

Website: <http://www.microsemi.com>

400W Transient Voltage Suppressor

- High Reliability controlled devices
- Economical series for thru hole mounting
- Unidirectional (A) and Bidirectional (CA) construction
- Selections for 5.8 to 342 V standoff voltages (V_{WM})
- Fast response

DEVICES

MP4KE6.8A thru MP4KE400CA, e3

LEVELS

M, MA, MX, MXL

FEATURES

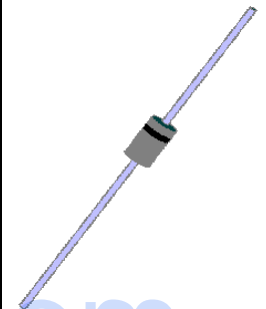
- High reliability controlled devices with wafer fabrication and assembly lot traceability
- 100 % surge tested devices
- Optional upscreening available by replacing the M prefix with MA, MX or MXL. These prefixes specify various screening and conformance inspection options based on MIL-PRF-19500 Refer to [MicroNote 129](#) for more details on the screening options.
- Moisture classification is Level 1 with no dry pack required per IPC/JEDEC J-STD-020B
- RoHS Compliant devices available by adding "e3" suffix
- 3σ lot norm screening performed on Standby Current I_D

APPLICATIONS / BENEFITS

- Suppresses transients up to 400 watts @ 10/1000 μ s (see Figure 1)
- Protects sensitive components such as IC's, CMOS, Bipolar, BiCMOS, ECL, DTL, T^2L , etc.
- Protection from switching transients & induced RF
- Compliant to IEC 61000-4-2 and IEC 61000-4-4 for ESD and EFT protection respectively.
- Secondary lightning protection per IEC 61000-4-5 with 42 Ohms source impedance:
 - Class 1: MP4KE5.0A to MP4KE91CA
 - Class 2: MP4KE5.0A to MP4KE47ACA
 - Class 3: MP4KE5.0A to MP4KE24CA
 - Class 4: MP4KE5.0A to MP4KE12CA
- Secondary lightning protection per IEC 61000-4-5 with 12 Ohms source impedance:
 - Class 1: MP4KE5.0A to MP4KE30CA
 - Class 2: MP4KE5.0A to MP4KE15CA

MAXIMUM RATINGS

- Operating and Storage Temperature: -65 °C to +150 °C
- Peak Pulse Power: 400 Watts at 10/1000 μ s (see Figures 1, 2 and 3 for t_W , waveform and derating effects) with impulse repetition rate (duty factor) of 0.01 % or less
- Thermal Resistance: 50 °C /W junction to leads @ 3/8 inch (10 mm) from body, or 110 °C/W junction to ambient when mounted on FR4 PC board with 4 mm² copper pads (1 oz) and track width 1 mm, length 25 mm
- Steady-State Power: 2.5 Watts @ $T_L=25$ °C at 3/8 inch (10 mm) from body, or 1.13 W at $T_A = 25$ °C on FR4 PC board described for thermal resistance
- Forward Voltage at 25 °C: 3.5 V @ 30 A with 8.3 ms half-sine wave (unidirectional only)
- Solder temperatures: 260 °C for 10 s (maximum)

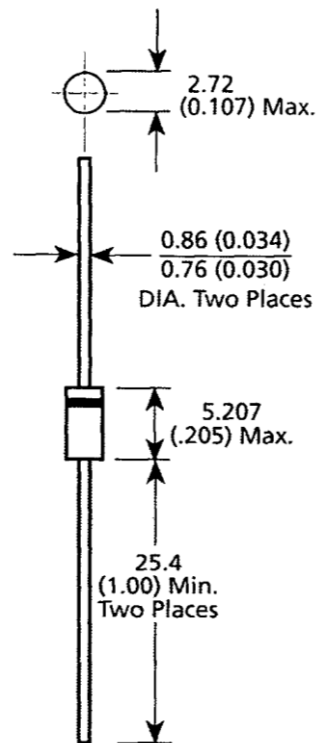


DO-41 (DO-204AL)

MECHANICAL AND PACKAGING

- Void-free transfer molded thermosetting epoxy body meeting UL94V-0
- Tin-Lead (90 % Sn, 10 % Pb) or RoHS (100% Sn) Compliant annealed matte-Tin plating readily solderable per MIL-STD-750, method 2026
- Body marked with part number
- Cathode indicated by band. No cathode band on bi-directional devices.
- Available in bulk or custom tape-and-reel packaging
- TAPE-AND-REEL standard per EIA-296 (add "TR" suffix to part number)
- Weight: 0.3 gram (approximately)

PACKAGE DIMENSIONS



NOTE: Cathode indicated by band.
 All dimensions in millimeters (inches)

SYMBOLS & DEFINITIONS

| Symbol | Definition | Symbol | Definition |
|----------|---------------------------------|----------|--------------------------------|
| V_{WM} | Working Peak (Standoff) Voltage | I_{PP} | Peak Pulse Current |
| P_{PP} | Peak Pulse Power | V_C | Clamping Voltage |
| V_{BR} | Breakdown Voltage | I_{BR} | Breakdown Current for V_{BR} |
| I_D | Standby Current | | |

ELECTRICAL CHARACTERISTICS @ 25°C

| MICROSEMI PART NUMBER (Note 2) | REVERSE STAND- OFF VOLTAGE V_{WM} V | BREAKDOWN VOLTAGE V_{BR} @ I_{BR} | | | MAXIMUM CLAMPING VOLTAGE V_C @ I_{PP} V | MAXIMUM STANDBY CURRENT I_D @ V_{WM} μA | PEAK PULSE CURRENT (see Fig. 2) I_{PP} A | MAXIMUM TEMPERATURE COEFFICIENT of V_{BR} $\alpha_{V(BR)}$ % / °C |
|--------------------------------------|----------------------------------------------------------|------------------------------------------|-----------|----|-------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------------------------|
| | | V_{MIN} | V_{MAX} | mA | | | | |
| | | | | | | | | |
| MP4KE6.8A | 5.80 | 6.45 | 7.14 | 10 | 10.5 | 500 | 38 | .057 |
| MP4KE7.5A | 6.40 | 7.13 | 7.88 | 10 | 11.3 | 200 | 35 | .061 |
| MP4KE8.2A | 7.02 | 7.79 | 8.61 | 10 | 12.1 | 100 | 33 | .065 |
| MP4KE9.1A | 7.78 | 8.65 | 9.55 | 1 | 13.4 | 20 | 30 | .068 |
| MP4KE10A | 8.55 | 9.50 | 10.5 | 1 | 14.5 | 5 | 28 | .073 |
| MP4KE11A | 9.40 | 10.5 | 11.6 | 1 | 15.6 | 2 | 26 | .075 |
| MP4KE12A | 10.2 | 11.4 | 12.6 | 1 | 16.7 | 1 | 24 | .078 |
| MP4KE13A | 11.1 | 12.4 | 13.7 | 1 | 18.2 | 1 | 22 | .081 |
| MP4KE15A | 12.8 | 14.3 | 15.8 | 1 | 21.2 | 1 | 19 | .084 |
| MP4KE16A | 13.6 | 15.2 | 16.8 | 1 | 22.5 | 1 | 18 | .086 |
| MP4KE18A | 15.3 | 17.1 | 18.0 | 1 | 25.2 | 1 | 16 | .088 |
| MP4KE20A | 17.1 | 19.0 | 21.0 | 1 | 27.7 | 1 | 14.5 | .090 |
| MP4KE22A | 18.8 | 20.9 | 23.1 | 1 | 30.6 | 1 | 13 | .092 |
| MP4KE24A | 20.5 | 22.8 | 25.2 | 1 | 33.2 | 1 | 12 | .094 |
| MP4KE27A | 23.1 | 25.7 | 28.4 | 1 | 37.5 | 1 | 11 | .096 |
| MP4KE30A | 25.6 | 28.5 | 31.5 | 1 | 41.4 | 1 | 9.5 | .097 |
| MP4KE33A | 28.2 | 31.4 | 34.7 | 1 | 45.7 | 1 | 9.0 | .098 |
| MP4KE36A | 30.8 | 34.2 | 37.8 | 1 | 49.9 | 1 | 8.0 | .099 |
| MP4KE39A | 33.3 | 37.1 | 41.0 | 1 | 53.9 | 1 | 7.5 | .100 |
| MP4KE43A | 36.8 | 40.9 | 45.2 | 1 | 59.3 | 1 | 7.0 | .101 |
| MP4KE47A | 40.2 | 44.7 | 49.4 | 1 | 64.8 | 1 | 6.2 | .101 |
| MP4KE51A | 43.6 | 48.5 | 53.6 | 1 | 70.1 | 1 | 5.7 | .102 |
| MP4KE56A | 47.8 | 53.2 | 58.8 | 1 | 77.0 | 1 | 5.2 | .103 |
| MP4KE62A | 53.0 | 58.9 | 65.1 | 1 | 85.0 | 1 | 4.7 | .104 |
| MP4KE68A | 58.1 | 64.6 | 71.4 | 1 | 92.0 | 1 | 4.4 | .104 |
| MP4KE75A | 64.1 | 71.3 | 78.8 | 1 | 103.0 | 1 | 3.9 | .105 |
| MP4KE82A | 70.1 | 77.9 | 86.1 | 1 | 113.0 | 1 | 3.5 | .105 |
| MP4KE91A | 77.8 | 86.5 | 95.5 | 1 | 125.0 | 1 | 3.2 | .106 |
| MP4KE100A | 85.5 | 95.0 | 105.0 | 1 | 137.0 | 1 | 2.9 | .106 |
| MP4KE110A | 94.0 | 105.0 | 116.0 | 1 | 152.0 | 1 | 2.6 | .107 |
| MP4KE120A | 102.0 | 114.0 | 126.0 | 1 | 165.0 | 1 | 2.4 | .107 |
| MP4KE130A | 111.0 | 124.0 | 137.0 | 1 | 179.0 | 1 | 2.2 | .107 |
| MP4KE150A | 128.0 | 143.0 | 158.0 | 1 | 207.0 | 1 | 1.95 | .108 |
| MP4KE160A | 136.0 | 152.0 | 168.0 | 1 | 219.0 | 1 | 1.8 | .108 |
| MP4KE170A | 145.0 | 162.0 | 179.0 | 1 | 234.0 | 1 | 1.7 | .108 |
| MP4KE180A | 154.0 | 171.0 | 189.0 | 1 | 246.0 | 1 | 1.6 | .108 |
| MP4KE200A | 171.0 | 190.0 | 210.0 | 1 | 274.0 | 1 | 1.5 | .108 |
| MP4KE220A | 185.0 | 209.0 | 231.0 | 1 | 328.0 | 1 | 1.0 | .110 |
| MP4KE250A | 214.0 | 237.0 | 263.0 | 1 | 344.0 | 1 | 1.0 | .110 |
| MP4KE300A | 256.0 | 285.0 | 315.0 | 1 | 414.0 | 1 | 1.0 | .110 |
| MP4KE350A | 300.0 | 333.0 | 368.0 | 1 | 482.0 | 1 | 1.0 | .110 |
| MP4KE400A | 342.0 | 380.0 | 420.0 | 1 | 548.0 | 1 | 1.0 | .110 |

NOTE 1: Forward Voltage (V_f) @ 30 amps peak, 8.3 ms sine wave equal to 3.5 volts maximum for MP4KE6.8A TO 200A (excluding bidirectional).

NOTE 2: For bidirectional construction, indicate a CA suffix after part number, e.g. MP4KE170CA. Bidirectional capacitance is half that shown in Figure 4 at zero volts.

GRAPHS

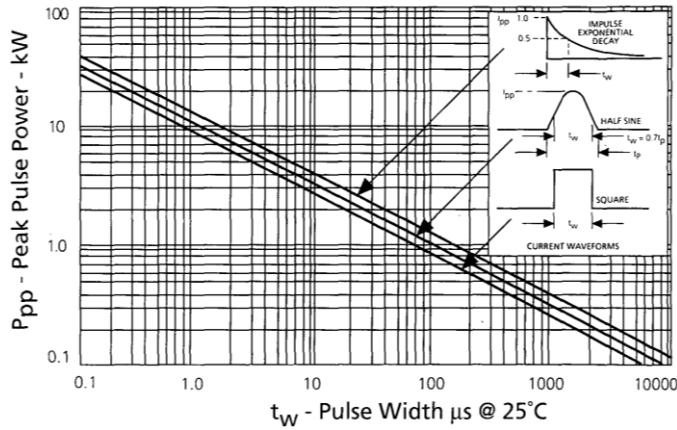
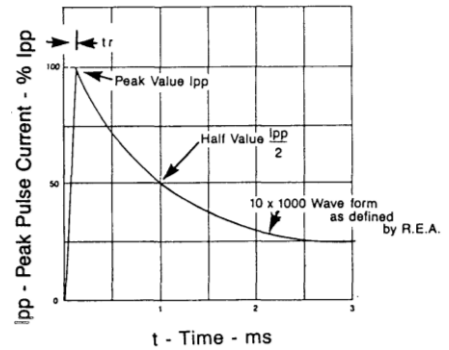


FIGURE 1 Peak Pulse Power vs. Pulse Time



Test waveform parameters: $t_r=10 \mu s$, $t_p=1000 \mu s$

FIGURE 2 Pulse Waveform for Exponential Surge

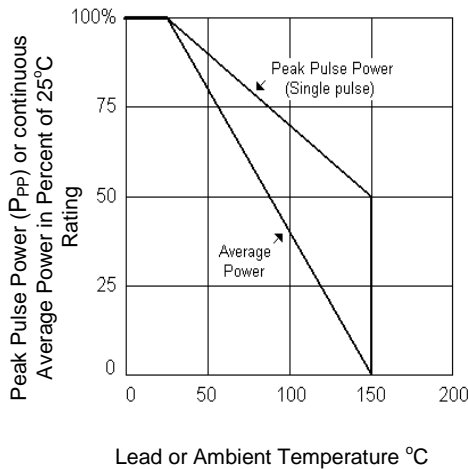


FIGURE 3 Derating Curve

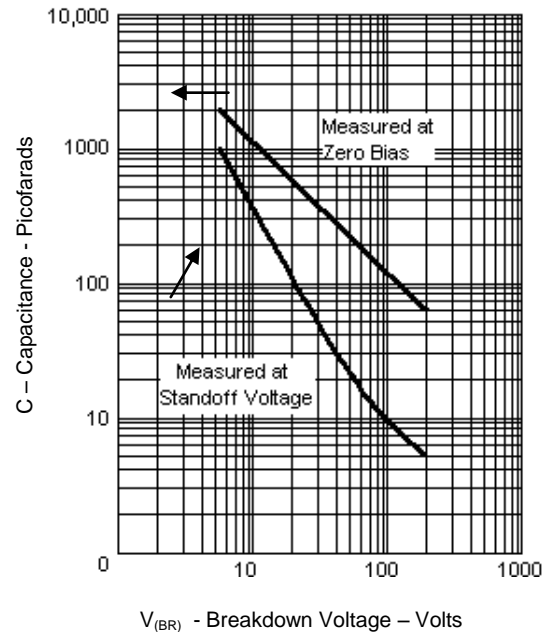


FIGURE 4 MP4KE Typical Capacitance vs. Breakdown Voltage (Unipolar)