RoHS Available

400 Watt
Transient Voltage Suppressors

Screening in reference to MIL-PRF-19500 available

DESCRIPTION

This family of high-reliability, plastic packaged Transient Voltage Suppressors offer high reliability at an affordable price. Standoff voltage values range from 5.8 to 342 volts and 5% or 10% tolerance options are available. Source control is standard and three increasingly stringent screening options for enhanced reliability are available.

Important: For the latest information, visit our website http://www.microsemi.com.

FEATURES

- High reliability controlled devices with wafer fabrication and assembly lot traceability.
- All devices 100% surge tested.
- Optional screening in reference to MIL-PRF-19500 is also available. Refer to High Reliability Non-Hermetic Product portfolio for more details on Microsemi screening options.
- Moisture classification is level 1 with no dry pack required per IPC/JEDEC J-STD-020B.
- 3σ lot norm screening performed on standby current (I_D).
- RoHS compliant versions available.

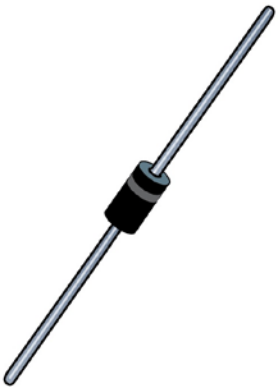
APPLICATIONS / BENEFITS

- Suppresses transients up to 400 watts @ 10/1000 μs (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

Parameters/Test Conditions	Symbol	Value	Unit
Junction and Storage Temperature	T_J and T_{STG}	-65 to +150	°C
Thermal Resistance, Junction to Leads @ 3/8 inch (10 mm) from body (1)	$R_{\Theta JL}$	50	°C/W
Peak Pulse Power Dissipation @ 10/1000 μs (2)	P_{PP}	400	W
Off-State Power Dissipation @ T_L = +25 °C (3) @ T_A = +25 °C (4)	P_D	2.5 1.13	W
Forward Voltage @ 25 °C with 8.3 ms half-sine wave (unidirectional only)	V_F	3.5	V
Solder Temperature @ 10 s	T_{SP}	260	°C

Notes:
1. Or 110 °C/W junction to ambient when mounted on FR4 PC board with 4 mm^2 copper pads (1 oz) and track width 1 mm, length 25 mm.
2. With impulse repetition rate (duty factor) of 0.01 % or less (see Figures 1, 2 and 3 for t_W, waveform and derating effects).
3. At 3/8 (10 mm) lead length from body.
4. On FR4 PC board with 110C/W junction to ambient with 4 mm2 copper pads (1 oz) and track width 1 mm and length 25 mm.



DO-41 (DO-204AL) Package

Also available in:

J-bend Package
(surface mount)
MSMBJ5.0A – MSMBJ170A

Gull-wing Package
(surface mount)
MSMBG5.0A – MSMBG170A

MSC – Lawrence
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Lawrence, MA 01841
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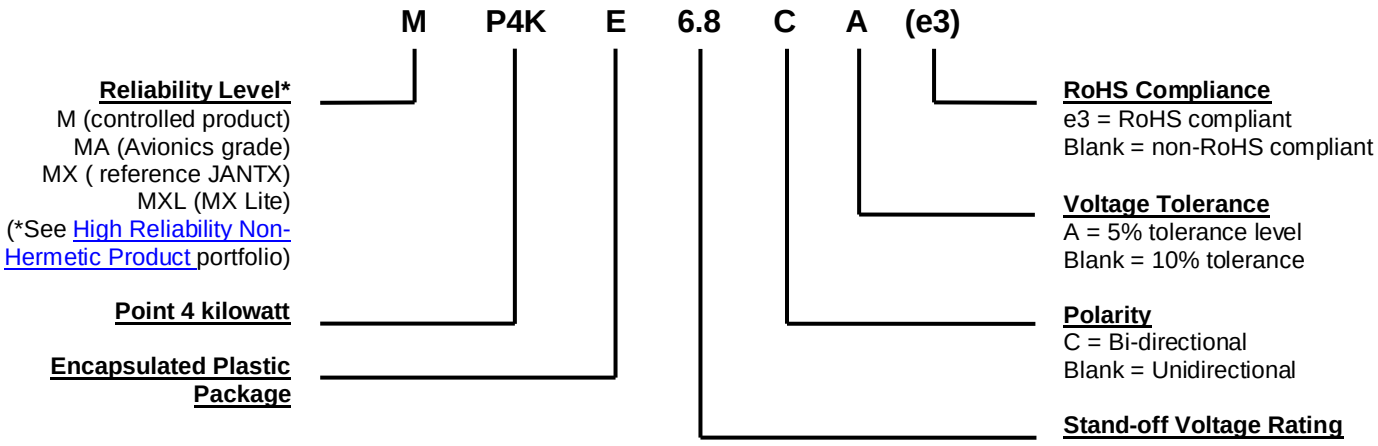
MECHANICAL and PACKAGING

- 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. Bi-directional not marked.
- TAPE & REEL option: Standard per EIA-296 (add "TR" suffix to part number). Consult factory for quantities.
- WEIGHT: Approximately 0.3 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.
C	Capacitance: The capacitance in pF at a frequency of 1 MHz and specified voltage
$I_{(BR)}$	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.

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ELECTRICAL CHARACTERISTICS @ 25 °C

PART NUMBER (Note 2)	WORKING STAND OFF VOLTAGE V_{WM}	BREAKDOWN VOLTAGE $V_{(BR)}$ @ $I_{(BR)}$			MAXIMUM CLAMPING VOLTAGE V_C @ I_{PP}	MAXIMUM STANDBY CURRENT I_D @ V_{WM}	PEAK PULSE CURRENT (see Fig. 2) I_{PP}	MAXIMUM TEMPERATURE COEFFICIENT of $V_{(BR)}$ $\alpha V_{(BR)}$
	Volts	MIN	MAX	mA	Volts	µA	Amps	% / °C
MP4KE6.8A	5.80	6.45	7.14	10	10.5	500	38	0.057
MP4KE7.5A	6.40	7.13	7.88	10	11.3	200	35	0.061
MP4KE8.2A	7.02	7.79	8.61	10	12.1	100	33	0.065
MP4KE9.1A	7.78	8.65	9.55	1	13.4	20	30	0.068
MP4KE10A	8.55	9.50	10.5	1	14.5	5	28	0.073
MP4KE11A	9.40	10.5	11.6	1	15.6	2	26	0.075
MP4KE12A	10.2	11.4	12.6	1	16.7	1	24	0.078
MP4KE13A	11.1	12.4	13.7	1	18.2	1	22	0.081
MP4KE15A	12.8	14.3	15.8	1	21.2	1	19	0.084
MP4KE16A	13.6	15.2	16.8	1	22.5	1	18	0.086
MP4KE18A	15.3	17.1	18.0	1	25.2	1	16	0.088
MP4KE20A	17.1	19.0	21.0	1	27.7	1	14.5	0.090
MP4KE22A	18.8	20.9	23.1	1	30.6	1	13	0.092
MP4KE24A	20.5	22.8	25.2	1	33.2	1	12	0.094
MP4KE27A	23.1	25.7	28.4	1	37.5	1	11	0.096
MP4KE30A	25.6	28.5	31.5	1	41.4	1	9.5	0.097
MP4KE33A	28.2	31.4	34.7	1	45.7	1	9.0	0.098
MP4KE36A	30.8	34.2	37.8	1	49.9	1	8.0	0.099
MP4KE39A	33.3	37.1	41.0	1	53.9	1	7.5	0.100
MP4KE43A	36.8	40.9	45.2	1	59.3	1	7.0	0.101
MP4KE47A	40.2	44.7	49.4	1	64.8	1	6.2	0.101
MP4KE51A	43.6	48.5	53.6	1	70.1	1	5.7	0.102
MP4KE56A	47.8	53.2	58.8	1	77.0	1	5.2	0.103
MP4KE62A	53.0	58.9	65.1	1	85.0	1	4.7	0.104
MP4KE68A	58.1	64.6	71.4	1	92.0	1	4.4	0.104
MP4KE75A	64.1	71.3	78.8	1	103.0	1	3.9	0.105
MP4KE82A	70.1	77.9	86.1	1	113.0	1	3.5	0.105
MP4KE91A	77.8	86.5	95.5	1	125.0	1	3.2	0.106
MP4KE100A	85.5	95.0	105.0	1	137.0	1	2.9	0.106
MP4KE110A	94.0	105.0	116.0	1	152.0	1	2.6	0.107
MP4KE120A	102.0	114.0	126.0	1	165.0	1	2.4	0.107
MP4KE130A	111.0	124.0	137.0	1	179.0	1	2.2	0.107
MP4KE150A	128.0	143.0	158.0	1	207.0	1	1.95	0.108
MP4KE160A	136.0	152.0	168.0	1	219.0	1	1.8	0.108
MP4KE170A	145.0	162.0	179.0	1	234.0	1	1.7	0.108
MP4KE180A	154.0	171.0	189.0	1	246.0	1	1.6	0.108
MP4KE200A	171.0	190.0	210.0	1	274.0	1	1.5	0.108
MP4KE220A	185.0	209.0	231.0	1	328.0	1	1.0	0.110
MP4KE250A	214.0	237.0	263.0	1	344.0	1	1.0	0.110
MP4KE300A	256.0	285.0	315.0	1	414.0	1	1.0	0.110
MP4KE350A	300.0	333.0	368.0	1	482.0	1	1.0	0.110
MP4KE400A	342.0	380.0	420.0	1	548.0	1	1.0	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. Bidirectional capacitance is half that shown in Figure 4 at zero volts.

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GRAPHS

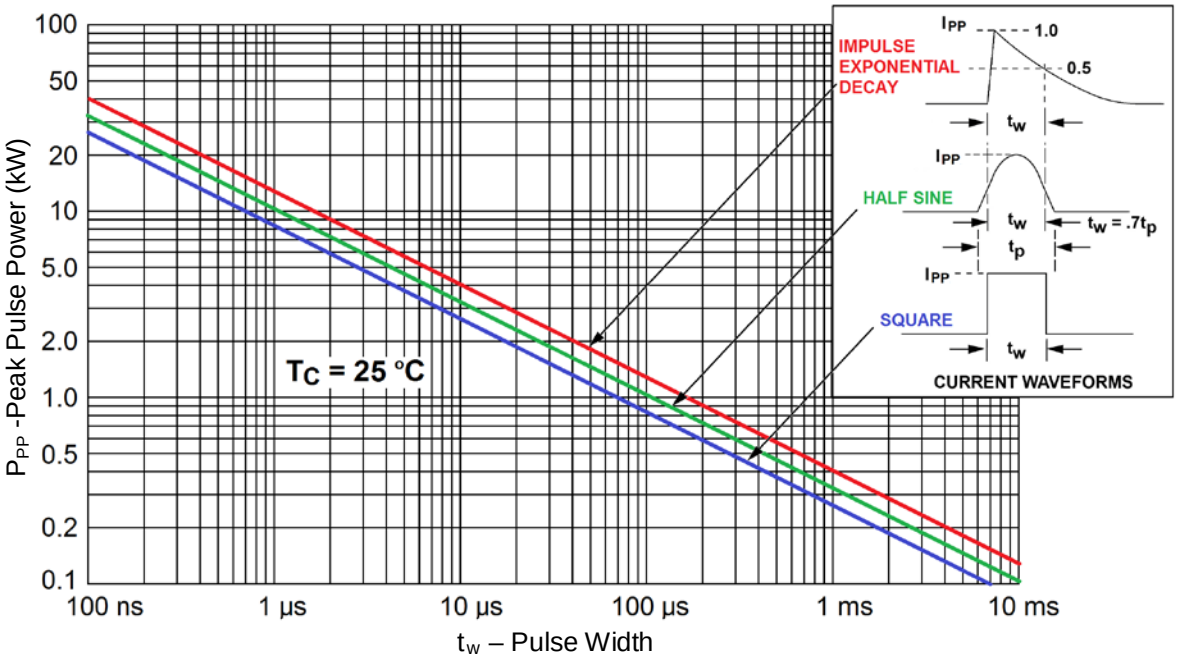

FIGURE 1
Peak Pulse Power vs. Pulse Time

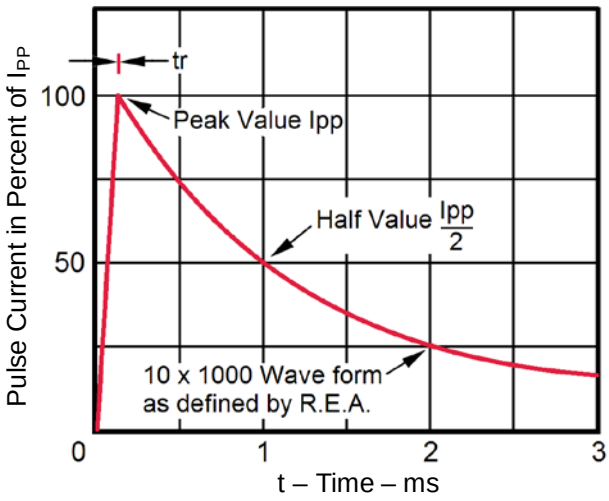

FIGURE 2
Pulse Waveform for Exponential Surge

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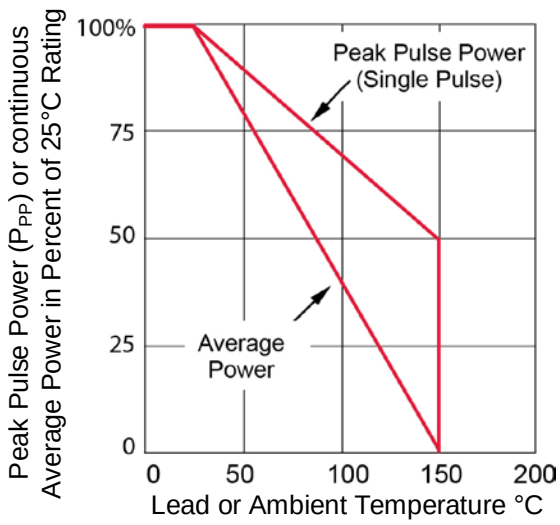

FIGURE 3
Derating Curve

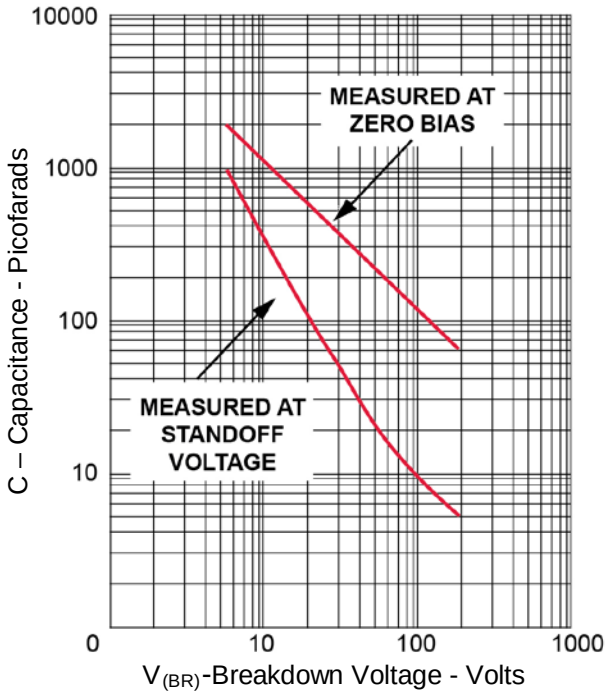

FIGURE 4
MP4KE Typical Capacitance vs. Breakdown Voltage (Unipolar)

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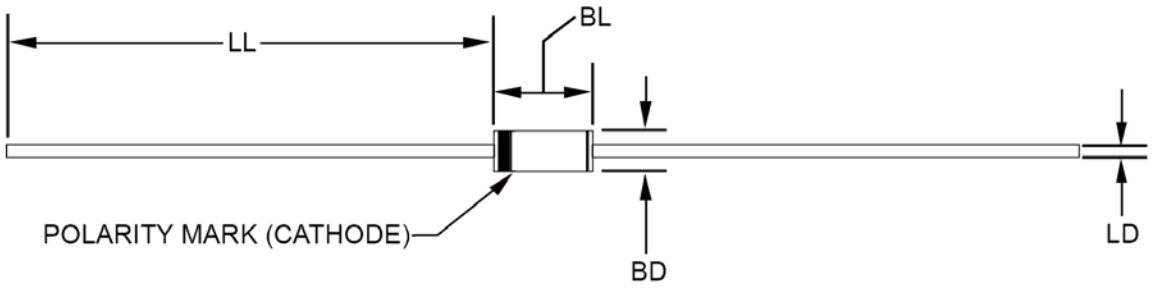
PACKAGE DIMENSIONS



NOTES: Cathode indicated by band.

Dim	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
LL	1.00	-	25.4	-
BL	-	0.205	-	5.207
BD	-	0.107	-	2.72
LD	0.030	0.034	0.76	0.86

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