

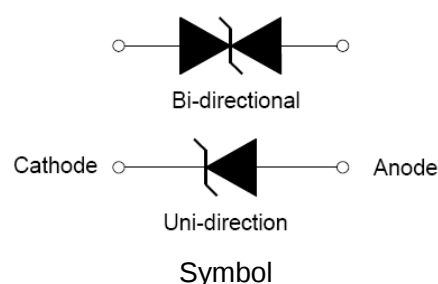


## 5KP Series 5000W Transient Voltage Suppressor

Rev.1.0

### DESCRIPTION:

The 5KP series of high current uni/bi-directional transient suppressors are designed for A.C. line protection and high power DC bus clamping applications. These devices offer uni/bi-directional port protection from 5.0 volts to 250 volts. They provide a clamping voltage lower than the avalanche voltage. Therefore, any voltage rise due to increased current conduction is contained to a minimum, providing the best possible protection level. They can also be connected in series and/or parallel to create very high capacity protection solutions.



### FEATURES:

- ✧ Low zener impedance.
- ✧ Excellent clamping capability.
- ✧ JEDEC R-6/P-600 Molded Plastic.
- ✧ Repetition rate (duty cycle): 0.01%.
- ✧ Color band denoted cathode except bidirectional.
- ✧ High temperature soldering: 260°C/10s at terminals.
- ✧ Glass passivated chip junction in R-6/P600 package.
- ✧ 5000W Peak Pulse power capability at 10×1000μs waveform.
- ✧ Fast response time: typically less than 1.0ps from 0V to  $V_{BR}$  min.

### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^{\circ}\text{C}$ , RH=45%-75%, unless otherwise noted)

| Parameter                                                  | Symbol         | Value          | Unit               |
|------------------------------------------------------------|----------------|----------------|--------------------|
| Peak pulse power dissipation on 10/1000μs waveform         | $P_{PP}$       | 5000           | W                  |
| Peak pulse current of on 10/1000μs waveform                | $I_{PP}$       | See next table | A                  |
| Steady state power dissipation at $T_L=75^{\circ}\text{C}$ | $P_{M(AV)}$    | 8              | W                  |
| Operating junction and Storage temperature range           | $T_{STG}, T_J$ | -55 to +125    | $^{\circ}\text{C}$ |
| Peak forward surge current, 8.3ms single half sine-wave    | $I_{FSM}$      | 400            | A                  |

**ELECTRICAL CHARACTERISTICS** ( $T_A=25^{\circ}\text{C}$ )

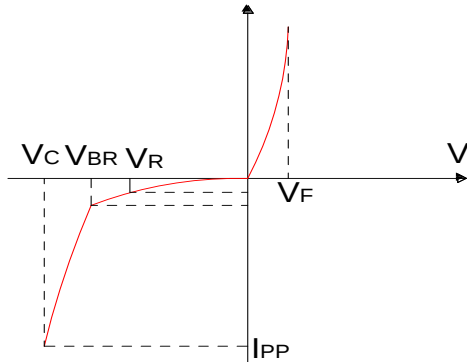
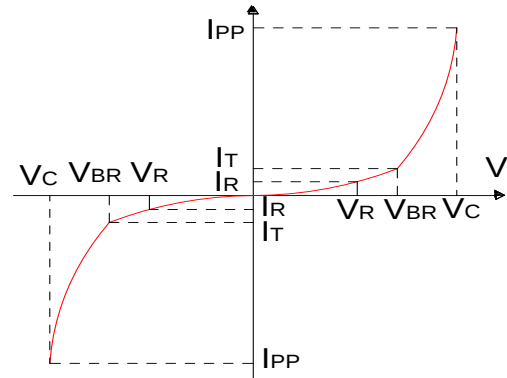
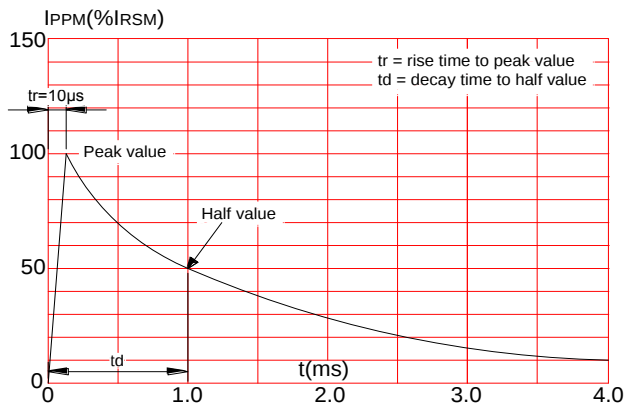
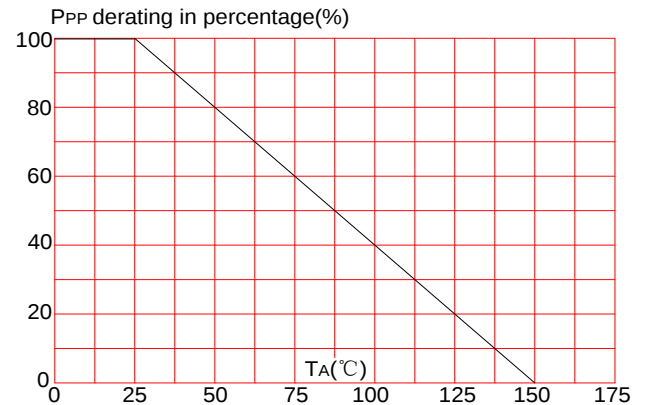
| Part Number |          | $V_R$ | $I_R@V_R$     | $V_{BR}@I_T$ |        | $I_T$ | $V_C@I_{PP}$ | $I_{PP}^{①}$ |
|-------------|----------|-------|---------------|--------------|--------|-------|--------------|--------------|
| Uni-Polar   | Bi-Polar | V     | $\mu\text{A}$ | min(V)       | max(V) | mA    | max(V)       | A            |
| 5KP5.0A     | 5KP5.0CA | 5.0   | 150           | 6.40         | 7.00   | 10    | 9.2          | 544.0        |
| 5KP6.0A     | 5KP6.0CA | 6.0   | 100           | 6.67         | 7.37   | 10    | 10.3         | 486.0        |
| 5KP6.5A     | 5KP6.5CA | 6.5   | 50            | 7.22         | 7.98   | 10    | 11.2         | 448.0        |
| 5KP7.0A     | 5KP7.0CA | 7.0   | 20            | 7.78         | 8.60   | 10    | 12.0         | 417.0        |
| 5KP7.5A     | 5KP7.5CA | 7.5   | 10            | 8.33         | 9.21   | 1     | 12.9         | 388.0        |
| 5KP8.0A     | 5KP8.0CA | 8.0   | 10            | 8.89         | 9.83   | 1     | 13.6         | 367.0        |
| 5KP8.5A     | 5KP8.5CA | 8.5   | 10            | 9.44         | 10.40  | 1     | 14.4         | 347.0        |
| 5KP9.0A     | 5KP9.0CA | 9.0   | 10            | 10.00        | 11.10  | 1     | 15.4         | 325.0        |
| 5KP10A      | 5KP10CA  | 10.0  | 5             | 11.10        | 12.30  | 1     | 17.0         | 294.0        |
| 5KP11A      | 5KP11CA  | 11.0  | 5             | 12.20        | 13.50  | 1     | 18.2         | 275.0        |
| 5KP12A      | 5KP12CA  | 12.0  | 2             | 13.30        | 14.70  | 1     | 19.9         | 252.0        |
| 5KP13A      | 5KP13CA  | 13.0  | 2             | 14.40        | 15.90  | 1     | 21.5         | 233.0        |
| 5KP14A      | 5KP14CA  | 14.0  | 1             | 15.60        | 17.20  | 1     | 23.2         | 216.0        |
| 5KP15A      | 5KP15CA  | 15.0  | 1             | 16.70        | 18.50  | 1     | 24.4         | 205.0        |
| 5KP16A      | 5KP16CA  | 16.0  | 1             | 17.80        | 19.70  | 1     | 26.0         | 193.0        |
| 5KP17A      | 5KP17CA  | 17.0  | 1             | 18.90        | 20.90  | 1     | 27.6         | 181.0        |
| 5KP18A      | 5KP18CA  | 18.0  | 1             | 20.00        | 22.10  | 1     | 29.2         | 172.0        |
| 5KP20A      | 5KP20CA  | 20.0  | 1             | 22.20        | 24.50  | 1     | 32.4         | 155.0        |
| 5KP22A      | 5KP22CA  | 22.0  | 1             | 24.40        | 26.90  | 1     | 35.5         | 141.0        |
| 5KP24A      | 5KP24CA  | 24.0  | 1             | 26.70        | 29.50  | 1     | 38.9         | 129.0        |
| 5KP26A      | 5KP26CA  | 26.0  | 1             | 28.90        | 31.90  | 1     | 42.1         | 119.0        |
| 5KP28A      | 5KP28CA  | 28.0  | 1             | 31.10        | 34.40  | 1     | 45.4         | 110.0        |
| 5KP30A      | 5KP30CA  | 30.0  | 1             | 33.30        | 36.80  | 1     | 48.4         | 103.0        |
| 5KP33A      | 5KP33CA  | 33.0  | 1             | 36.70        | 40.60  | 1     | 53.3         | 93.9         |
| 5KP36A      | 5KP36CA  | 36.0  | 1             | 40.00        | 44.20  | 1     | 58.1         | 86.1         |
| 5KP40A      | 5KP40CA  | 40.0  | 1             | 44.40        | 49.10  | 1     | 64.5         | 77.6         |
| 5KP43A      | 5KP43CA  | 43.0  | 1             | 47.80        | 52.80  | 1     | 69.4         | 72.1         |
| 5KP45A      | 5KP45CA  | 45.0  | 1             | 50.00        | 55.30  | 1     | 72.7         | 68.8         |
| 5KP48A      | 5KP48CA  | 48.0  | 1             | 53.30        | 58.90  | 1     | 77.4         | 64.7         |
| 5KP51A      | 5KP51CA  | 51.0  | 1             | 56.70        | 62.70  | 1     | 82.4         | 60.7         |

**ELECTRICAL CHARACTERISTICS** ( $T_A=25^{\circ}\text{C}$ , continued)

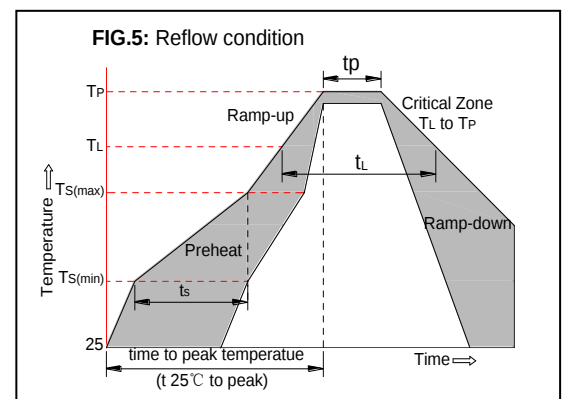
| Part Number |          | $V_R$ | $I_R@V_R$     | $V_{BR}@I_T$ |        | $I_T$ | $V_C@I_{PP}$ | $I_{PP}^{①}$ |
|-------------|----------|-------|---------------|--------------|--------|-------|--------------|--------------|
| Uni-Polar   | Bi-Polar | V     | $\mu\text{A}$ | min(V)       | max(V) | mA    | max(V)       | A            |
| 5KP54A      | 5KP54CA  | 54.0  | 1             | 60.00        | 66.30  | 1     | 87.1         | 57.5         |
| 5KP58A      | 5KP58CA  | 58.0  | 1             | 64.40        | 71.20  | 1     | 93.6         | 53.5         |
| 5KP60A      | 5KP60CA  | 60.0  | 1             | 66.70        | 73.70  | 1     | 96.8         | 51.7         |
| 5KP64A      | 5KP64CA  | 64.0  | 1             | 71.10        | 78.60  | 1     | 103.0        | 48.6         |
| 5KP70A      | 5KP70CA  | 70.0  | 1             | 77.80        | 86.00  | 1     | 113.0        | 44.3         |
| 5KP75A      | 5KP75CA  | 75.0  | 1             | 83.30        | 92.10  | 1     | 121.0        | 41.4         |
| 5KP78A      | 5KP78CA  | 78.0  | 1             | 86.70        | 95.80  | 1     | 126.0        | 39.7         |
| 5KP85A      | 5KP85CA  | 85.0  | 1             | 94.40        | 104.0  | 1     | 137.0        | 36.5         |
| 5KP90A      | 5KP90CA  | 90.0  | 1             | 100.0        | 111.0  | 1     | 146.0        | 34.3         |
| 5KP100A     | 5KP100CA | 100.0 | 1             | 111.0        | 123.0  | 1     | 162.0        | 30.9         |
| 5KP110A     | 5KP110CA | 110.0 | 1             | 122.0        | 135.0  | 1     | 177.0        | 28.3         |
| 5KP120A     | 5KP120CA | 120.0 | 1             | 133.0        | 147.0  | 1     | 193.0        | 26.0         |
| 5KP130A     | 5KP130CA | 130.0 | 1             | 144.0        | 159.0  | 1     | 209.0        | 24.0         |
| 5KP150A     | 5KP150CA | 150.0 | 1             | 167.0        | 185.0  | 1     | 243.0        | 20.6         |
| 5KP160A     | 5KP160CA | 160.0 | 1             | 178.0        | 197.0  | 1     | 259.0        | 19.3         |
| 5KP170A     | 5KP170CA | 170.0 | 1             | 189.0        | 209.0  | 1     | 275.0        | 18.2         |
| 5KP180A     | 5KP180CA | 180.0 | 1             | 201.0        | 222.0  | 1     | 292.0        | 17.5         |
| 5KP190A     | 5KP190CA | 190.0 | 1             | 211.0        | 233.0  | 1     | 310.0        | 16.5         |
| 5KP200A     | 5KP200CA | 200.0 | 1             | 224.0        | 247.0  | 1     | 329.2        | 15.5         |
| 5KP210A     | 5KP210CA | 210.0 | 1             | 237.0        | 263.0  | 1     | 349.5        | 14.6         |
| 5KP220A     | 5KP220CA | 220.0 | 1             | 246.0        | 272.0  | 1     | 371.1        | 13.7         |
| 5KP250A     | 5KP250CA | 250.0 | 1             | 277.0        | 309.0  | 1     | 425.0        | 12.0         |

① Surge waveform: 10/1000 $\mu\text{s}$  $V_R$  : Stand-off Voltage -- Maximum voltage that can be applied $V_{BR}$ : Breakdown Voltage $V_C$ : Clamping Voltage -- Peak voltage measured across the suppressor at a specified  $I_{pp}$  $I_R$ : Reverse Leakage Current

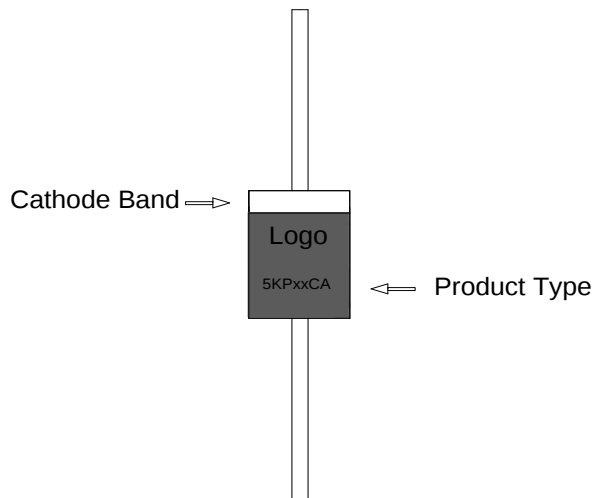
**RATINGS AND V-I CHARACTERISTICS CURVES** ( $T_A=25^\circ\text{C}$ , unless otherwise noted)

**FIG.1: V- I curve characteristics (Uni-directional)**

**FIG.2: V- I curve characteristics (Bi-directional)**

**FIG.3: Pulse waveform**

**FIG.4: Pulse derating curve**

**SOLDERING PARAMETERS**

| Reflow Condition                                        |                                    | Pb-Free assembly<br>(see FIG.5) |
|---------------------------------------------------------|------------------------------------|---------------------------------|
| Pre Heat                                                | -Temperature Min ( $T_{s(min)}$ )  | +150°C                          |
|                                                         | -Temperature Max ( $T_{s(max)}$ )  | +200°C                          |
|                                                         | -Time (Min to Max) ( $t_s$ )       | 60-180 secs.                    |
| Average ramp up rate (Liquid us Temp ( $T_L$ ) to peak) |                                    | 3°C/sec. Max                    |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                    |                                    | 3°C/sec. Max                    |
| Reflow                                                  | -Temperature ( $T_L$ ) (Liquid us) | +217°C                          |
|                                                         | -Temperature ( $t_L$ )             | 60-150 secs.                    |
| Peak Temp ( $T_p$ )                                     |                                    | +260(+0/-5)°C                   |
| Time within 5°C of actual Peak Temp ( $t_p$ )           |                                    | 30 secs. Max                    |
| Ramp-down Rate                                          |                                    | 6°C/sec. Max                    |
| Time 25°C to Peak Temp ( $T_p$ )                        |                                    | 8 min. Max                      |
| Do not exceed                                           |                                    | +260°C                          |

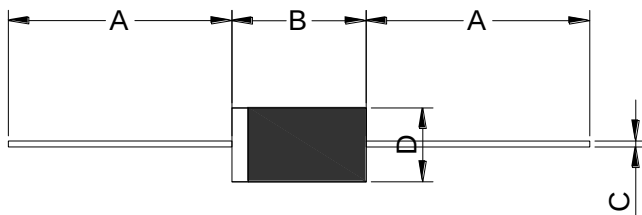


## MARKING &amp; ORDERING INFORMATION



- |     |     |     |     |
|-----|-----|-----|-----|
| 5KP | XX  | C   | A   |
| (1) | (2) | (3) | (4) |
- (1) Series: 5000 watts series  
 (2) Reverse Stand-off Voltage  
 (3) Bi-directional  
 (4) 5%  $V_{BR}$  Voltage tolerance

## PACKAGE MECHANICAL DATA



| Ref. | Dimensions |       |             |      |
|------|------------|-------|-------------|------|
|      | Inches     |       | Millimeters |      |
|      | Min.       | Max.  | Min.        | Max. |
| A    | 1.000      | -     | 25.40       | -    |
| B    | 0.339      | 0.370 | 8.60        | 9.40 |
| C    | 0.048      | 0.052 | 1.20        | 1.40 |
| D    | 0.340      | 0.360 | 8.60        | 9.10 |

| Part Number | Case Type | Quantity | Packing Option |
|-------------|-----------|----------|----------------|
| 5KPXXCA/A   | R6/P600   | 300      | Box            |

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