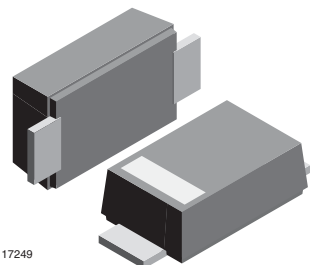


## Zener Diodes with Surge Current Specification



### 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
- Base P/N-M3 - halogen-free, RoHS-compliant, and commercial grade
- Base P/N-HM3 - halogen-free, RoHS-compliant, and automotive grade (available on request)
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### 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 to 188        | 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 |      |

### ORDERING INFORMATION

| DEVICE NAME    | ORDERING CODE                        | TAPED UNITS PER REEL            | MINIMUM ORDER QUANTITY |
|----------------|--------------------------------------|---------------------------------|------------------------|
| BZD27-M Series | BZD27C3V6P-M3-08 to BZD27C200P-M3-08 | 3000 per 7" reel (8mm tape)     | 30 000/box             |
|                | BZD27C3V6P-M3-18 to BZD27C200P-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         |
|----------------|--------|--------------------------------------|--------------------------------------|----------------------------|------------------------------|
| DO-219AB (SMF) | 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 μs square pulse                                                 | P <sub>ZSM</sub>  | 300         | W    |
|                                                            | 10/1000 μs 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 (≥ 40 μm 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 (≥ 40 μm 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.  |
| BZD27C3V6P-M | N0           | 3.4                                | 3.6  | 3.8  | 100          | 100             | 1   | 4                  | 8    | -0.14                      | -0.04 |
| BZD27C3V9P-M | N1           | 3.7                                | 3.9  | 4.1  | 100          | 50              | 1   | 4                  | 8    | -0.14                      | -0.04 |
| BZD27C4V3P-M | N2           | 4                                  | 4.3  | 4.6  | 100          | 25              | 1   | 4                  | 7    | -0.12                      | -0.02 |
| BZD27C4V7P-M | N3           | 4.4                                | 4.7  | 5    | 100          | 10              | 1   | 3                  | 7    | -0.1                       | 0     |
| BZD27C5V1P-M | N4           | 4.8                                | 5.1  | 5.4  | 100          | 5               | 1   | 3                  | 6    | -0.08                      | 0.02  |
| BZD27C5V6P-M | N5           | 5.2                                | 5.6  | 6    | 100          | 10              | 2   | 2                  | 4    | -0.04                      | 0.04  |
| BZD27C6V2P-M | N6           | 5.8                                | 6.2  | 6.6  | 100          | 5               | 2   | 2                  | 3    | -0.01                      | 0.06  |
| BZD27C6V8P-M | N7           | 6.4                                | 6.8  | 7.2  | 100          | 10              | 3   | 1                  | 3    | 0                          | 0.07  |
| BZD27C7V5P-M | N8           | 7                                  | 7.5  | 7.9  | 100          | 50              | 3   | 1                  | 2    | 0                          | 0.07  |
| BZD27C8V2P-M | N9           | 7.7                                | 8.2  | 8.7  | 100          | 10              | 3   | 1                  | 2    | 0.03                       | 0.08  |
| BZD27C9V1P-M | O0           | 8.5                                | 9.1  | 9.6  | 50           | 10              | 5   | 2                  | 4    | 0.03                       | 0.08  |
| BZD27C10P-M  | O1           | 9.4                                | 10   | 10.6 | 50           | 7               | 7.5 | 2                  | 4    | 0.05                       | 0.09  |
| BZD27C11P-M  | O2           | 10.4                               | 11   | 11.6 | 50           | 4               | 8.2 | 4                  | 7    | 0.05                       | 0.1   |
| BZD27C12P-M  | O3           | 11.4                               | 12   | 12.7 | 50           | 3               | 9.1 | 4                  | 7    | 0.05                       | 0.1   |
| BZD27C13P-M  | O4           | 12.4                               | 13   | 14.1 | 50           | 2               | 10  | 5                  | 10   | 0.05                       | 0.1   |
| BZD27C15P-M  | O5           | 13.8                               | 15   | 15.6 | 50           | 1               | 11  | 5                  | 10   | 0.05                       | 0.1   |
| BZD27C16P-M  | O6           | 15.3                               | 16   | 17.1 | 25           | 1               | 12  | 6                  | 15   | 0.06                       | 0.11  |
| BZD27C18P-M  | O7           | 16.8                               | 18   | 19.1 | 25           | 1               | 13  | 6                  | 15   | 0.06                       | 0.11  |
| BZD27C20P-M  | O8           | 18.8                               | 20   | 21.2 | 25           | 1               | 15  | 6                  | 15   | 0.06                       | 0.11  |
| BZD27C22P-M  | O9           | 20.8                               | 22   | 23.3 | 25           | 1               | 16  | 6                  | 15   | 0.06                       | 0.11  |
| BZD27C24P-M  | P0           | 22.8                               | 24   | 25.6 | 25           | 1               | 18  | 7                  | 15   | 0.06                       | 0.11  |
| BZD27C27P-M  | P1           | 25.1                               | 27   | 28.9 | 25           | 1               | 20  | 7                  | 15   | 0.06                       | 0.11  |
| BZD27C30P-M  | P2           | 28                                 | 30   | 32   | 25           | 1               | 22  | 8                  | 15   | 0.06                       | 0.11  |
| BZD27C33P-M  | P3           | 31                                 | 33   | 35   | 25           | 1               | 24  | 8                  | 15   | 0.06                       | 0.11  |
| BZD27C36P-M  | P4           | 34                                 | 36   | 38   | 10           | 1               | 27  | 21                 | 40   | 0.06                       | 0.11  |
| BZD27C39P-M  | P5           | 37                                 | 39   | 41   | 10           | 1               | 30  | 21                 | 40   | 0.06                       | 0.11  |
| BZD27C43P-M  | P6           | 40                                 | 43   | 46   | 10           | 1               | 33  | 24                 | 45   | 0.07                       | 0.12  |
| BZD27C47P-M  | P7           | 44                                 | 47   | 50   | 10           | 1               | 36  | 24                 | 45   | 0.07                       | 0.12  |
| BZD27C51P-M  | P8           | 48                                 | 51   | 54   | 10           | 1               | 39  | 25                 | 60   | 0.07                       | 0.12  |
| BZD27C56P-M  | P9           | 52                                 | 56   | 60   | 10           | 1               | 43  | 25                 | 60   | 0.07                       | 0.12  |
| BZD27C62P-M  | Q0           | 58                                 | 62   | 66   | 10           | 1               | 47  | 25                 | 80   | 0.08                       | 0.13  |
| BZD27C68P-M  | Q1           | 64                                 | 68   | 72   | 10           | 1               | 51  | 25                 | 80   | 0.08                       | 0.13  |
| BZD27C75P-M  | Q2           | 70                                 | 75   | 79   | 10           | 1               | 56  | 30                 | 100  | 0.08                       | 0.13  |
| BZD27C82P-M  | Q3           | 77                                 | 82   | 87   | 10           | 1               | 62  | 30                 | 100  | 0.08                       | 0.13  |
| BZD27C91P-M  | Q4           | 85                                 | 91   | 96   | 5            | 1               | 68  | 60                 | 200  | 0.08                       | 0.13  |
| BZD27C100P-M | Q5           | 94                                 | 100  | 106  | 5            | 1               | 75  | 60                 | 200  | 0.09                       | 0.13  |
| BZD27C110P-M | Q6           | 104                                | 110  | 116  | 5            | 1               | 82  | 80                 | 250  | 0.09                       | 0.13  |
| BZD27C120P-M | Q7           | 114                                | 120  | 127  | 5            | 1               | 91  | 80                 | 250  | 0.09                       | 0.13  |
| BZD27C130P-M | Q8           | 124                                | 130  | 141  | 5            | 1               | 100 | 110                | 300  | 0.09                       | 0.13  |
| BZD27C150P-M | Q9           | 138                                | 150  | 156  | 5            | 1               | 110 | 130                | 300  | 0.09                       | 0.13  |
| BZD27C160P-M | R0           | 153                                | 160  | 171  | 5            | 1               | 120 | 150                | 350  | 0.09                       | 0.13  |
| BZD27C180P-M | R1           | 168                                | 180  | 191  | 5            | 1               | 130 | 180                | 400  | 0.09                       | 0.13  |
| BZD27C200P-M | R2           | 188                                | 200  | 212  | 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. |
| BZD27C7V5P-M | N8           | 7                   | 7.5  | 7.9  | 100          | 1500            | 6.2 | 11.3                     | 13.3 | 0                          | 0.07 |
| BZD27C8V2P-M | N9           | 7.7                 | 8.2  | 8.7  | 100          | 1200            | 6.8 | 12.3                     | 12.2 | 0.03                       | 0.08 |
| BZD27C9V1P-M | O0           | 8.5                 | 9.1  | 9.6  | 50           | 100             | 7.5 | 13.3                     | 11.3 | 0.03                       | 0.08 |
| BZD27C10P-M  | O1           | 9.4                 | 10   | 10.6 | 50           | 20              | 8.2 | 14.8                     | 10.1 | 0.05                       | 0.09 |
| BZD27C11P-M  | O2           | 10.4                | 11   | 11.6 | 50           | 5               | 9.1 | 15.7                     | 9.6  | 0.05                       | 0.1  |
| BZD27C12P-M  | O3           | 11.4                | 12   | 12.7 | 50           | 5               | 10  | 17                       | 8.8  | 0.05                       | 0.1  |
| BZD27C13P-M  | O4           | 12.4                | 13   | 14.1 | 50           | 5               | 11  | 18.9                     | 7.9  | 0.05                       | 0.1  |
| BZD27C15P-M  | O5           | 13.8                | 15   | 15.6 | 50           | 5               | 12  | 20.9                     | 7.2  | 0.05                       | 0.1  |
| BZD27C16P-M  | O6           | 15.3                | 16   | 17.1 | 25           | 5               | 13  | 22.9                     | 6.6  | 0.06                       | 0.11 |
| BZD27C18P-M  | O7           | 16.8                | 18   | 19.1 | 25           | 5               | 15  | 25.6                     | 5.9  | 0.06                       | 0.11 |
| BZD27C20P-M  | O8           | 18.8                | 20   | 21.2 | 25           | 5               | 16  | 28.4                     | 5.3  | 0.06                       | 0.11 |
| BZD27C22P-M  | O9           | 20.8                | 22   | 23.3 | 25           | 5               | 18  | 31                       | 4.8  | 0.06                       | 0.11 |
| BZD27C24P-M  | P0           | 22.8                | 24   | 25.6 | 25           | 5               | 20  | 33.8                     | 4.4  | 0.06                       | 0.11 |
| BZD27C27P-M  | P1           | 25.1                | 27   | 28.9 | 25           | 5               | 22  | 38.1                     | 3.9  | 0.06                       | 0.11 |
| BZD27C30P-M  | P2           | 28                  | 30   | 32   | 25           | 5               | 24  | 42.2                     | 3.6  | 0.06                       | 0.11 |
| BZD27C33P-M  | P3           | 31                  | 33   | 35   | 25           | 5               | 27  | 46.2                     | 3.2  | 0.06                       | 0.11 |
| BZD27C36P-M  | P4           | 34                  | 36   | 38   | 10           | 5               | 30  | 50.1                     | 3    | 0.06                       | 0.11 |
| BZD27C39P-M  | P5           | 37                  | 39   | 41   | 10           | 5               | 33  | 54.1                     | 2.8  | 0.06                       | 0.11 |
| BZD27C43P-M  | P6           | 40                  | 43   | 46   | 10           | 5               | 36  | 60.7                     | 2.5  | 0.07                       | 0.12 |
| BZD27C47P-M  | P7           | 44                  | 47   | 50   | 10           | 5               | 39  | 65.5                     | 2.3  | 0.07                       | 0.12 |
| BZD27C51P-M  | P8           | 48                  | 51   | 54   | 10           | 5               | 43  | 70.8                     | 2.1  | 0.07                       | 0.12 |
| BZD27C56P-M  | P9           | 52                  | 56   | 60   | 10           | 5               | 47  | 78.6                     | 1.9  | 0.07                       | 0.12 |
| BZD27C62P-M  | Q0           | 58                  | 62   | 66   | 10           | 5               | 51  | 86.5                     | 1.7  | 0.08                       | 0.13 |
| BZD27C68P-M  | Q1           | 64                  | 68   | 72   | 10           | 5               | 56  | 94.4                     | 1.6  | 0.08                       | 0.13 |
| BZD27C75P-M  | Q2           | 70                  | 75   | 79   | 10           | 5               | 62  | 103.5                    | 1.5  | 0.08                       | 0.13 |
| BZD27C82P-M  | Q3           | 77                  | 82   | 87   | 10           | 5               | 68  | 114                      | 1.3  | 0.08                       | 0.13 |
| BZD27C91P-M  | Q4           | 85                  | 91   | 96   | 5            | 5               | 75  | 126                      | 1.2  | 0.09                       | 0.13 |
| BZD27C100P-M | Q5           | 94                  | 100  | 106  | 5            | 5               | 82  | 139                      | 1.1  | 0.09                       | 0.13 |
| BZD27C110P-M | Q6           | 104                 | 110  | 116  | 5            | 5               | 91  | 150                      | 1    | 0.09                       | 0.13 |
| BZD27C120P-M | Q7           | 114                 | 120  | 127  | 5            | 5               | 100 | 167                      | 0.9  | 0.09                       | 0.13 |
| BZD27C130P-M | Q8           | 124                 | 130  | 141  | 5            | 5               | 110 | 185                      | 0.81 | 0.09                       | 0.13 |
| BZD27C150P-M | Q9           | 138                 | 150  | 156  | 5            | 5               | 120 | 205                      | 0.73 | 0.09                       | 0.13 |
| BZD27C160P-M | R0           | 153                 | 160  | 171  | 5            | 5               | 130 | 224                      | 0.67 | 0.09                       | 0.13 |
| BZD27C180P-M | R1           | 168                 | 180  | 191  | 5            | 5               | 150 | 252                      | 0.6  | 0.09                       | 0.13 |
| BZD27C200P-M | R2           | 188                 | 200  | 212  | 5            | 5               | 160 | 278                      | 0.54 | 0.09                       | 0.13 |

**Notes**

- 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)

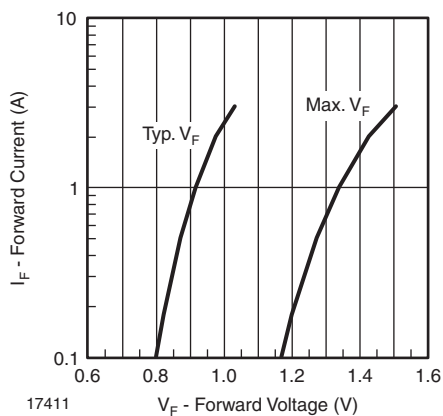


Fig. 1 - Forward Current vs. Forward Voltage

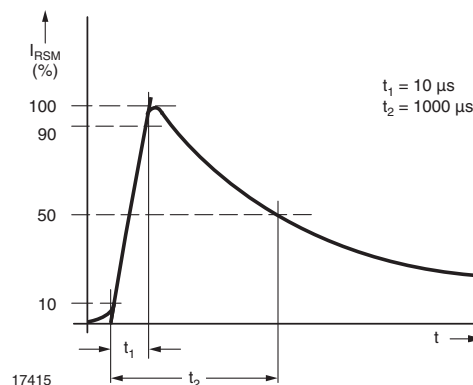


Fig. 4 - Non-Repetitive Peak Reverse Current Pulse Definition

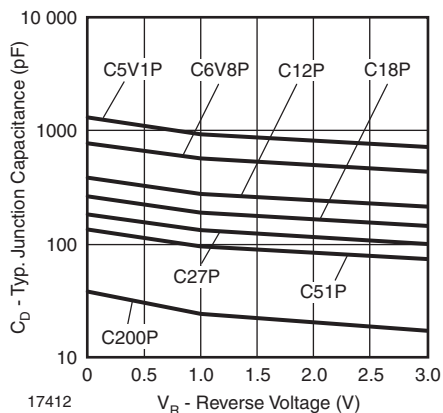


Fig. 2 - Typ. Diode Capacitance vs. Reverse Voltage

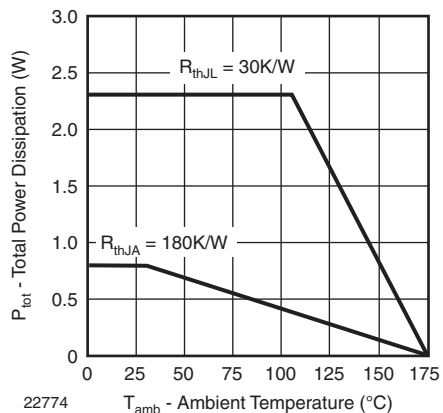
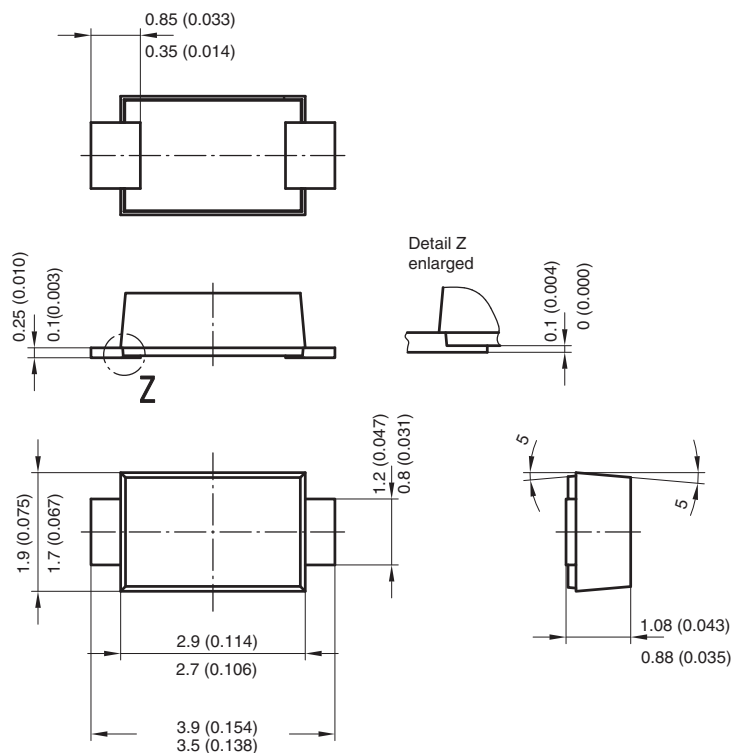


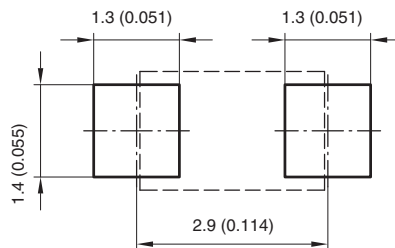
Fig. 3 - Power Dissipation vs. Ambient Temperature



**PACKAGE DIMENSIONS** in millimeters (inches): **DO219-AB (SMF)**

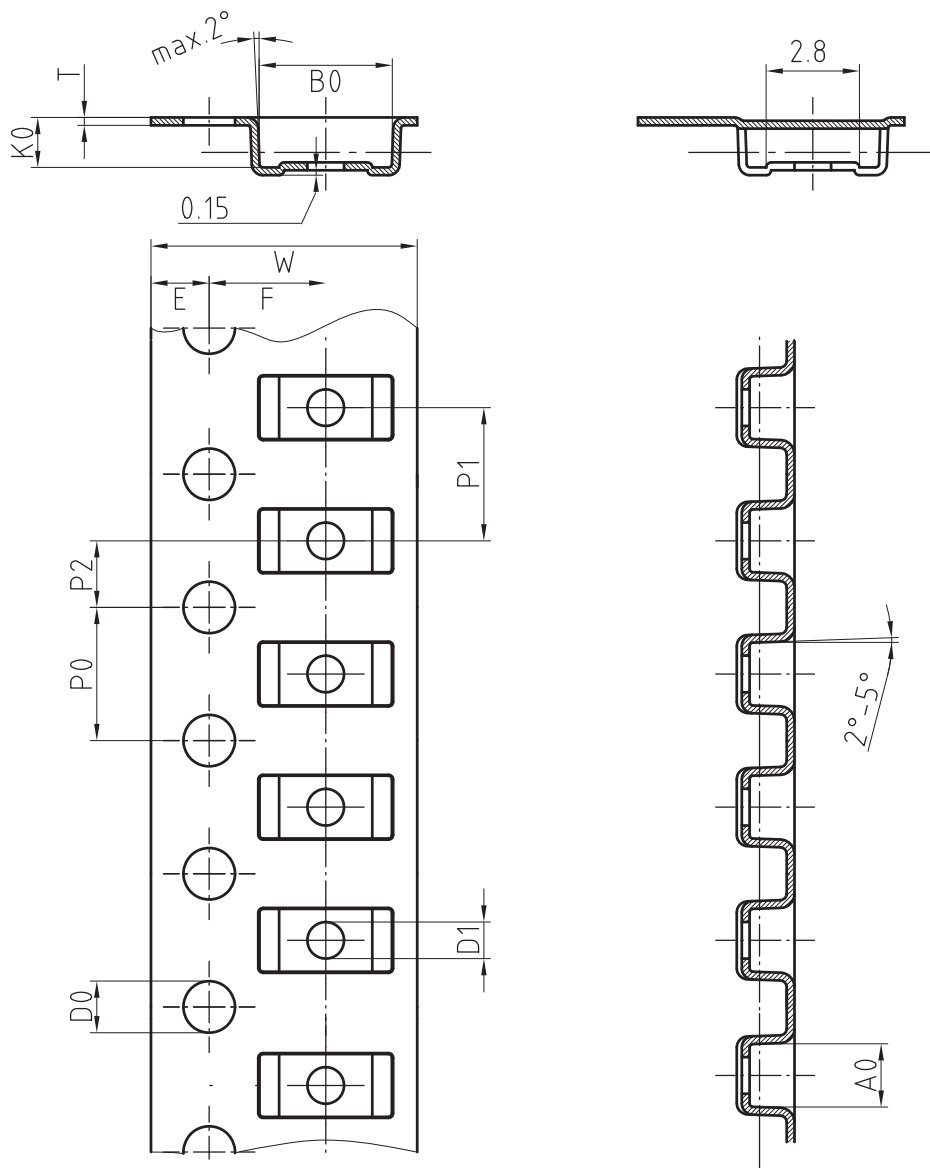


Foot print recommendation:



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

## BLISTERTAPE DIMENSIONS FOR SMF 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



## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

## Material Category Policy

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**