

# High Current Density Surface Mount Ultrafast Rectifiers

## eSMP® Series



**SMP (DO-220AA)**

Cathode  Anode

## LINKS TO ADDITIONAL RESOURCES



## FEATURES

- 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](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## 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.

## 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              |

## 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 ( $T_A = 25\text{ °C}$ 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   |

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

| PARAMETER                              | TEST CONDITIONS  | SYMBOL                              | VALUE | UNIT          |
|--|--|-------------------------------------|-------|---------------|
| Maximum instantaneous forward voltage  | $I_F = 0.6\text{ A}$   | $V_F^{(1)}$                         | 0.865 | V             |
|  | $I_F = 1\text{ A}$   |                                     | 0.920 |               |
| Maximum reverse current at rated $V_R$ |  | $I_R^{(2)}$                         | 5.0   | $\mu\text{A}$ |
|  |  |                                     | 500   |               |
| Maximum reverse recovery time          | $I_F = 0.5\text{ A}$ , $I_R = 1\text{ A}$ , $I_{rr} = 0.25\text{ A}$                                       | $t_{rr}$                            | 15    | ns            |
| Typical reverse recovery time          | $I_F = 1.0\text{ A}$ , $V_R = 30\text{ V}$ ,<br>$dI/dt = 50\text{ A}/\mu\text{s}$ , $I_{rr} = 10\% I_{RM}$ | $T_J = 25\text{ }^{\circ}\text{C}$  | 25    | ns            |
|  |  | $T_J = 100\text{ }^{\circ}\text{C}$ | 30    |               |
| Typical stored charge                  | $I_F = 1.0\text{ A}$ , $V_R = 30\text{ V}$ ,<br>$dI/dt = 50\text{ A}/\mu\text{s}$ , $I_{rr} = 10\% I_{RM}$ | $T_J = 25\text{ }^{\circ}\text{C}$  | 8     | nC            |
|  |  | $T_J = 100\text{ }^{\circ}\text{C}$ | 10    |               |
| Typical junction capacitance           | 4.0 V, 1 MHz   | $C_J$                               | 10    | pF            |

**Notes**(1) Pulse test: 300  $\mu\text{s}$  pulse width, 1 % duty cycle(2) Pulse test: Pulse width  $\leq 40\text{ ms}$ **THERMAL CHARACTERISTICS** ( $T_A = 25\text{ }^{\circ}\text{C}$  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 <sup>(1)</sup> | 0.024           | 84A                    | 3000          | 7" diameter plastic tape and reel  |
| ES1PBHM3/85A <sup>(1)</sup> | 0.024           | 85A                    | 10 000        | 13" diameter plastic tape and reel |

**Note**

(1) Automotive grade

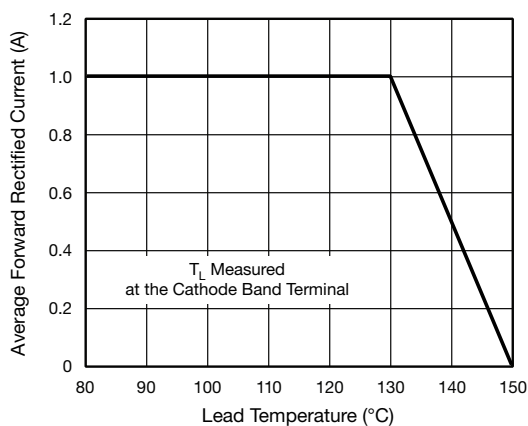
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Maximum Forward Current Derating Curve

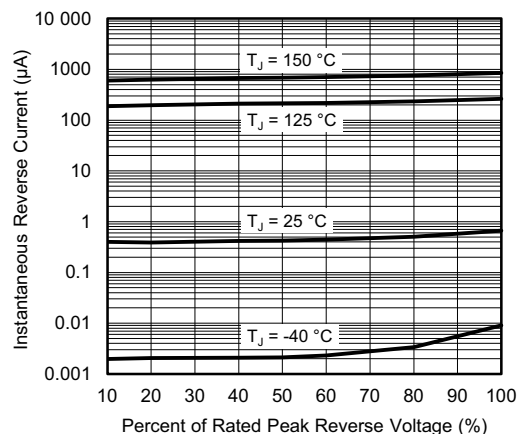


Fig. 4 - Typical Reverse Leakage Characteristics

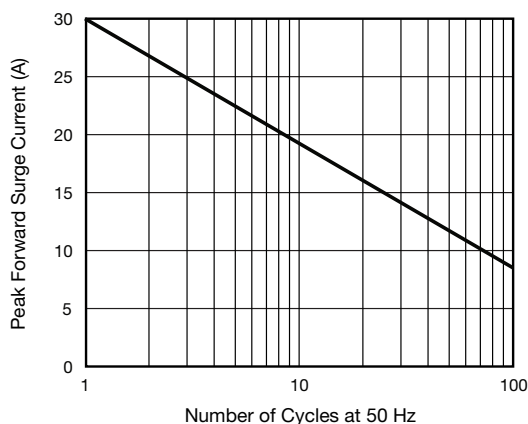


Fig. 2 - Maximum Non-Repetitive Peak Forward Surge Current

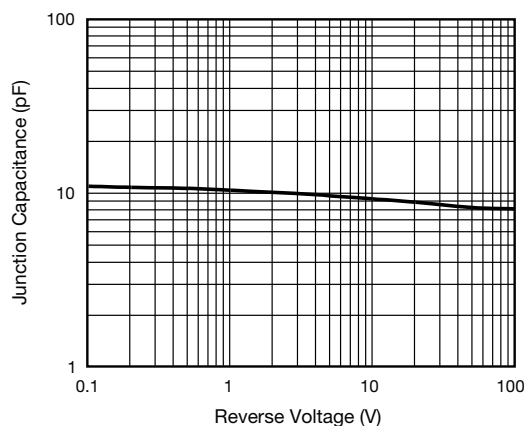


Fig. 5 - Typical Junction Capacitance

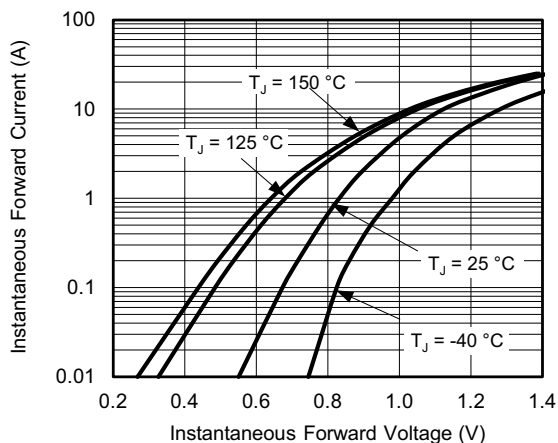


Fig. 3 - Typical Instantaneous Forward Characteristics

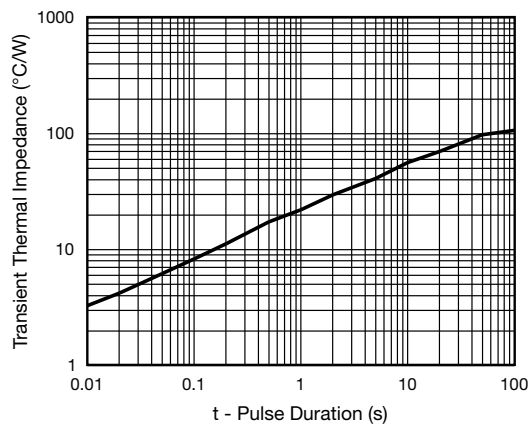
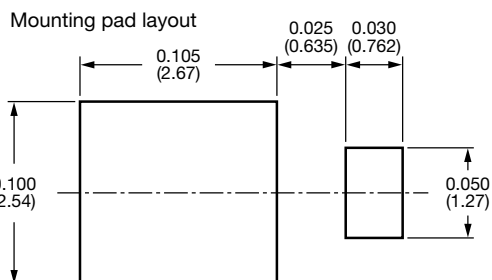
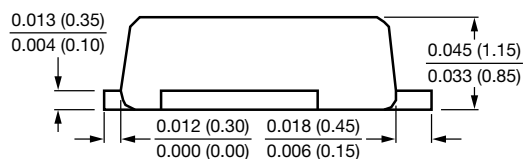
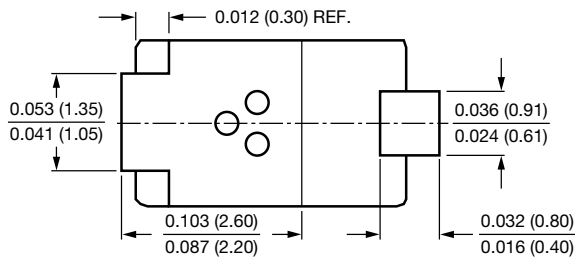
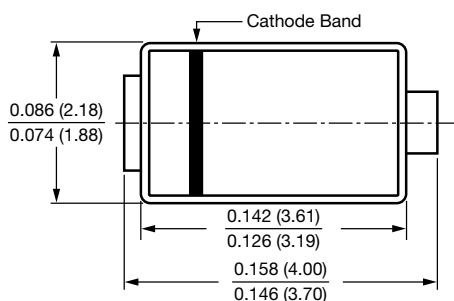


Fig. 6 - Typical Transient Thermal Impedance



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

**SMP (DO-220AA)**





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