

# FFSH2065B-F085

## Silicon Carbide Schottky Diode

**650 V, 20 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 & 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
- AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### Applications

- Automotive HEV-EV Onboard Chargers
- Automotive HEV-EV DC-DC Converters

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

Symbol	Parameter	Unit	Rated	Unit
$V_{RRM}$	Peak Repetitive Reverse Voltage		650	V
$E_{AS}$	Single Pulse Avalanche Energy (Note 1)		94	mJ
$I_F$	Continuous Rectified Forward Current	@ $T_C < 141^\circ\text{C}$	20	A
		@ $T_C < 135^\circ\text{C}$	22.3	
$I_{F, Max}$	Non-Repetitive Peak Forward Surge Current	$T_C = 25^\circ\text{C}$ , 10 $\mu\text{s}$	889	A
		$T_C = 150^\circ\text{C}$ , 10 $\mu\text{s}$	861	
$I_{F, SM}$	Non-Repetitive Forward Surge Current $T_C = 25^\circ\text{C}$	Half-Sine Pulse, $t_p = 8.3 \text{ ms}$	84	A
$P_{tot}$	Power Dissipation	$T_C = 25^\circ\text{C}$	148	W
		$T_C = 150^\circ\text{C}$	25	
$T_J, T_{STG}$	Operating and Storage Temperature Range		-55 to +175	$^\circ\text{C}$
	TO247 Mounting Torque, M3 Screw		60	Ncm

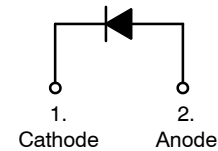
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1.  $E_{AS}$  of 94 mJ is based on starting  $T_J = 25^\circ\text{C}$ ,  $L = 0.5 \text{ mH}$ ,  $I_{AS} = 19.4 \text{ A}$ ,  $V = 50 \text{ V}$ .

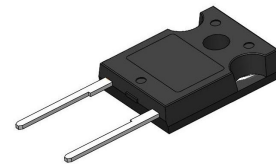


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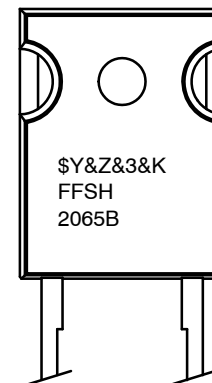


**Schottky Diode**



**TO-247-2LD  
CASE 340DA**

### MARKING DIAGRAM



$\$Y$  = ON Semiconductor Logo  
 $\&Z$  = Assembly Plant Code  
 $\&3$  = Numeric Date Code  
 $\&K$  = Lot Code  
 FFSH2065B = Specific Device Code

### ORDERING INFORMATION

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

# FFSH2065B-F085

## THERMAL CHARACTERISTICS

Symbol	Parameter	Ratings	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max	1.01	$^{\circ}C/W$

## 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
		$V_R = 300\text{ V}, f = 100\text{ kHz}$	-	80	-	
		$V_R = 600\text{ V}, f = 100\text{ kHz}$	-	70	-	

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.

## PACKAGE MARKING AND ORDERING INFORMATION

Part Number	Top Mark	Package	Shipping
FFSH2065B-F085	FFSH2065B	TO-247-2LD (Pb-Free/Halogen Free)	30 Units/Tube

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

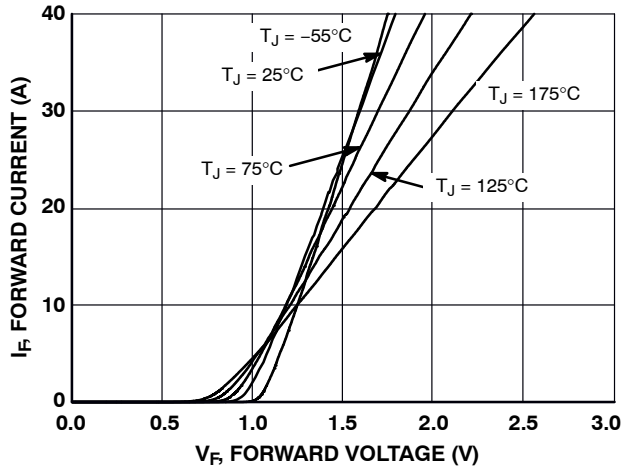


Figure 1. Forward Characteristics

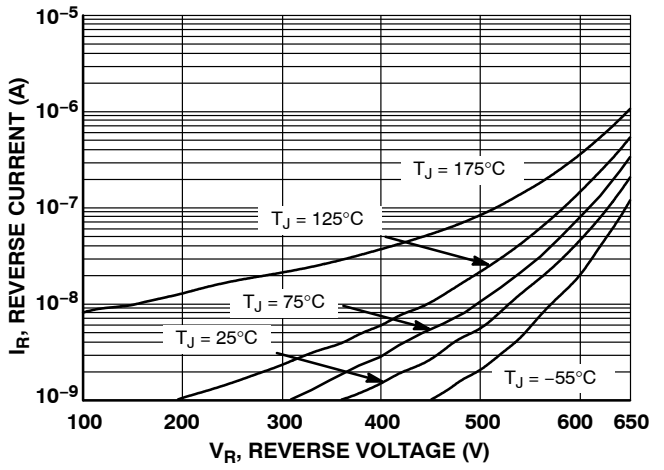


Figure 2. Reverse Characteristics

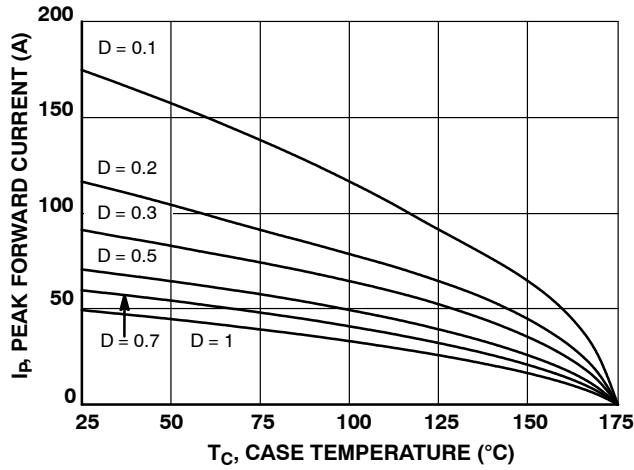


Figure 3. Current Derating

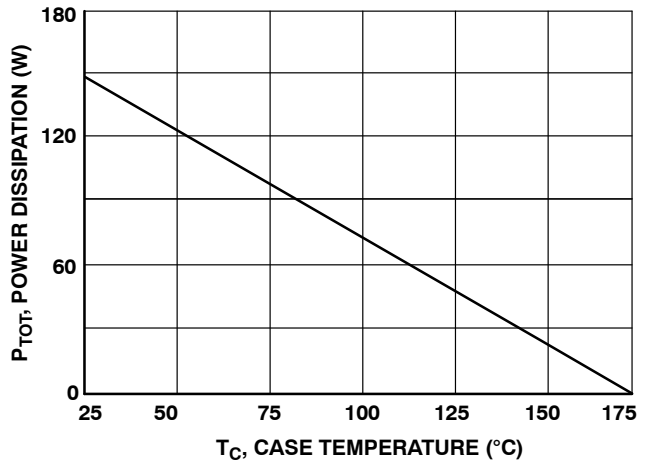


Figure 4. Power Derating

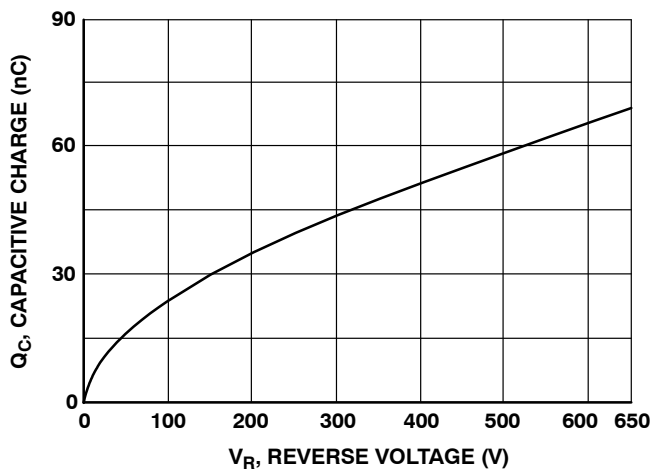


Figure 5. Capacitive Charge vs. Reverse Voltage

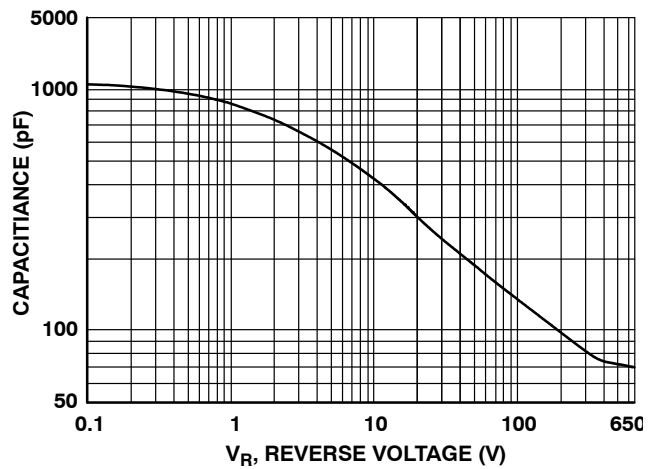


Figure 6. Capacitance vs. Reverse Voltage

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

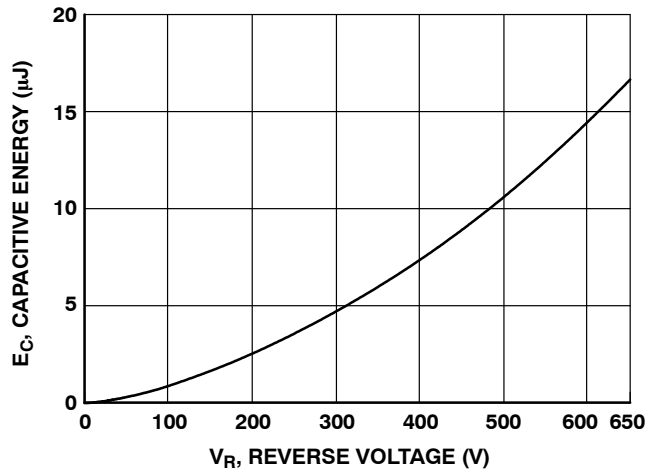


Figure 7. Capacitance Stored Energy

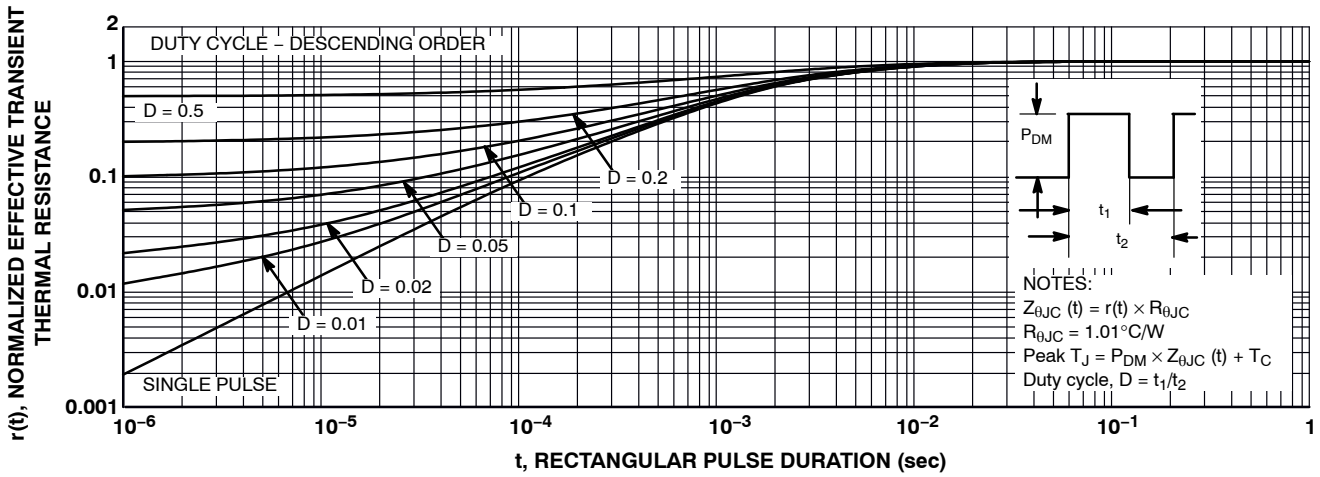


Figure 8. Junction-to-Case Transient Thermal Response Curve

TEST CIRCUIT AND WAVEFORMS

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

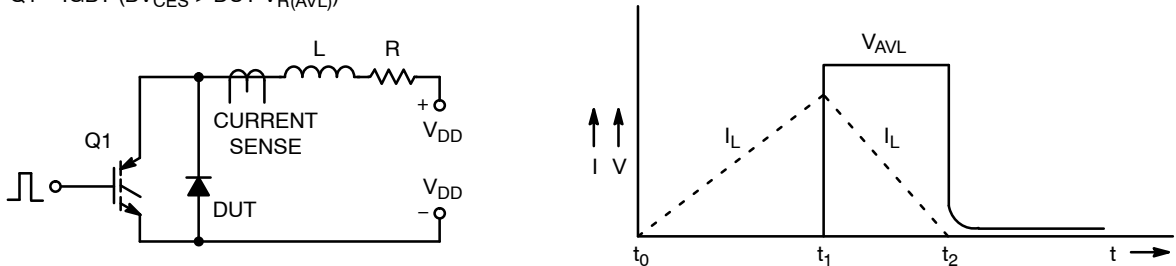
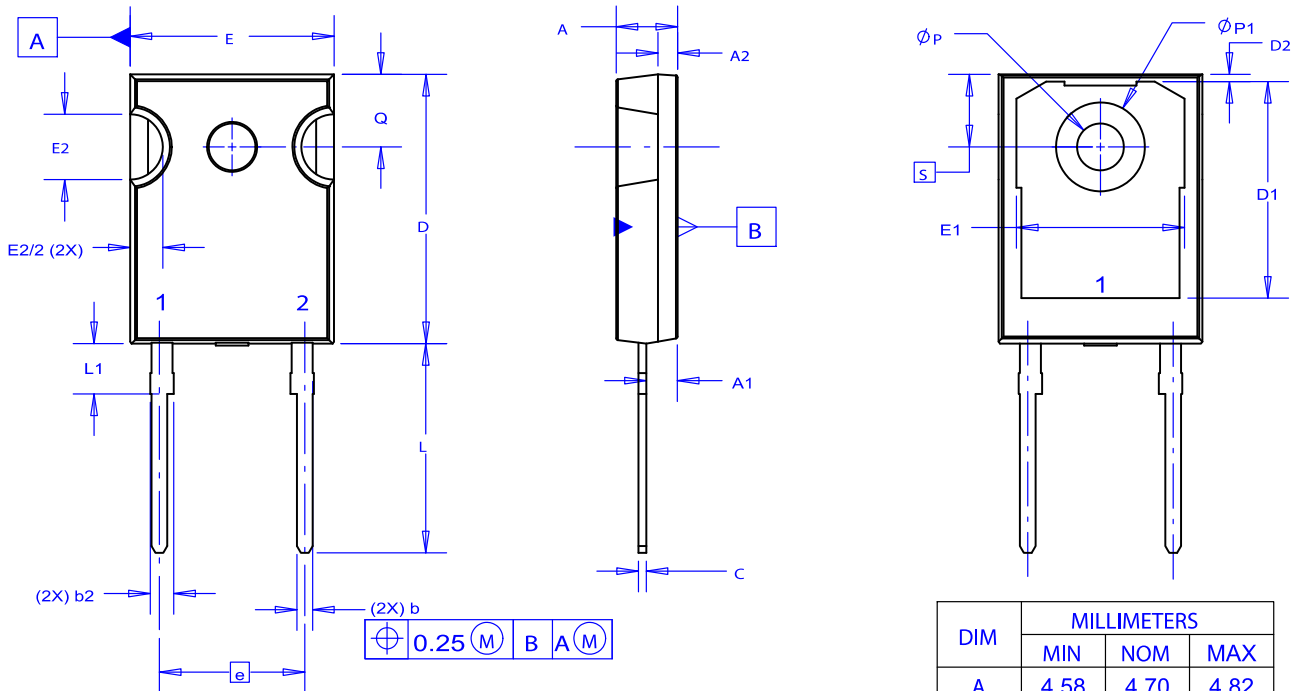


Figure 9. Unclamped Inductive Switching Test Circuit & Waveform

# FFSH2065B-F085

## PACKAGE DIMENSIONS


TO-247-2LD  
CASE 340DA  
ISSUE O



NOTES: UNLESS OTHERWISE SPECIFIED.

- A. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C. DRAWING CONFORMS TO ASME Y14.5 - 2009.
- D. DIMENSION A1 TO BE MEASURED IN THE REGION DEFINED BY L1.
- E. LEAD FINISH IS UNCONTROLLED IN THE REGION DEFINED BY L1.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.58	4.70	4.82
A1	2.20	2.40	2.60
A2	1.40	1.50	1.60
b	1.17	1.26	1.35
b2	1.53	1.65	1.77
c	0.51	0.61	0.71
D	20.32	20.57	20.82
D1	13.08	~	~
D2	0.51	0.93	1.35
E	15.37	15.62	15.87
E1	12.81	~	~
E2	4.96	5.08	5.20
e	~	11.12	~
L	15.75	16.00	16.25
L1	3.69	3.81	3.93
$\phi P$	3.51	3.58	3.65
$\phi P1$	6.60	6.80	7.00
Q	5.34	5.46	5.58
S	5.34	5.46	5.58

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