# High Current Density Surface Mount Ultrafast Rectifiers

**eSMP® Series**

**SMP (DO-220AA)**

Cathode ○—▶—○ Anode

## LINKS TO ADDITIONAL RESOURCES

3D Models

| PRIMARY CHARACTERISTICS | |
|---|---|
| $I_{F(AV)}$ | 1.0 A |
| $V_{RRM}$ | 100 V, 150 V, 200 V |
| $t_{rr}$ | 15 ns |
| $V_F$ at $I_F$ | 0.92 V |
| $T_J$ max. | 150 °C |
| Package | SMP (DO-220AA) |
| Circuit configuration | Single |

## FEATURES

AUTOMOTIVE GRADE Available

RoHS COMPLIANT HALOGEN FREE

- Very low profile - typical height of 1.0 mm
- Ideal for automated placement
- Glass passivated pellet chip junction
- Ultrafast recovery times for high efficiency
- Low forward voltage, low power losses
- Low thermal resistance
- Meets MSL level 1 per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

## TYPICAL APPLICATIONS

For use in secondary rectification and freewheeling for ultrafast switching speeds of AC/DC and DC/DC converters for both consumer and automotive applications.

## MECHANICAL DATA

**Case:** SMP (DO-220AA)
Molding compound meets UL 94 V-0 flammability rating
Base P/N-M3 - halogen-free, RoHS-compliant, and commercial grade
Base P/NHM3 - halogen-free, RoHS-compliant, and automotive grade

**Terminals:** matte tin plated leads, solderable per J-STD-002 and JESD 22-B102
M3 suffix meets JESD 201 class 2 whisker test, HM3 suffix meets JESD 201 class 2 whisker test

**Polarity:** color band denotes the cathode end

**MAXIMUM RATINGS** ($T_A$ = 25 °C unless otherwise noted)

| PARAMETER | SYMBOL | ES1PB | ES1PC | ES1PD | UNIT |
|---|---|---|---|---|---|
| Device marking code | | EB | EC | ED | |
| Maximum repetitive peak reverse voltage | $V_{RRM}$ | 100 | 150 | 200 | V |
| Maximum average forward rectified current (fig. 1) | $I_{F(AV)}$ | 1.0 | | | A |
| Peak forward surge current 10 ms single half sine-wave superimposed on rated load | $I_{FSM}$ | 30 | | | A |
| Operating junction and storage temperature range | $T_J$, $T_{STG}$ | -55 to +150 | | | °C |


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| ELECTRICAL CHARACTERISTICS ($T_A$ = 25 °C unless otherwise noted) | | | | | |
|---|---|---|---|---|---|
| PARAMETER | TEST CONDITIONS | | SYMBOL | VALUE | UNIT |
| Maximum instantaneous forward voltage | $I_F$ = 0.6 A | $T_J$ = 25 °C | $V_F$ (1) | 0.865 | V |
| | $I_F$ = 1 A | | | 0.920 | |
| Maximum reverse current at rated $V_R$ | | $T_J$ = 25 °C | $I_R$ (2) | 5.0 | μA |
| | | $T_J$ = 125 °C | | 500 | |
| Maximum reverse recovery time | $I_F$ = 0.5 A, $I_R$ = 1 A, $I_{rr}$ = 0.25 A | | $t_{rr}$ | 15 | ns |
| Typical reverse recovery time | $I_F$ = 1.0 A, $V_R$ = 30 V, dI/dt = 50 A/μs, $I_{rr}$ = 10 % $I_{RM}$ | $T_J$ = 25 °C | $t_{rr}$ | 25 | ns |
| | | $T_J$ = 100 °C | | 30 | |
| Typical stored charge | $I_F$ = 1.0 A, $V_R$ = 30 V, dI/dt = 50 A/μs, $I_{rr}$ = 10 % $I_{RM}$ | $T_J$ = 25 °C | $Q_{rr}$ | 8 | nC |
| | | $T_J$ = 100 °C | | 10 | |
| Typical junction capacitance | 4.0 V, 1 MHz | | $C_J$ | 10 | pF |

**Notes**

(1) Pulse test: 300 μs pulse width, 1 % duty cycle

(2) Pulse test: Pulse width ≤ 40 ms

| THERMAL CHARACTERISTICS ($T_A$ = 25 °C unless otherwise noted) | | | | | |
|---|---|---|---|---|---|
| PARAMETER | SYMBOL | ES1PB | ES1PC | ES1PD | UNIT |
| Typical thermal resistance | $R_{\theta JA}$ (1) | 105 | | | °C/W |
| | $R_{\theta JL}$ (1) | 15 | | | |
| | $R_{\theta JC}$ (1) | 20 | | | |

**Note**

(1) Thermal resistance from junction to ambient and junction to lead mounted on PCB with 5.0 mm x 5.0 mm copper pad areas. $R_{\theta JL}$ is measured at the terminal of cathode band. $R_{\theta JC}$ is measured at the top center of the body

| ORDERING INFORMATION (Example) | | | | |
|---|---|---|---|---|
| PREFERRED P/N | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
| ES1PB-M3/84A | 0.024 | 84A | 3000 | 7" diameter plastic tape and reel |
| ES1PB-M3/85A | 0.024 | 85A | 10 000 | 13" diameter plastic tape and reel |
| ES1PBHM3/84A (1) | 0.024 | 84A | 3000 | 7" diameter plastic tape and reel |
| ES1PBHM3/85A (1) | 0.024 | 85A | 10 000 | 13" diameter plastic tape and reel |

**Note**

(1) Automotive grade


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**RATINGS AND CHARACTERISTICS CURVES** ($T_A$ = 25 °C unless otherwise noted)

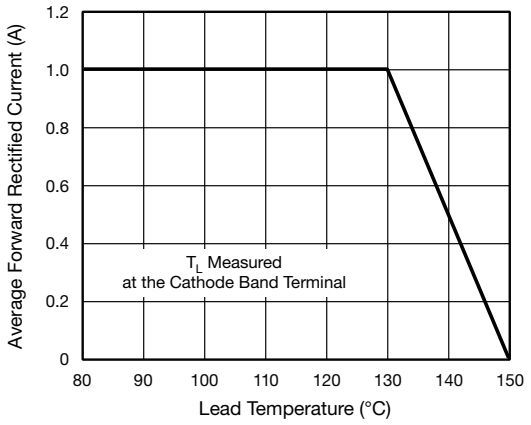


Fig. 1 - Maximum Forward Current Derating Curve

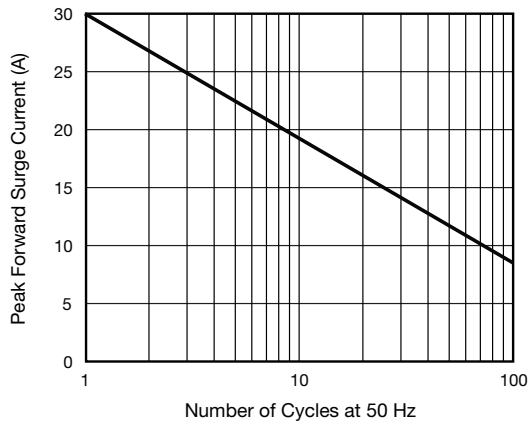


Fig. 2 - Maximum Non-Repetitive Peak Forward Surge Current

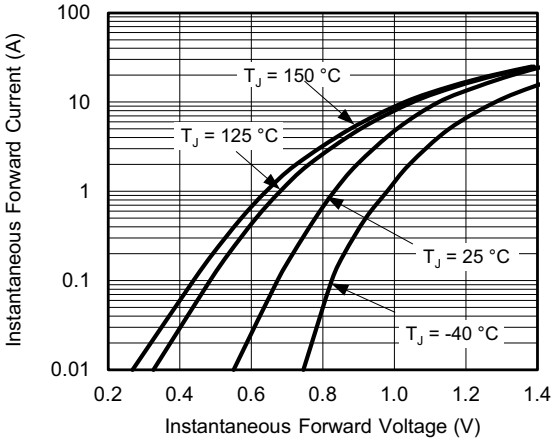


Fig. 3 - Typical Instantaneous Forward Characteristics

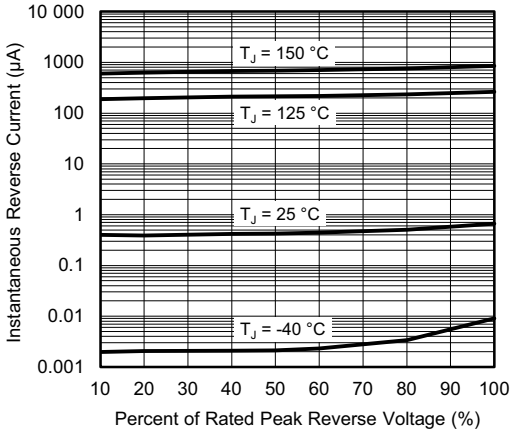


Fig. 4 - Typical Reverse Leakage Characteristics

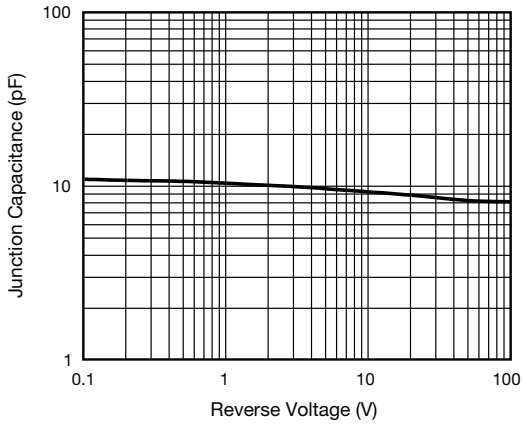


Fig. 5 - Typical Junction Capacitance

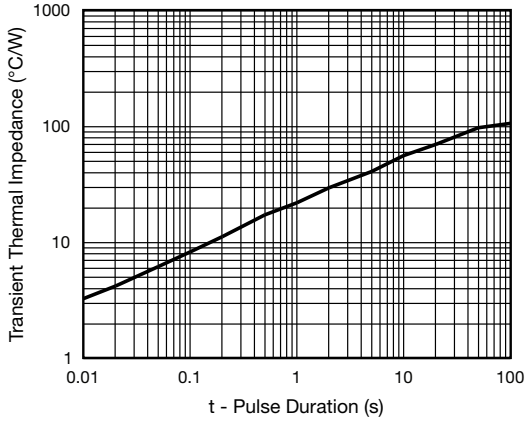


Fig. 6 - Typical Transient Thermal Impedance


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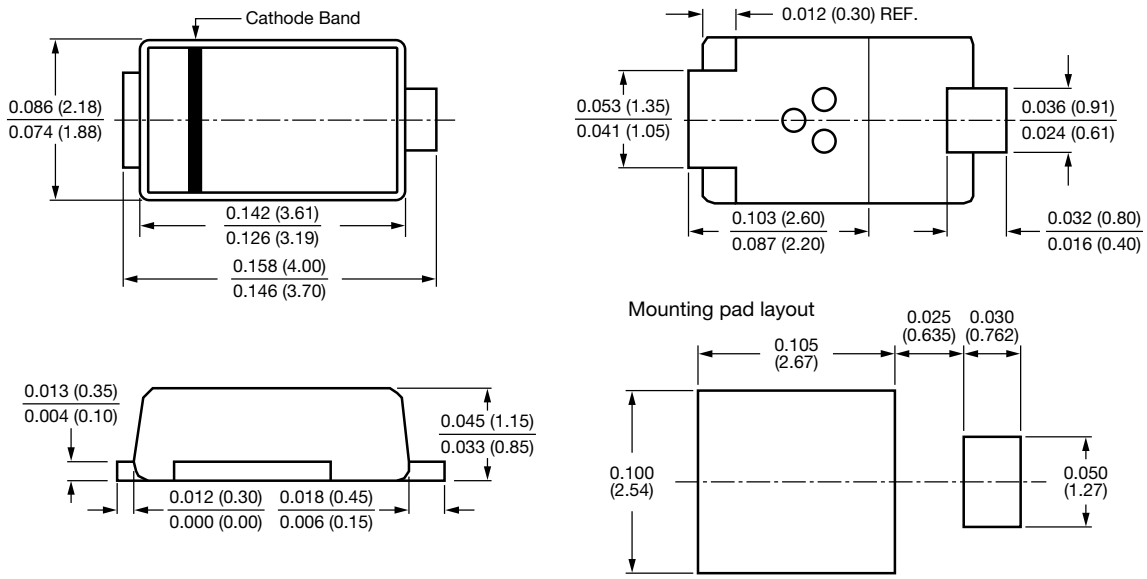
**PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)

**SMP (DO-220AA)**





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