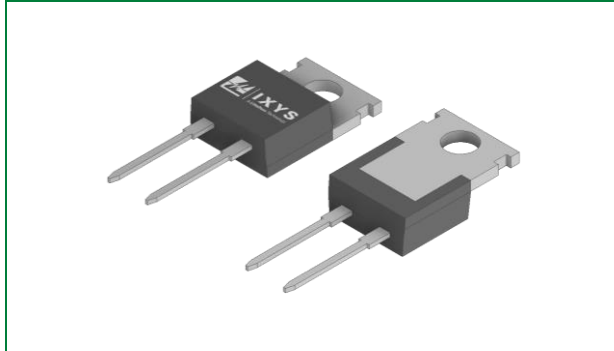


## LSIC2SD065A10A 650 V, 10 A SiC Schottky Barrier Diode

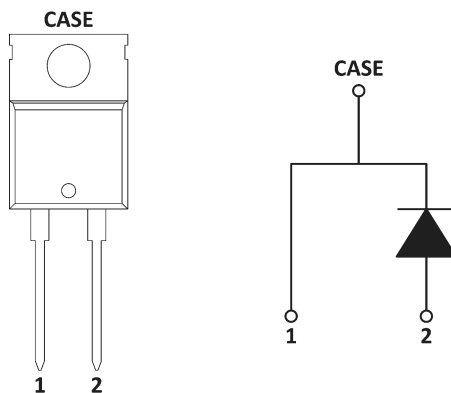


### Agency Approvals and Environmental

Environmental Approvals



### Circuit Diagram TO-220-2L



### Product Summary

| Characteristic                              | Value | Unit |
|---|-------|------|
| $V_{RRM}$                                   | 650   | V    |
| $I_F$ ( $T_C = 135\text{ }^\circ\text{C}$ ) | 13    | A    |
| $Q_C$ ( $V_R: 400\text{ V}$ )               | 31    | nC   |

### Description

This series of silicon carbide (SiC) Schottky diodes has negligible reverse recovery current, high surge capability, and a maximum operating junction temperature of 175 °C. These diodes series are ideal for applications where improvements in efficiency, reliability, and thermal management are desired.

### Features

- AEC-Q101 qualified
- Positive temperature coefficient for safe operation and ease of paralleling
- 175 °C maximum operating junction temperature
- Excellent surge capability
- Extremely fast, temperature-independent switching behavior
- Dramatically reduced switching losses compared to Si bipolar diodes
- RoHS compliant, lead-free, and halogen-free

### Applications

- Boost diodes in PFC or DC/DC stages
- Switch-mode power supplies
- Solar inverters
- Uninterruptable power supplies
- Industrial motor drives
- Battery Chargers
- High-speed Rectifier

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## 1. Maximum Ratings

| Characteristic                       | Symbol        | Conditions  | Value      | Unit                 |
|--------------------------------------|---------------|---|------------|----------------------|
| Repetitive Peak Reverse Voltage      | $V_{RRM}$     | -   | 650        | V                    |
| DC Blocking Voltage                  | $V_R$         | $T_J = 25\text{ }^\circ\text{C}$  | 650        | V                    |
| Continuous Forward Current           | $I_F$         | $T_C = 25\text{ }^\circ\text{C}$  | 28         | A                    |
|                                      |               | $T_C = 135\text{ }^\circ\text{C}$   | 13         |                      |
|                                      |               | $T_C = 148\text{ }^\circ\text{C}$   | 10         |                      |
| Non-repetitive Forward Surge Current | $I_{FSM}$     | $T_C = 25\text{ }^\circ\text{C}$ , $t_b = 10\text{ ms}$ , Half sine pulse | 48         | A                    |
| $I^2t$                               | $\int I^2 dt$ | $T_C = 25\text{ }^\circ\text{C}$ , $t_b = 10\text{ ms}$ , Half sine pulse | 11.5       | $\text{A}^2\text{s}$ |
| Power Dissipation                    | $P_{Tot}$     | $T_C = 25\text{ }^\circ\text{C}$  | 100        | W                    |
|                                      |               | $T_C = 110\text{ }^\circ\text{C}$   | 43         |                      |
| Operating Junction Temperature       | $T_J$         | -   | -55 to 175 | $^\circ\text{C}$     |
| Storage Temperature                  | $T_{STG}$     | -   | -55 to 150 | $^\circ\text{C}$     |
| Lead Temperature for Soldering       | $T_{SOLD}$    | -   | 260        | $^\circ\text{C}$     |
| Mounting Torque                      | $M_D$         | M3 or 6-32 screw  | 1.0        | Nm                   |
|                                      |               |   | 8.8        | In-lb                |

## 2. Thermal Characteristics

| Characteristic             | Symbol          | Value | Unit               |
|----------------------------|-----------------|-------|--------------------|
| Maximum Thermal Resistance | $R_{th,JC,MAX}$ | 1.5   | $^\circ\text{C/W}$ |

## 3. Electrical Characteristics ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)

| Characteristic           | Symbol | Conditions   | Value |     |     | Unit          |
|--------------------------|--------|--|-------|-----|-----|---------------|
|                          |        |  | Min   | Typ | Max |               |
| Forward Voltage          | $V_F$  | $I_F = 10\text{ A}$ , $T_J = 25\text{ }^\circ\text{C}$   | -     | 1.5 | 1.8 | V             |
|                          |        | $I_F = 10\text{ A}$ , $T_J = 175\text{ }^\circ\text{C}$  | -     | 1.8 | -   |               |
| Reverse Current          | $I_R$  | $V_R = 650\text{ V}$ , $T_J = 25\text{ }^\circ\text{C}$  | -     | <1  | 100 | $\mu\text{A}$ |
|                          |        | $V_R = 650\text{ V}$ , $T_J = 175\text{ }^\circ\text{C}$ | -     | 20  | -   |               |
| Capacitance              | C      | $V_R = 1\text{ V}$ , $f = 1\text{ MHz}$                  | -     | 470 | -   | pF            |
|                          |        | $V_R = 200\text{ V}$ , $f = 1\text{ MHz}$                | -     | 60  | -   |               |
|                          |        | $V_R = 400\text{ V}$ , $f = 1\text{ MHz}$                | -     | 43  | -   |               |
| Total Capacitive Charge  | $Q_C$  | $V_R = 400\text{ V}$ , $Q_C = \int C(V) dV$              | -     | 31  | -   | nC            |
| Capacitive Stored Energy | $E_C$  | $V_R = 400\text{ V}$                                     | -     | 3.4 | -   | $\mu\text{J}$ |

### 4. Performance Curves

Figure 1. Typical Forward Characteristics

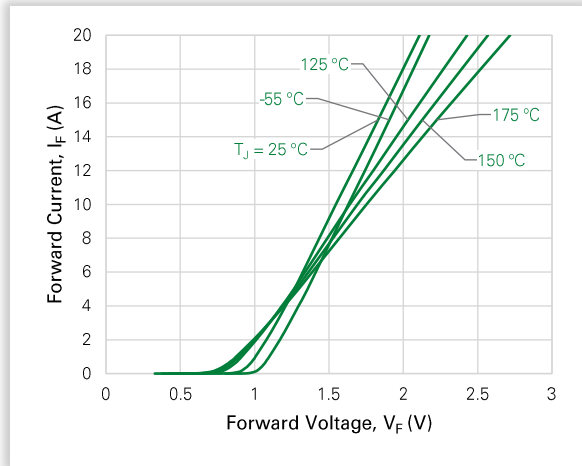


Figure 2. Typical Reverse Characteristics

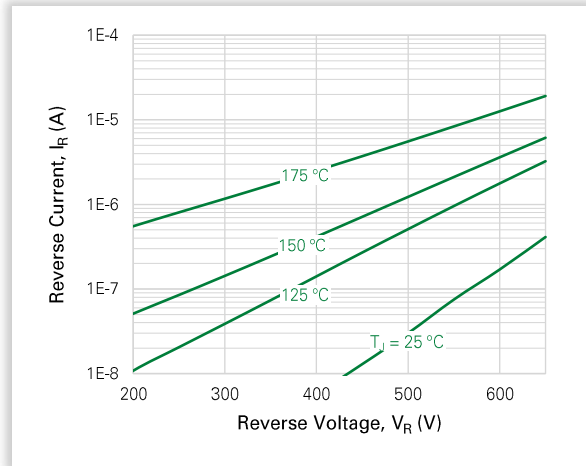


Figure 3. Power Derating

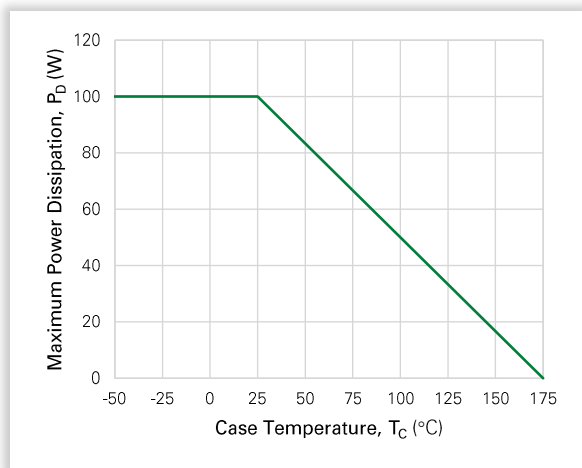


Figure 4. Current Derating

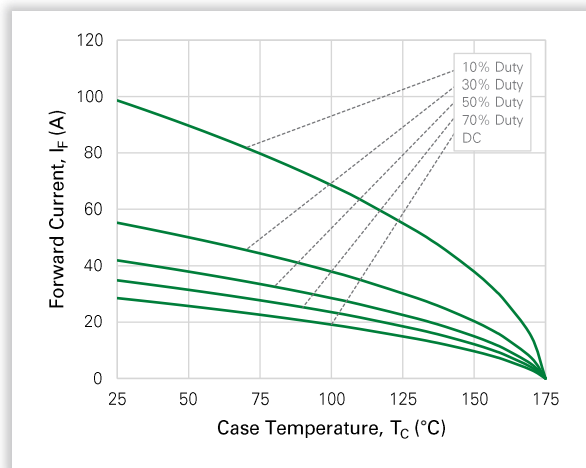


Figure 5. Capacitance vs. Reverse Voltage

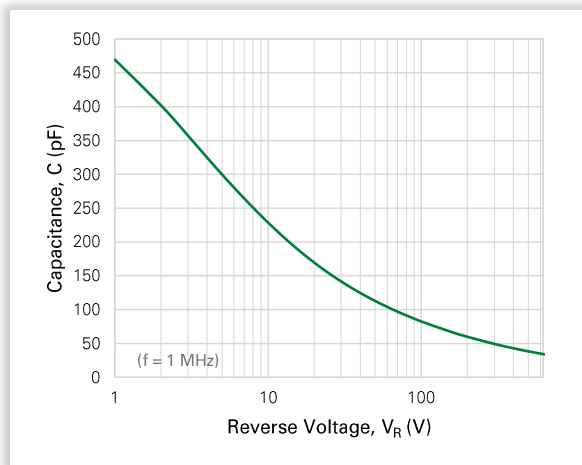


Figure 6. Capacitive Charge vs. Reverse Voltage

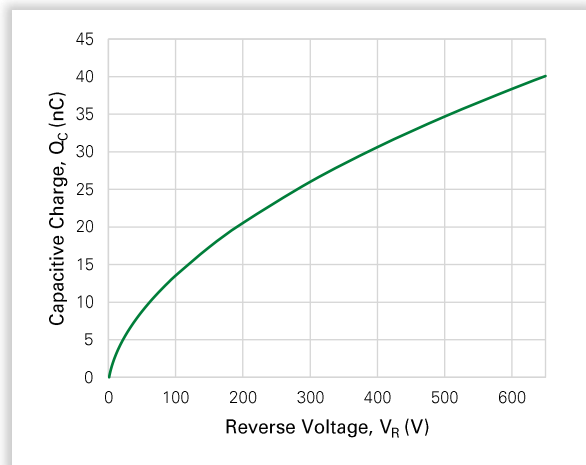


Figure 7. Stored Energy vs. Reverse Voltage

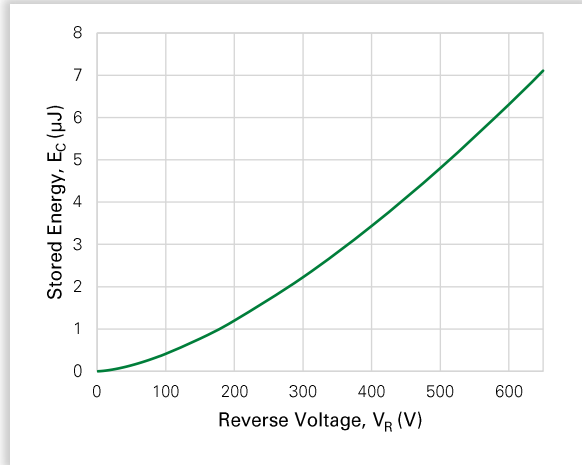
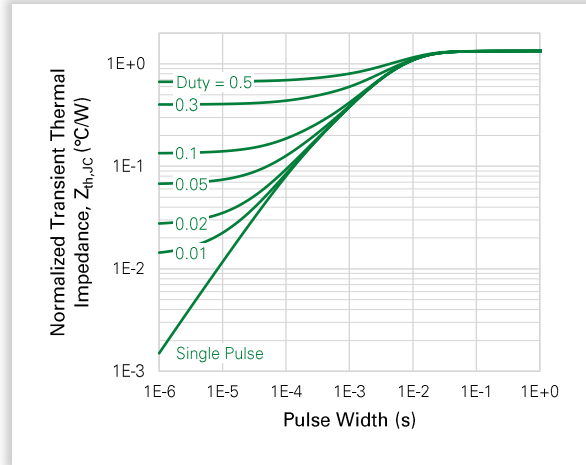
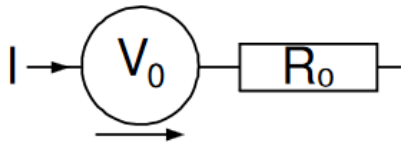


Figure 8. Transient Thermal Impedance



### 5. Diode V<sub>F</sub> Model for Simulation



$$V_F(T_J) = V_0 + IR_0$$

$$V_0 = -1.14 \times 10^{-3} \cdot T_J + 1.01 \times 10^0$$

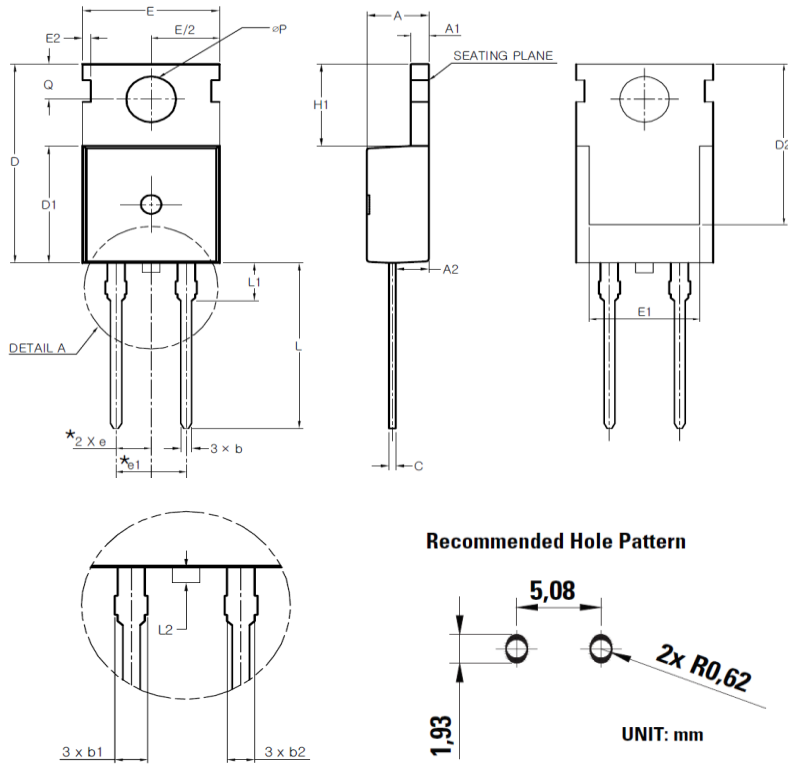
$$R_0 = 8.08 \times 10^{-7} \cdot T_J^2 + 9.46 \times 10^{-5} \cdot T_J + 5.34 \times 10^{-2}$$

Notes:

- T<sub>J</sub> is junction temperature in °C
- Range valid from 25 °C to 175 °C
- Model represents performance of a typical part

### 6. Package Dimensions

#### TO-220-2L Package

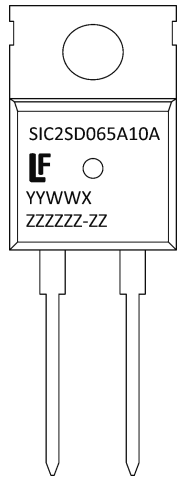


| Symbol | Millimeters |       |       |
|--------|-------------|-------|-------|
|        | Min         | Nom   | Max   |
| A      | 4.30        | 4.50  | 4.70  |
| A1     | 1.25        | 1.30  | 1.40  |
| A2     | 2.20        | 2.40  | 2.60  |
| b      | 0.70        | 0.80  | 0.90  |
| b2     | 1.17        | 1.27  | 1.37  |
| c      | 0.45        | 0.50  | 0.60  |
| D      | 15.50       | 15.70 | 15.90 |
| D1     | 9.00        | 9.20  | 9.40  |
| D2     | (12.70)     |       |       |
| E*     | 9.70        | 9.90  | 10.10 |
| E1     | (8.00)      |       |       |
| E2     | (0.60)      |       |       |
| E3     | 9.70        | 9.90  | 10.10 |
| e      | 2.54 BSC    |       |       |
| e1     | 5.08 BSC    |       |       |
| H1     | 6.30        | 6.50  | 6.70  |
| L      | 12.88       | 13.08 | 13.28 |
| L1     | (3.00)      |       |       |
| L2     | -           | -     | 0.80  |
| øP     | 3.50        | 3.60  | 3.70  |
| Q      | 2.70        | 2.80  | 2.90  |

**Notes:**

1. These dimensions do not include protrusions of the mold.
2. The “( )” mark is the reference.
3. The “L2” symbol is a protrusion of the mold.

### 7. Part Numbering and Marking



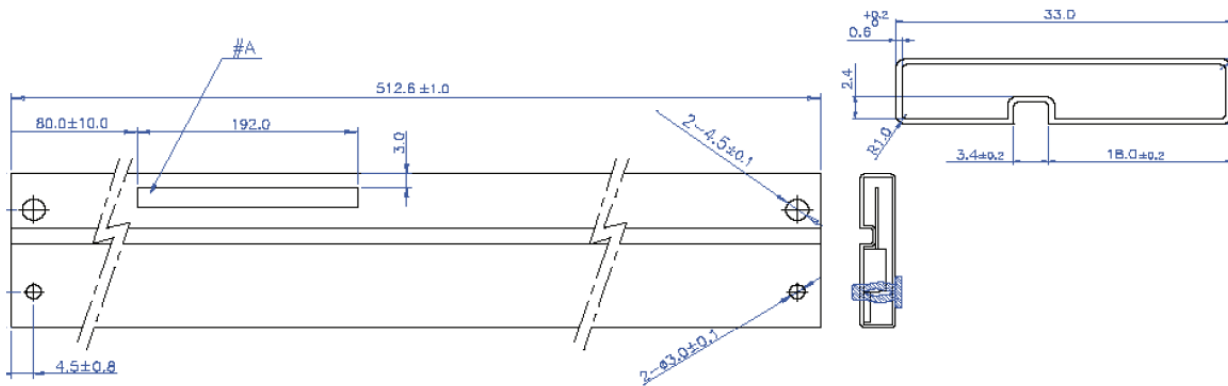
- Sic = SiC Diode
- 2 = Gen2
- SD = Schottky Diode
- 065 = Voltage Rating (650 V)
- A = TO-220 Package (2 Lead)
- 10 = Current Rating (10 A)
- A = AEC-Q101 Qualified
- YY = Year
- WW = Week
- X = Special Code
- ZZZZZZ-ZZ = Lot Number

### 8. Packing Options

| Part Number    | Marking       | Packing Mode  | M.O.Q. |
|----------------|---------------|---------------|--------|
| LSIC2SD065A10A | SIC2SD065A10A | Tube (50 pcs) | 1000   |

### 9. Packing Specifications

Tube for TO-220-2L



**NOTE ]**

- TUBE
  - MATERIAL : PVC / PET (WITH ANTISTATIC COATING)
  - COLOR : TRANSPARENCY, RED, YELLO
  - MARKING #A : BLACK COLOR, LETTER STYLE : Arial
  - Tube Surface Resistance :  $10^9 \sim 10^{11} \Omega$ /square
  - ESD (Electro Static Discharge) : less than 100 [volts], 6 Months
  - CAMBAR : 1.5 MAX
- PIN
  - COLOR : GREEN (ONE PIN MUST BE INSERTED IN LEFT-SIDE OF "ANTISTATIC-" AND ANOTHER PIN IS FREE.)

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