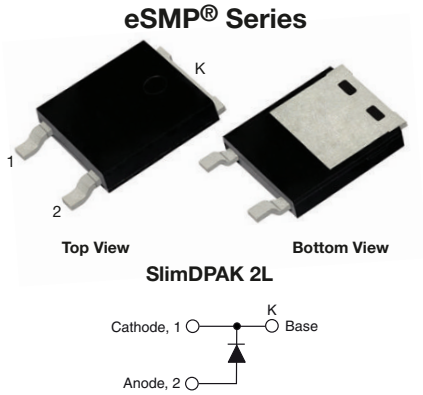
# 650 V Power SiC Gen 3 Merged PIN Schottky Diode, 8 A




## 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

RoHS COMPLIANT
HALOGEN FREE

## LINKS TO ADDITIONAL RESOURCES

Ultra Librarian
EDA / CAD

| PRIMARY CHARACTERISTICS | |
|---|---|
| $I_{F(AV)}$ | 8 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 | 25 µA |
| $Q_C$ ($V_R$ = 400 V) | 22 nC |
| Package | SlimDPAK 2L |
| Circuit configuration | Single |

## 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

**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 | $I_F$ | $T_M$ = 151 °C (DC) | 8 | 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 % | 42 | A |
| Non-repetitive peak forward surge current | $I_{FSM}$ | $T_M$ = 25 °C, $t_p$ = 10 ms, half sine wave | 52 | A |
| | | $T_M$ = 110 °C, $t_p$ = 10 ms, half sine wave | 51 | |
| Power dissipation | $P_{tot}$ (1) | $T_M$ = 25 °C | 79 | W |
| | | $T_M$ = 110 °C | 34 | |
| | $P_{tot}$ (2) | $T_M$ = 25 °C | 103 | W |
| | | $T_M$ = 110 °C | 45 | |
| $I^2t$ value | $\int i^2 dt$ | $T_M$ = 25 °C | 13.5 | $A^2s$ |
| | | $T_M$ = 110 °C | 12.5 | |
| 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: $dP_D/dT_J < 1/R_{\theta JA}$

| **ELECTRICAL SPECIFICATIONS** ($T_J$ = 25 °C unless otherwise specified) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **TEST CONDITIONS** | **MIN.** | **TYP.** | **MAX.** | **UNITS** |
| Forward voltage | $V_F$ | $I_F$ = 8 A | - | 1.3 | 1.5 | V |
| | | $I_F$ = 8 A, $T_J$ = 150 °C | - | 1.50 | 1.80 | |
| | | $I_F$ = 8 A, $T_J$ = 175 °C | - | 1.58 | - | |
| Reverse leakage current | $I_R$ | $V_R$ = $V_R$ rated | - | 0.35 | 90 | µA |
| | | $V_R$ = $V_R$ rated, $T_J$ = 150 °C | - | 8 | 180 | |
| | | $V_R$ = $V_R$ rated, $T_J$ = 175 °C | - | 25 | - | |
| Total capacitance | C | $V_R$ = 1 V, f = 1 MHz | - | 340 | - | pF |
| | | $V_R$ = 400 V, f = 1 MHz | - | 34 | - | |
| Total capacitive charge | $Q_C$ | $V_R$ = 400 V, f = 1 MHz | - | 22 | - | nC |

| **THERMAL - MECHANICAL SPECIFICATIONS** ($T_A$ = 25 °C unless otherwise specified) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **TEST CONDITIONS** | **MIN.** | **TYP.** | **MAX.** | **UNITS** |
| Thermal resistance, junction-to-mount | $R_{thJM}$ | | - | 1.45 | 1.90 | °C/W |
| Marking device | | | 3C08EV07T | | | |

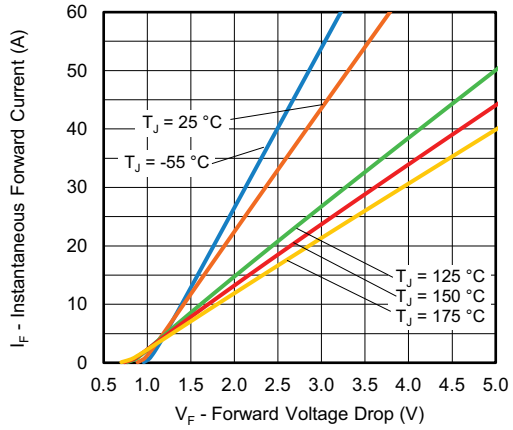



Fig. 1 - Typical Forward Voltage Drop Characteristics

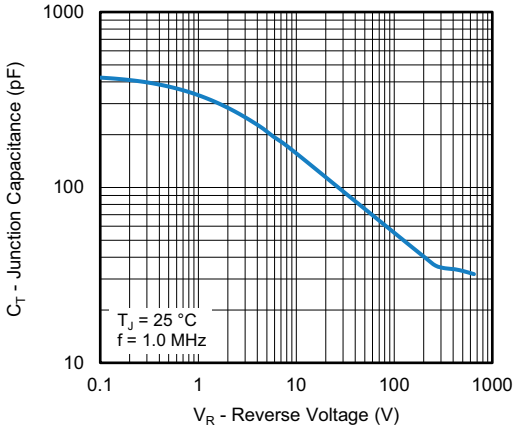



Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

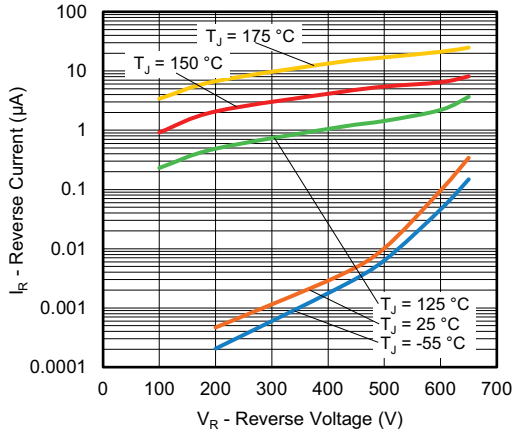



Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

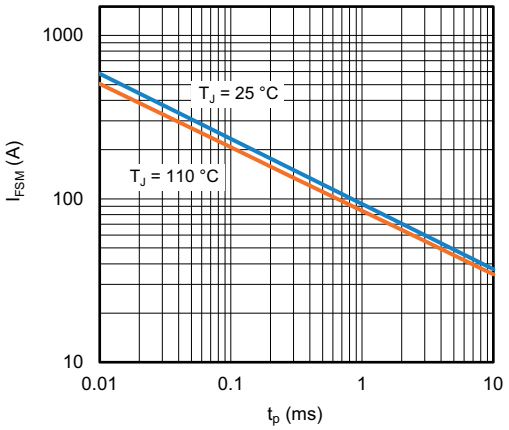



Fig. 4 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration (Square Wave)

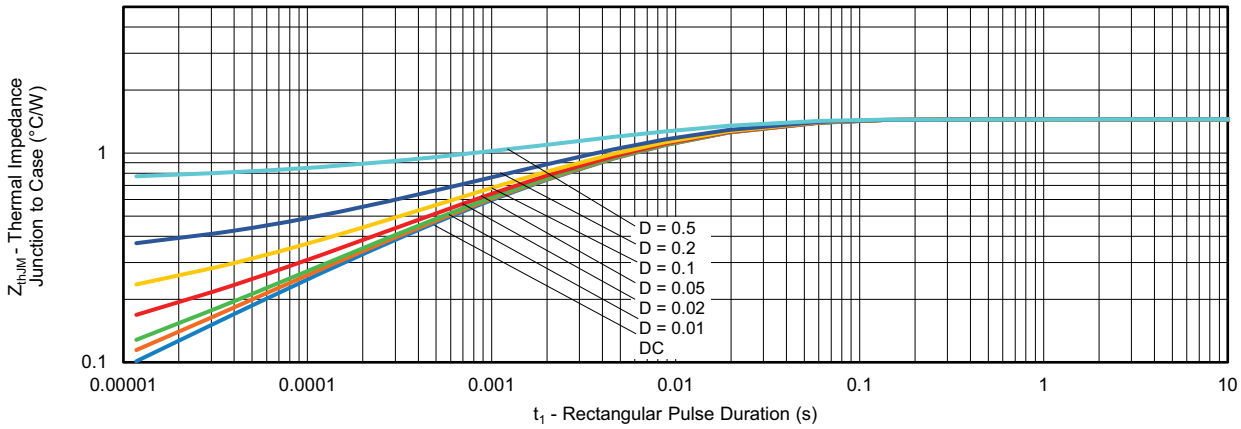



Fig. 5 - Typical Thermal Impedance $Z_{thJM}$ Characteristics

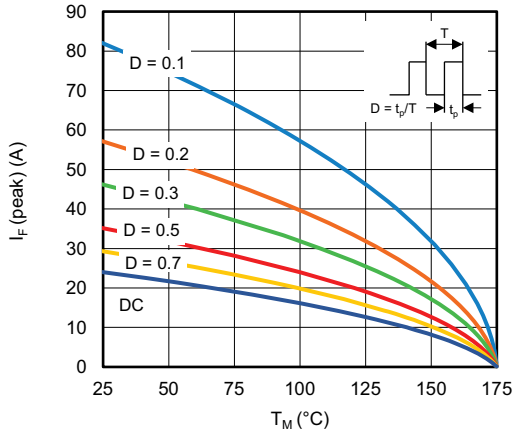



Fig. 6 - Peak Forward Current vs.
Maximum Allowable Mount Temperature

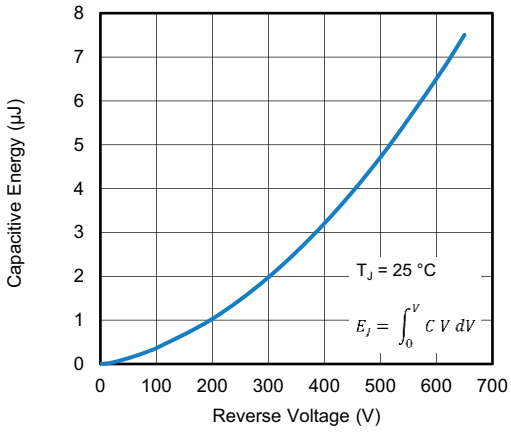



Fig. 8 - Typical Capacitive Energy vs. Reverse Voltage

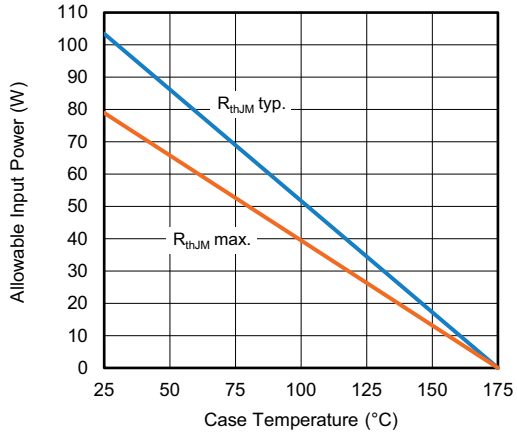



Fig. 7 - Forward Power Loss Characteristics

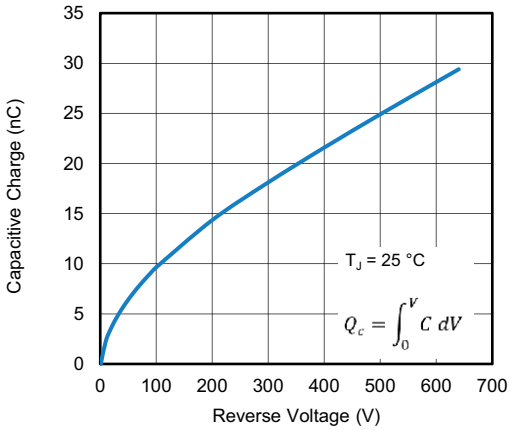
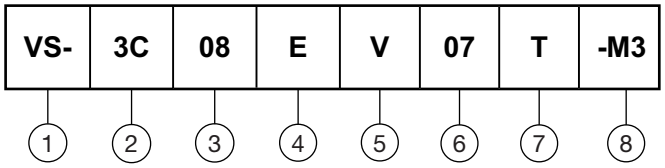



Fig. 9 - Typical Capacitive Charge vs. Reverse Voltage

## ORDERING INFORMATION TABLE

Device code



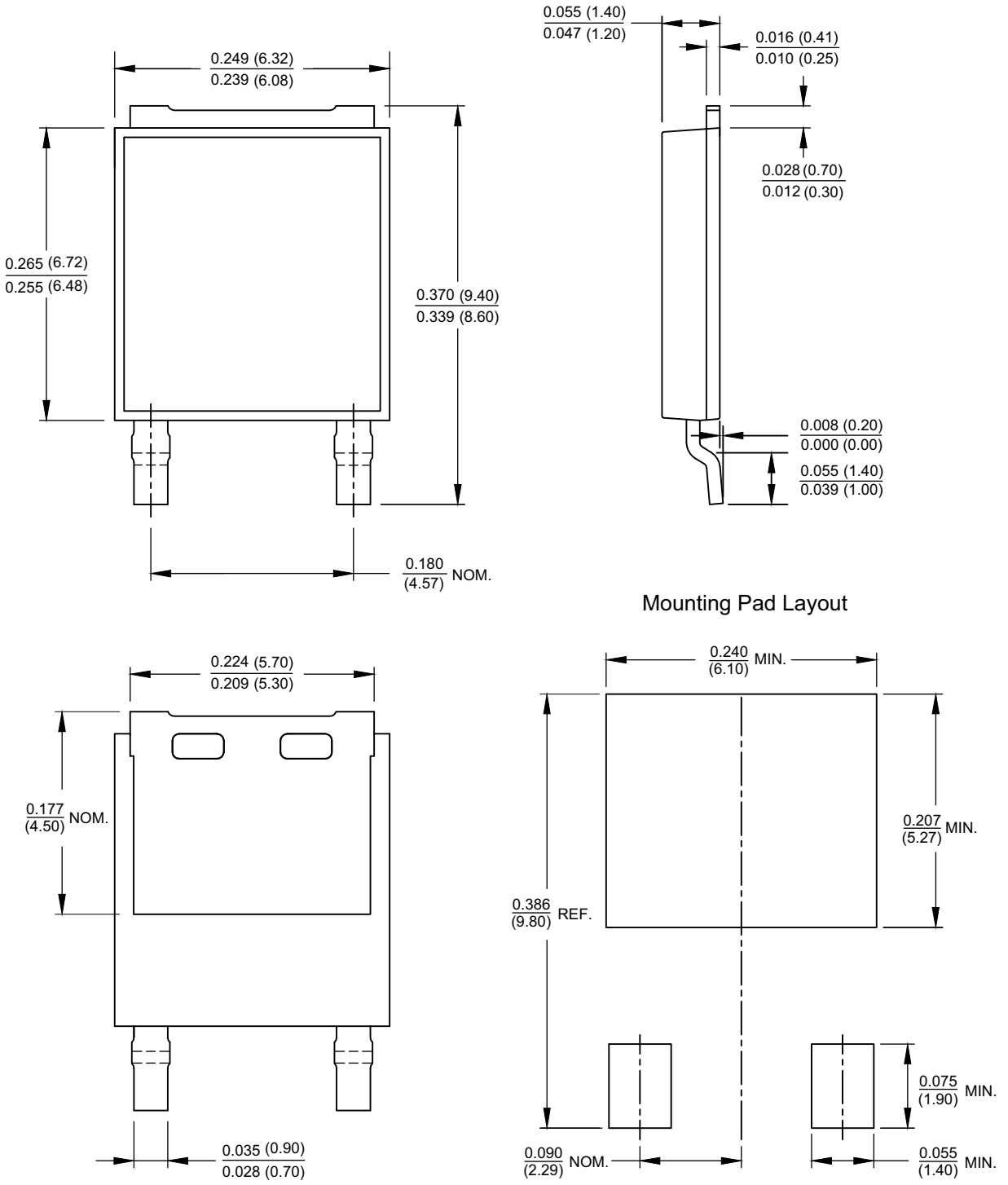

1 - Vishay Semiconductors product
2 - 3C = SiC diode, Generation 3
3 - Current rating (08 = 8 A)
4 - E = single diode
5 - Package SlimDPAK
6 - Voltage rating: (07 = 650 V)
7 - T = true 2 pin
8 - Environmental digit:
-M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free

| **ORDERING INFORMATION** (Example) | | | | |
|---|---|---|---|---|
| **ORDERING P/N** | **UNIT WEIGHT (g)** | **PACKAGE CODE** | **BASE QUANTITY** | **PACKAGING DESCRIPTION** |
| VS-3C08EV07T-M3/I | 0.20 | I | 4500 | 13"diameter plastic tape and reel |

| **LINKS TO RELATED DOCUMENTS** | |
|---|---|
| Dimensions | www.vishay.com/doc?97058 |
| Part marking information | www.vishay.com/doc?97104 |
| Packaging information | www.vishay.com/doc?88869 |

# SlimDPAK 2L

**DIMENSIONS** in millimeters (inches)



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