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RoHS Available

5,000 Watt Transient Voltage Suppressor (TVS) Protection Device

Screening in reference to MIL-PRF-19500 available

DESCRIPTION

This Transient Voltage Suppressor series M5KP5.0A – M5KP110CA provides a range of standoff voltage options from 5.0 to 110 V in unidirectional, bidirectional, RoHS compliant, and SnPb solder dipped options. Multiple advanced screening levels are available for enhanced reliability. Clamping action is almost instantaneous. As a result, they provide effective protection from ESD or EFT per IEC61000-4-2 and IEC61000-4-4, as well as transients caused by inductive switching and RFI. They also protect from secondary lightning effects per 61000-4-5 at the class levels specified below.

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

Case 5A (DO-204AR) Package

Also available in:

P600 package
(commercial plastic axial-leaded)
5KP5.0e3 – 5KP250CAe3

DO-13 package
(metal axial-leaded)
LC6.5A – LC170A

FEATURES

- Available in both unidirectional and bidirectional configurations
- 3σ lot norm screening performed on standby current I_D
- 100% surge tested devices
- Various screening in reference to MIL-PRF-19500. Refer to HiRel Non-Hermetic Product Portfolio for more details on the screening options
  (See part nomenclature for all options.)
- High reliability controlled devices with 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 for 5.0 to 110 volts stand-off voltage (V_{WM})
- Economical TVS series for thru-hole mounting
- This M5KPxxx series has a significantly reduced body diameter than the 5KPxxx commercial series for a smaller size footprint often required for aviation and other applications
- Pico- to nano-second response time
- Protection from transients due to inductive switching and 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, 2, 3, 4: M5KP5.0A to M5KP110CA
  - Class 5: M5KP5.0A to M5KP110CA (short distance)
  - Class 5: M5KP5.0A to M5KP36CA (long distance)
- Secondary lightning protection per IEC61000-4-5 with 12 ohms source impedance:
  - Class 1 & 2: M5KP5.0A to M5KP110CA
  - Class 3: M5KP5.0A to M5KP78CA
  - Class 4: M5KP5.0A to M5KP40CA
- Secondary lightning protection per IEC61000-4-5 with 2 ohms source impedance:
  - Class 2: M5KP5.0A to M5KP70CA
  - Class 3: M5KP5.0A to M5KP36CA
  - Class 4: M5KP5.0A to M5KP18CA

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MAXIMUM RATINGS @ 25 ºC unless otherwise noted

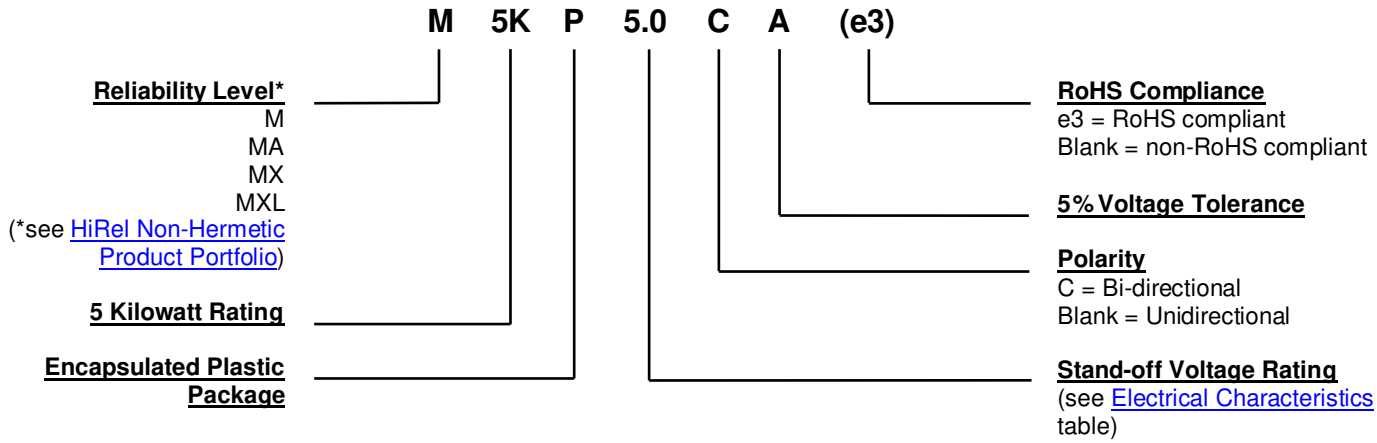
Parameters/Test Conditions	Symbol	Value	Unit
Junction and Storage Temperature	T_J and T_{STG}	-65 to +150	°C
Thermal Resistance, Junction to Lead @ 0.375 inch (9.5 mm) lead length from body	$R_{\Theta JL}$	20	°C/W
Thermal Resistance, Junction to Ambient (1)	$R_{\Theta JA}$	80	°C/W
Peak Pulse Power Dissipation (2) 10/1000 µs	P_{PP}	5000	W
Steady-State Power Dissipation @ T_L = 25 ºC 0.375 inch (9.5 mm) from body	P_D	6 1.56 (1)	W
$T_{clamping}$ (0 volts to $V_{(BR)}$ min, theoretical) Unidirectional Bidirectional		< 100 < 5	ps ns
Forward Voltage (3)	V_F	3.5	V
Solder Temperature @ 10 s		260	°C

Notes: 1. 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 (also Figure 1 and 2).
3. 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. No cathode band on bidirectional devices.
- TAPE & REEL option: Standard per EIA-296 (add "TR" suffix to part number). Consult factory for quantities.
- WEIGHT: Approximately 1.4 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.
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 ºC

PART NUMBER (Note 2)	REVERSE STAND-OFF VOLTAGE V_{WM} (Note 1)	BREAKDOWN VOLTAGE $V_{(BR)}$ @ $I_{(BR)}$		MAXIMUM CLAMPING VOLTAGE V_C @ I_{PP}	MAXIMUM STANDBY CURRENT I_D @ V_{WM}	MAXIMUM PEAK PULSE CURRENT I_{PP} (FIG. 2)	MAXIMUM TEMPERATURE COEFFICIENT OF $V_{(BR)}$ $\alpha_{V(BR)}$
	V	V	mA	V	µA	A	mV/ ºC
M5KP5.0A	5.0	6.40 – 7.00	50	9.2	2000*	543	4.0
M5KP6.0A	6.0	6.67 – 7.37	50	10.3	5000	485	4.0
M5KP6.5A	6.5	7.22 – 7.98	50	11.2	2000	447	4.0
M5KP7.0A	7.0	7.78 – 8.60	50	12.0	1000	417	5.0
M5KP7.5A	7.5	8.33 – 9.21	5	12.9	250	388	6.0
M5KP8.0A	8.0	8.89 – 9.83	5	13.6	150	367	6.0
M5KP8.5A	8.5	9.44 – 10.4	5	14.4	50	347	7.0
M5KP9.0A	9.0	10.0 – 11.1	5	15.4	20	325	8.0
M5KP10A	10	11.1 – 12.3	5	17.0	15	294	9.0
M5KP11A	11	12.2 – 13.5	5	18.2	10	274	10
M5KP12A	12	13.3 – 14.7	5	19.9	10	251	11
M5KP13A	13	14.4 – 15.9	5	21.5	10	232	12
M5KP14A	14	15.6 – 17.2	5	23.2	10	215	13
M5KP15A	15	16.7 – 18.5	5	24.4	10	206	15
M5KP16A	16	17.8 – 19.7	5	26.0	10	192	16
M5KP17A	17	18.9 – 20.9	5	27.6	10	181	18
M5KP18A	18	20.0 – 22.1	5	29.2	10	172	19
M5KP20A	20	22.2 – 24.5	5	32.4	10	154	22
M5KP22A	22	24.4 – 26.9	5	35.5	10	141	24
M5KP24A	24	26.7 – 29.5	5	38.9	10	128	27
M5KP26A	26	28.9 – 31.9	5	42.1	10	119	29
M5KP28A	28	31.1 – 34.4	5	45.5	10	110	30
M5KP30A	30	33.3 – 36.8	5	48.4	10	103	35
M5KP33A	33	36.7 – 40.6	5	53.3	10	94	38
M5KP36A	36	40.0 – 44.2	5	58.1	10	86	40
M5KP40A	40	44.4 – 49.1	5	64.5	10	78	45
M5KP43A	43	47.8 – 52.8	5	69.4	10	72	49
M5KP45A	45	50.0 – 55.3	5	72.7	10	69	51
M5KP48A	48	53.3 – 58.9	5	77.4	10	65	55
M5KP51A	51	56.7 – 62.7	5	82.4	10	61	60
M5KP54A	54	60.0 – 66.3	5	87.1	10	57	64
M5KP58A	58	64.4 – 71.2	5	93.6	10	53	69
M5KP60A	60	66.7 – 73.7	5	96.8	10	52	70
M5KP64A	64	71.1 – 78.6	5	103.0	10	49	75
M5KP70A	70	77.8 – 86.0	5	113	10	44	84
M5KP75A	75	83.3 – 92.1	5	121	10	41	90
M5KP78A	78	86.7 – 95.8	5	126	10	40	94
M5KP85A	85	94.4 – 104.0	5	137	10	36	102
M5KP90A	90	100 – 111	5	146	10	34	109
M5KP100A	100	111 – 123	5	162	10	31	122
M5KP110A	110	122 - 135	5	177	10	28	132

NOTES:

1. Transient voltage suppressors are normally selected with reverse “stand-off voltage” (V_{WM}) which should be equal to or greater than the dc or continuous peak operating voltage level.

2. For the bidirectional M5KP5.0CA double the I_D maximum standby current to 4000 µA .

GRAPHS

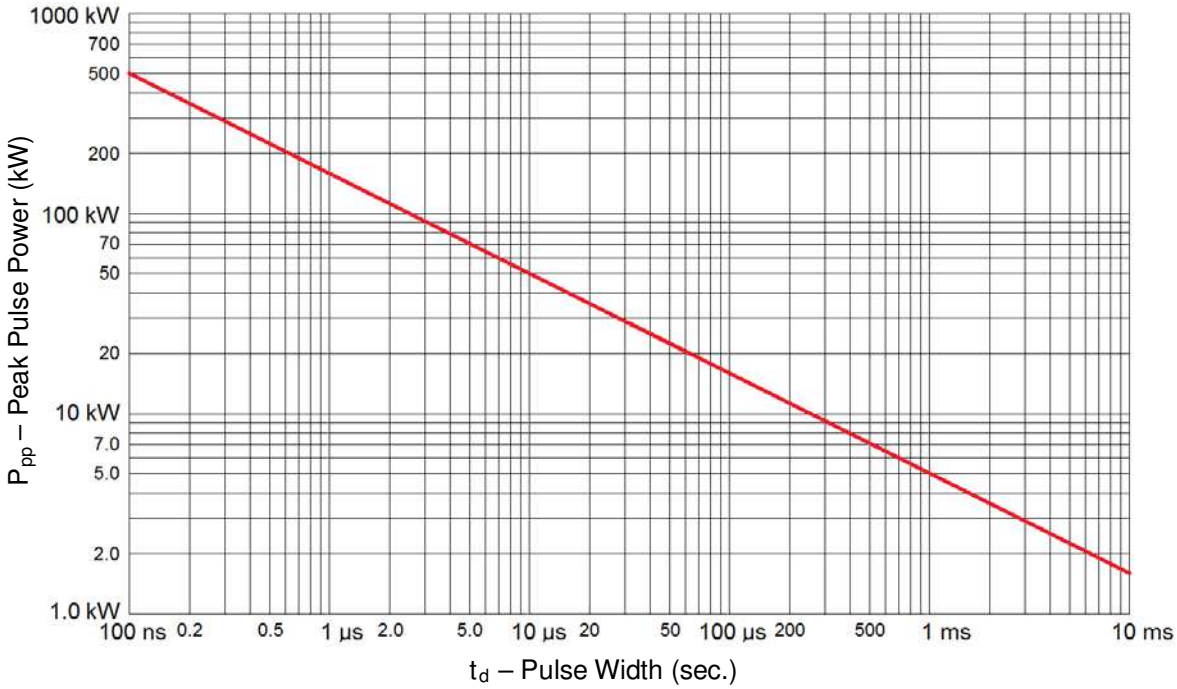
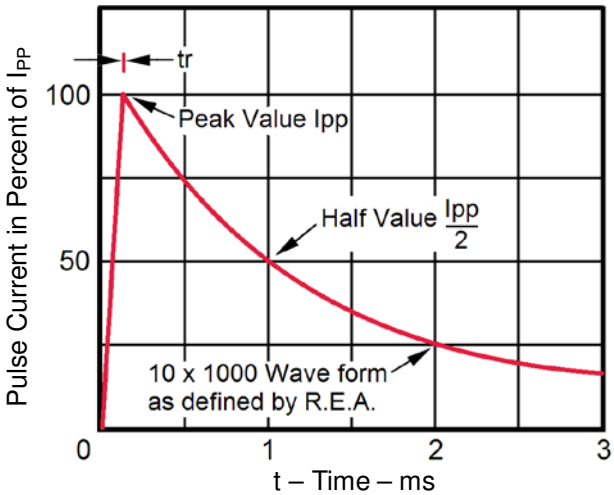


FIGURE 1
Peak Pulse Power Rating Curve



Test waveform parameters: tr=10 µs, tp=1000 µs

FIGURE 2
Pulse Waveform for 10/1000 µs Exponential Surge

GRAPHS (continued)

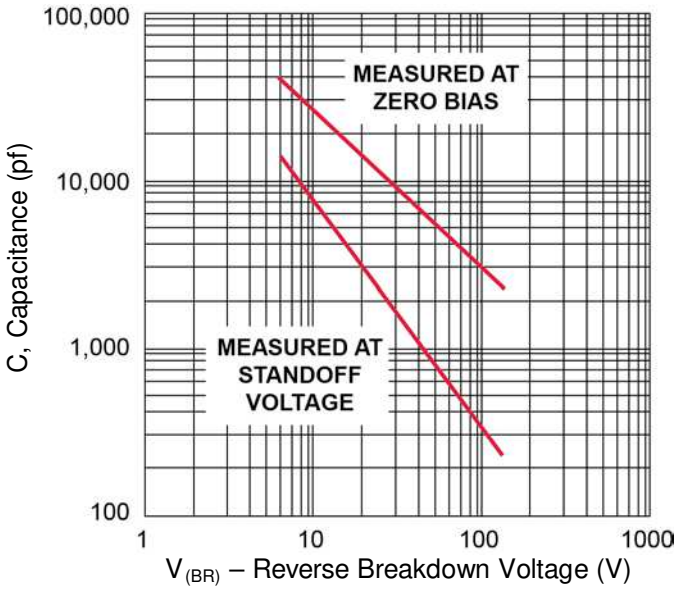
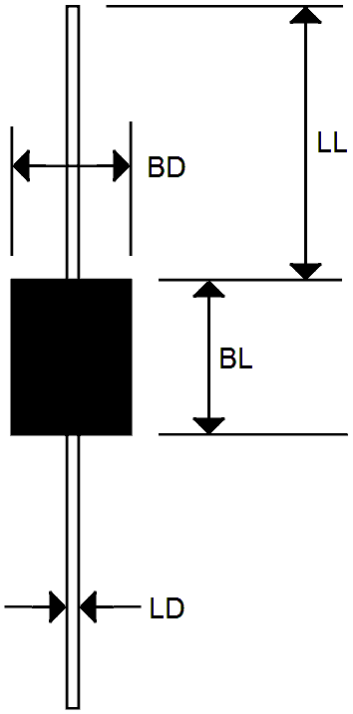


FIGURE 3
Typical Junction Capacitance

PACKAGE DIMENSIONS



Dim	Dimensions			
	Inch		Millimeters	
	Min	Max	Min	Max
LL	0.750	-	19.05	-
BL	0.365	0.385	9.27	9.78
BD	0.235	0.255	5.97	6.48
LD	0.047	0.053	1.194	1.346