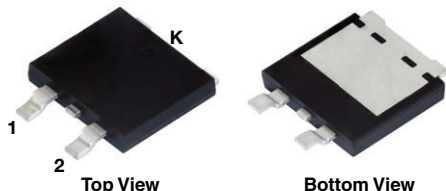
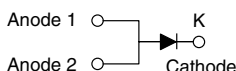


## Surface-Mount ESD Capability Rectifiers

### eSMP® Series SMPD (TO-263AC)



#### SE12DX



### ADDITIONAL RESOURCES



| PRIMARY CHARACTERISTICS                 |                            |
|-----------------------------------------|----------------------------|
| $I_{F(AV)}$                             | 12 A                       |
| $V_{RRM}$                               | 100 V, 200 V, 400 V, 600 V |
| $I_{FSM}$                               | 125 A                      |
| $V_F$ at $I_F = 12$ A ( $T_A = 125$ °C) | 0.96 V                     |
| $I_R$                                   | 20 $\mu$ A                 |
| $T_J$ max.                              | 175 °C                     |
| Package                                 | SMPD (TO-263AC)            |
| Circuit configuration                   | Single                     |

### FEATURES

- Very low profile - typical height of 1.7 mm
- Ideal for automated placement
- Oxide planar chip junction
- Low forward voltage drop
- ESD capability
- AEC-Q101 qualified
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- 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

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

### MECHANICAL DATA

#### Case: SMPD (TO-263AC)

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 AEC-Q101 qualified

**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:** as marked

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

| PARAMETER                                                                         | SYMBOL                            | SE12DB      | SE12DD | SE12DG | SE12DJ | UNIT |
|-----------------------------------------------------------------------------------|-----------------------------------|-------------|--------|--------|--------|------|
| Maximum repetitive peak reverse voltage                                           | V <sub>RRM</sub>                  | 100         | 200    | 400    | 600    | V    |
| Maximum DC forward current                                                        | I <sub>F</sub> <sup>(1)</sup>     | 12          |        |        |        | A    |
|                                                                                   | I <sub>F</sub> <sup>(2)</sup>     | 3.2         |        |        |        |      |
| Peak forward surge current 10 ms single half sine-wave superimposed on rated load | I <sub>FSM</sub>                  | 125         |        |        |        | A    |
| Operating junction and storage temperature range                                  | T <sub>J</sub> , T <sub>STG</sub> | -55 to +175 |        |        |        | °C   |

#### Notes

(1) With heatsink

(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> = 6 A                                                     | T <sub>A</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.95 | -    | V    |
|                               | I <sub>F</sub> = 12 A                                                    |                         |                               | 1.04 | 1.15 |      |
|                               | I <sub>F</sub> = 6 A                                                     | T <sub>A</sub> = 125 °C |                               | 0.85 | -    |      |
|                               | I <sub>F</sub> = 12 A                                                    |                         |                               | 0.96 | 1.10 |      |
| Reverse current               | Rated V <sub>R</sub>                                                     | T <sub>A</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | -    | 20   | μA   |
|                               |                                                                          | T <sub>A</sub> = 125 °C |                               | 27   | 150  |      |
| 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>               | 3000 | -    | ns   |
| Typical junction capacitance  | 4.0 V, 1 MHz                                                             |                         | C <sub>J</sub>                | 90   | -    | 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                             | SE12DB | SE12DD | SE12DG | SE12DJ | UNIT |
|----------------------------|------------------------------------|--------|--------|--------|--------|------|
| Typical thermal resistance | R <sub>θJA</sub> <sup>(1)(2)</sup> | 60     |        |        |        | °C/W |
|                            | R <sub>θJC</sub> <sup>(3)</sup>    | 1.6    |        |        |        |      |

**Notes**(1) The heat generated must be less than the thermal conductivity from junction-to-ambient:  $dP_D/dT_J < 1/R_{\theta JA}$ (2) Free air, mounted on recommended PCB, 2 oz. pad area; thermal resistance  $R_{\theta JA}$  - junction to ambient

(3) With infinite heatsink

**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)

| STANDARD        | PREFERRED P/N              | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
|-----------------|----------------------------|-----------------|------------------------|---------------|------------------------------------|
| SMPD (TO-263AC) | SE12DJ-M3/I                | 0.54            | I                      | 2000/reel     | 13" diameter plastic tape and reel |
| SMPD (TO-263AC) | SE12DJHM3/I <sup>(1)</sup> | 0.54            | I                      | 2000/reel     | 13" diameter plastic tape and reel |

**Note**

(1) AEC-Q101 qualified

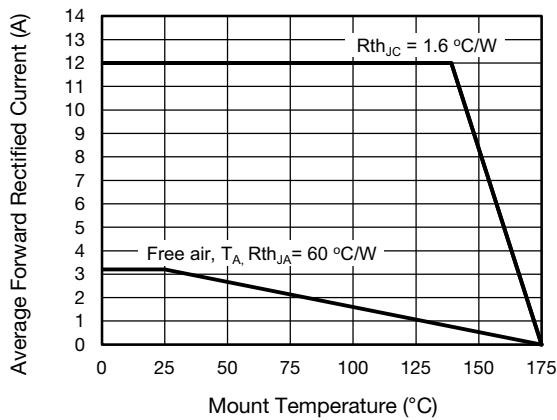
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Forward Current Derating Curve

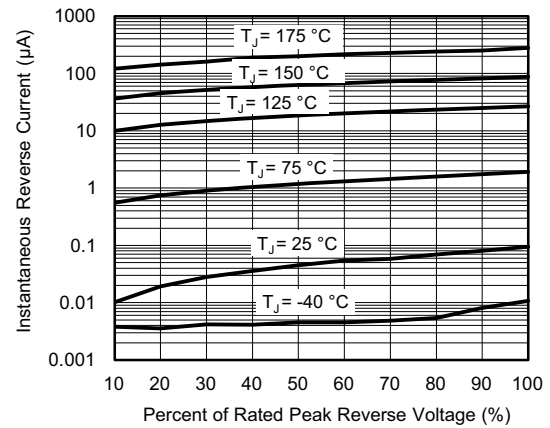


Fig. 4 - Typical Reverse Leakage Characteristics

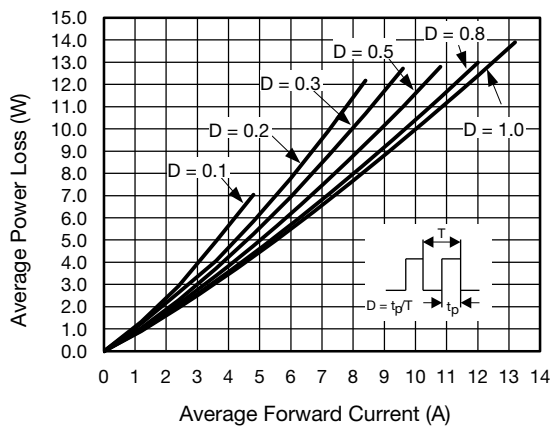


Fig. 2 - Forward Power Loss Characteristics

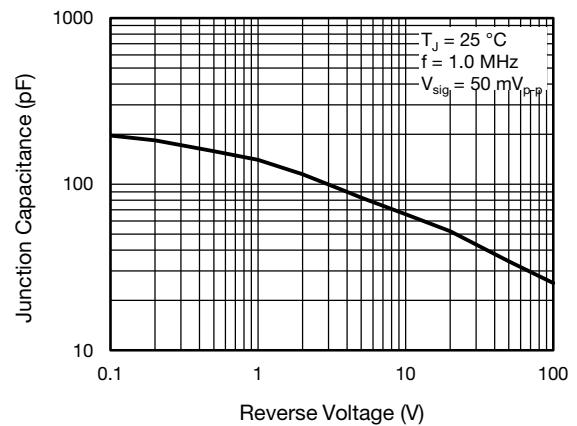


Fig. 5 - Typical Junction Capacitance

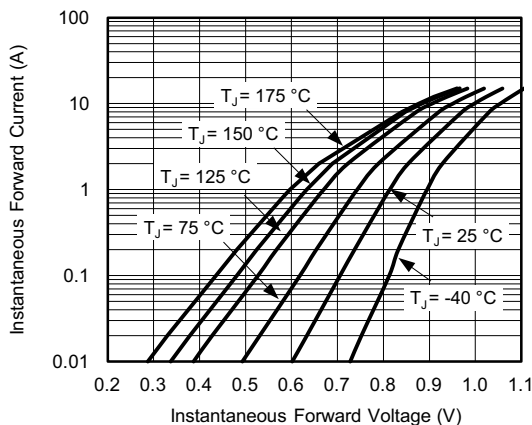


Fig. 3 - Typical Instantaneous Forward Characteristics

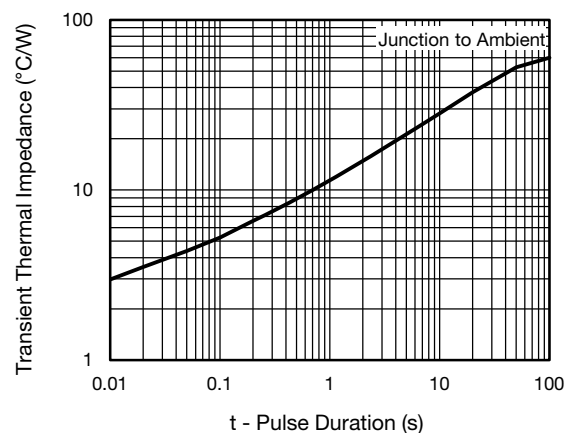
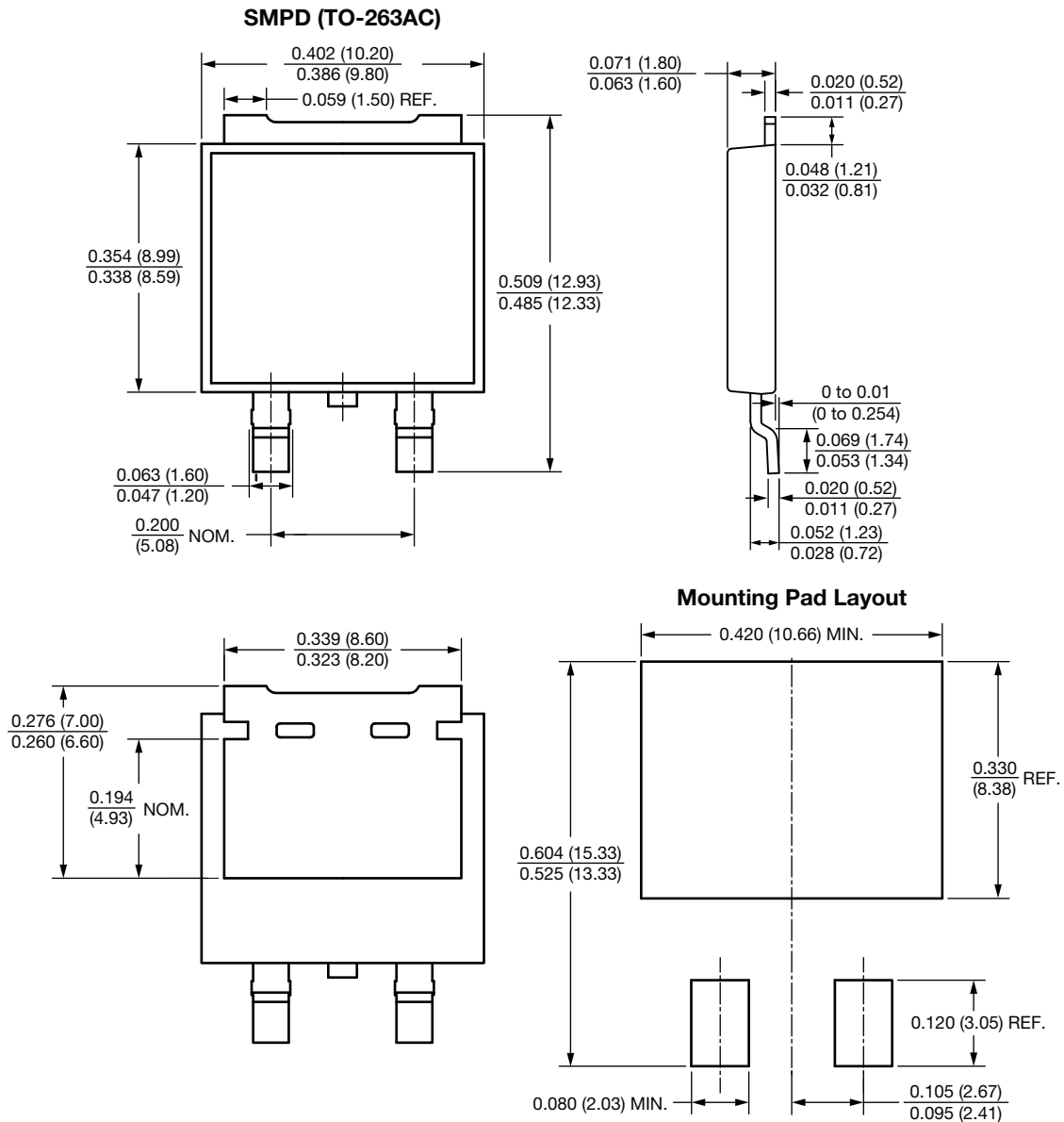


Fig. 6 - Typical Transient Thermal Impedance



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





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