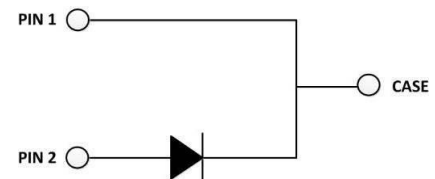


# 3<sup>rd</sup> Generation 650V/20A SiC Schottky Barrier Diode

## Features

- Revolutionary semiconductor material - Silicon Carbide (SiC)
- No reverse recovery
- High-speed switching performance
- Temperature-independent switching behavior
- System cost / size savings due to reduced cooling requirements
- Junction temperature range from -55°C to 175°C
- RoHS compliant



Package Type: TO-252-2L



## Potential Applications

- Industrial power supplies: Industrial UPS
- Battery chargers
- Solar inverters
- Switch mode power supplies

## Description

The SDS065J020D3 SiC Schottky Barrier Diode (SBD) has been developed using Sanan's advanced 3<sup>rd</sup> generation SiC SBD technology with the highest performance and reliability. It registers higher efficiency, higher operation temperature and lower loss and can be operated at higher frequency than Si-based solutions. As to the Schottky structure, it shows no recovery at turn-off and allows a low leakage current with reverse voltage up to 650V. It can contribute to system miniaturization and achieve lightweight system design. Using RoHS compliant components, it is qualified for use in industrial application.

## Product Specifications

| Device       | $V_{RRM}$ | $I_F$ (135°C) | $V_F$ (25°C) | $Q_C$ | Marking    |
|--------------|-----------|---------------|--------------|-------|------------|
| SDS065J020D3 | 650V      | 25A           | 1.35V        | 55nC  | DS065020D3 |

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**Table 1. Maximum Ratings**

(T<sub>C</sub> = 25°C, unless otherwise specified)

| Parameter                            | Symbol             | Value   | Unit             | Test conditions                                                      |
|--------------------------------------|--------------------|---------|------------------|----------------------------------------------------------------------|
| Repetitive peak reverse voltage      | V <sub>RRM</sub>   | 650     | V                | T <sub>C</sub> = 25°C                                                |
| Surge peak reverse voltage           | V <sub>RSM</sub>   | 650     |                  | T <sub>C</sub> = 25°C                                                |
| DC reverse voltage                   | V <sub>DC</sub>    | 650     |                  | T <sub>C</sub> = 25°C                                                |
| Continuous forward current           | I <sub>F</sub>     | 51      | A                | T <sub>C</sub> = 25°C                                                |
|                                      |                    | 25      |                  | T <sub>C</sub> = 135°C                                               |
|                                      |                    | 20      |                  | T <sub>C</sub> = 150°C                                               |
| Surge non-repetitive forward current | I <sub>FSM</sub>   | 110     | A                | T <sub>C</sub> = 25°C, t <sub>p</sub> = 10ms, half sine pulse        |
| Non-repetitive peak forward current  | I <sub>F,Max</sub> | 520     | A                | T <sub>C</sub> = 25°C, t <sub>p</sub> = 10μs, pulse                  |
| Surge repetitive forward current     | I <sub>FRM</sub>   | 47      | A                | T <sub>C</sub> = 25°C, t <sub>p</sub> = 10ms, half sine wave D = 0.1 |
| Power dissipation                    | P <sub>tot</sub>   | 178     | W                | T <sub>C</sub> = 25°C                                                |
| i <sup>2</sup> t value               | ∫i <sup>2</sup> dt | 60      | A <sup>2</sup> s | T <sub>C</sub> = 25°C, t <sub>p</sub> = 10ms                         |
| Operating junction temperature       | T <sub>j</sub>     | -55~175 | °C               |                                                                      |
| Storage temperature                  | T <sub>stg</sub>   | -55~175 | °C               |                                                                      |

**Table 2. Thermal Resistance**

| Parameter                                | Symbol               | Values |      |      | Unit | Test condition |
|------------------------------------------|----------------------|--------|------|------|------|----------------|
|                                          |                      | Min.   | Typ. | Max. |      |                |
| Thermal resistance from junction to case | R <sub>th(j-c)</sub> | /      | 0.84 | /    | °C/W |                |

**Table 3. Static Electrical Characteristics**

( $T_j = 25^\circ\text{C}$ , unless otherwise specified)

| Parameter           | Symbol   | Values |      |      | Unit          | Test conditions                                 |
|---------------------|----------|--------|------|------|---------------|-------------------------------------------------|
|                     |          | Min.   | Typ. | Max. |               |                                                 |
| DC blocking voltage | $V_{DC}$ | 650    | /    | /    | V             | $I_R = 100\ \mu\text{A}$                        |
| Forward voltage     | $V_F$    | /      | 1.35 | 1.50 | V             | $I_F = 20\text{A}$ , $T_j = 25^\circ\text{C}$   |
|                     |          | /      | 1.70 | 1.90 |               | $I_F = 20\text{A}$ , $T_j = 175^\circ\text{C}$  |
| Reverse current     | $I_R$    | /      | 2    | 40   | $\mu\text{A}$ | $V_R = 650\text{V}$ , $T_j = 25^\circ\text{C}$  |
|                     |          | /      | 10   | 100  |               | $V_R = 650\text{V}$ , $T_j = 175^\circ\text{C}$ |

**Table 4. Dynamic Electrical Characteristics**

( $T_j = 25^\circ\text{C}$ , unless otherwise specified)

| Parameter                 | Symbol | Values |      |      | Unit          | Test conditions                         |
|---------------------------|--------|--------|------|------|---------------|-----------------------------------------|
|                           |        | Min.   | Typ. | Max. |               |                                         |
| Total capacitance         | C      | /      | 1018 | /    | pF            | $V_R = 0\text{V}$ , $f = 1\text{MHz}$   |
|                           |        | /      | 104  | /    |               | $V_R = 200\text{V}$ , $f = 1\text{MHz}$ |
|                           |        | /      | 89   | /    |               | $V_R = 400\text{V}$ , $f = 1\text{MHz}$ |
| Total capacitive charge   | $Q_C$  | /      | 55   | /    | nC            | $V_R = 400\text{V}$                     |
| Capacitance stored energy | $E_C$  | /      | 8.3  | /    | $\mu\text{J}$ | $V_R = 400\text{V}$                     |

## Electrical Characteristic Diagrams

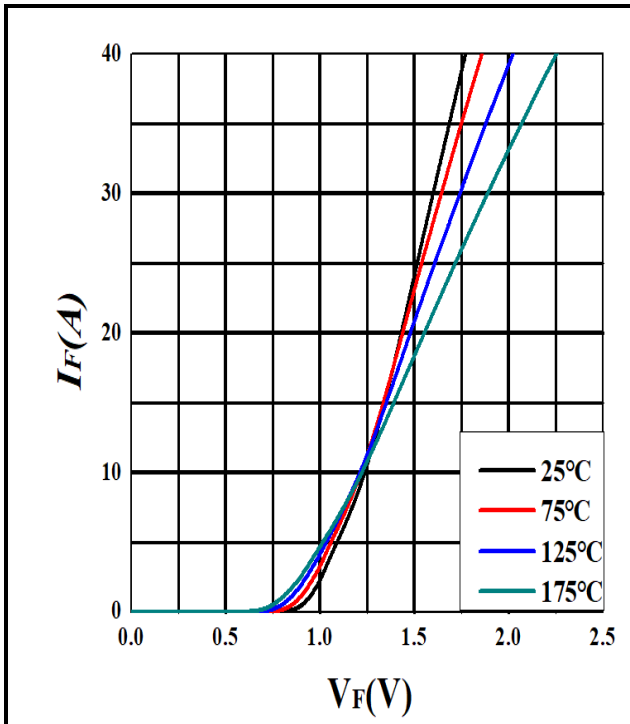


Figure 1. Forward characteristics

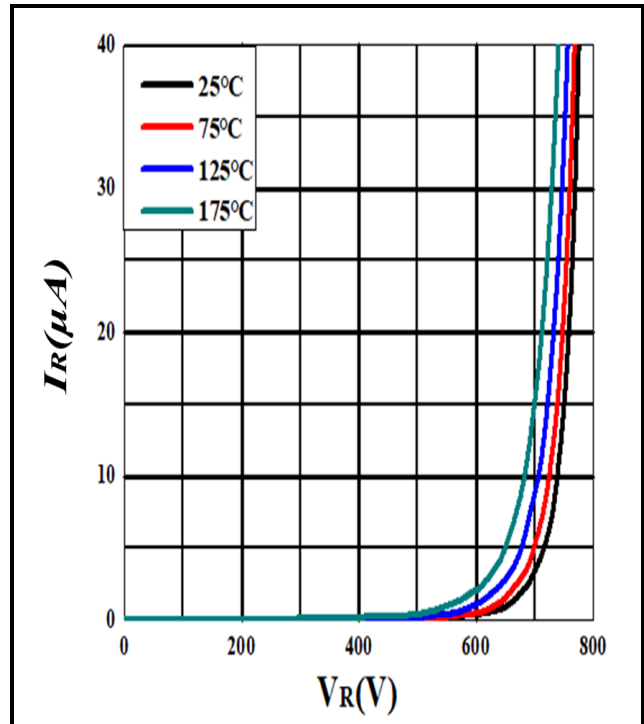


Figure 2. Reverse characteristics

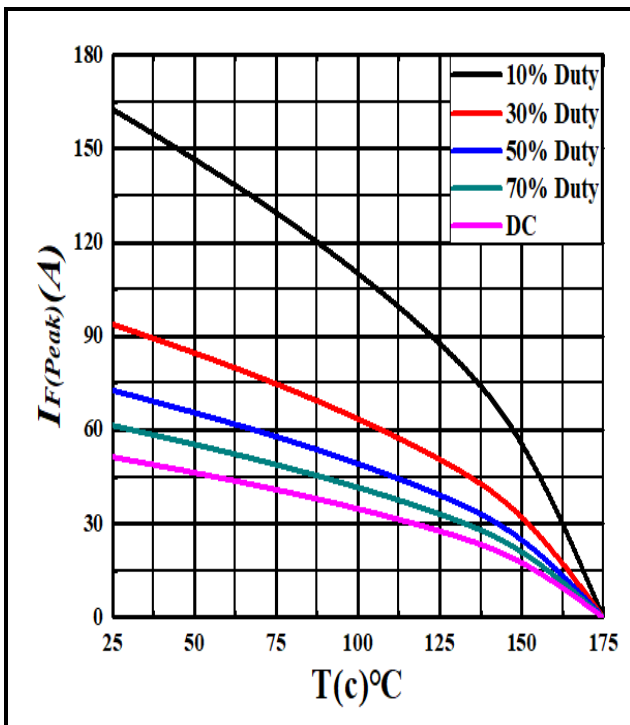


Figure 3. Current derating

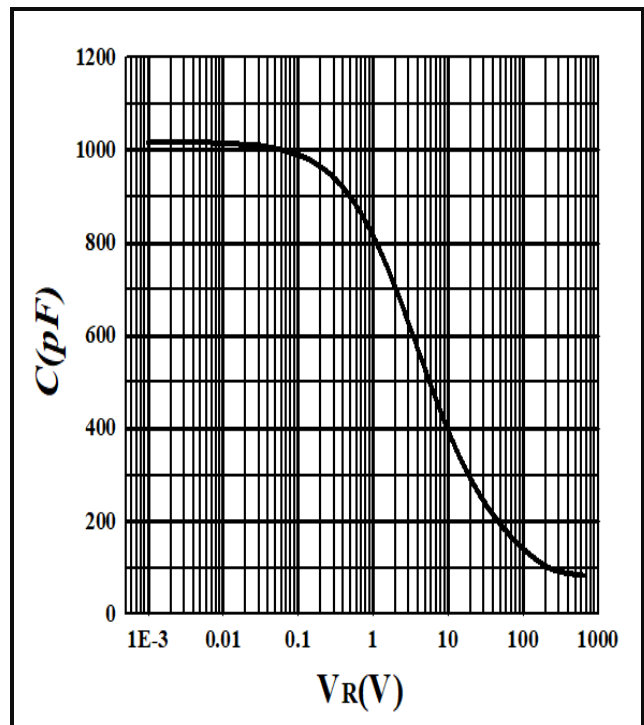


Figure 4. Capacitance vs. reverse voltage

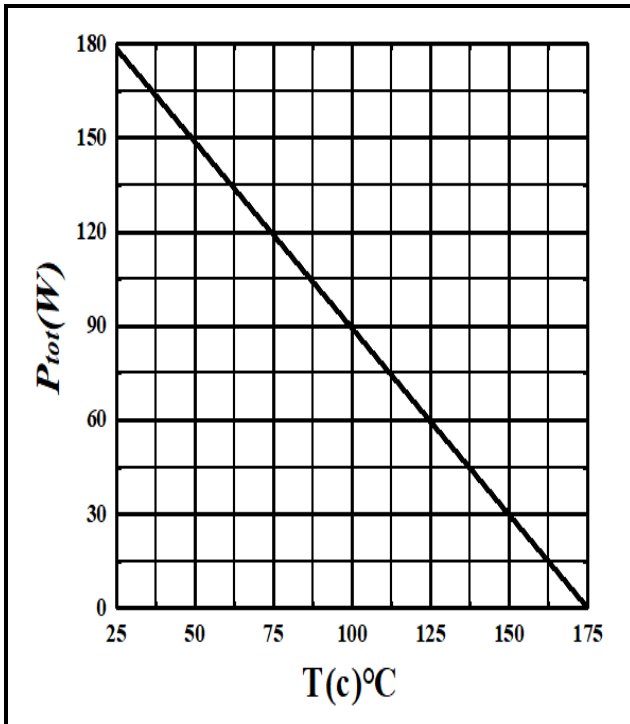


Figure 5. Power derating

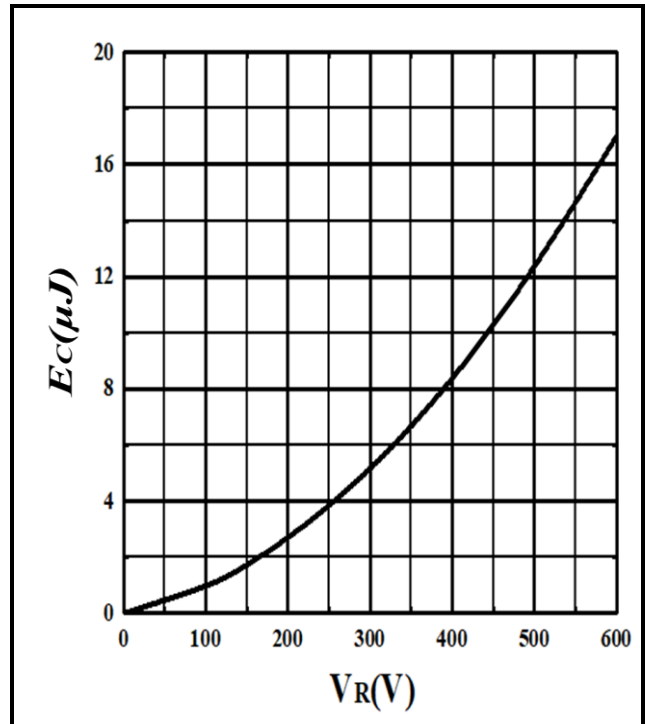


Figure 6. Capacitance stored energy

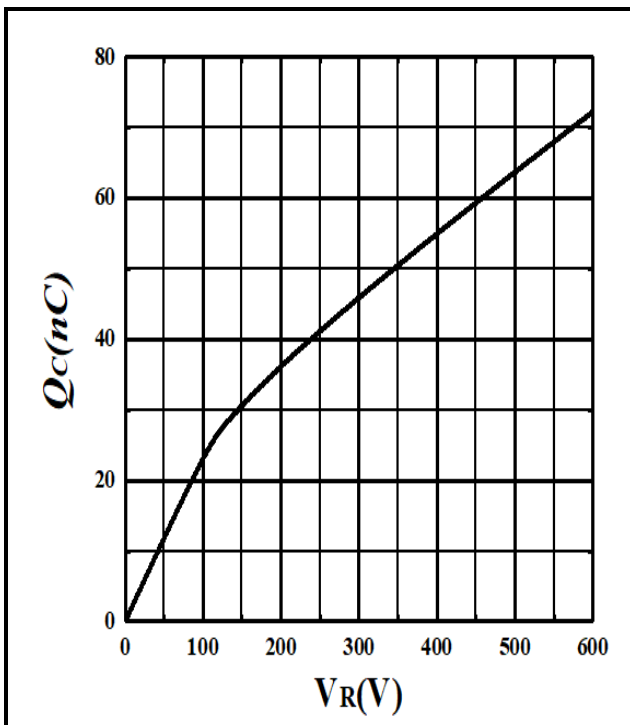


Figure 7. Total capacitance charge vs. reverse voltage

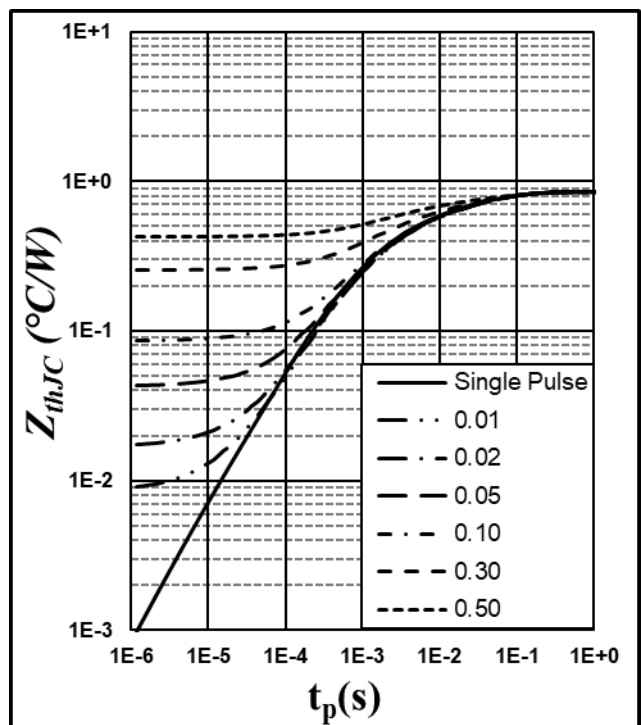
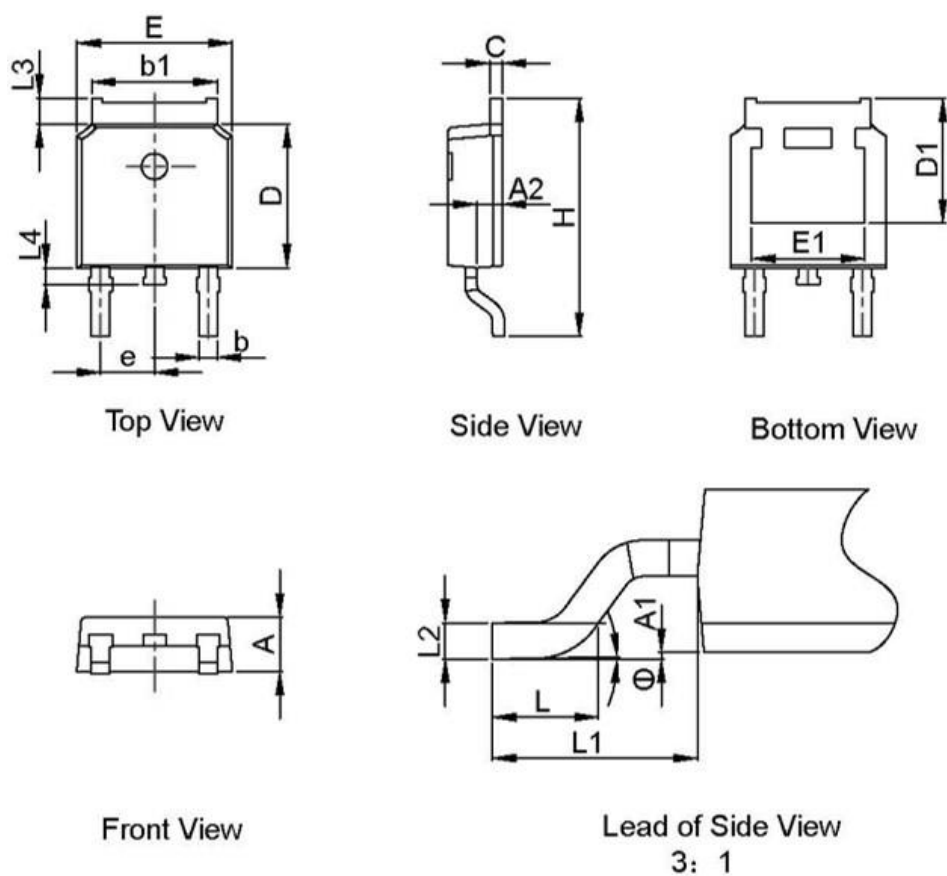


Figure 8. Transient Thermal Impedance  
(Junction-Case)

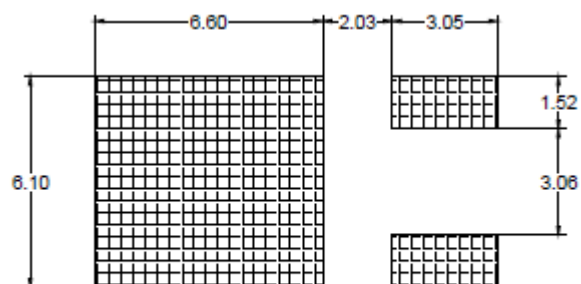
## Package Information



| Dimension unit: [mm] |           |       |       |
|----------------------|-----------|-------|-------|
| Symbol               | Min       | Nom   | Max   |
| A                    | 2.20      | 2.30  | 2.38  |
| A1                   | 0         | -     | 0.127 |
| A2                   | 0.97      | 1.07  | 1.17  |
| b                    | 0.68      | 0.78  | 0.90  |
| b1                   | 5.20      | 5.33  | 5.46  |
| c                    | 0.43      | 0.53  | 0.61  |
| D                    | 5.98      | 6.10  | 6.22  |
| D1                   | 5.30 REF  |       |       |
| E                    | 6.40      | 6.60  | 6.73  |
| E1                   | 4.63      | -     | -     |
| e                    | 2.286 BSC |       |       |
| H                    | 9.40      | 10.10 | 10.50 |
| L                    | 1.38      | 1.50  | 1.75  |
| L1                   | 2.743 REF |       |       |
| L2                   | 0.51 BSC  |       |       |
| L3                   | 0.88      | -     | 1.28  |
| L4                   | 0.50      | -     | 1.00  |
| $\theta$             | 0°        | -     | 8°    |

## Recommended Solder Pad Layout

Note: All dimensions are in mm



TO-252-2L

## Ordering Information

|               |                    |
|---------------|--------------------|
| Part number   | SDS065J020D3-ISARH |
| Package       | TO-252-2L          |
| Unit quantity | 2500 EA            |
| Packing type  | Tape & Reel        |

## **Important Notices – Read Carefully**

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