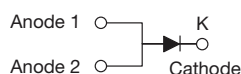
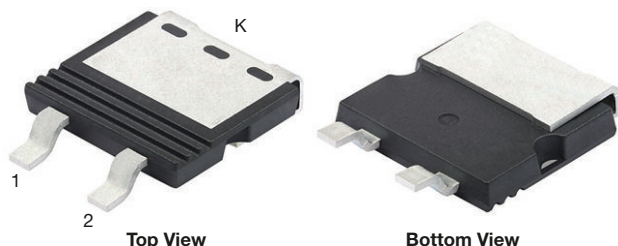


# Surface-Mount High Voltage Rectifier

## eSMP® Series eCool SMPD



## LINKS TO ADDITIONAL RESOURCES



| PRIMARY CHARACTERISTICS                 |            |
|-----------------------------------------|------------|
| $I_{F(AV)}$                             | 40 A       |
| $V_{RRM}$                               | 600 V      |
| $I_{FSM}$                               | 405 A      |
| $V_F$ at $I_F = 40$ A ( $T_J = 125$ °C) | 0.87 V     |
| $I_R$                                   | 5 $\mu$ A  |
| $T_J$ max.                              | 175 °C     |
| Package                                 | eCool SMPD |
| Circuit configuration                   | Single     |

## FEATURES

- Top side cool
- Ideal for automated placement
- Creepage distance 4.3 mm minimum
- Oxide planar chip junction
- Low forward voltage drop
- 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

- On board charger (OBC)
- Charging stations
- Bridge function

## MECHANICAL DATA

**Case:** eCool SMPD

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 and HM3 suffix meets JESD 201 class 2 whisker test

**Polarity:** as marked

| MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)                            |                      |             |      |
|------------------------------------------------------------------------------------|----------------------|-------------|------|
| PARAMETER                                                                          | SYMBOL               | SE40CLJ     | UNIT |
| Device marking code                                                                |                      | SE40CLJ     | V    |
| Maximum repetitive peak reverse voltage                                            | $V_{RRM}$            | 600         | V    |
| Maximum DC forward current (Fig.1)                                                 | $I_F^{(1)}$          | 40          | A    |
|                                                                                    | $I_F^{(2)}$          | 8.4         |      |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load | $I_{FSM}$            | 405         | A    |
| Operating junction and storage temperature range                                   | $T_J, T_{STG}^{(3)}$ | -55 to +175 | °C   |

## Notes

- (1) With infinite heatsink
- (2) Free air, mounted on FR4 PCB, 2 oz., standard footprint with top side aluminum cooling
- (3) The heat generated must be less than the thermal conductivity from junction-to-ambient:  $dP_D/dT_J < 1/R_{\theta JA}$



| ELECTRICAL CHARACTERISTICS (T <sub>J</sub> = 25 °C unless otherwise noted) |                                                                          |                         |                               |      |      |      |
|----------------------------------------------------------------------------|--------------------------------------------------------------------------|-------------------------|-------------------------------|------|------|------|
| PARAMETER                                                                  | TEST CONDITIONS                                                          |                         | SYMBOL                        | TYP. | MAX. | UNIT |
| Instantaneous forward voltage                                              | I <sub>F</sub> = 20 A                                                    | T <sub>J</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.88 | -    | V    |
|                                                                            | I <sub>F</sub> = 40 A                                                    |                         |                               | 0.98 | 1.1  |      |
|                                                                            | I <sub>F</sub> = 20 A                                                    | T <sub>J</sub> = 125 °C |                               | 0.76 | -    |      |
|                                                                            | I <sub>F</sub> = 40 A                                                    |                         |                               | 0.87 | -    |      |
| Reverse current                                                            | Rated V <sub>R</sub>                                                     | T <sub>J</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | -    | 5    | μA   |
|                                                                            |                                                                          | T <sub>J</sub> = 125 °C |                               | 17   | 300  |      |
| 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>               | 0.28 | -    | μs   |
| Typical junction capacitance                                               | 4.0 V, 1 MHz                                                             |                         | C <sub>J</sub>                | 188  | -    | 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                   | SE40CLJ | UNIT                 |
| Typical thermal resistance                                                           | $R_{\theta JA}^{(1)(2)}$ | 24.5    | $^{\circ}\text{C/W}$ |
|                                                                                      | $R_{\theta JC}^{(3)}$    | 0.7     |                      |

**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) Thermal resistance junction-to-ambient to follow JEDEC® 51-2A, device mounted on FR4 PCB, 2 oz. standard footprint with top-side aluminum cooling heatsink size L 35 mm x W 20 mm x H 10 mm

(3) Thermal resistance junction-to-top case to follow JEDEC® 51-14 transient dual interface test method (TDIM)

**ORDERING INFORMATION TABLE**

|             |                                                                                                          |          |           |          |          |          |          |           |
|-------------|----------------------------------------------------------------------------------------------------------|----------|-----------|----------|----------|----------|----------|-----------|
| Device code | <b>S</b>                                                                                                 | <b>E</b> | <b>40</b> | <b>C</b> | <b>L</b> | <b>J</b> | <b>H</b> | <b>M3</b> |
|             | ①                                                                                                        | ②        | ③         | ④        | ⑤        | ⑥        | ⑦        | ⑧         |
| <b>1</b>    | - Vishay standard recovery product                                                                       |          |           |          |          |          |          |           |
| <b>2</b>    | - Oxide planar chip technology                                                                           |          |           |          |          |          |          |           |
| <b>3</b>    | - Current rating (40 = 40 A)                                                                             |          |           |          |          |          |          |           |
| <b>4</b>    | - Package type (C = eCool SMPD package)                                                                  |          |           |          |          |          |          |           |
| <b>5</b>    | - Process type (L = low $V_F$ )                                                                          |          |           |          |          |          |          |           |
| <b>6</b>    | - Voltage rating (D = 200 V, G = 400 V, J = 600 V)                                                       |          |           |          |          |          |          |           |
| <b>7</b>    | - Quality grade (H = AEC-Q101 qualified, - = industry grade)                                             |          |           |          |          |          |          |           |
| <b>8</b>    | - Material / Environment category<br>(M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free) |          |           |          |          |          |          |           |

| ORDERING INFORMATION (Example) |                 |                        |               |                                    |
|--------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N                  | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| SE40CLJ-M3/I                   | 0.66            | I                      | 1500 / reel   | 13" diameter plastic tape and reel |
| SE40CLJHM3/I <sup>(1)</sup>    | 0.66            | I                      | 1500 / reel   | 13" diameter plastic tape and reel |

**Note**

(1) AEC-Q101 qualified

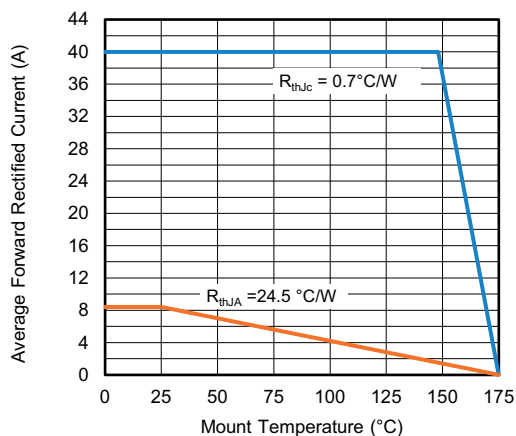
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Forward Current Derating Curve

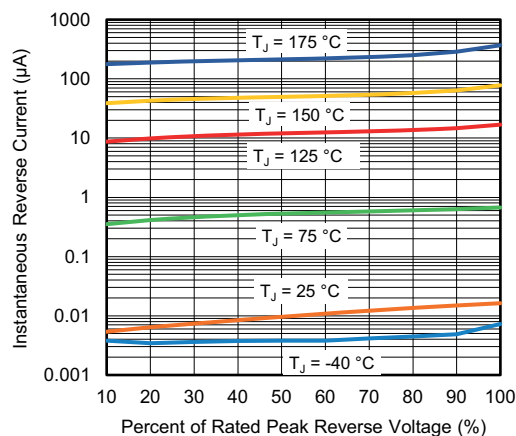


Fig. 4 - Typical Reverse Leakage Characteristics

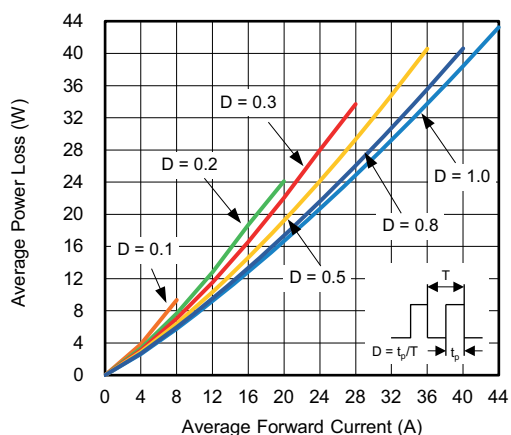


Fig. 2 - Forward Power Loss Characteristics

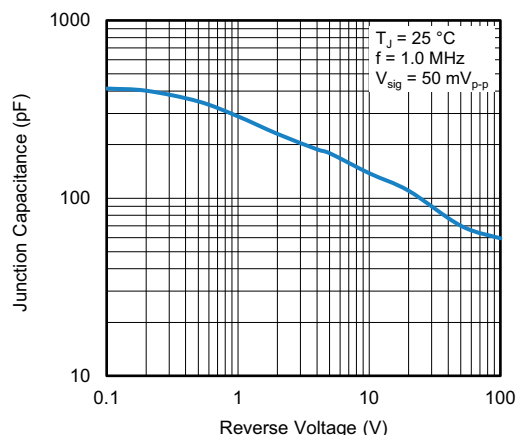


Fig. 5 - Typical Junction Capacitance

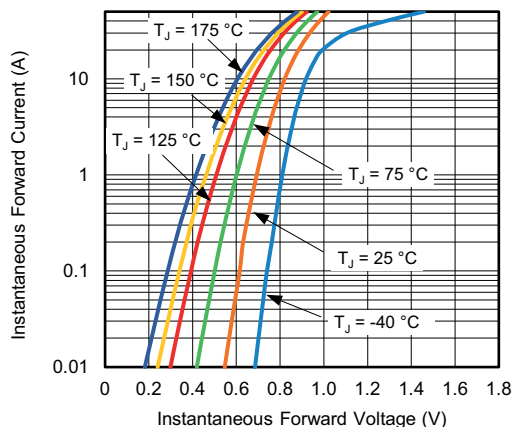


Fig. 3 - Typical Instantaneous Forward Characteristics

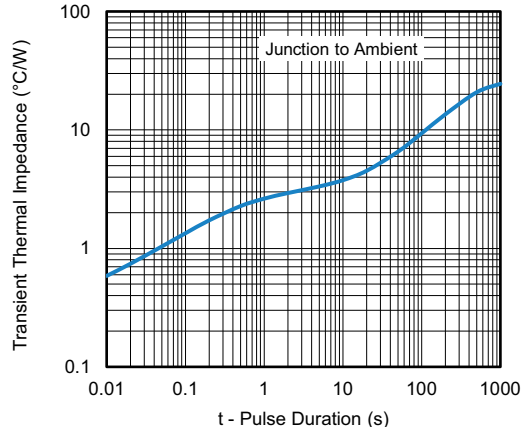
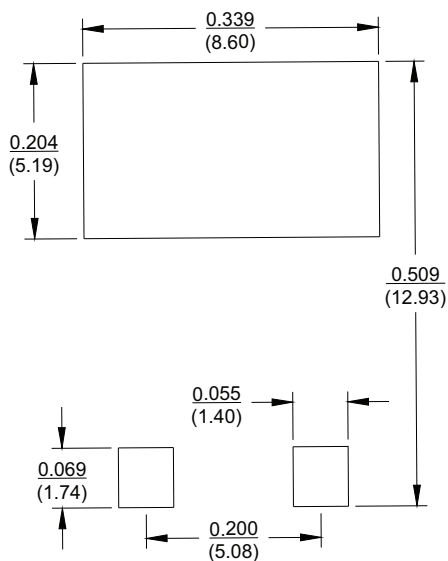
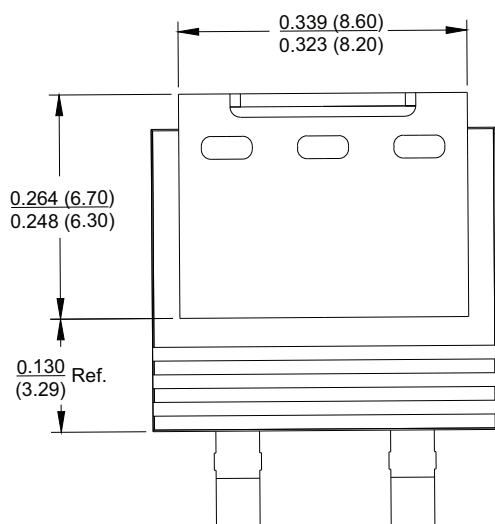
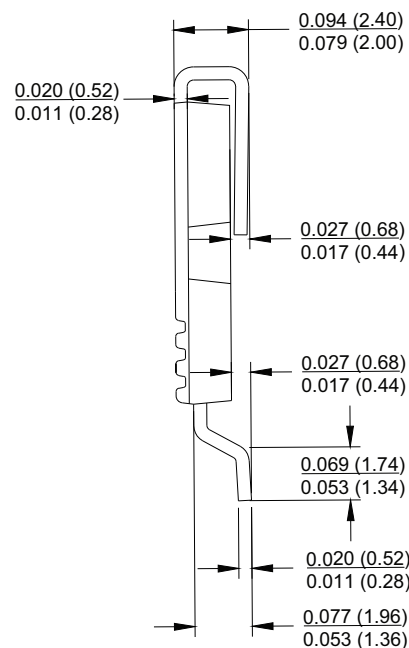
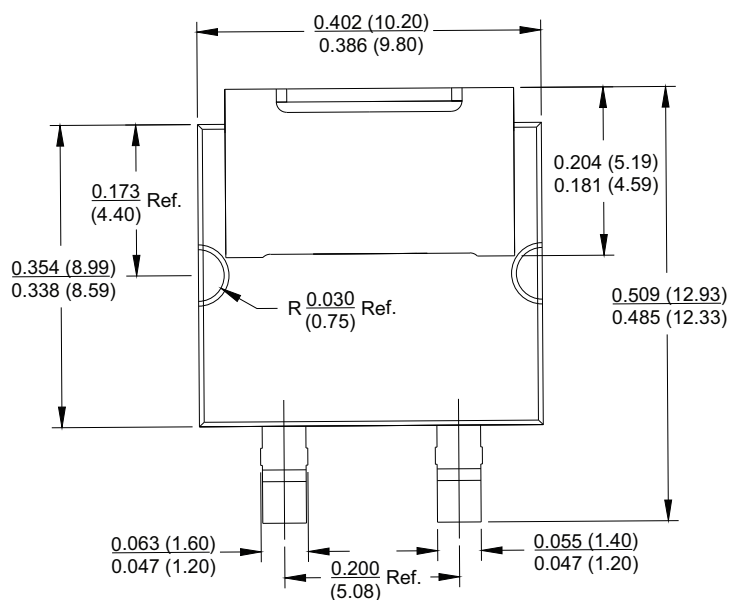


Fig. 6 - Typical Transient Thermal Impedance



PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

eCool SMPD



Note

- The suggested mounting pad layout is provided for reference only, as actual pad layouts may vary depending on application



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