

## Surface Mount ESD Capability Rectifiers

### eSMP® Series



**DO-220AA (SMP)**

### FEATURES

- Very low profile - typical height of 1.0 mm
- Ideal for automated placement
- Oxide planar chip junction
- Low forward voltage drop
- Typical  $I_R$  less than 0.1  $\mu$ A
- ESD capability
- 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)

AUTOMOTIVE  
GRADE



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

### PRIMARY CHARACTERISTICS

|                        |                            |
|------------------------|----------------------------|
| $I_{F(AV)}$            | 1.5 A                      |
| $V_{RRM}$              | 100 V, 200 V, 400 V, 600 V |
| $I_R$                  | 5 $\mu$ A                  |
| $V_F$ at $I_F = 1.0$ A | 0.868 V                    |
| $T_J$ max.             | 175 °C                     |
| Package                | DO-220AA (SMP)             |
| Diode variations       | Single die                 |

### TYPICAL APPLICATIONS

General purpose, polarity protection, and rail-to-rail protection in 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 1A whisker test, HM3 suffix meets JESD 201 class 2 whisker test

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

| PARAMETER                                                                         | SYMBOL         | SE15PB        | SE15PD | SE15PG | SE15PJ | UNIT |
|-----------------------------------------------------------------------------------|----------------|---------------|--------|--------|--------|------|
| Device marking code                                                               |                | 15B           | 15D    | 15G    | 15J    |      |
| Max. repetitive peak reverse voltage                                              | $V_{RRM}$      | 100           | 200    | 400    | 600    | V    |
| Average forward current (fig. 1)                                                  | $I_{F(AV)}$    | 1.5           |        |        |        | 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 + 175 |        |        |        | °C   |

### ELECTRICAL CHARACTERISTICS ( $T_A = 25$ °C unless otherwise noted)

| PARAMETER                          | TEST CONDITIONS                                 | SYMBOL    | TYP.  | MAX. | UNIT    |
|------------------------------------|-------------------------------------------------|-----------|-------|------|---------|
| Max. instantaneous forward voltage | $I_F = 1.5$ A                                   | $V_F$ (1) | 0.968 | 1.05 | V       |
|                                    |                                                 |           | 0.868 | 0.95 |         |
| Max. reverse current               | Rated $V_R$                                     | $I_R$ (2) | -     | 5.0  | $\mu$ A |
|                                    |                                                 |           | 5.4   | 50   |         |
| Max. reverse recovery time         | $I_F = 0.5$ A, $I_R = 1.0$ A, $I_{rr} = 0.25$ A | $t_{rr}$  | 900   | -    | ns      |
| Typical junction capacitance       | 4.0 V, 1 MHz                                    | $C_J$     | 9.5   | -    | pF      |

#### Notes

(1) Pulse test: 300  $\mu$ s pulse width, 1 % duty cycle

(2) Pulse test: Pulse width  $\leq$  40 ms

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

| PARAMETER                  | SYMBOL                          | SE15PB | SE15PD | SE15PG | SE15PJ | UNIT |
|----------------------------|---------------------------------|--------|--------|--------|--------|------|
| Typical thermal resistance | R <sub>θJA</sub> <sup>(1)</sup> | 105    |        |        |        | °C/W |
|                            | R <sub>θJL</sub> <sup>(1)</sup> | 25     |        |        |        |      |
|                            | R <sub>θJC</sub> <sup>(1)</sup> | 30     |        |        |        |      |

**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.

**IMMUNITY TO ELECTRICAL STATIC DISCHARGE TO THE FOLLOWING STANDARDS**( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)

| STANDARD                     | TEST TYPE                                            | TEST CONDITIONS                                | SYMBOL | CLASS | VALUE   |
|------------------------------|------------------------------------------------------|------------------------------------------------|--------|-------|---------|
| AEC-Q101-001                 | Human body model (contact mode)                      | $C = 100\text{ pF}$ , $R = 1.5\text{ k}\Omega$ | $V_C$  | H3B   | > 8 kV  |
| AEC-Q101-002                 | Machine model (contact mode)                         | $C = 200\text{ pF}$ , $R = 0\text{ }\Omega$    |        | M4    | > 400 V |
| JESD22-A114                  | Human body model (contact mode)                      | $C = 100\text{ pF}$ , $R = 1.5\text{ k}\Omega$ |        | 3B    | > 8 kV  |
| JESD22-A115                  | Machine model (contact mode)                         | $C = 200\text{ pF}$ , $R = 0\text{ }\Omega$    |        | C     | > 400 V |
| IEC 61000-4-2 <sup>(2)</sup> | Human body model (contact mode)                      | $C = 150\text{ pF}$ , $R = 330\text{ }\Omega$  |        | 4     | > 8 kV  |
|                              | Human body model (air-discharge mode) <sup>(1)</sup> | $C = 150\text{ pF}$ , $R = 330\text{ }\Omega$  |        | 4     | > 15 kV |

**Notes**

(1) Immunity to IEC 61000-4-2 air discharge mode has a typical performance > 30 kV

(2) System ESD standard

**ORDERING INFORMATION** (Example)

| PREFERRED P/N                | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
|------------------------------|-----------------|------------------------|---------------|------------------------------------|
| SE15PJ-M3/84A                | 0.024           | 84A                    | 3000          | 7" diameter plastic tape and reel  |
| SE15PJ-M3/85A                | 0.024           | 85A                    | 10 000        | 13" diameter plastic tape and reel |
| SE15PJHM3/84A <sup>(1)</sup> | 0.024           | 84A                    | 3000          | 7" diameter plastic tape and reel  |
| SE15PJHM3/85A <sup>(1)</sup> | 0.024           | 85A                    | 10 000        | 13" diameter plastic tape and reel |

**Note**

(1) Automotive grade

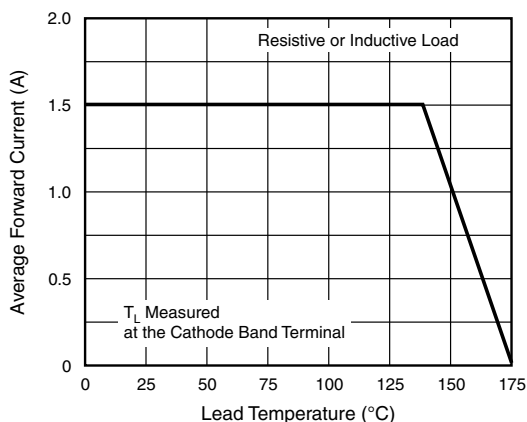
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)

Fig. 1 - Max. Forward Current Derating Curve

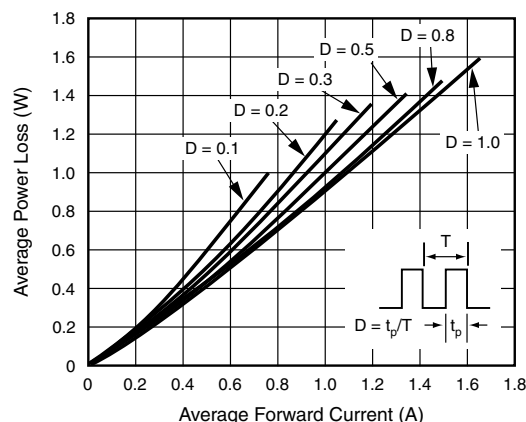


Fig. 2 - Forward Power Loss Characteristics

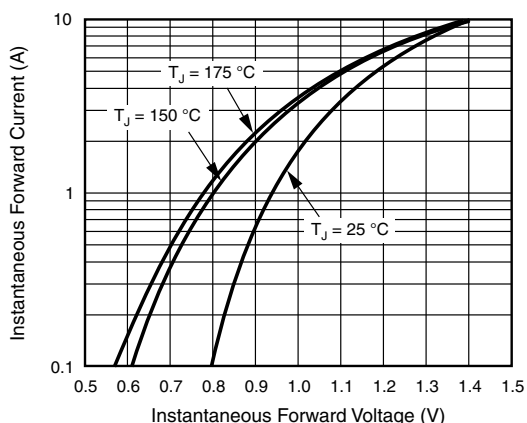


Fig. 3 - Forward Power Loss Characteristics

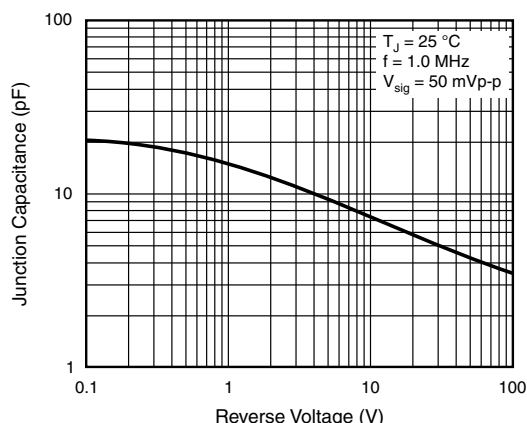


Fig. 5 - Typical Instantaneous Forward Characteristics

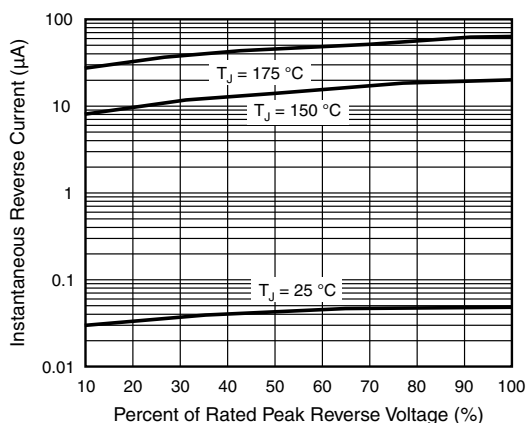
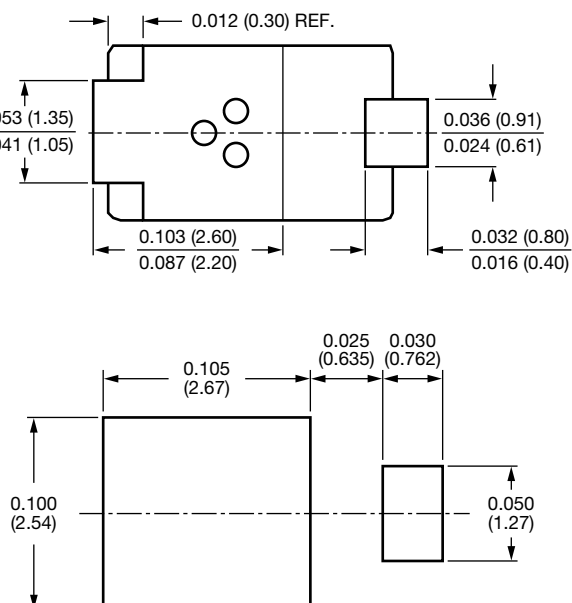
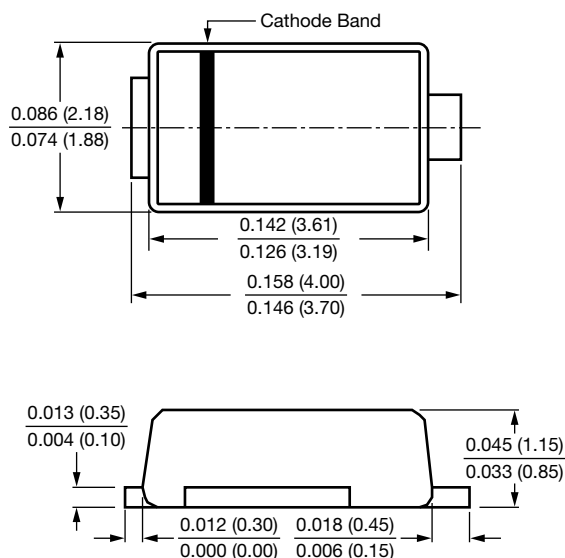


Fig. 4 - Typical Instantaneous Forward Characteristics

## PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

### DO-220AA (SMP)





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