

## 650V SiC Schottky Diode

|                    |          |
|--------------------|----------|
| VDC                | 650 V    |
| Q <sub>C</sub>     | 72 nC*** |
| I <sub>F</sub>     | 24 A***  |
| T <sub>j,max</sub> | 175 °C   |

### Amp+™ Features

- Unipolar rectifier with surge current
- Zero reverse recovery current
- Fast, temperature-independent switching
- Avalanche tested to 80mJ per leg\*

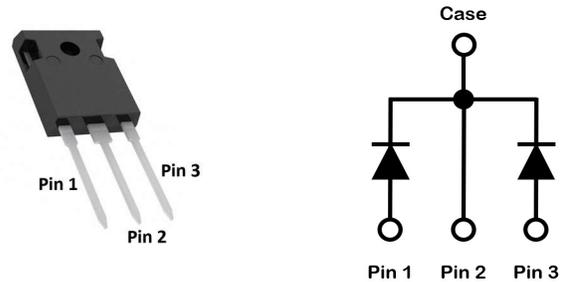
### Amp+™ Benefits

- Zero switching loss
- Higher efficiency
- Smaller heat sink
- Easy to parallel

### Amp+™ Applications

- Switch mode power supplies, UPS
- Power factor correction
- EV charging stations
- Output rectification

### Package



| Part #       | Package   | Marking   |
|--------------|-----------|-----------|
| GP3D024A065U | TO-247-3L | 3D024A065 |



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

| Characteristics Per Leg                            | Symbol                                | Conditions                                     | Values    | Unit             |
|--|---------------------------------------|--|-----------|------------------|
| Continuous forward current                         | I <sub>F</sub> **                     | T <sub>C</sub> =25 °C, T <sub>J</sub> =175 °C  | 37        | A                |
|  |                                       | T <sub>C</sub> =125 °C, T <sub>J</sub> =175 °C | 19        |                  |
|  |                                       | T <sub>C</sub> =150 °C, T <sub>J</sub> =175 °C | 12        |                  |
| Surge non-repetitive forward current sine halfwave | I <sub>FSM</sub>                      | T <sub>C</sub> =25 °C, t <sub>p</sub> =8.3 ms  | 120       | A                |
|  |                                       | T <sub>C</sub> =110 °C, t <sub>p</sub> =8.3 ms | 96        |                  |
| Non-repetitive peak forward current                | I <sub>F,max</sub>                    | T <sub>C</sub> =25 °C, t <sub>p</sub> =10 μs   | 720       | 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  | 60        | A <sup>2</sup> s |
|  |                                       | T <sub>C</sub> =110 °C, t <sub>p</sub> =8.3 ms | 38        |                  |
| Repetitive peak reverse voltage                    | V <sub>RRM</sub>                      | T <sub>J</sub> =25 °C                          | 650       | 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                          | 124       | 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 80 mJ is based on starting T<sub>j</sub> = 25°C, L = 1.0 mH, I<sub>AS</sub> = 12.65 A, V = 50 V.

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

\*\*\* Per Device

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

| Characteristics Per Leg | Symbol   | Conditions                                       | Values |      |      | Unit          |
|-------------------------|----------|--|--------|------|------|---------------|
|                         |          |  | min.   | typ. | max. |               |
| DC blocking voltage     | $V_{DC}$ | $T_j=25\text{ }^\circ\text{C}$                   | 650    | -    | -    | V             |
| Diode forward voltage   | $V_F$    | $I_F=12\text{A}, T_j=25\text{ }^\circ\text{C}$   | -      | 1.42 | 1.50 | V             |
|                         |          | $I_F=12\text{A}, T_j=125\text{ }^\circ\text{C}$  | -      | 1.49 | -    |               |
|                         |          | $I_F=12\text{A}, T_j=175\text{ }^\circ\text{C}$  | -      | 1.60 | 1.90 |               |
| Reverse current         | $I_R$    | $V_R=650\text{V}, T_j=25\text{ }^\circ\text{C}$  | -      | 2    | 30   | $\mu\text{A}$ |
|                         |          | $V_R=650\text{V}, T_j=125\text{ }^\circ\text{C}$ | -      | 14   | -    |               |
|                         |          | $V_R=650\text{V}, T_j=175\text{ }^\circ\text{C}$ | -      | 47   | 300  |               |
| Total capacitive charge | $Q_C$    | $V_R=400\text{V}, T_j=25\text{ }^\circ\text{C}$  | -      | 36   | -    | nC            |
| Total capacitance       | C        | $V_R=1\text{V}, f=1\text{ MHz}$                  | -      | 572  | -    | pF            |
|                         |          | $V_R=200\text{V}, f=1\text{ MHz}$                | -      | 68   | -    |               |
|                         |          | $V_R=400\text{V}, f=1\text{ MHz}$                | -      | 57   | -    |               |

Thermal Characteristics Per Leg

| Characteristics Per Leg           | Symbol     | Conditions | Values |      |      | Unit               |
|-----------------------------------|------------|------------|--------|------|------|--------------------|
|                                   |            |            | min.   | typ. | max. |                    |
| Thermal resistance, junction-case | $R_{thJC}$ | -          | -      | 1.21 | 1.48 | $^\circ\text{C/W}$ |

Typical Performance Per Leg

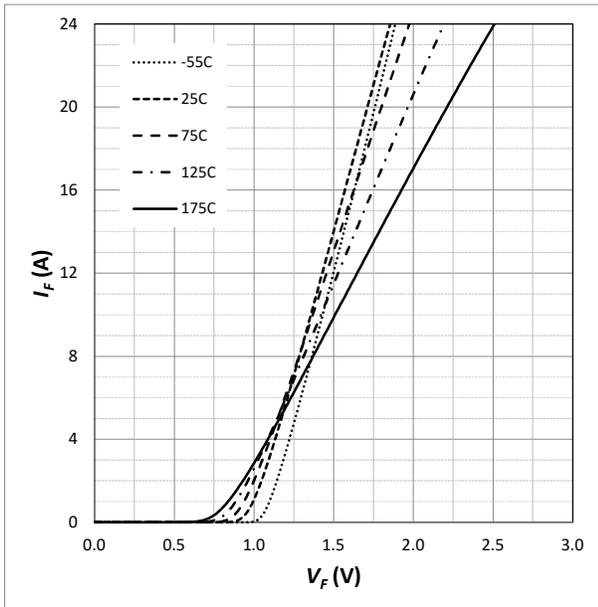


Fig. 1 Forward Characteristics (parameterized on  $T_j$ )

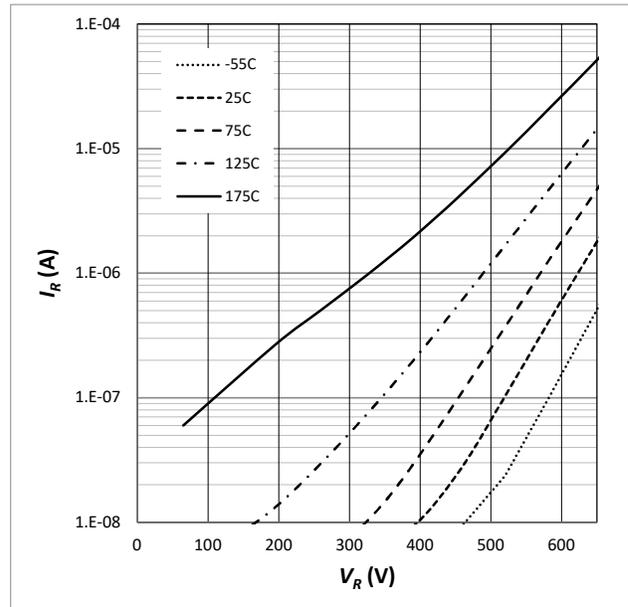


Fig. 2 Reverse Characteristics (parameterized on  $T_j$ )

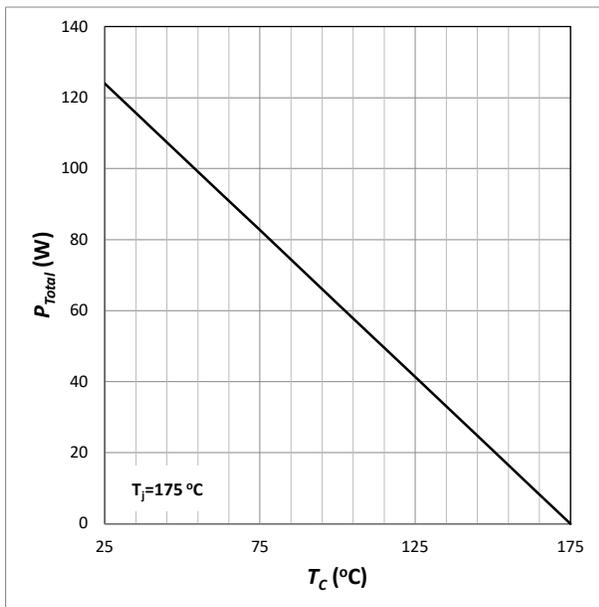


Fig. 3 Power Derating

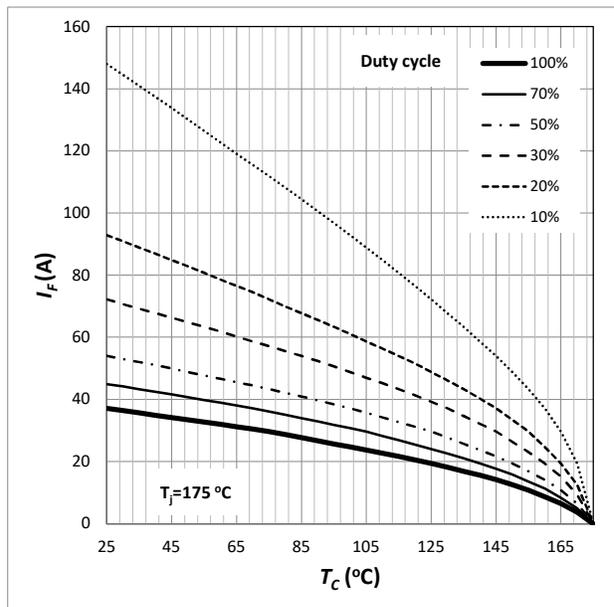


Fig. 4 Current Derating

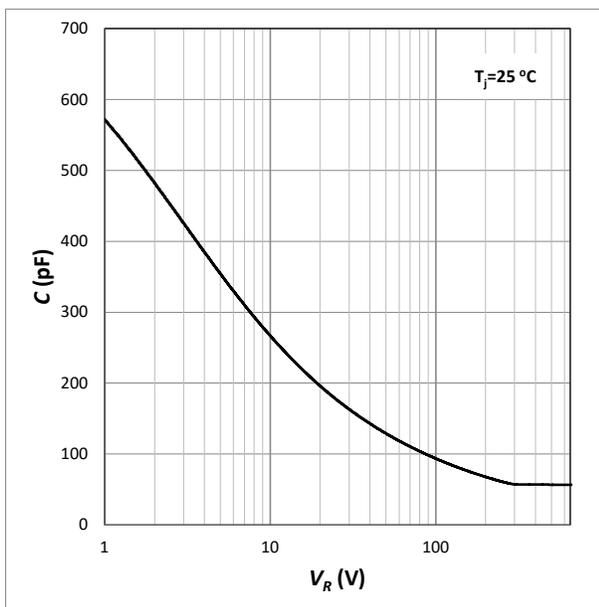


Fig. 5 Capacitance

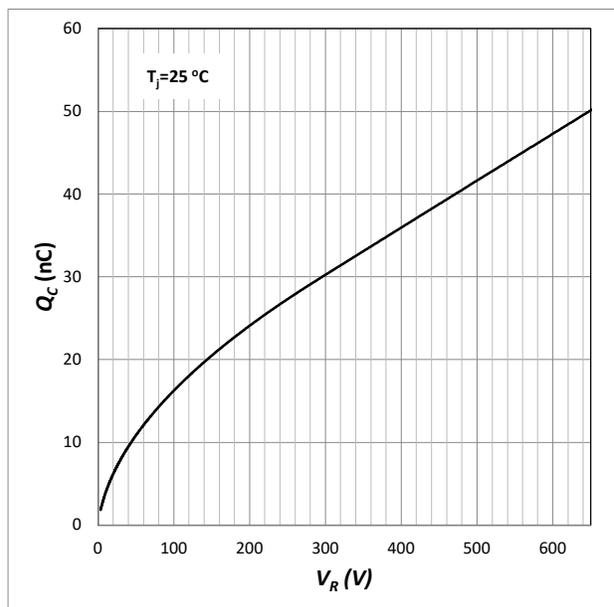


Fig. 6 Capacitive Charge

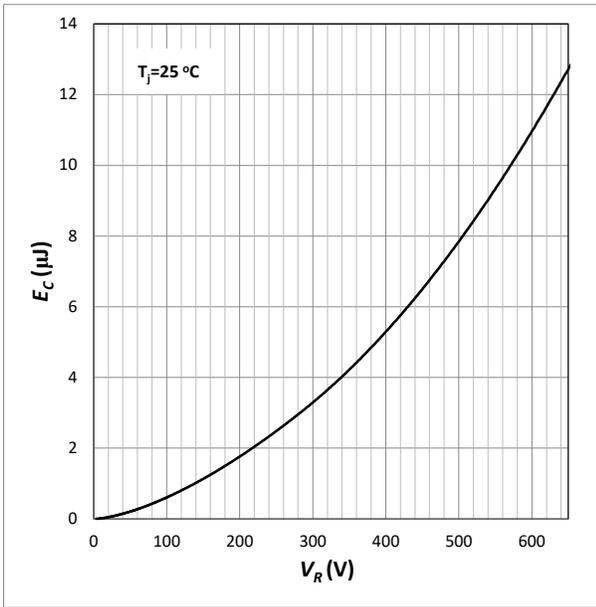


Fig. 7 Typical Capacitance Stored Energy

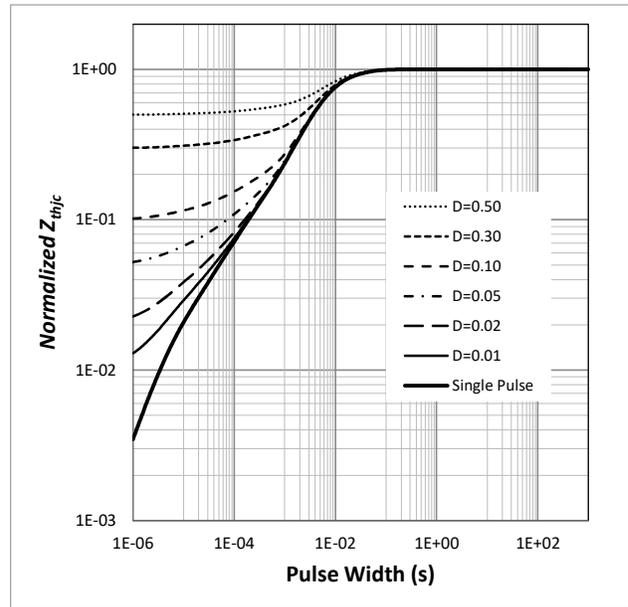
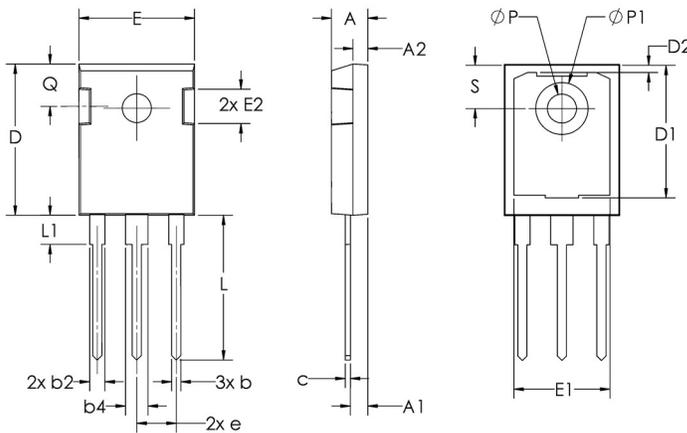


Fig. 8 Transient Thermal Impedance

Package Dimensions TO-247-3L



| 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 |
| b4  | 2.59        | 3.43  | 0.102     | 0.135 |
| 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    |       | 0.214 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   | 5.39        | 6.20  | 0.212     | 0.244 |
| S   | 6.04        | 6.30  | 0.238     | 0.248 |

## 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).

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