

P6KE6.8 thru P6KE540A

Vishay General Semiconductor



| ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted) | | | | | | | | |
|--|--|------|-------------------------|--------------------------------|--|---|---|--|
| DEVICE TYPE | BREAKDOWN VOLTAGE $V_{(BR)}$ AT I_T ⁽¹⁾ (V) | | TEST CURRENT I_T (mA) | STAND-OFF VOLTAGE V_{WM} (V) | MAXIMUM REVERSE LEAKAGE AT V_{WM} ⁽³⁾ I_D (μA) | PEAK PULSE CURRENT I_{PPM} ⁽²⁾ (A) | MAXIMUM CLAMPING VOLTAGE AT I_{PPM} V_C (V) | MAXIMUM TEMPERATURE COEFFICIENT OF $V_{(BR)}$ (%/ $^\circ\text{C}$) |
| | MIN | MAX | | | | | | |
| (+)P6KE6.8 | 6.12 | 7.48 | 10 | 5.50 | 1000 | 55.6 | 10.8 | 0.057 |
| (+)P6KE6.8A | 6.45 | 7.14 | 10 | 5.80 | 1000 | 57.1 | 10.5 | 0.057 |
| (+)P6KE7.5 | 6.75 | 8.25 | 10 | 6.05 | 500 | 51.3 | 11.7 | 0.061 |
| (+)P6KE7.5A | 7.13 | 7.88 | 10 | 6.40 | 500 | 53.1 | 11.3 | 0.061 |
| (+)P6KE8.2 | 7.38 | 9.02 | 10 | 6.63 | 200 | 48.0 | 12.5 | 0.065 |
| (+)P6KE8.2A | 7.79 | 8.61 | 10 | 7.02 | 200 | 49.6 | 12.1 | 0.065 |
| (+)P6KE9.1 | 8.19 | 10.0 | 1.0 | 7.37 | 50 | 43.5 | 13.8 | 0.068 |
| (+)P6KE9.1A | 8.65 | 9.55 | 1.0 | 7.78 | 50 | 44.8 | 13.4 | 0.068 |
| (+)P6KE10 | 9.00 | 11.0 | 1.0 | 8.10 | 10 | 40.0 | 15.0 | 0.073 |
| (+)P6KE10A | 9.50 | 10.5 | 1.0 | 8.55 | 10 | 41.4 | 14.5 | 0.073 |
| (+)P6KE11 | 9.90 | 12.1 | 1.0 | 8.92 | 5.0 | 37.0 | 16.2 | 0.075 |
| (+)P6KE11A | 10.5 | 11.6 | 1.0 | 9.40 | 5.0 | 38.5 | 15.6 | 0.075 |
| (+)P6KE12 | 10.8 | 13.2 | 1.0 | 9.72 | 5.0 | 34.7 | 17.3 | 0.078 |
| (+)P6KE12A | 11.4 | 12.6 | 1.0 | 10.2 | 5.0 | 35.9 | 16.7 | 0.078 |
| (+)P6KE13 | 11.7 | 14.3 | 1.0 | 10.5 | 5.0 | 31.6 | 19.0 | 0.081 |
| (+)P6KE13A | 12.4 | 13.7 | 1.0 | 11.1 | 5.0 | 33.0 | 18.2 | 0.081 |
| (+)P6KE15 | 13.5 | 16.5 | 1.0 | 12.1 | 1.0 | 27.3 | 22.0 | 0.084 |
| (+)P6KE15A | 14.3 | 15.8 | 1.0 | 12.8 | 1.0 | 28.3 | 21.2 | 0.084 |
| (+)P6KE16 | 14.4 | 17.6 | 1.0 | 12.9 | 1.0 | 25.5 | 23.5 | 0.086 |
| (+)P6KE16A | 15.2 | 16.8 | 1.0 | 13.6 | 1.0 | 26.7 | 22.5 | 0.086 |
| (+)P6KE18 | 16.2 | 19.8 | 1.0 | 14.5 | 1.0 | 22.6 | 26.5 | 0.088 |
| (+)P6KE18A | 17.1 | 18.9 | 1.0 | 15.3 | 1.0 | 23.8 | 25.2 | 0.088 |
| (+)P6KE20 | 18.0 | 22.0 | 1.0 | 16.2 | 1.0 | 20.6 | 29.1 | 0.090 |
| (+)P6KE20A | 19.0 | 21.0 | 1.0 | 17.1 | 1.0 | 21.7 | 27.7 | 0.090 |
| (+)P6KE22 | 19.8 | 24.2 | 1.0 | 17.8 | 1.0 | 18.8 | 31.9 | 0.092 |
| (+)P6KE22A | 20.9 | 23.1 | 1.0 | 18.8 | 1.0 | 19.6 | 30.6 | 0.092 |
| (+)P6KE24 | 21.6 | 26.4 | 1.0 | 19.4 | 1.0 | 17.3 | 34.7 | 0.094 |
| (+)P6KE24A | 22.8 | 25.2 | 1.0 | 20.5 | 1.0 | 18.1 | 33.2 | 0.094 |
| (+)P6KE27 | 24.3 | 29.7 | 1.0 | 21.8 | 1.0 | 15.3 | 39.1 | 0.096 |
| (+)P6KE27A | 25.7 | 28.4 | 1.0 | 23.1 | 1.0 | 16.0 | 37.5 | 0.096 |
| (+)P6KE30 | 27.0 | 33.0 | 1.0 | 24.3 | 1.0 | 13.8 | 43.5 | 0.097 |
| (+)P6KE30A | 28.5 | 31.5 | 1.0 | 25.6 | 1.0 | 14.5 | 41.4 | 0.097 |
| (+)P6KE33 | 29.7 | 36.3 | 1.0 | 26.8 | 1.0 | 12.6 | 47.7 | 0.098 |
| (+)P6KE33A | 31.4 | 34.7 | 1.0 | 28.2 | 1.0 | 13.1 | 45.7 | 0.098 |
| (+)P6KE36 | 32.4 | 39.6 | 1.0 | 29.1 | 1.0 | 11.5 | 52.0 | 0.099 |
| (+)P6KE36A | 34.2 | 37.8 | 1.0 | 30.8 | 1.0 | 12.0 | 49.9 | 0.099 |
| (+)P6KE39 | 35.1 | 42.9 | 1.0 | 31.6 | 1.0 | 10.6 | 56.4 | 0.100 |
| (+)P6KE39A | 37.1 | 41.0 | 1.0 | 33.3 | 1.0 | 11.1 | 53.9 | 0.100 |
| (+)P6KE43 | 38.7 | 47.3 | 1.0 | 34.8 | 1.0 | 9.7 | 61.9 | 0.101 |
| (+)P6KE43A | 40.9 | 45.2 | 1.0 | 36.8 | 1.0 | 10.1 | 59.3 | 0.101 |
| (+)P6KE47 | 42.3 | 51.7 | 1.0 | 38.1 | 1.0 | 8.8 | 67.8 | 0.101 |
| (+)P6KE47A | 44.7 | 49.4 | 1.0 | 40.2 | 1.0 | 9.3 | 64.8 | 0.101 |



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| | MIN | MAX | | | | | | |
| (+)P6KE51 | 45.9 | 56.1 | 1.0 | 41.3 | 1.0 | 8.2 | 73.5 | 0.102 |
| (+)P6KE51A | 48.5 | 53.6 | 1.0 | 43.6 | 1.0 | 8.6 | 70.1 | 0.102 |
| (+)P6KE56 | 50.4 | 61.6 | 1.0 | 45.4 | 1.0 | 7.5 | 80.5 | 0.103 |
| (+)P6KE56A | 53.2 | 58.8 | 1.0 | 47.8 | 1.0 | 7.8 | 77.0 | 0.103 |
| (+)P6KE62 | 55.8 | 68.2 | 1.0 | 50.2 | 1.0 | 6.7 | 89.0 | 0.104 |
| (+)P6KE62A | 58.9 | 65.1 | 1.0 | 53.0 | 1.0 | 7.1 | 85.0 | 0.104 |
| (+)P6KE68 | 61.2 | 74.8 | 1.0 | 55.1 | 1.0 | 6.1 | 98.0 | 0.104 |
| (+)P6KE68A | 64.6 | 71.4 | 1.0 | 58.1 | 1.0 | 6.5 | 92.0 | 0.104 |
| (+)P6KE75 | 67.5 | 82.5 | 1.0 | 60.7 | 1.0 | 5.6 | 108 | 0.105 |
| (+)P6KE75A | 71.3 | 78.8 | 1.0 | 64.1 | 1.0 | 5.8 | 103 | 0.105 |
| (+)P6KE82 | 73.8 | 90.2 | 1.0 | 66.4 | 1.0 | 5.1 | 118 | 0.105 |
| (+)P6KE82A | 77.9 | 86.1 | 1.0 | 70.1 | 1.0 | 5.3 | 113 | 0.105 |
| (+)P6KE91 | 81.9 | 100 | 1.0 | 73.7 | 1.0 | 4.6 | 131 | 0.106 |
| (+)P6KE91A | 86.5 | 95.5 | 1.0 | 77.8 | 1.0 | 4.8 | 125 | 0.106 |
| (+)P6KE100 | 90.0 | 110 | 1.0 | 81.0 | 1.0 | 4.2 | 144 | 0.106 |
| (+)P6KE100A | 95.0 | 105 | 1.0 | 85.5 | 1.0 | 4.4 | 137 | 0.106 |
| (+)P6KE110 | 99.0 | 121 | 1.0 | 89.2 | 1.0 | 3.8 | 158 | 0.107 |
| (+)P6KE110A | 105 | 116 | 1.0 | 94.0 | 1.0 | 3.9 | 152 | 0.107 |
| (+)P6KE120 | 108 | 132 | 1.0 | 97.2 | 1.0 | 3.5 | 173 | 0.107 |
| (+)P6KE120A | 114 | 126 | 1.0 | 102 | 1.0 | 3.6 | 165 | 0.107 |
| (+)P6KE130 | 117 | 143 | 1.0 | 105 | 1.0 | 3.2 | 187 | 0.107 |
| (+)P6KE130A | 124 | 137 | 1.0 | 111 | 1.0 | 3.4 | 179 | 0.107 |
| (+)P6KE150 | 135 | 165 | 1.0 | 121 | 1.0 | 2.8 | 215 | 0.108 |
| (+)P6KE150A | 143 | 158 | 1.0 | 128 | 1.0 | 2.9 | 207 | 0.108 |
| (+)P6KE160 | 144 | 176 | 1.0 | 130 | 1.0 | 2.6 | 230 | 0.108 |
| (+)P6KE160A | 152 | 168 | 1.0 | 136 | 1.0 | 2.7 | 219 | 0.108 |
| (+)P6KE170 | 153 | 187 | 1.0 | 138 | 1.0 | 2.5 | 244 | 0.108 |
| (+)P6KE170A | 162 | 179 | 1.0 | 145 | 1.0 | 2.6 | 234 | 0.108 |
| (+)P6KE180 | 162 | 198 | 1.0 | 146 | 1.0 | 2.3 | 258 | 0.108 |
| (+)P6KE180A | 171 | 189 | 1.0 | 154 | 1.0 | 2.4 | 246 | 0.108 |
| (+)P6KE200 | 180 | 220 | 1.0 | 162 | 1.0 | 2.1 | 287 | 0.108 |
| (+)P6KE200A | 190 | 210 | 1.0 | 171 | 1.0 | 2.2 | 274 | 0.108 |
| (+)P6KE220 | 198 | 242 | 1.0 | 175 | 1.0 | 1.7 | 344 | 0.108 |
| (+)P6KE220A | 209 | 231 | 1.0 | 185 | 1.0 | 1.8 | 328 | 0.108 |
| (+)P6KE250 | 225 | 275 | 1.0 | 202 | 1.0 | 1.7 | 360 | 0.110 |
| (+)P6KE250A | 237 | 263 | 1.0 | 214 | 1.0 | 1.7 | 344 | 0.110 |
| (+)P6KE300 | 270 | 330 | 1.0 | 243 | 1.0 | 1.4 | 430 | 0.110 |
| (+)P6KE300A | 285 | 315 | 1.0 | 256 | 1.0 | 1.4 | 414 | 0.110 |
| (+)P6KE350 | 315 | 385 | 1.0 | 284 | 1.0 | 1.2 | 504 | 0.110 |
| (+)P6KE350A | 333 | 368 | 1.0 | 300 | 1.0 | 1.2 | 482 | 0.110 |
| (+)P6KE400 | 360 | 440 | 1.0 | 324 | 1.0 | 1.0 | 574 | 0.110 |
| (+)P6KE400A | 380 | 420 | 1.0 | 342 | 1.0 | 1.1 | 548 | 0.110 |

P6KE6.8 thru P6KE540A

Vishay General Semiconductor



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| | MIN | MAX | | | | | | |
| (+)P6KE440 | 396 | 484 | 1.0 | 356 | 1.0 | 0.95 | 631 | 0.110 |
| (+)P6KE440A | 418 | 462 | 1.0 | 376 | 1.0 | 1.00 | 602 | 0.110 |
| P6KE480 | 432 | 528 | 1.0 | 389 | 1.0 | 0.88 | 686 | 0.110 |
| P6KE480A | 456 | 504 | 1.0 | 408 | 1.0 | 0.91 | 658 | 0.110 |
| P6KE510 | 459 | 561 | 1.0 | 413 | 1.0 | 0.82 | 729 | 0.110 |
| P6KE510A | 485 | 535 | 1.0 | 434 | 1.0 | 0.86 | 698 | 0.110 |
| P6KE540 | 486 | 594 | 1.0 | 437 | 1.0 | 0.78 | 772 | 0.110 |
| P6KE540A | 513 | 567 | 1.0 | 459 | 1.0 | 0.81 | 740 | 0.110 |

Note:

(+) Underwriters Laboratory Recognition for the classification of protectors (QVGG2) under the UL standard for safety 497B and file number E136766 for both uni-directional and bi-directional devices

- (1) Pulse test: $t_p \leq 50\text{ ms}$
- (2) Surge current waveform per Fig. 3 and derate per Fig. 2
- (3) For bidirectional types with V_{WM} of 10 volts and less, the I_D limit is doubled
- (4) All terms and symbols are consistent with ANSI/IEEE C62.35

| THERMAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) | | | |
|---|-----------------|-------|--------------------|
| PARAMETER | SYMBOL | VALUE | UNIT |
| Typical thermal resistance junction-to-lead | $R_{\theta JL}$ | 20 | $^\circ\text{C/W}$ |
| Typical thermal resistance junction-to-ambient | $R_{\theta JA}$ | 75 | $^\circ\text{C/W}$ |

| ORDERING INFORMATION | | | | |
|-----------------------------|-----------------|------------------------|---------------|--------------------------------|
| PREFERRED P/N | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
| P6KE6.8A-E3/54 | 0.432 | 54 | 4000 | 13" Diameter Paper Tape & Reel |

RATINGS AND CHARACTERISTICS CURVES

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

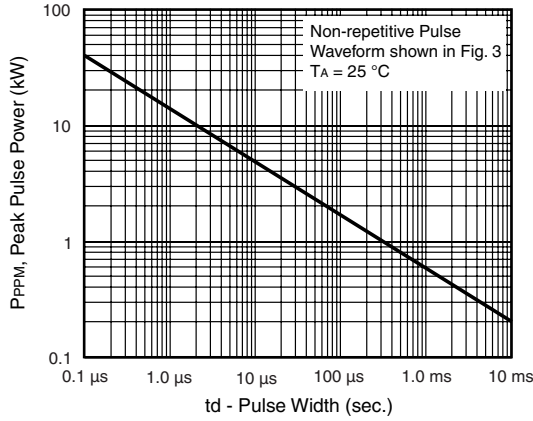


Figure 1. Peak Pulse Power Rating Curve

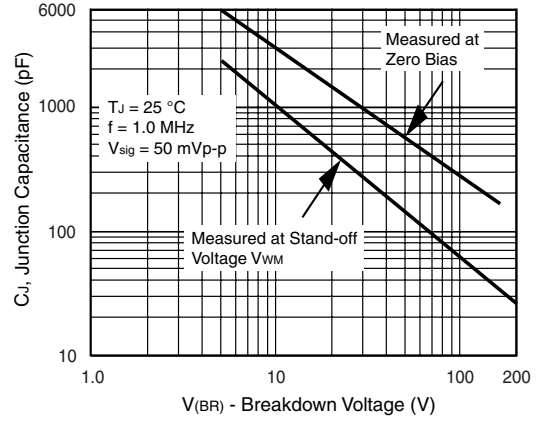


Figure 4. Typical Junction Capacitance Uni-Directional

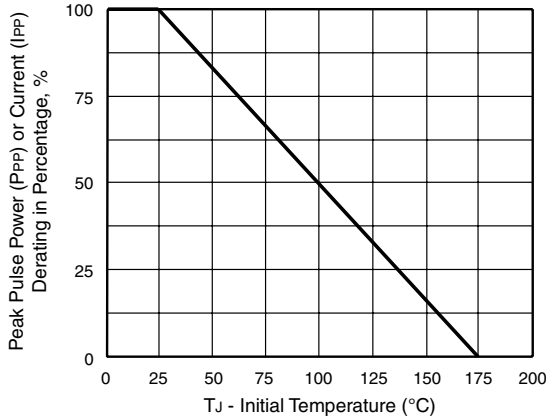


Figure 2. Pulse Power or Current versus Initial Junction Temperature

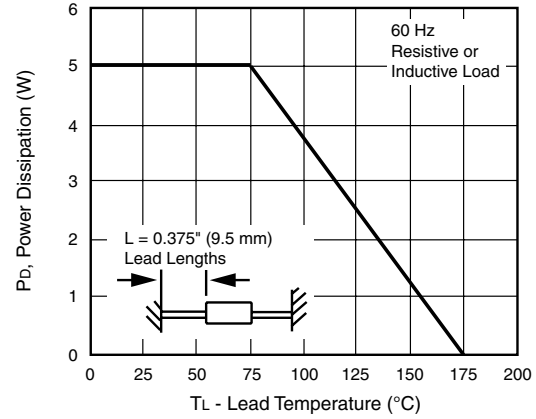


Figure 5. Power Derating Curve

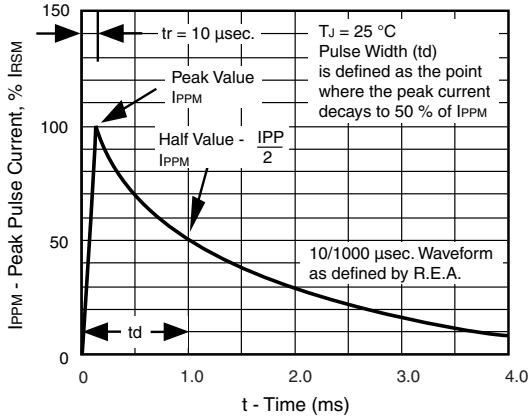


Figure 3. Pulse Waveform

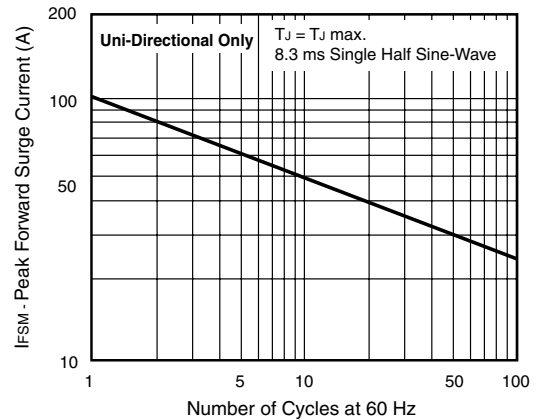


Figure 6. Maximum Non-Repetitive Forward Surge Current

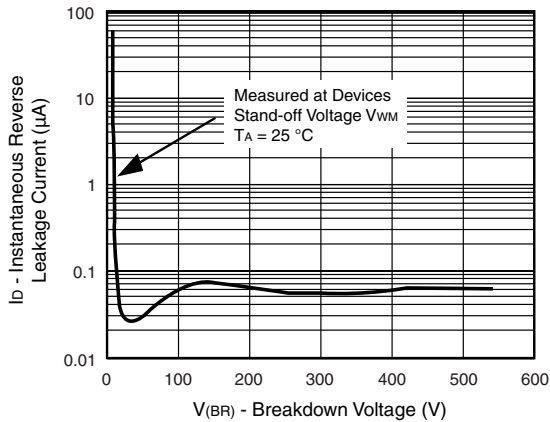


Figure 7. Typical Reverse Leakage Characteristics

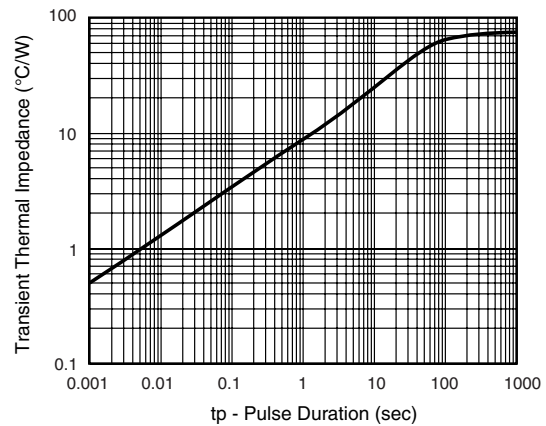
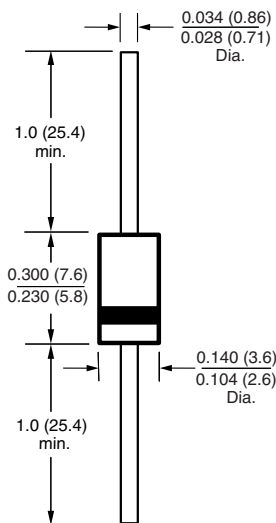


Figure 8. Typical Transient Thermal Impedance

PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

DO-204AC (DO-15)



APPLICATION NOTE

This P6KE TVS series is a low cost commercial product for use in applications where large voltage transients can permanently damage voltage-sensitive components.

The P6KE series device types are designed in a small package size where power and space is a consideration. They are characterized by their high surge capability, extremely fast response time, and low impedance, (R_{on}). Because of the unpredictable nature of transients, and the variation of the impedance with respect to these transients, impedance, per se, is not specified as a parametric value. However, a minimum voltage at low current conditions (BV) and a maximum clamping voltage (V_C) at a maximum peak pulse current is specified.

In some instances, the thermal effect (see V_C Clamping Voltage) may be responsible for 50 % to 70 % of the observed voltage differential when subjected to high current pulses for several duty cycles, thus making a maximum impedance specification insignificant.

In case of a severe current overload or abnormal transient beyond the maximum ratings, the Transient Voltage Suppressor will initially fail 'short' thus tripping the system's circuit breaker or fuse while protecting the entire circuit. Curves depicting clamping voltage vs. various current pulses are available from the factory. Extended power curves vs. pulse time are also available.



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