



**THE DATASHEET OF
BZD27C12P-M3-08**



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



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

| ABSOLUTE MAXIMUM RATINGS (T _{amb} = 25 °C, unless otherwise specified) | | | | | |
|---|---|-------------------|-------------|------|--|
| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT | |
| Power dissipation | T _L = 105 °C | P _{tot} | 2300 | mW | |
| | T _A = 30 °C ⁽¹⁾ | P _{tot} | 800 | mW | |
| Non repetitive peak surge power dissipation ⁽²⁾ | 100 μs square pulse | P _{ZSM} | 300 | W | |
| | 10/1000 μs 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 (≥ 40 μm 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 (≥ 40 μm thick)
⁽²⁾ T_J = 25 °C prior to surge



| ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | | | | | | |
|--|--------------|------------------------------------|------|------|------------------|----------------------------------|-----|------------------------------------|------|-----------------------------------|-------|
| PART NUMBER | MARKING CODE | ZENER VOLTAGE RANGE ⁽¹⁾ | | | 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} | | α_{VZ} at I _{ZT1} | |
| | | V | | | mA | μA | V | Ω | | %/ $^{\circ}\text{C}$ | |
| | | 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 $I_F = 0.2\text{ A}$
- (1) 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 $I_{RSM}^{(1)}$ | | α_{VZ} at I_{ZT1} | |
| | | V | | | mA | μA | 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 μs pulse); see fig. 4

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

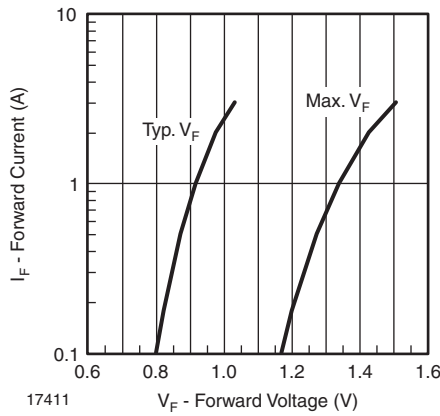


Fig. 1 - Forward Current vs. Forward Voltage



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

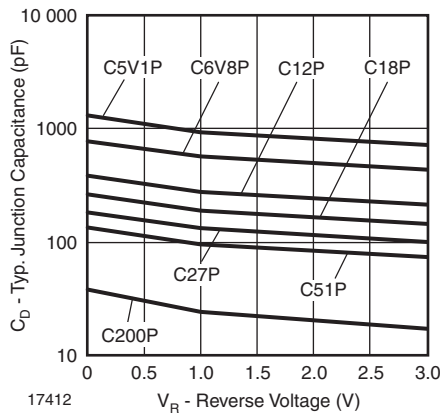


Fig. 2 - Typ. Diode Capacitance vs. Reverse Voltage

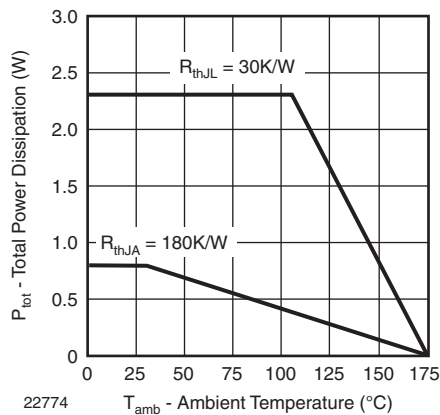
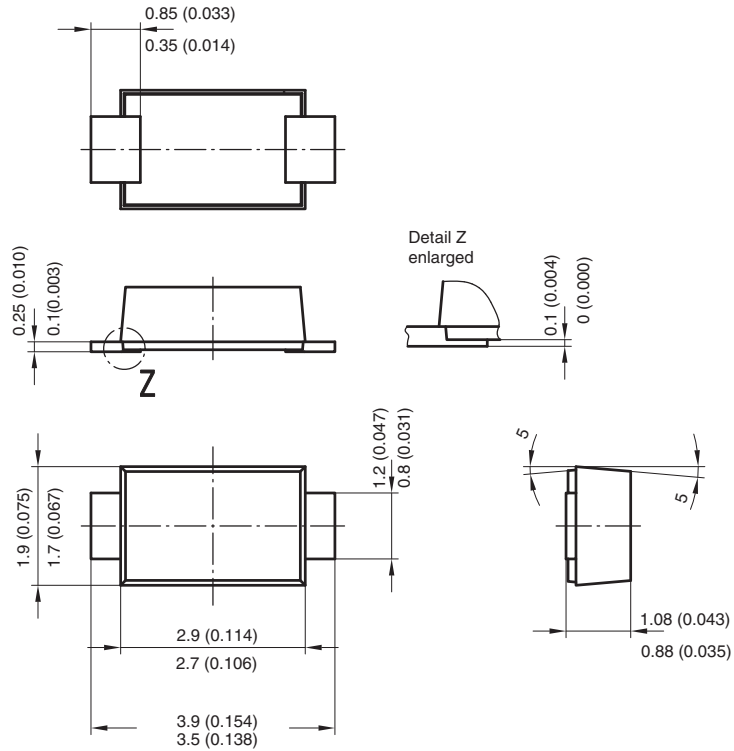


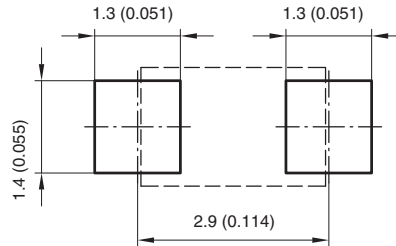
Fig. 3 - Power Dissipation vs. Ambient Temperature



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)

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