

## GP3D050B170B

### QSiC™ 1700V SiC Schottky Diode

|                    |        |
|--------------------|--------|
| VDC                | 1700 V |
| Q <sub>C</sub>     | 515 nC |
| I <sub>F</sub>     | 50 A   |
| T <sub>j,max</sub> | 175 °C |

#### Features

- Unipolar rectifier with surge current
- Zero reverse recovery current
- Fast, temperature-independent switching
- Avalanche tested to 1250mJ\*
- All parts tested to greater than 1,870V

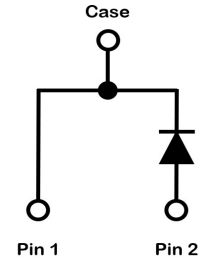
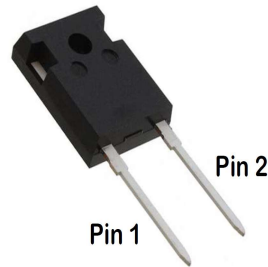
#### Benefits

- Near zero switching loss
- Higher efficiency
- Reduced heat sink requirements
- Easy to parallel

#### Applications

- Switch mode power supplies, UPS
- DC/DC Converters
- Solar Inverters
- EV charging stations

#### Package



| Part #       | Package   | Marking   |
|--------------|-----------|-----------|
| GP3D050B170B | TO-247-2L | 3D050B170 |



**Maximum Ratings**, at T<sub>J</sub>=25 °C, unless otherwise specified

| Characteristics                                    | Symbol                                | Conditions                                     | Values    | Unit             |
|----------------------------------------------------|---------------------------------------|------------------------------------------------|-----------|------------------|
| Continuous forward current                         | I <sub>F</sub> **                     | T <sub>C</sub> =25 °C, T <sub>J</sub> =175 °C  | 151       | A                |
|                                                    |                                       | T <sub>C</sub> =125 °C, T <sub>J</sub> =175 °C | 83        |                  |
|                                                    |                                       | T <sub>C</sub> =150 °C, T <sub>J</sub> =175 °C | 55        |                  |
| Surge non-repetitive forward current sine halfwave | I <sub>FSM</sub>                      | T <sub>C</sub> =25 °C, t <sub>p</sub> =8.3 ms  | 360       | A                |
|                                                    |                                       | T <sub>C</sub> =110 °C, t <sub>p</sub> =8.3 ms | 324       |                  |
| Non-repetitive peak forward current                | I <sub>F,max</sub>                    | T <sub>C</sub> =25 °C, t <sub>p</sub> =10 μs   | 1475      | A                |
| i <sup>2</sup> t value                             | ∫i <sup>2</sup> dt                    | T <sub>C</sub> =25 °C, t <sub>p</sub> =8.3 ms  | 538       | A <sup>2</sup> s |
|                                                    |                                       | T <sub>C</sub> =110 °C, t <sub>p</sub> =8.3 ms | 436       |                  |
| Repetitive peak reverse voltage                    | V <sub>RRM</sub>                      | T <sub>J</sub> =25 °C                          | 1700      | V                |
| Diode dv/dt ruggedness                             | dv/dt                                 | Turn-on slew rate, repetitive                  | 200       | V/ns             |
| Power dissipation                                  | P <sub>tot</sub> **                   | T <sub>C</sub> =25 °C                          | 789       | W                |
| Operating junction & storage temperature           | T <sub>J</sub> , T <sub>storage</sub> | Continuous                                     | -55...175 | °C               |
| Soldering temperature                              | T <sub>solder</sub>                   | Wave soldering leads                           | 260       | °C               |
| Mounting torque                                    |                                       | M3 Screw                                       | 1         | N-m              |

**Notes:**

\* EAS of 1250 mJ is based on starting T<sub>J</sub> = 25°C, L = 1.0 mH, I<sub>AS</sub> = 50 A, V = 50 V.

\*\* Typical R<sub>thJC</sub> used

Electrical Characteristics, at  $T_j=25\text{ }^{\circ}\text{C}$ , unless otherwise specified

| Characteristics         | Symbol   | Conditions                                              | Values |      |      | Unit          |
|-------------------------|----------|---------------------------------------------------------|--------|------|------|---------------|
|                         |          |                                                         | min.   | typ. | max. |               |
| DC blocking voltage     | $V_{DC}$ | $I_R=200\mu\text{A}$ , $T_j=25\text{ }^{\circ}\text{C}$ | 1700   | -    | -    | V             |
| Breakdown voltage       | $V_{BR}$ | $I_R=5\text{mA}$ , $T_j=25\text{ }^{\circ}\text{C}$     | 1870   | -    | -    | V             |
| Diode forward voltage   | $V_F$    | $I_F=50\text{A}$ , $T_j=25\text{ }^{\circ}\text{C}$     | -      | 1.52 | 1.65 | V             |
|                         |          | $I_F=50\text{A}$ , $T_j=125\text{ }^{\circ}\text{C}$    | -      | 1.92 | -    |               |
|                         |          | $I_F=50\text{A}$ , $T_j=175\text{ }^{\circ}\text{C}$    | -      | 2.27 | 2.80 |               |
| Reverse current         | $I_R$    | $V_R=1,700\text{V}$ , $T_j=25\text{ }^{\circ}\text{C}$  | -      | 12   | 200  | $\mu\text{A}$ |
|                         |          | $V_R=1,870\text{V}$ , $T_j=25\text{ }^{\circ}\text{C}$  | -      | 42   | -    |               |
|                         |          | $V_R=1,700\text{V}$ , $T_j=125\text{ }^{\circ}\text{C}$ | -      | 182  | -    |               |
|                         |          | $V_R=1,700\text{V}$ , $T_j=175\text{ }^{\circ}\text{C}$ | -      | 845  | 2000 |               |
| Total capacitive charge | $Q_C$    | $V_R=1700\text{V}$ , $T_j=25\text{ }^{\circ}\text{C}$   | -      | 515  | -    | nC            |
| Total capacitance       | C        | $V_R=1\text{V}$ , $f=1\text{ MHz}$                      | -      | 3511 | -    | pF            |
|                         |          | $V_R=800\text{V}$ , $f=1\text{ MHz}$                    | -      | 219  | -    |               |
|                         |          | $V_R=1700\text{V}$ , $f=1\text{ MHz}$                   | -      | 216  | -    |               |

Thermal Characteristics

| Characteristics                   | Symbol     | Conditions | Values |      |      | Unit                 |
|-----------------------------------|------------|------------|--------|------|------|----------------------|
|                                   |            |            | min.   | typ. | max. |                      |
| Thermal resistance, junction-case | $R_{thJC}$ | -          | -      | 0.19 | 0.23 | $^{\circ}\text{C/W}$ |

Typical Performance

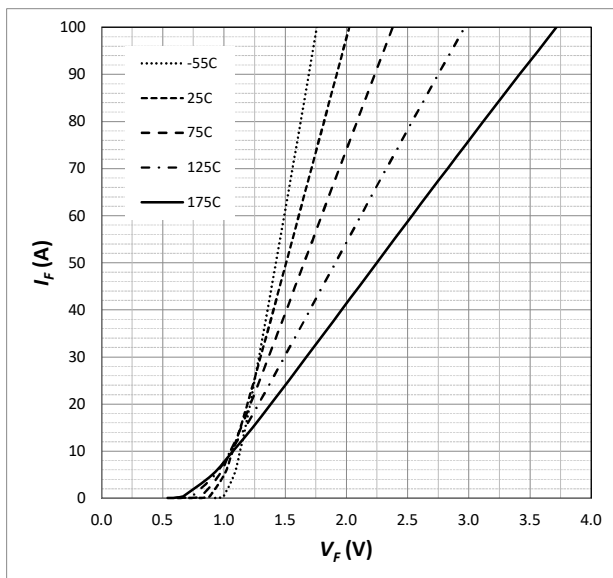


Fig. 1 Forward Characteristics (parameterized on  $T_j$ )

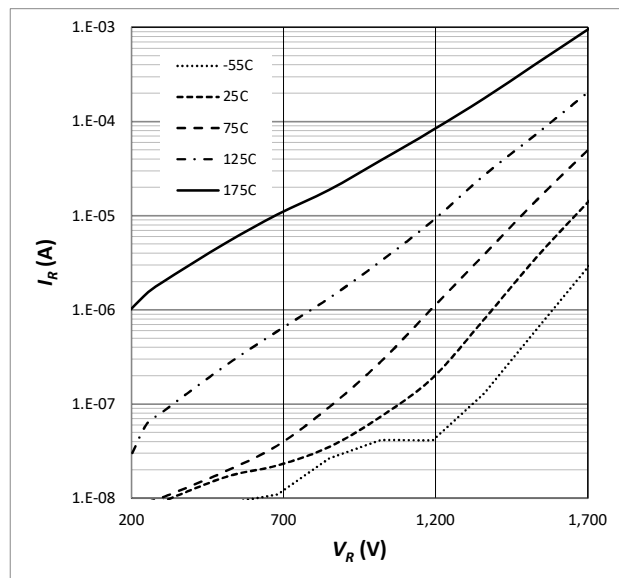


Fig. 2 Reverse Characteristics (parameterized on  $T_j$ )

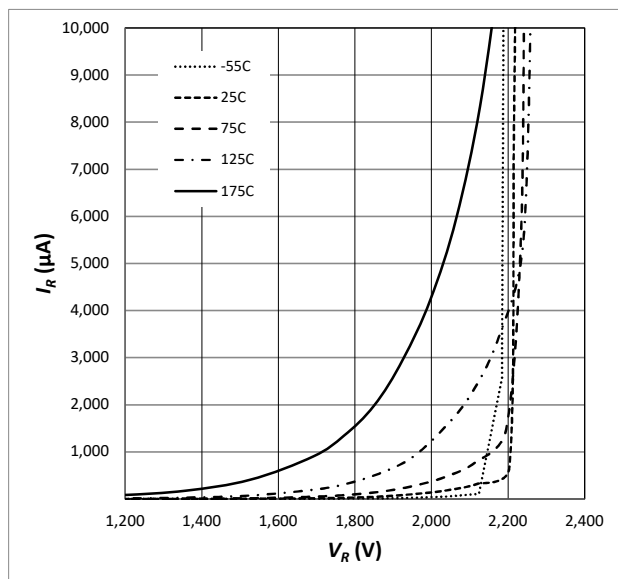


Fig. 3 Reverse Characteristics (parameterized on  $T_j$ )

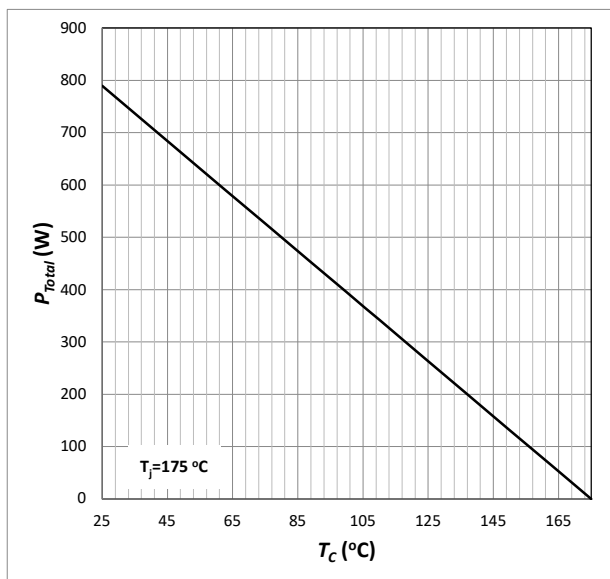


Fig. 4 Power Derating

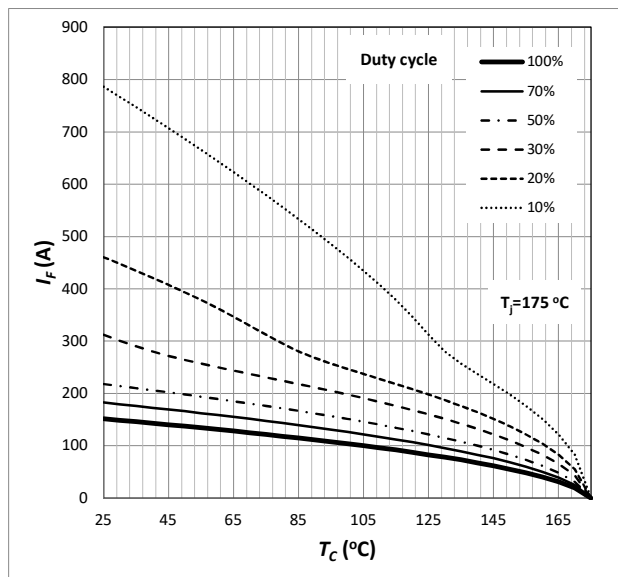


Fig. 5 Current Derating

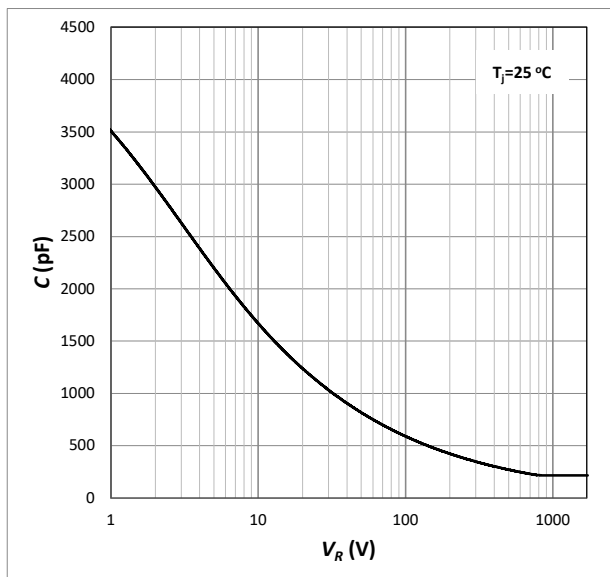


Fig. 6 Capacitance

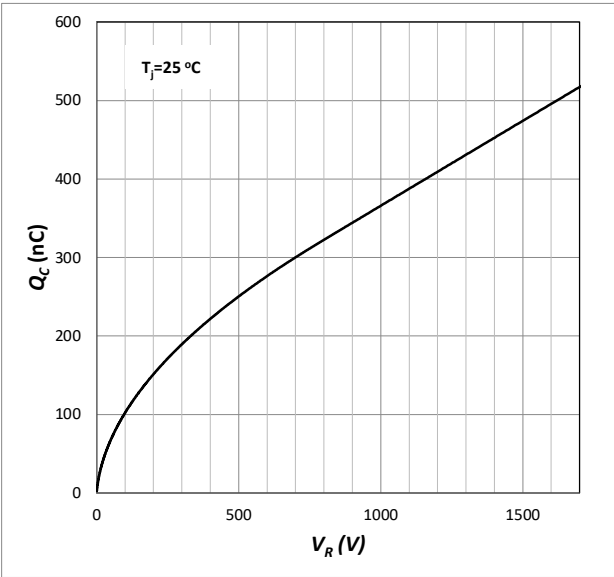


Fig. 7 Capacitive Charge

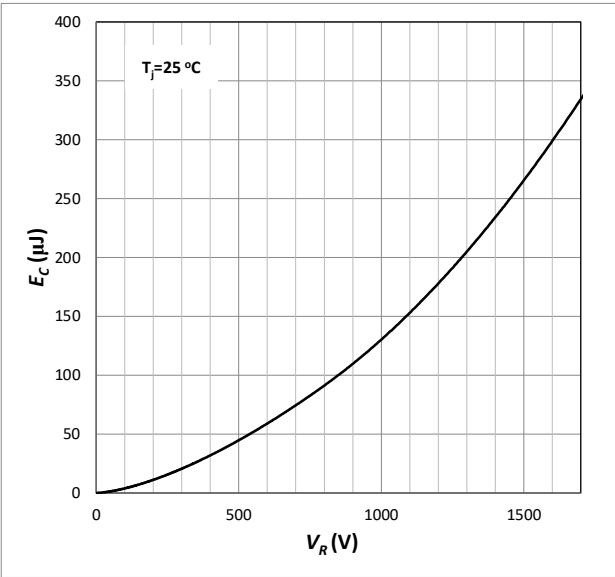


Fig. 8 Typical Capacitance Stored Energy

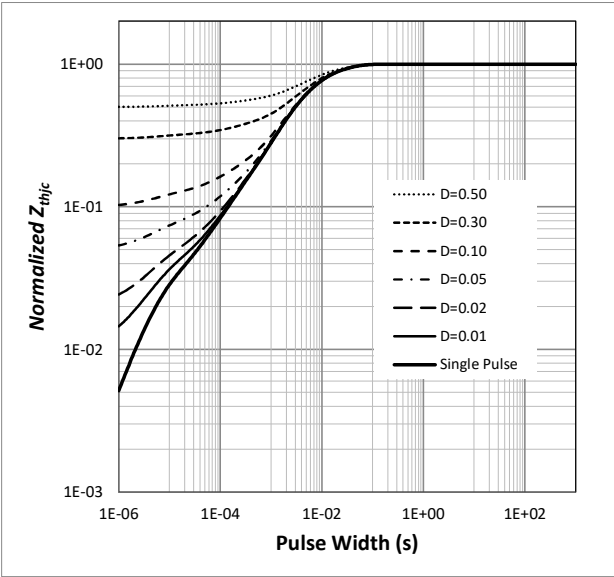
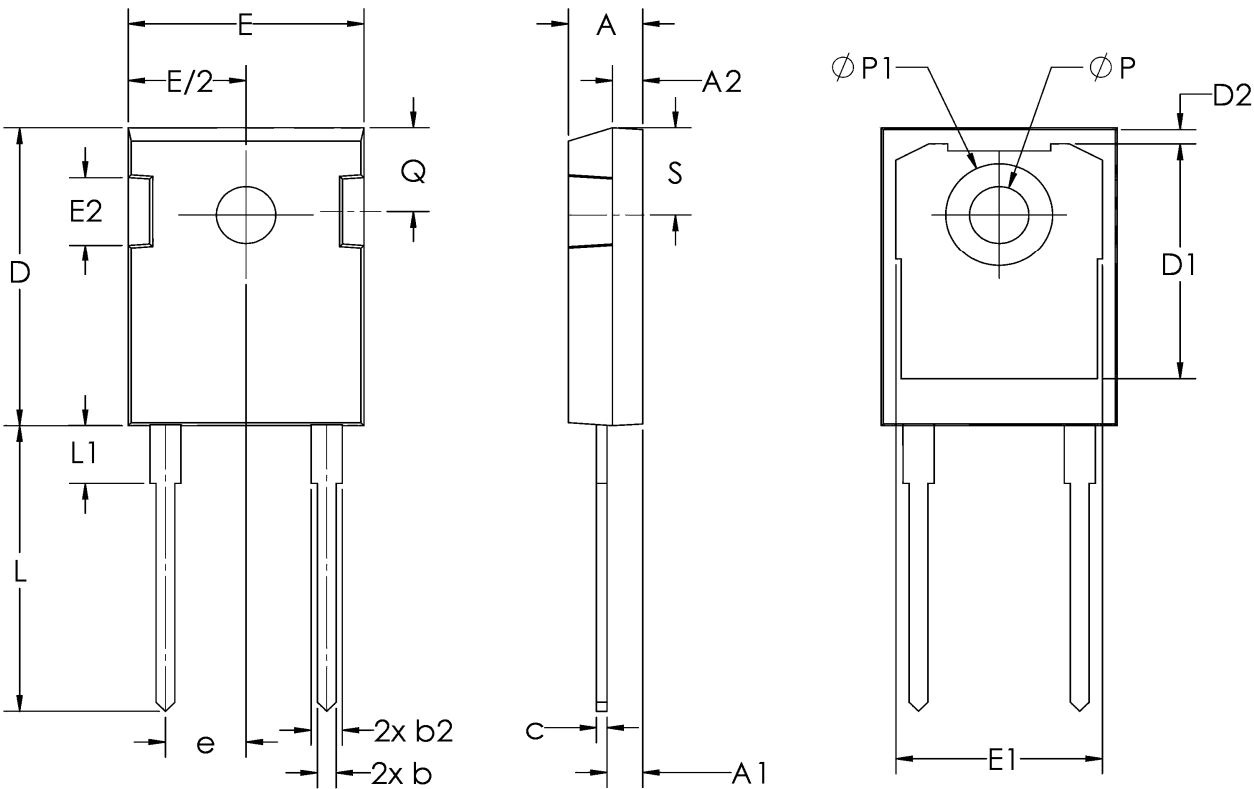


Fig. 9 Transient Thermal Impedance

# QSiC™ 1700V SiC Schottky Di

GP3D050B170B

## Package Dimensions TO-247-2L



| Sym | Millimeters |       | Inches   |       |
|-----|-------------|-------|----------|-------|
|     | Min         | Max   | Min      | Max   |
| A   | 4.70        | 5.31  | 0.185    | 0.209 |
| A1  | 2.21        | 2.59  | 0.087    | 0.102 |
| A2  | 1.50        | 2.49  | 0.059    | 0.098 |
| b   | 0.99        | 1.40  | 0.039    | 0.055 |
| b2  | 1.65        | 2.39  | 0.065    | 0.094 |
| c   | 0.38        | 0.89  | 0.015    | 0.035 |
| D   | 20.80       | 21.46 | 0.819    | 0.845 |
| D1  | 13.08       | 17.65 | 0.515    | 0.695 |
| D2  | 0.51        | 1.35  | 0.020    | 0.053 |
| E   | 15.49       | 16.26 | 0.610    | 0.640 |
| E1  | 13.46       | 14.16 | 0.530    | 0.557 |
| E2  | 3.43        | 5.49  | 0.135    | 0.216 |
| e   | 5.44 BSC    |       | .214 BSC |       |
| L   | 19.81       | 20.32 | 0.780    | 0.800 |
| L1  | 4.10        | 4.50  | 0.161    | 0.177 |
| ØP  | 3.56        | 3.66  | 0.140    | 0.144 |
| ØP1 | 7.06        | 7.39  | 0.278    | 0.291 |
| Q   | 5.38        | 6.20  | 0.212    | 0.244 |
| S   | 6.04        | 6.30  | 0.238    | 0.248 |

**Revision History**

| Date      | Revision | Notes                                    |
|-----------|----------|------------------------------------------|
| 7/23/2021 | 0.1      | Initial release of preliminary datasheet |
| 4/5/2024  | 0.2      | Updated additional data, updated format  |
| 5/23/2024 | 0.3      | Update part number                       |
| 5/30/2024 | 1        | Initial release                          |
|           |          |                                          |
|           |          |                                          |
|           |          |                                          |
|           |          |                                          |

**Notes**

**RoHS Compliance**

The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS2), as implemented March, 2013. RoHS Declarations for this product can be obtained from the Product Documentation sections of [www.SemiQ.com](http://www.SemiQ.com).

**REACH Compliance**

REACH substances of high concern (SVHC) information is available for this product. Since the European Chemicals Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, please contact our office at SemiQ Headquarters in Lake Forest, California to insure you get the most up-to-date REACH SVHC Declaration. REACH banned substance information (REACH Article 67) is also available upon request.

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