

# 1.5KE Series

## TRANSIENT VOLTAGE SUPPRESSOR

Reverse Voltage: 6.8 to 440 V

Peak Pulse Power: 1500 W

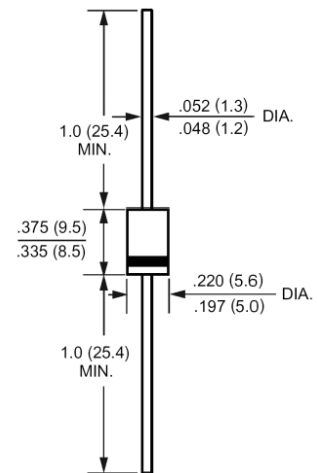
### Features

- Plastic package has UL flammability Classification 94V-0
- 1500 W peak pulse power capability on 10/1000  $\mu$ s waveform, repetition rate (duty cycle): 0.01%
- Excellent clamping capability
- Low incremental surge resistance
- Very fast response time

### Mechanical Data

- Case: Molded plastic, DO-201AD
- Epoxy: UL 94V-0 rate flame retardant
- Lead: Axial leads, solderable per MIL-STD-202, Method 208 guaranteed
- Polarity: Color band denotes cathode except bipolar
- Mounting Position: Any

DO-201AD



### Description

- Devices for bidirectional applications
- For bi-directional use C or CA suffix for types 1.5KE6.8 thru types 1.5KE440 (e.g. 1.5KE6.8C, 1.5KE440CA)
- Electrical characteristics apply in both directions

### Absolute Maximum Ratings and Characteristics

Ratings at 25 °C ambient temperature unless otherwise specified. Single phase, half wave, 60 Hz, resistive or inductive load. For capacitive load, derate current by 20%.

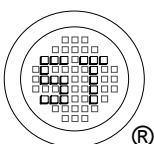
| Parameter  | Symbol                          | Value         | Unit |
|--|---------------------------------|---------------|------|
| Peak Power Dissipation with a 10/1000 $\mu$ s waveform <sup>1)</sup>                               | P <sub>PPM</sub>                | Min. 1500     | W    |
| Steady State Power Dissipation at T <sub>L</sub> = 75 °C Lead lengths 0.375"(9.5 mm) <sup>2)</sup> | P <sub>M(AV)</sub>              | 6.5           | W    |
| Peak Forward Surge Current, 8.3 ms Single half sine-wave unidirectional only <sup>3)</sup>         | I <sub>FSM</sub>                | 200           | A    |
| Maximum Instantaneous Forward Voltage at 100 A for Unidirectional only <sup>4)</sup>               | V <sub>F</sub>                  | 3.5/5         | V    |
| Operating Junction and Storage Temperature Range   | T <sub>J</sub> , T <sub>S</sub> | - 55 to + 150 | °C   |

<sup>1)</sup> Non-repetitive current pulse, per Fig. 3 and derated above T<sub>A</sub> = 25 °C Fig. 2

<sup>2)</sup> Mounted on copper pad area of 1.6 X 1.6" (40 X 40 mm)

<sup>3)</sup> Measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum.

<sup>4)</sup> V<sub>F</sub> = 3.5 V max. for 1.5KE200A & below; V<sub>F</sub> = 5 V max. for 1.5KE220 & above.



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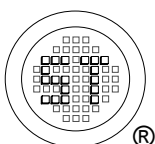


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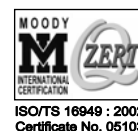
## Electrical Characteristics ( $T_a = 25\text{ }^\circ\text{C}$ unless otherwise specified)

| Uni-directional /<br>Bi-directional<br>Type | Reverse<br>Stand-off<br>Voltage<br>$V_{WM}$ (V) | Breakdown Voltage <sup>1)</sup> |                               | Test<br>Current<br>$I_T$<br>(mA) | Maximum<br>Clamping<br>Voltage<br>$V_C$ (V) at $I_{PPM}$ | Maximum<br>Peak Pulse<br>Current <sup>2)</sup><br>$I_{PPM}$ (A) | Maximum<br>Reverse<br>Leakage <sup>3)</sup><br>$I_D$ ( $\mu\text{A}$ ) at $V_{WM}$ |
|---|---|---------------------------------|-------------------------------|----------------------------------|--|---|--|
|   |   | $V_{BR}$ (V)<br>Min. at $I_T$   | $V_{BR}$ (V)<br>Max. at $I_T$ |                                  |  |   |  |
| 1.5KE6.8 / C                                | 5.5   | 6.12                            | 7.48                          | 10                               | 10.8   | 139   | 1000   |
| 1.5KE6.8A / CA                              | 5.8   | 6.45                            | 7.14                          | 10                               | 10.5   | 143   | 1000   |
| 1.5KE7.5 / C                                | 6.05  | 6.75                            | 8.25                          | 10                               | 11.7   | 128   | 500  |
| 1.5KE7.5A / CA                              | 6.4   | 7.13                            | 7.88                          | 10                               | 11.3   | 133   | 500  |
| 1.5KE8.2 / C                                | 6.63  | 7.38                            | 9.02                          | 10                               | 12.5   | 120   | 200  |
| 1.5KE8.2A / CA                              | 7.02  | 7.79                            | 8.61                          | 10                               | 12.1   | 124   | 200  |
| 1.5KE9.1 / C                                | 7.37  | 8.19                            | 10                            | 1                                | 13.8   | 109   | 50   |
| 1.5KE9.1A / CA                              | 7.78  | 8.65                            | 9.55                          | 1                                | 13.4   | 112   | 50   |
| 1.5KE10 / C                                 | 8.1   | 9                               | 11                            | 1                                | 15   | 100   | 10   |
| 1.5KE10A / CA                               | 8.55  | 9.5                             | 10.5                          | 1                                | 14.5   | 103   | 10   |
| 1.5KE11 / C                                 | 8.92  | 9.9                             | 12.1                          | 1                                | 16.2   | 92.6  | 5  |
| 1.5KE11A / CA                               | 9.4   | 10.5                            | 11.6                          | 1                                | 15.6   | 96.2  | 5  |
| 1.5KE12 / C                                 | 9.72  | 10.8                            | 13.2                          | 1                                | 17.3   | 86.7  | 5  |
| 1.5KE12A / CA                               | 10.2  | 11.4                            | 12.6                          | 1                                | 16.7   | 89.8  | 5  |
| 1.5KE13 / C                                 | 10.5  | 11.7                            | 14.3                          | 1                                | 19   | 78.9  | 5  |
| 1.5KE13A / CA                               | 11.1  | 12.4                            | 13.7                          | 1                                | 18.2   | 82.4  | 5  |
| 1.5KE15 / C                                 | 12.1  | 13.5                            | 16.5                          | 1                                | 22   | 68.2  | 5  |
| 1.5KE15A / CA                               | 12.8  | 14.3                            | 15.8                          | 1                                | 21.2   | 70.8  | 5  |
| 1.5KE16 / C                                 | 12.9  | 14.4                            | 17.6                          | 1                                | 23.5   | 63.8  | 5  |
| 1.5KE16A / CA                               | 13.6  | 15.2                            | 16.8                          | 1                                | 22.5   | 66.7  | 5  |
| 1.5KE18 / C                                 | 14.5  | 16.2                            | 19.8                          | 1                                | 26.5   | 56.6  | 5  |
| 1.5KE18A / CA                               | 15.3  | 17.1                            | 18.9                          | 1                                | 25.2   | 59.5  | 5  |
| 1.5KE20 / C                                 | 16.2  | 18                              | 22                            | 1                                | 29.1   | 51.5  | 5  |
| 1.5KE20A / CA                               | 17.1  | 19                              | 21                            | 1                                | 27.7   | 54.2  | 5  |
| 1.5KE22 / C                                 | 17.8  | 19.8                            | 24.2                          | 1                                | 31.9   | 47  | 5  |
| 1.5KE22A / CA                               | 18.8  | 20.9                            | 23.1                          | 1                                | 30.6   | 49  | 5  |
| 1.5KE24 / C                                 | 19.4  | 21.6                            | 26.4                          | 1                                | 34.7   | 43.2  | 5  |
| 1.5KE24A / CA                               | 20.5  | 22.8                            | 25.2                          | 1                                | 33.2   | 45.2  | 5  |
| 1.5KE27 / C                                 | 21.8  | 24.3                            | 29.7                          | 1                                | 39.1   | 38.4  | 5  |
| 1.5KE27A / CA                               | 23.1  | 25.7                            | 28.4                          | 1                                | 37.5   | 40  | 5  |
| 1.5KE30 / C                                 | 24.3  | 27                              | 33                            | 1                                | 43.5   | 34.5  | 5  |
| 1.5KE30A / CA                               | 25.6  | 28.5                            | 31.5                          | 1                                | 41.4   | 36.2  | 5  |
| 1.5KE33 / C                                 | 26.8  | 29.7                            | 36.3                          | 1                                | 47.7   | 31.4  | 5  |
| 1.5KE33A / CA                               | 28.2  | 31.4                            | 34.7                          | 1                                | 45.7   | 32.8  | 5  |
| 1.5KE36 / C                                 | 29.1  | 32.4                            | 39.6                          | 1                                | 52   | 28.8  | 5  |
| 1.5KE36A / CA                               | 30.8  | 34.2                            | 37.8                          | 1                                | 49.9   | 30.1  | 5  |
| 1.5KE39 / C                                 | 31.6  | 35.1                            | 42.9                          | 1                                | 56.4   | 26.6  | 5  |
| 1.5KE39A / CA                               | 33.3  | 37.1                            | 41                            | 1                                | 53.9   | 27.8  | 5  |
| 1.5KE43 / C                                 | 34.8  | 38.7                            | 47.3                          | 1                                | 61.9   | 24.2  | 5  |
| 1.5KE43A / CA                               | 36.8  | 40.9                            | 45.2                          | 1                                | 59.3   | 25.3  | 5  |
| 1.5KE47 / C                                 | 38.1  | 42.3                            | 51.7                          | 1                                | 67.8   | 22.1  | 5  |
| 1.5KE47A / CA                               | 40.2  | 44.7                            | 49.4                          | 1                                | 64.8   | 23.1  | 5  |
| 1.5KE51 / C                                 | 41.3  | 45.9                            | 56.1                          | 1                                | 73.5   | 20.4  | 5  |
| 1.5KE51A / CA                               | 43.6  | 48.5                            | 53.6                          | 1                                | 70.1   | 21.4  | 5  |



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ISO 14001:2004  
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ISO 9001:2000  
Certificate No. 050098

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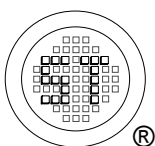
## Electrical Characteristics ( $T_a = 25\text{ }^\circ\text{C}$ unless otherwise specified)

| Uni-directional /<br>Bi-directional<br>Type | Reverse<br>Stand-off<br>Voltage<br>$V_{WM}$ (V) | Breakdown Voltage <sup>1)</sup> |                               | Test<br>Current<br>$I_T$<br>(mA) | Maximum<br>Clamping<br>Voltage<br>$V_C$ (V) at $I_{PPM}$ | Maximum<br>Peak Pulse<br>Current <sup>2)</sup><br>$I_{PPM}$ (A) | Maximum<br>Reverse<br>Leakage <sup>3)</sup><br>$I_D$ ( $\mu\text{A}$ ) at $V_{WM}$ |
|---|---|---------------------------------|-------------------------------|----------------------------------|--|---|--|
|   |   | $V_{BR}$ (V)<br>Min. at $I_T$   | $V_{BR}$ (V)<br>Max. at $I_T$ |                                  |  |   |  |
| 1.5KE56 / C                                 | 45.4  | 50.4                            | 61.8                          | 1                                | 80.5   | 18.6  | 5  |
| 1.5KE56A / CA                               | 47.8  | 53.2                            | 58.8                          | 1                                | 77   | 19.5  | 5  |
| 1.5KE62 / C                                 | 50.2  | 55.8                            | 68.2                          | 1                                | 89   | 16.9  | 5  |
| 1.5KE62A / CA                               | 53  | 58.9                            | 65.1                          | 1                                | 85   | 17.6  | 5  |
| 1.5KE68 / C                                 | 55.1  | 61.2                            | 74.8                          | 1                                | 98   | 15.3  | 5  |
| 1.5KE68A / CA                               | 58.1  | 64.6                            | 71.4                          | 1                                | 92   | 16.3  | 5  |
| 1.5KE75 / C                                 | 60.7  | 67.5                            | 82.5                          | 1                                | 108  | 13.9  | 5  |
| 1.5KE75A / CA                               | 64.1  | 71.3                            | 78.8                          | 1                                | 103  | 14.6  | 5  |
| 1.5KE82 / C                                 | 66.4  | 73.8                            | 90.2                          | 1                                | 118  | 12.7  | 5  |
| 1.5KE82A / CA                               | 70.1  | 77.9                            | 86.1                          | 1                                | 113  | 13.3  | 5  |
| 1.5KE91 / C                                 | 73.7  | 81.9                            | 100                           | 1                                | 131  | 11.5  | 5  |
| 1.5KE91A / CA                               | 77.8  | 86.5                            | 95.5                          | 1                                | 125  | 12  | 5  |
| 1.5KE100 / C                                | 81  | 90                              | 110                           | 1                                | 144  | 10.4  | 5  |
| 1.5KE100A / CA                              | 85.5  | 95                              | 105                           | 1                                | 137  | 10.9  | 5  |
| 1.5KE110 / C                                | 89.2  | 99                              | 121                           | 1                                | 158  | 9.5   | 5  |
| 1.5KE110A / CA                              | 94  | 105                             | 116                           | 1                                | 152  | 9.9   | 5  |
| 1.5KE120 / C                                | 97.2  | 108                             | 132                           | 1                                | 173  | 8.7   | 5  |
| 1.5KE120A / CA                              | 102   | 114                             | 126                           | 1                                | 165  | 9.1   | 5  |
| 1.5KE130 / C                                | 105   | 117                             | 143                           | 1                                | 187  | 8   | 5  |
| 1.5KE130A / CA                              | 111   | 124                             | 137                           | 1                                | 179  | 8.4   | 5  |
| 1.5KE150 / C                                | 121   | 135                             | 165                           | 1                                | 215  | 7   | 5  |
| 1.5KE150A / CA                              | 128   | 143                             | 158                           | 1                                | 207  | 7.2   | 5  |
| 1.5KE160 / C                                | 130   | 144                             | 176                           | 1                                | 230  | 6.5   | 5  |
| 1.5KE160A / CA                              | 136   | 152                             | 168                           | 1                                | 219  | 6.8   | 5  |
| 1.5KE170 / C                                | 138   | 153                             | 187                           | 1                                | 244  | 6.1   | 5  |
| 1.5KE170A / CA                              | 145   | 162                             | 179                           | 1                                | 234  | 6.4   | 5  |
| 1.5KE180 / C                                | 146   | 162                             | 198                           | 1                                | 258  | 5.8   | 5  |
| 1.5KE180A / CA                              | 154   | 171                             | 189                           | 1                                | 246  | 6.1   | 5  |
| 1.5KE200 / C                                | 162   | 180                             | 220                           | 1                                | 287  | 5.2   | 5  |
| 1.5KE200A / CA                              | 171   | 190                             | 210                           | 1                                | 274  | 5.5   | 5  |
| 1.5KE220 / C                                | 175   | 198                             | 242                           | 1                                | 344  | 4.4   | 5  |
| 1.5KE220A / CA                              | 185   | 209                             | 231                           | 1                                | 328  | 4.6   | 5  |
| 1.5KE250 / C                                | 202   | 225                             | 275                           | 1                                | 360  | 4.2   | 5  |
| 1.5KE250A / CA                              | 214   | 237                             | 263                           | 1                                | 344  | 4.4   | 5  |
| 1.5KE300 / C                                | 243   | 270                             | 330                           | 1                                | 430  | 3.5   | 5  |
| 1.5KE300A / CA                              | 256   | 285                             | 315                           | 1                                | 414  | 3.6   | 5  |
| 1.5KE350 / C                                | 284   | 315                             | 385                           | 1                                | 504  | 3   | 5  |
| 1.5KE350A / CA                              | 300   | 333                             | 368                           | 1                                | 482  | 3.1   | 5  |
| 1.5KE400 / C                                | 324   | 360                             | 440                           | 1                                | 574  | 2.6   | 5  |
| 1.5KE400A / CA                              | 342   | 380                             | 420                           | 1                                | 548  | 2.7   | 5  |
| 1.5KE440 / C                                | 356   | 396                             | 484                           | 1                                | 631  | 2.4   | 5  |
| 1.5KE440A / CA                              | 376   | 418                             | 462                           | 1                                | 602  | 2.5   | 5  |

<sup>1)</sup> Pulse test:  $t_p \leq 50$  ms

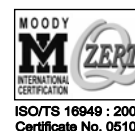
<sup>2)</sup> Surge current waveform per Fig. 3 and derated per Fig. 2

<sup>3)</sup> For bidirectional types having  $V_{WM}$  of 10 V and less, the  $I_D$  limited is doubled



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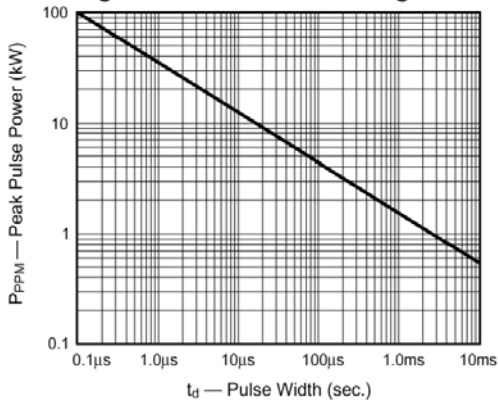
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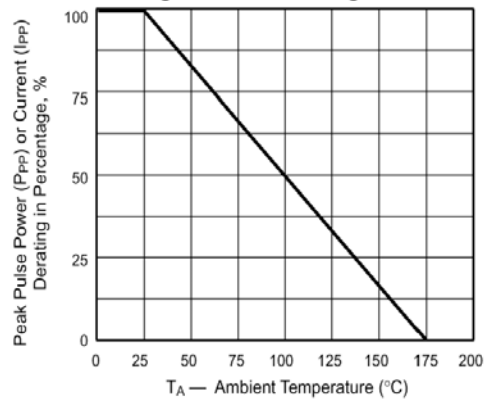
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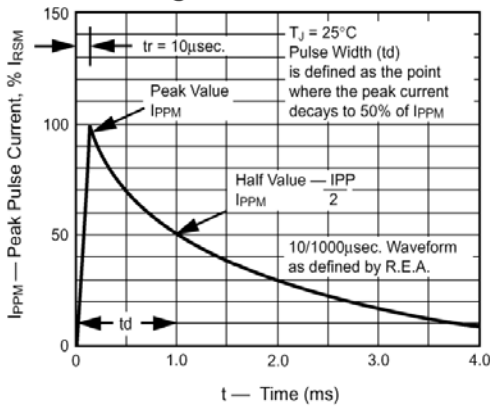
**Fig. 1 – Peak Pulse Power Rating Curve**



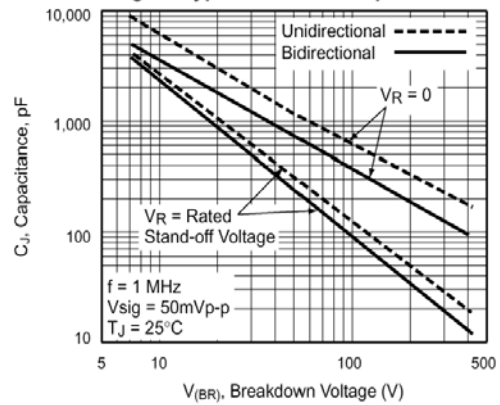
**Fig. 2 – Pulse Derating Curve**



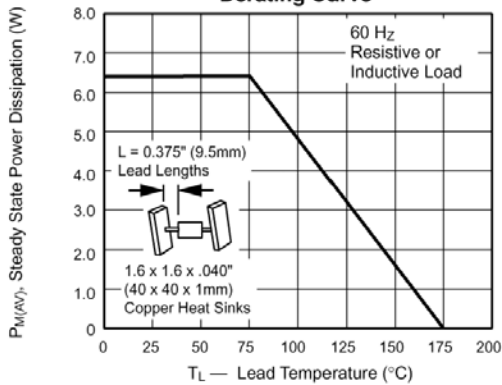
**Fig. 3 – Pulse Waveform**



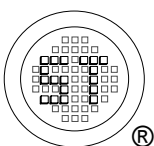
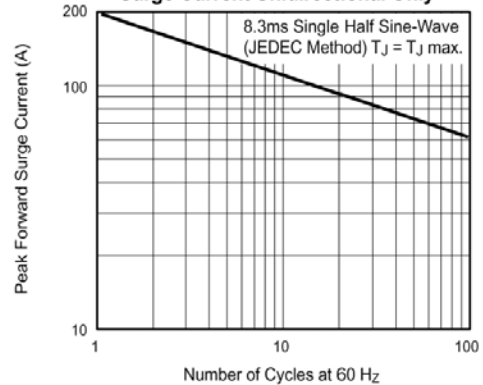
**Fig. 4 - Typical Junction Capacitance**



**Fig. 5 – Steady State Power Derating Curve**



**Fig. 6 - Maximum Non-repetitive Peak Forward Surge Current Unidirectional Only**



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