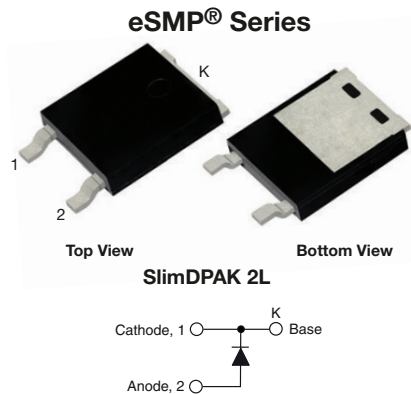


# 650 V Power SiC Gen 3 Merged PIN Schottky Diode, 6 A



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

## FEATURES

- Creepage and clearance distance 2.8 mm minimum
- Very low profile – typical height of 1.3 mm
- Majority carrier diode using Schottky technology on SiC wide band gap material
- Improved  $V_F$  and efficiency by thin wafer technology
- Positive  $V_F$  temperature coefficient for easy paralleling
- Virtually no recovery tail and no switching losses
- Temperature invariant switching behavior
- 175 °C maximum operating junction temperature
- MPS structure for high ruggedness to forward current surge events
- Meets JESD 201 class 2 whisker test
- Meet 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)

## LINKS TO ADDITIONAL RESOURCES



## DESCRIPTION / APPLICATIONS

Wide band gap SiC based 650 V Schottky diode, designed for high performance and ruggedness.

Optimum choice for high speed hard switching and efficient operation over a wide temperature range, it is also recommended for all applications suffering from Silicon ultrafast recovery behavior.

Typical applications include AC/DC PFC and DC/DC ultra high frequency output rectification in FBPS and LLC converters.

## MECHANICAL DATA

**Case:** SlimDPAK 2L

Molding compound meets UL 94 V-0 flammability rating Base P/N-M3 - halogen-free, RoHS-compliant

**Terminals:** matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

| PRIMARY CHARACTERISTICS       |             |
|-------------------------------|-------------|
| $I_{F(AV)}$                   | 6 A         |
| $V_R$                         | 650 V       |
| $V_F$ at $I_F$ at 25 °C, typ. | 1.30 V      |
| $T_J$ max.                    | 175 °C      |
| $I_R$ at $V_R$ at 175 °C      | 16 $\mu$ A  |
| $Q_C$ ( $V_R = 400$ V)        | 17 nC       |
| Package                       | SlimDPAK 2L |
| Circuit configuration         | Single      |

| MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise specified) |                      |  |             |                  |
|---|----------------------|--|-------------|------------------|
| PARAMETER   | SYMBOL               | NOTES / TEST CONDITIONS                            | VALUES      | UNITS            |
| Peak repetitive reverse voltage                             | $V_{RRM}$            |  | 650         | V                |
| Continuous forward current                                  | $I_F$                | $T_M = 154$ °C (DC)                                | 6           | A                |
| DC blocking voltage   | $V_{DC}$             |  | 650         | V                |
| Repetitive peak surge current                               | $I_{FRM}$            | $T_M = 25$ °C, $f = 50$ Hz, square wave, DC = 25 % | 35          | A                |
| Non-repetitive peak forward surge current                   | $I_{FSM}$            | $T_M = 25$ °C, $t_p = 10$ ms, half sine wave       | 42          | A                |
|   |                      | $T_M = 110$ °C, $t_p = 10$ ms, half sine wave      | 40          |                  |
| Power dissipation   | $P_{tot(1)}$         | $T_M = 25$ °C                                      | 72          | W                |
|   |                      | $T_M = 110$ °C                                     | 31          |                  |
|   | $P_{tot(2)}$         | $T_M = 25$ °C                                      | 87          | W                |
|   |                      | $T_M = 110$ °C                                     | 38          |                  |
| $I^2t$ value  | $\int i^2 dt$        | $T_M = 25$ °C                                      | 9           | A <sup>2</sup> s |
|   |                      | $T_M = 110$ °C                                     | 8           |                  |
| Operating junction and storage temperatures                 | $T_J^{(3)}, T_{Stg}$ |  | -55 to +175 | °C               |

### Notes

- (1) Based on maximum  $R_{th}$
- (2) Based on typical  $R_{th}$
- (3) The heat generated must be less than the thermal conductivity from junction-to-ambient:  $dP_D/dT_J < 1/R_{thJA}$



| ELECTRICAL SPECIFICATIONS (T <sub>J</sub> = 25 °C unless otherwise specified) |                |  |      |      |      |       |
|---|----------------|--|------|------|------|-------|
| PARAMETER   | SYMBOL         | TEST CONDITIONS  | MIN. | TYP. | MAX. | UNITS |
| Forward voltage   | V <sub>F</sub> | I <sub>F</sub> = 6 A   | -    | 1.3  | 1.5  | V     |
|   |                | I <sub>F</sub> = 6 A, T <sub>J</sub> = 150 °C                  | -    | 1.50 | 1.75 |       |
|   |                | I <sub>F</sub> = 6 A, T <sub>J</sub> = 175 °C                  | -    | 1.58 | -    |       |
| Reverse leakage current   | I <sub>R</sub> | V <sub>R</sub> = V <sub>R</sub> rated                          | -    | 0.25 | 47   | μA    |
|   |                | V <sub>R</sub> = V <sub>R</sub> rated, T <sub>J</sub> = 150 °C | -    | 5.5  | 100  |       |
|   |                | V <sub>R</sub> = V <sub>R</sub> rated, T <sub>J</sub> = 175 °C | -    | 16   | -    |       |
| Total capacitance   | C              | V <sub>R</sub> = 1 V, f = 1 MHz                                | -    | 255  | -    | pF    |
|   |                | V <sub>R</sub> = 400 V, f = 1 MHz                              | -    | 27   | -    |       |
| Total capacitive charge   | Q <sub>C</sub> | V <sub>R</sub> = 400 V, f = 1 MHz                              | -    | 17   | -    | nC    |

| THERMAL - MECHANICAL SPECIFICATIONS (T <sub>A</sub> = 25 °C unless otherwise specified) |                   |                 |           |      |      |       |
|---|-------------------|-----------------|-----------|------|------|-------|
| PARAMETER   | SYMBOL            | TEST CONDITIONS | MIN.      | TYP. | MAX. | UNITS |
| Thermal resistance, junction-to-mount   | R <sub>thJM</sub> |                 | -         | 1.72 | 2.1  | °C/W  |
| Marking device  |                   |                 | 3C06EV07T |      |      |       |

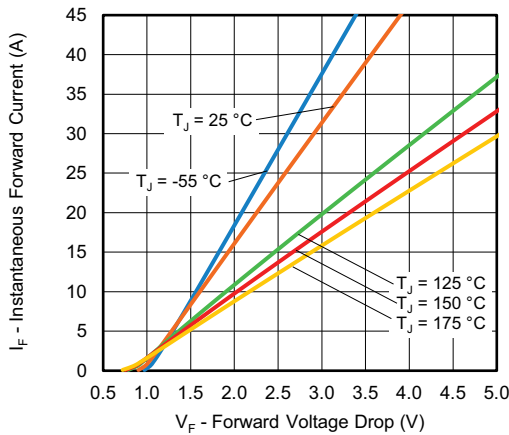


Fig. 1 - Typical Forward Voltage Drop Characteristics

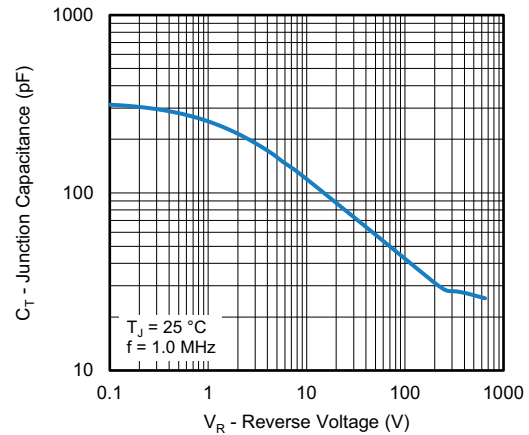


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

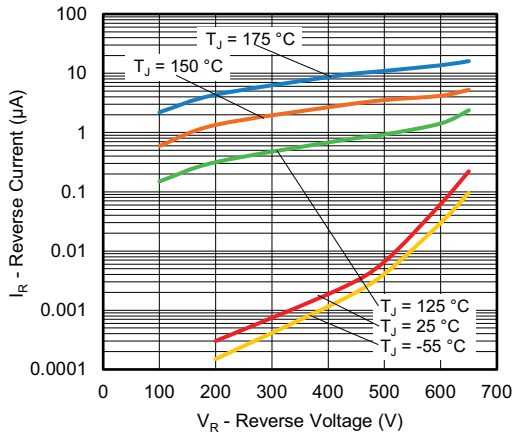


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

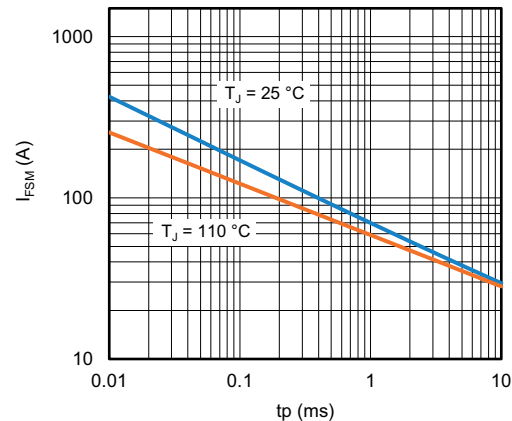


Fig. 4 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration (Square Wave)

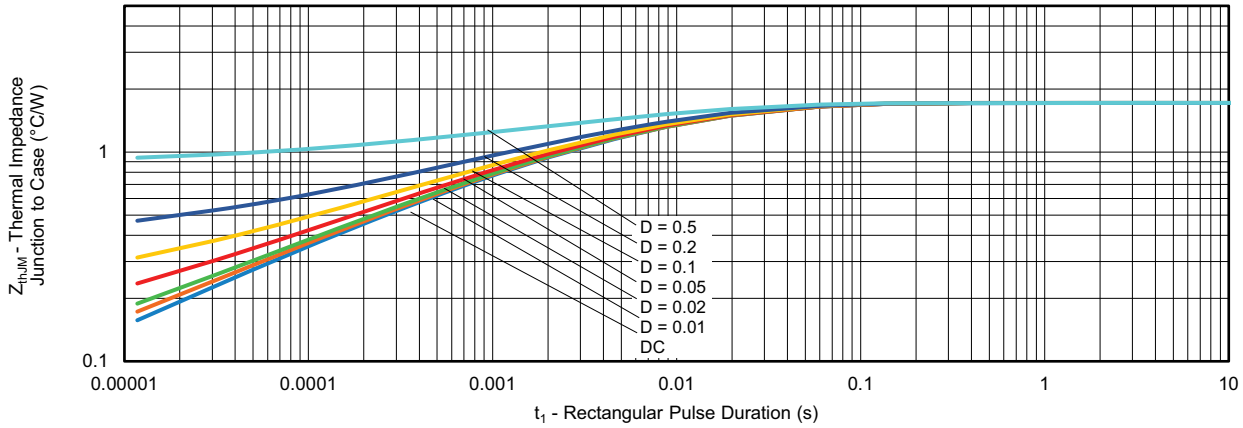


Fig. 5 - Typical Thermal Impedance  $Z_{thJM}$  Characteristics

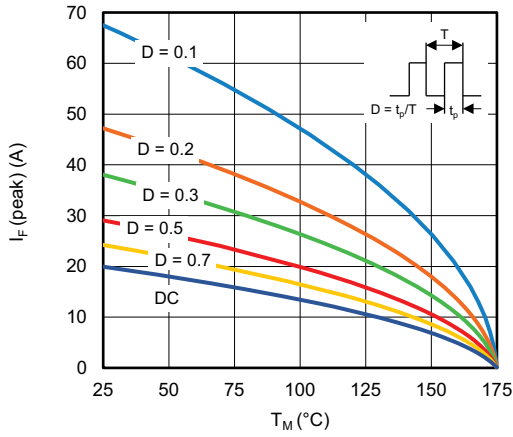


Fig. 6 - Peak Forward Current vs. Maximum Allowable Mount Temperature

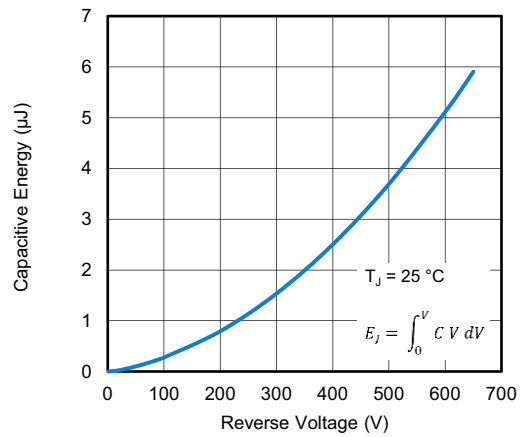


Fig. 8 - Typical Capacitive Energy vs. Reverse Voltage

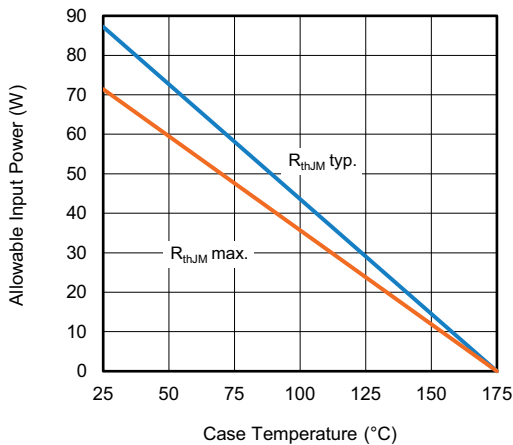


Fig. 7 - Forward Power Loss Characteristics

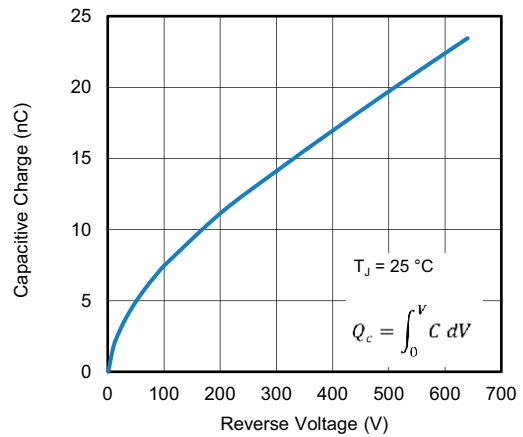
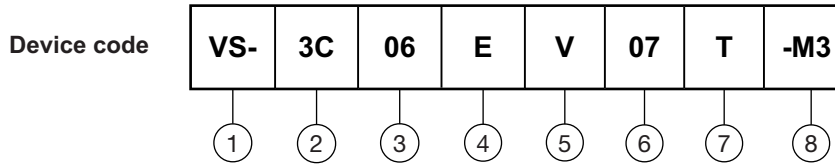


Fig. 9 - Typical Capacitive Charge vs. Reverse Voltage



ORDERING INFORMATION TABLE



- ① - Vishay Semiconductors product
- ② - 3C = SiC diode, Generation 3
- ③ - Current rating (06 = 6 A)
- ④ - E = single diode
- ⑤ - Package SlimDPAK
- ⑥ - Voltage rating: (07 = 650 V)
- ⑦ - T = true 2 pin
- ⑧ - Environmental digit:  
-M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free

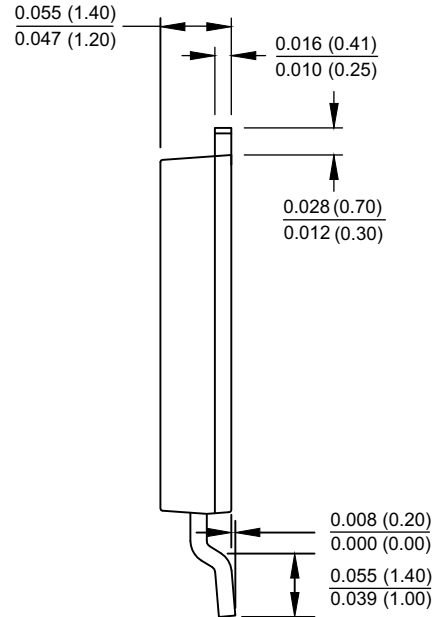
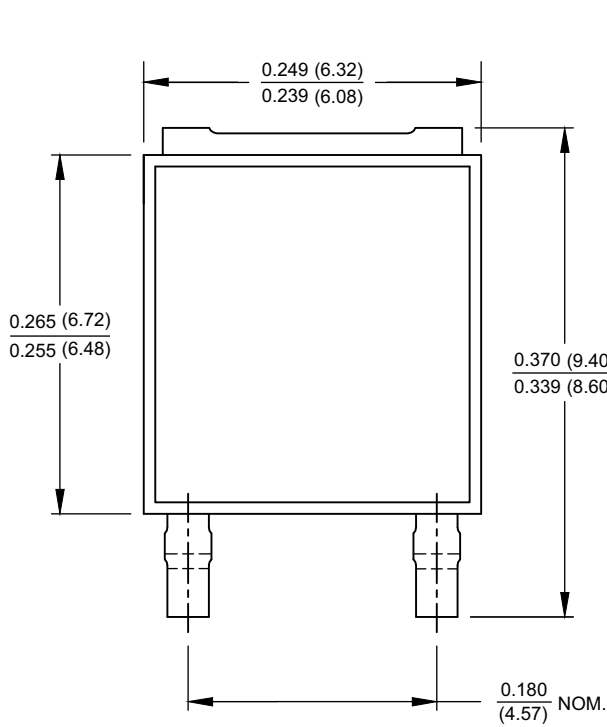
| ORDERING INFORMATION (Example) |                 |              |               |                                    |
|--------------------------------|-----------------|--------------|---------------|------------------------------------|
| ORDERING P/N                   | UNIT WEIGHT (g) | PACKAGE CODE | BASE QUANTITY | PACKAGING DESCRIPTION              |
| VS-3C06EV07T-M3/I              | 0.20            | I            | 4500          | 13" diameter plastic tape and reel |

| LINKS TO RELATED DOCUMENTS |  |
|----------------------------|--|
| Dimensions                 | <a href="http://www.vishay.com/doc?97058">www.vishay.com/doc?97058</a> |
| Part marking information   | <a href="http://www.vishay.com/doc?97104">www.vishay.com/doc?97104</a> |
| Packaging information      | <a href="http://www.vishay.com/doc?88869">www.vishay.com/doc?88869</a> |

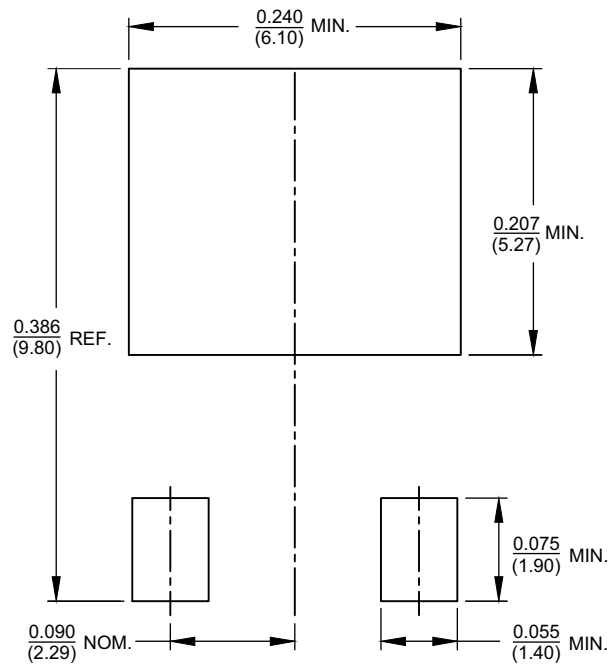
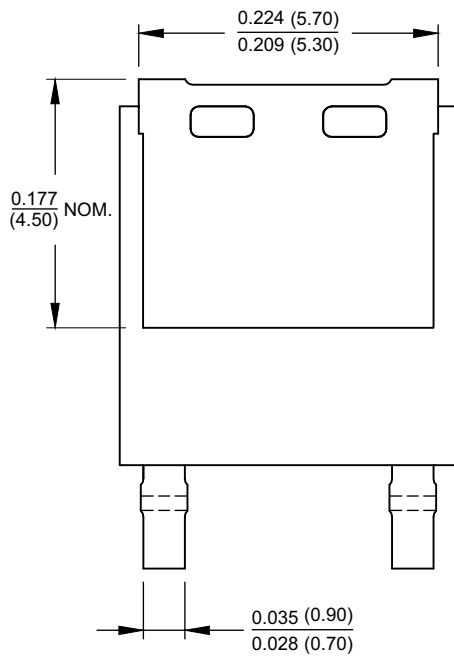


### SlimDPAK 2L

**DIMENSIONS** in millimeters (inches)



Mounting Pad Layout





## Disclaimer

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