

## Zener Diodes with Surge Current Specification



SMA (DO-214AC)

### FEATURES

- High reliability
- Stand-off voltage range 8.2 V to 220 V
- Excellent clamping capability
- Fast response time
- AEC-Q101 qualified available
- Base P/N-M3 - halogen-free, RoHS-compliant, and commercial grade
- Base P/NHM3 - halogen-free, 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)



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

### APPLICATIONS

- Protection from high voltage, high energy transients

### PRIMARY CHARACTERISTICS

| PARAMETER                    | VALUE           | UNIT |
|------------------------------|-----------------|------|
| V <sub>Z</sub> range nom.    | 10 to 270       | V    |
| Test current I <sub>ZT</sub> | 2 to 50         | mA   |
| V <sub>BR</sub>              | 9.4 to 251      | V    |
| V <sub>WM</sub>              | 8.2 to 220      | V    |
| P <sub>PPM</sub>             | 300             | W    |
| T <sub>J</sub> max.          | 150             | °C   |
| V <sub>Z</sub> specification | Pulse current   |      |
| Circuit configuration        | Single          |      |
| Polarity                     | Uni-directional |      |

### ORDERING INFORMATION

| DEVICE NAME    | ORDERING CODE   | TAPED UNITS PER REEL | MINIMUM ORDER QUANTITY |
|----------------|-----------------|----------------------|------------------------|
| BZG04-M-series | BZG04xxx-M3-08  | 1500 per 7" reel     | 6000/box               |
| BZG04-M-series | BZG04xxx-M3-18  | 6000 per 13" reel    | 6000/box               |
| BZG04-M-series | BZG04xxx-HM3-08 | 1500 per 7" reel     | 6000/box               |
| BZG04-M-series | BZG04xxx-HM3-18 | 6000 per 13" reel    | 6000/box               |

### PACKAGE

| PACKAGE NAME   | WEIGHT | MOLDING COMPOUND<br>FLAMMABILITY RATING | MOISTURE SENSITIVITY<br>LEVEL        | SOLDERING CONDITIONS     |
|----------------|--------|-----------------------------------------|--------------------------------------|--------------------------|
| SMA (DO-214AC) | 73 mg  | UL 94 V-0                               | MSL level 1<br>(according J-STD-020) | 260 °C/10 s at terminals |

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

| PARAMETER                                   | TEST CONDITION                                                                   | SYMBOL            | VALUE       | UNIT |
|---------------------------------------------|----------------------------------------------------------------------------------|-------------------|-------------|------|
| Power dissipation                           | R <sub>thJA</sub> < 25 K/W, T <sub>amb</sub> = 100 °C                            | P <sub>tot</sub>  | 3000        | mW   |
|                                             | R <sub>thJA</sub> < 100 K/W, T <sub>amb</sub> = 50 °C                            | P <sub>tot</sub>  | 1250        | mW   |
| Non repetitive peak surge power dissipation | t <sub>p</sub> = 10/1000 µs exp. pulse,<br>T <sub>j</sub> = 25 °C prior to surge | P <sub>ZSM</sub>  | 300         | W    |
| Peak forward surge current                  | 10 ms single half sine wave                                                      | I <sub>FSM</sub>  | 50          | A    |
| Junction to lead                            |                                                                                  | R <sub>thJL</sub> | 25          | K/W  |
| Junction to ambient air                     | Mounted on epoxy-glass hard tissue, fig. 1a                                      | R <sub>thJA</sub> | 150         | K/W  |
|                                             | Mounted on epoxy-glass hard tissue, fig. 1b                                      | R <sub>thJA</sub> | 125         | K/W  |
|                                             | Mounted on Al-oxide-ceramic (Al <sub>2</sub> O <sub>3</sub> ), fig. 1b           | R <sub>thJA</sub> | 100         | K/W  |
| Junction temperature                        |                                                                                  | T <sub>j</sub>    | 150         | °C   |
| Storage temperature range                   |                                                                                  | T <sub>stg</sub>  | -65 to +150 | °C   |
| Forward voltage (max.)                      | I <sub>F</sub> = 0.5 A                                                           | V <sub>F</sub>    | 1.2         | V    |



| ELECTRICAL CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |                     |              |                   |               |                         |                                 |          |                         |      |                                                  |
|---------------------------------------------------------------------------------------------------|---------------------|--------------|-------------------|---------------|-------------------------|---------------------------------|----------|-------------------------|------|--------------------------------------------------|
| PART NUMBER                                                                                       | ZENER VOLTAGE RANGE | TEST CURRENT | STAND OFF VOLTAGE |               | BREAKDOWN VOLTAGE       | CLAMPING VOLTAGE <sup>(1)</sup> |          | TEMPERATURE COEFFICIENT |      | JUNCTION CAPACITANCE                             |
|                                                                                                   | $V_Z$ at $I_{ZT1}$  | $I_{ZT1}$    | $V_R$ at $I_R$    |               | $V_{(BR)}$ at $I_{ZT1}$ | $V_{CL(R)}$ at $I_{PP}$         | $I_{PP}$ | $TK_{VZ}$ at $I_{ZT1}$  |      | $C_j$ at $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ |
|                                                                                                   | V                   | mA           | V                 | $\mu\text{A}$ | V                       | V                               | A        | % / K                   |      | pF                                               |
|                                                                                                   | NOM.                |              |                   | MAX.          | MIN.                    | MIN.                            |          | TYP.                    | MAX. | TYP.                                             |
| BZG04-8V2-M                                                                                       | 10                  | 50           | 8.2               | 20            | 9.4                     | 14.8                            | 20.3     | 0.05                    | 0.09 | 1200                                             |
| BZG04-9V1-M                                                                                       | 11                  | 50           | 9.1               | 5             | 10.4                    | 15.7                            | 19.1     | 0.05                    | 0.1  | 1100                                             |
| BZG04-10-M                                                                                        | 12                  | 50           | 10                | 5             | 11.4                    | 17                              | 17.7     | 0.05                    | 0.1  | 1000                                             |
| BZG04-11-M                                                                                        | 13                  | 50           | 11                | 5             | 12.4                    | 18.9                            | 15.9     | 0.05                    | 0.1  | 850                                              |
| BZG04-12-M                                                                                        | 15                  | 50           | 12                | 5             | 13.8                    | 20.9                            | 14.4     | 0.05                    | 0.1  | 815                                              |
| BZG04-13-M                                                                                        | 16                  | 25           | 13                | 5             | 15.3                    | 22.9                            | 13.1     | 0.06                    | 0.11 | 785                                              |
| BZG04-15-M                                                                                        | 18                  | 25           | 15                | 5             | 16.8                    | 25.6                            | 11.7     | 0.06                    | 0.11 | 710                                              |
| BZG04-16-M                                                                                        | 20                  | 25           | 16                | 5             | 18.8                    | 28.4                            | 10.6     | 0.06                    | 0.11 | 655                                              |
| BZG04-18-M                                                                                        | 22                  | 25           | 18                | 5             | 20.8                    | 31                              | 9.7      | 0.06                    | 0.11 | 610                                              |
| BZG04-20-M                                                                                        | 24                  | 25           | 20                | 5             | 22.8                    | 33.8                            | 8.9      | 0.06                    | 0.11 | 570                                              |
| BZG04-22-M                                                                                        | 27                  | 25           | 22                | 5             | 25.1                    | 38.1                            | 7.9      | 0.06                    | 0.11 | 545                                              |
| BZG04-24-M                                                                                        | 30                  | 25           | 24                | 5             | 28                      | 42.2                            | 7.1      | 0.06                    | 0.11 | 505                                              |
| BZG04-27-M                                                                                        | 33                  | 25           | 27                | 5             | 31                      | 46.2                            | 6.5      | 0.06                    | 0.11 | 475                                              |
| BZG04-30-M                                                                                        | 36                  | 10           | 30                | 5             | 34                      | 50.1                            | 6        | 0.06                    | 0.11 | 450                                              |
| BZG04-33-M                                                                                        | 39                  | 10           | 33                | 5             | 37                      | 54.1                            | 5.5      | 0.06                    | 0.11 | 420                                              |
| BZG04-36-M                                                                                        | 43                  | 10           | 36                | 5             | 40                      | 60.7                            | 4.9      | 0.07                    | 0.12 | 390                                              |
| BZG04-39-M                                                                                        | 47                  | 10           | 39                | 5             | 44                      | 65.5                            | 4.6      | 0.07                    | 0.12 | 370                                              |
| BZG04-43-M                                                                                        | 51                  | 10           | 43                | 5             | 48                      | 70.8                            | 4.2      | 0.07                    | 0.12 | 350                                              |
| BZG04-47-M                                                                                        | 56                  | 10           | 47                | 5             | 52                      | 78.6                            | 3.8      | 0.07                    | 0.12 | 330                                              |
| BZG04-51-M                                                                                        | 62                  | 10           | 51                | 5             | 58                      | 86.5                            | 3.5      | 0.08                    | 0.13 | 310                                              |
| BZG04-56-M                                                                                        | 68                  | 10           | 56                | 5             | 64                      | 94.4                            | 3.2      | 0.08                    | 0.13 | 291                                              |
| BZG04-62-M                                                                                        | 75                  | 10           | 62                | 5             | 70                      | 103.5                           | 2.9      | 0.08                    | 0.13 | 280                                              |
| BZG04-68-M                                                                                        | 82                  | 10           | 68                | 5             | 77                      | 114                             | 2.6      | 0.08                    | 0.13 | 275                                              |
| BZG04-75-M                                                                                        | 91                  | 5            | 75                | 5             | 85                      | 126                             | 2.4      | 0.09                    | 0.13 | 260                                              |
| BZG04-82-M                                                                                        | 100                 | 5            | 82                | 5             | 94                      | 139                             | 2.2      | 0.09                    | 0.13 | 250                                              |
| BZG04-91-M                                                                                        | 110                 | 5            | 91                | 5             | 104                     | 152                             | 2        | 0.09                    | 0.13 | 243                                              |
| BZG04-100-M                                                                                       | 120                 | 5            | 100               | 5             | 114                     | 167                             | 1.8      | 0.09                    | 0.13 | 170                                              |
| BZG04-110-M                                                                                       | 130                 | 5            | 110               | 5             | 124                     | 185                             | 1.6      | 0.09                    | 0.13 | 153                                              |
| BZG04-120-M                                                                                       | 150                 | 5            | 120               | 5             | 138                     | 204                             | 1.5      | 0.09                    | 0.13 | 150                                              |
| BZG04-130-M                                                                                       | 160                 | 5            | 130               | 5             | 153                     | 224                             | 1.3      | 0.09                    | 0.13 | 145                                              |
| BZG04-150-M                                                                                       | 180                 | 5            | 150               | 5             | 168                     | 249                             | 1.2      | 0.09                    | 0.13 | 140                                              |
| BZG04-160-M                                                                                       | 200                 | 5            | 160               | 5             | 188                     | 276                             | 1.1      | 0.09                    | 0.13 | 135                                              |
| BZG04-180-M                                                                                       | 220                 | 2            | 180               | 5             | 208                     | 305                             | 1        | 0.09                    | 0.13 | 131                                              |
| BZG04-200-M                                                                                       | 240                 | 2            | 200               | 5             | 228                     | 336                             | 0.9      | 0.09                    | 0.13 | 122                                              |
| BZG04-220-M                                                                                       | 270                 | 2            | 220               | 5             | 251                     | 380                             | 0.8      | 0.09                    | 0.13 | 120                                              |

**Note**<sup>(1)</sup> 10/1000  $\mu\text{s}$  pulse

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

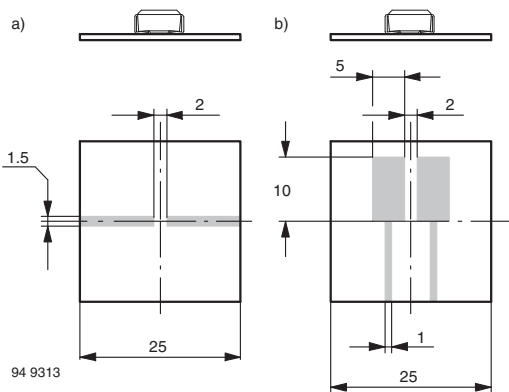


Fig. 1 - Boards for  $R_{thJA}$  Definition (Copper Overlay 35  $\mu$ )

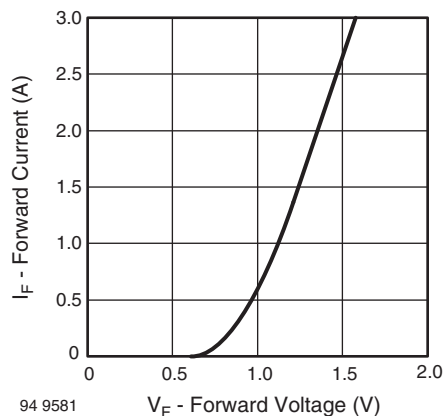


Fig. 3 - Forward Current vs. Forward Voltage



Fig. 2 - Typ. Total Power Dissipation vs. Ambient Temperature



Fig. 4 - Non Repetitive Surge Power Dissipation vs. Pulse Length

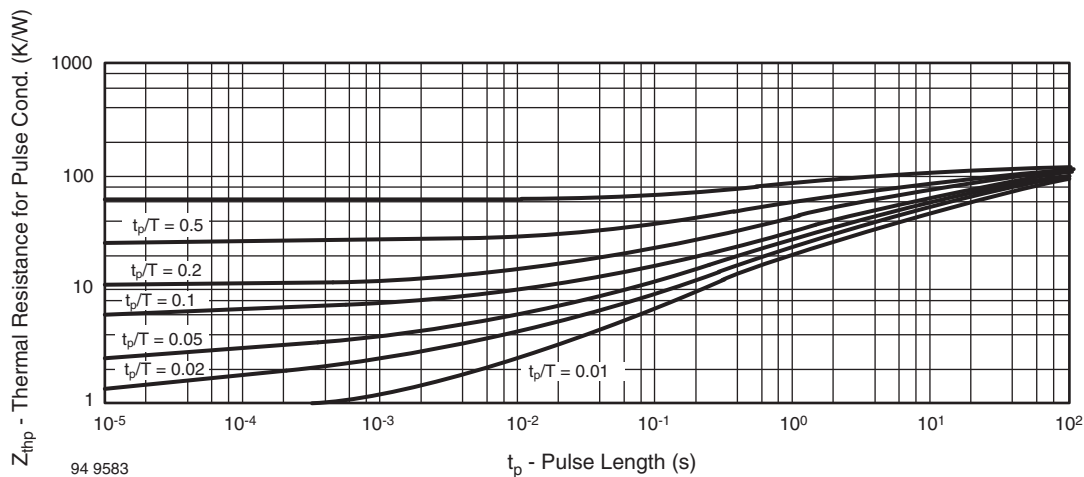


Fig. 5 - Thermal Response



**PACKAGE DIMENSIONS** in millimeters (inches): **SMA (DO-214AC)**



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