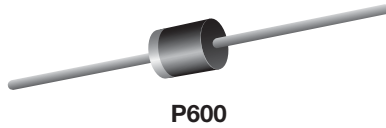




**THE DATASHEET OF
5KP20A-E3/54**



TRANSZORB® Transient Voltage Suppressors



FEATURES

- P600 glass passivated chip junction
- Available in uni-directional polarity only
- 5000 W peak pulse power capability with a 10/1000 μ 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



RoHS
COMPLIANT

TYPICAL APPLICATIONS

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

MECHANICAL DATA

Case: 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 - RoHS compliant, AEC-Q101 qualified

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

| PRIMARY CHARACTERISTICS | |
|-------------------------|-----------------|
| V_{WM} | 5.0 V to 188 V |
| V_{BR} | 6.4 V to 231 V |
| P_{PPM} | 5000 W |
| P_D | 8.0 W |
| I_{FSM} | 500 A |
| T_J max. | 175 °C |
| Polarity | Uni-directional |
| Package | P600 |

| MAXIMUM RATINGS ($T_A = 25$ °C unless otherwise noted) | | | |
|---|----------------|----------------|------|
| PARAMETER | SYMBOL | LIMIT | UNIT |
| Peak pulse power dissipation with a 10/1000 μ s waveform ⁽¹⁾ | P_{PPM} | 5000 | W |
| Peak pulse current with a 10/1000 μ s waveform ⁽¹⁾ | 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} | 600 | A |
| Instantaneous forward voltage at 100 A ⁽²⁾ | V_F | 3.5 | V |
| Operating junction and storage temperature range | T_J, T_{STG} | - 55 to + 175 | °C |

Notes

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

⁽²⁾ 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 ⁽¹⁾ (V) | | TEST CURRENT I_T (mA) | STAND-OFF VOLTAGE V_{WM} (V) | MAXIMUM REVERSE LEAKAGE AT V_{WM} I_D (μA) | MAXIMUM PEAK PULSE CURRENT I_{PPM} ⁽²⁾ (A) | MAXIMUM CLAMPING VOLTAGE AT I_{PPM} V_C (V) | MAXIMUM TEMP. COEFFICIENT OF V_{BR} (%/ $^\circ\text{C}$) |
| | MIN. | MAX. | | | | | | |
| 5KP5.0A | 6.4 | 7.00 | 50 | 5.0 | 2000 | 543 | 9.20 | 0.057 |
| 5KP6.0A | 6.67 | 7.37 | 50 | 6.0 | 5000 | 485 | 10.3 | 0.061 |
| 5KP6.5A | 7.22 | 7.98 | 50 | 6.5 | 2000 | 446 | 11.2 | 0.065 |
| 5KP7.0A | 7.78 | 8.60 | 50 | 7.0 | 1000 | 417 | 12.0 | 0.068 |
| 5KP7.5A | 8.33 | 9.21 | 5.0 | 7.5 | 250 | 388 | 12.9 | 0.073 |
| 5KP8.0A | 8.89 | 9.83 | 5.0 | 8.0 | 150 | 368 | 13.6 | 0.075 |
| 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 |
| 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 |
| 5KP5.0A-E3/54 | 2.776 | 54 | 800 | 13" diameter paper tape and reel |
| 5KP5.0AHE3/54 (1) | 2.776 | 54 | 800 | 13" diameter paper tape and reel |

Note

(1) AEC-Q101 qualified

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

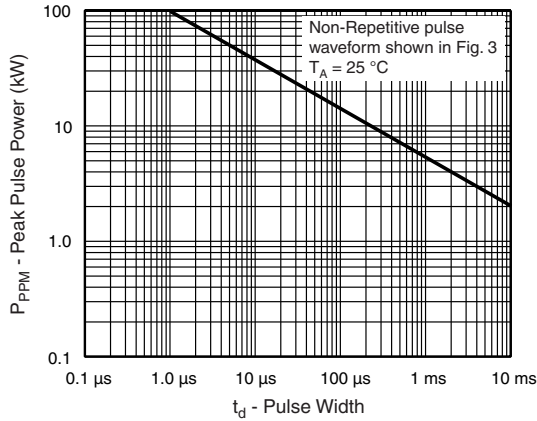


Fig. 1 - Peak Pulse Power Rating Curve

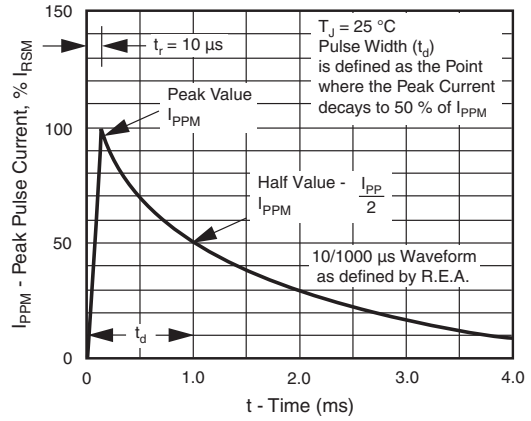


Fig. 3 - Pulse Waveform

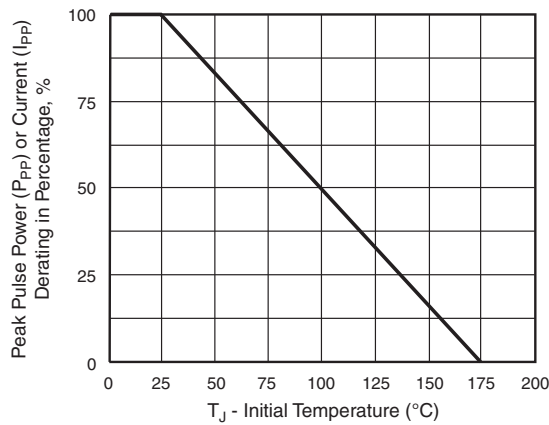


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

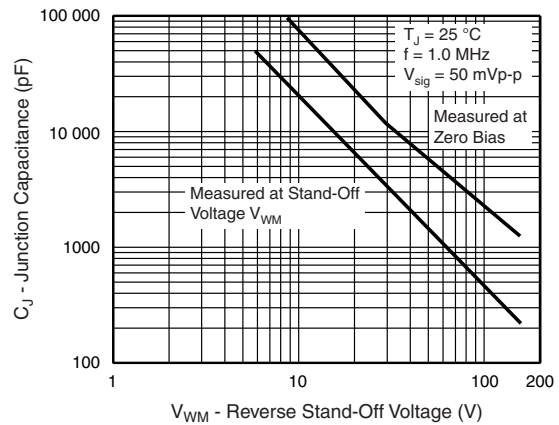


Fig. 4 - Typical Junction Capacitance



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. Both the 5 % and 10 % voltage tolerances are referenced to the power supply output voltage level.

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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