

# High Current Density Surface Mount Ultrafast Rectifiers

eSMP® Series



DO-220AA (SMP)



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

## FEATURES

- Very low profile - typical height of 1.0 mm
- Ideal for automated placement
- Glass passivated pallet chip junction
- Ultrafast recovery times for high frequency
- Low forward voltage drop, 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)

## TYPICAL APPLICATIONS

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

## MECHANICAL DATA

**Case:** DO-220AA (SMP)

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

| PRIMARY CHARACTERISTICS |                     |
|-------------------------|---------------------|
| $I_{F(AV)}$             | 2.0 A               |
| $V_{RRM}$               | 100 V, 150 V, 200 V |
| $t_{rr}$                | 25 ns               |
| $V_F$ at $I_F = 2$ A    | 0.75 V              |
| $T_J$ max.              | 175 °C              |
| Package                 | DO-220AA (SMP)      |
| Diode variations        | Single die          |

| MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)                           |                |             |        |        |      |
|-----------------------------------------------------------------------------------|----------------|-------------|--------|--------|------|
| PARAMETER                                                                         | SYMBOL         | ESH2PB      | ESH2PC | ESH2PD | UNIT |
| Device marking code                                                               |                | P2B         | P2C    | P2D    |      |
| Maximum repetitive peak reverse voltage                                           | $V_{RRM}$      | 100         | 150    | 200    | V    |
| Maximum average forward rectified current (fig. 1)                                | $I_{F(AV)}$    | 2.0         |        |        | A    |
| Peak forward surge current 10 ms single half sine-wave superimposed on rated load | $I_{FSM}$      | 50          |        |        | A    |
| Operating junction and storage temperature range                                  | $T_J, T_{STG}$ | -55 to +175 |        |        | °C   |



| ELECTRICAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted) |                                                                                                        |                         |                               |      |      |      |
|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-------------------------|-------------------------------|------|------|------|
| PARAMETER                                                                  | TEST CONDITIONS                                                                                        |                         | SYMBOL                        | TYP. | MAX. | UNIT |
| Maximum instantaneous forward voltage                                      | I <sub>F</sub> = 2 A                                                                                   | T <sub>J</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.90 | 0.98 | V    |
|                                                                            |                                                                                                        | T <sub>J</sub> = 125 °C |                               | 0.75 | 0.82 |      |
| Maximum reverse current at rated V <sub>R</sub>                            |                                                                                                        | T <sub>J</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | 0.2  | 1.0  | µA   |
|                                                                            |                                                                                                        | T <sub>J</sub> = 125 °C |                               | 12.6 | 25   |      |
| Maximum reverse recovery time                                              | I <sub>F</sub> = 0.5 A, I <sub>R</sub> = 1 A, I <sub>rr</sub> = 0.25 A                                 |                         | t <sub>rr</sub>               | -    | 25   | ns   |
| Typical reverse recovery time                                              | I <sub>F</sub> = 1.0 A, V <sub>R</sub> = 30 V, dI/dt = 50 A/µs, I <sub>rr</sub> = 10 % I <sub>RM</sub> | T <sub>J</sub> = 25 °C  | t <sub>rr</sub>               | 25   | -    | ns   |
|                                                                            |                                                                                                        | T <sub>J</sub> = 100 °C |                               | 35   | -    |      |
| Typical stored charge                                                      | I <sub>F</sub> = 1.0 A, V <sub>R</sub> = 30 V, dI/dt = 50 A/µs, I <sub>rr</sub> = 10 % I <sub>RM</sub> | T <sub>J</sub> = 25 °C  | Q <sub>rr</sub>               | 10   | -    | nC   |
|                                                                            |                                                                                                        | T <sub>J</sub> = 100 °C |                               | 15   | -    |      |
| Typical junction capacitance                                               | 4.0 V, 1 MHz                                                                                           |                         | C <sub>J</sub>                | 25   | -    | 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 <sub>A</sub> = 25 °C unless otherwise noted) |                                 |        |        |        |      |
|-------------------------------------------------------------------------|---------------------------------|--------|--------|--------|------|
| PARAMETER                                                               | SYMBOL                          | ESH2PB | ESH2PC | ESH2PD | UNIT |
| Typical thermal resistance                                              | R <sub>θJA</sub> <sup>(1)</sup> | 80     |        |        | °C/W |
|                                                                         | R <sub>θJL</sub> <sup>(1)</sup> | 15     |        |        |      |
|                                                                         | R <sub>θJC</sub> <sup>(1)</sup> | 22     |        |        |      |

**Note**

- (1) Thermal resistance from junction to ambient and junction to lead mounted on PCB with 6.0 mm x 6.0 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                      |
| ESH2PB-M3/84A                  | 0.024           | 84A                    | 3000          | 7" diameter plastic tape and reel  |
| ESH2PB-M3/85A                  | 0.024           | 85A                    | 10 000        | 13" diameter plastic tape and reel |
| ESH2PBHM3/84A <sup>(1)</sup>   | 0.024           | 84A                    | 3000          | 7" diameter plastic tape and reel  |
| ESH2PBHM3/85A <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)

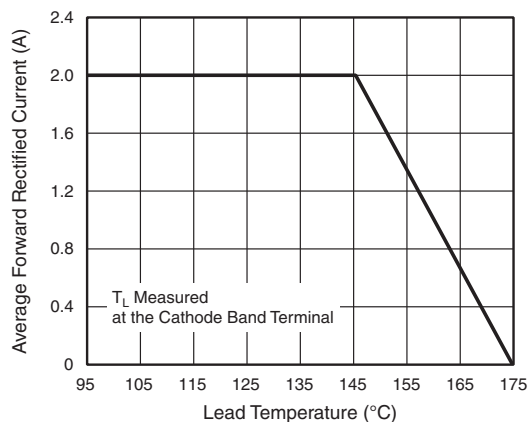


Fig. 1 - Maximum Forward Current Derating Curve

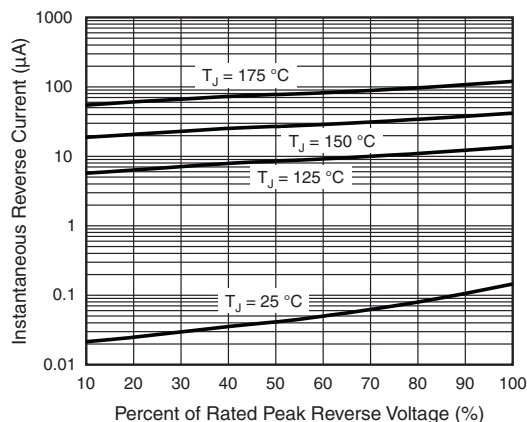


Fig. 4 - Typical Reverse Leakage Characteristics

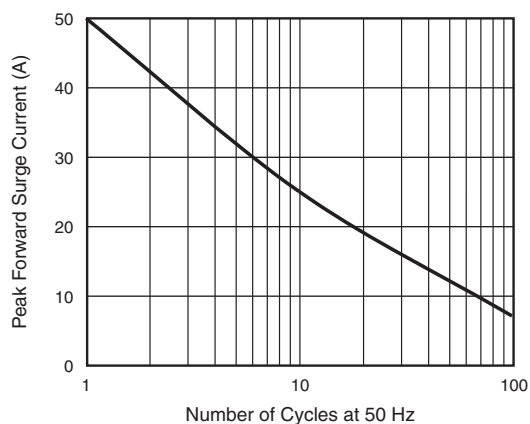


Fig. 2 - Maximum Non-Repetitive Peak Forward Surge Current

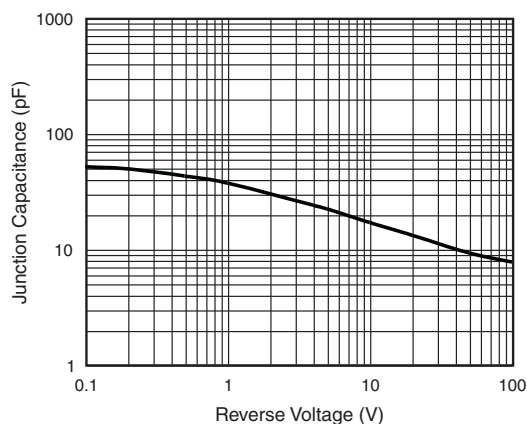


Fig. 5 - Typical Junction Capacitance

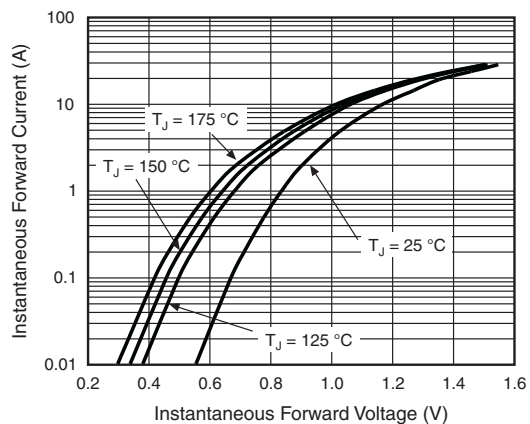
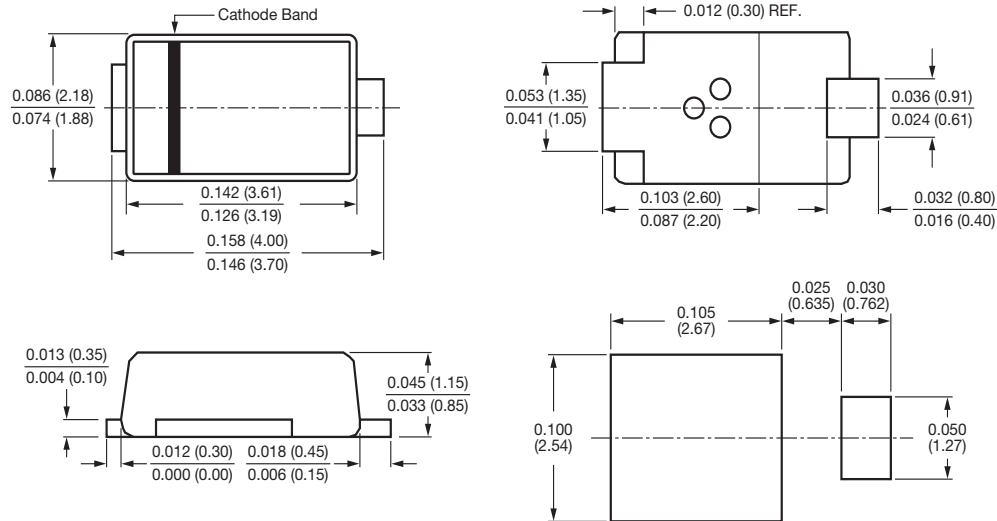


Fig. 3 - Typical Instantaneous Forward Characteristics



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

**DO-220AA (SMP)**





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