

Silicon Carbide (SiC) Schottky Diode – EliteSiC, 20 A, 650 V, D2, D2PAK-3L

FFSB2065BDN-F085

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 49 mJ
- High Surge Current Capacity
- Positive Temperature Coefficient
- Ease of Paralleling
- No Reverse Recovery/No Forward Recovery
- AEC-Q101 Qualified and PPAP Capable

Applications

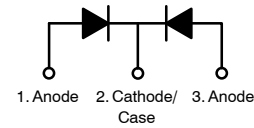
- Automotive BEV-EV
- Automotive HEV-EV Onboard Chargers
- Automotive HEV-EV DC-DC Converters

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

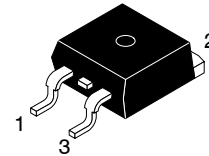
Symbol	Parameter	Ratings	Unit	
V _{RRM}	Peak Repetitive Reverse Voltage	650	V	
E _{AS}	Single Pulse Avalanche Energy (Note 1)	49	mJ	
I _F	Continuous Rectified Forward Current	@ T _C < 25°C	23.6	A
		@ T _C < 140°C	10	
I _{F, Max}	Non-Repetitive Peak Forward Surge Current	T _C = 25°C, 10 μs	600	A
		T _C = 150°C, 10 μs	554	
I _{F, SM}	Non-Repetitive Forward Surge Current, T _C = 25°C	Half-Sine Pulse, t _p = 8.3 ms	45	A
P _{tot}	Power Dissipation	T _C = 25°C	75	W
		T _C = 150°C	12.5	
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 49 mJ is based on starting T_J = 25°C, L = 0.5 mH, I_{AS} = 14 A, V = 50 V.

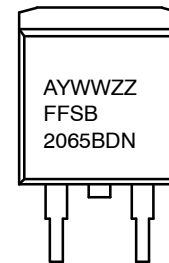


Schottky Diode



D²PAK-3 (TO-263, 3-LEAD)
CASE 418AJ

MARKING DIAGRAM



- A = Assembly Plant Code
- YWW = Date Code (Year & Week)
- ZZ = Lot Code
- FFSB2065BDN = Specific Device Code

ORDERING INFORMATION

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

FFSB2065BDN-F085

THERMAL CHARACTERISTICS

Symbol	Parameter	Ratings	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max	2.0	$^{\circ}C/W$

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

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F = 10\text{ A}, T_C = 25^{\circ}C$	–	1.38	1.75	V
		$I_F = 10\text{ A}, T_C = 125^{\circ}C$	–	1.6	2.0	
		$I_F = 10\text{ A}, T_C = 175^{\circ}C$	–	1.72	2.4	
I_R	Reverse Current	$V_R = 650\text{ V}, T_C = 25^{\circ}C$	–	0.5	40	μA
		$V_R = 650\text{ V}, T_C = 125^{\circ}C$	–	1	80	
		$V_R = 650\text{ V}, T_C = 175^{\circ}C$	–	2	160	
Q_C	Total Capacitive Charge	$V = 400\text{ V}$	–	25	–	nC
C	Total Capacitance	$V_R = 1\text{ V}, f = 100\text{ kHz}$	–	421	–	pF
		$V_R = 200\text{ V}, f = 100\text{ kHz}$	–	46	–	
		$V_R = 400\text{ V}, f = 100\text{ kHz}$	–	35	–	

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 [†]
FFSB2065BDN-F085	FFSB2065BDN	D2PAK	800 Units/ 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 ($T_J = 25^\circ\text{C}$ unless otherwise noted)

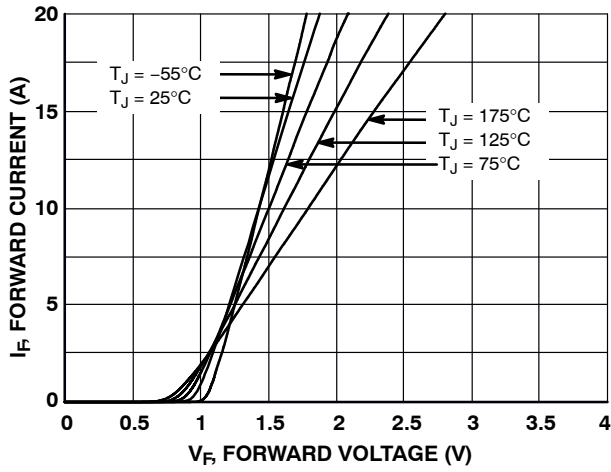


Figure 1. Forward Characteristics

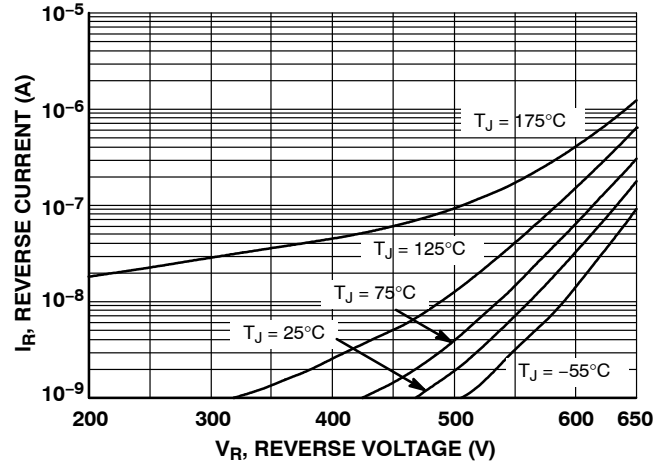


Figure 2. Reverse Characteristics

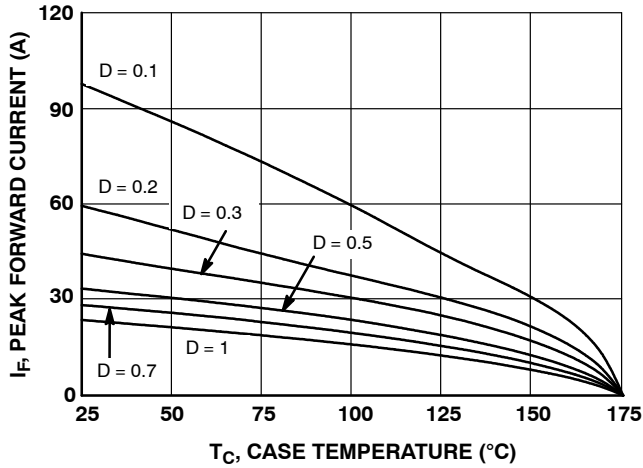


Figure 3. Current Derating

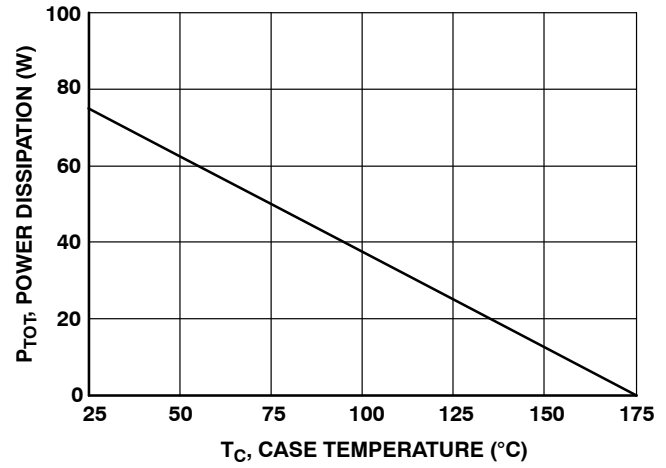


Figure 4. Power Derating

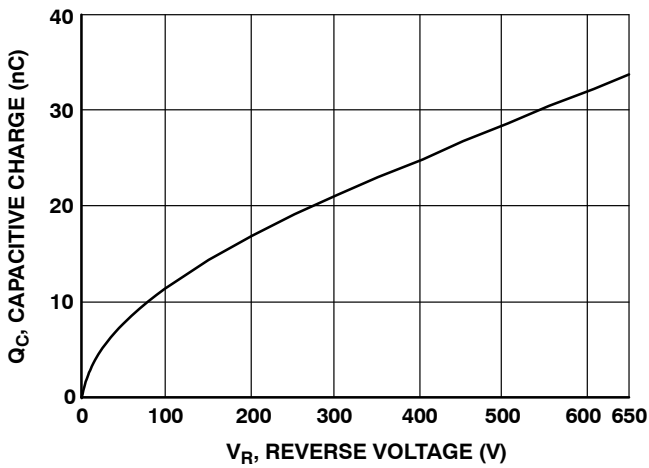


Figure 5. Capacitive Charge vs. Reverse Voltage

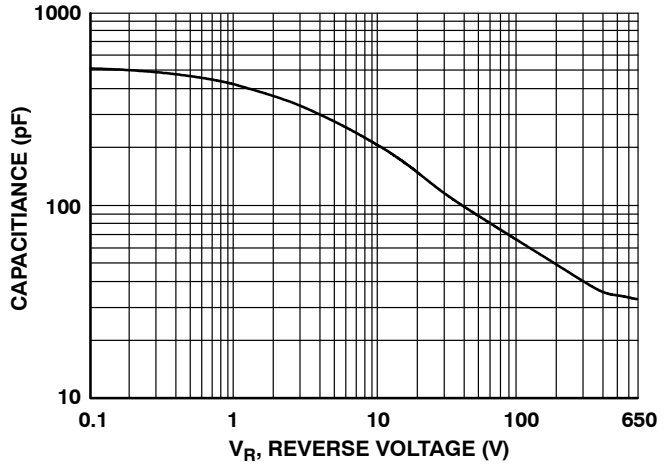


Figure 6. Capacitance vs. Reverse Voltage

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

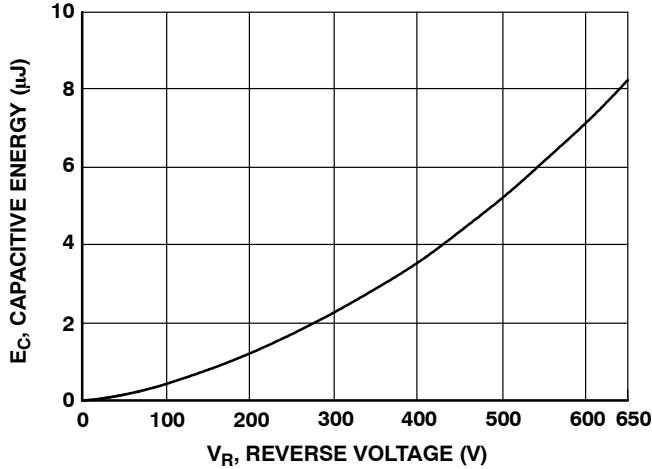


Figure 7. Capacitance Stored Energy

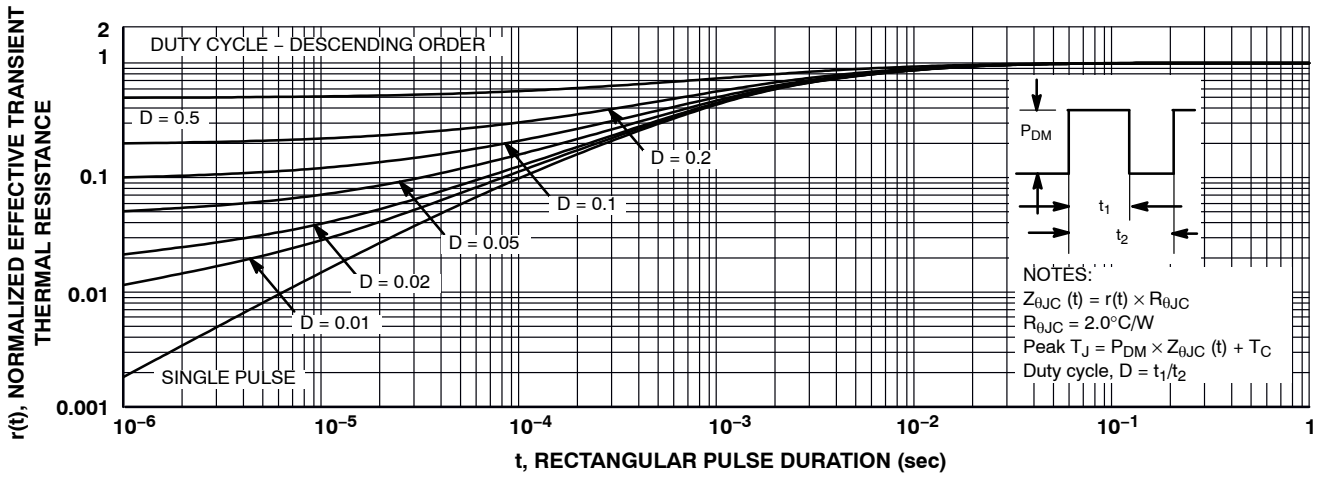


Figure 8. Junction-to-Case Transient Thermal Response Curve

TEST CIRCUIT AND WAVEFORMS

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

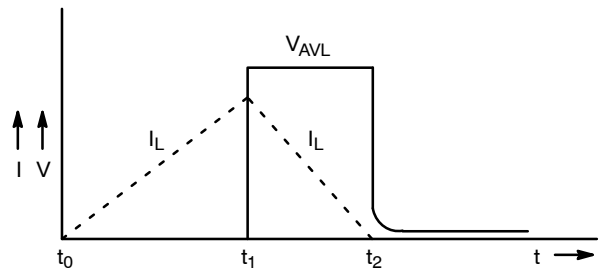
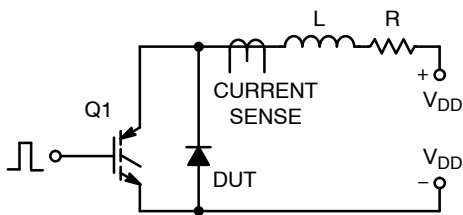
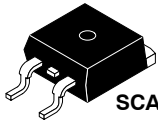


Figure 9. Unclamped Inductive Switching Test Circuit & Waveform

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

ON Semiconductor®



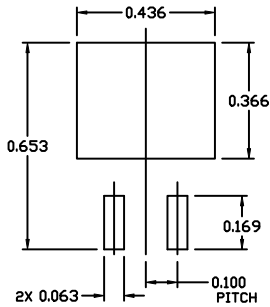
SCALE 1:1

D²PAK-3 (TO-263, 3-LEAD)

CASE 418AJ

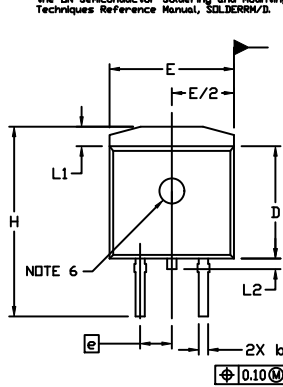
ISSUE F

DATE 11 MAR 2021



RECOMMENDED MOUNTING FOOTPRINT

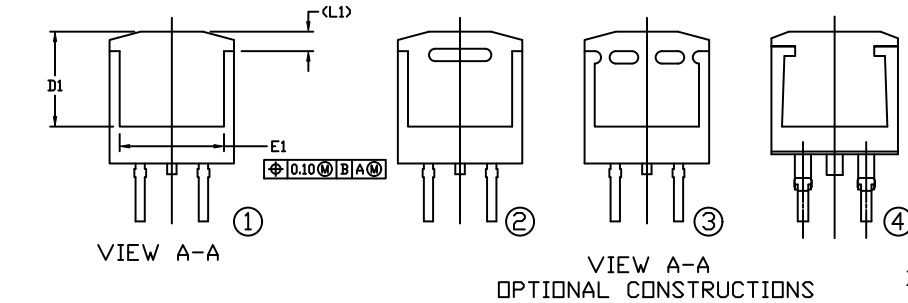
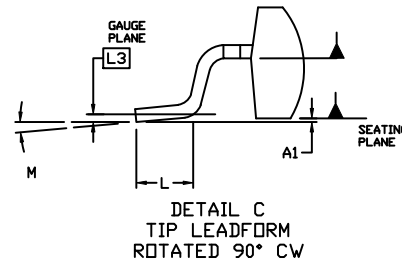
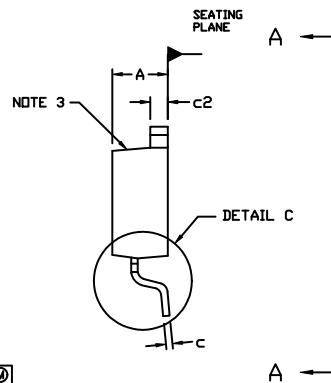
For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



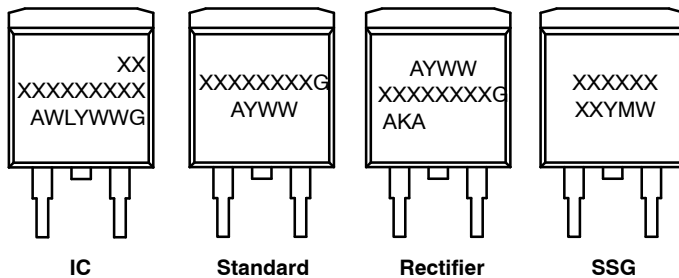
NOTES:

- DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
- CONTROLLING DIMENSION: INCHES
- CHAMFER OPTIONAL.
- DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.005 PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY AT DATUM H.
- THERMAL PAD CONTOUR IS OPTIONAL WITHIN DIMENSIONS E, L1, D1, AND E1.
- OPTIONAL MOLD FEATURE.
- ①, ② ... OPTIONAL CONSTRUCTION FEATURE CALL OUTS.

DIM	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	0.160	0.190	4.06	4.83
A1	0.000	0.010	0.00	0.25
b	0.020	0.039	0.51	0.99
c	0.012	0.029	0.30	0.74
c2	0.045	0.065	1.14	1.65
D	0.330	0.380	8.38	9.65
D1	0.260	---	6.60	---
E	0.380	0.420	9.65	10.67
E1	0.245	---	6.22	---
e	0.100	BSC	2.54	BSC
H	0.575	0.625	14.60	15.88
L	0.070	0.110	1.78	2.79
L1	---	0.066	---	1.68
L2	---	0.070	---	1.78
L3	0.010	BSC	0.25	BSC
M	0*	8*	0*	8*



GENERIC MARKING DIAGRAMS*



- XXXXXX = Specific Device Code
- A = Assembly Location
- WL = Wafer Lot
- Y = Year
- WW = Work Week
- W = Week Code (SSG)
- M = Month Code (SSG)
- G = Pb-Free Package
- AKA = Polarity Indicator

*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.

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