# Silicon Carbide Schottky Diode

# 650 V, 6 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 26 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	Parar	Value	Unit		
$V_{RRM}$	Peak Repetitive Rev	650	V		
E <sub>AS</sub>	Single Pulse Avalan	26	mJ		
I <sub>F</sub>	Continuous Rectified @ T <sub>C</sub> < 150°C	6.0	Α		
	Continuous Rectified @ T <sub>C</sub> < 135°C	8.0			
I <sub>F, Max</sub>	Non-Repetitive Peak Forward	$T_C = 25^{\circ}C$ , 10 µs	473	Α	
	Surge Current	$T_C = 150^{\circ}C, 10 \ \mu s$	408		
I <sub>F, SM</sub>	Non-Repetitive Forward Surge Current	Half-Sine Pulse, t <sub>p</sub> = 8.3 ms	28	A	
P <sub>tot</sub>	Power Dissipation	Dissipation $T_C = 25^{\circ}C$		W	
		T <sub>C</sub> = 150°C	8.3		
T <sub>J</sub> , T <sub>STG</sub>	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.

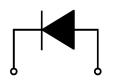
1.  $E_{AS}$  of 26 mJ is based on starting  $T_J = 25^{\circ}C$ , L = 0.5 mH,  $I_{AS} = 10.2$  A, V = 50 V.



## ON Semiconductor®

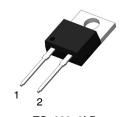
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#### **ELECTRICAL CONNECTION**



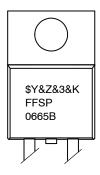
1. Cathode

2. Anode



TO-220-2LD CASE 340BB

#### **MARKING DIAGRAM**



\$Y = ON Semiconductor Logo &Z = Assembly Plant Code &3 = Numeric Date Code

K = Lot Code

FFSP0665B = Specific Device Code

## **ORDERING INFORMATION**

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

## THERMAL CHARACTERISTICS

Symbol	Parameter	Ratings	Unit	
$R_{ heta JC}$	Thermal Resistance, Junction to Case, Max.	2.46	°C/W	

## PACKAGE MARKING AND ORDERING INFORMATION

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FFSP0665B	FFSP0665B	TO220	Tube	N/A	N/A	50 Units

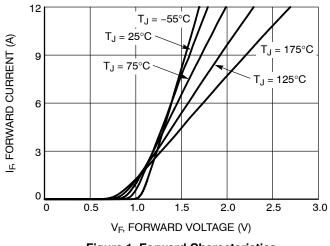
## **ELECTRICAL CHARACTERISTICS** $T_C = 25^{\circ}C$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Тур	Max	Unit
V <sub>F</sub>	Forward Voltage	I <sub>F</sub> = 6 A, T <sub>C</sub> = 25°C		1.38	1.7	V
		I <sub>F</sub> = 6 A, T <sub>C</sub> = 125°C		1.6	2.0	
		I <sub>F</sub> = 6 A, T <sub>C</sub> = 175°C		1.72	2.4	
I <sub>R</sub>	Reverse Current	V <sub>R</sub> = 650 V, T <sub>C</sub> = 25°C		0.025	40	μΑ
		V <sub>R</sub> = 650 V, T <sub>C</sub> = 125°C		0.08	80	
		V <sub>R</sub> = 650 V, T <sub>C</sub> = 175°C		0.22	160	
Q <sub>C</sub>	Total Capacitive Charge	V = 400 V		15		nC
С	Total Capacitance	V <sub>R</sub> = 1 V, f = 100 kHz		259		pF
		V <sub>R</sub> = 200 V, f = 100 kHz		29		
		V <sub>R</sub> = 400 V, f = 100 kHz		23		

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.

## **TYPICAL CHARACTERISTICS**

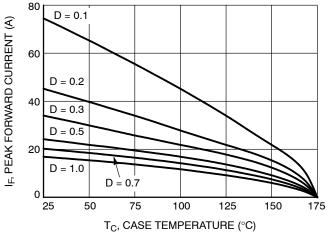
T<sub>J</sub> = 25°C Unless Otherwise Noted



10<sup>-6</sup> IR, REVERSE CURRENT (A) T<sub>J</sub> = 175°C 10<sup>-7</sup>  $T_J = 125^{\circ}C$ 10<sup>-8</sup>  $T_J = 75^{\circ}C$  $T_J = 25^{\circ}C$  $T_J = -55^{\circ}C$ 10<sup>-9</sup> 100 300 200 400 500 600 650 V<sub>R</sub>, REVERSE VOLTAGE (V)

Figure 1. Forward Characteristics

Figure 2. Reverse Characteristics



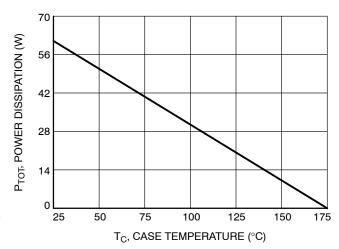
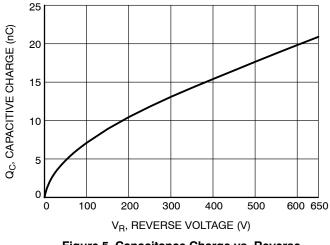


Figure 3. Current Derating

Figure 4. Power Dissipation



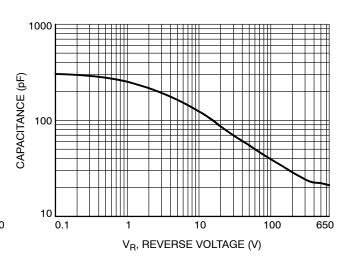


Figure 5. Capacitance Charge vs. Reverse Voltage

Figure 6. Capacitance vs. Reverse Voltage

## **TYPICAL CHARACTERISTICS**

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

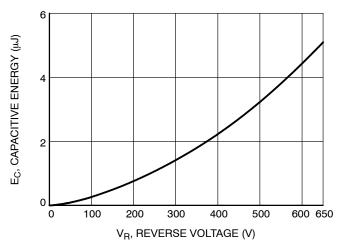


Figure 7. Capacitance Stored Energy

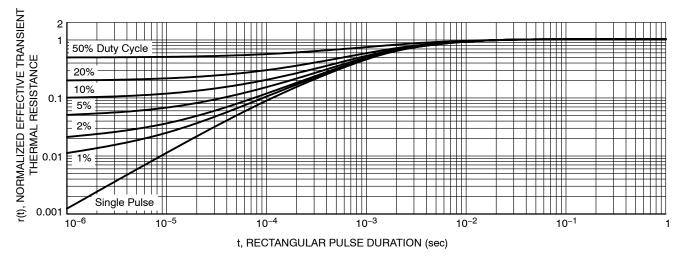


Figure 8. Junction-to-Case Transient Thermal Response Curve

## **TEST CIRCUIT AND WAVEFORMS**

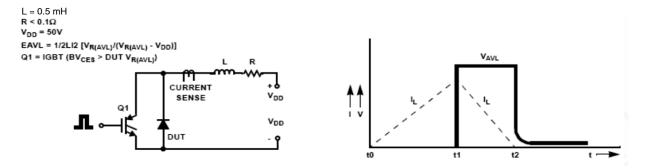
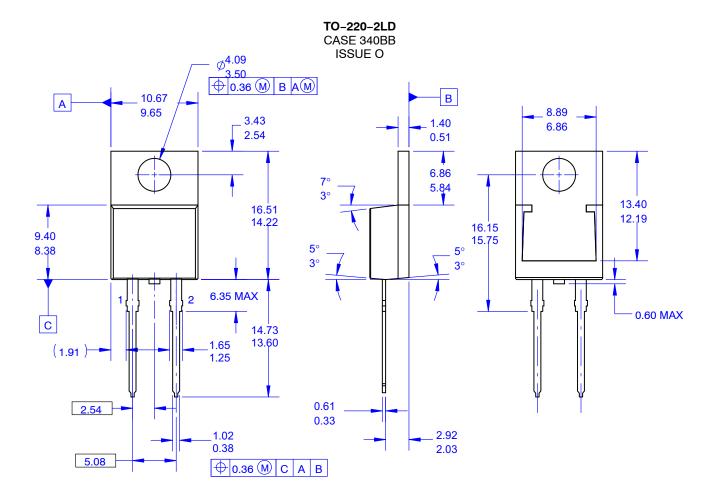
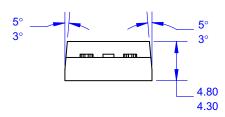


Figure 9. Unclamped Inductive Switching Test Circuit & Waveform

#### PACKAGE DIMENSIONS





## 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.

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