



650V 50A SiC Schottky Diode – SiS650S50AS

Rev 1.0
30/10/23

Silicon Carbide Schottky Barrier Rectifier diode in bare die form

Features:

- Capable of high temperature operation $\geq 175^{\circ}\text{C}$
- High Frequency Operation
- High Surge Current Capability
- No Reverse Recovery / No Forward Recovery
- Positive Temperature Coefficient

Ordering Information:

The following part suffixes apply:

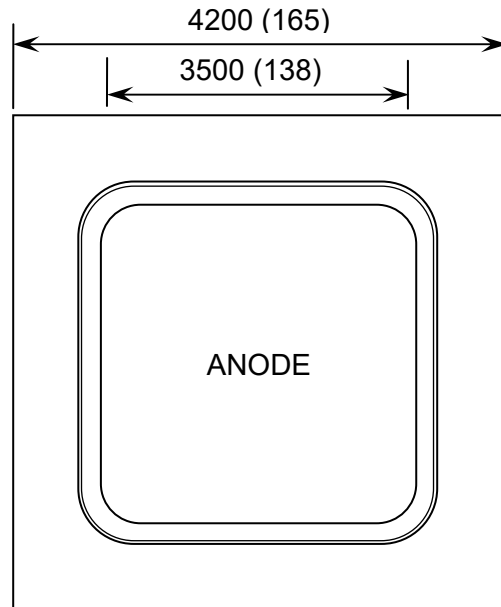
- No suffix - MIL-STD-750 /2073 Visual Inspection
- "H" - MIL-STD-750 /2073 Visual Inspection
+ MIL-PRF-38534 Class H LAT
- "K" - MIL-STD-750 /2073 Visual Inspection
+ MIL-PRF-38534 Class K LAT

LAT = Lot Acceptance Test.

For further information on LAT process flows see below.

www.siliconsupplies.com/quality/bare-die-lot-qualification

Die Dimensions in μm (mils)



CHIP BACKSIDE IS CATHODE

Supply Formats:

- Default – Die in Waffle Pack (100 per tray capacity)
- Sawn Wafer on Tape – By specific request
- Unsawn Wafer – By specific request
- With additional electrical selection – By specific request

Mechanical Specification

| | | |
|------------------------|----------------------------------|-----------------------|
| Die Size (Unsawn) | 4200 x 4200 165 x 165 | μm mils |
| Anode Pad Size | 3500 x 3500 138 x 138 | μm mils |
| Die Thickness | 350 (± 20) 13.78 (0.79) | μm mils |
| Top Metal Composition | Al 4 μm | |
| Back Metal Composition | Ag 0.4 μm | |





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Absolute Maximum Ratings $T_J = 25^\circ\text{C}$ unless otherwise stated

| PARAMETER | SYMBOL | VALUE | UNIT |
|--|-------------|------------|------------------|
| Repetitive peak reverse voltage | V_{RRM} | 650 | V |
| Surge peak reverse voltage | V_{RSM} | 650 | V |
| DC Peak Blocking Voltage | V_{BR} | 650 | V |
| Average forward rectified current | $I_{F(AV)}$ | 50 | A |
| Repetitive Peak Forward Surge Current | I_{FRM} | 121 | A |
| Peak Single-Cycle Non-Repetitive Surge Current | I_{FSM} | 300 | A |
| Operating Junction temperature | T_J | -55 to 175 | $^\circ\text{C}$ |
| Storage Temperature Range | T_{STG} | -65 to 175 | $^\circ\text{C}$ |

Electrical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise stated

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
|--|-------------------|--|-----|-------|------|---------------|
| Maximum instantaneous forward voltage ¹ | V_{F1} | $V_{RRM} = 650\text{V}, I_{FM} = 50\text{A}$ | - | 1.50 | 1.70 | V |
| | V_{F2} | $V_{RRM} = 650\text{V}, I_{FM} = 50\text{A}, T_J = 175^\circ\text{C}$ | - | 2.00 | 2.40 | |
| Maximum reverse leakage current ¹ | $I_{RM} @ V_{RM}$ | $V_R = 650\text{V}$ | - | 1 | 40 | μA |
| | | $V_R = 650\text{V}, T_J = 175^\circ\text{C}$ | - | 10 | 60 | |
| Junction Capacitance | C_T | $V_R = 0\text{V}, f = 1\text{MHz}$ | - | 3100 | - | pF |
| Reverse Recovery Charge | Q_C | $V_R = 400\text{V}, I_F = 50\text{A}, di/dt = 200\text{A}/\mu\text{s}$ | - | 193.4 | - | nC |
| Capacitance Stored Energy | E_C | $V_R = 400\text{V}$ | - | 47.37 | - | μJ |

1. Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2.0\%$

Typical Characteristics $T_J = 25^\circ\text{C}$

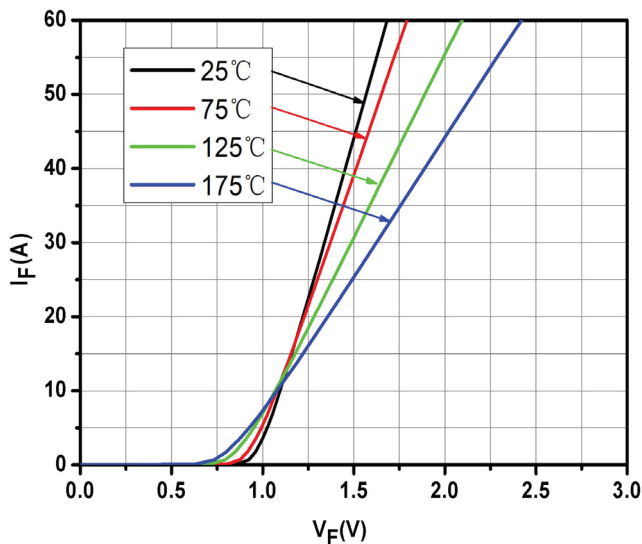


FIGURE 1. Forward Voltage Characteristics

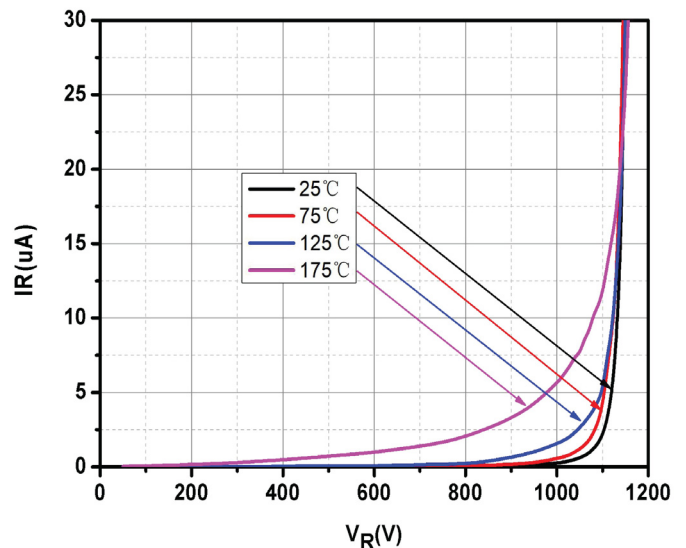


FIGURE 2. Reverse Characteristics





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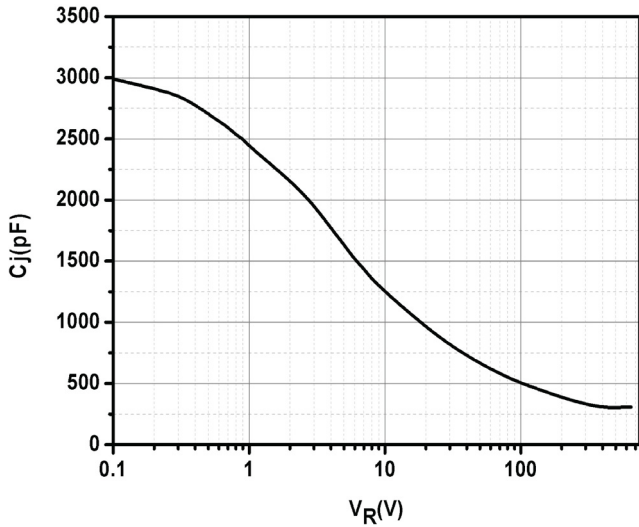


FIGURE 3. Capacitance Versus Reverse Voltage

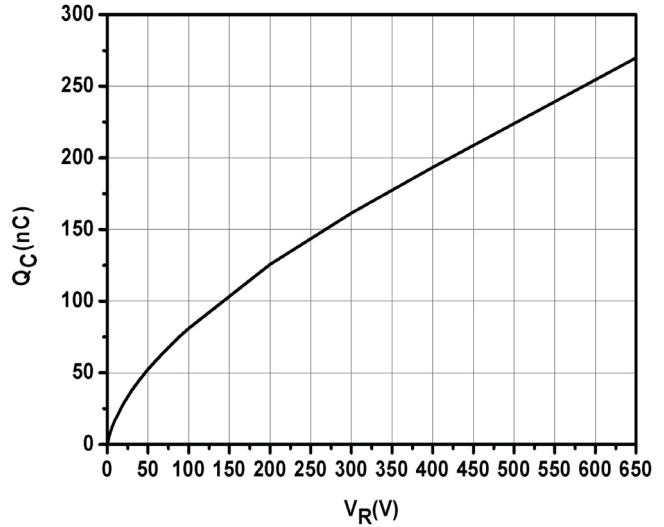


FIGURE 4. Total Capacitance Charge Versus Reverse Voltage

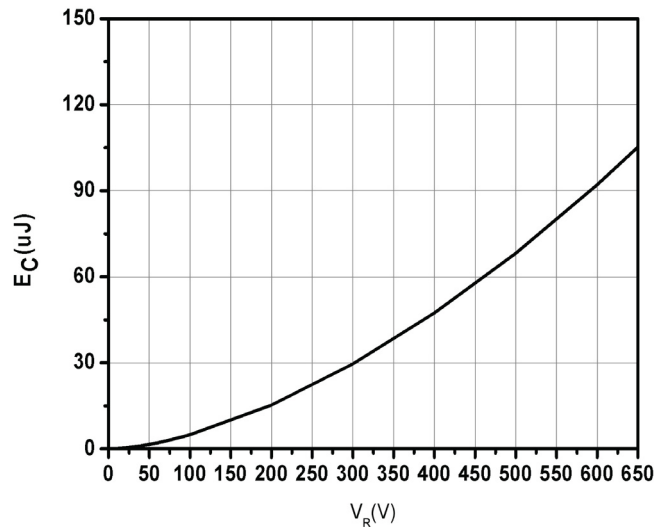


FIGURE 5. Capacitance Stored Energy

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