



600 Watt Transient Voltage Suppressor

Screening in
reference to
MIL-PRF-19500
available

DESCRIPTION

This screened MP6KE6.8A – MP6KE200CA series provides a variety of enhanced reliability choices. Uni- and bi- directional options, as well RoHS compliant versions, are available. These devices have the ability to clamp dangerous high voltage transients such as secondary effects of lightning strikes, providing circuit protection to several class levels in the IEC61000-4-5 specification. Clamping time is virtually instantaneous. It also provides protection from transients caused by inductive load dumps, RFI, and ESD, providing protection to IEC61000-4-2 and -4-4.

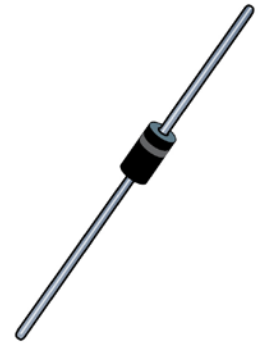
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FEATURES

- Available in both unidirectional and bidirectional configurations
- 3 σ lot norm screening performed on standby current I_D
- 100% surge tested devices
- Optional 100% **screening for avionics grade** is available
- Various screenings in reference to MIL-PRF-19500 are available. Refer to [Hirel Non-Hermetic Product Portfolio](#) for more details on the screening options.
(See [part nomenclature](#) for all options.)
- High reliability controlled devices have wafer fabrication and assembly lot traceability
- Moisture classification is level 1 with no dry pack required per IPC/JEDEC J-STD-020B
- RoHS compliant versions are available

APPLICATIONS / BENEFITS

- Selections from 6.8 to 200 volts breakdown (V_{BR})
- Economical TVS series for thru-hole mounting
- Protects sensitive components such as IC's, CMOS, Bipolar, BiCMOS, ECL, DTL, T²L, etc
- Protection from switching transients & induced RFI
- Compliant to IEC 61000-4-2 and IEC 61000-4-4 for ESD and EFT protection respectively.
- Secondary lightning protection per IEC61000-4-5 with 42 ohms source impedance:
 - Class 1: MP6KE6.8A to MP6KE130A or CA
 - Class 2: MP6KE6.8A to MP6KE68A or CA
 - Class 3: MP6KE6.8A to MP6KE36A or CA
 - Class 4: MP6KE6.8A to MP6KE18A or CA
- Secondary lightning protection per IEC61000-4-5 with 12 ohms source impedance:
 - Class 1: MP6KE6.8A to MP6KE43A or CA
 - Class 2: MP6KE6.8A to MP6KE22A or CA



T-18 Package

Also available in:

DO-214AA package

(J-bend surface mount)

 [MSMBJ5.0A thru MSMBJ170CA](#)

DO-215AA package

(Gull-wing surface mount)

 [MSMBG5.0A thru MSMBG170CA](#)

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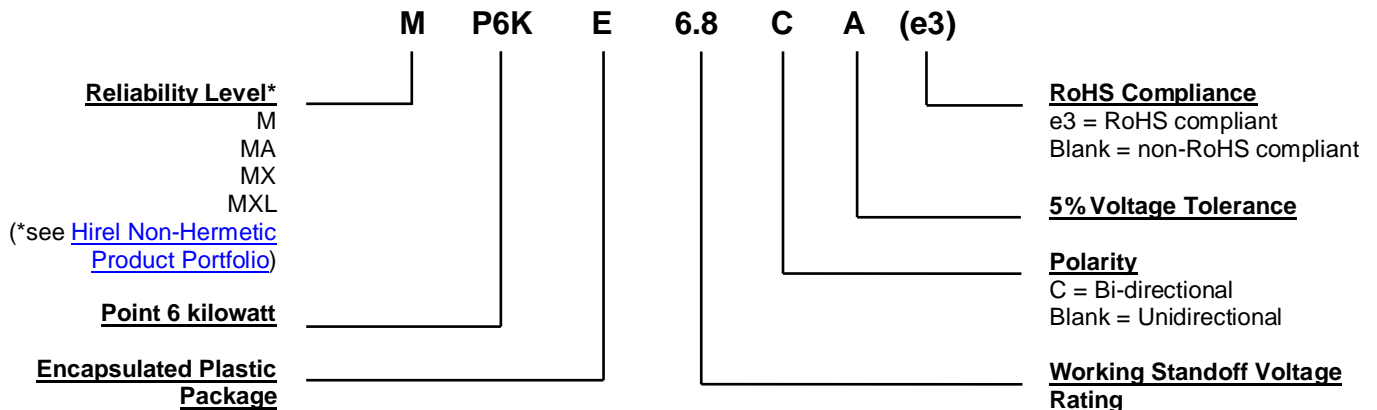
MAXIMUM RATINGS @ 25 °C unless otherwise stated

| Parameters/Test Conditions | Symbol | Value | Unit |
|--|-------------------------------------|--------------------------|------|
| Junction and Storage Temperature | T _J and T _{STG} | -65 to +150 | °C |
| Thermal Resistance, Junction to Lead @ 3/8 inch (10 mm) lead length from body | R _{θJL} | 25 | °C/W |
| Thermal Resistance, Junction to Ambient ⁽¹⁾ | R _{θJA} | 85 | °C/W |
| Peak Pulse Power Dissipation ⁽²⁾ 10/1000μs | P _{PP} | 600 | W |
| Steady-State Power Dissipation @ T _L = 25 °C 3/8 inch (10 mm) from body | P _D | 5 1.47 ⁽¹⁾ | W |
| T _{clamping} (0 volts to V _(BR) min, theoretical) Unidirectional | | < 100 | ps |
| | Bidirectional | < 5 | ns |
| Forward Voltage ⁽³⁾ | V _F | 3.5 | V |
| Solder Temperature @ 10 s | | 260 | °C |

- Notes:**
- When mounted on FR4 PC board with 4 mm² copper pads (1 oz) and track width 1 mm, length 25 mm.
 - With impulse repetition rate (duty factor) of 0.01 % or less (also [Figure 1 and 4](#)).
 - At 100 amp peak impulse of 8.3 ms half-sine wave (unidirectional only).

MECHANICAL and PACKAGING

- CASE: Void-free transfer molded thermosetting epoxy body meeting UL94V-0
- TERMINALS: Tin-lead or RoHS compliant annealed matte-tin plating. Solderable per MIL-STD-750, method 2026.
- MARKING: Part number
- POLARITY: Cathode indicated by band. Bidirectional not marked.
- TAPE & REEL option: Standard per EIA-296 (add "TR" suffix to part number). Consult factory for quantities.
- WEIGHT: Approximately 0.7 grams
- See [Package Dimensions](#) on last page.

PART NOMENCLATURE


SYMBOLS & DEFINITIONS

| Symbol | Definition |
|------------------|---|
| $\alpha_{V(BR)}$ | Temperature Coefficient of Breakdown Voltage: The change in breakdown voltage divided by the change in temperature that caused it expressed in %/°C or mV/°C. |
| $I_{(BR)}$ | Breakdown Current: The current used for measuring Breakdown Voltage $V_{(BR)}$. |
| I_D | Standby Current: The current through the device at rated stand-off voltage. |
| I_{PP} | Peak Impulse Current: The maximum rated random recurring peak impulse current or nonrepetitive peak impulse current that may be applied to a device. A random recurring or nonrepetitive transient current is usually due to an external cause, and it is assumed that its effect will have completely disappeared before the next transient arrives. |
| P_{PP} | Peak Pulse Power: The rated random recurring peak impulse power or rated nonrepetitive peak impulse power. The impulse power is the maximum-rated value of the product of I_{PP} and V_C . |
| $V_{(BR)}$ | Breakdown Voltage: The voltage across the device at a specified current $I_{(BR)}$ in the breakdown region. |
| V_C | Clamping Voltage: The voltage across the device in a region of low differential resistance during the application of an impulse current (I_{PP}) for a specified waveform. |
| V_{WM} | Working Standoff Voltage: The maximum-rated value of dc or repetitive peak positive cathode-to-anode voltage that may be continuously applied over the standard operating temperature. |

ELECTRICAL CHARACTERISTICS @ 25 °C

| PART NUMBER | BREAKDOWN VOLTAGE | | | | RATED STANDOFF VOLTAGE V_{WM} V | MAX STANDBY CURRENT $I_D @ V_{WM}$ μA | MAX CLAMPING VOLTAGE $V_C @ I_{PP}$ V | PEAK PULSE CURRENT (see Fig. 2) I_{PP} A | TEMPERATURE COEFFICIENT of $V_{(BR)}$ $\alpha_{V(BR)}$ %/°C |
|-------------|-------------------|-----------|-----------|------------------|---|--|---|---|---|
| | $V_{(BR)}$ @ | | | $I_{(BR)}$ mA | | | | | |
| | V_{MIN} | V_{NOM} | V_{MAX} | | | | | | |
| MP6KE6.8A | 6.45 | 6.8 | 7.14 | 10 | 5.8 | 1000 | 10.5 | 57 | 0.057 |
| MP6KE7.5A | 7.13 | 7.5 | 7.88 | 10 | 6.4 | 500 | 11.3 | 53 | 0.061 |
| MP6KE8.2A | 7.79 | 8.2 | 8.61 | 10 | 7.02 | 200 | 12.1 | 50 | 0.065 |
| MP6KE9.1A | 8.65 | 9.1 | 9.55 | 1 | 7.78 | 50 | 13.4 | 45 | 0.068 |
| MP6KE10A | 9.5 | 10 | 10.5 | 1 | 8.55 | 10 | 14.5 | 41 | 0.073 |
| MP6KE11A | 10.5 | 11 | 11.6 | 1 | 9.4 | 5 | 15.6 | 38 | 0.075 |
| MP6KE12A | 11.4 | 12 | 12.6 | 1 | 10.2 | 5 | 16.7 | 36 | 0.078 |
| MP6KE13A | 12.4 | 13 | 13.7 | 1 | 11.1 | 5 | 18.2 | 33 | 0.081 |
| MP6KE15A | 14.3 | 15 | 15.8 | 1 | 12.8 | 1 | 21.2 | 28 | 0.084 |
| MP6KE16A | 15.2 | 16 | 16.8 | 1 | 13.6 | 1 | 22.5 | 27 | 0.086 |
| MP6KE18A | 17.1 | 18 | 18.9 | 1 | 15.3 | 1 | 25.2 | 24 | 0.088 |
| MP6KE20A | 19 | 20 | 21 | 1 | 17.1 | 1 | 27.7 | 22 | 0.090 |
| MP6KE22A | 20.9 | 22 | 23.1 | 1 | 18.8 | 1 | 30.6 | 20 | 0.092 |
| MP6KE24A | 22.8 | 24 | 25.2 | 1 | 20.5 | 1 | 33.2 | 18 | 0.094 |
| MP6KE27A | 25.7 | 27 | 28.4 | 1 | 23.1 | 1 | 37.5 | 16 | 0.096 |
| MP6KE30A | 28.5 | 30 | 31.5 | 1 | 25.6 | 1 | 41.4 | 14.4 | 0.097 |
| MP6KE33A | 31.4 | 33 | 34.7 | 1 | 28.2 | 1 | 45.7 | 13.2 | 0.098 |
| MP6KE36A | 34.2 | 36 | 37.8 | 1 | 30.8 | 1 | 49.9 | 12 | 0.099 |
| MP6KE39A | 37.1 | 39 | 41 | 1 | 33.3 | 1 | 53.9 | 11.2 | 0.100 |
| MP6KE43A | 40.9 | 43 | 45.2 | 1 | 36.8 | 1 | 59.3 | 10.1 | 0.101 |
| MP6KE47A | 44.7 | 47 | 49.4 | 1 | 40.2 | 1 | 64.8 | 9.3 | 0.101 |
| MP6KE51A | 48.5 | 51 | 53.6 | 1 | 43.6 | 1 | 70.1 | 8.6 | 0.102 |
| MP6KE56A | 53.2 | 56 | 58.8 | 1 | 47.8 | 1 | 77 | 7.8 | 0.103 |
| MP6KE62A | 58.9 | 62 | 65.1 | 1 | 53 | 1 | 85 | 7.1 | 0.104 |
| MP6KE68A | 64.6 | 68 | 71.4 | 1 | 58.1 | 1 | 92 | 6.5 | 0.104 |
| MP6KE75A | 71.3 | 75 | 78.8 | 1 | 64.1 | 1 | 103 | 5.8 | 0.105 |
| MP6KE82A | 77.9 | 82 | 86.1 | 1 | 70.1 | 1 | 113 | 5.3 | 0.105 |
| MP6KE91A | 86.5 | 91 | 95.5 | 1 | 77.8 | 1 | 125 | 4.8 | 0.106 |
| MP6KE100A | 95 | 100 | 105 | 1 | 85.5 | 1 | 137 | 4.4 | 0.106 |
| MP6KE110A | 105 | 110 | 116 | 1 | 94 | 1 | 152 | 3.4 | 0.107 |
| MP6KE120A | 114 | 120 | 126 | 1 | 102 | 1 | 165 | 3.6 | 0.107 |
| MP6KE130A | 124 | 130 | 137 | 1 | 111 | 1 | 179 | 3.3 | 0.107 |
| MP6KE150A | 143 | 150 | 158 | 1 | 128 | 1 | 207 | 2.9 | 0.108 |
| MP6KE160A | 152 | 160 | 168 | 1 | 136 | 1 | 219 | 2.7 | 0.108 |
| MP6KE170A | 161 | 170 | 179 | 1 | 145 | 1 | 234 | 2.6 | 0.108 |
| MP6KE180A | 171 | 180 | 189 | 1 | 154 | 1 | 246 | 2.4 | 0.108 |
| MP6KE200A | 190 | 200 | 210 | 1 | 171 | 1 | 274 | 2.2 | 0.108 |

Consult factory for higher voltages.

NOTE 1: For bidirectional construction, capacitance will be one-half that shown in [Figure 4](#).

GRAPHS

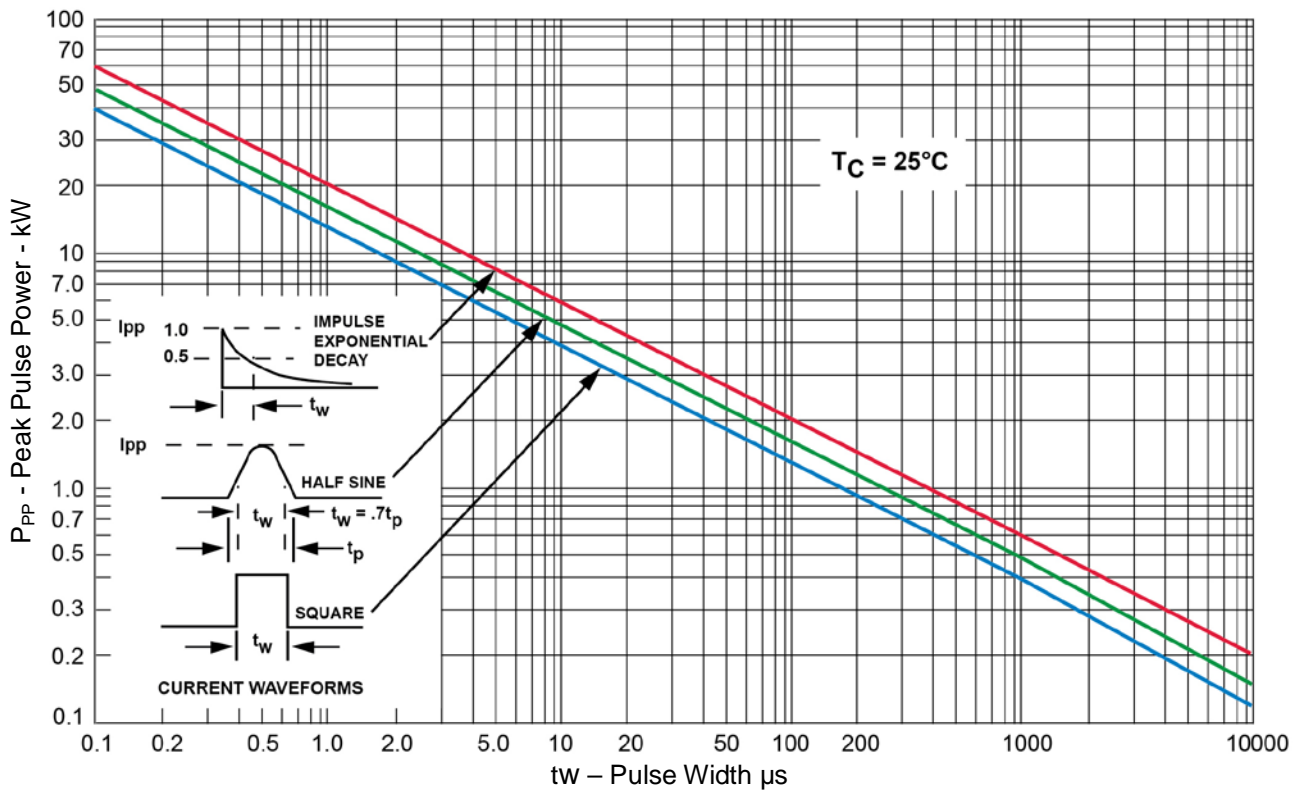


FIGURE 1
Peak Pulse Power vs Pulse Time

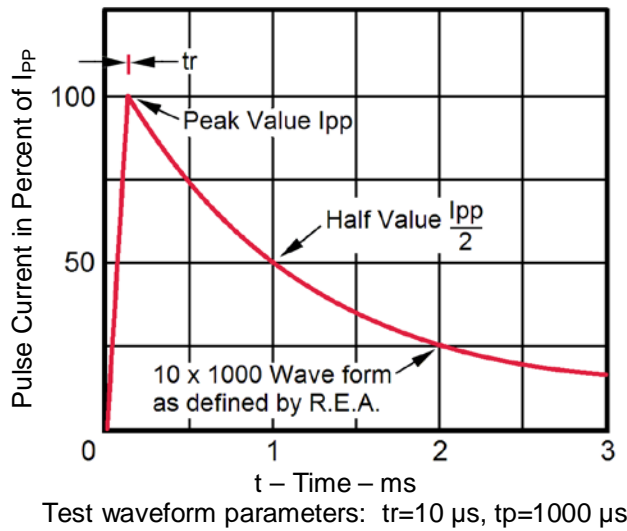


FIGURE 2
Pulse Waveform for 10/1000 μs Exponential Surge

GRAPHS (continued)

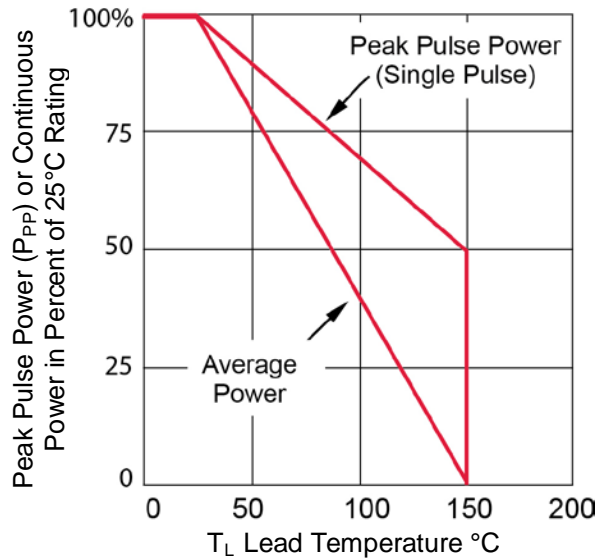


FIGURE 3
Derating Curve



FIGURE 4
Typical Capacitance vs. Breakdown Voltage

PACKAGE DIMENSIONS


NOTES: Cathode indicated by band.

| Dim | Dimensions | | | |
|-----------|------------|-------|-------------|------|
| | Inches | | Millimeters | |
| | Min | Max | Min | Max |
| LL | 1.00 | - | 25.4 | - |
| BL | 0.330 | 0.350 | 8.39 | 8.89 |
| BD | 0.130 | 0.145 | 3.31 | 3.68 |
| LD | 0.038 | 0.042 | 0.97 | 1.06 |