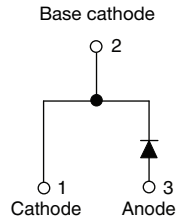


## 650 V Power SiC Merged PIN Schottky Diode, 6 A


**2L TO-220AC**

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

### FEATURES

- Majority carrier diode using Schottky technology on SiC wide band gap material
- 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 1A whisker test
- Solder bath temperature 275 °C maximum, 10 s per JESD 22-B106
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

### 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:** 2L TO-220AC

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

**Mounting torque:** 10 in-lbs maximum

| PRIMARY CHARACTERISTICS  |             |
|--------------------------|-------------|
| $I_{F(AV)}$              | 6 A         |
| $V_R$                    | 650 V       |
| $V_F$ at $I_F$ at 150 °C | 1.70 V      |
| $T_J$ max.               | 175 °C      |
| $I_R$ at $V_R$ at 175 °C | 4.4 $\mu$ A |
| $Q_C$ ( $V_R = 400$ V)   | 17 nC       |
| Package                  | 2L TO-220AC |
| Circuit configuration    | Single      |

| ABSOLUTE MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise specified) |                      |                                                    |             |                  |
|----------------------------------------------------------------------|----------------------|----------------------------------------------------|-------------|------------------|
| PARAMETER                                                            | SYMBOL               | TEST CONDITIONS                                    | VALUES      | UNITS            |
| Peak repetitive reverse voltage                                      | $V_{RRM}$            |                                                    | 650         | V                |
| Average rectified forward current                                    | $I_{F(AV)}$          | $T_C = 127$ °C (DC)                                | 6           | A                |
| DC blocking voltage                                                  | $V_{DC}$             |                                                    | 650         | V                |
| Repetitive peak surge current                                        | $I_{FRM}$            | $T_C = 25$ °C, $f = 50$ Hz, square wave, DC = 25 % | 23          | A                |
| Non-repetitive peak forward surge current                            | $I_{FSM}$            | $T_C = 25$ °C, $t_p = 10$ ms, half sine wave       | 39          |                  |
|                                                                      |                      | $T_C = 110$ °C, $t_p = 10$ ms, half sine wave      | 37          |                  |
| Power dissipation                                                    | $P_{tot}^{(1)}$      | $T_C = 25$ °C                                      | 42          | W                |
|                                                                      |                      | $T_C = 110$ °C                                     | 18          |                  |
| $I^2t$ value                                                         | $\int i^2 dt$        | $T_C = 25$ °C                                      | 8           | A <sup>2</sup> s |
|                                                                      |                      | $T_C = 110$ °C                                     | 6.8         |                  |
| Operating junction and storage temperatures                          | $T_J^{(2)}, T_{Stg}$ |                                                    | -55 to +175 | °C               |

### Notes

(1) Based on maximum  $R_{th}$

(2) The heat generated must be less than the thermal conductivity from junction-to-ambient:  $dP_D/dT_J < 1/R_{\theta JA}$



| <b>ELECTRICAL SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified) |        |                                                           |      |      |      |               |
|-------------------------------------------------------------------------------------------------|--------|-----------------------------------------------------------|------|------|------|---------------|
| PARAMETER                                                                                       | SYMBOL | TEST CONDITIONS                                           | MIN. | TYP. | MAX. | UNITS         |
| Forward voltage                                                                                 | $V_F$  | $I_F = 6\text{ A}$                                        | -    | 1.45 | 1.70 | V             |
|                                                                                                 |        | $I_F = 6\text{ A}, T_J = 150\text{ }^\circ\text{C}$       | -    | 1.70 | 2.10 |               |
|                                                                                                 |        | $I_F = 6\text{ A}, T_J = 175\text{ }^\circ\text{C}$       | -    | 1.80 | -    |               |
| Reverse leakage current                                                                         | $I_R$  | $V_R = V_R\text{ rated}$                                  | -    | -    | 35   | $\mu\text{A}$ |
|                                                                                                 |        | $V_R = V_R\text{ rated}, T_J = 150\text{ }^\circ\text{C}$ | -    | -    | 75   |               |
|                                                                                                 |        | $V_R = V_R\text{ rated}, T_J = 175\text{ }^\circ\text{C}$ | -    | 4.4  | -    |               |
| Total capacitance                                                                               | C      | $V_R = 1\text{ V}, f = 1\text{ MHz}$                      | -    | 250  | -    | pF            |
|                                                                                                 |        | $V_R = 400\text{ V}, f = 1\text{ MHz}$                    | -    | 27   | -    |               |
| Total capacitive charge                                                                         | $Q_C$  | $V_R = 400\text{ V}, f = 1\text{ MHz}$                    | -    | 17   | -    | nC            |

| <b>THERMAL - MECHANICAL SPECIFICATIONS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise specified) |            |                 |          |      |      |                    |
|-----------------------------------------------------------------------------------------------------------|------------|-----------------|----------|------|------|--------------------|
| PARAMETER                                                                                                 | SYMBOL     | TEST CONDITIONS | MIN.     | TYP. | MAX. | UNITS              |
| Thermal resistance, junction-to-case                                                                      | $R_{thJC}$ |                 | -        | 2.55 | 3.6  | $^\circ\text{C/W}$ |
| Marking device                                                                                            |            |                 | C06ET07T |      |      |                    |

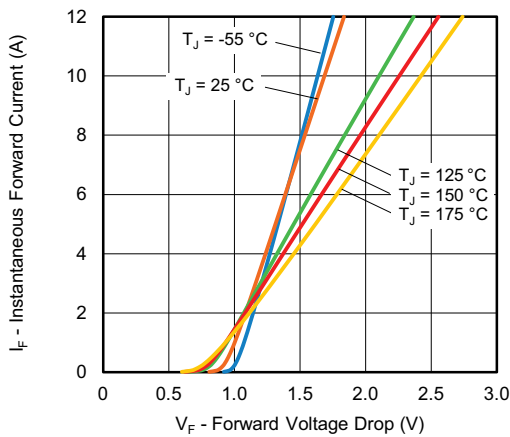


Fig. 1 - Typical Forward Voltage Drop Characteristics

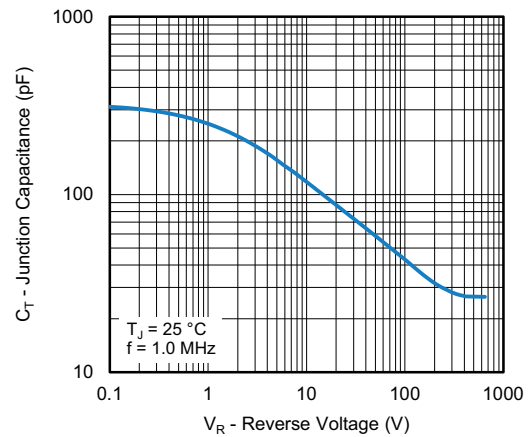


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

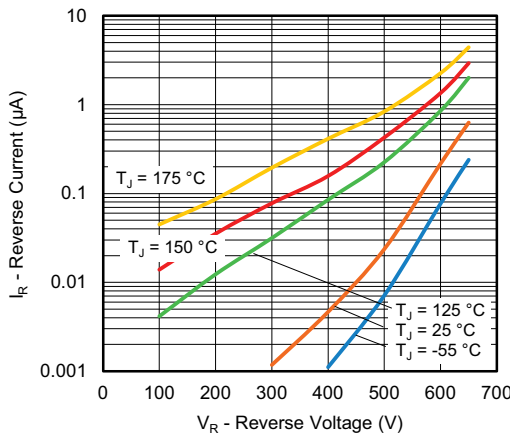


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

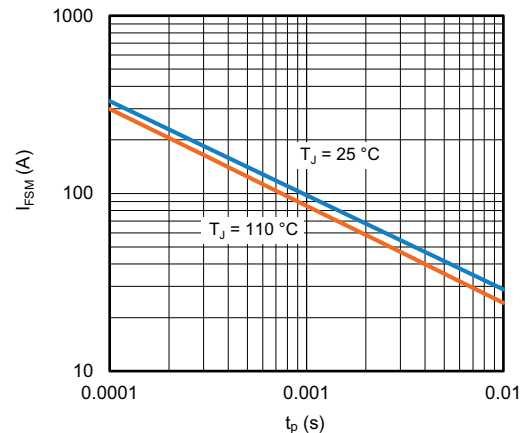


Fig. 4 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration (Square Wave)

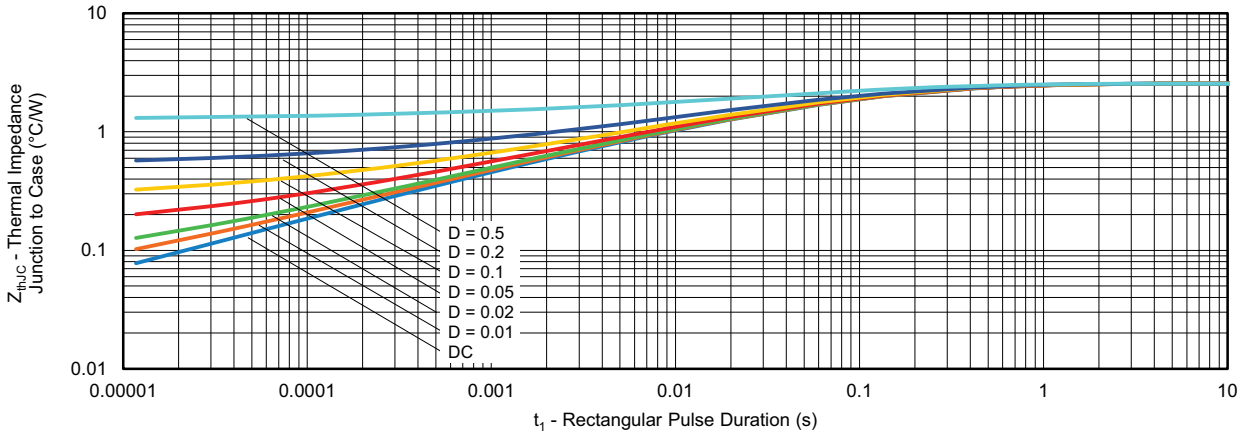


Fig. 5 - Typical Thermal Impedance  $Z_{thJC}$  Characteristics

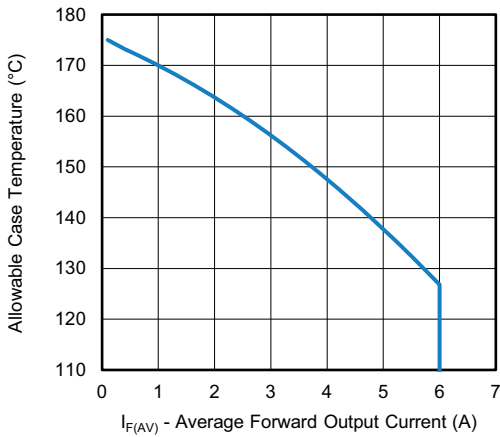


Fig. 6 - Maximum Allowable Case Temperature vs. Average Forward Current

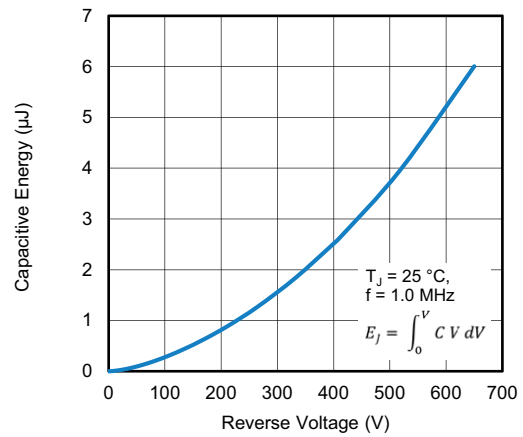


Fig. 8 - Typical Capacitive Energy vs. Reverse Voltage

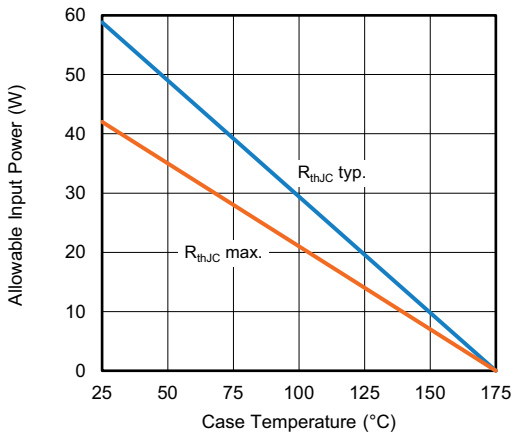


Fig. 7 - Forward Power Loss Characteristics

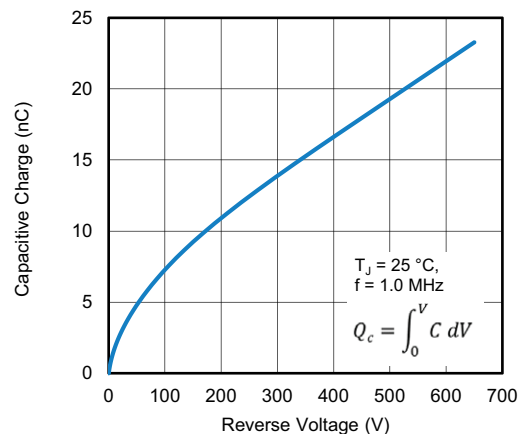
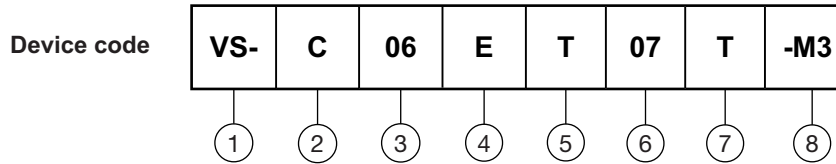


Fig. 9 - Typical Capacitive Charge vs. Reverse Voltage



## ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - C = SiC diode
- 3** - Current rating (06 = 6 A)
- 4** - E = single diode
- 5** - Package TO-220
- 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 |               |                        |                          |
|----------------------|---------------|------------------------|--------------------------|
| PREFERRED P/N        | BASE QUANTITY | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION    |
| VS-C06ET07T-M3       | 50/tube       | 1000                   | Antistatic plastic tubes |

| LINKS TO RELATED DOCUMENTS |                                                                        |
|----------------------------|------------------------------------------------------------------------|
| Dimensions                 | <a href="http://www.vishay.com/doc?96069">www.vishay.com/doc?96069</a> |
| Part marking information   | <a href="http://www.vishay.com/doc?95391">www.vishay.com/doc?95391</a> |



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