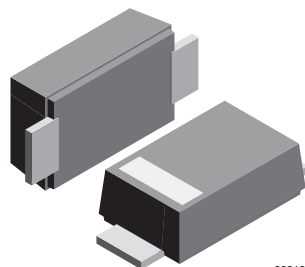
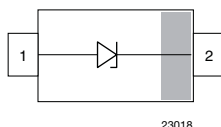


## Zener Diodes with Surge Current Specification

### eSMP® Series



SMF (DO-219AB)



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

### DESIGN SUPPORT TOOLS

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**3D**  
Models  
Available

### PRIMARY CHARACTERISTICS

| PARAMETER                    | VALUE           | UNIT |
|------------------------------|-----------------|------|
| V <sub>Z</sub> range nom.    | 3.6 to 200      | V    |
| Test current I <sub>ZT</sub> | 5 to 100        | mA   |
| V <sub>BR</sub>              | 7.35 to 196     | V    |
| V <sub>WM</sub>              | 6.2 to 160      | V    |
| P <sub>PPM</sub>             | 150             | W    |
| T <sub>J</sub> max.          | 175             | °C   |
| V <sub>Z</sub> specification | Pulse current   |      |
| Int. construction            | Single          |      |
| Polarity                     | Uni-directional |      |

### FEATURES

- Silicon planar Zener diodes
- Voltage range includes 43 breakdown voltages from 3.6 V to 200 V with  $\pm 2\%$  for BZD27B-M Series
- Low profile surface-mount package
- Zener and surge current specification
- Low leakage current
- Excellent stability
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Meets JESD 201 class 2 whisker test
- ESD capability according to AEC-Q101:  
human body model: > 8 kV  
machine model: > 800 V
- Wave and reflow solderable
- AEC-Q101 qualified available
- Base P/N-M3 - halogen-free, RoHS-compliant, and commercial grade
- Base P/N-HM3 - halogen-free, RoHS-compliant, and AEC-Q101 qualified (available on request)
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

### ORDERING INFORMATION

| DEVICE NAME     | ORDERING CODE                        | TAPED UNITS PER REEL            | MINIMUM ORDER QUANTITY |
|-----------------|--------------------------------------|---------------------------------|------------------------|
| BZD27B-M Series | BZD27B3V6P-M3-08 to BZD27B200P-M3-08 | 3000 per 7" reel (8mm tape)     | 30 000/box             |
|                 | BZD27B3V6P-M3-18 to BZD27B200P-M3-18 | 10 000 per 13" reel (8 mm tape) | 50 000/box             |

### PACKAGE

| PACKAGE NAME   | WEIGHT | MOLDING COMPOUND FLAMMABILITY RATING | MOISTURE SENSITIVITY LEVEL           | WHISKER TEST ACC. JESD 201 | SOLDERING CONDITIONS         |
|----------------|--------|--------------------------------------|--------------------------------------|----------------------------|------------------------------|
| SMF (DO-219AB) | 15 mg  | UL 94 V-0                            | MSL level 1<br>(according J-STD-020) | Class 2                    | Peak temperature max. 260 °C |

### ABSOLUTE MAXIMUM RATINGS (T<sub>amb</sub> = 25 °C, unless otherwise specified)

| PARAMETER                                                  | TEST CONDITION                                                               | SYMBOL            | VALUE       | UNIT |
|------------------------------------------------------------|------------------------------------------------------------------------------|-------------------|-------------|------|
| Power dissipation                                          | T <sub>L</sub> = 105 °C                                                      | P <sub>tot</sub>  | 2300        | mW   |
|                                                            | T <sub>A</sub> = 30 °C <sup>(1)</sup>                                        | P <sub>tot</sub>  | 800         | mW   |
| Non repetitive peak surge power dissipation <sup>(2)</sup> | 100 $\mu$ s square pulse                                                     | P <sub>ZSM</sub>  | 300         | W    |
|                                                            | 10/1000 $\mu$ s waveform                                                     | P <sub>RSM</sub>  | 150         | W    |
| Junction to lead                                           |                                                                              | R <sub>thJL</sub> | 30          | K/W  |
| Junction to ambient air                                    | Mounted on epoxy-glass PCB with 3 mm x 3 mm Cu pads ( $\geq 40 \mu$ m thick) | R <sub>thJA</sub> | 180         | K/W  |
| Junction temperature                                       |                                                                              | T <sub>J</sub>    | 175         | °C   |
| Storage temperature range                                  |                                                                              | T <sub>stg</sub>  | -65 to +175 | °C   |
| Operating temperature range                                |                                                                              | T <sub>op</sub>   | -65 to +175 | °C   |

### Notes

<sup>(1)</sup> Mounted on epoxy-glass PCB with 3 mm x 3 mm Cu pads ( $\geq 40 \mu$ m thick)

<sup>(2)</sup> T<sub>J</sub> = 25 °C prior to surge

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

| PART NUMBER  | MARKING CODE | ZENER VOLTAGE RANGE <sup>(1)</sup> |      |        | TEST CURRENT | REVERSE CURRENT |     | DYNAMIC RESISTANCE |      | TEMPERATURE COEFFICIENT    |       |
|--------------|--------------|------------------------------------|------|--------|--------------|-----------------|-----|--------------------|------|----------------------------|-------|
|              |              | $V_Z$ at $I_{ZT1}$                 |      |        | $I_{ZT1}$    | $I_R$ at $V_R$  |     | $Z_Z$ at $I_{ZT1}$ |      | $\alpha_{VZ}$ at $I_{ZT1}$ |       |
|              |              | V                                  |      |        | mA           | $\mu\text{A}$   | V   | $\Omega$           |      | %/ $^{\circ}\text{C}$      |       |
|              |              | MIN.                               | NOM. | MAX.   |              | MAX.            |     | TYP.               | MAX. | MIN.                       | MAX.  |
| BZD27B3V6P-M | 0N           | 3.53                               | 3.6  | 3.67   | 100          | 100             | 1   | 4                  | 8    | -0.14                      | -0.04 |
| BZD27B3V9P-M | 1N           | 3.82                               | 3.9  | 3.98   | 100          | 50              | 1   | 4                  | 8    | -0.14                      | -0.04 |
| BZD27B4V3P-M | 2N           | 4.21                               | 4.3  | 4.39   | 100          | 25              | 1   | 4                  | 7    | -0.12                      | -0.02 |
| BZD27B4V7P-M | 3N           | 4.61                               | 4.7  | 4.79   | 100          | 10              | 1   | 3                  | 7    | -0.1                       | 0     |
| BZD27B5V1P-M | 4N           | 5.00                               | 5.1  | 5.20   | 100          | 5               | 1   | 3                  | 6    | -0.08                      | 0.02  |
| BZD27B5V6P-M | 5N           | 5.49                               | 5.6  | 5.71   | 100          | 10              | 2   | 2                  | 4    | -0.04                      | 0.04  |
| BZD27B6V2P-M | 6N           | 6.08                               | 6.2  | 6.32   | 100          | 5               | 2   | 2                  | 3    | -0.01                      | 0.06  |
| BZD27B6V8P-M | 7N           | 6.66                               | 6.8  | 6.94   | 100          | 10              | 3   | 1                  | 3    | 0                          | 0.07  |
| BZD27B7V5P-M | 8N           | 7.35                               | 7.5  | 7.65   | 100          | 50              | 3   | 1                  | 2    | 0                          | 0.07  |
| BZD27B8V2P-M | 9N           | 8.04                               | 8.2  | 8.36   | 100          | 10              | 3   | 1                  | 2    | 0.03                       | 0.08  |
| BZD27B9V1P-M | 0O           | 8.92                               | 9.1  | 9.28   | 50           | 10              | 5   | 2                  | 4    | 0.03                       | 0.08  |
| BZD27B10P-M  | 1O           | 9.80                               | 10   | 10.20  | 50           | 7               | 7.5 | 2                  | 4    | 0.05                       | 0.09  |
| BZD27B11P-M  | 2O           | 10.78                              | 11   | 11.22  | 50           | 4               | 8.2 | 4                  | 7    | 0.05                       | 0.1   |
| BZD27B12P-M  | 3O           | 11.76                              | 12   | 12.24  | 50           | 3               | 9.1 | 4                  | 7    | 0.05                       | 0.1   |
| BZD27B13P-M  | 4O           | 12.74                              | 13   | 13.26  | 50           | 2               | 10  | 5                  | 10   | 0.05                       | 0.1   |
| BZD27B15P-M  | 5O           | 14.70                              | 15   | 15.30  | 50           | 1               | 11  | 5                  | 10   | 0.05                       | 0.1   |
| BZD27B16P-M  | 6O           | 15.68                              | 16   | 16.32  | 25           | 1               | 12  | 6                  | 15   | 0.06                       | 0.11  |
| BZD27B18P-M  | 7O           | 17.64                              | 18   | 18.36  | 25           | 1               | 13  | 6                  | 15   | 0.06                       | 0.11  |
| BZD27B20P-M  | 8O           | 19.60                              | 20   | 20.40  | 25           | 1               | 15  | 6                  | 15   | 0.06                       | 0.11  |
| BZD27B22P-M  | 9O           | 21.56                              | 22   | 22.44  | 25           | 1               | 16  | 6                  | 15   | 0.06                       | 0.11  |
| BZD27B24P-M  | 0P           | 23.52                              | 24   | 24.48  | 25           | 1               | 18  | 7                  | 15   | 0.06                       | 0.11  |
| BZD27B27P-M  | 1P           | 26.46                              | 27   | 27.54  | 25           | 1               | 20  | 7                  | 15   | 0.06                       | 0.11  |
| BZD27B30P-M  | 2P           | 29.40                              | 30   | 30.60  | 25           | 1               | 22  | 8                  | 15   | 0.06                       | 0.11  |
| BZD27B33P-M  | 3P           | 32.34                              | 33   | 33.66  | 25           | 1               | 24  | 8                  | 15   | 0.06                       | 0.11  |
| BZD27B36P-M  | 4P           | 35.28                              | 36   | 36.72  | 10           | 1               | 27  | 21                 | 40   | 0.06                       | 0.11  |
| BZD27B39P-M  | 5P           | 38.22                              | 39   | 39.78  | 10           | 1               | 30  | 21                 | 40   | 0.06                       | 0.11  |
| BZD27B43P-M  | 6P           | 42.14                              | 43   | 43.86  | 10           | 1               | 33  | 24                 | 45   | 0.07                       | 0.12  |
| BZD27B47P-M  | 7P           | 46.06                              | 47   | 47.94  | 10           | 1               | 36  | 24                 | 45   | 0.07                       | 0.12  |
| BZD27B51P-M  | 8P           | 49.98                              | 51   | 52.02  | 10           | 1               | 39  | 25                 | 60   | 0.07                       | 0.12  |
| BZD27B56P-M  | 9P           | 54.88                              | 56   | 57.12  | 10           | 1               | 43  | 25                 | 60   | 0.07                       | 0.12  |
| BZD27B62P-M  | 0Q           | 60.76                              | 62   | 63.24  | 10           | 1               | 47  | 25                 | 80   | 0.08                       | 0.13  |
| BZD27B68P-M  | 1Q           | 66.64                              | 68   | 69.36  | 10           | 1               | 51  | 25                 | 80   | 0.08                       | 0.13  |
| BZD27B75P-M  | 2Q           | 73.50                              | 75   | 76.50  | 10           | 1               | 56  | 30                 | 100  | 0.08                       | 0.13  |
| BZD27B82P-M  | 3Q           | 80.36                              | 82   | 83.64  | 10           | 1               | 62  | 30                 | 100  | 0.08                       | 0.13  |
| BZD27B91P-M  | 4Q           | 89.18                              | 91   | 92.82  | 5            | 1               | 68  | 60                 | 200  | 0.08                       | 0.13  |
| BZD27B100P-M | 5Q           | 98.00                              | 100  | 102.00 | 5            | 1               | 75  | 60                 | 200  | 0.09                       | 0.13  |
| BZD27B110P-M | 6Q           | 107.80                             | 110  | 112.20 | 5            | 1               | 82  | 80                 | 250  | 0.09                       | 0.13  |
| BZD27B120P-M | 7Q           | 117.60                             | 120  | 122.40 | 5            | 1               | 91  | 80                 | 250  | 0.09                       | 0.13  |
| BZD27B130P-M | 8Q           | 127.40                             | 130  | 132.60 | 5            | 1               | 100 | 110                | 300  | 0.09                       | 0.13  |
| BZD27B150P-M | 9Q           | 147.00                             | 150  | 153.00 | 5            | 1               | 110 | 130                | 300  | 0.09                       | 0.13  |
| BZD27B160P-M | 0R           | 156.80                             | 160  | 163.20 | 5            | 1               | 120 | 150                | 350  | 0.09                       | 0.13  |
| BZD27B180P-M | 1R           | 176.40                             | 180  | 183.60 | 5            | 1               | 130 | 180                | 400  | 0.09                       | 0.13  |
| BZD27B200P-M | 2R           | 196.00                             | 200  | 204.00 | 5            | 1               | 150 | 200                | 500  | 0.09                       | 0.13  |

**Notes**

- Electrical characteristics when used as regulator diodes
- Maximum  $V_F = 1.2\text{ V}$ , at  $I_F = 0.2\text{ A}$
- <sup>(1)</sup> Pulse test:  $t_p \leq 5\text{ ms}$

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

| PART NUMBER  | MARKING CODE | ZENER VOLTAGE RANGE |      |        | TEST CURRENT | REVERSE CURRENT |     | CLAMPING VOLTAGE         |      | TEMPERATURE COEFFICIENT    |      |
|--------------|--------------|---------------------|------|--------|--------------|-----------------|-----|--------------------------|------|----------------------------|------|
|              |              | $V_Z$ at $I_{ZT1}$  |      |        | $I_{ZT1}$    | $I_R$ at $V_R$  |     | $V_C$ at $I_{RSM}^{(1)}$ |      | $\alpha_{VZ}$ at $I_{ZT1}$ |      |
|              |              | V                   |      |        | mA           | $\mu\text{A}$   | V   | V                        | A    | %/ $^{\circ}\text{C}$      |      |
|              |              | MIN.                | NOM. | MAX.   |              | MAX.            |     | MAX.                     |      | MIN.                       | MAX. |
| BZD27B7V5P-M | 8N           | 7.35                | 7.5  | 7.65   | 100          | 1500            | 6.2 | 10.9                     | 13.3 | 0                          | 0.07 |
| BZD27B8V2P-M | 9N           | 8.04                | 8.2  | 8.36   | 100          | 1200            | 6.8 | 11.8                     | 12.2 | 0.03                       | 0.08 |
| BZD27B9V1P-M | 0O           | 8.92                | 9.1  | 9.28   | 50           | 100             | 7.5 | 12.9                     | 11.3 | 0.03                       | 0.08 |
| BZD27B10P-M  | 1O           | 9.80                | 10   | 10.20  | 50           | 20              | 8.2 | 14.2                     | 10.1 | 0.05                       | 0.09 |
| BZD27B11P-M  | 2O           | 10.78               | 11   | 11.22  | 50           | 5               | 9.1 | 15.2                     | 9.6  | 0.05                       | 0.1  |
| BZD27B12P-M  | 3O           | 11.76               | 12   | 12.24  | 50           | 5               | 10  | 16                       | 8.8  | 0.05                       | 0.1  |
| BZD27B13P-M  | 4O           | 12.74               | 13   | 13.26  | 50           | 5               | 11  | 17.8                     | 7.9  | 0.05                       | 0.1  |
| BZD27B15P-M  | 5O           | 14.70               | 15   | 15.30  | 50           | 5               | 12  | 20.5                     | 7.2  | 0.05                       | 0.1  |
| BZD27B16P-M  | 6O           | 15.68               | 16   | 16.32  | 25           | 5               | 13  | 21.9                     | 6.6  | 0.06                       | 0.11 |
| BZD27B18P-M  | 7O           | 17.64               | 18   | 18.36  | 25           | 5               | 15  | 24.6                     | 5.9  | 0.06                       | 0.11 |
| BZD27B20P-M  | 8O           | 19.60               | 20   | 20.40  | 25           | 5               | 16  | 27.3                     | 5.3  | 0.06                       | 0.11 |
| BZD27B22P-M  | 9O           | 21.56               | 22   | 22.44  | 25           | 5               | 18  | 30                       | 4.8  | 0.06                       | 0.11 |
| BZD27B24P-M  | 0P           | 23.52               | 24   | 24.48  | 25           | 5               | 20  | 32.3                     | 4.4  | 0.06                       | 0.11 |
| BZD27B27P-M  | 1P           | 26.46               | 27   | 27.54  | 25           | 5               | 22  | 36.3                     | 3.9  | 0.06                       | 0.11 |
| BZD27B30P-M  | 2P           | 29.40               | 30   | 30.60  | 25           | 5               | 24  | 40.4                     | 3.6  | 0.06                       | 0.11 |
| BZD27B33P-M  | 3P           | 32.34               | 33   | 33.66  | 25           | 5               | 27  | 44.4                     | 3.2  | 0.06                       | 0.11 |
| BZD27B36P-M  | 4P           | 35.28               | 36   | 36.72  | 10           | 5               | 30  | 48.4                     | 3    | 0.06                       | 0.11 |
| BZD27B39P-M  | 5P           | 38.22               | 39   | 39.78  | 10           | 5               | 33  | 52.5                     | 2.8  | 0.06                       | 0.11 |
| BZD27B43P-M  | 6P           | 42.14               | 43   | 43.86  | 10           | 5               | 36  | 57.9                     | 2.5  | 0.07                       | 0.12 |
| BZD27B47P-M  | 7P           | 46.06               | 47   | 47.94  | 10           | 5               | 39  | 62.8                     | 2.3  | 0.07                       | 0.12 |
| BZD27B51P-M  | 8P           | 49.98               | 51   | 52.02  | 10           | 5               | 43  | 68.2                     | 2.1  | 0.07                       | 0.12 |
| BZD27B56P-M  | 9P           | 54.88               | 56   | 57.12  | 10           | 5               | 47  | 74.8                     | 1.9  | 0.07                       | 0.12 |
| BZD27B62P-M  | 0Q           | 60.76               | 62   | 63.24  | 10           | 5               | 51  | 82.9                     | 1.7  | 0.08                       | 0.13 |
| BZD27B68P-M  | 1Q           | 66.64               | 68   | 69.36  | 10           | 5               | 56  | 90.9                     | 1.6  | 0.08                       | 0.13 |
| BZD27B75P-M  | 2Q           | 73.50               | 75   | 76.50  | 10           | 5               | 62  | 100.2                    | 1.5  | 0.08                       | 0.13 |
| BZD27B82P-M  | 3Q           | 80.36               | 82   | 83.64  | 10           | 5               | 68  | 110                      | 1.3  | 0.08                       | 0.13 |
| BZD27B91P-M  | 4Q           | 89.18               | 91   | 92.82  | 5            | 5               | 75  | 122                      | 1.2  | 0.09                       | 0.13 |
| BZD27B100P-M | 5Q           | 98.00               | 100  | 102.00 | 5            | 5               | 82  | 134                      | 1.1  | 0.09                       | 0.13 |
| BZD27B110P-M | 6Q           | 107.80              | 110  | 112.20 | 5            | 5               | 91  | 145                      | 1    | 0.09                       | 0.13 |
| BZD27B120P-M | 7Q           | 117.60              | 120  | 122.40 | 5            | 5               | 100 | 161                      | 0.9  | 0.09                       | 0.13 |
| BZD27B130P-M | 8Q           | 127.40              | 130  | 132.60 | 5            | 5               | 110 | 174                      | 0.81 | 0.09                       | 0.13 |
| BZD27B150P-M | 9Q           | 147.00              | 150  | 153.00 | 5            | 5               | 120 | 201                      | 0.73 | 0.09                       | 0.13 |
| BZD27B160P-M | 0R           | 156.80              | 160  | 163.20 | 5            | 5               | 130 | 214                      | 0.67 | 0.09                       | 0.13 |
| BZD27B180P-M | 1R           | 176.40              | 180  | 183.60 | 5            | 5               | 150 | 242                      | 0.6  | 0.09                       | 0.13 |
| BZD27B200P-M | 2R           | 196.00              | 200  | 204.00 | 5            | 5               | 160 | 268                      | 0.54 | 0.09                       | 0.13 |

**Notes**

- Electrical characteristics when used as protection diodes

<sup>(1)</sup> Non-repetitive peak reverse current in accordance with "IEC 60-1, section 8" (10/1000  $\mu\text{s}$  pulse); see fig. 4

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

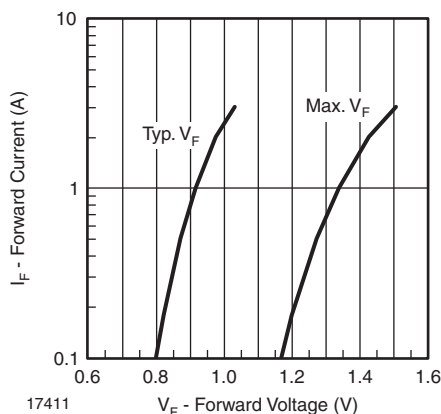


Fig. 1 - Forward Current vs. Forward Voltage

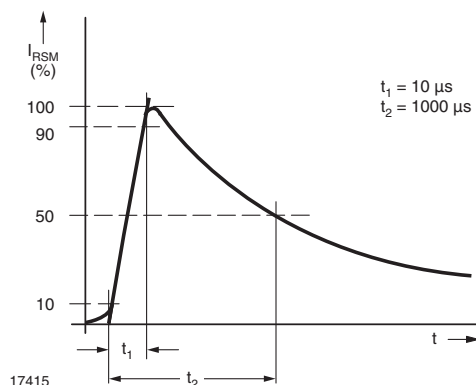


Fig. 4 - Non-Repetitive Peak Reverse Current Pulse Definition

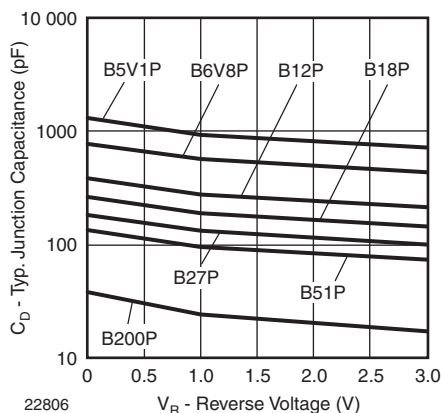


Fig. 2 - Typ. Diode Capacitance vs. Reverse Voltage

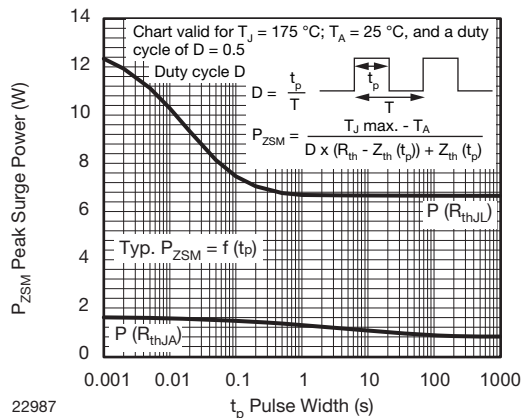


Fig. 5 - Typical Repetitive Peak Surge Power

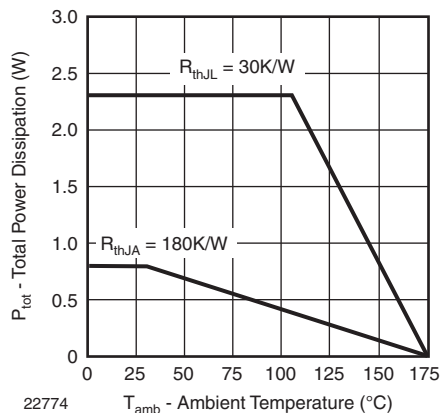


Fig. 3 - Power Dissipation vs. Ambient Temperature

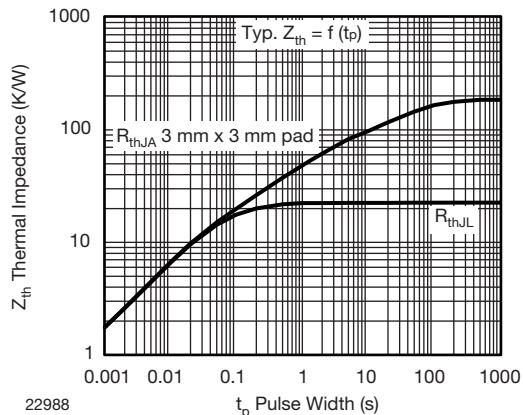
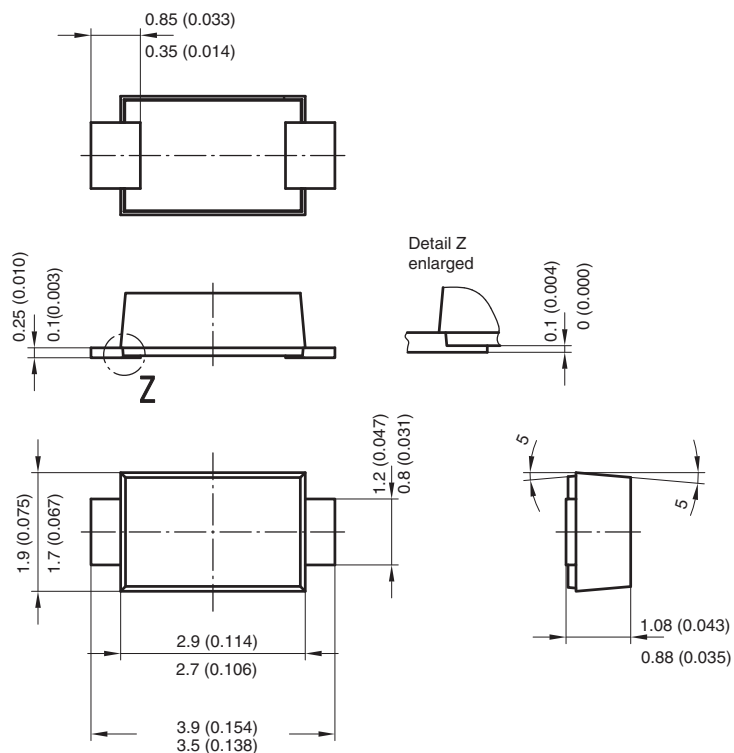


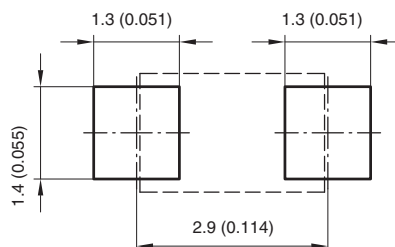
Fig. 6 - Typical Thermal Impedance vs. Time



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



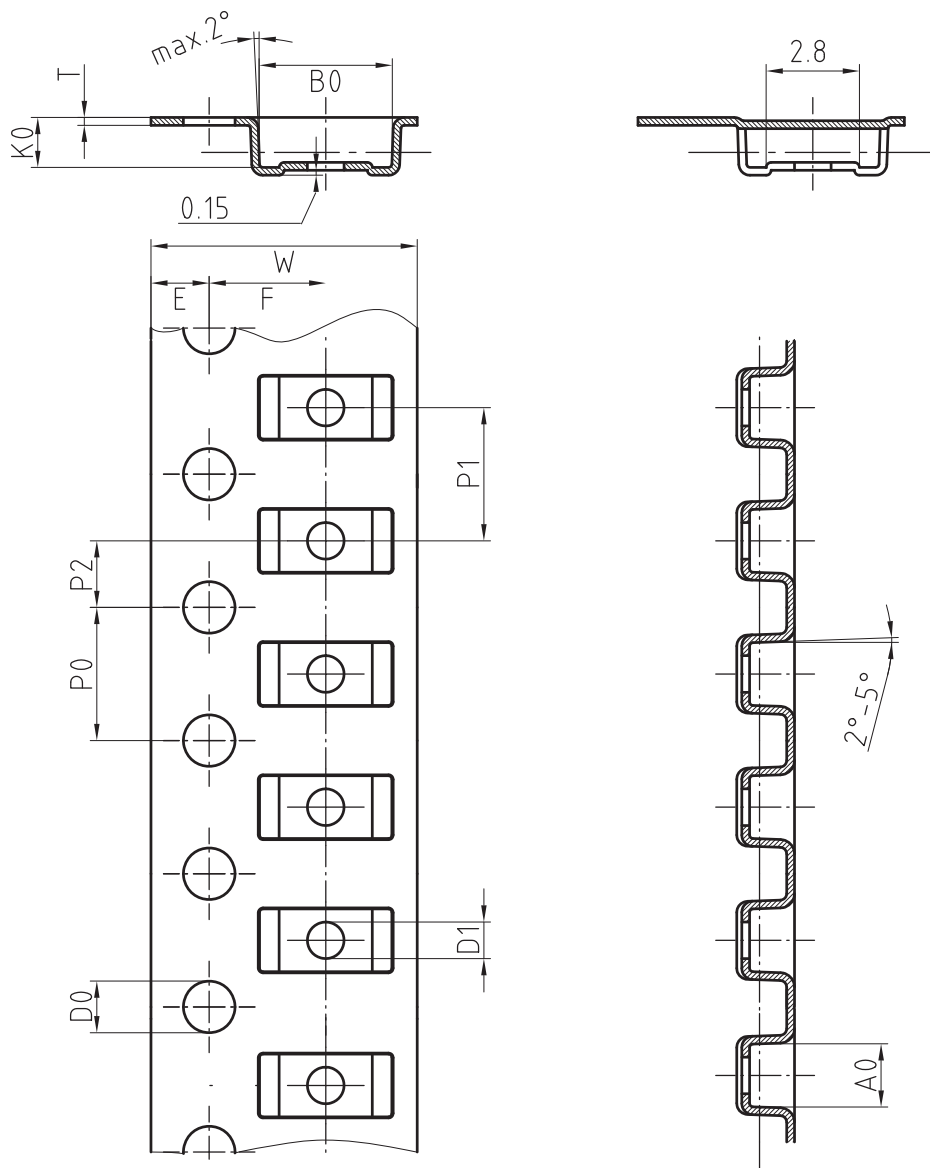
Foot print recommendation:



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



**BLISTERTAPE DIMENSIONS FOR SMF (DO-219AB) in millimeters**



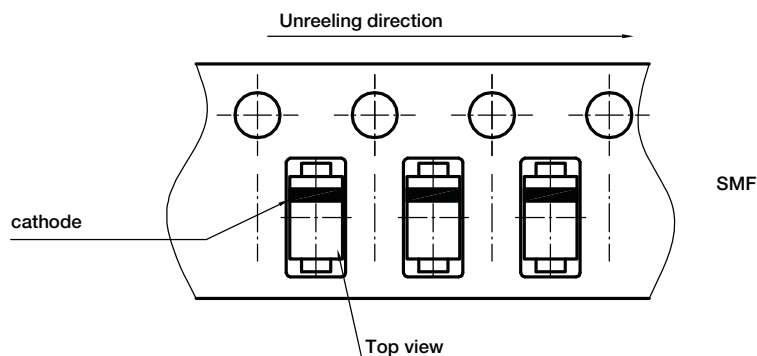
| Mat: | A0  | B0  | K0  | W   | T     | P0  | P2  | P1  | D0  | D1 | E    | F   |
|------|-----|-----|-----|-----|-------|-----|-----|-----|-----|----|------|-----|
| PS   | 1.9 | 4.0 | 1.5 | 8.0 | 0.235 | 4.0 | 2.0 | 4.0 | 1.5 | 1  | 1.75 | 3.5 |

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

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**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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