

## Surface-Mount ESD Capability Rectifiers

### eSMP® Series



**SMP (DO-220AA)**

Cathode  Anode

### FEATURES

- Very low profile - typical height of 1.0 mm
- Ideal for automated placement
- Oxide planar chip junction
- Low forward voltage drop
- 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)



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

### LINKS TO ADDITIONAL RESOURCES



[3D Models](#)

### PRIMARY CHARACTERISTICS

|                                          |                            |
|------------------------------------------|----------------------------|
| $I_{F(AV)}$                              | 2.0 A                      |
| $V_{RRM}$                                | 100 V, 200 V, 400 V, 600 V |
| $I_{FSM}$                                | 32 A                       |
| $V_F$ at $I_F = 2.0$ A ( $T_A = 125$ °C) | 0.85 V                     |
| $I_R$                                    | 5 $\mu$ A                  |
| $T_J$ max.                               | 175 °C                     |
| Package                                  | SMP (DO-220AA)             |
| Circuit configuration                    | Single                     |

### TYPICAL APPLICATIONS

General purpose, power line polarity protection, in both consumer and automotive applications.

### MECHANICAL DATA

**Case:** SMP (DO-221AA)

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

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

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

| PARAMETER                                                                         | SYMBOL                            | SE20PB      | SE20PD | SE20PG | SE20PJ | UNIT |
|-----------------------------------------------------------------------------------|-----------------------------------|-------------|--------|--------|--------|------|
| Device marking code                                                               |                                   | 20B         | 20D    | 20G    | 20J    |      |
| Maximum repetitive peak reverse voltage                                           | V <sub>RRM</sub>                  | 100         | 200    | 400    | 600    | V    |
| Average forward current (fig. 1)                                                  | I <sub>F(AV)</sub> <sup>(1)</sup> | 2.0         |        |        |        | A    |
|                                                                                   | I <sub>F(AV)</sub> <sup>(2)</sup> | 1.6         |        |        |        |      |
| Peak forward surge current 10 ms single half sine-wave superimposed on rated load | I <sub>FSM</sub>                  | 32          |        |        |        | A    |
| Operating junction and storage temperature range                                  | T <sub>J</sub> , T <sub>STG</sub> | -55 to +175 |        |        |        | °C   |

### Notes

(1) Mounted on 5.0 mm x 5.0 mm pad areas, 2 oz. FR4 PCB

(2) Free air, mounted on recommended copper pad area

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

| PARAMETER                     | TEST CONDITIONS                                                          |                         | SYMBOL                        | TYP. | MAX. | UNIT |
|-------------------------------|--------------------------------------------------------------------------|-------------------------|-------------------------------|------|------|------|
| Instantaneous forward voltage | I <sub>F</sub> = 1.0 A                                                   | T <sub>A</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.90 | -    | V    |
|                               | I <sub>F</sub> = 2.0 A                                                   |                         |                               | 0.96 | 1.05 |      |
|                               | I <sub>F</sub> = 1.0 A                                                   | T <sub>A</sub> = 125 °C |                               | 0.78 | -    |      |
|                               | I <sub>F</sub> = 2.0 A                                                   |                         |                               | 0.85 | 0.95 |      |
| 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 |                               | 16   | 100  |      |
| Typical 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>               | 1.2  | -    | μs   |
| Typical junction capacitance  | 4.0 V, 1 MHz                                                             |                         | C <sub>J</sub>                | 13   | -    | 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                          | SE20PB | SE20PD | SE20PG | SE20PJ | UNIT |
|----------------------------|---------------------------------|--------|--------|--------|--------|------|
| Typical thermal resistance | R <sub>θJA</sub> <sup>(1)</sup> | 105    |        |        |        | °C/W |
|                            | R <sub>θJM</sub> <sup>(2)</sup> | 20     |        |        |        |      |

**Notes**(1) Free air, mounted on recommended PCB, 1 oz. pad area; thermal resistance  $R_{\theta JA}$  - junction to ambient(2) Mounted on 5.0 mm x 5.0 mm pad areas, 2 oz. FR4 PCB;  $R_{\theta JM}$  - junction to mount**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   | $> 8\text{ kV}$ |

**ORDERING INFORMATION** (Example)

| PREFERRED P/N                | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
|------------------------------|-----------------|------------------------|---------------|------------------------------------|
| SE20PJ-M3/84A                | 0.024           | 84A                    | 3000          | 7" diameter plastic tape and reel  |
| SE20PJ-M3/85A                | 0.024           | 85A                    | 10 000        | 13" diameter plastic tape and reel |
| SE20PJHM3/84A <sup>(1)</sup> | 0.024           | 84A                    | 3000          | 7" diameter plastic tape and reel  |
| SE20PJHM3/85A <sup>(1)</sup> | 0.024           | 85A                    | 10 000        | 13" diameter plastic tape and reel |

**Note**<sup>(1)</sup> AEC-Q101 qualified



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

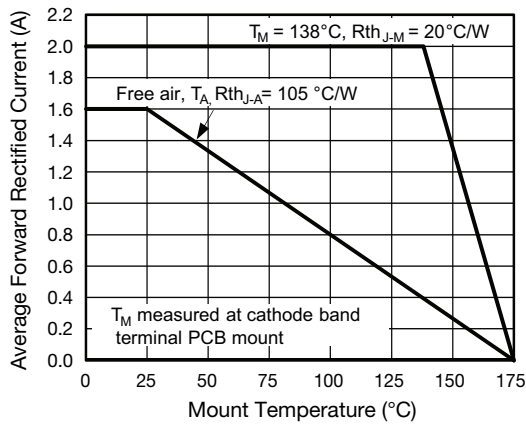


Fig. 1 - Maximum Forward Current Derating Curve

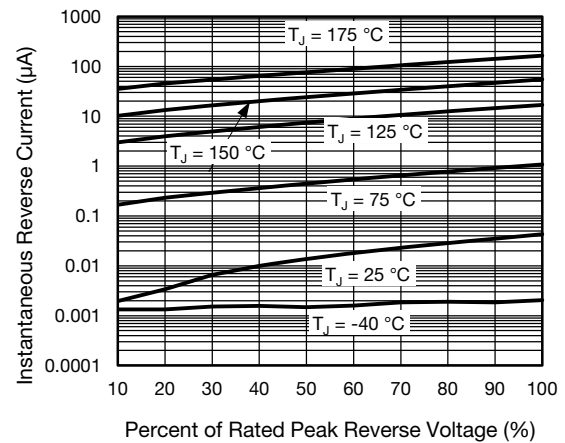


Fig. 4 - Typical Reverse Leakage Characteristics

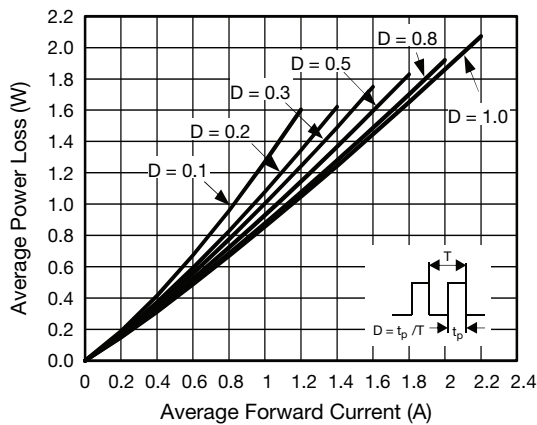


Fig. 2 - Forward Power Loss Characteristics

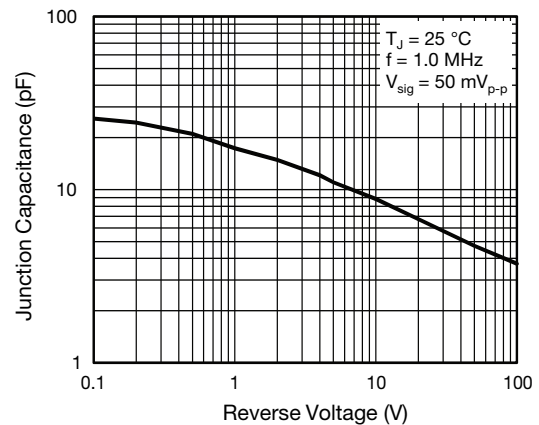


Fig. 5 - Typical Junction Capacitance

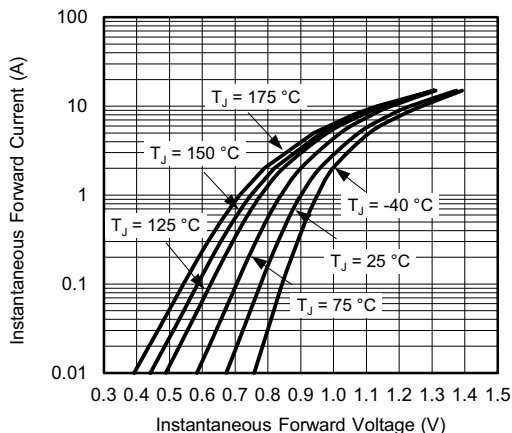


Fig. 3 - Typical Instantaneous Forward Characteristics

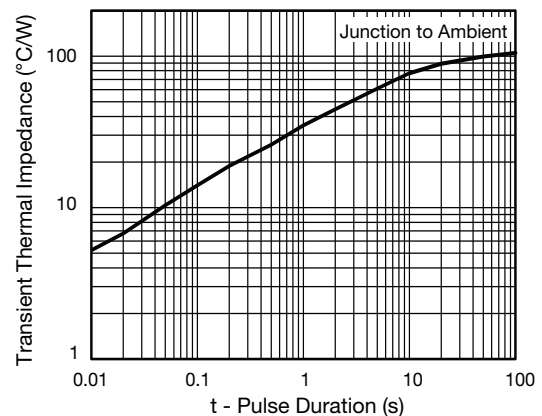
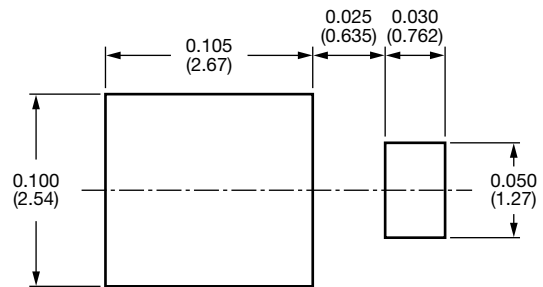
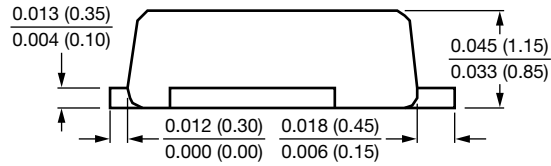
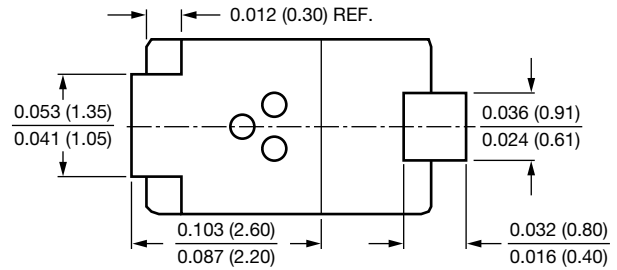
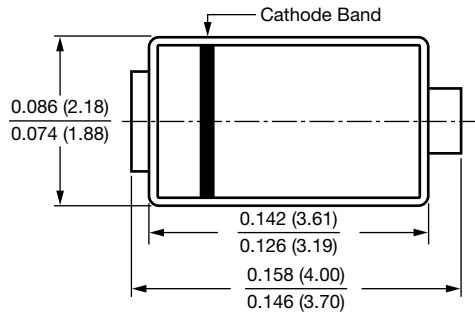


Fig. 6 - Typical Junction Capacitance



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

**SMP (DO-220AA)**





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