voltage    | $I_F = 50\text{ A}$ , $t_p = 400\text{ }\mu\text{s}$                                       | $V_F$      | 2.5                              | V                  |
| Junction temperature        |                                                                                            | $T_J$      | 175                              | $^{\circ}\text{C}$ |
| Storage temperature range   |                                                                                            | $T_{stg}$  | -65 to +175                      | $^{\circ}\text{C}$ |
| Operating temperature range |                                                                                            | $T_{op}$   | -65 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 $I_T$ , $t_p = 5\text{ ms}$ |                   | TEST CURRENT | 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 |
|-------------|-----------|--------------|----------------------------------------------------------|-------------------|--------------|-------------------|--------------------------------------|---------------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------|------------------|
|             | STD.      | HALOGEN-FREE | $V_{BR}$ MIN. (V)                                        | $V_{BR}$ MAX. (V) | $I_T$ (mA)   | $V_{RWM}$ (V)     | $I_R$ ( $\mu\text{A}$ )              | $I_{PPM}$ (A)                                                 | $V_C$ MAX. (V)                                | $C_D$ TYP. (pF)                                         | $N_{channel}$    |
| SMF5V0A     | AE        | NE           | 6.40                                                     | 7.1               | 10           | 5                 | 5                                    | 21.7                                                          | 9.2                                           | 1120                                                    | 1                |
| SMF6V0A     | AG        | NG           | 6.67                                                     | 7.4               | 10           | 6                 | 26                                   | 19.4                                                          | 10.3                                          | 1063                                                    | 1                |
| SMF6V5A     | AK        | NK           | 7.22                                                     | 8                 | 10           | 6.5               | 20                                   | 17.9                                                          | 11.2                                          | 938                                                     | 1                |
| SMF7V0A     | AM        | NM           | 7.78                                                     | 8.6               | 10           | 7                 | 3                                    | 16.7                                                          | 12                                            | 843                                                     | 1                |
| SMF7V5A     | AP        | NP           | 8.33                                                     | 9.3               | 1            | 7.5               | 0.1                                  | 15.5                                                          | 12.9                                          | 773                                                     | 1                |
| SMF8V0A     | AR        | NR           | 8.89                                                     | 9.9               | 1            | 8                 | 0.1                                  | 14.7                                                          | 13.6                                          | 706                                                     | 1                |
| SMF8V5A     | AT        | NT           | 9.44                                                     | 10.5              | 1            | 8.5               | 0.1                                  | 13.9                                                          | 14.4                                          | 674                                                     | 1                |
| SMF9V0A     | AV        | NV           | 10                                                       | 11.2              | 1            | 9                 | 0.1                                  | 13.5                                                          | 15.4                                          | 640                                                     | 1                |
| SMF10A      | AX        | NX           | 11.1                                                     | 12.3              | 1            | 10                | 0.1                                  | 11.8                                                          | 17                                            | 562                                                     | 1                |
| SMF11A      | AZ        | NZ           | 12.2                                                     | 13.5              | 1            | 11                | 0.1                                  | 11                                                            | 18.2                                          | 509                                                     | 1                |
| SMF12A      | BE        | OE           | 13.3                                                     | 14.7              | 1            | 12                | 0.1                                  | 10.1                                                          | 19.9                                          | 483                                                     | 1                |
| SMF13A      | BG        | OG           | 14.4                                                     | 16                | 1            | 13                | 0.1                                  | 9.3                                                           | 21.5                                          | 423                                                     | 1                |
| SMF14A      | BK        | OK           | 15.6                                                     | 17.3              | 1            | 14                | 0.1                                  | 8.6                                                           | 23.2                                          | 392                                                     | 1                |
| SMF15A      | BM        | OM           | 16.7                                                     | 18.5              | 1            | 15                | 0.1                                  | 8.2                                                           | 24.4                                          | 367                                                     | 1                |
| SMF16A      | BP        | OP           | 17.8                                                     | 19.7              | 1            | 16                | 0.1                                  | 7.7                                                           | 26                                            | 343                                                     | 1                |
| SMF17A      | BR        | OR           | 18.9                                                     | 20.9              | 1            | 17                | 0.1                                  | 7.2                                                           | 27.6                                          | 324                                                     | 1                |
| SMF18A      | BT        | OT           | 20                                                       | 22.3              | 1            | 18                | 0.1                                  | 6.8                                                           | 29.2                                          | 320                                                     | 1                |
| SMF20A      | BV        | OV           | 22.2                                                     | 24.6              | 1            | 20                | 0.1                                  | 6.2                                                           | 32.4                                          | 283                                                     | 1                |
| SMF22A      | BX        | OX           | 24.4                                                     | 27                | 1            | 22                | 0.1                                  | 5.6                                                           | 35.5                                          | 271                                                     | 1                |
| SMF24A      | BZ        | OZ           | 26.7                                                     | 29.6              | 1            | 24                | 0.1                                  | 5.1                                                           | 38.9                                          | 244                                                     | 1                |
| SMF26A      | CE        | PE           | 28.9                                                     | 32                | 1            | 26                | 0.1                                  | 4.8                                                           | 42.1                                          | 230                                                     | 1                |
| SMF28A      | CG        | PG           | 31.1                                                     | 34.4              | 1            | 28                | 0.1                                  | 4.4                                                           | 45.4                                          | 227                                                     | 1                |
| SMF30A      | CK        | PK           | 33.3                                                     | 36.9              | 1            | 30                | 0.1                                  | 4.1                                                           | 48.4                                          | 207                                                     | 1                |
| SMF33A      | CM        | PM           | 36.7                                                     | 40.6              | 1            | 33                | 0.1                                  | 3.8                                                           | 53.3                                          | 198                                                     | 1                |
| SMF36A      | CP        | PP           | 40                                                       | 44.3              | 1            | 36                | 0.1                                  | 3.4                                                           | 58.1                                          | 178                                                     | 1                |
| SMF40A      | CR        | PR           | 44.4                                                     | 49.1              | 1            | 40                | 0.1                                  | 3.1                                                           | 64.5                                          | 172                                                     | 1                |
| SMF43A      | CT        | PT           | 47.8                                                     | 52.9              | 1            | 43                | 0.1                                  | 2.9                                                           | 69.4                                          | 165                                                     | 1                |
| SMF45A      | CV        | PV           | 50                                                       | 55.3              | 1            | 45                | 0.1                                  | 2.8                                                           | 72.7                                          | 162                                                     | 1                |
| SMF48A      | CX        | PX           | 53.3                                                     | 59                | 1            | 48                | 0.1                                  | 2.6                                                           | 77.4                                          | 161                                                     | 1                |
| SMF51A      | CZ        | PZ           | 56.7                                                     | 62.7              | 1            | 51                | 0.1                                  | 2.4                                                           | 82.4                                          | 151                                                     | 1                |
| SMF54A      | CA        | PA           | 60                                                       | 66                | 1            | 54                | 0.1                                  | 2.25                                                          | 88                                            | 148                                                     | 1                |
| SMF58A      | CC        | PC           | 64.4                                                     | 70.8              | 1            | 58                | 0.1                                  | 2.1                                                           | 95                                            | 144                                                     | 1                |

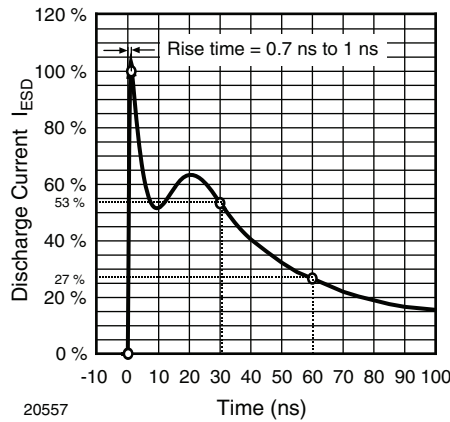
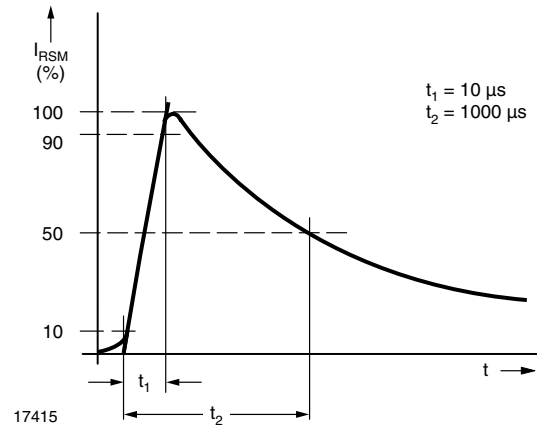
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

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


Fig. 4 - Pulse Waveform

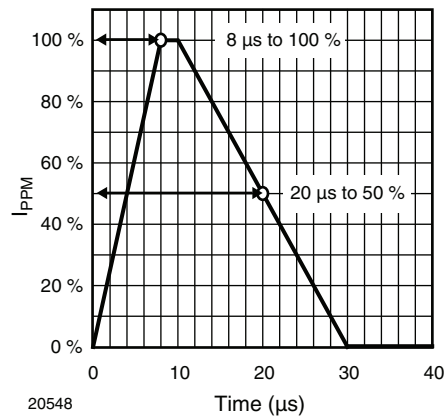
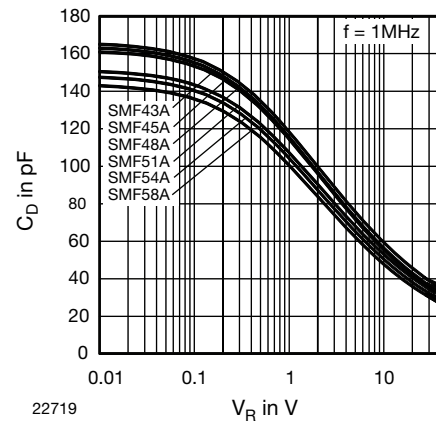
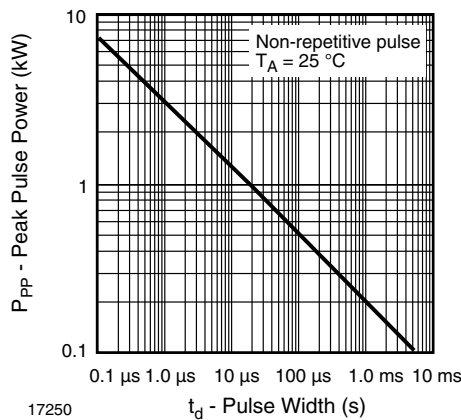
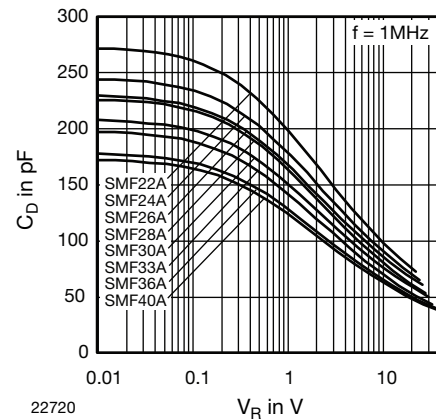
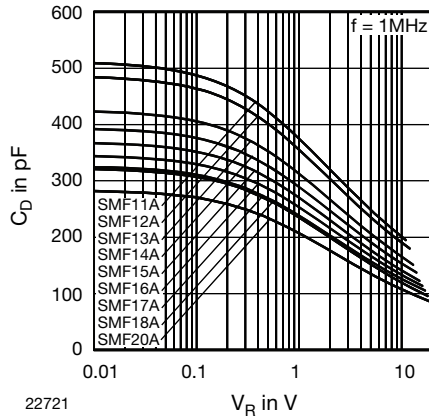
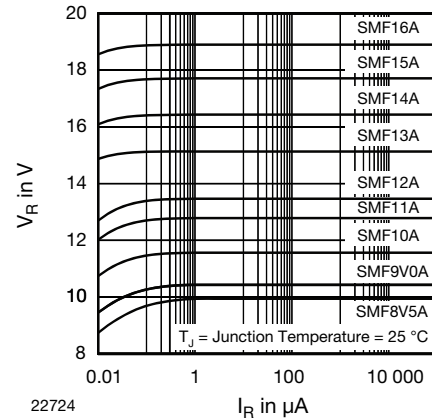
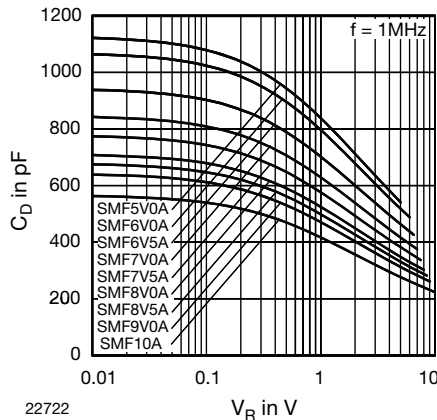
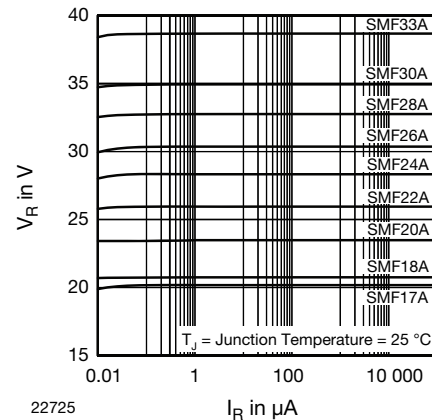
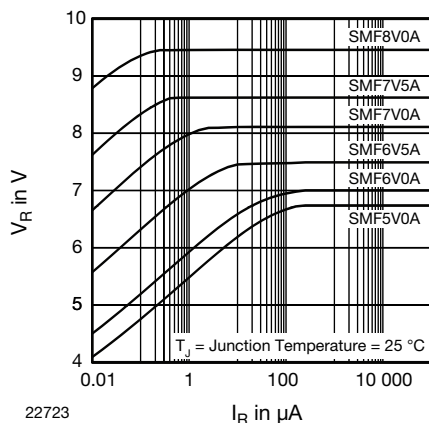
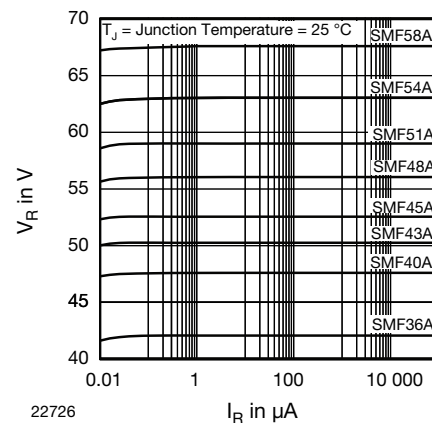
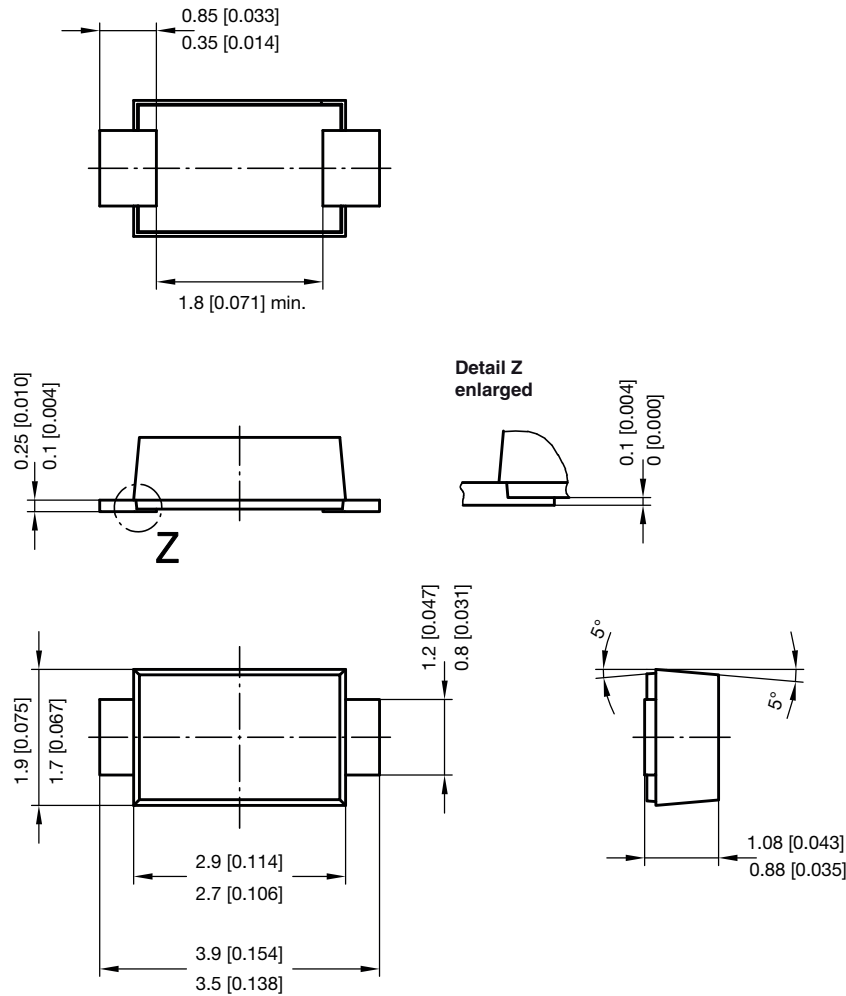

Fig. 2 - 8/20  $\mu\text{s}$  Peak Pulse Current Wave Form acc. IEC 61000-4-5

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


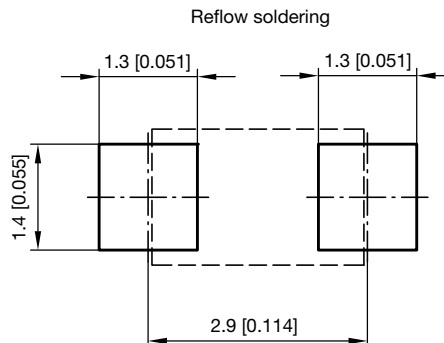
Fig. 3 - Peak Pulse Power Rating


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 (DO-219AB)**


foot print recommendation:



Created - Date: 15. February 2005

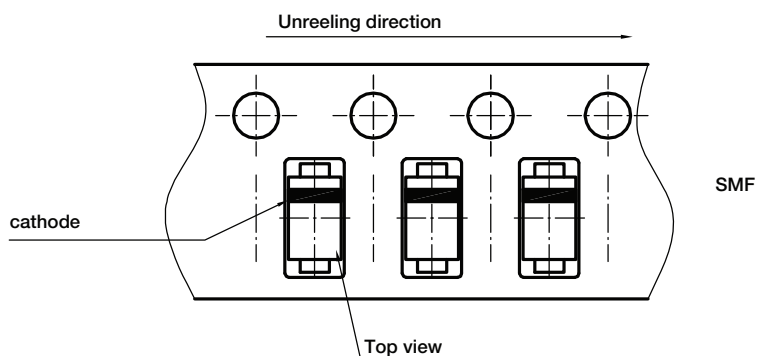
Rev. 6 - Date: 24.Feb.2021

Document no.: S8-V-3915.01-001 (4)

22989



**ORIENTATION IN CARRIER TAPE - SMF (DO-219AB)**



Document no.: S8-V-3717.02-003 (4)

Created - Date: 09. Feb. 2010

22670



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