

# SOT-227 Silicon Carbide Schottky Barrier Diode, 650 V, 120 A



SOT-227


**RoHS**  
COMPLIANT

## FEATURES

- Virtually no recovery tail and no switching losses
- Majority carrier diode using Schottky technology on SiC wide band gap material
- Improved  $V_F$  and efficiency by thin wafer technology
- High speed switching, low switching losses
- Positive temperature coefficient, for easy paralleling
- Electrically isolated base plate
- Large creepage distance between terminal
- Simplified mechanical designs, rapid assembly
- Designed and qualified for industrial level
- UL approved file E78996 
- 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

| PRIMARY CHARACTERISTICS                                     |                                       |
|-------------------------------------------------------------|---------------------------------------|
| $V_R$                                                       | 650 V                                 |
| $V_F$ (typical) at 60 A, per diode                          | 1.39 V                                |
| $Q_C$ (typical), per diode                                  | 164 nC                                |
| $I_{F(DC)}$ per module at $T_C = 127\text{ }^\circ\text{C}$ | 120 A                                 |
| Type                                                        | Modules - diode, SiC Schottky         |
| Package                                                     | SOT-227                               |
| Circuit configuration                                       | Two separate diodes, parallel pin-out |

| ABSOLUTE MAXIMUM RATINGS                         |                |                                                      |             |                  |
|--------------------------------------------------|----------------|------------------------------------------------------|-------------|------------------|
| PARAMETER                                        | SYMBOL         | TEST CONDITIONS                                      | MAX.        | UNITS            |
| Cathode to anode voltage                         | $V_R$          |                                                      | 650         | V                |
| Continuous forward current per diode             | $I_F$          | $T_C = 127\text{ }^\circ\text{C}$                    | 60          | A                |
| Single pulse forward current per diode           | $I_{FSM}$      | $T_J = 25\text{ }^\circ\text{C}$ , 6 ms square pulse | 340         |                  |
| Maximum power dissipation per module             | $P_D$          | $T_C = 127\text{ }^\circ\text{C}$                    | 228         | W                |
| RMS isolation voltage                            | $V_{ISOL}$     | Any terminal to case, $t = 1\text{ min}$             | 2500        | V                |
| Operating junction and storage temperature range | $T_J, T_{Stg}$ |                                                      | -55 to +175 | $^\circ\text{C}$ |

| ELECTRICAL SPECIFICATIONS ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified) |          |                                                       |      |      |      |               |
|------------------------------------------------------------------------------------------|----------|-------------------------------------------------------|------|------|------|---------------|
| PARAMETER                                                                                | SYMBOL   | TEST CONDITIONS                                       | MIN. | TYP. | MAX. | UNITS         |
| Cathode to anode breakdown voltage                                                       | $V_{BR}$ | $I_R = 300\text{ }\mu\text{A}$                        | 650  | -    | -    | V             |
| Forward voltage                                                                          | $V_{FM}$ | $I_F = 60\text{ A}$                                   | -    | 1.39 | 1.59 |               |
|                                                                                          |          | $I_F = 60\text{ A}, T_J = 150\text{ }^\circ\text{C}$  | -    | 1.61 | -    |               |
| Reverse leakage current                                                                  | $I_{RM}$ | $V_R = 650\text{ V}$                                  | -    | 2.6  | 120  | $\mu\text{A}$ |
|                                                                                          |          | $T_J = 125\text{ }^\circ\text{C}, V_R = 650\text{ V}$ | -    | 9.2  | -    |               |
|                                                                                          |          | $T_J = 150\text{ }^\circ\text{C}, V_R = 650\text{ V}$ | -    | 13.1 | -    |               |
| Junction capacitance                                                                     | $C_T$    | $V_R = 650\text{ V}, f = 1\text{ MHz}$                | -    | 240  | -    | pF            |

**DYNAMIC RECOVERY CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$  unless otherwise specified)

| PARAMETER               | SYMBOL | TEST CONDITIONS      | MIN. | TYP. | MAX. | UNITS |
|-------------------------|--------|----------------------|------|------|------|-------|
| Total capacitive charge | $Q_C$  | $V_R = 400\text{ V}$ | -    | 164  | -    | nC    |

**THERMAL - MECHANICAL SPECIFICATIONS**

| PARAMETER                                       | SYMBOL     | TEST CONDITIONS       | MIN.    | TYP. | MAX.       | UNITS              |
|-------------------------------------------------|------------|-----------------------|---------|------|------------|--------------------|
| Thermal resistance junction to case, per diode  | $R_{thJC}$ |                       | -       | -    | 0.42       | $^\circ\text{C/W}$ |
| Thermal resistance junction to case, per module |            |                       | -       | -    | 0.21       |                    |
| Thermal resistance case to heatsink, per module | $R_{thCS}$ | Flat, greased surface | -       | 0.05 | -          |                    |
| Weight                                          |            |                       | -       | 30   | -          | g                  |
| Mounting torque                                 |            | Torque per diode      | -       | -    | 1.1 (9.7)  | Nm (lbf.in)        |
|                                                 |            | Torque to heatsink    | -       | -    | 1.8 (15.9) | Nm (lbf.in)        |
| Case style                                      |            |                       | SOT-227 |      |            |                    |

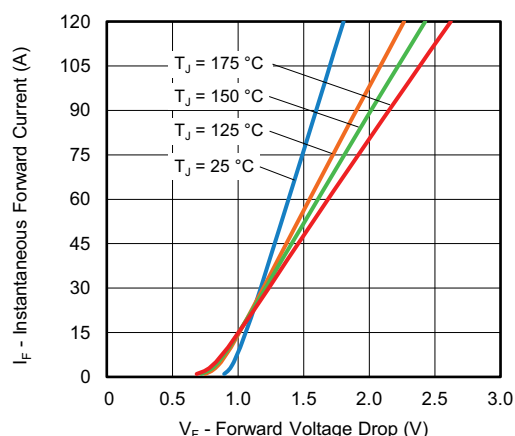


Fig. 1 - Instantaneous Forward Current vs. Forward Voltage Drop Characteristics

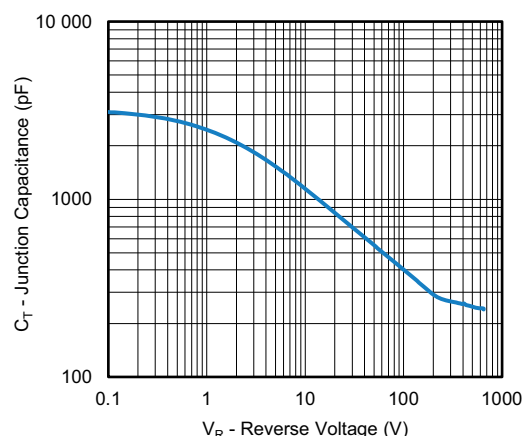


Fig. 3 - Junction Capacitance vs. Reverse Voltage

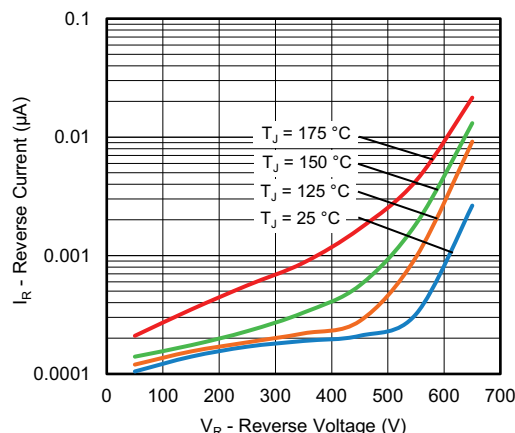


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

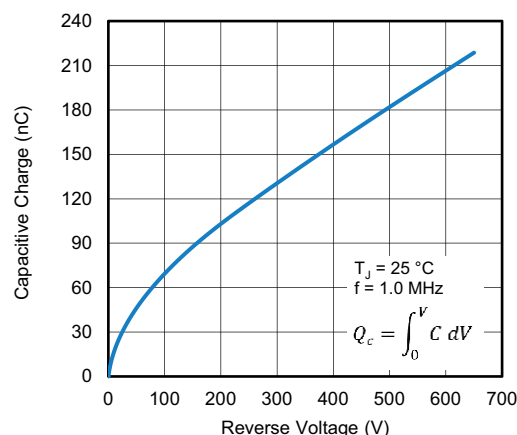


Fig. 4 - Typical Capacitive Charge vs. Reverse Voltage

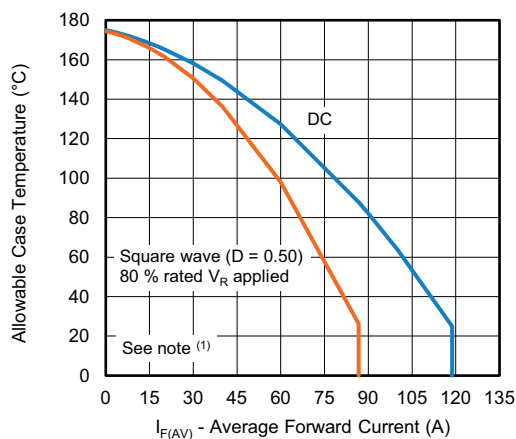


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

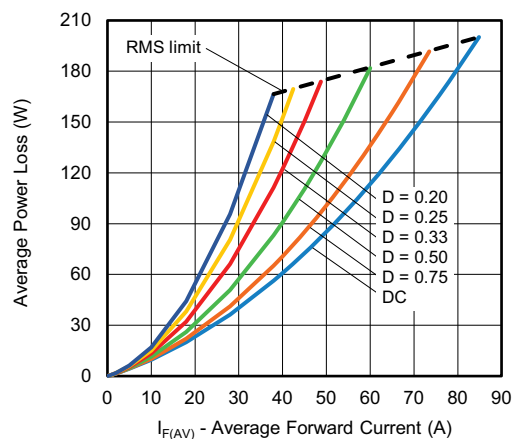


Fig. 6 - Forward Power Loss Characteristics

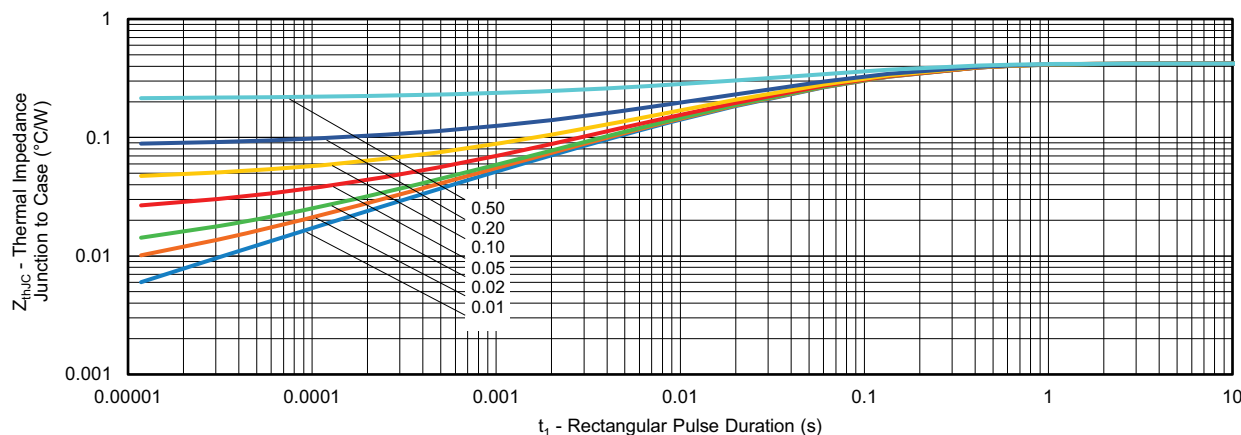


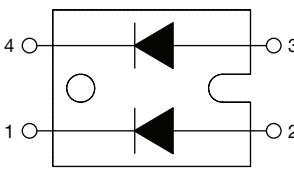
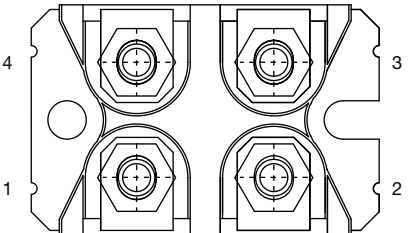
Fig. 7 - Maximum Thermal Impedance Characteristics

## ORDERING INFORMATION TABLE

| Device code | VS- | SC | 120 | F | A | 65 |
|-------------|-----|----|-----|---|---|----|
|             | 1   | 2  | 3   | 4 | 5 | 6  |

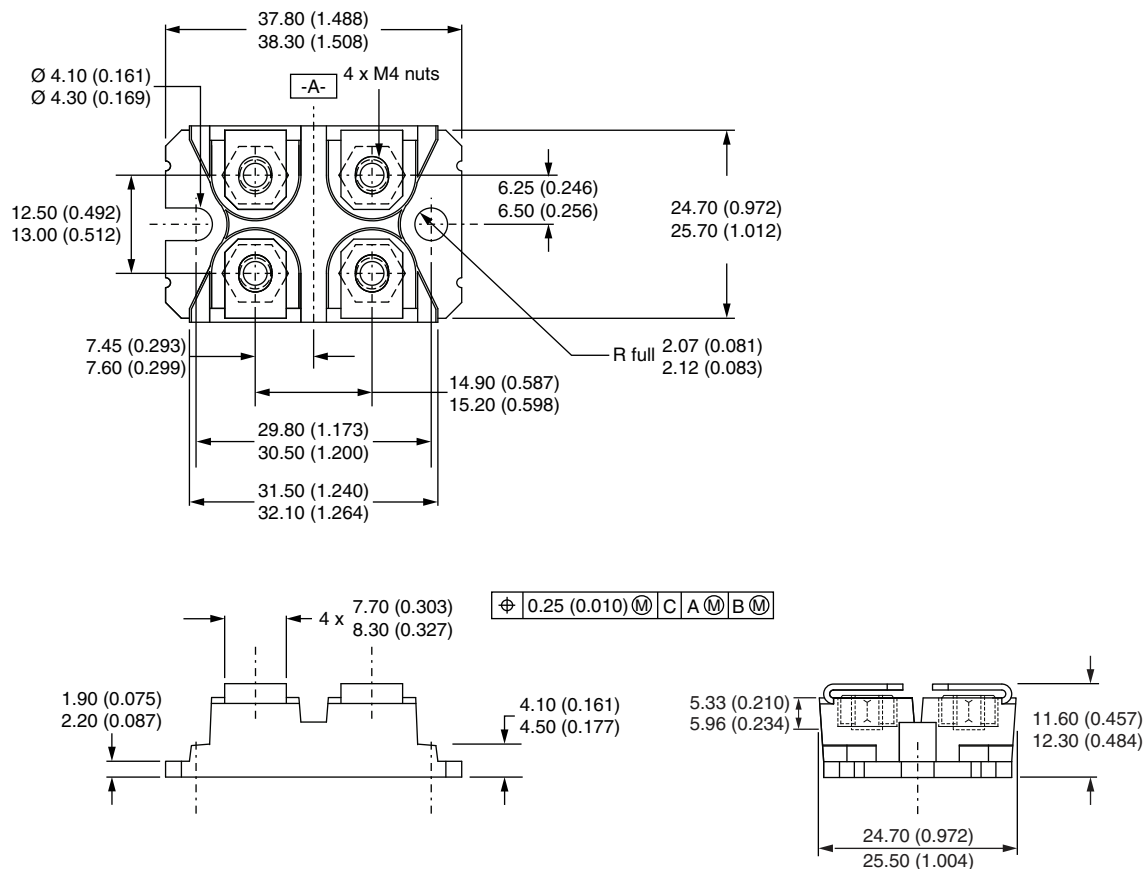
- 1** - Vishay Semiconductors product
- 2** - SC = SiC Schottky Barrier Diode
- 3** - Current rating per module (120 = 120 A)
- 4** - F = circuit configuration (two separate diodes, parallel pin-out)
- 5** - Package indicator (SOT-227 standard insulated base)
- 6** - Voltage rating (65 = 650 V)



| CIRCUIT CONFIGURATION                 |                            |                                                                                                                                                                                                                             |
|---------------------------------------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CIRCUIT                               | CIRCUIT CONFIGURATION CODE | CIRCUIT DRAWING                                                                                                                                                                                                             |
| Two separate diodes, parallel pin-out | F                          | <div><div></div><div><p>Lead Assignment</p></div></div> |
| LINKS TO RELATED DOCUMENTS            |                            |                                                                                                                                                                                                                             |
| Dimensions                            |                            | <a href="http://www.vishay.com/doc?95423">www.vishay.com/doc?95423</a>                                                                                                                                                      |
| Packaging information                 |                            | <a href="http://www.vishay.com/doc?95425">www.vishay.com/doc?95425</a>                                                                                                                                                      |

## SOT-227 Generation 2

**DIMENSIONS** in millimeters (inches)



### Note

- Controlling dimension: millimeter



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