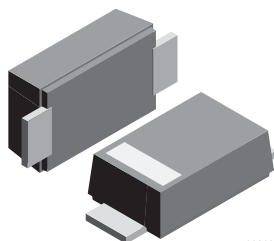
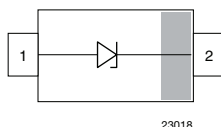


# Zener Diodes with Surge Current Specification

## eSMP® Series



SMF (DO-219AB)


**RoHS**  
COMPLIANT

## FEATURES

- Silicon planar Zener diodes
- Voltage range includes 43 breakdown voltages from 3.6 V to 200 V with  $\pm 2\%$  for BZD27B 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-E3 - RoHS-compliant, and commercial grade
- Base P/N-HE3 - RoHS-compliant, and AEC-Q101 qualified
- 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



## PRIMARY CHARACTERISTICS

| PARAMETER             | VALUE           | UNIT |
|-----------------------|-----------------|------|
| $V_Z$ range nom.      | 3.6 to 200      | V    |
| Test current $I_{ZT}$ | 5 to 100        | mA   |
| $V_{BR}$              | 7.35 to 196     | V    |
| $V_{WM}$              | 6.2 to 160      | V    |
| $P_{PPM}$             | 150             | W    |
| $T_J$ max.            | 175             | °C   |
| $V_Z$ specification   | Pulse current   |      |
| Circuit configuration | Single          |      |
| Polarity              | Uni-directional |      |

## ORDERING INFORMATION

| DEVICE NAME   | ORDERING CODE                            | TAPED UNITS PER REEL            | MINIMUM ORDER QUANTITY |
|---------------|------------------------------------------|---------------------------------|------------------------|
| BZD27B Series | BZD27B3V6P-E3-08 to BZD27B200P-E3-08     | 3000 per 7" reel (8 mm tape)    | MOQ = 30K              |
|               | BZD27B3V6P-HE3_A08 to BZD27B200P-HE3_A08 |                                 |                        |
|               | BZD27B3V6P-E3-18 to BZD27B200P-E3-18     | 10 000 per 13" reel (8 mm tape) | MOQ = 50K              |
|               | BZD27B3V6P-HE3_A18 to BZD27B200P-HE3_A18 |                                 |                        |

## 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 (according J-STD-020) | Class 2                    | Peak temperature max. 260 °C |

## ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25\text{ °C}$ , unless otherwise specified)

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

## Notes

(1) Mounted on epoxy-glass PCB with 3 mm x 3 mm Cu pads ( $\geq 40\text{ }\mu$ m thick)

(2)  $T_J = 25\text{ °C}$  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  | 0D           | 3.53                               | 3.6  | 3.67   | 100          | 100             | 1   | 4                  | 8    | -0.14                      | -0.04 |
| BZD27B3V9P  | 1D           | 3.82                               | 3.9  | 3.98   | 100          | 50              | 1   | 4                  | 8    | -0.14                      | -0.04 |
| BZD27B4V3P  | 2D           | 4.21                               | 4.3  | 4.39   | 100          | 25              | 1   | 4                  | 7    | -0.12                      | -0.02 |
| BZD27B4V7P  | 3D           | 4.61                               | 4.7  | 4.79   | 100          | 10              | 1   | 3                  | 7    | -0.1                       | 0     |
| BZD27B5V1P  | 4D           | 5.00                               | 5.1  | 5.20   | 100          | 5               | 1   | 3                  | 6    | -0.08                      | 0.02  |
| BZD27B5V6P  | 5D           | 5.49                               | 5.6  | 5.71   | 100          | 10              | 2   | 2                  | 4    | -0.04                      | 0.04  |
| BZD27B6V2P  | 6D           | 6.08                               | 6.2  | 6.32   | 100          | 5               | 2   | 2                  | 3    | -0.01                      | 0.06  |
| BZD27B6V8P  | 7D           | 6.66                               | 6.8  | 6.94   | 100          | 10              | 3   | 1                  | 3    | 0                          | 0.07  |
| BZD27B7V5P  | 8D           | 7.35                               | 7.5  | 7.65   | 100          | 50              | 3   | 1                  | 2    | 0                          | 0.07  |
| BZD27B8V2P  | 9D           | 8.04                               | 8.2  | 8.36   | 100          | 10              | 3   | 1                  | 2    | 0.03                       | 0.08  |
| BZD27B9V1P  | 0E           | 8.92                               | 9.1  | 9.28   | 50           | 10              | 5   | 2                  | 4    | 0.03                       | 0.08  |
| BZD27B10P   | 1E           | 9.80                               | 10   | 10.20  | 50           | 7               | 7.5 | 2                  | 4    | 0.05                       | 0.09  |
| BZD27B11P   | 2E           | 10.78                              | 11   | 11.22  | 50           | 4               | 8.2 | 4                  | 7    | 0.05                       | 0.1   |
| BZD27B12P   | 3E           | 11.76                              | 12   | 12.24  | 50           | 3               | 9.1 | 4                  | 7    | 0.05                       | 0.1   |
| BZD27B13P   | 4E           | 12.74                              | 13   | 13.26  | 50           | 2               | 10  | 5                  | 10   | 0.05                       | 0.1   |
| BZD27B15P   | 5E           | 14.70                              | 15   | 15.30  | 50           | 1               | 11  | 5                  | 10   | 0.05                       | 0.1   |
| BZD27B16P   | 6E           | 15.68                              | 16   | 16.32  | 25           | 1               | 12  | 6                  | 15   | 0.06                       | 0.11  |
| BZD27B18P   | 7E           | 17.64                              | 18   | 18.36  | 25           | 1               | 13  | 6                  | 15   | 0.06                       | 0.11  |
| BZD27B20P   | 8E           | 19.60                              | 20   | 20.40  | 25           | 1               | 15  | 6                  | 15   | 0.06                       | 0.11  |
| BZD27B22P   | 9E           | 21.56                              | 22   | 22.44  | 25           | 1               | 16  | 6                  | 15   | 0.06                       | 0.11  |
| BZD27B24P   | 0F           | 23.52                              | 24   | 24.48  | 25           | 1               | 18  | 7                  | 15   | 0.06                       | 0.11  |
| BZD27B27P   | 1F           | 26.46                              | 27   | 27.54  | 25           | 1               | 20  | 7                  | 15   | 0.06                       | 0.11  |
| BZD27B30P   | 2F           | 29.40                              | 30   | 30.60  | 25           | 1               | 22  | 8                  | 15   | 0.06                       | 0.11  |
| BZD27B33P   | 3F           | 32.34                              | 33   | 33.66  | 25           | 1               | 24  | 8                  | 15   | 0.06                       | 0.11  |
| BZD27B36P   | 4F           | 35.28                              | 36   | 36.72  | 10           | 1               | 27  | 21                 | 40   | 0.06                       | 0.11  |
| BZD27B39P   | 5F           | 38.22                              | 39   | 39.78  | 10           | 1               | 30  | 21                 | 40   | 0.06                       | 0.11  |
| BZD27B43P   | 6F           | 42.14                              | 43   | 43.86  | 10           | 1               | 33  | 24                 | 45   | 0.07                       | 0.12  |
| BZD27B47P   | 7F           | 46.06                              | 47   | 47.94  | 10           | 1               | 36  | 24                 | 45   | 0.07                       | 0.12  |
| BZD27B51P   | 8F           | 49.98                              | 51   | 52.02  | 10           | 1               | 39  | 25                 | 60   | 0.07                       | 0.12  |
| BZD27B56P   | 9F           | 54.88                              | 56   | 57.12  | 10           | 1               | 43  | 25                 | 60   | 0.07                       | 0.12  |
| BZD27B62P   | 0G           | 60.76                              | 62   | 63.24  | 10           | 1               | 47  | 25                 | 80   | 0.08                       | 0.13  |
| BZD27B68P   | 1G           | 66.64                              | 68   | 69.36  | 10           | 1               | 51  | 25                 | 80   | 0.08                       | 0.13  |
| BZD27B75P   | 2G           | 73.50                              | 75   | 76.50  | 10           | 1               | 56  | 30                 | 100  | 0.08                       | 0.13  |
| BZD27B82P   | 3G           | 80.36                              | 82   | 83.64  | 10           | 1               | 62  | 30                 | 100  | 0.08                       | 0.13  |
| BZD27B91P   | 4G           | 89.18                              | 91   | 92.82  | 5            | 1               | 68  | 60                 | 200  | 0.08                       | 0.13  |
| BZD27B100P  | 5G           | 98.00                              | 100  | 102.00 | 5            | 1               | 75  | 60                 | 200  | 0.09                       | 0.13  |
| BZD27B110P  | 6G           | 107.80                             | 110  | 112.20 | 5            | 1               | 82  | 80                 | 250  | 0.09                       | 0.13  |
| BZD27B120P  | 7G           | 117.60                             | 120  | 122.40 | 5            | 1               | 91  | 80                 | 250  | 0.09                       | 0.13  |
| BZD27B130P  | 8G           | 127.40                             | 130  | 132.60 | 5            | 1               | 100 | 110                | 300  | 0.09                       | 0.13  |
| BZD27B150P  | 9G           | 147.00                             | 150  | 153.00 | 5            | 1               | 110 | 130                | 300  | 0.09                       | 0.13  |
| BZD27B160P  | 0H           | 156.80                             | 160  | 163.20 | 5            | 1               | 120 | 150                | 350  | 0.09                       | 0.13  |
| BZD27B180P  | 1H           | 176.40                             | 180  | 183.60 | 5            | 1               | 130 | 180                | 400  | 0.09                       | 0.13  |
| BZD27B200P  | 2H           | 196.00                             | 200  | 204.00 | 5            | 1               | 150 | 200                | 500  | 0.09                       | 0.13  |

**Notes**

- Maximum  $V_F = 1.2\text{ V}$ , at  $I_F = 0.2\text{ A}$
  - Electrical characteristics when used as voltage regulator diodes
- <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  | 8D           | 7.35                | 7.5  | 7.65   | 100          | 1500            | 6.2 | 10.9                     | 13.3 | 0                          | 0.07 |
| BZD27B8V2P  | 9D           | 8.04                | 8.2  | 8.36   | 100          | 1200            | 6.8 | 11.8                     | 12.2 | 0.03                       | 0.08 |
| BZD27B9V1P  | 0E           | 8.92                | 9.1  | 9.28   | 50           | 100             | 7.5 | 12.9                     | 11.3 | 0.03                       | 0.08 |
| BZD27B10P   | 1E           | 9.80                | 10   | 10.20  | 50           | 20              | 8.2 | 14.2                     | 10.1 | 0.05                       | 0.09 |
| BZD27B11P   | 2E           | 10.78               | 11   | 11.22  | 50           | 5               | 9.1 | 15.2                     | 9.6  | 0.05                       | 0.1  |
| BZD27B12P   | 3E           | 11.76               | 12   | 12.24  | 50           | 5               | 10  | 16                       | 8.8  | 0.05                       | 0.1  |
| BZD27B13P   | 4E           | 12.74               | 13   | 13.26  | 50           | 5               | 11  | 17.8                     | 7.9  | 0.05                       | 0.1  |
| BZD27B15P   | 5E           | 14.70               | 15   | 15.30  | 50           | 5               | 12  | 20.5                     | 7.2  | 0.05                       | 0.1  |
| BZD27B16P   | 6E           | 15.68               | 16   | 16.32  | 25           | 5               | 13  | 21.9                     | 6.6  | 0.06                       | 0.11 |
| BZD27B18P   | 7E           | 17.64               | 18   | 18.36  | 25           | 5               | 15  | 24.6                     | 5.9  | 0.06                       | 0.11 |
| BZD27B20P   | 8E           | 19.60               | 20   | 20.40  | 25           | 5               | 16  | 27.3                     | 5.3  | 0.06                       | 0.11 |
| BZD27B22P   | 9E           | 21.56               | 22   | 22.44  | 25           | 5               | 18  | 30                       | 4.8  | 0.06                       | 0.11 |
| BZD27B24P   | 0F           | 23.52               | 24   | 24.48  | 25           | 5               | 20  | 32.3                     | 4.4  | 0.06                       | 0.11 |
| BZD27B27P   | 1F           | 26.46               | 27   | 27.54  | 25           | 5               | 22  | 36.3                     | 3.9  | 0.06                       | 0.11 |
| BZD27B30P   | 2F           | 29.40               | 30   | 30.60  | 25           | 5               | 24  | 40.4                     | 3.6  | 0.06                       | 0.11 |
| BZD27B33P   | 3F           | 32.34               | 33   | 33.66  | 25           | 5               | 27  | 44.4                     | 3.2  | 0.06                       | 0.11 |
| BZD27B36P   | 4F           | 35.28               | 36   | 36.72  | 10           | 5               | 30  | 48.4                     | 3    | 0.06                       | 0.11 |
| BZD27B39P   | 5F           | 38.22               | 39   | 39.78  | 10           | 5               | 33  | 52.5                     | 2.8  | 0.06                       | 0.11 |
| BZD27B43P   | 6F           | 42.14               | 43   | 43.86  | 10           | 5               | 36  | 57.9                     | 2.5  | 0.07                       | 0.12 |
| BZD27B47P   | 7F           | 46.06               | 47   | 47.94  | 10           | 5               | 39  | 62.8                     | 2.3  | 0.07                       | 0.12 |
| BZD27B51P   | 8F           | 49.98               | 51   | 52.02  | 10           | 5               | 43  | 68.2                     | 2.1  | 0.07                       | 0.12 |
| BZD27B56P   | 9F           | 54.88               | 56   | 57.12  | 10           | 5               | 47  | 74.8                     | 1.9  | 0.07                       | 0.12 |
| BZD27B62P   | 0G           | 60.76               | 62   | 63.24  | 10           | 5               | 51  | 82.9                     | 1.7  | 0.08                       | 0.13 |
| BZD27B68P   | 1G           | 66.64               | 68   | 69.36  | 10           | 5               | 56  | 90.9                     | 1.6  | 0.08                       | 0.13 |
| BZD27B75P   | 2G           | 73.50               | 75   | 76.50  | 10           | 5               | 62  | 100.2                    | 1.5  | 0.08                       | 0.13 |
| BZD27B82P   | 3G           | 80.36               | 82   | 83.64  | 10           | 5               | 68  | 110                      | 1.3  | 0.08                       | 0.13 |
| BZD27B91P   | 4G           | 89.18               | 91   | 92.82  | 5            | 5               | 75  | 122                      | 1.2  | 0.09                       | 0.13 |
| BZD27B100P  | 5G           | 98.00               | 100  | 102.00 | 5            | 5               | 82  | 134                      | 1.1  | 0.09                       | 0.13 |
| BZD27B110P  | 6G           | 107.80              | 110  | 112.20 | 5            | 5               | 91  | 145                      | 1    | 0.09                       | 0.13 |
| BZD27B120P  | 7G           | 117.60              | 120  | 122.40 | 5            | 5               | 100 | 161                      | 0.9  | 0.09                       | 0.13 |
| BZD27B130P  | 8G           | 127.40              | 130  | 132.60 | 5            | 5               | 110 | 174                      | 0.81 | 0.09                       | 0.13 |
| BZD27B150P  | 9G           | 147.00              | 150  | 153.00 | 5            | 5               | 120 | 201                      | 0.73 | 0.09                       | 0.13 |
| BZD27B160P  | 0H           | 156.80              | 160  | 163.20 | 5            | 5               | 130 | 214                      | 0.67 | 0.09                       | 0.13 |
| BZD27B180P  | 1H           | 176.40              | 180  | 183.60 | 5            | 5               | 150 | 242                      | 0.6  | 0.09                       | 0.13 |
| BZD27B200P  | 2H           | 196.00              | 200  | 204.00 | 5            | 5               | 160 | 268                      | 0.54 | 0.09                       | 0.13 |

**Notes**

- Maximum  $V_F = 1.2\text{ V}$ , at  $I_F = 0.2\text{ A}$
  - Electrical characteristics when used as protection diodes
- (1) 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)

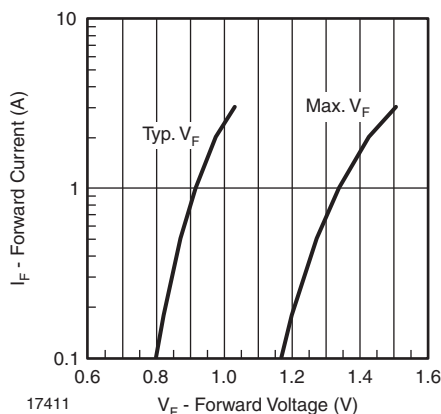


Fig. 1 - Forward Current vs. Forward Voltage

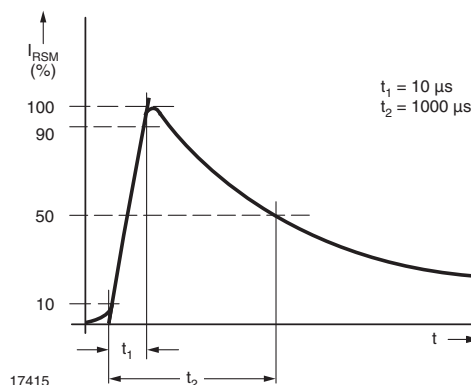


Fig. 4 - Non-Repetitive Peak Reverse Current Pulse Definition

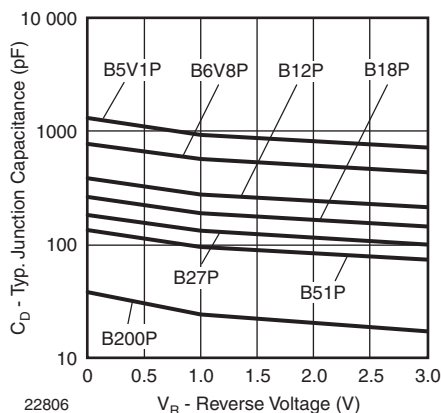


Fig. 2 - Typical Diode Capacitance vs. Reverse Voltage

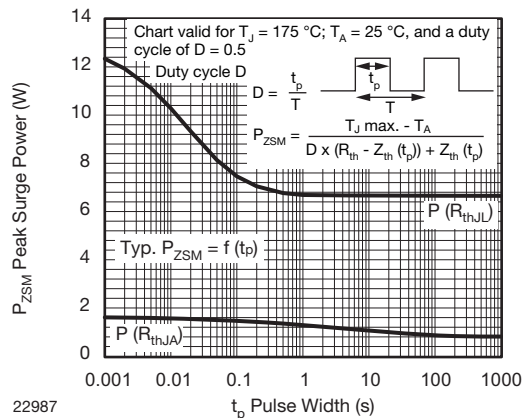


Fig. 5 - Typical Repetitive Peak Surge Power

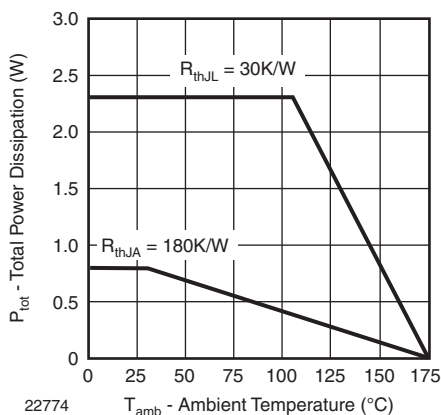


Fig. 3 - Power Dissipation vs. Ambient Temperature

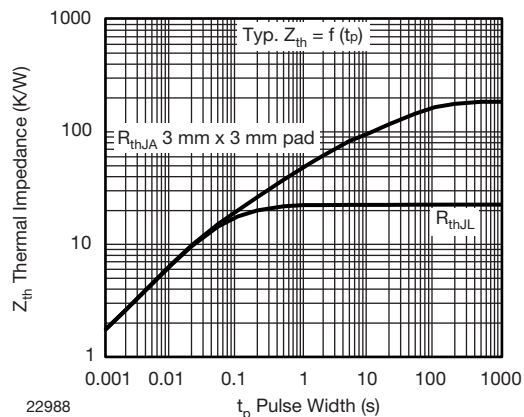
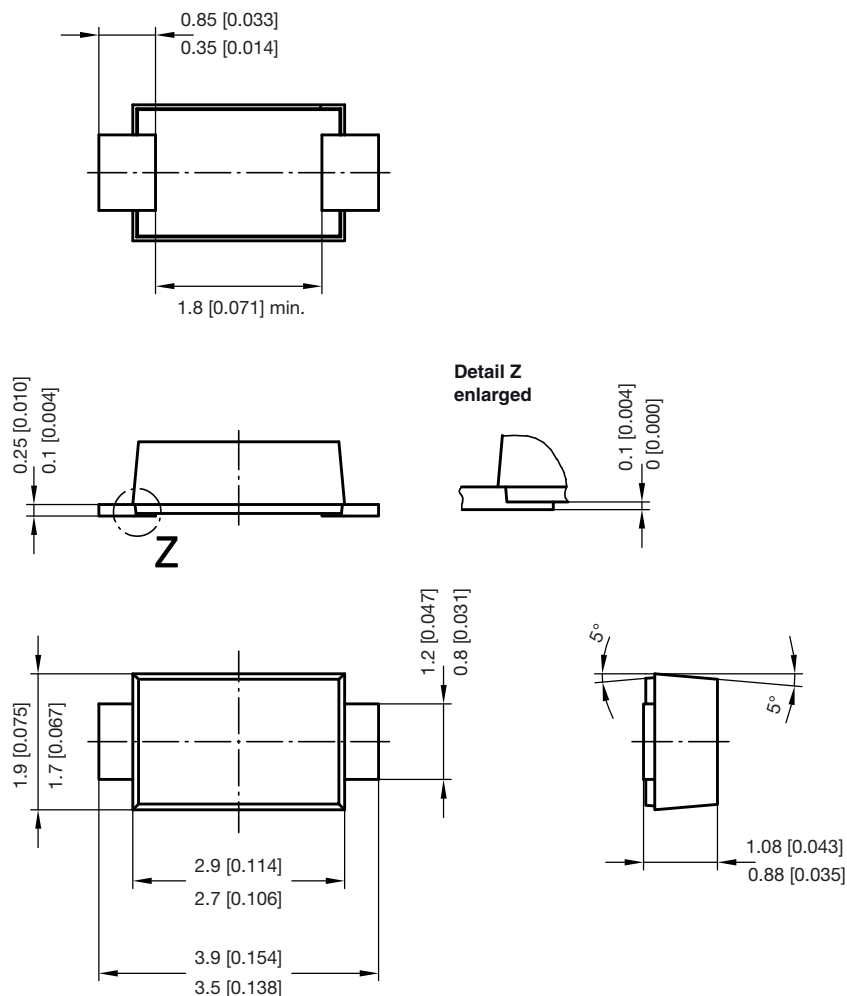


Fig. 6 - Typical Thermal Impedance vs. Time

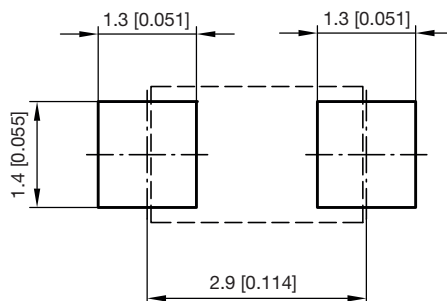


**PACKAGE DIMENSIONS** in millimeters (inches): **SMF (DO-219AB)**



foot print recommendation:

Reflow soldering



Created - Date: 15. February 2005

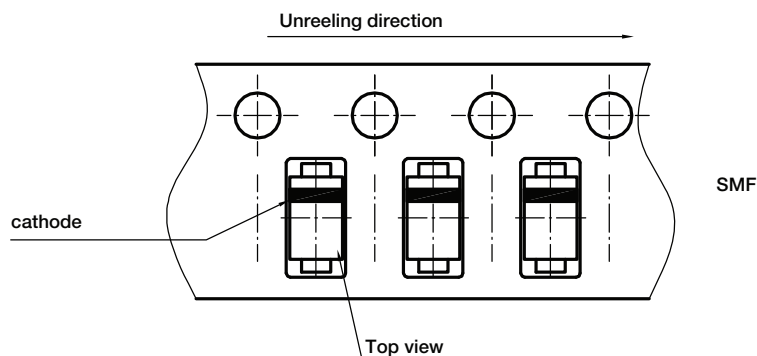
Rev. 6 - Date: 24.Feb.2021

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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