Silicon Carbide Schottky Diode

650 V, 30 A

FFSH3065B

ON Semiconductor®

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Description

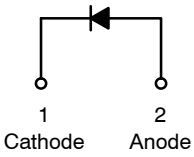
Silicon Carbide (SiC) Schottky Diodes use a completely new technology that provides superior switching performance and higher reliability compared to Silicon. No reverse recovery current, temperature independent switching characteristics, and excellent thermal performance sets Silicon Carbide as the next generation of power semiconductor. System benefits include highest efficiency, faster operating frequency, increased power density, reduced EMI, and reduced system size & cost.

Features

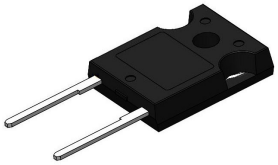
- Max Junction Temperature 175°C
- Avalanche Rated 144 mJ
- High Surge Current Capacity
- Positive Temperature Coefficient
- Ease of Paralleling
- No Reverse Recovery/No Forward Recovery
- AEC−Q101 Qualified
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

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

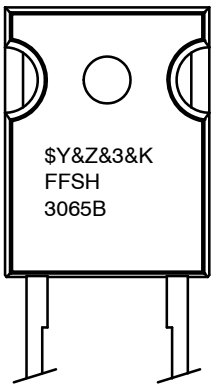


Schottky Diode



TO−247−2LD
CASE 340DA

MARKING DIAGRAM



$Y	= ON Semiconductor Logo
&Z	= Assembly Plant Code
&3	= Numeric Date Code
&K	= Lot Code
FFSH3065B	= Specific Device Code

ORDERING INFORMATION

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

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ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

Symbol	Parameter		Value	Unit
V_{RRM}	Peak Repetitive Reverse Voltage		650	V
E_{AS}	Single Pulse Avalanche Energy (Note 1)		144	mJ
I_F	Continuous Rectified Forward Current @ T_C < 146°C		30	A
	Continuous Rectified Forward Current @ T_C < 135°C		37	
$I_{F, Max}$	Non-Repetitive Peak Forward Surge Current	T_C = 25°C, 10 μs	1100	A
		T_C = 150°C, 10 μs	1000	A
$I_{F,SM}$	Non-Repetitive Forward Surge Current T_C = 25°C	Half-Sine Pulse, t_p = 8.3 ms	110	A
Ptot	Power Dissipation	T_C = 25°C	268	W
		T_C = 150°C	45	W
T_J, T_{STG}	Operating and Storage Temperature Range		−55 to +175	°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 144 mJ is based on starting T_J = 25°C, L = 0.5 mH, I_{AS} = 24 A, V = 50 V.

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max	0.56	°C/W

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
V_F	Forward Voltage	I_F = 30 A, T_C = 25°C	–	1.38	1.7	V
		I_F = 30 A, T_C = 125°C	–	1.6	2.0	
		I_F = 30 A, T_C = 175°C	–	1.72	2.4	
I_R	Reverse Current	V_R = 650 V, T_C = 25°C	–	0.5	40	μA
		V_R = 650 V, T_C = 125°C	–	1	80	
		V_R = 650 V, T_C = 175°C	–	2	160	
Q_C	Total Capacitive Charge	V = 400 V	–	73	–	nC
C	Total Capacitance	V_R = 1 V, f = 100 kHz	–	1260	–	pF
		V_R = 300 V, f = 100 kHz	–	115	–	
		V_R = 600 V, f = 100 kHz	–	104	–	

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 Marking	Package	Shipping
FFSH3065B	FFSH3065B	TO−247−2LD (Pb−Free / Halogen Free)	30 Units / Tube

TYPICAL CHARACTERISTICS

(T_J = 25°C unless otherwise noted)

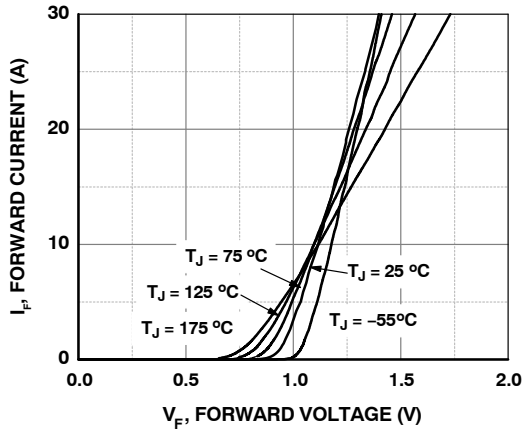


Figure 1. Forward Characteristics

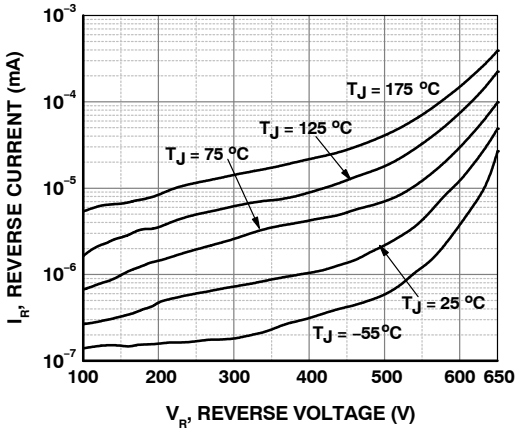


Figure 2. Reverse Characteristics

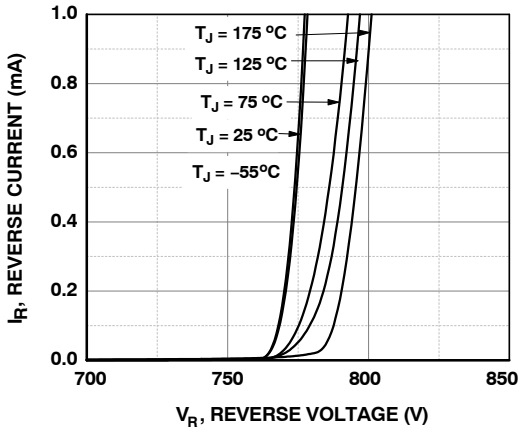


Figure 3. Reverse Characteristics

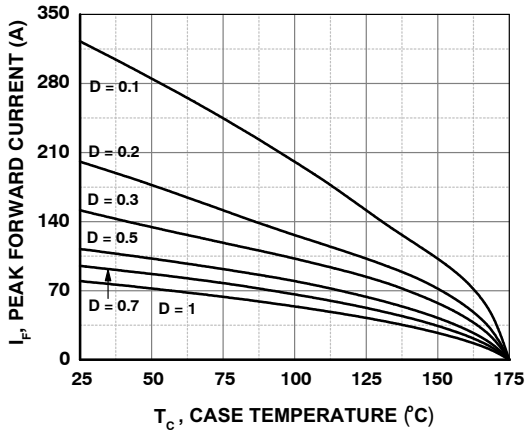


Figure 4. Current Derating

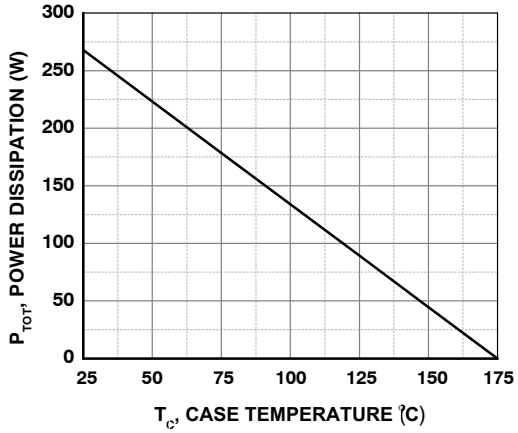


Figure 5. Power Derating

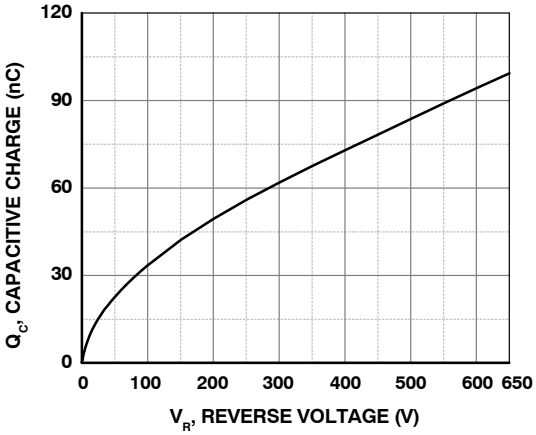


Figure 6. Capacitive Charge vs. Reverse Voltage

TYPICAL CHARACTERISTICS

(T_J = 25°C unless otherwise noted)

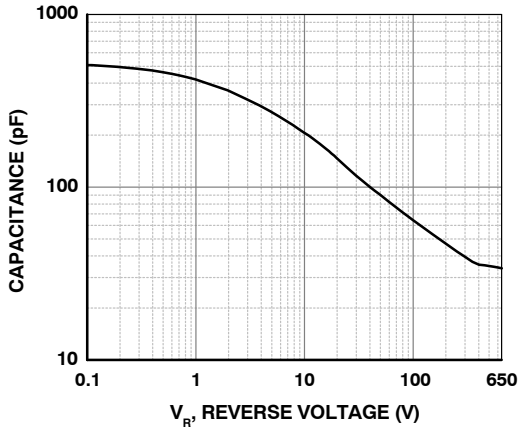


Figure 7. Capacitance vs. Reverse Voltage

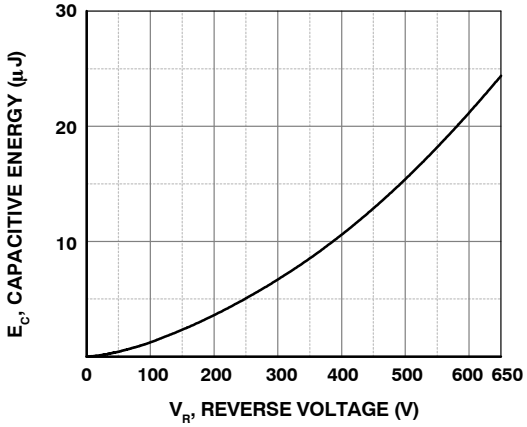


Figure 8. Capacitance Stored Energy

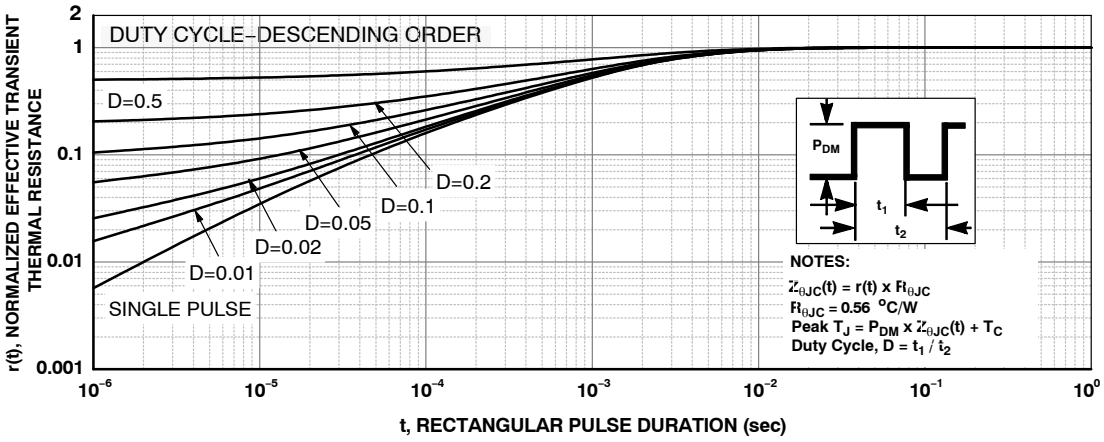
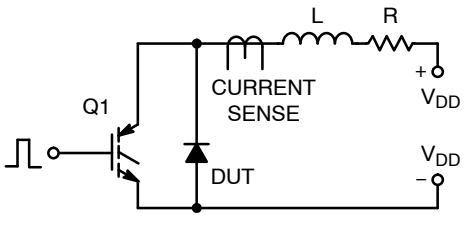


Figure 9. Junction-to-Case Transient Thermal Response Curve

TEST CIRCUIT AND WAVEFORMS

L = 0.5 mH
R < 0.1 Ω
V_{DD} = 50 V
EAVL = 1/2LI2 [$V_{R(AVL)}$ / ($V_{R(AVL)}$ − V_{DD})]
Q1 = IGBT (BV_{CES} > DUT $V_{R(AVL)}$)



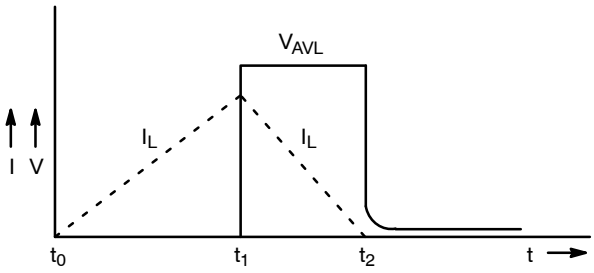
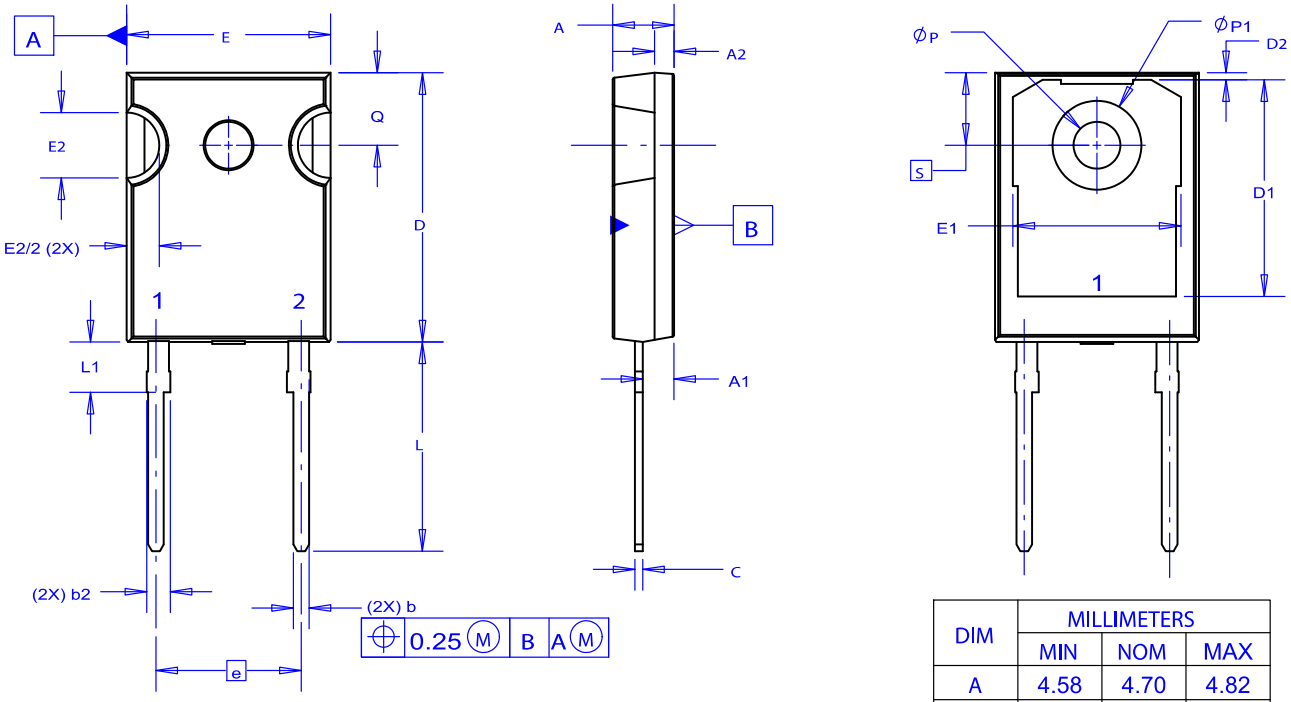


Figure 10. Unclamped Inductive Switching Test Circuit & Waveform

PACKAGE DIMENSIONS

TO−247−2LD
CASE 340DA
ISSUE A



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
ØP	3.51	3.58	3.65
ØP1	6.60	6.80	7.00
Q	5.34	5.46	5.58
S	5.34	5.46	5.58

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.

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