

# Silicon Carbide Schottky Diode

650 V, 6 A

## FFSD0665A

### Description

Silicon Carbide (SiC) Schottky Diodes use a completely new technology that provides superior switching performance and higher reliability compared to Silicon. No reverse recovery current, temperature independent switching characteristics, and excellent thermal performance sets Silicon Carbide as the next generation of power semiconductor. System benefits include highest efficiency, faster operating frequency, increased power density, reduced EMI, and reduced system size and cost.

### Features

- Max Junction Temperature 175°C
- Avalanche Rated 36 mJ
- High Surge Current Capacity
- Positive Temperature Coefficient
- Ease of Paralleling
- No Reverse Recovery/No Forward Recovery
- This Device is Pb-Free, Halogen Free/BFR Free and RoHS Compliant

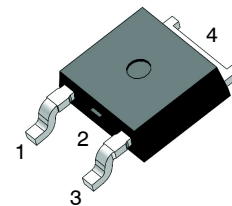
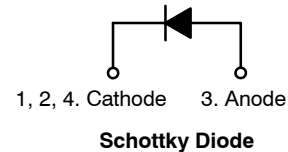
### Applications

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



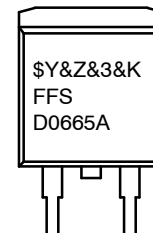
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DPAK3 (TO-252, 3 LD)  
CASE 369AS

### MARKING DIAGRAM



|           |                         |
|-----------|-------------------------|
| \$Y       | = ON Semiconductor Logo |
| &Z        | = Assembly Plant Code   |
| &3        | = Numeric Date Code     |
| &K        | = Lot Code              |
| FFSD0665A | = Specific Device Code  |

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

# FFSD0665A

**Table 1. ABSOLUTE MAXIMUM RATINGS** ( $T_C = 25^\circ\text{C}$  unless otherwise noted)

| Symbol         | Parameter  | FFSD0665A                                    | Unit             |   |
|----------------|--|--|------------------|---|
| $V_{RRM}$      | Peak Repetitive Reverse Voltage                                  | 650  | V                |   |
| $E_{AS}$       | Single Pulse Avalanche Energy (Note 1)                           | 36   | mJ               |   |
| $I_F$          | Continuous Rectified Forward Current @ $T_C < 159^\circ\text{C}$ | 6  | A                |   |
|                | Continuous Rectified Forward Current @ $T_C < 135^\circ\text{C}$ | 11   |                  |   |
| $I_{F,Max}$    | Non-Repetitive Peak Forward Surge Current                        | $T_C = 25^\circ\text{C}$ , 10 $\mu\text{s}$  | 430              | A |
|                |  | $T_C = 150^\circ\text{C}$ , 10 $\mu\text{s}$ | 415              | A |
| $I_{F,SM}$     | Non-Repetitive Forward Surge Current                             | Half-Sine Pulse, $t_p = 8.3$ ms              | 42               | A |
| $I_{F,RM}$     | Repetitive Forward Surge Current                                 | Half-Sine Pulse, $t_p = 8.3$ ms              | 24               | A |
| $P_{tot}$      | Power Dissipation  | $T_C = 25^\circ\text{C}$                     | 89               | W |
|                |  | $T_C = 150^\circ\text{C}$                    | 15               | W |
| $T_J, T_{STG}$ | Operating and Storage Temperature Range                          | -55 to +175                                  | $^\circ\text{C}$ |   |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1.  $E_{AS}$  of 36 mJ is based on starting  $T_J = 25^\circ\text{C}$ ,  $L = 0.5$  mH,  $I_{AS} = 12$  A,  $V = 50$  V.

**Table 2. THERMAL CHARACTERISTICS**

| Symbol          | Parameter                                  | Rating | Unit                      |
|-----------------|--|--------|---------------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case, Max. | 1.7    | $^\circ\text{C}/\text{W}$ |

**Table 3. OPERATING CHARACTERISTICS** ( $T_C = 25^\circ\text{C}$ , unless otherwise noted)

| Symbol | Parameter               | Test Conditions                          | Min | Typ  | Max  | Unit          |
|--------|-------------------------|--|-----|------|------|---------------|
| $V_F$  | Forward Voltage         | $I_F = 6$ A, $T_C = 25^\circ\text{C}$    | -   | 1.50 | 1.75 | V             |
|        |                         | $I_F = 6$ A, $T_C = 125^\circ\text{C}$   | -   | 1.6  | 2.0  |               |
|        |                         | $I_F = 6$ A, $T_C = 175^\circ\text{C}$   | -   | 1.72 | 2.4  |               |
| $I_R$  | Reverse Current         | $V_R = 650$ V, $T_C = 25^\circ\text{C}$  | -   | -    | 200  | $\mu\text{A}$ |
|        |                         | $V_R = 650$ V, $T_C = 125^\circ\text{C}$ | -   | -    | 400  |               |
|        |                         | $V_R = 650$ V, $T_C = 175^\circ\text{C}$ | -   | -    | 600  |               |
| $Q_C$  | Total Capacitive Charge | $V = 400$ V                              | -   | 22   | -    | nC            |
| C      | Total Capacitance       | $V_R = 1$ V, $f = 100$ kHz               | -   | 361  | -    | pF            |
|        |                         | $V_R = 200$ V, $f = 100$ kHz             | -   | 41   | -    |               |
|        |                         | $V_R = 400$ V, $f = 100$ kHz             | -   | 32   | -    |               |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

## PART MARKING AND ORDERING INFORMATION

| Part Number | Top Mark  | Package | Packing Method | Reel Size <sup>†</sup> | Tape Width | Quantity   |
|-------------|-----------|---------|----------------|------------------------|------------|------------|
| FFSD0665A   | FFSD0665A | DPAK3   | N/A            | 13"                    | N/A        | 2500 Units |

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D

TYPICAL CHARACTERISTICS

( $T_J = 25^\circ\text{C}$  unless otherwise noted)

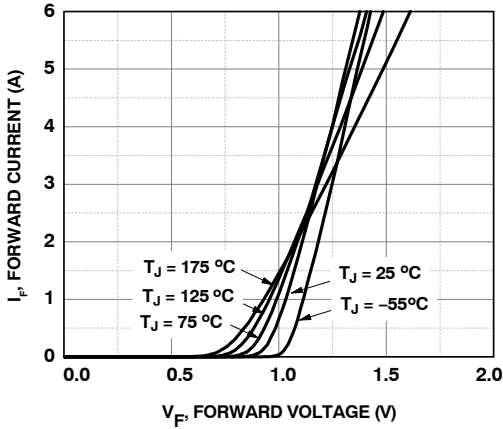


Figure 1. Forward Characteristics

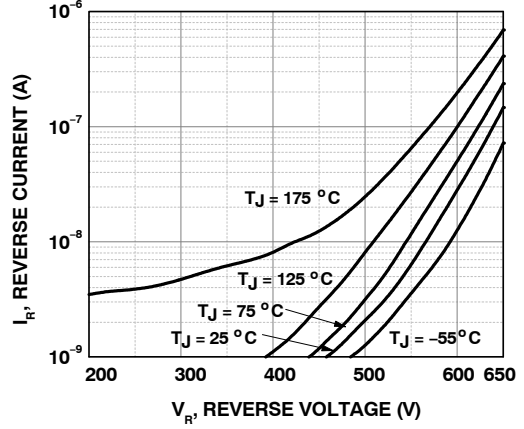


Figure 2. Reverse Characteristics

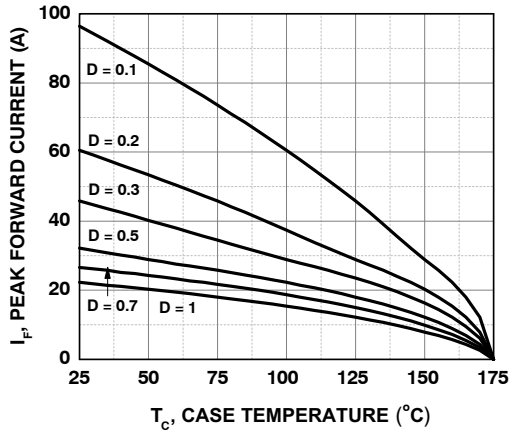


Figure 3. Current Derating

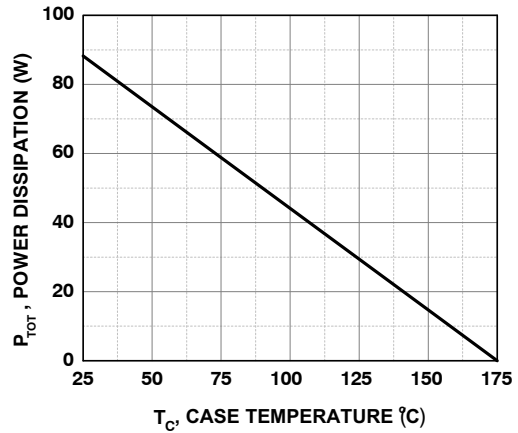


Figure 4. Power Derating

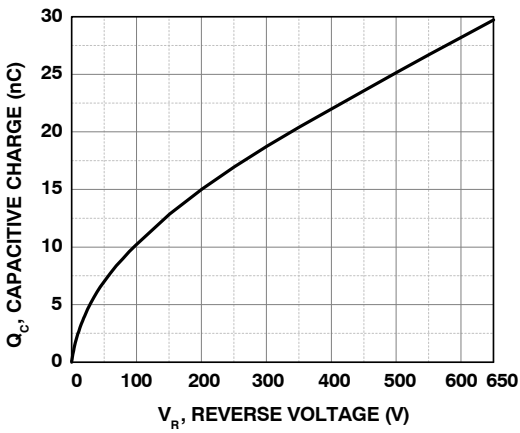


Figure 5. Capacitive Charge vs. Reverse Voltage

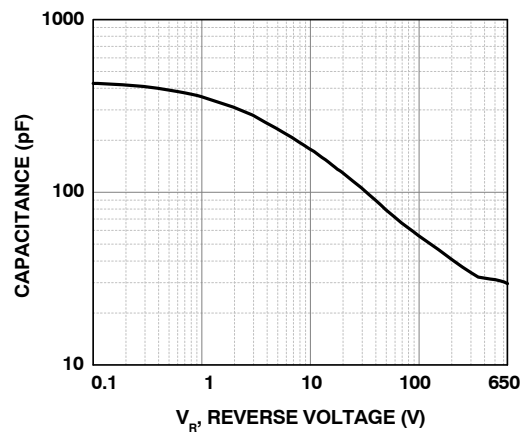


Figure 6. Capacitance vs. Reverse Voltage

TYPICAL CHARACTERISTICS (continued)

(T<sub>J</sub> = 25°C unless otherwise noted)

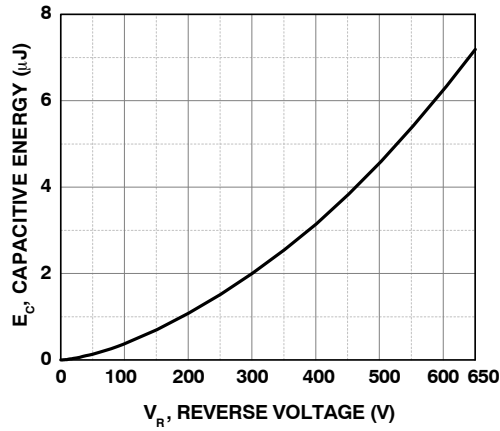


Figure 7. Capacitance Stored Energy

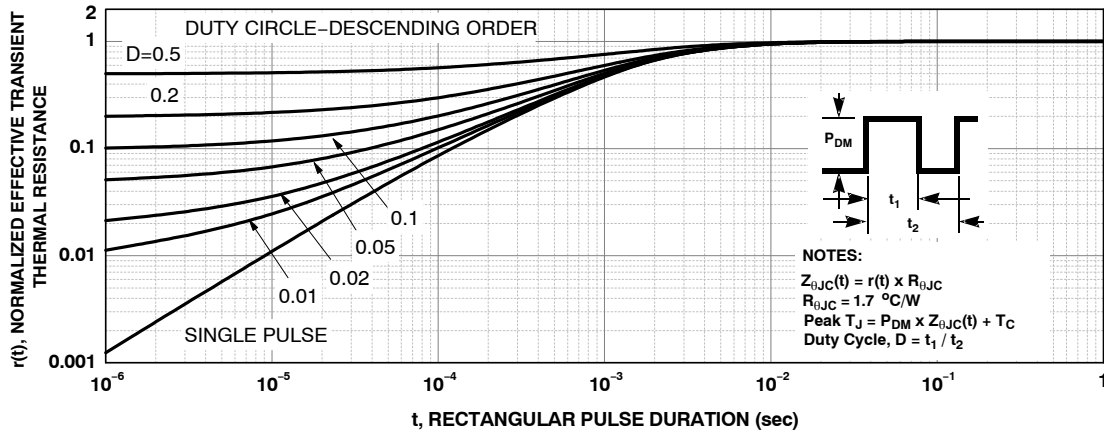


Figure 8. Junction-to-Case Transient Thermal Response Curve

TEST CIRCUIT AND WAVEFORMS

L = 0.5 mH  
 R < 0.1 Ω  
 V<sub>DD</sub> = 50 V  
 E<sub>AVL</sub> = 1/2LI<sup>2</sup> [V<sub>R(AVL)</sub> / (V<sub>R(AVL)</sub> - V<sub>DD</sub>)]  
 Q1 = IGBT (BV<sub>CES</sub> > DUT V<sub>R(AVL)</sub>)

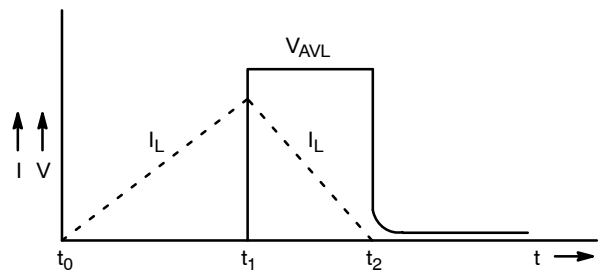
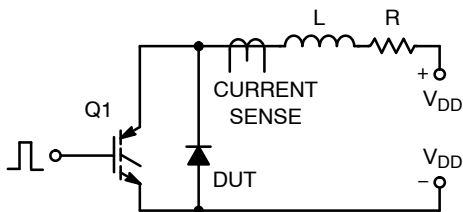


Figure 9. Unclamped Inductive Switching Test Circuit & Waveform

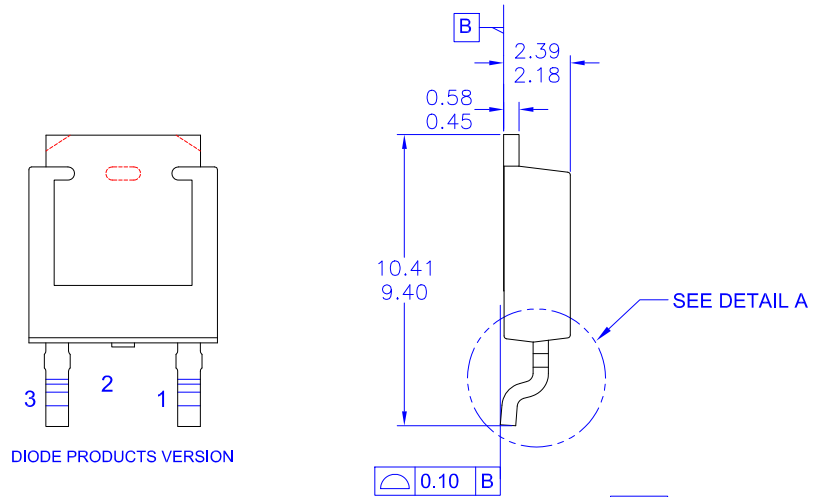
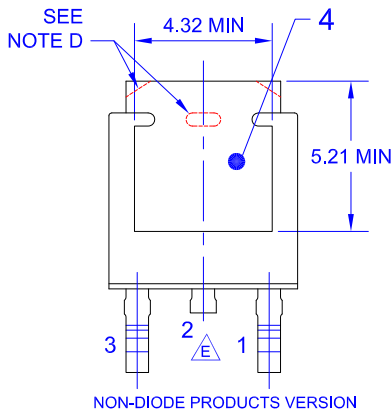
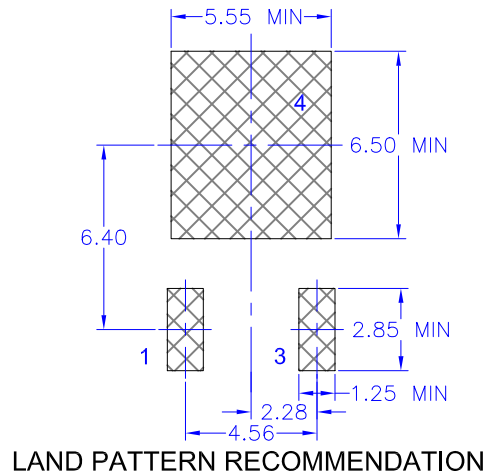
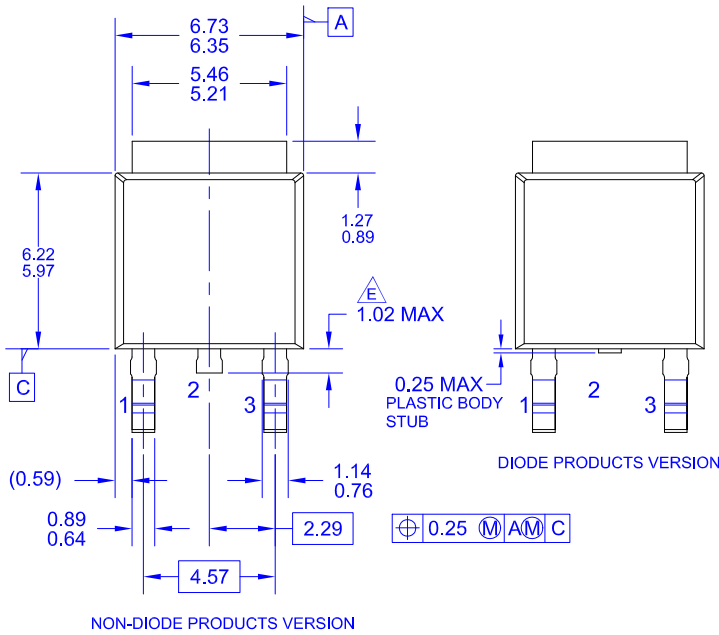
# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

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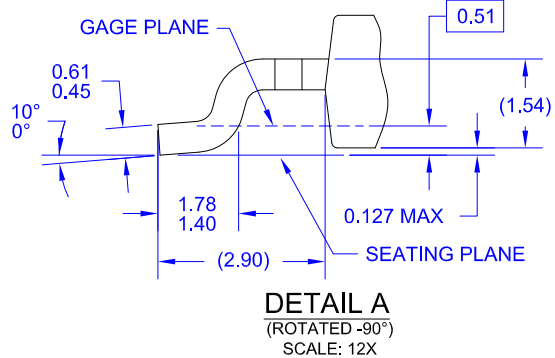


## DPAK3 (TO-252 3 LD) CASE 369AS ISSUE O

DATE 30 SEP 2016



- NOTES: UNLESS OTHERWISE SPECIFIED
- A) THIS PACKAGE CONFORMS TO JEDEC, TO-252, ISSUE C, VARIATION AA.
  - B) ALL DIMENSIONS ARE IN MILLIMETERS.
  - C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009.
  - D) SUPPLIER DEPENDENT MOLD LOCKING HOLES OR CHAMFERED CORNERS OR EDGE PROTRUSION.
  - E) TRIMMED CENTER LEAD IS PRESENT ONLY FOR DIODE PRODUCTS
  - F) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
  - G) LAND PATTERN RECOMMENDATION IS BASED ON IPC7351A STD TO228P991X239-3N.



|                         |                            |  |
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