

## Surface Mount ESD Capability Rectifiers

### eSMP® Series



**SMP (DO-220AA)**

Cathode  Anode

### DESIGN SUPPORT TOOLS

[click logo to get started](#)

**3D**  
Models  
Available

### 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**

### TYPICAL APPLICATIONS

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

| PRIMARY CHARACTERISTICS |                            |
|-------------------------|----------------------------|
| $I_{F(AV)}$             | 1.0 A                      |
| $V_{RRM}$               | 100 V, 200 V, 400 V, 600 V |
| $I_R$                   | 5 $\mu$ A                  |
| $V_F$ at $I_F = 1.0$ A  | 0.86 V                     |
| $T_J$ max.              | 175 °C                     |
| Package                 | SMP (DO-220AA)             |
| Circuit configuration   | Single                     |

| MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)                           |                |             |        |        |        |      |
|-----------------------------------------------------------------------------------|----------------|-------------|--------|--------|--------|------|
| PARAMETER                                                                         | SYMBOL         | SE10PB      | SE10PD | SE10PG | SE10PJ | UNIT |
| Device marking code                                                               |                | 10B         | 10D    | 10G    | 10J    |      |
| Max. repetitive peak reverse voltage                                              | $V_{RRM}$      | 100         | 200    | 400    | 600    | V    |
| Average forward current                                                           | $I_{F(AV)}$    | 1.0         |        |        |        | A    |
| Peak forward surge current 10 ms single half sine-wave superimposed on rated load | $I_{FSM}$      | 25          |        |        |        | 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 |
| Max. instantaneous forward voltage                                         | I <sub>F</sub> = 1.0 A                                                   | T <sub>A</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.960 | 1.05 | V    |
|                                                                            |                                                                          | T <sub>A</sub> = 125 °C |                               | 0.860 | 0.95 |      |
| Max. reverse current                                                       | Rated V <sub>R</sub>                                                     | T <sub>A</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | -     | 5.0  | μA   |
|                                                                            |                                                                          | T <sub>A</sub> = 125 °C |                               | 4.8   | 50   |      |
| Max. reverse recovery time                                                 | I <sub>F</sub> = 0.5 A, I <sub>R</sub> = 1.0 A, I <sub>rr</sub> = 0.25 A |                         | t <sub>rr</sub>               | 780   | -    | ns   |
| Typical junction capacitance                                               | 4.0 V, 1 MHz                                                             |                         | C <sub>J</sub>                | 7.0   | -    | 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                          | SE10PB | SE10PD | SE10PG | SE10PJ | 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<br>( $T_A = 25\text{ }^{\circ}\text{C}$ 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   | $> 8\text{ kV}$  |
| AEC-Q101-002                                                                                                                       | Machine model (contact mode)                         | $C = 200\text{ pF}$ , $R = 0\text{ }\Omega$    |        | M4    | $> 400\text{ V}$ |
| JESD22-A114                                                                                                                        | Human body model (contact mode)                      | $C = 100\text{ pF}$ , $R = 1.5\text{ k}\Omega$ |        | 3B    | $> 8\text{ kV}$  |
| JESD22-A115                                                                                                                        | Machine model (contact mode)                         | $C = 200\text{ pF}$ , $R = 0\text{ }\Omega$    |        | C     | $> 400\text{ V}$ |
| IEC 61000-4-2 <sup>(2)</sup>                                                                                                       | Human body model (contact mode)                      | $C = 150\text{ pF}$ , $R = 330\text{ }\Omega$  |        | 4     | $> 8\text{ kV}$  |
|                                                                                                                                    | Human body model (air-discharge mode) <sup>(1)</sup> | $C = 150\text{ pF}$ , $R = 330\text{ }\Omega$  |        | 4     | $> 15\text{ kV}$ |

**Notes**(1) Immunity to IEC 61000-4-2 air discharge mode has a typical performance  $> 30\text{ kV}$ 

(2) System ESD standard

| ORDERING INFORMATION (Example) |                 |                        |               |                                    |
|--------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N                  | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| SE10PJ-M3/84A                  | 0.024           | 84A                    | 3000          | 7" diameter plastic tape and reel  |
| SE10PJ-M3/85A                  | 0.024           | 85A                    | 10 000        | 13" diameter plastic tape and reel |
| SE10PJHM3/84A <sup>(1)</sup>   | 0.024           | 84A                    | 3000          | 7" diameter plastic tape and reel  |
| SE10PJHM3/85A <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)

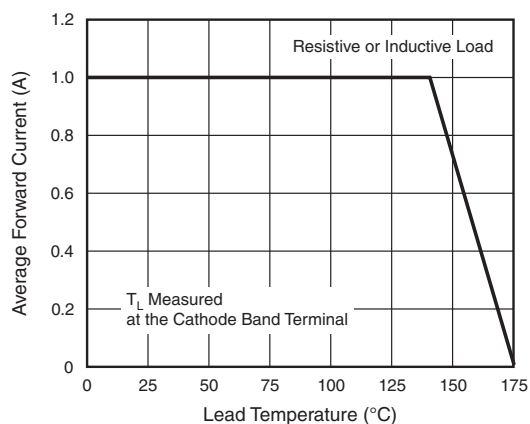


Fig. 1 - Max. Forward Current Derating Curve

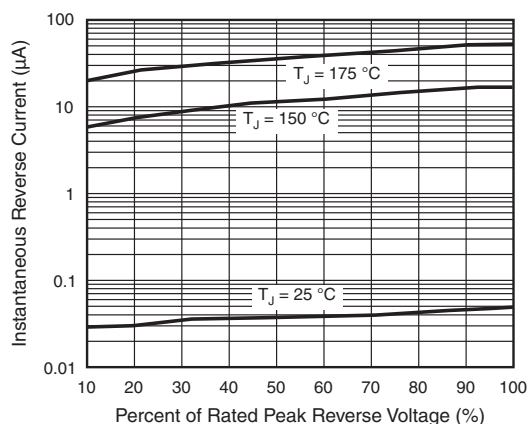


Fig. 4 - Typical Instantaneous Forward Characteristics

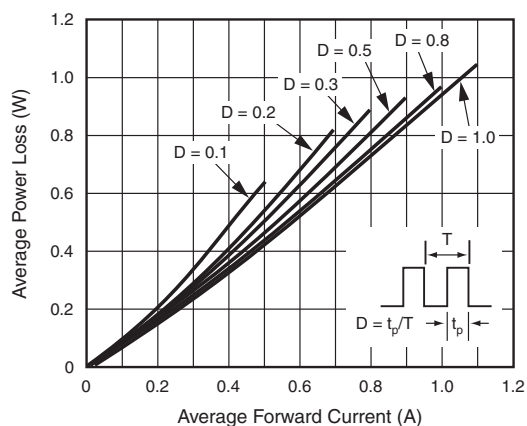


Fig. 2 - Forward Power Loss Characteristics

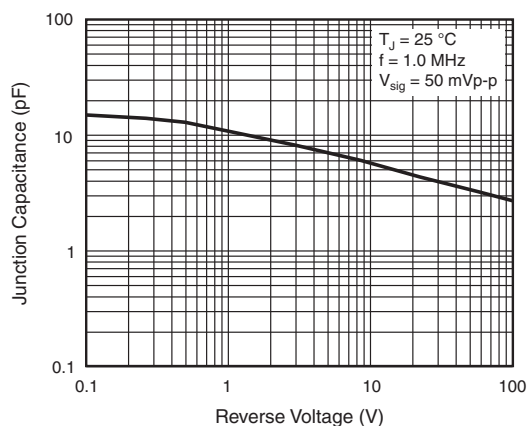


Fig. 5 - Typical Instantaneous Forward Characteristics

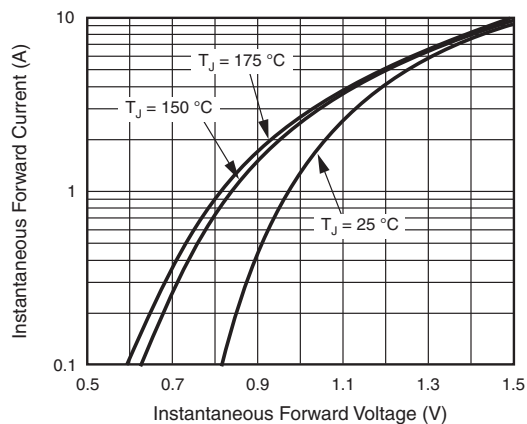
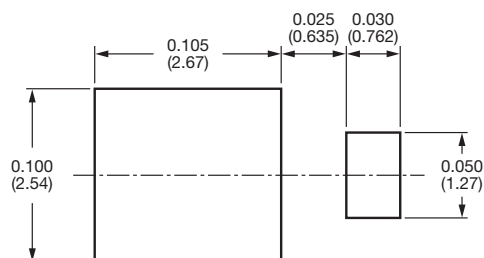
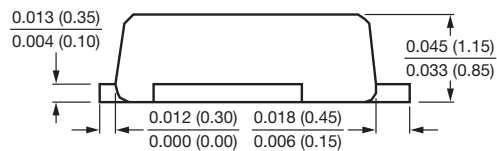
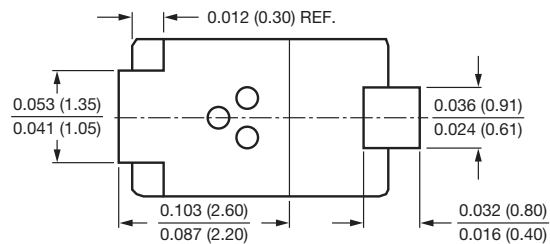
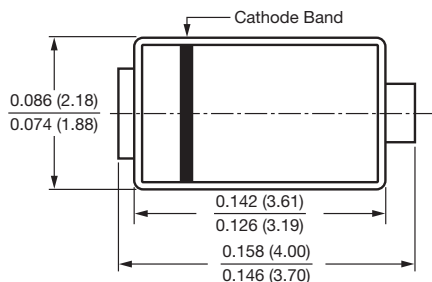


Fig. 3 - Forward Power Loss Characteristics



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

**SMP (DO-220AA)**





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