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## FFSP3065A

### Silicon Carbide Schottky Diode 650 V, 30 A

#### Features

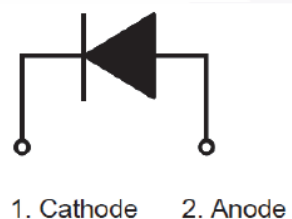
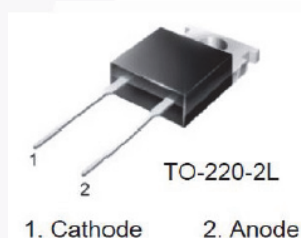
- Max Junction Temperature 175 °C
- Avalanche Rated 180 mJ
- High Surge Current Capacity
- Positive Temperature Coefficient
- Ease of Paralleling
- No Reverse Recovery / No Forward Recovery

#### Applications

- General Purpose
- SMPS, Solar Inverter, UPS
- Power Switching Circuits

#### Description

SiC Schottky Diode has no switching loss, provides improved system efficiency against Si diodes by utilizing new semiconductor material - Silicon Carbide, enables higher operating frequency, and helps increasing power density and reduction of system size/cost. Its high reliability ensures robust operation during surge or over-voltage conditions



#### Absolute Maximum Ratings $T_C = 25\text{ }^{\circ}\text{C}$ unless otherwise noted.

| Symbol                            | Parameter                                                      |                                          | FFSP3065A   | Unit |
|-----------------------------------|----------------------------------------------------------------|------------------------------------------|-------------|------|
| V <sub>RRM</sub>                  | Peak Repetitive Reverse Voltage                                |                                          | 650         | V    |
| E <sub>AS</sub>                   | Single Pulse Avalanche Energy (Note 1)                         |                                          | 180         | mJ   |
| I <sub>F</sub>                    | Continuous Rectified Forward Current @ T <sub>C</sub> < 148 °C |                                          | 30          | A    |
| I <sub>F, Max</sub>               | Non-Repetitive Peak Forward Surge Current                      | T <sub>C</sub> = 25 °C, 10 μs            | 1125        | A    |
|                                   |                                                                | T <sub>C</sub> = 150 °C, 10 μs           | 1040        | A    |
| I <sub>F, SM</sub>                | Non-Repetitive Forward Surge Current                           | Half-Sine Pulse, t <sub>p</sub> = 8.3 ms | 150         | A    |
| I <sub>F, RM</sub>                | Repetitive Forward Surge Current                               | Half-Sine Pulse, t <sub>p</sub> = 8.3 ms | 75          | A    |
| P <sub>tot</sub>                  | Power Dissipation                                              | T <sub>C</sub> = 25 °C                   | 240         | W    |
|                                   |                                                                | T <sub>C</sub> = 150 °C                  | 40          | W    |
| T <sub>J</sub> , T <sub>STG</sub> | Operating and Storage Temperature Range                        |                                          | -55 to +175 | °C   |

#### Thermal Characteristics

| Symbol          | Parameter                                  | FFSP3065A | Unit                 |
|-----------------|--------------------------------------------|-----------|----------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case, Max. | 0.62      | $^{\circ}\text{C/W}$ |

## Package Marking and Ordering Information

| Part Number | Top Mark  | Package   | Packing Method | Reel Size | Tape Width | Quantity |
|-------------|-----------|-----------|----------------|-----------|------------|----------|
| FFSP3065A   | FFSP3065A | TO-220-2L | Tube           | N/A       | N/A        | 50 units |

## Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted.

| Symbol | Parameter               | Test Conditions                               | Min. | Typ. | Max. | Unit          |
|--------|-------------------------|-----------------------------------------------|------|------|------|---------------|
| $V_F$  | Forward Voltage         | $I_F = 30\text{ A}, T_C = 25^\circ\text{C}$   | -    | 1.50 | 1.75 | V             |
|        |                         | $I_F = 30\text{ A}, T_C = 125^\circ\text{C}$  | -    | 1.60 | 2.0  |               |
|        |                         | $I_F = 30\text{ A}, T_C = 175^\circ\text{C}$  | -    | 1.72 | 2.4  |               |
| $I_R$  | Reverse Current         | $V_R = 650\text{ V}, T_C = 25^\circ\text{C}$  | -    | -    | 200  | $\mu\text{A}$ |
|        |                         | $V_R = 650\text{ V}, T_C = 125^\circ\text{C}$ | -    | -    | 400  |               |
|        |                         | $V_R = 650\text{ V}, T_C = 175^\circ\text{C}$ | -    | -    | 600  |               |
| $Q_C$  | Total Capacitive Charge | $V = 400\text{ V}$                            | -    | 100  | -    | nC            |
| C      | Total Capacitance       | $V_R = 1\text{ V}, f = 100\text{ kHz}$        | -    | 1705 | -    | pF            |
|        |                         | $V_R = 200\text{ V}, f = 100\text{ kHz}$      | -    | 180  | -    |               |
|        |                         | $V_R = 400\text{ V}, f = 100\text{ kHz}$      | -    | 130  | -    |               |

### Notes:

1: EAS of 180 mJ is based on starting  $T_J = 25^\circ\text{C}$ ,  $L = 0.5\text{ mH}$ ,  $I_{AS} = 27\text{ A}$ ,  $V = 50\text{ V}$ .

## Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted.

Figure 1. Forward Characteristics

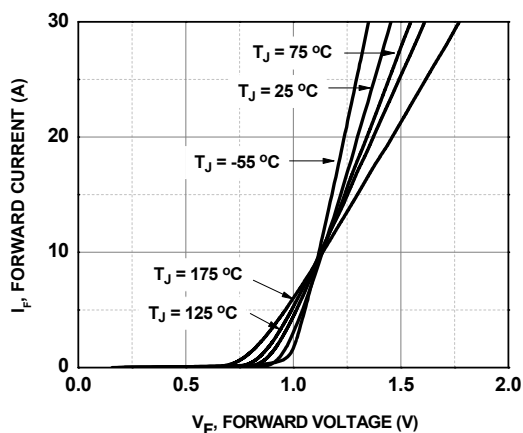


Figure 2. Reverse Characteristics

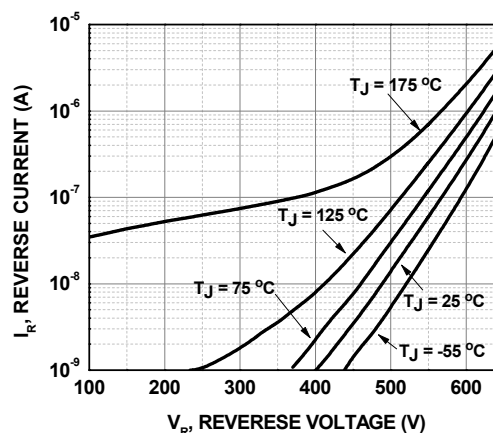


Figure 3. Current Derating

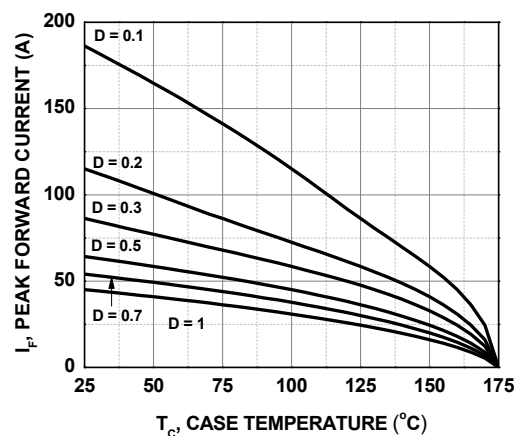
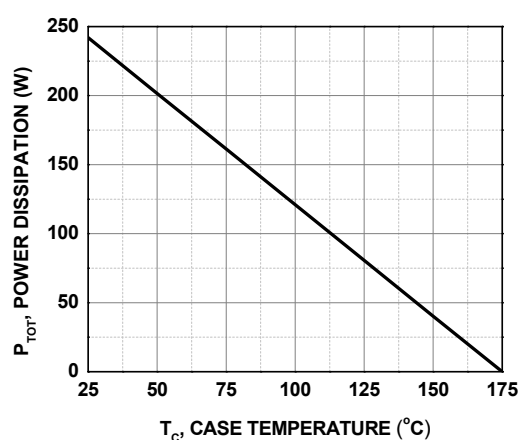


Figure 4. Power Derating



# Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted.

Figure 5. Capacitive Charge vs. Reverse Voltage

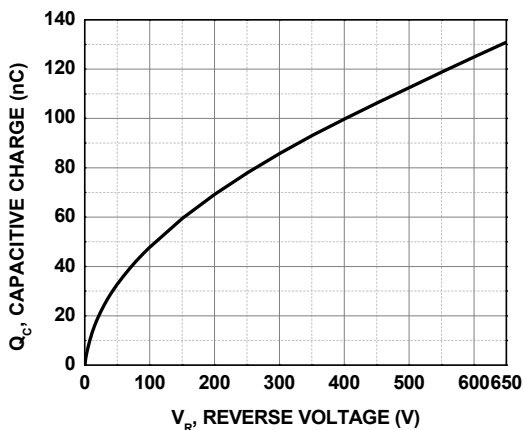


Figure 6. Capacitance vs. Reverse Voltage

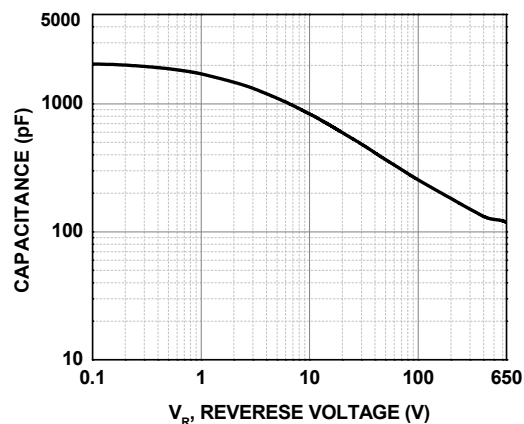


Figure 7. Capacitance Stored Energy

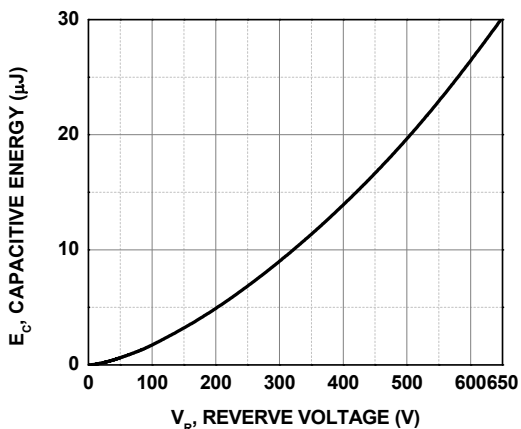
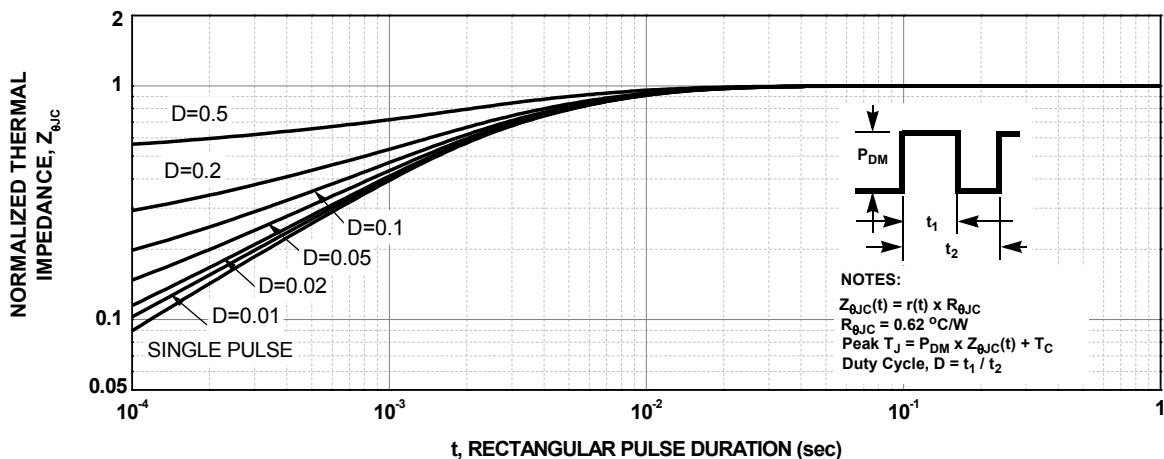


Figure 8. Junction-to-Case Transient Thermal Response Curve



## Test Circuit and Waveforms

Figure 9. Unclamped Inductive Switching Test Circuit & Waveform

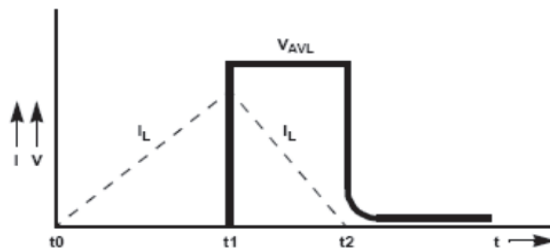
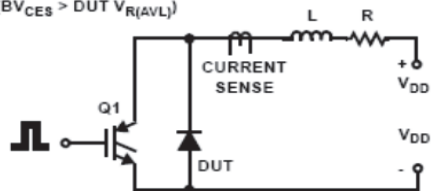
$L = 0.5\text{mH}$

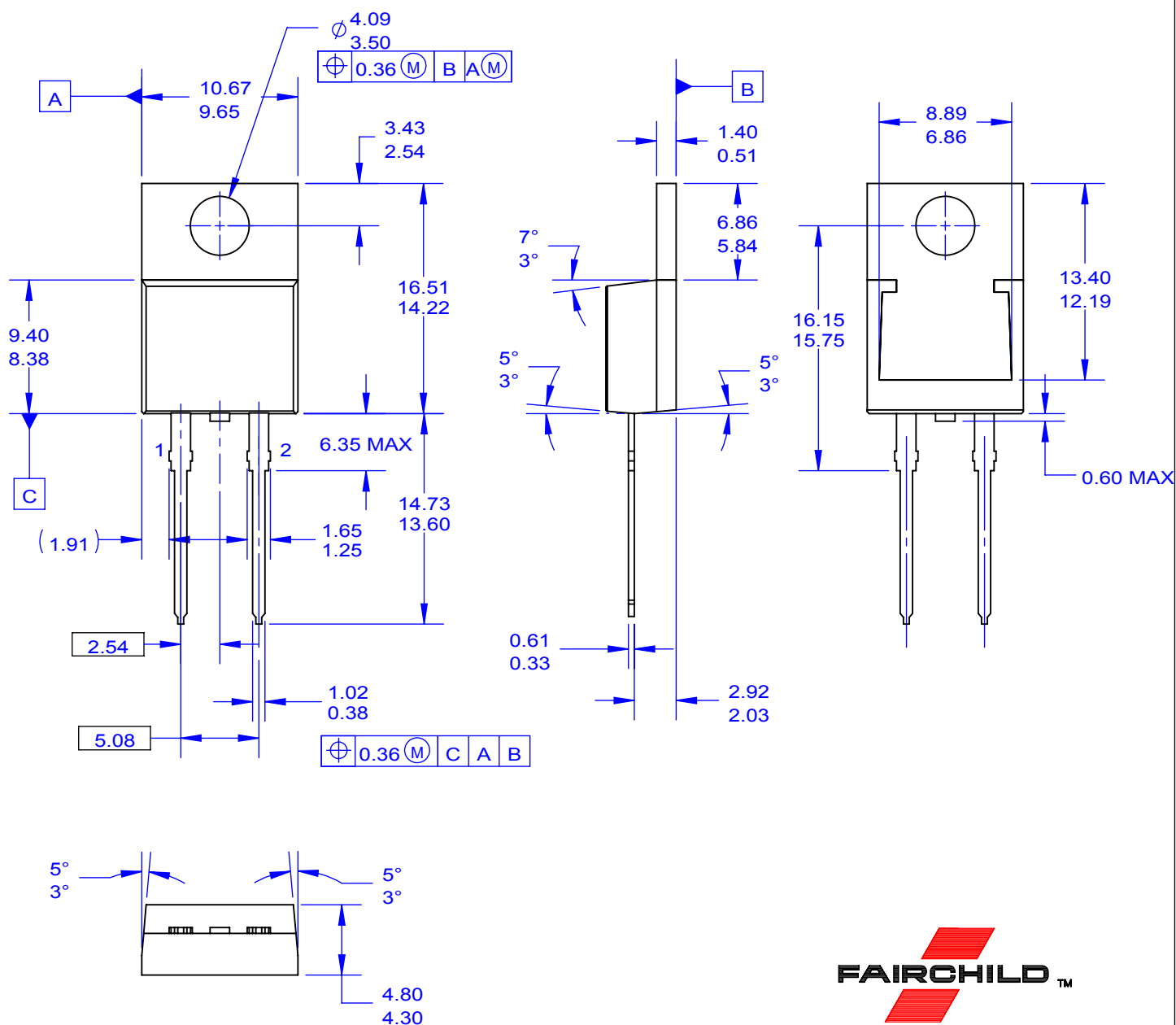
$R < 0.1\Omega$

$V_{DD} = 50\text{V}$

$E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$

$Q1 = \text{IGBT (BV}_{CES} > \text{DUT } V_{R(AVL)})$





#### NOTES:

- PACKAGE REFERENCE: JEDEC TO220, ISSUE K, VARIATION AC, DATED APRIL 2002.
- ALL DIMENSIONS ARE IN MILLIMETERS.
- DIMENSION AND TOLERANCE AS PER ASME Y14.5-2009.
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