



**THE DATASHEET OF
SMP20-E3/85A**



Surface Mount TRANSZORB® Transient Voltage Suppressors

eSMP® Series

SMP (DO-220AA)

Anode Cathode


RoHS
COMPLIANT
HALOGEN
FREE
FEATURES

- Very low profile - typical height of 1.0 mm
- Ideal for automated placement
- Available in unidirectional
- 400 W peak pulse power capability with a 10/1000 μ s waveform
- Excellent clamping capability
- Very fast response time
- Low incremental surge resistance
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

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, and telecommunication.

MECHANICAL DATA
Case: SMP (DO-220AA)

Molding compound meets UL 94 V-0 flammability rating
Base P/N-M3 - halogen-free, RoHS-compliant, and industrial grade

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

M3 suffix meets JESD 201 class 2 whisker test

Polarity: color band denotes cathode end

LINKS TO ADDITIONAL RESOURCES


| PRIMARY CHARACTERISTICS | |
|--------------------------|------------------|
| V_{BR} uni-directional | 4.10 V to 44.2 V |
| V_{WM} | 3.3 V to 36 V |
| P_{PPM} | 400 W |
| I_{FSM} | 40 A |
| T_J max. | 150 °C |
| Polarity | Unidirectional |
| Package | SMP (DO-220AA) |

| MAXIMUM RATINGS ($T_A = 25$ °C unless otherwise noted) | | | |
|---|----------------|---------------------|------|
| PARAMETER | SYMBOL | VALUE | UNIT |
| Peak pulse power dissipation with a 10/1000 μ s waveform (fig. 1) ⁽¹⁾⁽²⁾ | P_{PPM} | 400 | W |
| Peak pulse current with a 10/1000 μ s waveform ⁽¹⁾ | I_{PPM} | See table next page | A |
| Peak forward surge current 10 ms single half sine-wave ⁽²⁾ | I_{FSM} | 40 | A |
| Maximum instantaneous forward voltage at 25 A ⁽³⁾ | V_F | 2.5 | V |
| Operating junction and storage temperature range | T_J, T_{STG} | -55 to +150 | °C |

Notes

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

⁽²⁾ Mounted on 0.2" x 0.2" (5.0 mm x 5.0 mm) copper pads to each terminal

⁽³⁾ Pulse test: 300 μ s pulse width, 1 % duty cycle



| ELECTRICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) | | | | | | | | |
|---|---------------------|--|------|-------------------------|--------------------------------|--|---|---|
| DEVICE TYPE | DEVICE MARKING CODE | 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) ⁽³⁾ | MAXIMUM PEAK PULSE SURGE CURRENT I_{PPM} (A) ⁽²⁾ | MAXIMUM CLAMPING VOLTAGE AT I_{PPM} V_C (V) |
| | | MIN. | MAX. | | | | | |
| SMP3V3 | AC | 4.10 | 5.10 | 1.0 | 3.3 | 200 | 54.8 | 7.3 |
| SMP5.0A | AE | 6.40 | 7.07 | 10 | 5.0 | 150 | 43.5 | 9.2 |
| SMP6.0A | AG | 6.67 | 7.37 | 10 | 6.0 | 600 | 38.8 | 10.3 |
| SMP6.5A | AK | 7.22 | 7.98 | 10 | 6.5 | 100 | 35.7 | 11.2 |
| SMP7.0A | AM | 7.78 | 8.60 | 10 | 7.0 | 50 | 33.3 | 12.0 |
| SMP7.5A | AN | 8.33 | 9.21 | 1.0 | 7.5 | 50 | 31.0 | 12.9 |
| SMP8.0A | AR | 8.89 | 9.83 | 1.0 | 8.0 | 20 | 29.4 | 13.6 |
| SMP11A | AZ | 12.2 | 13.5 | 1.0 | 11 | 1.0 | 22.0 | 18.2 |
| SMP12A | BE | 13.3 | 14.7 | 1.0 | 12 | 1.0 | 20.1 | 19.9 |
| SMP13A | BG | 14.4 | 15.9 | 1.0 | 13 | 1.0 | 18.6 | 21.5 |
| SMP14A | BK | 15.6 | 17.2 | 1.0 | 14 | 1.0 | 17.2 | 23.2 |
| SMP15A | BM | 16.7 | 18.5 | 1.0 | 15 | 1.0 | 16.4 | 24.4 |
| SMP16A | BP | 17.8 | 19.7 | 1.0 | 16 | 1.0 | 15.4 | 26.0 |
| SMP17A | BR | 18.9 | 20.9 | 1.0 | 17 | 1.0 | 14.5 | 27.6 |
| SMP18A | BT | 20.0 | 22.1 | 1.0 | 18 | 1.0 | 13.7 | 29.2 |
| SMP20A | BV | 22.2 | 24.5 | 1.0 | 20 | 1.0 | 12.3 | 32.4 |
| SMP22A | BX | 24.4 | 26.9 | 1.0 | 22 | 1.0 | 11.3 | 35.5 |
| SMP24A | BZ | 26.7 | 29.5 | 1.0 | 24 | 1.0 | 10.3 | 38.9 |
| SMP26A | CE | 28.9 | 31.9 | 1.0 | 26 | 1.0 | 9.5 | 42.1 |
| SMP28A | CG | 31.1 | 34.4 | 1.0 | 28 | 1.0 | 8.8 | 45.4 |
| SMP30A | CK | 33.3 | 36.8 | 1.0 | 30 | 1.0 | 8.3 | 48.4 |
| SMP33A | CM | 36.7 | 40.6 | 1.0 | 33 | 1.0 | 7.5 | 53.3 |
| SMP36A | CP | 40.0 | 44.2 | 1.0 | 36 | 1.0 | 6.9 | 58.1 |

Notes

- (1) V_{BR} measured after I_T applied for 300 μs , I_T = square wave pulse or equivalent
(2) Surge current waveform per fig. 3 and derate per fig. 2
(3) All terms and symbols are consistent with ANSI/IEEE C62.35

| THERMAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) | | | |
|--|-----------------|-------|--------------------|
| PARAMETER | SYMBOL | LIMIT | UNIT |
| Typical thermal resistance, junction to lead ⁽¹⁾ | $R_{\theta JL}$ | 50 | $^\circ\text{C/W}$ |
| Typical thermal resistance, junction to ambient ⁽²⁾ | $R_{\theta JA}$ | 250 | $^\circ\text{C/W}$ |

Notes

- (1) Mounted on PCB with 5.0 mm x 5.0 mm copper pad areas attached to each terminal
(2) Mounted on minimum recommended pad layout

| ORDERING INFORMATION (Example) | | | | |
|--------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
| SMP3V3-M3/84A | 0.024 | 84A | 3000 | 7" diameter plastic tape and reel |
| SMP3V3-M3/85A | 0.024 | 85A | 10 000 | 13" diameter plastic tape and reel |
| SMP11A-M3/84A | 0.024 | 84A | 3000 | 7" diameter plastic tape and reel |
| SMP11A-M3/85A | 0.024 | 85A | 10 000 | 13" diameter plastic tape and reel |



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



Fig. 1 - Peak Pulse Power Rating Curve



Fig. 4 - Typical Junction Capacitance



Fig. 2 - Pulse Derating Curve

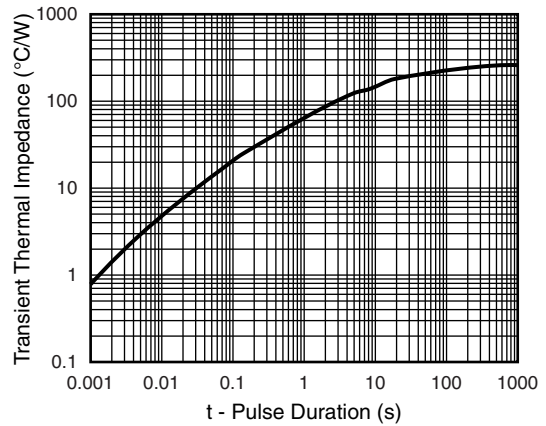


Fig. 5 - Typical Transient Thermal Impedance



Fig. 3 - Pulse Waveform



PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

SMP (DO-220AA)





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