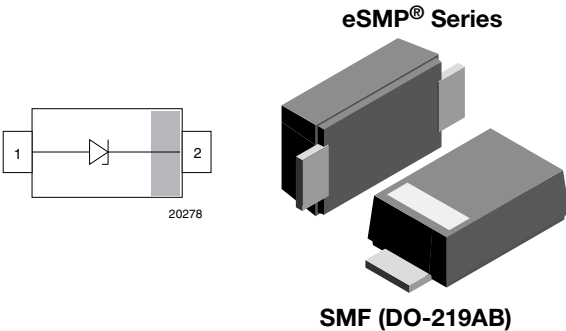
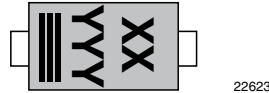


# 400 W TransZorb® Transient Voltage Suppressor (TVS) Diode in SMF-Package



eSMP® Series

SMF (DO-219AB)

**MARKING** (example only)


Bar = cathode marking  
 YYY = type code (see table below)  
 XX = date code

**LINKS TO ADDITIONAL RESOURCES**

**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)



| 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 (EXAMPLE) | TOLERANCE $E V_{BR}$ | 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), MOQ = 30K | 10K PER 13" REEL (8 mm TAPE), MOQ = 50K |                         |
|                       |                      |                                | HALOGEN-FREE                                 |            |                                       |   |                         |
| 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 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) | 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 <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> = 10/1000 μs waveform            | P <sub>PP</sub>   | 400                              | W    |
| 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 infinite heat sink                   | R <sub>thJL</sub> | 20                               | K/W  |
| Forward clamping voltage  | I <sub>F</sub> = 50 A, t <sub>p</sub> = 1 ms    | V <sub>F</sub>    | 1.8                              | V    |
| Operating temperature   | Junction temperature                            | T <sub>J</sub>    | -55 to +175                      | °C   |
| Storage temperature   |   | T <sub>STG</sub>  | -55 to +175                      | °C   |

| ELECTRICAL CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified) |              |  |                          |                      |   |  |  |   |                      |
|---|--------------|--|--------------------------|----------------------|---|--|--|---|----------------------|
| PART NUMBER   | TYPE CODE    | REVERSE BREAKDOWN VOLTAGE at T <sub>J</sub> = 25 °C, I <sub>T</sub> = 1 mA |                          | STAND-OFF VOLTAGE    | MAXIMUM REVERSE CURRENT at V <sub>RWM</sub> | MAXIMUM PEAK PULSE CURRENT t <sub>p</sub> = 10/1000 μs | MAXIMUM REVERSE CLAMPING VOLTAGE at I <sub>PPM</sub> | TYPICAL CAP. at V <sub>R</sub> = 0 V, f = 1 MHz | PROTECTION PATHS     |
|   | HALOGEN-FREE | V <sub>BR</sub> (V) MIN.   | V <sub>BR</sub> (V) MAX. | V <sub>RWM</sub> (V) | I <sub>R</sub> (μA)                         | I <sub>PPM</sub> (A)                                   | V <sub>C</sub> (V)                                   | C <sub>D</sub> (pF)                             | N <sub>channel</sub> |
| 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. |                   |                                      |   |   |   |                  |
| 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<sub>amb</sub> = 25 °C, unless otherwise specified)

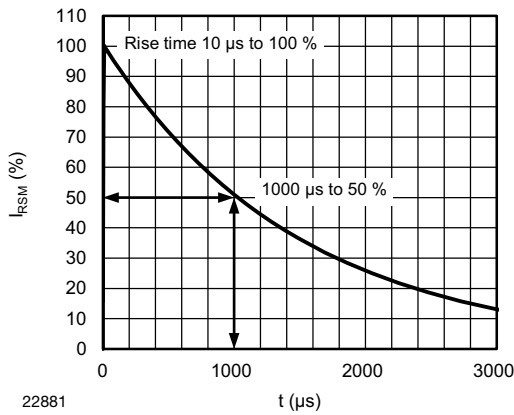


Fig. 1 - 10/1000 µs Peak Pulse Current Wave Form

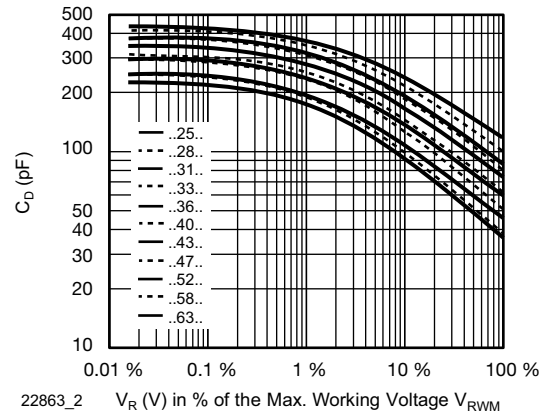


Fig. 4 - Typical Capacitance C<sub>D</sub> vs. Reverse Voltage V<sub>R</sub>

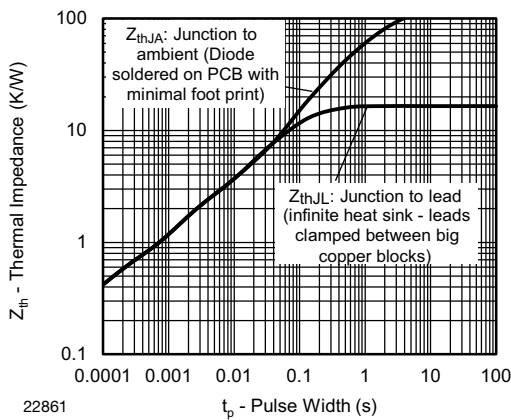


Fig. 2 - Thermal Impedance vs. Time

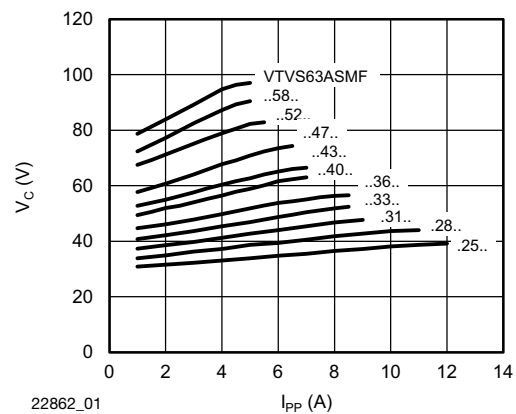


Fig. 5 - Typical Peak Clamping Voltage vs. Peak Pulse Current

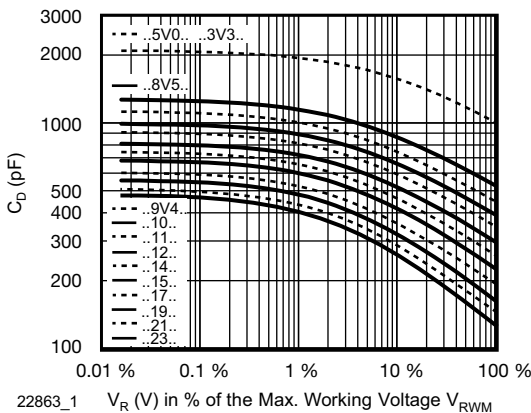


Fig. 3 - Typical Capacitance C<sub>D</sub> vs. Reverse Voltage V<sub>R</sub>

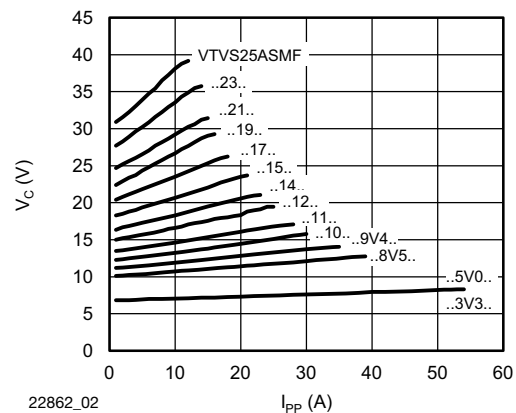
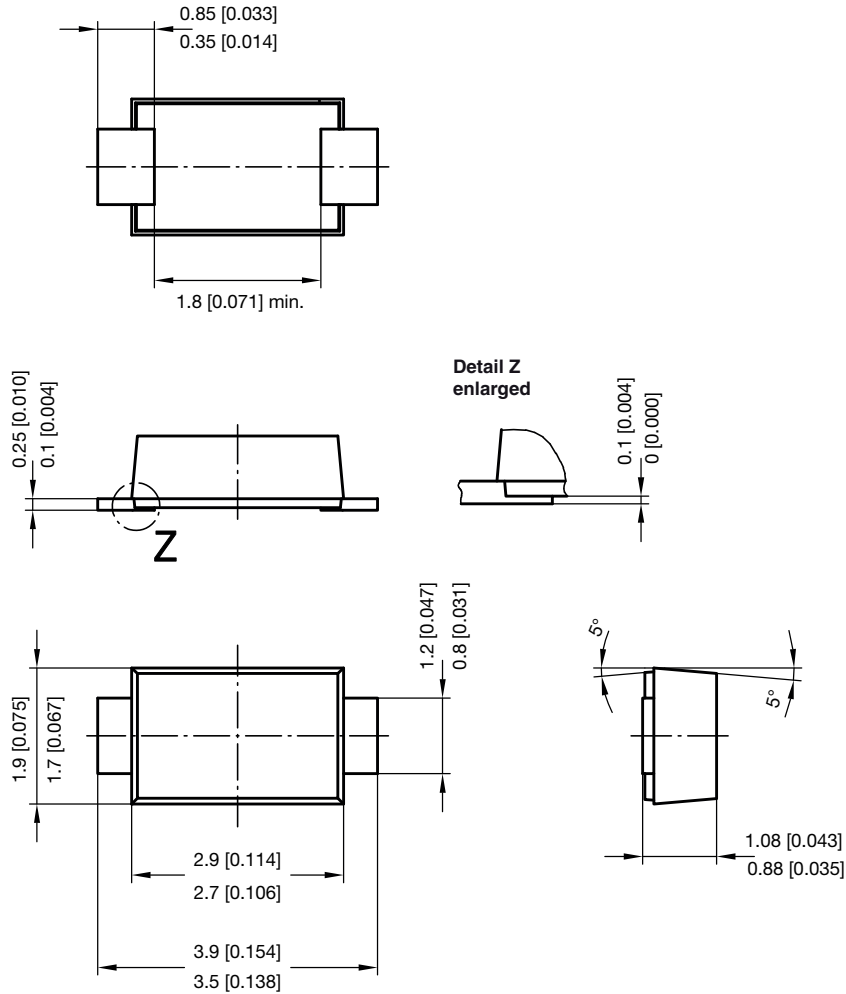


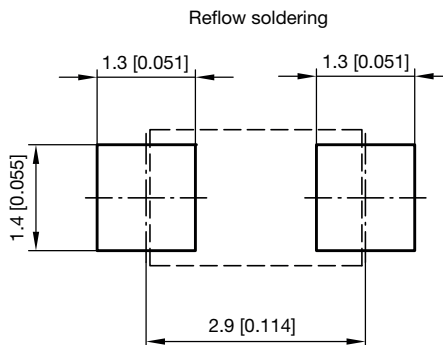
Fig. 6 - Typical Peak Clamping Voltage vs. Peak Pulse Current



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



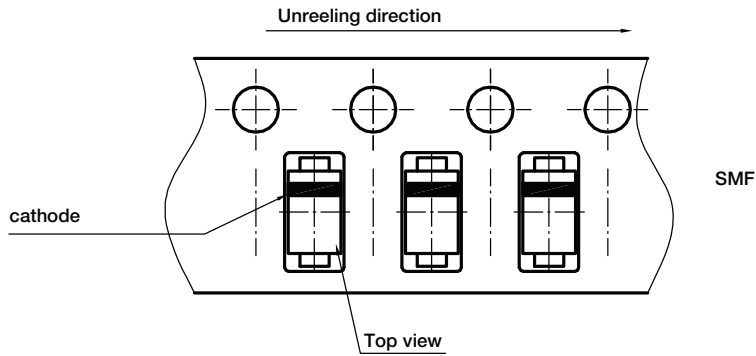
foot print recommendation:



Created - Date: 15. February 2005  
 Rev. 6 - Date: 24.Feb.2021  
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 22989



## ORIENTATION IN CARRIER TAPE - SMF



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