

## LSIC2SD170B10 1700 V, 10 A SiC Schottky Barrier Diode

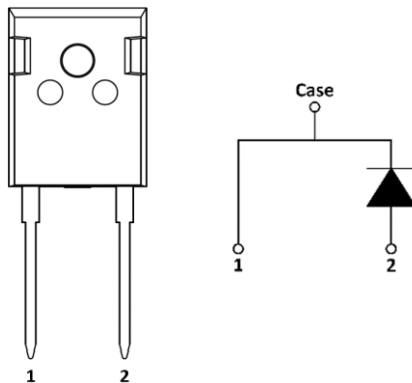


### Agency Approvals and Environmental

Environmental Approvals



### Pinout Diagram



### Product Summary

| Characteristic                     | Value | Unit |
|------------------------------------|-------|------|
| $V_{RRM}$                          | 1700  | V    |
| $I_F (T_C \leq 135^\circ\text{C})$ | 15    | A    |
| $Q_C (V_R: 0-800\text{ V})$        | 74    | nC   |

### Features

- 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
- Zero reverse recovery current

### 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      | $V_{RRM}$     | -                                                                           | 1700       | V                  |
| DC Blocking Voltage                  | $V_R$         | -                                                                           | 1700       | V                  |
| Continuous Forward Current           | $I_F$         | $T_C = 25\text{ }^{\circ}\text{C}$                                          | 31         | A                  |
|                                      |               | $T_C = 135\text{ }^{\circ}\text{C}$                                         | 15         |                    |
|                                      |               | $T_C = 155\text{ }^{\circ}\text{C}$                                         | 10         |                    |
| Non-repetitive Forward Surge Current | $I_{FSM}$     | $T_C = 25\text{ }^{\circ}\text{C}$ , $t_p = 10\text{ ms}$ , Half sine pulse | 72         | A                  |
| $I^2t$                               | $\int I^2 dt$ | $T_C = 25\text{ }^{\circ}\text{C}$ , $t_p = 10\text{ ms}$ , Half sine pulse | 26         | A <sup>2</sup> s   |
| Power Dissipation                    | $P_{Tot}$     | $T_C = 25\text{ }^{\circ}\text{C}$                                          | 176        | W                  |
|                                      |               | $T_C = 110\text{ }^{\circ}\text{C}$                                         | 76         |                    |
| Operating Junction Temperature       | $T_J$         | -                                                                           | -55 to 175 | $^{\circ}\text{C}$ |
| Storage Temperature                  | $T_{STG}$     | -                                                                           | -55 to 150 | $^{\circ}\text{C}$ |
| Mounting Torque                      | $M_D$         | M3 or 6-32 screw                                                            | 0.6        | Nm                 |

## 2. Thermal Characteristics

| Characteristic     | Symbol          | Value | Unit                 |
|--------------------|-----------------|-------|----------------------|
| Thermal Resistance | $R_{thJC, max}$ | 0.85  | $^{\circ}\text{C/W}$ |

## 3. Electrical Characteristics

| Characteristic           | Symbol | Conditions                                                  | Value |     |     | Unit          |
|--------------------------|--------|-------------------------------------------------------------|-------|-----|-----|---------------|
|                          |        |                                                             | Min   | Typ | Max |               |
| Forward Voltage          | $V_F$  | $I_F = 10\text{ A}$ , $T_C = 25\text{ }^{\circ}\text{C}$    | -     | 1.5 | 1.8 | V             |
|                          |        | $I_F = 10\text{ A}$ , $T_C = 175\text{ }^{\circ}\text{C}$   | -     | 2.2 | -   |               |
| Reverse Current          | $I_R$  | $V_R = 1700\text{ V}$ , $T_C = 25\text{ }^{\circ}\text{C}$  | -     | <1  | 100 | $\mu\text{A}$ |
|                          |        | $V_R = 1700\text{ V}$ , $T_C = 175\text{ }^{\circ}\text{C}$ | -     | 20  | -   |               |
| Total Capacitance        | $C$    | $V_R = 1\text{ V}$ , $f = 1\text{ MHz}$                     | -     | 757 | -   | pF            |
|                          |        | $V_R = 400\text{ V}$ , $f = 1\text{ MHz}$                   | -     | 71  | -   |               |
|                          |        | $V_R = 800\text{ V}$ , $f = 1\text{ MHz}$                   | -     | 52  | -   |               |
| Total Capacitive Charge  | $Q_C$  | $V_R = 800\text{ V}$ , $Q_C = \int Q(V) dV$                 | -     | 74  | -   | nC            |
| Capacitive Stored Energy | $E_C$  | $V_R = 800\text{ V}$                                        | -     | 17  | -   | $\mu\text{J}$ |

## 4. Performance Curves

Figure 1. Typical Forward Characteristics

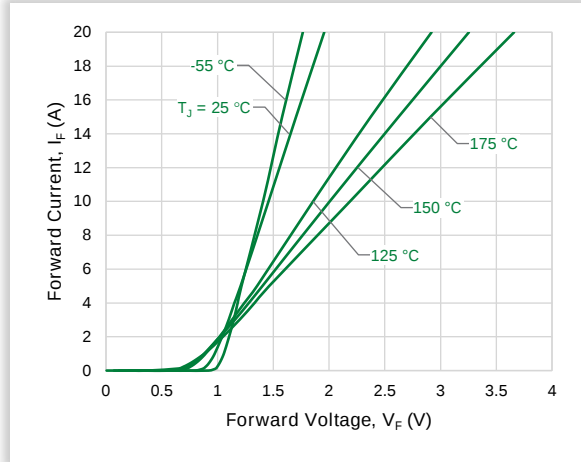


Figure 2. Typical Reverse Characteristics

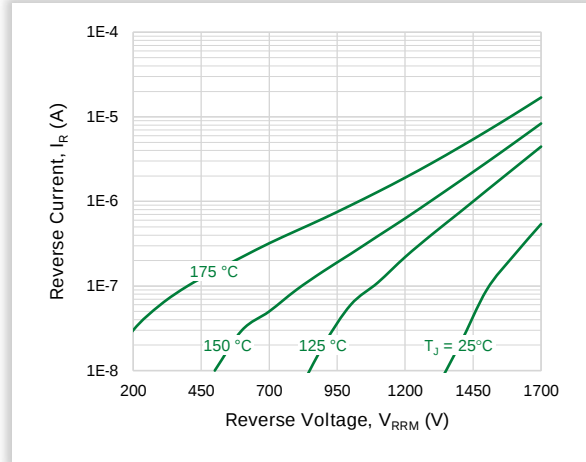


Figure 3. Power Derating

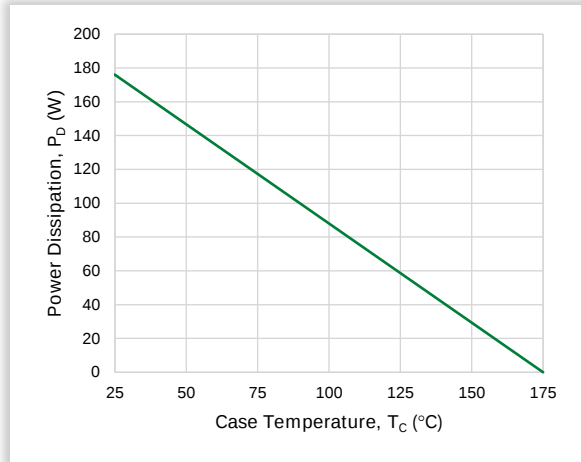


Figure 4. Current Derating

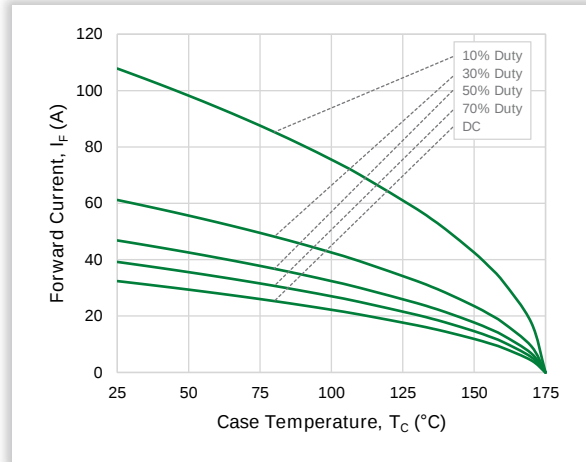


Figure 5. Capacitance vs. Reverse Voltage

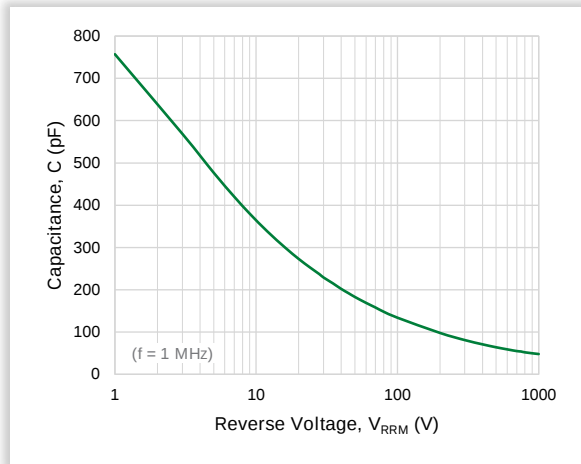


Figure 6. Capacitive Charge vs. Reverse Voltage

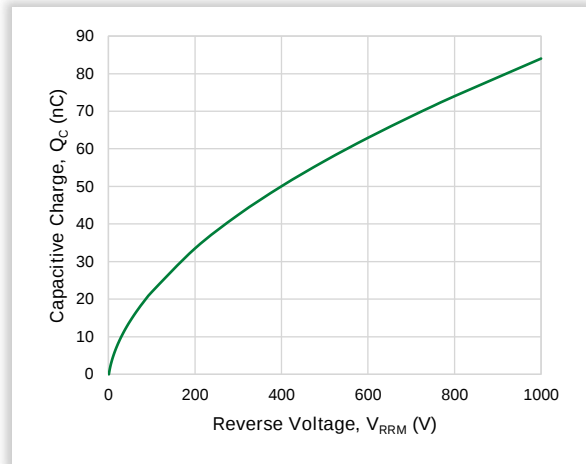


Figure 7. Stored Energy vs. Reverse Voltage

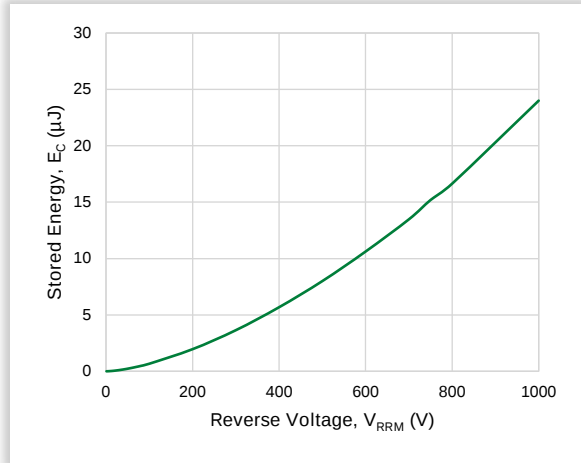
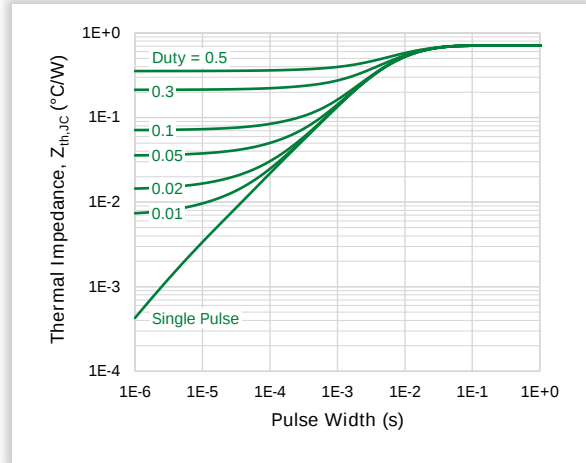
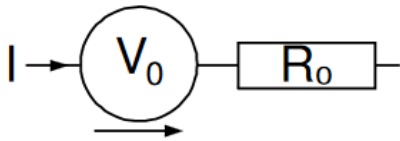


Figure 8. Transient Thermal Impedance



## 5. $V_F$ Model for Simulation



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

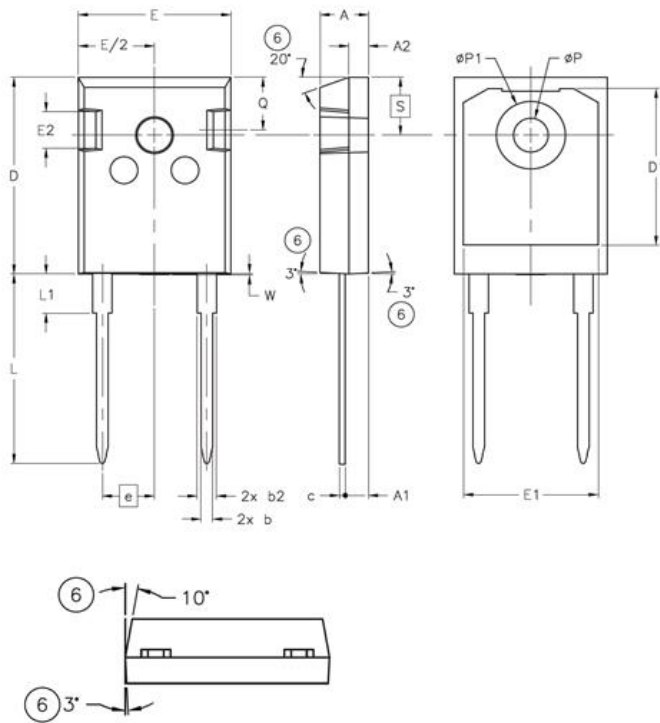
$$V_0 = -1.39 \times 10^{-3} \cdot T_J + 9.93 \times 10^{-1}$$

$$R_0 = 1.82 \times 10^{-6} \cdot T_J^2 + 2.70 \times 10^{-4} \cdot T_J + 4.21 \times 10^{-2}$$

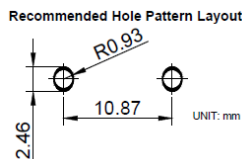
Notes:

- $T_J$  is junction temperature in °C
- Range valid from 25 °C to 175 °C
- Model represents performance of a typical part

## 6. Package Dimensions



## Recommended Hole Pattern Layout:

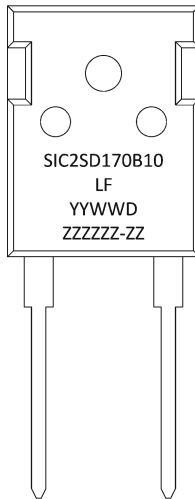


## Notes:

1. Dimensions are in millimeters
2. Dimension D, E do not include mold flash. Mold flash shall not exceed 0.127 mm per side measured at outer most extreme of plastic body.
3.  $\phi P$  to have a maximum draft angle of 38.1 mm to the top of the part with a maximum hole diameter of 3.912 mm.

| Symbol    | Millimeters |     |       |
|-----------|-------------|-----|-------|
|           | Min         | Nom | Max   |
| A         | 4.7         | -   | 5.31  |
| A1        | 2.21        | -   | 2.59  |
| A2        | 1.5         | -   | 2.49  |
| b         | 0.99        | -   | 1.4   |
| b2        | 1.65        | -   | 2.39  |
| c         | 0.38        | -   | 0.89  |
| D         | 20.8        | -   | 21.46 |
| D1        | 13.08       | -   | -     |
| D2        | 0.51        | -   | 1.35  |
| e         | 5.44 BSC    |     |       |
| E         | 15.49       | -   | 16.26 |
| E1        | 13.46       | -   | -     |
| E2        | 3.43        | -   | 3.99  |
| L         | 19.81       | -   | 20.32 |
| L1        | -           | -   | 4.5   |
| $\phi P$  | 3.56        | -   | 3.66  |
| $\phi P1$ | 7.06        | -   | 7.39  |
| Q         | 5.38        | -   | 6.2   |
| S         | 6.17 BSC    |     |       |
| W         | -           | -   | 0.15  |

## 7. Part Numbering and Marking

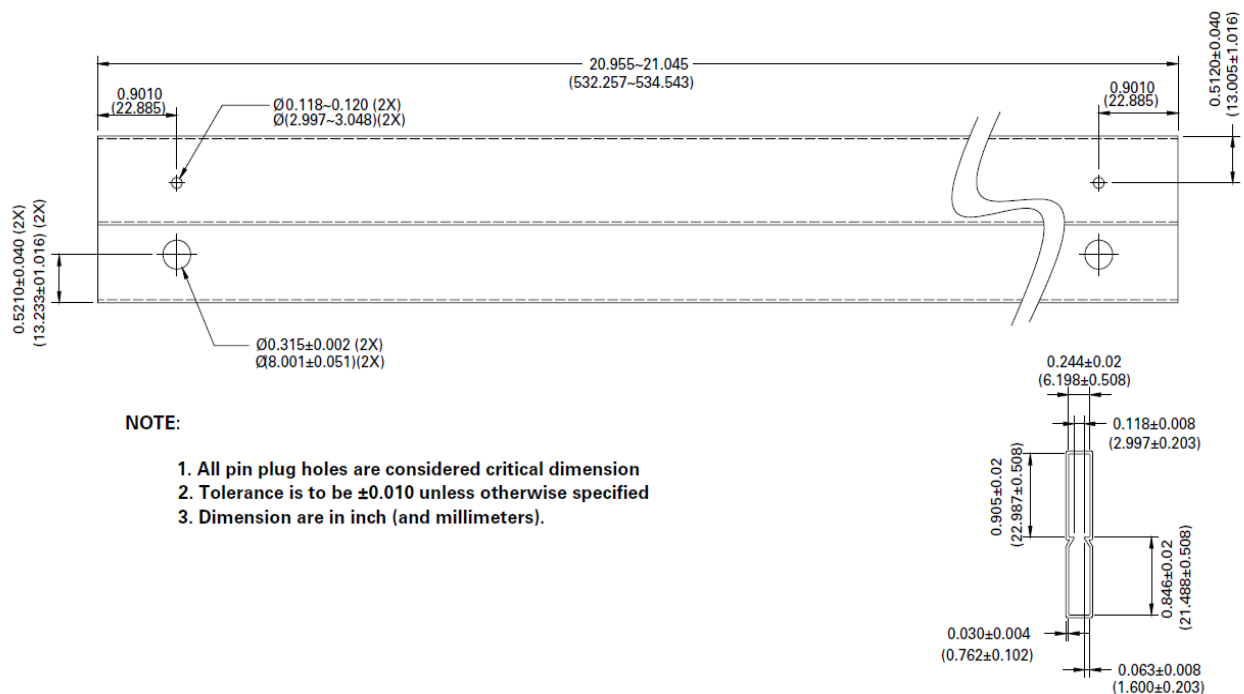


|           |                           |
|-----------|---------------------------|
| SiC       | = SiC                     |
| 2         | = Gen 2                   |
| SD        | = Schottky Barrier Diode  |
| 170       | = Voltage Rating (1700 V) |
| B         | = Package (TO-247-2L)     |
| 10        | = Current Rating (10 A)   |
| YY        | = Year                    |
| WW        | = Week                    |
| D         | = Special Code            |
| ZZZZZZ-ZZ | = Lot Number              |

## 8. Packing Options

| Part Number   | Marking      | Packing Mode  | M.O.Q. |
|---------------|--------------|---------------|--------|
| LSIC2SD170B10 | SIC2SD170B10 | Tube (30 pcs) | 30 pcs |

## 9. Packing Specifications



For additional information please visit [www.Littelfuse.com/powersemi](http://www.Littelfuse.com/powersemi)

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