

# Silicon Carbide (SiC) Schottky Diode – EliteSiC, 4 A, 650 V, D1, DPAK

## FFSD0465A

### 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 25 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

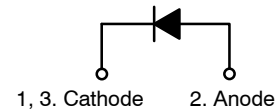
- General Purpose
- SMPS, Solar Inverter, UPS
- Power Switching Circuits

### ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

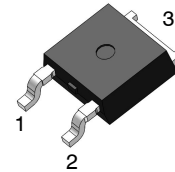
Symbol	Parameter	Value	Unit
$V_{RRM}$	Peak Repetitive Reverse Voltage	650	V
$E_{AS}$	Single Pulse Avalanche Energy (Note 1)	25	mJ
$I_F$	Continuous Rectified Forward Current @ $T_C < 160^\circ\text{C}$	4	A
	Continuous Rectified Forward Current @ $T_C < 135^\circ\text{C}$	7.6	A
$I_{F, Max}$	Non-Repetitive Peak Forward Surge Current	$T_C = 25^\circ\text{C}, 10 \mu\text{s}$	360 A
		$T_C = 150^\circ\text{C}, 10 \mu\text{s}$	330 A
$I_{F, SM}$	Non-Repetitive Forward Surge Current	Half-Sine Pulse, $t_p = 8.3 \text{ ms}$	38 A
$I_{F, RM}$	Repetitive Forward Surge Current	Half-Sine Pulse, $t_p = 8.3 \text{ ms}$	18 A
$P_{tot}$	Power Dissipation	$T_C = 25^\circ\text{C}$	61 W
		$T_C = 150^\circ\text{C}$	10 W
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +175	°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 25 mJ is based on starting  $T_J = 25^\circ\text{C}$ ,  $L = 0.5 \text{ mH}$ ,  $I_{AS} = 10 \text{ A}$ ,  $V = 50 \text{ V}$

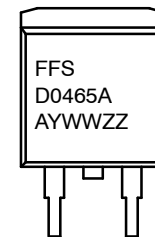


Schottky Diode



DPAK  
CASE 369AS

### MARKING DIAGRAM



FFSD0465A	= Specific Device Code
A	= Assembly Site
YWW	= Date Code (Year & Week)
ZZ	= Lot Code

### ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

# FFSD0465A

## THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	2.46	$^{\circ}C/W$

## ELECTRICAL CHARACTERISTICS ( $T_C = 25^{\circ}C$ unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
$V_F$	Forward Voltage	$I_F = 4\text{ A}, T_C = 25^{\circ}C$	-	1.50	1.75	V
		$I_F = 4\text{ A}, T_C = 125^{\circ}C$	-	1.6	2.0	
		$I_F = 4\text{ A}, T_C = 175^{\circ}C$	-	1.72	2.4	
$I_R$	Reverse Current	$V_R = 650\text{ V}, T_C = 25^{\circ}C$	-	-	200	$\mu A$
		$V_R = 650\text{ V}, T_C = 125^{\circ}C$	-	-	400	
		$V_R = 650\text{ V}, T_C = 175^{\circ}C$	-	-	600	
$Q_C$	Total Capacitive Charge	$V = 400\text{ V}$	-	16	-	nC
C	Total Capacitance	$V_R = 1\text{ V}, f = 100\text{ kHz}$	-	258	-	pF
		$V_R = 200\text{ V}, f = 100\text{ kHz}$	-	29	-	
		$V_R = 400\text{ V}, f = 100\text{ kHz}$	-	21	-	

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.

## ORDERING INFORMATION

Part Number	Top Marking	Package	Shipping*
FFSD0465A	FFSD0465A	DPAK	2500 / Tape & Reel

†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

( $T_J = 25^{\circ}C$  UNLESS OTHERWISE NOTED)

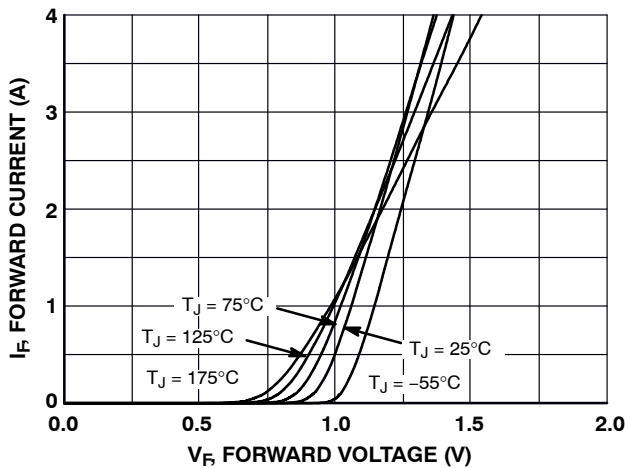


Figure 1. Forward Characteristics

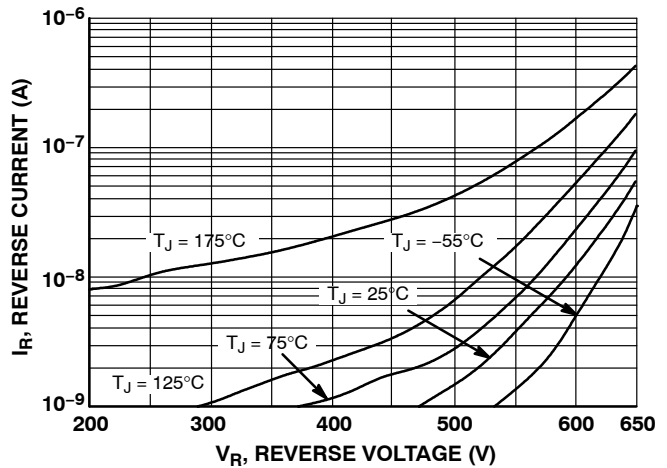


Figure 2. Reverse Characteristics

# FFSD0465A

## TYPICAL CHARACTERISTICS (CONTINUED)

( $T_J = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)

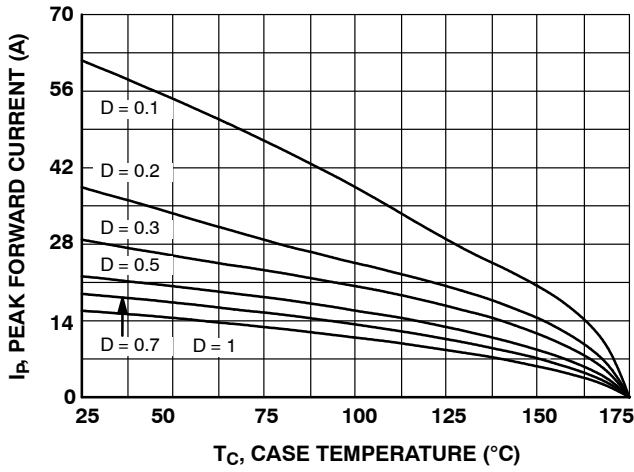


Figure 3. Current Derating

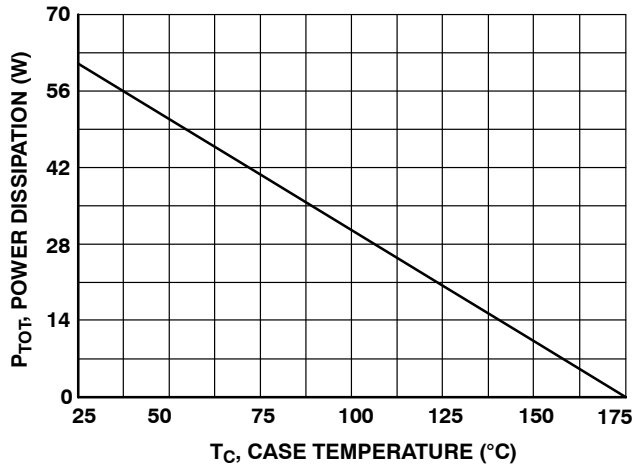


Figure 4. Power Derating

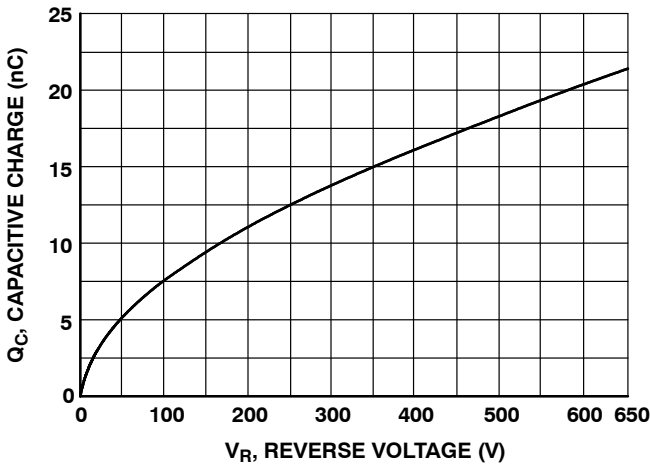


Figure 5. Capacitive Charge vs. Reverse Voltage

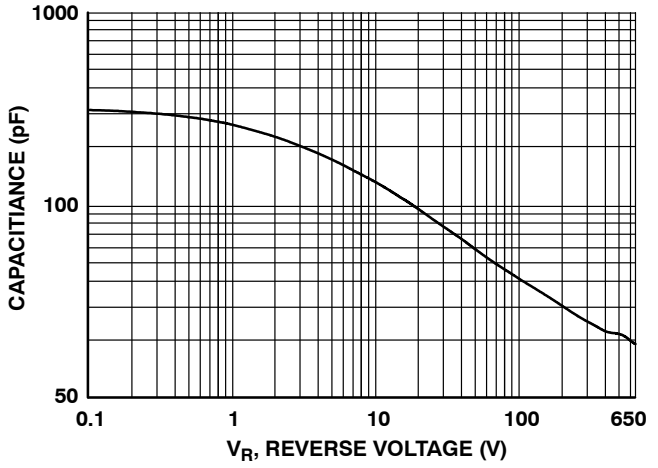


Figure 6. Capacitance vs. Reverse Voltage

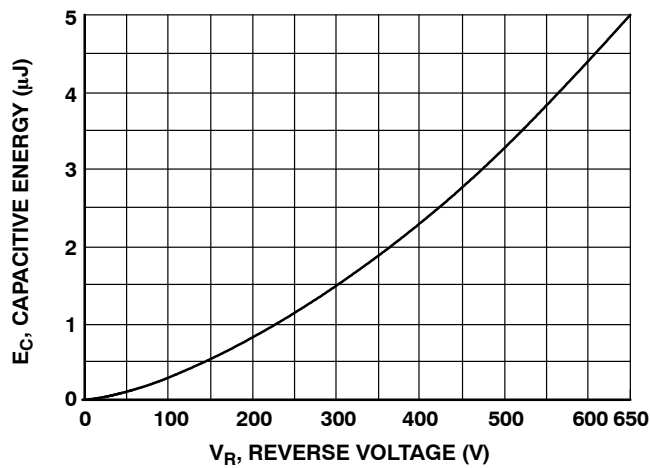


Figure 7. Capacitance Stored Energy

TYPICAL CHARACTERISTICS (CONTINUED)

( $T_J = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)

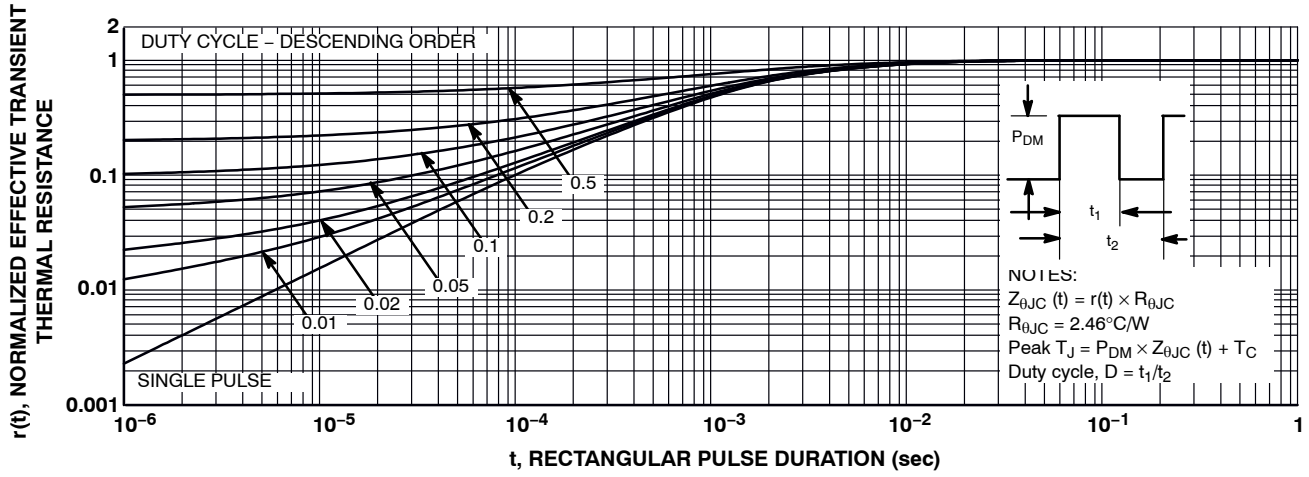


Figure 8. Junction-to-Case Transient Thermal Response Curve

TEST CIRCUIT AND WAVEFORMS

$L = 0.5 \text{ mH}$   
 $R < 0.1 \ \Omega$   
 $V_{DD} = 50 \text{ V}$   
 $E_{AVL} = 1/2LI^2 [V_{R(AVL)} / (V_{R(AVL)} - V_{DD})]$   
 $Q1 = \text{IGBT (} BV_{CES} > \text{DUT } V_{R(AVL)})$

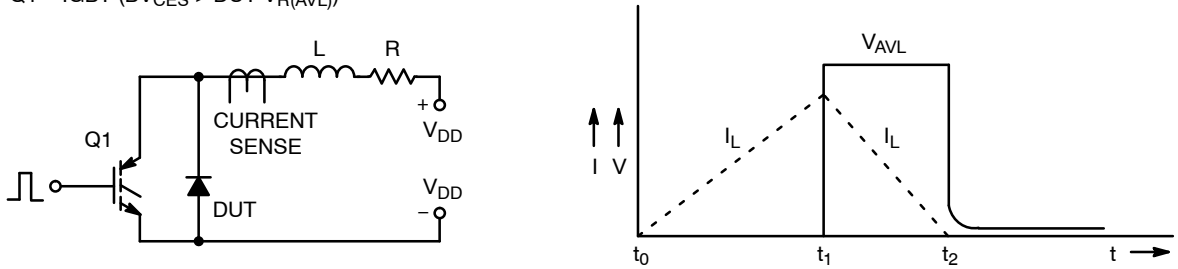
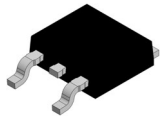


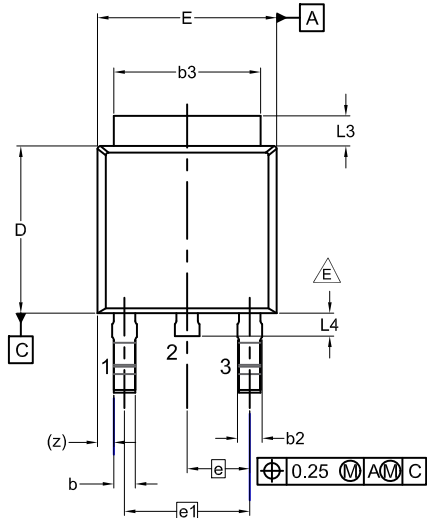
Figure 9. Unclamped Inductive Switching Test Circuit & Waveform

# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

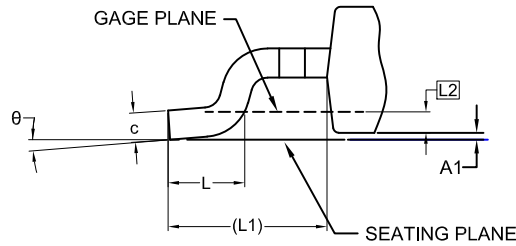


## DPAK3 (TO-252 3 LD) CASE 369AS ISSUE A

DATE 28 SEP 2022

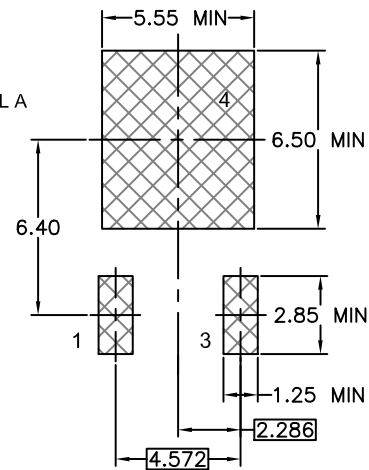
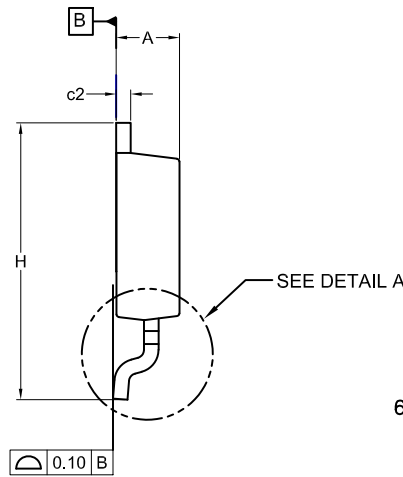
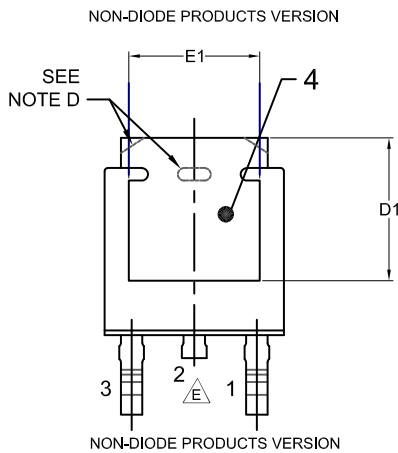


- NOTES: UNLESS OTHERWISE SPECIFIED  
 A) THIS PACKAGE CONFORMS TO JEDEC, TO-252, ISSUE C, VARIATION AA.  
 B) ALL DIMENSIONS ARE IN MILLIMETERS.  
 C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009.  
 D) SUPPLIER DEPENDENT MOLD LOCKING HOLES OR CHAMFERED CORNERS OR EDGE PROTRUSION.  
 E) FOR DIODE PRODUCTS, L4 IS 0.25 MM MAX.  
 F) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.  
 G) LAND PATTERN RECOMMENDATION IS BASED ON IPC7351A STD TO228P991X239-3N.



**DETAIL A**  
(ROTATED -90°)  
SCALE: 12X

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	2.18	2.29	2.39
A1	0.00	-	0.127
b	0.64	0.77	0.89
b2	0.76	0.95	1.14
b3	5.21	5.34	5.46
c	0.45	0.53	0.61
c2	0.45	0.52	0.58
D	5.97	6.10	6.22
D1	5.21	-	-
E	6.35	6.54	6.73
E1	4.32	-	-
e	2.286 BSC		
e1	4.572 BSC		
H	9.40	9.91	10.41
L	1.40	1.59	1.78
L1	2.90 REF		
L2	0.51 BSC		
L3	0.89	1.08	1.27
L4	-	-	1.02
θ	0°	--	10°



### GENERIC MARKING DIAGRAM\*



- XXXX = Specific Device Code
- A = Assembly Location
- Y = Year
- WW = Work Week
- ZZ = Assembly Lot Code

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

### LAND PATTERN RECOMMENDATION

\*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

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