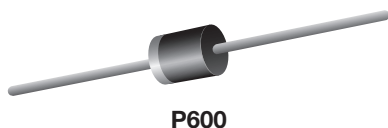


# TRANSZORB® Transient Voltage Suppressors



## FEATURES

- P600 glass passivated chip junction
- Available in unidirectional polarity only
- 5000 W peak pulse power capability with a 10/1000  $\mu$ s waveform, repetitive rate (duty cycle): 0.01 %
- Excellent clamping capability
- Very fast response time
- Low incremental surge resistance
- Solder dip 275 °C max. 10 s, per JESD 22-B106
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT

| PRIMARY CHARACTERISTICS |                |
|-------------------------|----------------|
| $V_{WM}$                | 8.5 V to 188 V |
| $V_{BR}$                | 9.4 V to 231 V |
| $P_{PPM}$               | 5000 W         |
| $P_D$                   | 8.0 W          |
| $I_{FSM}$               | 500 A          |
| $T_J$ max.              | 175 °C         |
| Polarity                | Unidirectional |
| Package                 | P600           |

## TYPICAL APPLICATIONS

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lightning on ICs, MOSFET, signal lines of sensor units for consumer, computer, industrial, automotive, and telecommunication.

## MECHANICAL DATA

**Case:** P600, molded epoxy body over passivated junction  
Molding compound meets UL 94 V-0 flammability rating  
Base P/N-E3 - RoHS compliant, commercial grade  
Base P/NHE3\_X - RoHS compliant, AEC-Q101 qualified  
(\_X denotes revision code e.g. A, B,...)

**Terminals:** matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

E3 suffix meets JESD 201 class 1A whisker test, HE3 suffix meets JESD 201 class 2 whisker test

**Polarity:** color band denotes cathode end

| MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)                     |                |                |      |
|-----------------------------------------------------------------------------|----------------|----------------|------|
| PARAMETER                                                                   | SYMBOL         | LIMIT          | UNIT |
| Peak pulse power dissipation with a 10/1000 $\mu$ s waveform <sup>(1)</sup> | $P_{PPM}$      | 5000           | W    |
| Peak pulse current with a 10/1000 $\mu$ s waveform <sup>(1)</sup>           | $I_{PPM}$      | See next table | A    |
| Power dissipation on infinite heatsink at $T_L = 75$ °C (fig. 5)            | $P_D$          | 8.0            | W    |
| Peak forward surge current 8.3 ms single half sine-wave (fig. 5)            | $I_{FSM}$      | 500            | A    |
| Instantaneous forward voltage at 100 A <sup>(2)</sup>                       | $V_F$          | 3.5            | V    |
| Operating junction and storage temperature range                            | $T_J, T_{STG}$ | -55 to +175    | °C   |

### Notes

<sup>(1)</sup> Non-repetitive current pulse, per fig. 3 and derated above  $T_A = 25$  °C per fig. 2

<sup>(2)</sup> Measured 8.3 ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum

**ELECTRICAL CHARACTERISTICS (JEDEC REGISTERED DATA)** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)

| DEVICE TYPE | BREAKDOWN VOLTAGE $V_{BR}$ AT $I_T$ <sup>(1)</sup> (V) |      | TEST CURRENT $I_T$ (mA) | STAND-OFF VOLTAGE $V_{WM}$ (V) | MAXIMUM REVERSE LEAKAGE AT $V_{WM}$ $I_D$ ( $\mu\text{A}$ ) | MAXIMUM PEAK PULSE CURRENT $I_{PPM}$ <sup>(2)</sup> (A) | MAXIMUM CLAMPING VOLTAGE AT $I_{PPM}$ $V_C$ (V) | MAXIMUM TEMP. COEFFICIENT OF $V_{BR}$ ( $\%/^{\circ}\text{C}$ ) |
|-------------|--------------------------------------------------------|------|-------------------------|--------------------------------|-------------------------------------------------------------|---------------------------------------------------------|-------------------------------------------------|-----------------------------------------------------------------|
|             | MIN.                                                   | MAX. |                         |                                |                                                             |                                                         |                                                 |                                                                 |
| 5KP8.5A     | 9.44                                                   | 10.4 | 5.0                     | 8.5                            | 50                                                          | 347                                                     | 14.4                                            | 0.078                                                           |
| 5KP9.0A     | 10.0                                                   | 11.1 | 5.0                     | 9.0                            | 20                                                          | 325                                                     | 15.4                                            | 0.081                                                           |
| 5KP10A      | 11.1                                                   | 12.3 | 5.0                     | 10.0                           | 15                                                          | 294                                                     | 17.0                                            | 0.084                                                           |
| 5KP11A      | 12.2                                                   | 13.5 | 5.0                     | 11.0                           | 10                                                          | 275                                                     | 18.2                                            | 0.086                                                           |
| 5KP12A      | 13.3                                                   | 14.7 | 5.0                     | 12.0                           | 5.0                                                         | 251                                                     | 19.9                                            | 0.088                                                           |
| 5KP13A      | 14.4                                                   | 15.9 | 5.0                     | 13.0                           | 2.0                                                         | 233                                                     | 21.5                                            | 0.090                                                           |
| 5KP14A      | 15.6                                                   | 17.2 | 5.0                     | 14.0                           | 2.0                                                         | 216                                                     | 23.2                                            | 0.092                                                           |
| 5KP15A      | 16.7                                                   | 18.5 | 5.0                     | 15.0                           | 2.0                                                         | 205                                                     | 24.4                                            | 0.094                                                           |
| 5KP16A      | 17.8                                                   | 19.7 | 5.0                     | 16.0                           | 2.0                                                         | 192                                                     | 26.0                                            | 0.096                                                           |
| 5KP17A      | 18.9                                                   | 20.9 | 5.0                     | 17.0                           | 2.0                                                         | 181                                                     | 27.6                                            | 0.097                                                           |
| 5KP18A      | 20.0                                                   | 22.1 | 5.0                     | 18.0                           | 2.0                                                         | 171                                                     | 29.2                                            | 0.098                                                           |
| 5KP20A      | 22.2                                                   | 24.5 | 5.0                     | 20.0                           | 2.0                                                         | 154                                                     | 32.4                                            | 0.099                                                           |
| 5KP22A      | 24.4                                                   | 26.9 | 5.0                     | 22.0                           | 2.0                                                         | 141                                                     | 35.5                                            | 0.100                                                           |
| 5KP24A      | 26.7                                                   | 29.5 | 5.0                     | 24.0                           | 2.0                                                         | 129                                                     | 38.9                                            | 0.101                                                           |
| 5KP26A      | 28.9                                                   | 31.9 | 5.0                     | 26.0                           | 2.0                                                         | 119                                                     | 42.1                                            | 0.101                                                           |
| 5KP28A      | 31.1                                                   | 34.4 | 5.0                     | 28.0                           | 2.0                                                         | 110                                                     | 45.4                                            | 0.102                                                           |
| 5KP30A      | 33.3                                                   | 36.8 | 5.0                     | 30.0                           | 2.0                                                         | 103                                                     | 48.4                                            | 0.103                                                           |
| 5KP33A      | 36.7                                                   | 40.6 | 5.0                     | 33.0                           | 2.0                                                         | 93.8                                                    | 53.3                                            | 0.104                                                           |
| 5KP36A      | 40.0                                                   | 44.2 | 5.0                     | 36.0                           | 2.0                                                         | 86.1                                                    | 58.1                                            | 0.104                                                           |
| 5KP40A      | 44.4                                                   | 49.1 | 5.0                     | 40.0                           | 2.0                                                         | 77.5                                                    | 64.5                                            | 0.105                                                           |
| 5KP43A      | 47.8                                                   | 52.8 | 5.0                     | 43.0                           | 2.0                                                         | 72.0                                                    | 69.4                                            | 0.105                                                           |
| 5KP45A      | 50.0                                                   | 55.3 | 5.0                     | 45.0                           | 2.0                                                         | 68.8                                                    | 72.7                                            | 0.106                                                           |
| 5KP48A      | 53.3                                                   | 58.9 | 5.0                     | 48.0                           | 2.0                                                         | 64.6                                                    | 77.4                                            | 0.106                                                           |
| 5KP51A      | 56.7                                                   | 62.7 | 5.0                     | 51.0                           | 2.0                                                         | 60.7                                                    | 82.4                                            | 0.107                                                           |
| 5KP54A      | 60.0                                                   | 66.3 | 5.0                     | 54.0                           | 2.0                                                         | 57.4                                                    | 87.1                                            | 0.107                                                           |
| 5KP58A      | 64.4                                                   | 71.2 | 5.0                     | 58.0                           | 2.0                                                         | 53.4                                                    | 94                                              | 0.107                                                           |
| 5KP60A      | 66.7                                                   | 73.7 | 5.0                     | 60.0                           | 2.0                                                         | 51.7                                                    | 97.0                                            | 0.108                                                           |
| 5KP64A      | 71.1                                                   | 78.6 | 5.0                     | 64.0                           | 2.0                                                         | 48.5                                                    | 103                                             | 0.108                                                           |
| 5KP70A      | 77.8                                                   | 86.0 | 5.0                     | 70.0                           | 2.0                                                         | 44.2                                                    | 113                                             | 0.108                                                           |
| 5KP75A      | 83.3                                                   | 92.1 | 5.0                     | 75.0                           | 2.0                                                         | 41.3                                                    | 121                                             | 0.108                                                           |
| 5KP78A      | 86.7                                                   | 95.8 | 5.0                     | 78.0                           | 2.0                                                         | 39.7                                                    | 126                                             | 0.108                                                           |
| 5KP85A      | 94.4                                                   | 104  | 5.0                     | 85.0                           | 2.0                                                         | 36.5                                                    | 137                                             | 0.110                                                           |
| 5KP90A      | 100                                                    | 111  | 5.0                     | 90.0                           | 2.0                                                         | 34.2                                                    | 146                                             | 0.110                                                           |
| 5KP100A     | 111                                                    | 123  | 5.0                     | 100                            | 2.0                                                         | 30.9                                                    | 162                                             | 0.110                                                           |
| 5KP110A     | 122                                                    | 135  | 5.0                     | 110                            | 2.0                                                         | 28.2                                                    | 177                                             | 0.112                                                           |
| 5KP120A     | 133                                                    | 147  | 5.0                     | 120                            | 2.0                                                         | 25.9                                                    | 193                                             | 0.112                                                           |
| 5KP130A     | 144                                                    | 159  | 5.0                     | 130                            | 2.0                                                         | 23.9                                                    | 209                                             | 0.112                                                           |
| 5KP150A     | 167                                                    | 185  | 5.0                     | 150                            | 2.0                                                         | 20.6                                                    | 243                                             | 0.112                                                           |
| 5KP160A     | 178                                                    | 197  | 5.0                     | 160                            | 2.0                                                         | 19.3                                                    | 259                                             | 0.112                                                           |
| 5KP170A     | 189                                                    | 209  | 5.0                     | 170                            | 2.0                                                         | 18.2                                                    | 275                                             | 0.112                                                           |
| 5KP188A     | 209                                                    | 231  | 5.0                     | 188                            | 2.0                                                         | 15.2                                                    | 328                                             | 0.112                                                           |

**Notes**

- (1) Pulse test:  $t_p \leq 50\text{ ms}$   
(2) Surge current waveform per fig. 3 and derate per fig. 2  
(3) All terms and symbols are consistent with ANSI/IEEE CA62.35

**ORDERING INFORMATION** (Example)

| PREFERRED P/N                 | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                    |
|-------------------------------|-----------------|------------------------|---------------|----------------------------------|
| 5KP8.5A-E3/54                 | 2.776           | 54                     | 800           | 13" diameter paper tape and reel |
| 5KP8.5AHE3_A/C <sup>(1)</sup> | 2.776           | C                      | 800           | 13" diameter paper tape and reel |

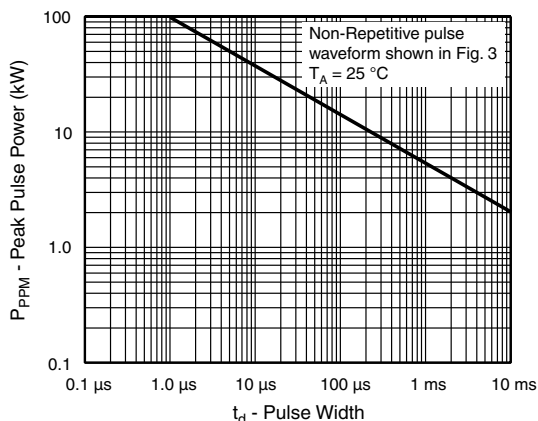
**Note**<sup>(1)</sup> AEC-Q101 qualified**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Fig. 1 - Peak Pulse Power Rating Curve



Fig. 3 - Pulse Waveform

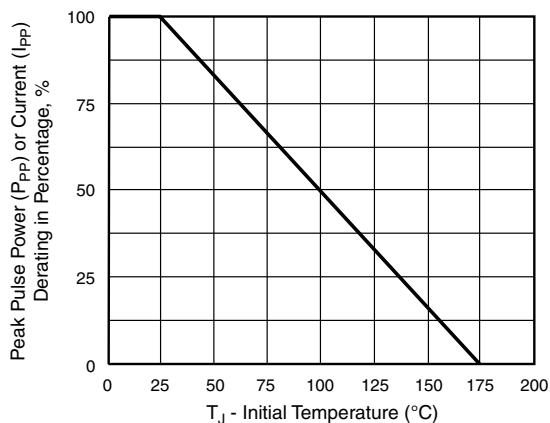


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

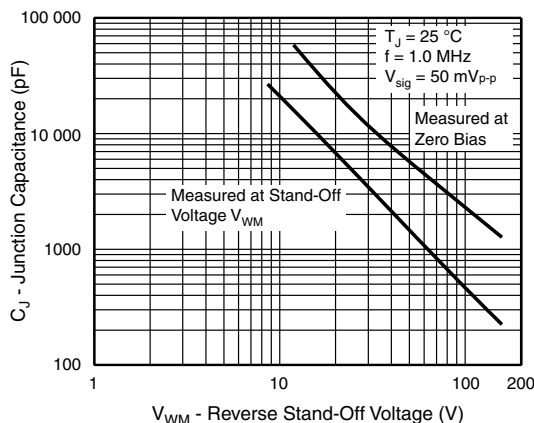


Fig. 4 - Typical Junction Capacitance

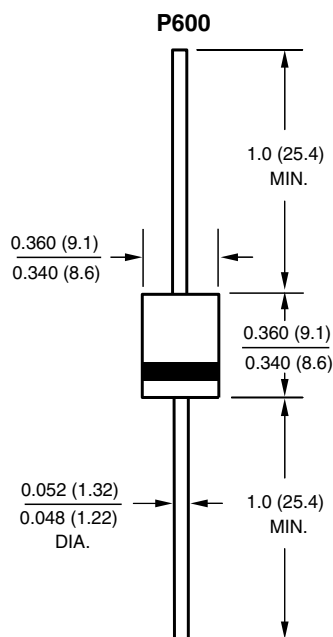


Fig. 5 - Power Derating Curve



Fig. 6 - Maximum Non-Repetitive Forward Surge Current

### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)



### APPLICATION NOTES

The 5KP series of high power transient voltage suppressors were designed to be used on the output of switching power supplies. These devices may be used to replace crowbar circuits.

They are able to withstand high levels of peak current while allowing a circuit breaker to trip or a fuse blow before

shorting. This will enable the user to reset the breaker or replace the fuse and continue operation. For this type operation, it is recommended that a sufficient mounting surface be used for dissipating the heat generated by the Transient Voltage Suppressor during the transient or over-voltage condition.



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