



# 1.5KE6.8 thru 1.5KE550CA and 1N6267 thru 1N6303A

Transient Voltage Suppressors  
Peak Pulse Power 1500W Breakdown Voltage 6.8 to 550V

## Features

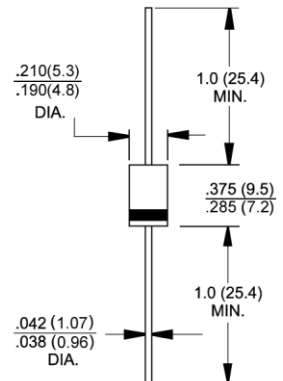
- ◆ Plastic package has Underwriters Laboratory Flammability Classification 94V-0
- ◆ Glass passivated junction
- ◆ 1500W peak pulse power capability on 10/1000us waveform, repetition rate (duty cycle): 0.05%
- ◆ Excellent clamping capability
- ◆ Low incremental surge resistance
- ◆ Very fast response time
- ◆ High temperature soldering guaranteed: 265°C/10 seconds, 0.375" (9.5mm) lead length, 5lbs. (2.3 kg) tension
- ◆ Includes 1N6267 thru 1N6303A



DO-201AE

## Mechanical Data

- ◆ Case: Molded plastic body over passivated junction
- ◆ Terminals: Plated axial leads, solderable per MIL-STD-750, Method 2026
- ◆ Polarity: For unidirectional types the color band denotes the cathode, which is positive with respect to the anode under normal TVS operation
- ◆ Mounting Position: Any
- ◆ Weight: 0.045oz., 1.2g



Dimensions in inches and (millimeters)

## 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.

## Maximum Ratings and Characteristics

( $T_A=25^\circ\text{C}$  unless otherwise noted)

| Parameter   | Symbol          | Value          | Unit               |
|---|-----------------|----------------|--------------------|
| Peak power dissipation with a 10/1000us waveform <sup>(1)</sup> (Fig. 1)                              | $P_{PPM}$       | Minimum 1500   | W                  |
| Peak pulse current with a 10/1000us waveform <sup>(1)</sup>   | $I_{PPM}$       | See Next Table | A                  |
| Steady state power dissipation at $T_J=75^\circ\text{C}$ , lead lengths 0.375" (9.5mm) <sup>(2)</sup> | $P_{M(AV)}$     | 6.5            | W                  |
| Peak forward surge current 8.3ms single half sine-wave uni-directional only <sup>(3)</sup>            | $I_{FSM}$       | 200            | Amps               |
| Maximum instantaneous forward voltage at 100A for unidirectional only <sup>(4)</sup>                  | $V_F$           | 3.5/5.0        | Volts              |
| Typical thermal resistance junction-to-lead   | $R_{\theta JL}$ | 20             | $^\circ\text{C/W}$ |
| Typical thermal resistance junction-to-ambient  | $R_{\theta JA}$ | 75             | $^\circ\text{C/W}$ |
| Operating junction and storage temperature range  | $T_J, T_{STG}$  | -55 to +175    | $^\circ\text{C}$   |

- Notes:**
1. Non-repetitive current pulse, per Fig.3 and derated above  $T_A=25^\circ\text{C}$  per Fig. 2
  2. Mounted on copper pad area of 1.6 x 1.6" (40 x 40 mm) per Fig. 5
  3. Measured on 8.3ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum
  4.  $V_F=3.5$  V for devices of  $V_{(BR)} < 220\text{V}$ , and  $V_F=5.0$  Volt max. for devices of  $V_{(BR)} > 220\text{V}$

## Electrical Characteristics

(T<sub>A</sub>=25°C unless otherwise noted)

| JEDEC<br>Type number | Good-Ark<br>Part number | Breakdown voltage<br>V <sub>(BR)</sub><br>(Volts) <sup>(1)</sup> |      | Test<br>current<br>at I <sub>p</sub><br>(mA) | Stand-off<br>voltage<br>V <sub>WM</sub><br>(Volts) | Maximum<br>reverse<br>leakage<br>at V <sub>WM</sub><br>I <sub>p</sub> <sup>(4)</sup><br>(uA) | Maximum<br>peak pulse<br>current<br>I <sub>PPM</sub> <sup>(2)</sup><br>(A) | Maximum<br>clamping<br>voltage at<br>I <sub>PPM</sub><br>V <sub>c</sub> (Volts) | Maximum<br>temperature<br>coefficient<br>of V <sub>(BR)</sub><br>(% / °C) |
|----------------------|-------------------------|--|------|--|--|--|--|---|---|
|                      |                         | Min.   | Max. |  |  |  |  |   |   |
| 1N6267               | 1.5KE6.8                | 6.12   | 7.48 | 10   | 5.50   | 1000   | 139  | 10.8  | 0.057   |
| 1N6267A              | 1.5KE6.8A               | 6.45   | 7.14 | 10   | 5.80   | 1000   | 143  | 10.5  | 0.057   |
| 1N6268               | 1.5KE7.5                | 6.75   | 8.25 | 10   | 6.05   | 500  | 128  | 11.7  | 0.061   |
| 1N6268A              | 1.5KE7.5A               | 7.13   | 7.88 | 10   | 6.40   | 500  | 133  | 11.3  | 0.061   |
| 1N6269               | 1.5KE8.2                | 7.38   | 9.02 | 10   | 6.63   | 200  | 120  | 12.5  | 0.065   |
| 1N6269A              | 1.5KE8.2A               | 7.79   | 8.61 | 10   | 7.02   | 200  | 124  | 12.1  | 0.065   |
| 1N6270               | 1.5KE9.1                | 8.19   | 10.0 | 1.0  | 7.37   | 50   | 109  | 13.8  | 0.068   |
| 1N6270A              | 1.5KE9.1A               | 8.65   | 9.55 | 1.0  | 7.78   | 50   | 112  | 13.4  | 0.068   |
| 1N6271               | 1.5KE10                 | 9.00   | 11.0 | 1.0  | 8.10   | 10   | 100  | 15.0  | 0.073   |
| 1N6271A              | 1.5KE10A                | 9.50   | 10.5 | 1.0  | 8.55   | 10   | 103  | 14.5  | 0.073   |
| 1N6272               | 1.5KE11                 | 9.90   | 12.1 | 1.0  | 8.92   | 5.0  | 92.6   | 16.2  | 0.075   |
| 1N6272A              | 1.5KE11A                | 10.5   | 11.6 | 1.0  | 9.40   | 5.0  | 96.2   | 15.6  | 0.075   |
| 1N6273               | 1.5KE12                 | 10.8   | 13.2 | 1.0  | 9.72   | 5.0  | 86.7   | 17.3  | 0.076   |
| 1N6273A              | 1.5KE12A                | 11.4   | 12.6 | 1.0  | 10.2   | 5.0  | 89.8   | 16.7  | 0.078   |
| 1N6274               | 1.5KE13                 | 11.7   | 14.3 | 1.0  | 10.5   | 5.0  | 78.9   | 19.0  | 0.081   |
| 1N6274A              | 1.5KE13A                | 12.4   | 13.7 | 1.0  | 11.1   | 5.0  | 82.4   | 18.2  | 0.081   |
| 1N6275               | 1.5KE15                 | 13.5   | 16.5 | 1.0  | 12.1   | 1.0  | 68.2   | 22.0  | 0.084   |
| 1N6275A              | 1.5KE15A                | 14.3   | 15.8 | 1.0  | 12.8   | 1.0  | 70.8   | 21.2  | 0.084   |
| 1N6276               | 1.5KE16                 | 14.4   | 17.6 | 1.0  | 12.9   | 1.0  | 63.8   | 23.5  | 0.086   |
| 1N6276A              | 1.5KE16A                | 15.2   | 16.8 | 1.0  | 13.6   | 1.0  | 66.7   | 22.5  | 0.086   |
| 1N6277               | 1.5KE18                 | 16.2   | 19.8 | 1.0  | 14.5   | 1.0  | 56.6   | 26.5  | 0.088   |
| 1N6277A              | 1.5KE18A                | 17.1   | 18.9 | 1.0  | 15.3   | 1.0  | 59.5   | 25.2  | 0.088   |
| 1N6278               | 1.5KE20                 | 18.0   | 22.0 | 1.0  | 16.2   | 1.0  | 51.5   | 29.1  | 0.090   |
| 1N6278A              | 1.5KE20A                | 19.0   | 21.0 | 1.0  | 17.1   | 1.0  | 54.2   | 27.7  | 0.090   |
| 1N6279               | 1.5KE22                 | 19.8   | 24.2 | 1.0  | 17.8   | 1.0  | 47.0   | 31.9  | 0.092   |
| 1N6279A              | 1.5KE22A                | 20.9   | 23.1 | 1.0  | 18.8   | 1.0  | 49.0   | 30.6  | 0.092   |
| 1N6280               | 1.5KE24                 | 21.6   | 26.4 | 1.0  | 19.4   | 1.0  | 43.2   | 34.7  | 0.094   |
| 1N6280A              | 1.5KE24A                | 22.8   | 25.2 | 1.0  | 20.5   | 1.0  | 45.2   | 33.2  | 0.094   |
| 1N6281               | 1.5KE27                 | 24.3   | 29.7 | 1.0  | 21.8   | 1.0  | 38.4   | 39.1  | 0.096   |
| 1N6281A              | 1.5KE27A                | 25.7   | 28.4 | 1.0  | 23.1   | 1.0  | 40.0   | 37.5  | 0.096   |
| 1N6282               | 1.5KE30                 | 27.0   | 33.0 | 1.0  | 24.3   | 1.0  | 34.5   | 43.5  | 0.097   |
| 1N6282A              | 1.5KE30A                | 28.5   | 31.5 | 1.0  | 25.6   | 1.0  | 36.2   | 41.4  | 0.097   |
| 1N6283               | 1.5KE33                 | 29.7   | 36.3 | 1.0  | 26.8   | 1.0  | 31.4   | 47.7  | 0.098   |
| 1N6283A              | 1.5KE33A                | 31.4   | 34.7 | 1.0  | 28.2   | 1.0  | 32.8   | 45.7  | 0.098   |
| 1N6284               | 1.5KE36                 | 32.4   | 39.6 | 1.0  | 29.1   | 1.0  | 28.8   | 52.0  | 0.099   |
| 1N6284A              | 1.5KE36A                | 34.2   | 37.8 | 1.0  | 30.8   | 1.0  | 30.1   | 49.9  | 0.099   |
| 1N6285               | 1.5KE39                 | 35.1   | 42.9 | 1.0  | 31.6   | 1.0  | 26.6   | 56.4  | 0.100   |
| 1N6285A              | 1.5KE39A                | 37.1   | 41.0 | 1.0  | 33.3   | 1.0  | 27.8   | 53.9  | 0.100   |
| 1N6286               | 1.5KE43                 | 38.7   | 47.3 | 1.0  | 34.8   | 1.0  | 24.2   | 61.9  | 0.101   |
| 1N6286A              | 1.5KE43A                | 40.9   | 45.2 | 1.0  | 36.8   | 1.0  | 25.3   | 59.3  | 0.101   |
| 1N6287               | 1.5KE47                 | 42.3   | 51.7 | 1.0  | 38.1   | 1.0  | 22.1   | 67.8  | 0.101   |
| 1N6287A              | 1.5KE47A                | 44.7   | 49.4 | 1.0  | 40.2   | 1.0  | 23.1   | 64.8  | 0.101   |
| 1N6288               | 1.5KE51                 | 45.9   | 56.1 | 1.0  | 41.3   | 1.0  | 20.4   | 73.5  | 0.102   |
| 1N6288A              | 1.5KE51A                | 48.5   | 53.6 | 1.0  | 43.6   | 1.0  | 21.4   | 70.1  | 0.102   |
| 1N6289               | 1.5KE56                 | 50.4   | 61.6 | 1.0  | 45.4   | 1.0  | 18.6   | 80.5  | 0.103   |
| 1N6289A              | 1.5KE56A                | 53.2   | 58.8 | 1.0  | 47.8   | 1.0  | 19.5   | 77.0  | 0.103   |

## Electrical Characteristics

(T<sub>A</sub>=25°C unless otherwise noted)

| JEDEC Type number | Good-Ark Part number | Breakdown voltage V <sub>(BR)</sub> (Volts) <sup>(1)</sup> |       | Test current at I <sub>T</sub> (mA) | Stand-off voltage V <sub>WM</sub> (Volts) | Maximum reverse leakage at V <sub>WM</sub> I <sub>D</sub> (µA) | Maximum peak pulse current I <sub>PPM</sub> <sup>(2)</sup> (A) | Maximum clamping voltage at V <sub>C</sub> <sup>(PPM)</sup> (Volts) | Maximum temperature coefficient of V <sub>(BR)</sub> (% / °C) |
|-------------------|----------------------|--|-------|-------------------------------------|---|--|--|---|---|
|                   |                      | Min.   | Max.  |                                     |   |  |  |   |   |
| 1N6290            | 1.5KE62              | 55.8   | 68.2  | 1.0                                 | 50.2                                      | 1.0  | 16.9   | 89.0  | 0.104   |
| 1N6290A           | 1.5KE62A             | 58.9   | 65.1  | 1.0                                 | 53.0                                      | 1.0  | 17.6   | 85.0  | 0.104   |
| 1N6291            | 1.5KE68              | 61.2   | 74.8  | 1.0                                 | 55.1                                      | 1.0  | 15.3   | 98.0  | 0.104   |
| 1N6291A           | 1.5KE68A             | 64.6   | 71.4  | 1.0                                 | 58.1                                      | 1.0  | 16.3   | 92.0  | 0.104   |
| 1N6292            | 1.5KE75              | 67.5   | 82.5  | 1.0                                 | 60.7                                      | 1.0  | 13.9   | 109   | 0.105   |
| 1N6292A           | 1.5KE75A             | 71.3   | 78.8  | 1.0                                 | 64.1                                      | 1.0  | 14.6   | 104   | 0.105   |
| 1N6293            | 1.5KE82              | 73.8   | 90.2  | 1.0                                 | 66.4                                      | 1.0  | 12.7   | 118   | 0.105   |
| 1N6293A           | 1.5KE82A             | 77.9   | 86.1  | 1.0                                 | 70.1                                      | 1.0  | 13.3   | 113   | 0.105   |
| 1N6294            | 1.5KE91              | 81.9   | 100   | 1.0                                 | 73.7                                      | 1.0  | 11.5   | 131   | 0.106   |
| 1N6294A           | 1.5KE91A             | 86.5   | 95.5  | 1.0                                 | 77.8                                      | 1.0  | 12.0   | 125   | 0.106   |
| 1N6295            | 1.5KE100             | 90.0   | 110   | 1.0                                 | 81.0                                      | 1.0  | 10.4   | 144   | 0.106   |
| 1N6295A           | 1.5KE100A            | 95.0   | 105   | 1.0                                 | 85.5                                      | 1.0  | 10.9   | 137   | 0.106   |
| 1N6296            | 1.5KE110             | 99.0   | 121   | 1.0                                 | 89.2                                      | 1.0  | 9.5  | 158   | 0.107   |
| 1N6296A           | 1.5KE110A            | 105  | 116   | 1.0                                 | 94.0                                      | 1.0  | 9.9  | 152   | 0.107   |
| 1N6297            | 1.5KE120             | 108  | 132   | 1.0                                 | 97.2                                      | 1.0  | 8.7  | 173   | 0.107   |
| 1N6297A           | 1.5KE120A            | 114  | 126   | 1.0                                 | 102                                       | 1.0  | 9.1  | 165   | 0.107   |
| 1N6298            | 1.5KE130             | 117  | 143   | 1.0                                 | 105                                       | 1.0  | 8.0  | 187   | 0.107   |
| 1N6298A           | 1.5KE130A            | 124  | 137   | 1.0                                 | 111                                       | 1.0  | 8.4  | 179   | 0.107   |
| 1N6299            | 1.5KE150             | 136  | 165   | 1.0                                 | 121                                       | 1.0  | 7.0  | 215   | 0.108   |
| 1N6299A           | 1.5KE150A            | 143  | 158   | 1.0                                 | 128                                       | 1.0  | 7.2  | 207   | 0.106   |
| 1N6300            | 1.5KE160             | 144  | 176   | 1.0                                 | 130                                       | 1.0  | 6.5  | 230   | 0.106   |
| 1N6300A           | 1.5KE160A            | 152  | 168   | 1.0                                 | 136                                       | 1.0  | 6.8  | 219   | 0.108   |
| 1N6301            | 1.5KE170             | 153  | 187   | 1.0                                 | 138                                       | 1.0  | 6.1  | 244   | 0.108   |
| 1N6301A           | 1.5KE170A            | 162  | 179   | 1.0                                 | 145                                       | 1.0  | 6.4  | 234   | 0.108   |
| 1N6302            | 1.5KE180             | 162  | 198   | 1.0                                 | 146                                       | 1.0  | 5.8  | 258   | 0.108   |
| 1N6302A           | 1.5KE180A            | 171  | 189   | 1.0                                 | 154                                       | 1.0  | 6.1  | 246   | 0.108   |
| 1N6303            | 1.5KE200             | 180  | 220   | 1.0                                 | 162                                       | 1.0  | 5.2  | 287   | 0.108   |
| 1N6303A           | 1.5KE200A *          | 190  | 210   | 1.0                                 | 171                                       | 1.0  | 5.5  | 274   | 0.108   |
|                   | 1.5KE220             | 198  | 242   | 1.0                                 | 175                                       | 1.0  | 4.4  | 344   | 0.108   |
|                   | 1.5KE220A *          | 209  | 231   | 1.0                                 | 185                                       | 1.0  | 4.6  | 328   | 0.108   |
|                   | 1.5KE250             | 225  | 275   | 1.0                                 | 202                                       | 1.0  | 4.2  | 360   | 0.110   |
|                   | 1.5KE250A            | 237  | 263   | 1.0                                 | 214                                       | 1.0  | 4.4  | 344   | 0.110   |
|                   | 1.5KE300             | 270  | 330   | 1.0                                 | 243                                       | 1.0  | 3.5  | 430   | 0.110   |
|                   | 1.5KE300A            | 285  | 315   | 1.0                                 | 256                                       | 1.0  | 3.6  | 414   | 0.110   |
|                   | 1.5KE350             | 315  | 385   | 1.0                                 | 284                                       | 1.0  | 3.0  | 504   | 0.110   |
|                   | 1.5KE350A            | 333  | 368   | 1.0                                 | 300                                       | 1.0  | 3.1  | 482   | 0.110   |
|                   | 1.5KE400             | 360  | 440   | 1.0                                 | 324                                       | 1.0  | 2.6  | 574   | 0.110   |
|                   | 1.5KE400A            | 380  | 420   | 1.0                                 | 342                                       | 1.0  | 2.7  | 548   | 0.110   |
|                   | 1.5KE440             | 396  | 484   | 1.0                                 | 356                                       | 1.0  | 2.4  | 631   | 0.110   |
|                   | 1.5KE440A            | 418  | 462   | 1.0                                 | 376                                       | 1.0  | 2.5  | 602   | 0.110   |
|                   | 1.5KE480A            | 456  | 504   | 1.0                                 | 408                                       | 1.0  | 2.3  | 658   | 0.110   |
|                   | 1.5KE510A            | 485  | 535   | 1.0                                 | 434                                       | 1.0  | 2.1  | 698   | 0.110   |
|                   | 1.5KE530A            | 503.5  | 556.5 | 1.0                                 | 450                                       | 1.0  | 2.1  | 725   | 0.110   |
|                   | 1.5KE540A            | 513  | 567   | 1.0                                 | 459                                       | 1.0  | 2.0  | 740   | 0.110   |
|                   | 1.5KE550A            | 522.5  | 577.5 | 1.0                                 | 467                                       | 1.0  | 2.0  | 760   | 0.110   |

- Notes:**
1. V<sub>(BR)</sub> measured after I<sub>T</sub> applied for 300µs, I<sub>T</sub>=square wave pulse or equivalent
  2. Surge current waveform per Fig. 3 and derate per Fig. 2
  3. All terms and symbols are consistent with ANSI/IEEE CA62.35
  4. For bidirectional types with V<sub>R</sub> 10 volts and less the ID limit is doubled
  5. For parts without A, the V<sub>BR</sub> is +10%

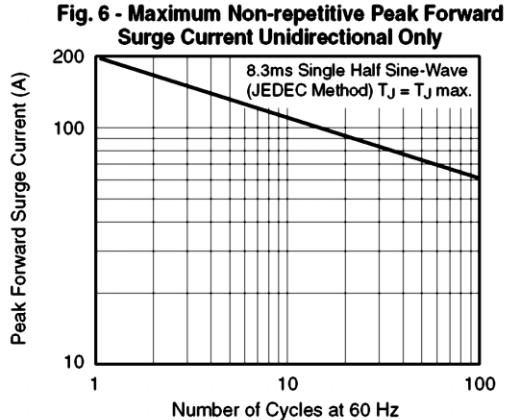
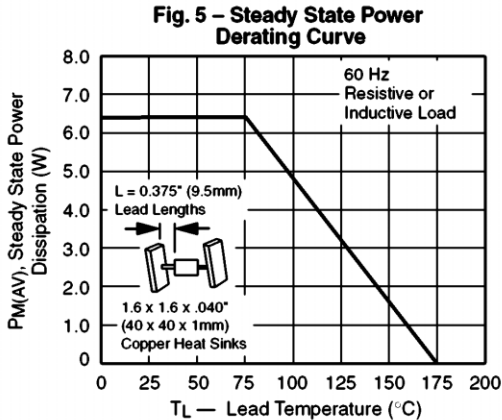
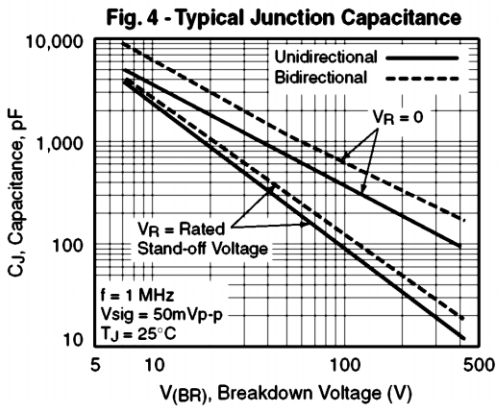
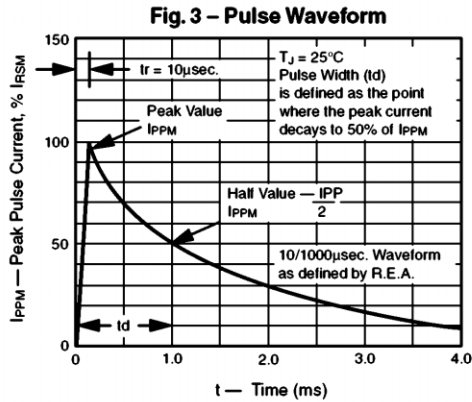
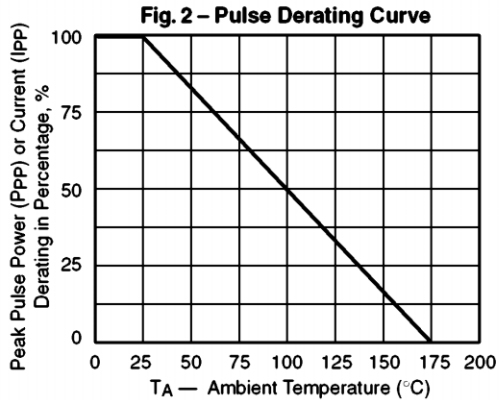
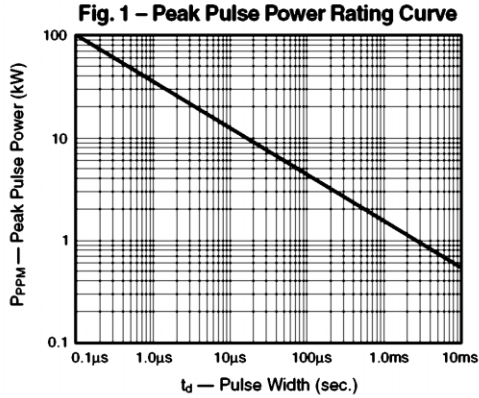
### Application:

This series of Silicon Transient Suppressors is used in applications where large voltage transients can permanently damage voltage-sensitive components. The TVS diode can be used in applications where induced lightning on rural or remote transmission lines presents a hazard to electronic circuitry (ref: R.E.A. specification P.E. 60).

This Transient Voltage Suppressor diode has a pulse power rating of 1500 watts for one millisecond. The response time of TVS diode clamping action is effectively instantaneous (1 x 10<sup>-9</sup> seconds bidirectional); therefore, they can protect integrated circuits, MOS devices, hybrids, and other voltage sensitive semiconductors and components. TVS diodes can also be used in series or parallel to increase the peak power ratings.

# RATINGS AND CHARACTERISTIC CURVES

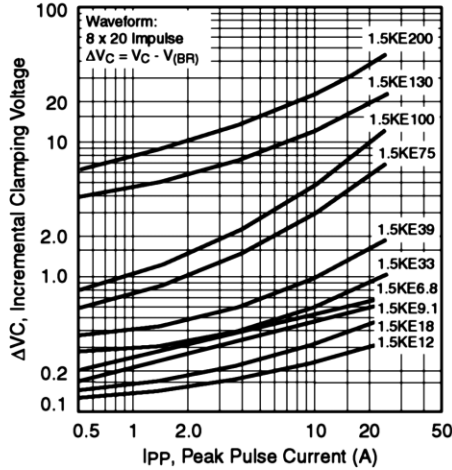
( $T_A = 25^\circ\text{C}$  unless otherwise noted)



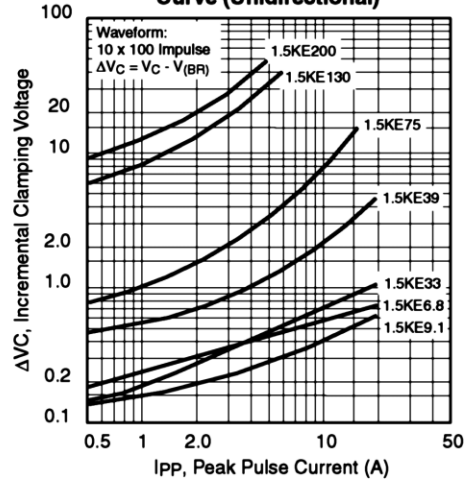
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( $T_A = 25^\circ\text{C}$  unless otherwise noted)

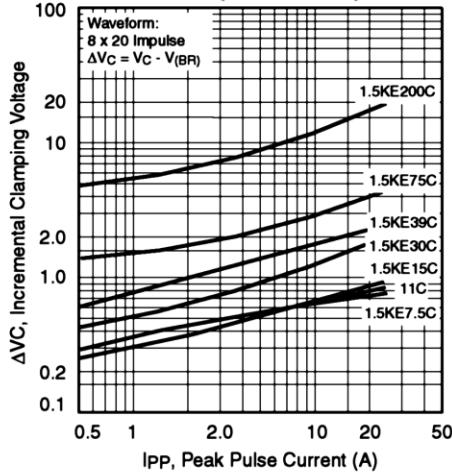
**Fig. 7 – Incremental Clamping Voltage Curve (Unidirectional)**



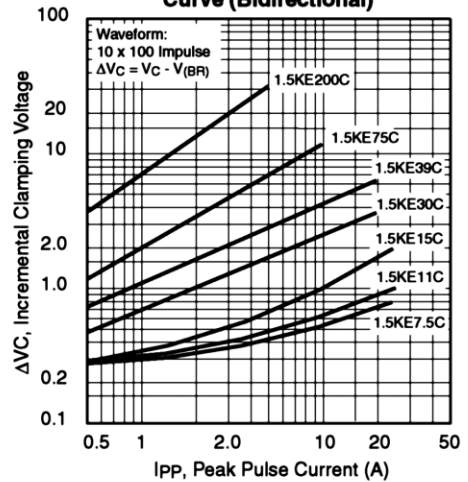
**Fig. 8 – Incremental Clamping Voltage Curve (Unidirectional)**



**Fig. 9 – Incremental Clamping Voltage Curve (Bidirectional)**



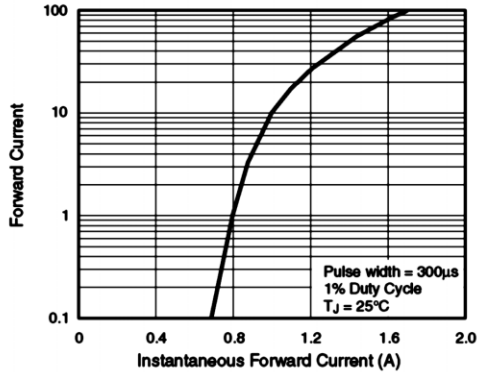
**Fig. 10 – Incremental Clamping Voltage Curve (Bidirectional)**



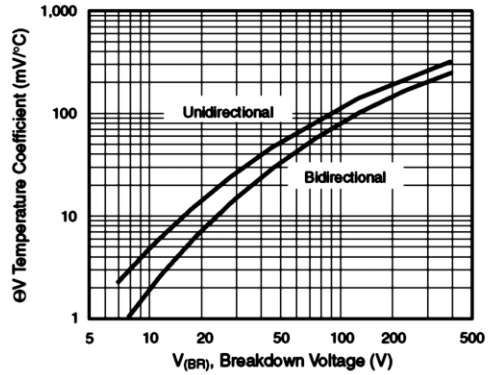
# RATINGS AND CHARACTERISTIC CURVES

( $T_A = 25^\circ\text{C}$  unless otherwise noted)

**Fig. 11 – Instantaneous Forward Voltage Characteristics Curve**



**Fig. 12 – Breakdown Voltage Temperature Coefficient Curve**



**Fig. 13 – Typical Transient Thermal Impedance**

