

# FFSD0665A

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## Silicon Carbide Schottky Diode

### 650 V, 6 A

#### 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

#### Applications

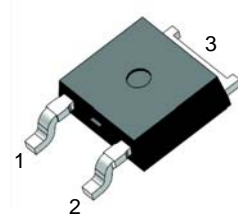
- General Purpose
- SMPS, Solar Inverter, UPS
- Power Switching Circuits



**ON Semiconductor®**

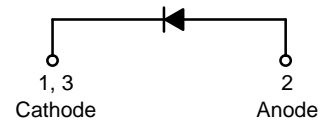
[www.onsemi.com](http://www.onsemi.com)

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DPAK3  
TO-252  
CASE 369AS

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#### ORDERING INFORMATION

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

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# 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	$^\circ\text{C/W}$

**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	Tape Width	Quantity
FFSD0665A	FFSD0665A	D-PAK	N/A	13"	N/A	2500 units

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

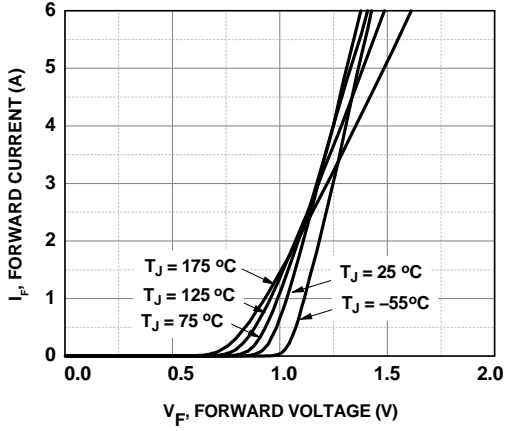


Figure 1. Forward Characteristics

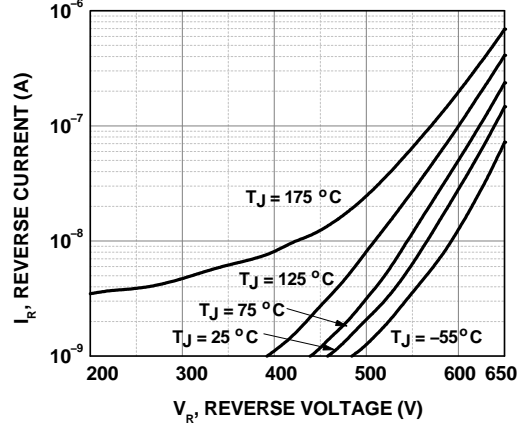


Figure 2. Reverse Characteristics

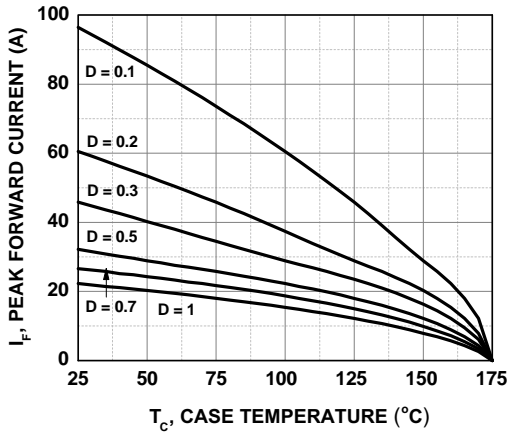


Figure 3. Current Derating

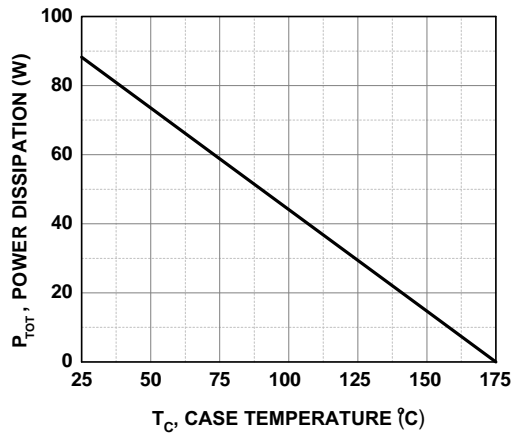


Figure 4. Power Derating

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

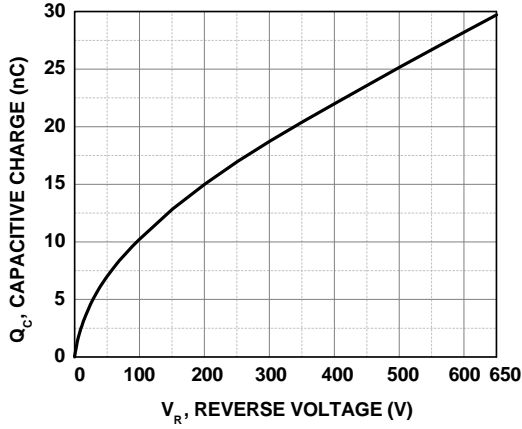


Figure 5. Capacitive Charge vs. Reverse Voltage

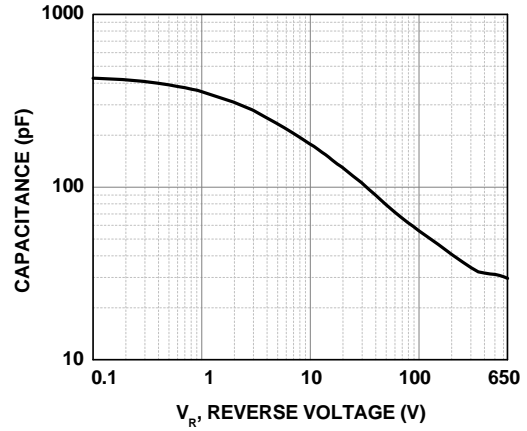


Figure 6. Capacitance vs. Reverse Voltage

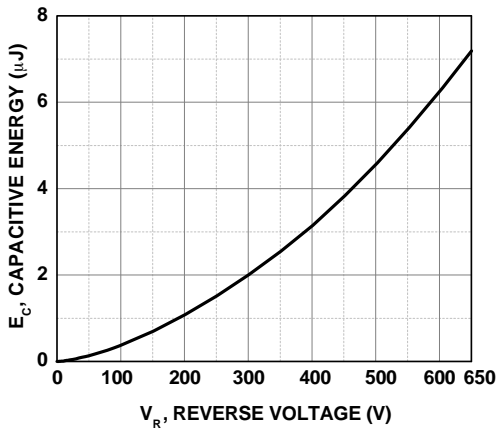


Figure 7. Capacitance Stored Energy

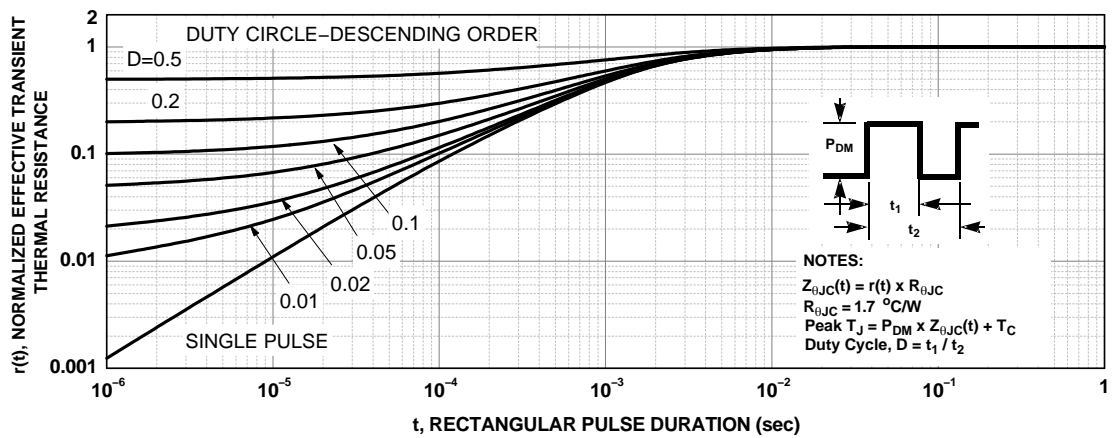


Figure 8. Junction-to-Case Transient Thermal Response Curve

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

$L = 0.5\text{mH}$

$R < 0.1\Omega$

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

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

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

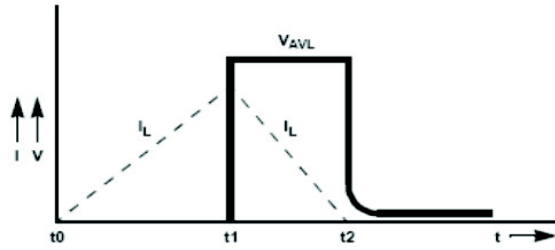
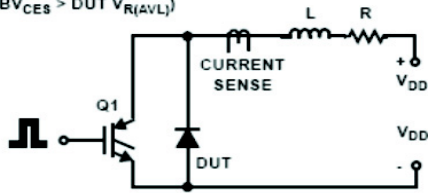
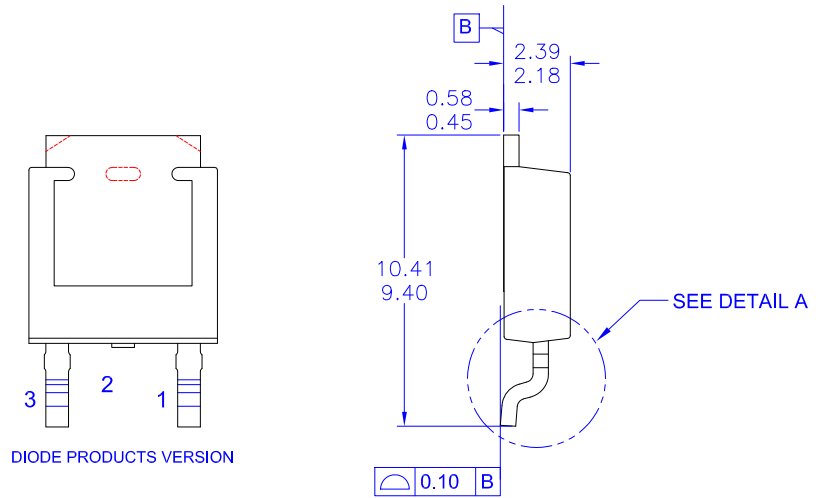
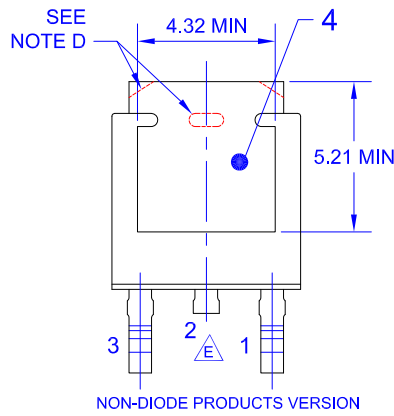
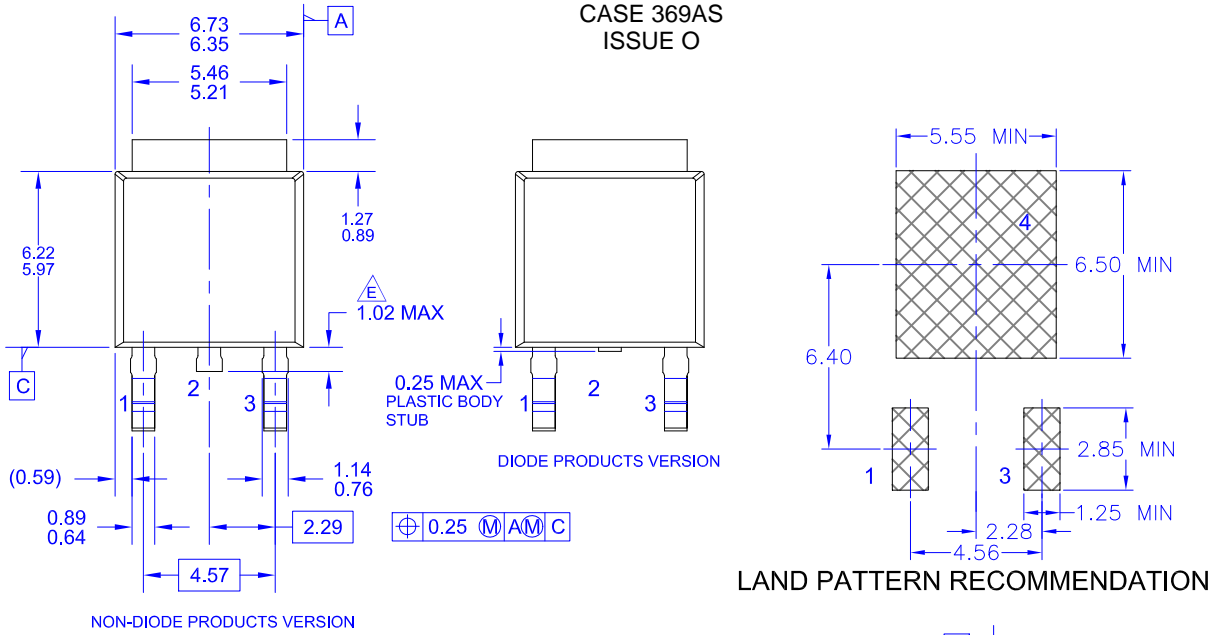


Figure 9. Unclamped Inductive Switching Test Circuit & Waveform

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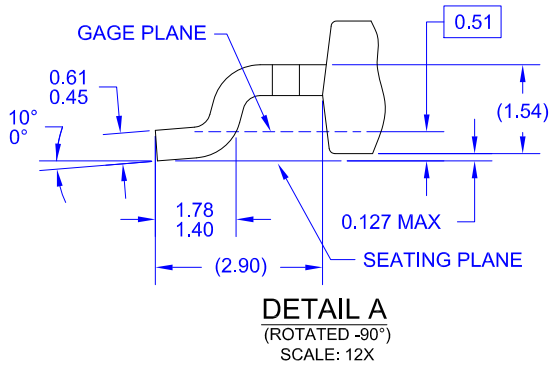
## PACKAGE DIMENSIONS


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



**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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