

# FFSP2065B

## Silicon Carbide Schottky Diode

### 650 V, 20 A

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 94 mJ
- High Surge Current Capacity
- Positive Temperature Coefficient
- Ease of Paralleling
- No Reverse Recovery / No Forward Recovery
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

#### Applications

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

#### ABSOLUTE MAXIMUM RATINGS

(T<sub>C</sub> = 25°C, Unless otherwise specified)

Symbol	Parameter	Value	Unit	
V <sub>RRM</sub>	Peak Repetitive Reverse Voltage	650	V	
E <sub>AS</sub>	Single Pulse Avalanche Energy (Note 1)	94	mJ	
I <sub>F</sub>	Continuous Rectified Forward Current @ T <sub>C</sub> < 141°C	20	A	
	Continuous Rectified Forward Current @ T <sub>C</sub> < 135°C	22.5		
I <sub>F, Max</sub>	Non-Repetitive Peak Forward Surge Current	T <sub>C</sub> = 25°C, 10 μs	882	A
		T <sub>C</sub> = 150°C, 10 μs	798	
I <sub>F, SM</sub>	Non-Repetitive Forward Surge Current	Half-Sine Pulse, t <sub>p</sub> = 8.3 ms	84	A
P <sub>tot</sub>	Power Dissipation	T <sub>C</sub> = 25°C	150	W
		T <sub>C</sub> = 150°C	25	
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Temperature Range	-55 to +175	°C	

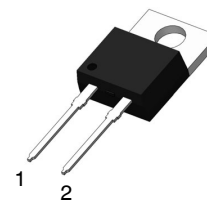
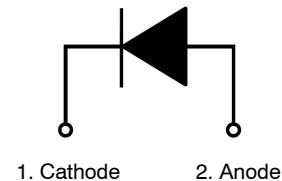
1. E<sub>AS</sub> of 94 mJ is based on starting T<sub>J</sub> = 25°C, L = 0.5 mH, I<sub>AS</sub> = 19.4 A, V = 50 V.



ON Semiconductor®

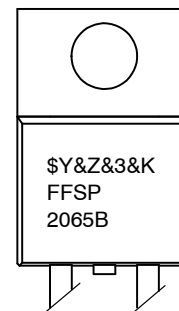
[www.onsemi.com](http://www.onsemi.com)

#### ELECTRICAL CONNECTION



TO-220-2LD  
CASE 340BB

#### MARKING DIAGRAM



\$Y = ON Semiconductor Logo  
 &Z = Assembly Plant Code  
 &3 = Numeric Date Code  
 &K = Lot Code  
 FFSP2065B = Specific Device Code

#### ORDERING INFORMATION

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

# FFSP2065B

## THERMAL CHARACTERISTICS

Symbol	Parameter	Ratings	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	1.0	$^{\circ}C/W$

## PACKAGE MARKING AND ORDERING INFORMATION

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FFSP2065B	FFSP2065B	TO220	Tube	N/A	N/A	50 Units

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_F$	Forward Voltage	$I_F = 20\text{ A}, T_C = 25^{\circ}C$		1.38	1.7	V
		$I_F = 20\text{ A}, T_C = 125^{\circ}C$		1.6	2.0	
		$I_F = 20\text{ A}, T_C = 175^{\circ}C$		1.72	2.4	
$I_R$	Reverse Current	$V_R = 650\text{ V}, T_C = 25^{\circ}C$		0.5	40	$\mu A$
		$V_R = 650\text{ V}, T_C = 125^{\circ}C$		1	80	
		$V_R = 650\text{ V}, T_C = 175^{\circ}C$		2	160	
$Q_C$	Total Capacitive Charge	$V = 400\text{ V}$		51		nC
C	Total Capacitance	$V_R = 1\text{ V}, f = 100\text{ kHz}$		866		pF
		$V_R = 200\text{ V}, f = 100\text{ kHz}$		80		
		$V_R = 400\text{ V}, f = 100\text{ kHz}$		70		

TYPICAL CHARACTERISTICS  $T_J = 25^\circ\text{C}$  Unless Otherwise Noted

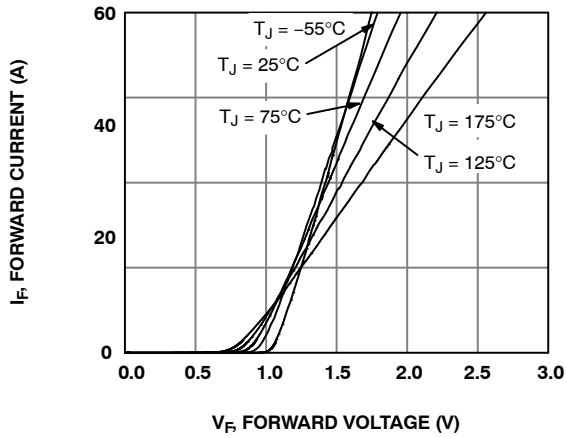


Figure 1. Forward Characteristics

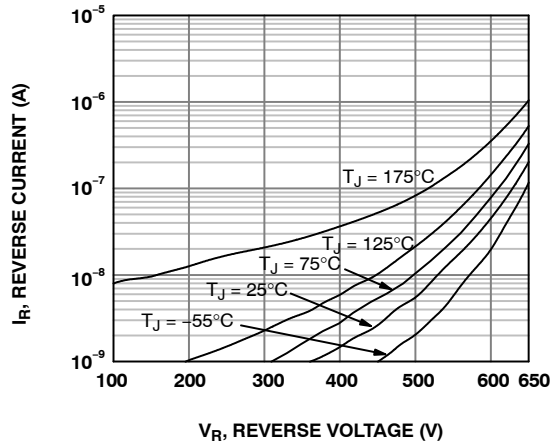


Figure 2. Reverse Characteristics

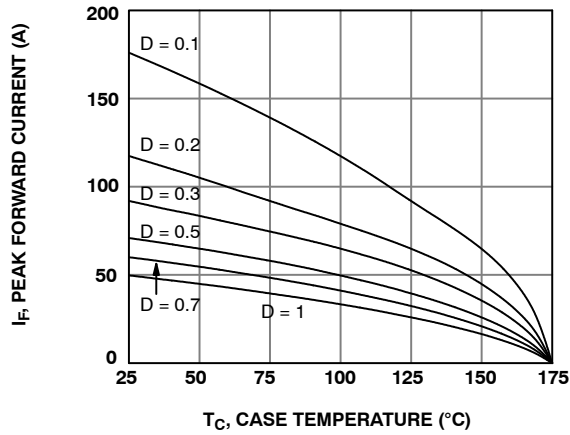


Figure 3. Current Derating

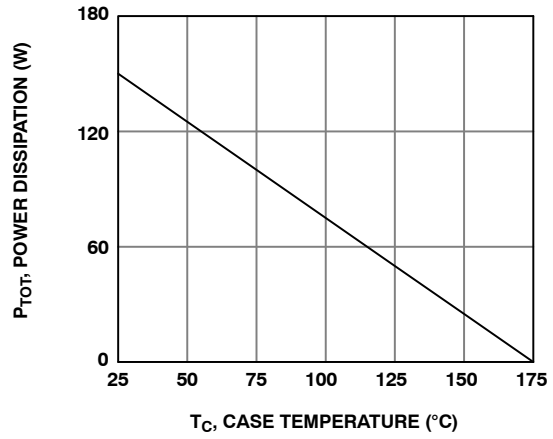


Figure 4. Power Dissipation

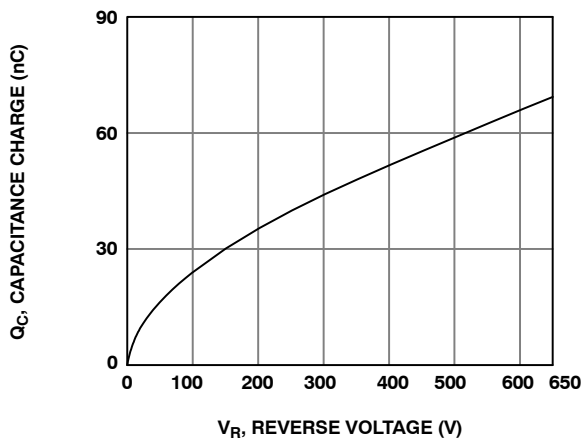


Figure 5. Capacitance Charge vs. Reverse Voltage

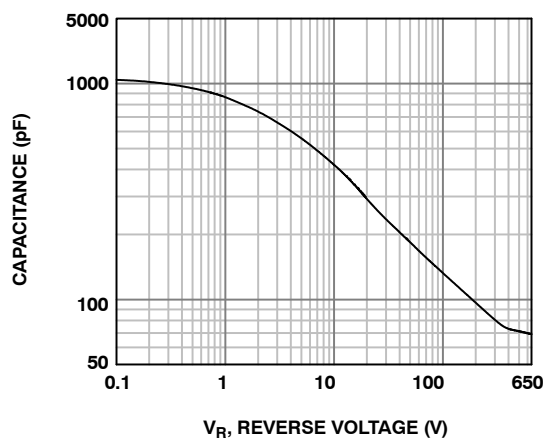


Figure 6. Capacitance vs. Reverse Voltage

TYPICAL CHARACTERISTICS  $T_J = 25^\circ\text{C}$  Unless Otherwise Noted (continued)

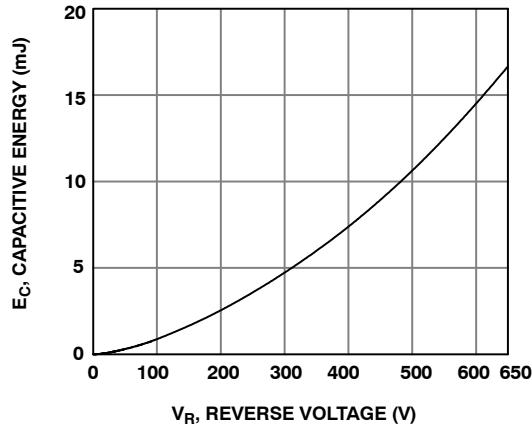


Figure 7. Capacitance Stored Energy

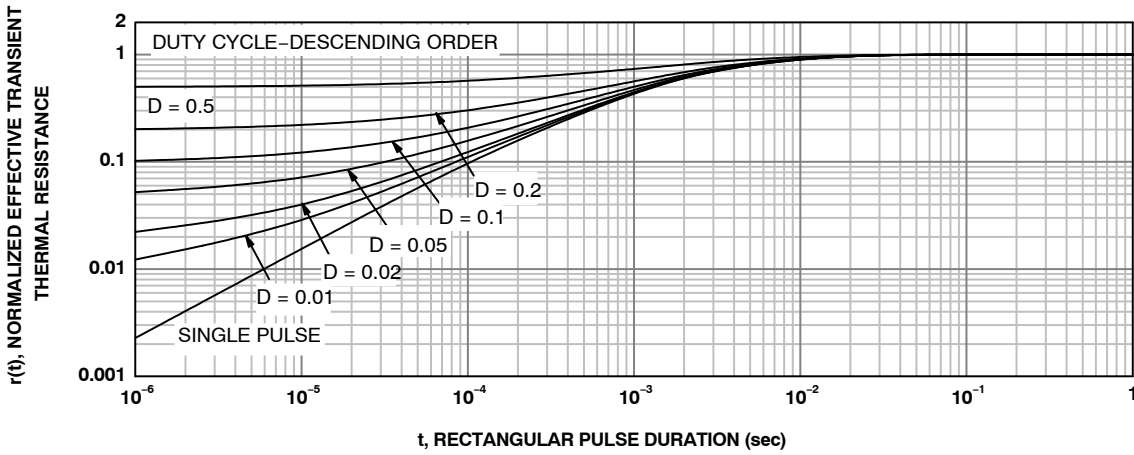


Figure 8. Junction-to-Case Transient Thermal Response Curve

TEST CIRCUIT AND WAVEFORMS

$L = 0.5 \text{ mH}$   
 $R < 0.1 \Omega$   
 $V_{DD} = 50 \text{ V}$

$E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$   
 $Q1 = \text{IGBT (} BV_{CES} > DUT V_{R(AVL)} \text{)}$

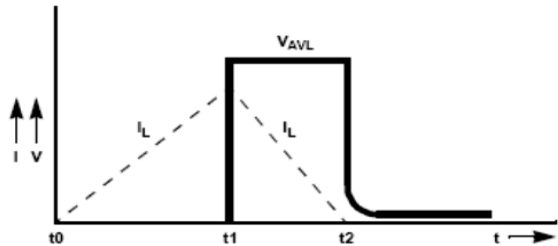
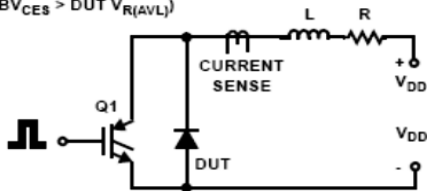
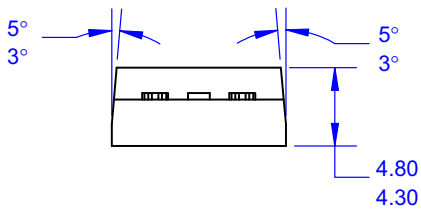
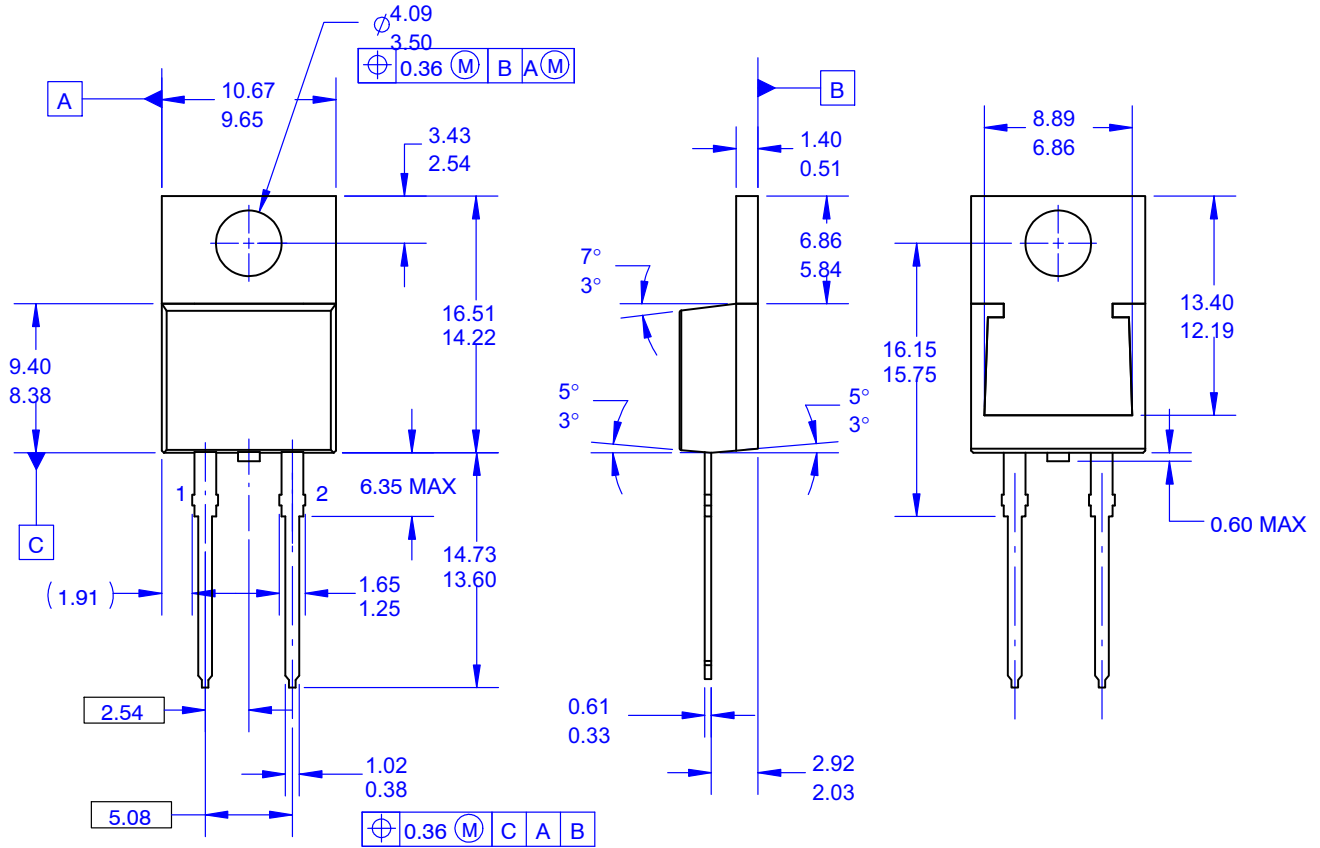


Figure 9. Unclamped Inductive Switching Test Circuit & Waveform

# FFSP2065B


## PACKAGE DIMENSIONS

TO-220-2LD  
CASE 340BB  
ISSUE O



### NOTES:

- A. PACKAGE REFERENCE: JEDEC TO220,ISSUE K, VARIATION AC, DATED APRIL 2002.
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSION AND TOLERANCE AS PER ASME Y14.5-2009.
- D. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS.

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

**PUBLICATION ORDERING INFORMATION**

**LITERATURE FULFILLMENT:**

Literature Distribution Center for ON Semiconductor  
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA  
**Phone:** 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
**Fax:** 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
**Email:** [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada  
**Europe, Middle East and Africa Technical Support:**  
Phone: 421 33 790 2910

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)  
**Order Literature:** <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative