



## 500 Watt Transient Voltage Suppressor (TVS) Protection Device

Screening in  
reference to  
MIL-PRF-19500  
available

### DESCRIPTION

This MP5KE5.0A – MP5KE170CA is a family of economical 500 W transient voltage suppressors (TVS) for protecting voltage-sensitive components from destruction or degradation. It is available in both unidirectional and bi-directional configurations as well as RoHS compliant (annealed matte-tin finish) and upscreened, enhanced high reliability options. The response time of their clamping time is virtually instantaneous. As a result, they may also be used effectively for protection from ESD or EFT per IEC61000-4-2 and IEC61000-4-4 or for inductive switching environments and induced RFI. They can also be used for protection from the secondary effects of lightning per IEC61000-4-5 at the class levels listed below.

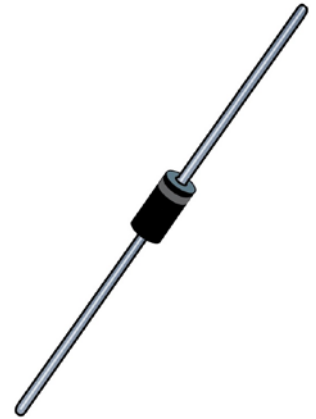
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### FEATURES


- Available in both unidirectional and bidirectional configurations
- Suppresses transients up to 500 watts Peak Pulse Power ( $P_{PP}$ ) @ 10/1000  $\mu$ s
- 3 $\sigma$  lot norm screening performed on standby current  $I_D$
- 100% surge tested devices
- Various screening 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

- Protects sensitive components such as IC's, CMOS, Bipolar, BiCMOS, ECL, DTL, T<sup>2</sup>L, etc.
- Selections from 5.0 to 170 volts stand-off voltage ( $V_{WM}$ )
- Economical TVS series for thru-hole mounting
- Similar to SA5.0 thru SA170 series
- Protection from switching transients & induced RFI
- Sub-nanosecond response time (unidirectional)
- Compliant to IEC61000-4-2 and IEC61000-4-4 for ESD and EFT protection respectively
- Secondary lightning protection per IEC61000-4-5 with 42 ohms source impedance:
  - Class 1: MP5KE5.0A to MP5KE120A or CA
  - Class 2: MP5KE5.0A to MP5KE60A or CA
  - Class 3: MP5KE5.0A to MP5KE30A or CA
  - Class 4: MP5KE5.0A to MP5KE15A or CA
- Secondary lightning protection per IEC61000-4-5 with 12 ohms source impedance:
  - Class 1: MP5KE5.0A to MP5KE36A or CA
  - Class 2: MP5KE5.0A to MP5KE18A or CA



**DO-204AL  
(DO-41) Plastic  
Package**

Also available in:  
**DO-214AC package**  
(tabbed surface mount)  
 [SMAJ5.0 – SMAJ170A](#)

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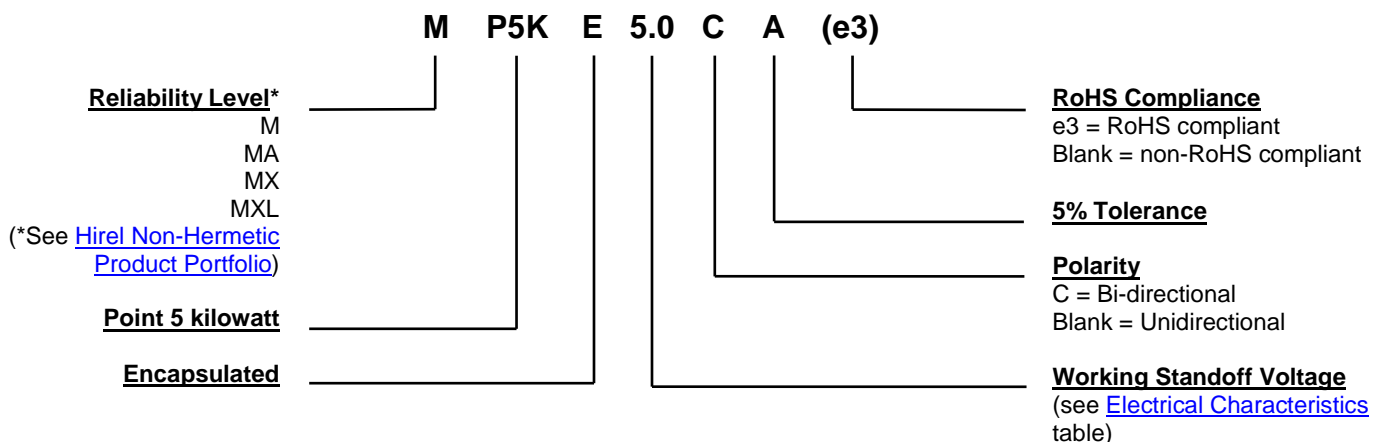
**MAXIMUM RATINGS @ 25 °C unless otherwise noted**

Parameters/Test Conditions	Symbol	Value	Unit
Junction and Storage Temperature	T <sub>J</sub> and T <sub>STG</sub>	-65 to +150	°C
Thermal Resistance, Junction to Lead @ 3/8 inch (10 mm) lead length from body	R <sub>θJL</sub>	45	°C/W
Thermal Resistance, Junction to Ambient <sup>(1)</sup>	R <sub>θJA</sub>	105	°C/W
Peak Pulse Power Dissipation <sup>(2)</sup> 10/1000 us	P <sub>PP</sub>	500	W
Steady-State Power Dissipation @ T <sub>L</sub> = 25 °C 3/8 inch (10 mm) from body	P <sub>D</sub>	2.77 1.19 <sup>(1)</sup>	W
Forward Voltage <sup>(3)</sup>	V <sub>F</sub>	3.5	V
Solder Temperature @ 10 s		260	°C

- Notes:**
1. At T<sub>A</sub> = 25 °C when mounted on FR4 PC board with 4 mm<sup>2</sup> copper pads (1 oz) and track width 1 mm, length 25 mm.
  2. With impulse repetition rate (duty factor) of 0.01 % or less (also Figure 1 and 4).
  3. At 30 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: RoHS compliant annealed matte/tin over copper. Solderable per MIL-STD-750, method 2026.
- MARKING: Body marked with part number.
- POLARITY: Band denotes cathode. Bidirectional 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**


<b>SYMBOLS &amp; DEFINITIONS</b>	
<b>Symbol</b>	<b>Definition</b>
$\alpha_{V(BR)}$	Temperature Coefficient of Breakdown Voltage: The change in breakdown voltage divided by the change in temperature that caused it expressed in $\%/^{\circ}\text{C}$ or $\text{mV}/^{\circ}\text{C}$ .
$V_{WM}$	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.
$P_{PP}$	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.
$I_D$	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.
$V_C$	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.
$I_{(BR)}$	Breakdown Current: The current used for measuring Breakdown Voltage $V_{(BR)}$ .

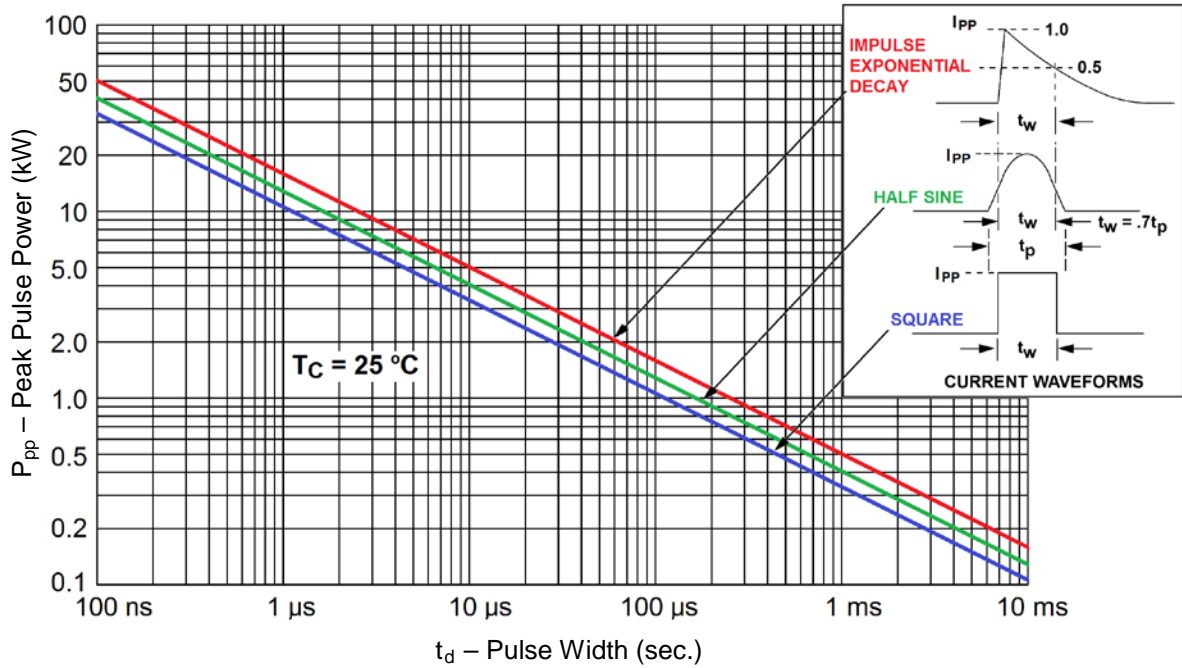
**ELECTRICAL CHARACTERISTICS @ 25 °C**

PART NUMBER	BREAKDOWN VOLTAGE $V_{(BR)}$		TEST CURRENT $I_{(BR)}$	RATED STANDOFF VOLTAGE $V_{WM}$	MAX STANDBY CURRENT $I_D @ V_{WM}$	MAX CLAMPING VOLTAGE $V_C @ I_{PP}$	MAX PEAK PULSE CURRENT $I_{PP}$	MAX TEMP COEFFICIENT OF $V_{(BR)}$ $\alpha_{V(BR)}$
	Min.	Max.						
	V	V	mA	V	$\mu A$	V	A	% / °C
MP5KE5.0A	6.4	7.0	10	5.0	600	9.2	54.3	0.057
MP5KE6.0A	6.67	7.37	10	6.0	600	10.3	48.5	0.059
MP5KE6.5A	7.22	7.98	10	6.5	400	11.2	44.7	0.061
MP5KE7.0A	7.78	8.60	10	7.0	150	12.0	41.7	0.065
MP5KE7.5A	8.33	9.21	1	7.5	50	12.9	38.8	0.067
MP5KE8.0A	8.89	9.83	1	8.0	25	13.6	36.7	0.070
MP5KE8.5A	9.44	10.4	1	8.5	5	14.4	34.7	0.073
MP5KE9.0A	10.0	11.1	1	9.0	1	15.4	32.5	0.076
MP5KE10A	11.1	12.3	1	10	1	17.0	29.4	0.078
MP5KE11A	12.2	13.5	1	11	1	18.2	27.4	0.081
MP5KE12A	13.3	14.7	1	12	1	19.9	25.1	0.082
MP5KE13A	14.4	15.9	1	13	1	21.5	23.2	0.084
MP5KE14A	15.6	17.2	1	14	1	23.2	21.5	0.086
MP5KE15A	16.7	18.5	1	15	1	24.4	20.6	0.087
MP5KE16A	17.8	19.7	1	16	1	26.0	19.2	0.088
MP5KE17A	18.9	20.9	1	17	1	27.6	18.1	0.090
MP5KE18A	20.0	22.1	1	18	1	29.2	17.2	0.092
MP5KE20A	22.2	24.5	1	20	1	32.4	15.4	0.093
MP5KE22A	24.4	26.9	1	22	1	35.5	14.1	0.094
MP5KE24A	26.7	29.5	1	24	1	38.9	12.8	0.096
MP5KE26A	28.9	31.9	1	26	1	42.1	11.9	0.097
MP5KE28A	31.1	34.4	1	28	1	45.4	11.0	0.098
MP5KE30A	33.3	36.8	1	30	1	48.4	10.3	0.099
MP5KE33A	36.7	40.6	1	33	1	53.3	9.4	0.100
MP5KE36A	40.0	44.2	1	36	1	58.1	8.6	0.101
MP5KE40A	44.4	49.1	1	40	1	64.5	7.8	0.101
MP5KE43A	47.8	52.8	1	43	1	69.4	7.2	0.102
MP5KE45A	50.0	55.3	1	45	1	72.7	6.9	0.102
MP5KE48A	53.3	58.9	1	48	1	77.4	6.5	0.103
MP5KE51A	56.7	62.7	1	51	1	82.4	6.1	0.103
MP5KE54A	60.0	66.3	1	54	1	87.1	5.7	0.104
MP5KE58A	64.4	71.2	1	58	1	93.6	5.3	0.104
MP5KE60A	66.7	73.7	1	60	1	96.8	5.2	0.104
MP5KE64A	71.1	78.6	1	64	1	103.0	4.9	0.105
MP5KE70A	77.8	86.0	1	70	1	113.0	4.4	0.105
MP5KE75A	83.3	92.1	1	75	1	121.0	4.1	0.105
MP5KE78A	86.7	95.8	1	78	1	126.0	4.0	0.106
MP5KE85A	94.4	104.0	1	85	1	137.0	3.6	0.106
MP5KE90A	100.0	111.0	1	90	1	146.0	3.4	0.107
MP5KE100A	111.0	123.0	1	100	1	162.0	3.1	0.107
MP5KE110A	122.0	135.0	1	110	1	177.0	2.8	0.107
MP5KE120A	133.0	147.0	1	120	1	193.0	2.0	0.107
MP5KE130A	144.0	159.0	1	130	1	209.0	2.4	0.108
MP5KE150A	167.0	185.0	1	150	1	243.0	2.1	0.108
MP5KE160A	178.0	197.0	1	160	1	259.0	1.9	0.108
MP5KE170A	189.0	209.0	1	170	1	275.0	1.8	0.108

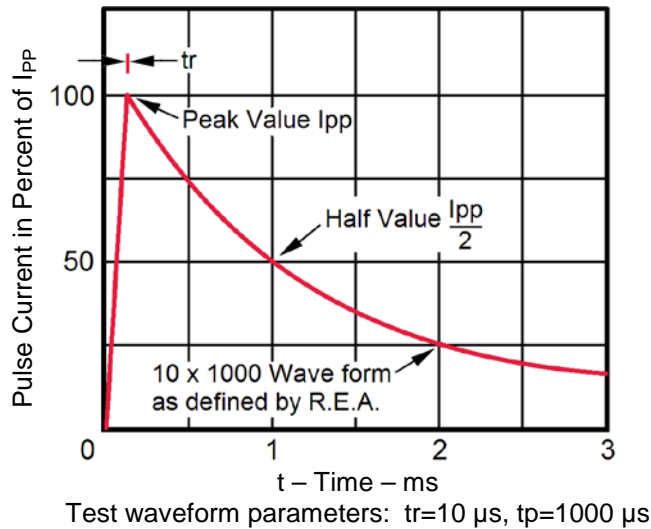
**NOTES:**

1. Forward voltage ( $V_F$ ) @ 35 amps peak, 8.3 ms sine wave equal to 3.5 volts max. (Excluding bidirectional).
2. For bidirectional construction, capacitance will be one-half that shown in [Figure 4](#).

**GRAPHS**

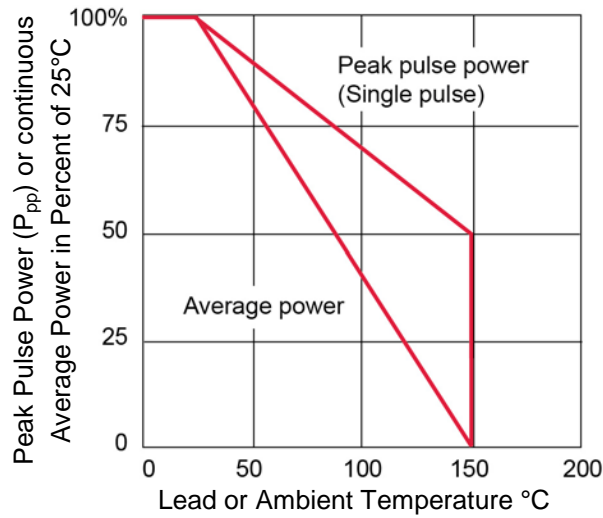


**FIGURE 1**  
Peak Pulse Power Rating Curve

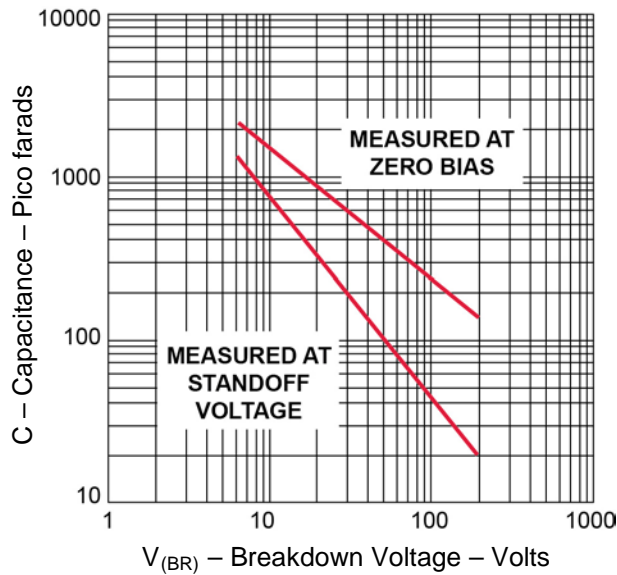


**FIGURE 2**  
Pulse Waveform for 10/1000 Exponential Surge

GRAPHS (continued)

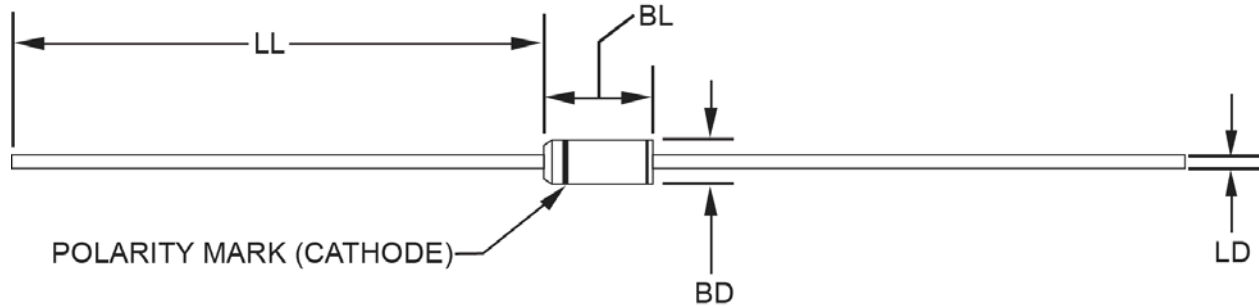


**FIGURE 3**  
Derating Curve



**FIGURE 4**  
Typical Capacitance vs. Breakdown Voltage

**PACKAGE DIMENSIONS**



**NOTES:**

1. Dimensions are in inches.
2. Millimeters are given for information only.
3. In accordance with ASME Y14.5M, diameters are equivalent to  $\Phi$ x symbology.

Ltr	DIMENSIONS			
	INCH		MILLIMETERS	
	Min	Max	Min	Max
<b>BD</b>	-	0.107	-	2.718
<b>BL</b>	-	0.205	-	5.207
<b>LD</b>	0.030	0.034	0.762	0.864
<b>LL</b>	1.10	-	27.940	-

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