



**THE DATASHEET OF  
BZD27C120P-E3-08**



## Zener Diodes with Surge Current Specification

**eSMP® Series**


SMF (DO-219AB)



23018

**DESIGN SUPPORT TOOLS**
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**3D**  
Models  
Available

| 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 to 188        | 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 |      |

**FEATURES**

- Silicon planar Zener diodes
- 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
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

 AUTOMOTIVE  
GRADE  
Available

**RoHS**  
COMPLIANT

**ORDERING INFORMATION**

| DEVICE NAME   | ORDERING CODE                          | TAPED UNITS PER REEL            | MINIMUM ORDER QUANTITY |
|---------------|--|---------------------------------|------------------------|
| BZD27C Series | BZD27C3V6P-E3-08 to BZD27C200P-E3-08   | 3000 per 7" reel (8 mm tape)    | 30 000/box             |
|               | BZD27C3V6P-HE3-08 to BZD27C200P-HE3-08 |                                 |                        |
|               | BZD27C3V6P-E3-18 to BZD27C200P-E3-18   | 10 000 per 13" reel (8 mm tape) | 50 000/box             |
|               | BZD27C3V6P-HE3-18 to BZD27C200P-HE3-18 |                                 |                        |

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

| PARAMETER  | TEST CONDITION  | SYMBOL     | VALUE       | UNIT |
|--|---|------------|-------------|------|
| Power dissipation  | $T_L = 105\text{ °C}$   | $P_{tot}$  | 2300        | mW   |
|  | $T_A = 30\text{ °C}$ <sup>(1)</sup>   | $P_{tot}$  | 800         | mW   |
| Non repetitive peak surge power dissipation <sup>(2)</sup> | 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<br>3 mm x 3 mm Cu pads<br>( $\geq 40\text{ }\mu$ 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**
<sup>(1)</sup> Mounted on epoxy-glass PCB with 3 mm x 3 mm Cu pads ( $\geq 40\text{ }\mu$ m thick)

<sup>(2)</sup>  $T_j = 25\text{ °C}$  prior to surge



| <b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , 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.  |
| BZD27C3V6P   | D0           | 3.4                                | 3.6  | 3.8  | 100          | 100             | 1   | 4                  | 8    | -0.14                      | -0.04 |
| BZD27C3V9P   | D1           | 3.7                                | 3.9  | 4.1  | 100          | 50              | 1   | 4                  | 8    | -0.14                      | -0.04 |
| BZD27C4V3P   | D2           | 4                                  | 4.3  | 4.6  | 100          | 25              | 1   | 4                  | 7    | -0.12                      | -0.02 |
| BZD27C4V7P   | D3           | 4.4                                | 4.7  | 5    | 100          | 10              | 1   | 3                  | 7    | -0.1                       | 0     |
| BZD27C5V1P   | D4           | 4.8                                | 5.1  | 5.4  | 100          | 5               | 1   | 3                  | 6    | -0.08                      | 0.02  |
| BZD27C5V6P   | D5           | 5.2                                | 5.6  | 6    | 100          | 10              | 2   | 2                  | 4    | -0.04                      | 0.04  |
| BZD27C6V2P   | D6           | 5.8                                | 6.2  | 6.6  | 100          | 5               | 2   | 2                  | 3    | -0.01                      | 0.06  |
| BZD27C6V8P   | D7           | 6.4                                | 6.8  | 7.2  | 100          | 10              | 3   | 1                  | 3    | 0                          | 0.07  |
| BZD27C7V5P   | D8           | 7                                  | 7.5  | 7.9  | 100          | 50              | 3   | 1                  | 2    | 0                          | 0.07  |
| BZD27C8V2P   | D9           | 7.7                                | 8.2  | 8.7  | 100          | 10              | 3   | 1                  | 2    | 0.03                       | 0.08  |
| BZD27C9V1P   | E0           | 8.5                                | 9.1  | 9.6  | 50           | 10              | 5   | 2                  | 4    | 0.03                       | 0.08  |
| BZD27C10P  | E1           | 9.4                                | 10   | 10.6 | 50           | 7               | 7.5 | 2                  | 4    | 0.05                       | 0.09  |
| BZD27C11P  | E2           | 10.4                               | 11   | 11.6 | 50           | 4               | 8.2 | 4                  | 7    | 0.05                       | 0.1   |
| BZD27C12P  | E3           | 11.4                               | 12   | 12.7 | 50           | 3               | 9.1 | 4                  | 7    | 0.05                       | 0.1   |
| BZD27C13P  | E4           | 12.4                               | 13   | 14.1 | 50           | 2               | 10  | 5                  | 10   | 0.05                       | 0.1   |
| BZD27C15P  | E5           | 13.8                               | 15   | 15.6 | 50           | 1               | 11  | 5                  | 10   | 0.05                       | 0.1   |
| BZD27C16P  | E6           | 15.3                               | 16   | 17.1 | 25           | 1               | 12  | 6                  | 15   | 0.06                       | 0.11  |
| BZD27C18P  | E7           | 16.8                               | 18   | 19.1 | 25           | 1               | 13  | 6                  | 15   | 0.06                       | 0.11  |
| BZD27C20P  | E8           | 18.8                               | 20   | 21.2 | 25           | 1               | 15  | 6                  | 15   | 0.06                       | 0.11  |
| BZD27C22P  | E9           | 20.8                               | 22   | 23.3 | 25           | 1               | 16  | 6                  | 15   | 0.06                       | 0.11  |
| BZD27C24P  | F0           | 22.8                               | 24   | 25.6 | 25           | 1               | 18  | 7                  | 15   | 0.06                       | 0.11  |
| BZD27C27P  | F1           | 25.1                               | 27   | 28.9 | 25           | 1               | 20  | 7                  | 15   | 0.06                       | 0.11  |
| BZD27C30P  | F2           | 28                                 | 30   | 32   | 25           | 1               | 22  | 8                  | 15   | 0.06                       | 0.11  |
| BZD27C33P  | F3           | 31                                 | 33   | 35   | 25           | 1               | 24  | 8                  | 15   | 0.06                       | 0.11  |
| BZD27C36P  | F4           | 34                                 | 36   | 38   | 10           | 1               | 27  | 21                 | 40   | 0.06                       | 0.11  |
| BZD27C39P  | F5           | 37                                 | 39   | 41   | 10           | 1               | 30  | 21                 | 40   | 0.06                       | 0.11  |
| BZD27C43P  | F6           | 40                                 | 43   | 46   | 10           | 1               | 33  | 24                 | 45   | 0.07                       | 0.12  |
| BZD27C47P  | F7           | 44                                 | 47   | 50   | 10           | 1               | 36  | 24                 | 45   | 0.07                       | 0.12  |
| BZD27C51P  | F8           | 48                                 | 51   | 54   | 10           | 1               | 39  | 25                 | 60   | 0.07                       | 0.12  |
| BZD27C56P  | F9           | 52                                 | 56   | 60   | 10           | 1               | 43  | 25                 | 60   | 0.07                       | 0.12  |
| BZD27C62P  | G0           | 58                                 | 62   | 66   | 10           | 1               | 47  | 25                 | 80   | 0.08                       | 0.13  |
| BZD27C68P  | G1           | 64                                 | 68   | 72   | 10           | 1               | 51  | 25                 | 80   | 0.08                       | 0.13  |
| BZD27C75P  | G2           | 70                                 | 75   | 79   | 10           | 1               | 56  | 30                 | 100  | 0.08                       | 0.13  |
| BZD27C82P  | G3           | 77                                 | 82   | 87   | 10           | 1               | 62  | 30                 | 100  | 0.08                       | 0.13  |
| BZD27C91P  | G4           | 85                                 | 91   | 96   | 5            | 1               | 68  | 60                 | 200  | 0.08                       | 0.13  |
| BZD27C100P   | G5           | 94                                 | 100  | 106  | 5            | 1               | 75  | 60                 | 200  | 0.09                       | 0.13  |
| BZD27C110P   | G6           | 104                                | 110  | 116  | 5            | 1               | 82  | 80                 | 250  | 0.09                       | 0.13  |
| BZD27C120P   | G7           | 114                                | 120  | 127  | 5            | 1               | 91  | 80                 | 250  | 0.09                       | 0.13  |
| BZD27C130P   | G8           | 124                                | 130  | 141  | 5            | 1               | 100 | 110                | 300  | 0.09                       | 0.13  |
| BZD27C150P   | G9           | 138                                | 150  | 156  | 5            | 1               | 110 | 130                | 300  | 0.09                       | 0.13  |
| BZD27C160P   | H0           | 153                                | 160  | 171  | 5            | 1               | 120 | 150                | 350  | 0.09                       | 0.13  |
| BZD27C180P   | H1           | 168                                | 180  | 191  | 5            | 1               | 130 | 180                | 400  | 0.09                       | 0.13  |
| BZD27C200P   | H2           | 188                                | 200  | 212  | 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

(1) Pulse test:  $t_p \leq 5\text{ ms}$



| <b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , 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. |
| BZD27C7V5P   | D8           | 7                   | 7.5  | 7.9  | 100          | 1500            | 6.2 | 11.3                     | 13.3 | 0                          | 0.07 |
| BZD27C8V2P   | D9           | 7.7                 | 8.2  | 8.7  | 100          | 1200            | 6.8 | 12.3                     | 12.2 | 0.03                       | 0.08 |
| BZD27C9V1P   | E0           | 8.5                 | 9.1  | 9.6  | 50           | 100             | 7.5 | 13.3                     | 11.3 | 0.03                       | 0.08 |
| BZD27C10P  | E1           | 9.4                 | 10   | 10.6 | 50           | 20              | 8.2 | 14.8                     | 10.1 | 0.05                       | 0.09 |
| BZD27C11P  | E2           | 10.4                | 11   | 11.6 | 50           | 5               | 9.1 | 15.7                     | 9.6  | 0.05                       | 0.1  |
| BZD27C12P  | E3           | 11.4                | 12   | 12.7 | 50           | 5               | 10  | 17                       | 8.8  | 0.05                       | 0.1  |
| BZD27C13P  | E4           | 12.4                | 13   | 14.1 | 50           | 5               | 11  | 18.9                     | 7.9  | 0.05                       | 0.1  |
| BZD27C15P  | E5           | 13.8                | 15   | 15.6 | 50           | 5               | 12  | 20.9                     | 7.2  | 0.05                       | 0.1  |
| BZD27C16P  | E6           | 15.3                | 16   | 17.1 | 25           | 5               | 13  | 22.9                     | 6.6  | 0.06                       | 0.11 |
| BZD27C18P  | E7           | 16.8                | 18   | 19.1 | 25           | 5               | 15  | 25.6                     | 5.9  | 0.06                       | 0.11 |
| BZD27C20P  | E8           | 18.8                | 20   | 21.2 | 25           | 5               | 16  | 28.4                     | 5.3  | 0.06                       | 0.11 |
| BZD27C22P  | E9           | 20.8                | 22   | 23.3 | 25           | 5               | 18  | 31                       | 4.8  | 0.06                       | 0.11 |
| BZD27C24P  | F0           | 22.8                | 24   | 25.6 | 25           | 5               | 20  | 33.8                     | 4.4  | 0.06                       | 0.11 |
| BZD27C27P  | F1           | 25.1                | 27   | 28.9 | 25           | 5               | 22  | 38.1                     | 3.9  | 0.06                       | 0.11 |
| BZD27C30P  | F2           | 28                  | 30   | 32   | 25           | 5               | 24  | 42.2                     | 3.6  | 0.06                       | 0.11 |
| BZD27C33P  | F3           | 31                  | 33   | 35   | 25           | 5               | 27  | 46.2                     | 3.2  | 0.06                       | 0.11 |
| BZD27C36P  | F4           | 34                  | 36   | 38   | 10           | 5               | 30  | 50.1                     | 3    | 0.06                       | 0.11 |
| BZD27C39P  | F5           | 37                  | 39   | 41   | 10           | 5               | 33  | 54.1                     | 2.8  | 0.06                       | 0.11 |
| BZD27C43P  | F6           | 40                  | 43   | 46   | 10           | 5               | 36  | 60.7                     | 2.5  | 0.07                       | 0.12 |
| BZD27C47P  | F7           | 44                  | 47   | 50   | 10           | 5               | 39  | 65.5                     | 2.3  | 0.07                       | 0.12 |
| BZD27C51P  | F8           | 48                  | 51   | 54   | 10           | 5               | 43  | 70.8                     | 2.1  | 0.07                       | 0.12 |
| BZD27C56P  | F9           | 52                  | 56   | 60   | 10           | 5               | 47  | 78.6                     | 1.9  | 0.07                       | 0.12 |
| BZD27C62P  | G0           | 58                  | 62   | 66   | 10           | 5               | 51  | 86.5                     | 1.7  | 0.08                       | 0.13 |
| BZD27C68P  | G1           | 64                  | 68   | 72   | 10           | 5               | 56  | 94.4                     | 1.6  | 0.08                       | 0.13 |
| BZD27C75P  | G2           | 70                  | 75   | 79   | 10           | 5               | 62  | 103.5                    | 1.5  | 0.08                       | 0.13 |
| BZD27C82P  | G3           | 77                  | 82   | 87   | 10           | 5               | 68  | 114                      | 1.3  | 0.08                       | 0.13 |
| BZD27C91P  | G4           | 85                  | 91   | 96   | 5            | 5               | 75  | 126                      | 1.2  | 0.09                       | 0.13 |
| BZD27C100P   | G5           | 94                  | 100  | 106  | 5            | 5               | 82  | 139                      | 1.1  | 0.09                       | 0.13 |
| BZD27C110P   | G6           | 104                 | 110  | 116  | 5            | 5               | 91  | 150                      | 1    | 0.09                       | 0.13 |
| BZD27C120P   | G7           | 114                 | 120  | 127  | 5            | 5               | 100 | 167                      | 0.9  | 0.09                       | 0.13 |
| BZD27C130P   | G8           | 124                 | 130  | 141  | 5            | 5               | 110 | 185                      | 0.81 | 0.09                       | 0.13 |
| BZD27C150P   | G9           | 138                 | 150  | 156  | 5            | 5               | 120 | 205                      | 0.73 | 0.09                       | 0.13 |
| BZD27C160P   | H0           | 153                 | 160  | 171  | 5            | 5               | 130 | 224                      | 0.67 | 0.09                       | 0.13 |
| BZD27C180P   | H1           | 168                 | 180  | 191  | 5            | 5               | 150 | 252                      | 0.6  | 0.09                       | 0.13 |
| BZD27C200P   | H2           | 188                 | 200  | 212  | 5            | 5               | 160 | 278                      | 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)

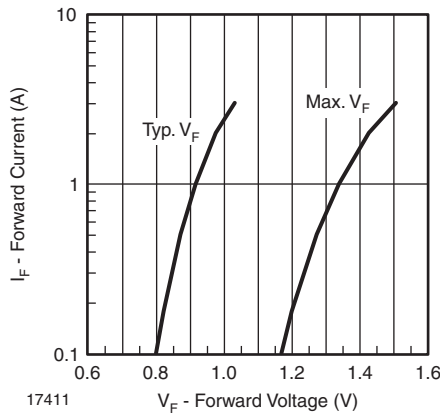


Fig. 1 - Forward Current vs. Forward Voltage

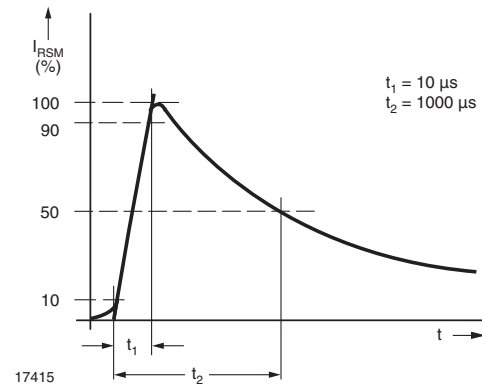


Fig. 4 - Non-Repetitive Peak Reverse Current Pulse Definition

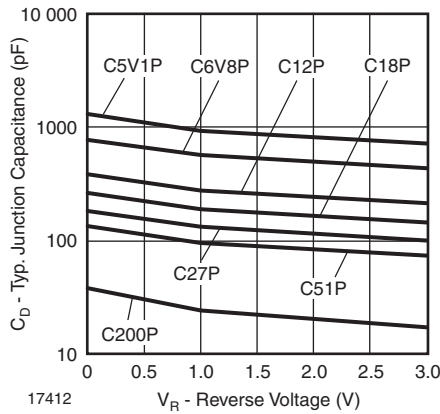


Fig. 2 - Typ. Diode Capacitance vs. Reverse Voltage

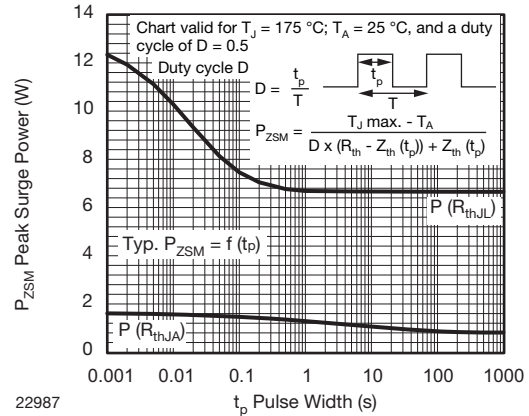


Fig. 5 - Typical Repetitive Peak Surge Power

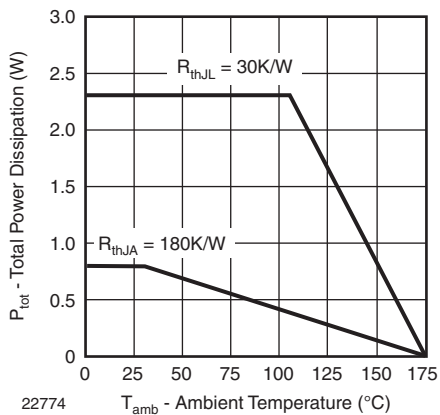


Fig. 3 - Power Dissipation vs. Ambient Temperature

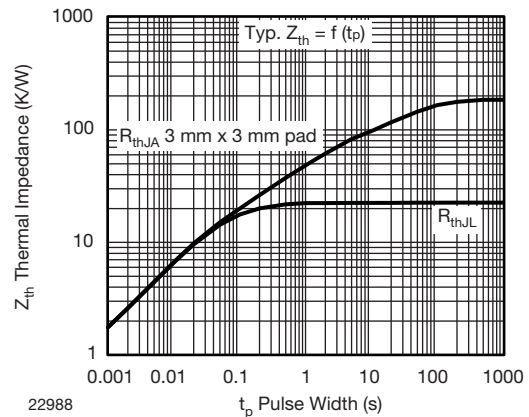
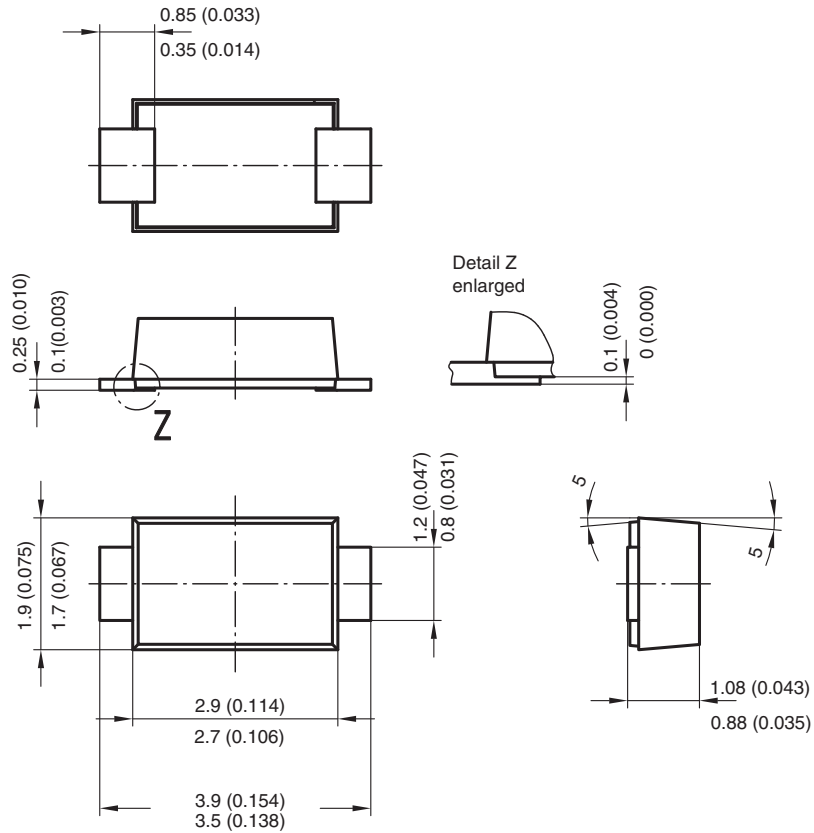


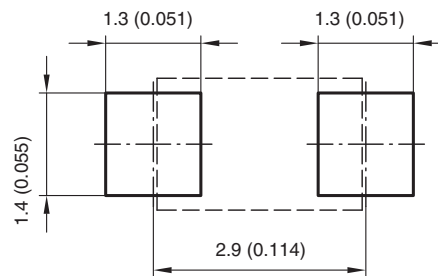
Fig. 6 - Typical Thermal Impedance vs. Time



**PACKAGE DIMENSIONS** in millimeters (inches): **SMF (D0219-AB)**



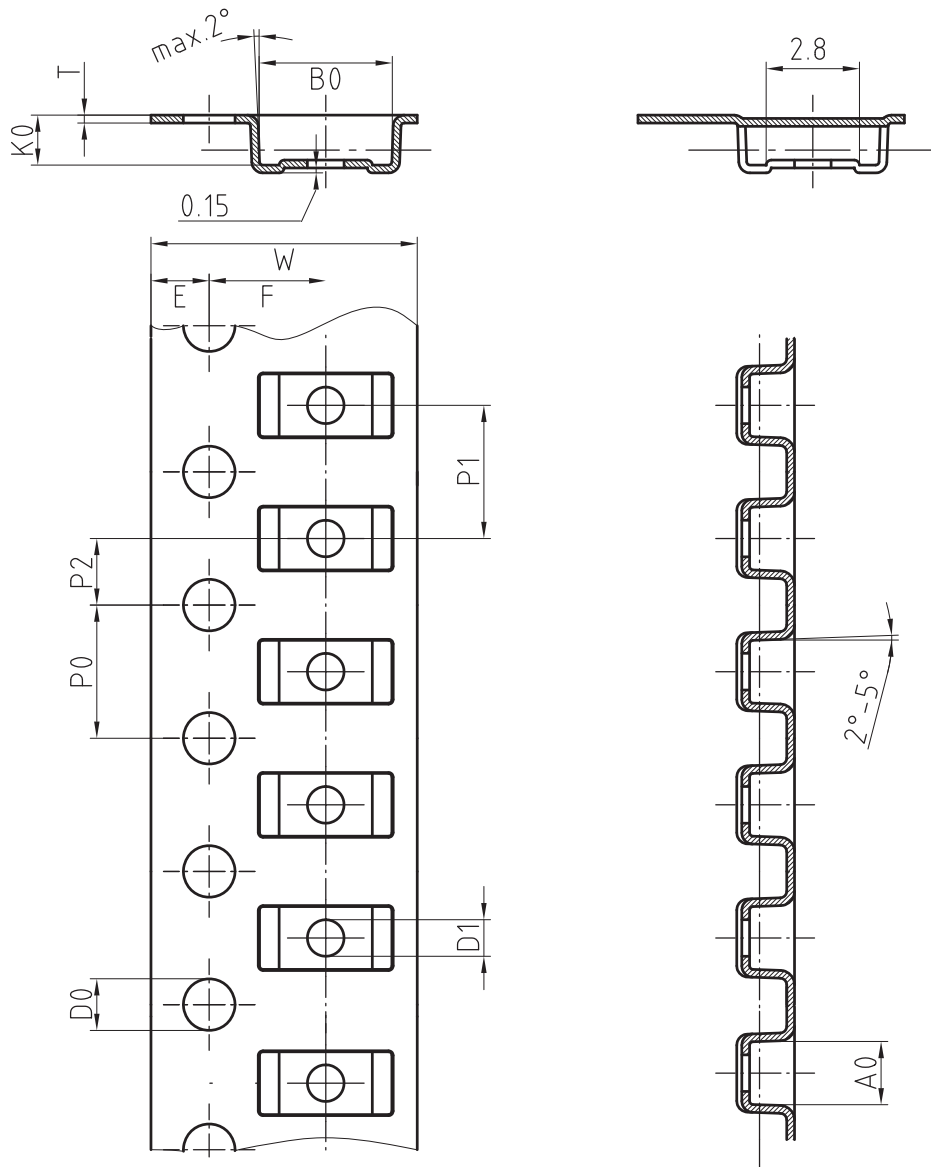
Foot print recommendation:



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



**BLISTERTAPE DIMENSIONS FOR SMF (DO219-AB) in millimeters**



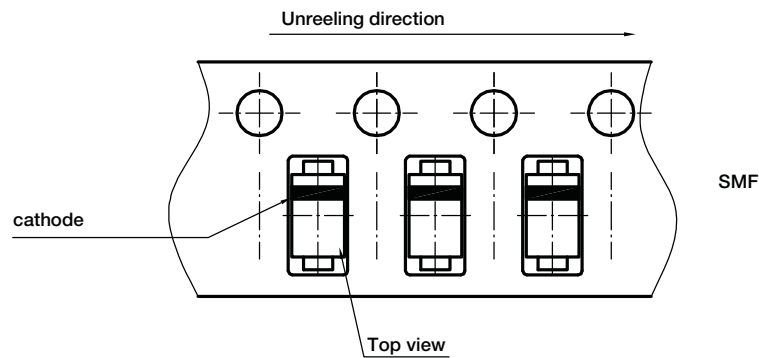
| Mat: | A0  | B0  | K0  | W   | T     | P0  | P2  | P1  | D0  | D1 | E    | F   |
|------|-----|-----|-----|-----|-------|-----|-----|-----|-----|----|------|-----|
| PS   | 1.9 | 4.0 | 1.5 | 8.0 | 0.235 | 4.0 | 2.0 | 4.0 | 1.5 | 1  | 1.75 | 3.5 |

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

18513



**ORIENTATION IN CARRIER TAPE - SMF (D0219-AB)**



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Created - Date: 09. Feb. 2010  
22670



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