


## SOT-227 Silicon Carbide Schottky Barrier Diode, 650 V, 40 A


**SOT-227**

| PRIMARY CHARACTERISTICS                         |                                       |
|---|---------------------------------------|
| $V_R$   | 650 V                                 |
| $V_F$ (typical) at 20 A, per diode              | 1.36 V                                |
| $Q_C$ (typical), per diode                      | 56 nC                                 |
| $I_{F(DC)}$ per module at $T_C = 136\text{ °C}$ | 40 A                                  |
| Type  | Modules - diode, SiC Schottky         |
| Package   | SOT-227                               |
| Circuit configuration                           | Two separate diodes, parallel pin-out |

### 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)


**RoHS  
COMPLIANT**

### 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

| ABSOLUTE MAXIMUM RATINGS                         |                |  |             |       |
|--|----------------|--|-------------|-------|
| PARAMETER  | SYMBOL         | TEST CONDITIONS                          | MAX.        | UNITS |
| Cathode to anode voltage                         | $V_R$          |  | 650         | V     |
| Continuous forward current per diode             | $I_F$          | $T_C = 136\text{ °C}$                    | 20          | A     |
| Single pulse forward current per diode           | $I_{FSM}$      | $T_J = 25\text{ °C}$ , 6 ms square pulse | 105         |       |
| Maximum power dissipation per module             | $P_D$          | $T_C = 136\text{ °C}$                    | 74          | 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 | °C    |

| ELECTRICAL SPECIFICATIONS ( $T_J = 25\text{ °C}$ unless otherwise specified) |          |  |      |      |      |               |
|--|----------|--|------|------|------|---------------|
| PARAMETER  | SYMBOL   | TEST CONDITIONS                              | MIN. | TYP. | MAX. | UNITS         |
| Cathode to anode breakdown voltage   | $V_{BR}$ | $I_R = 100\text{ }\mu\text{A}$               | 650  | -    | -    | V             |
| Forward voltage  | $V_{FM}$ | $I_F = 20\text{ A}$                          | -    | 1.36 | 1.55 |               |
|  |          | $I_F = 20\text{ A}$ , $T_J = 150\text{ °C}$  | -    | 1.57 | -    |               |
| Reverse leakage current  | $I_{RM}$ | $V_R = 650\text{ V}$                         | -    | 1    | 40   | $\mu\text{A}$ |
|  |          | $T_J = 125\text{ °C}$ , $V_R = 650\text{ V}$ | -    | 3.1  | -    |               |
|  |          | $T_J = 150\text{ °C}$ , $V_R = 650\text{ V}$ | -    | 4.6  | -    |               |
| Junction capacitance   | $C_T$    | $V_R = 650\text{ V}$ , $f = 1\text{ MHz}$    | -    | 82   | -    | pF            |



| DYNAMIC RECOVERY CHARACTERISTICS (T <sub>J</sub> = 25 °C unless otherwise specified) |                |                        |      |      |      |       |
|--|----------------|------------------------|------|------|------|-------|
| PARAMETER  | SYMBOL         | TEST CONDITIONS        | MIN. | TYP. | MAX. | UNITS |
| Total capacitive charge  | Q <sub>C</sub> | V <sub>R</sub> = 400 V | -    | 56   | -    | nC    |

| THERMAL - MECHANICAL SPECIFICATIONS             |                   |                       |         |      |            |             |
|---|-------------------|-----------------------|---------|------|------------|-------------|
| PARAMETER                                       | SYMBOL            | TEST CONDITIONS       | MIN.    | TYP. | MAX.       | UNITS       |
| Thermal resistance junction to case, per diode  | R <sub>thJC</sub> |                       | -       | -    | 1.06       | °C/W        |
| Thermal resistance junction to case, per module |                   |                       | -       | -    | 0.53       |             |
| Thermal resistance case to heatsink, per module | R <sub>thCS</sub> | 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 |      |            |             |

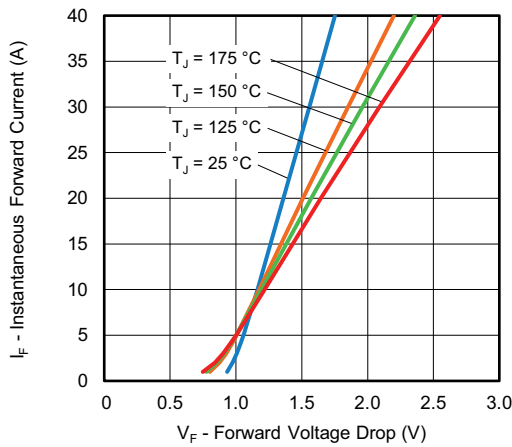


Fig. 1 - Typical Forward Voltage Drop Characteristics

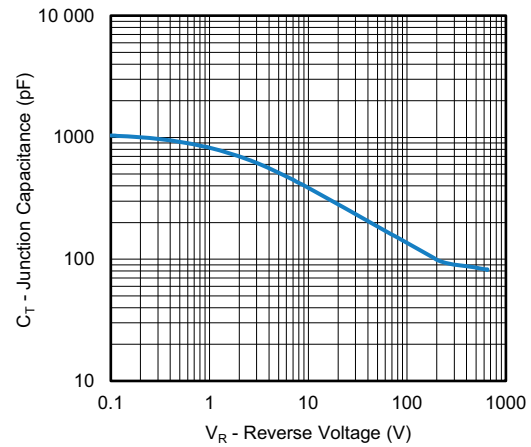


Fig. 3 - Junction Capacitance vs. Reverse Voltage

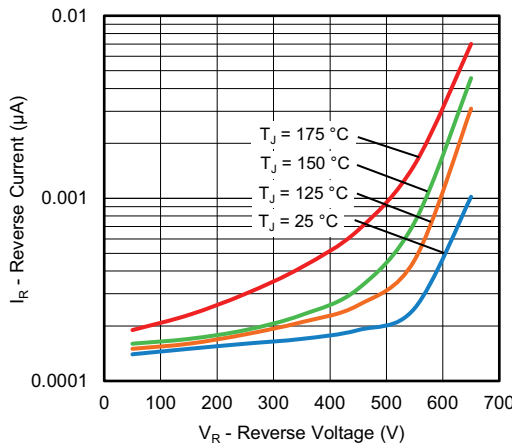


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

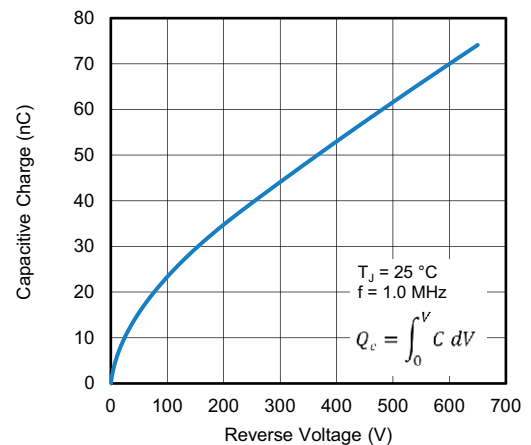


Fig. 4 - Typical Capacitive Charge vs. Reverse Voltage

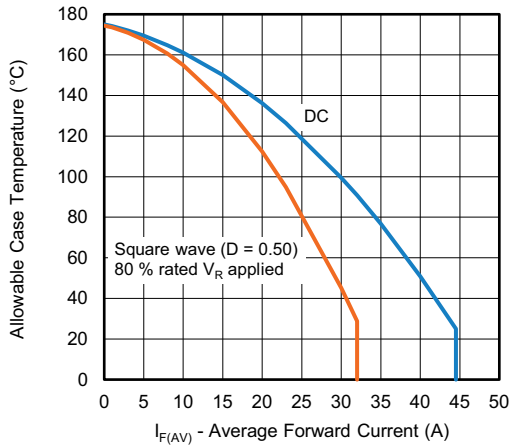


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

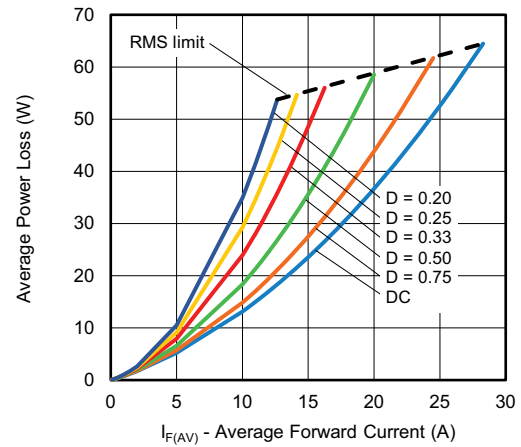


Fig. 6 - Forward Power Loss Characteristics

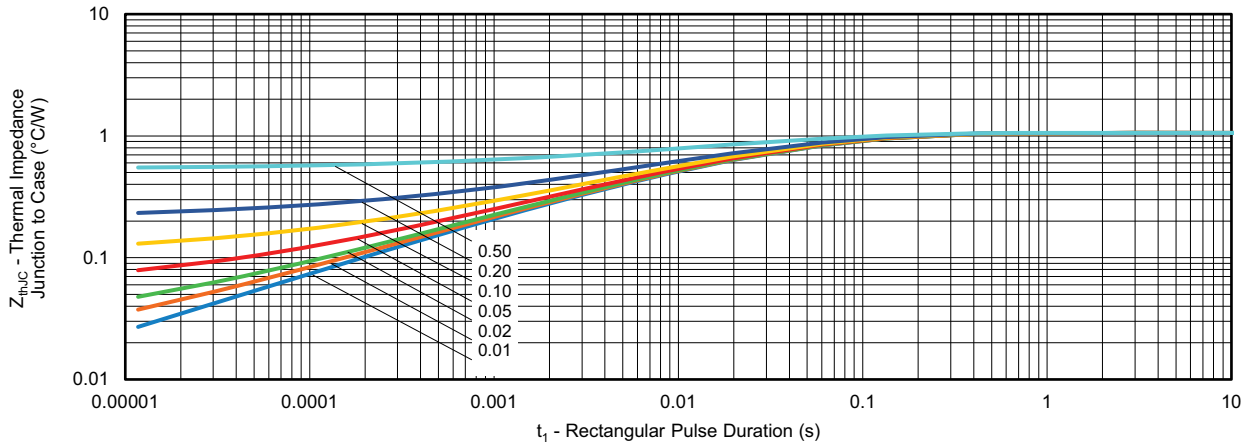


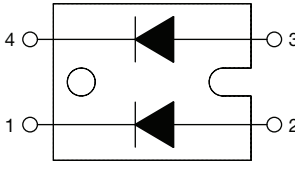
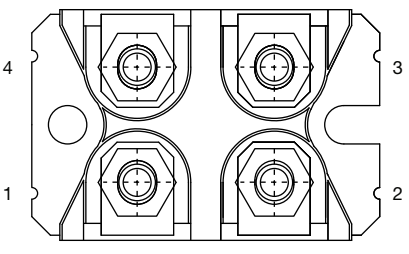
Fig. 7 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

**ORDERING INFORMATION TABLE**

|             |            |           |           |          |          |           |
|-------------|------------|-----------|-----------|----------|----------|-----------|
| Device code | <b>VS-</b> | <b>SC</b> | <b>40</b> | <b>F</b> | <b>A</b> | <b>65</b> |
|             | ①          | ②         | ③         | ④        | ⑤        | ⑥         |

- 1** - Vishay Semiconductors product
- 2** - SC = SiC Schottky Barrier Diode
- 3** - Current rating per module (40 = 40 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                          |   |

| 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



## Disclaimer

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