

Silicon Carbide Schottky Diode

1200 V, 20 A

FFSB20120A-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 and cost.

Features

- Max Junction Temperature 175°C
- Avalanche Rated 200 mJ
- High Surge Current Capacity
- Positive Temperature Coefficient
- Ease of Paralleling
- No Reverse Recovery/No Forward Recovery
- AEC-Q101 qualified

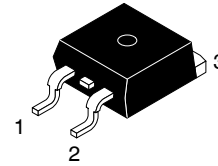
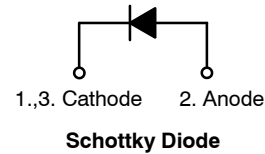
Applications

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



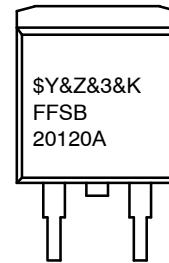
ON Semiconductor®

www.onsemi.com



D²PAK2 (TO-263-2L)
CASE 418BK

MARKING DIAGRAM



\$Y = ON Semiconductor Logo
&Z = Assembly Plant Code
&3 = Numeric Date Code
&K = Lot Code
FFSB20120A = Specific Device Code

ORDERING INFORMATION

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

FFSB20120A-F085

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

Symbol	Parameter	Ratings	Unit	
V_{RRM}	Peak Repetitive Reverse Voltage	1200	V	
E_{AS}	Single Pulse Avalanche Energy (Note 1)	200	mJ	
I_F	Continuous Rectified Forward Current @ $T_C < 157^\circ\text{C}$	20	A	
	Continuous Rectified Forward Current @ $T_C < 135^\circ\text{C}$	32		
$I_{F, Max}$	Non-Repetitive Peak Forward Surge Current	$T_C = 25^\circ\text{C}$, 10 μs	1190	A
		$T_C = 150^\circ\text{C}$, 10 μs	990	
$I_{F, SM}$	Non-Repetitive Forward Surge Current	Half-Sine Pulse, $t_p = 8.3$ ms	135	A
$I_{F, RM}$	Repetitive Forward Surge Current	Half-Sine Pulse, $t_p = 8.3$ ms	74	A
P_{tot}	Power Dissipation	$T_C = 25^\circ\text{C}$	333	W
		$T_C = 150^\circ\text{C}$	55	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +175	$^\circ\text{C}$	

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.

THERMAL CHARACTERISTICS

Symbol	Parameter	Ratings	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max	0.45	$^\circ\text{C}/\text{W}$

PACKAGE MARKING AND ORDERING INFORMATION

Part Number	Top Mark	Package	Shipping [†]
FFSB20120A-F085	FFSB20120A	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.

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

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F = 20$ A, $T_C = 25^\circ\text{C}$	-	1.45	1.75	V
		$I_F = 20$ A, $T_C = 125^\circ\text{C}$	-	1.7	2	
		$I_F = 20$ A, $T_C = 175^\circ\text{C}$	-	2	2.4	
I_R	Reverse Current	$V_R = 1200$ V, $T_C = 25^\circ\text{C}$	-	-	200	μA
		$V_R = 1200$ V, $T_C = 125^\circ\text{C}$	-	-	300	
		$V_R = 1200$ V, $T_C = 175^\circ\text{C}$	-	-	400	
Q_C	Total Capacitive Charge	$V = 800$ V	-	120	-	nC
C	Total Capacitance	$V_R = 1$ V, $f = 100$ kHz	-	1220	-	pF
		$V_R = 400$ V, $f = 100$ kHz	-	111	-	
		$V_R = 800$ V, $f = 100$ kHz	-	88	-	

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.

- E_{AS} of 200 mJ is based on starting $T_J = 25^\circ\text{C}$, $L = 0.5$ mH, $I_{AS} = 29$ A, $V = 50$ V.

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

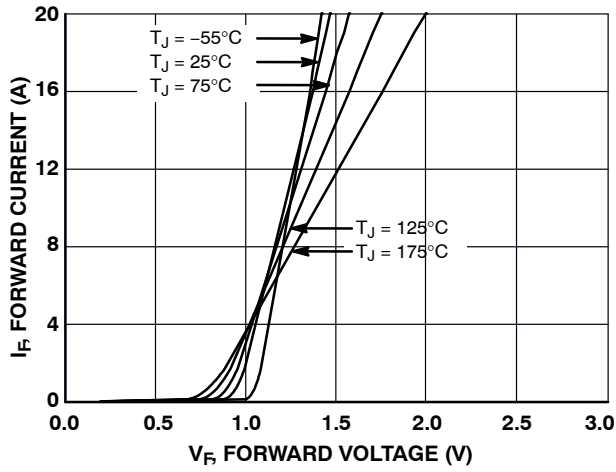


Figure 1. Forward Characteristics

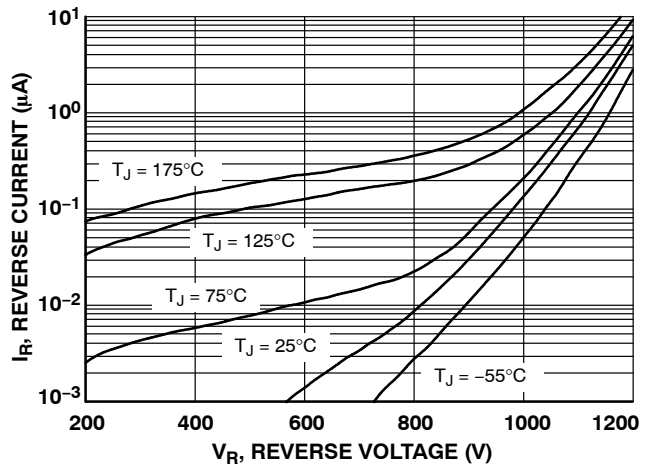


Figure 2. Reverse Characteristics

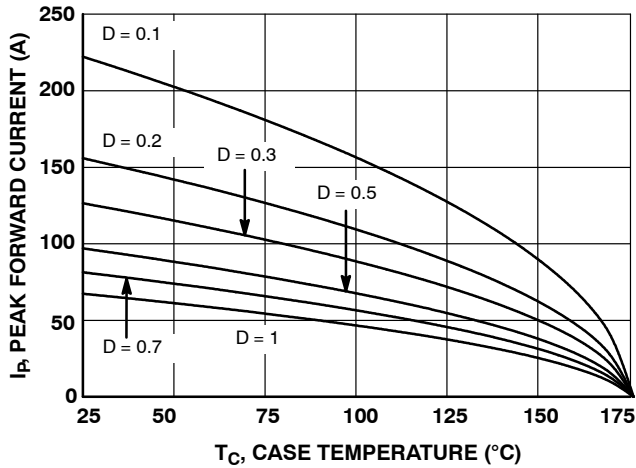


Figure 3. Current Derating

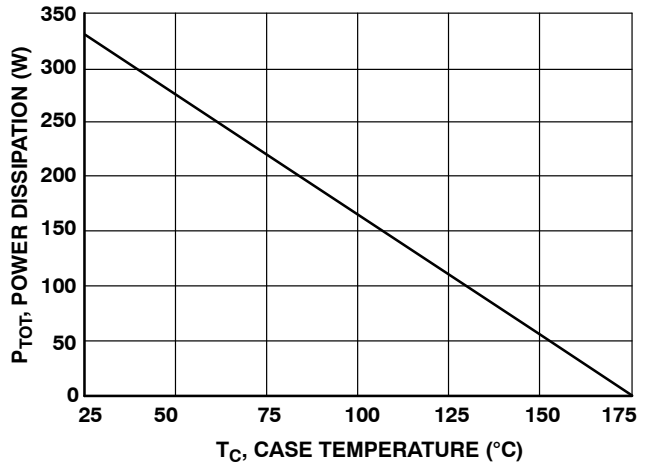


Figure 4. Power Derating

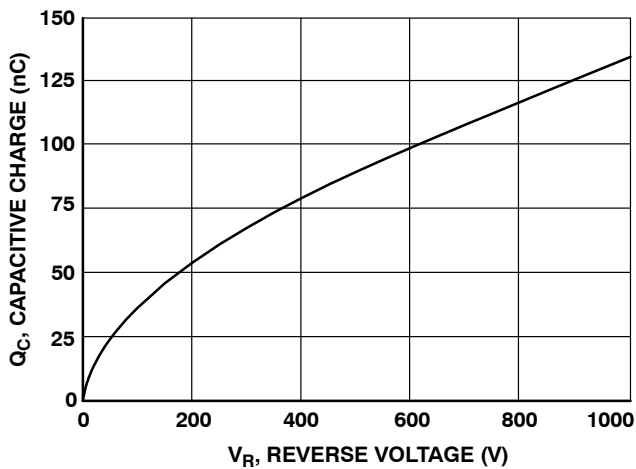


Figure 5. Capacitive Charge vs. Reverse Voltage

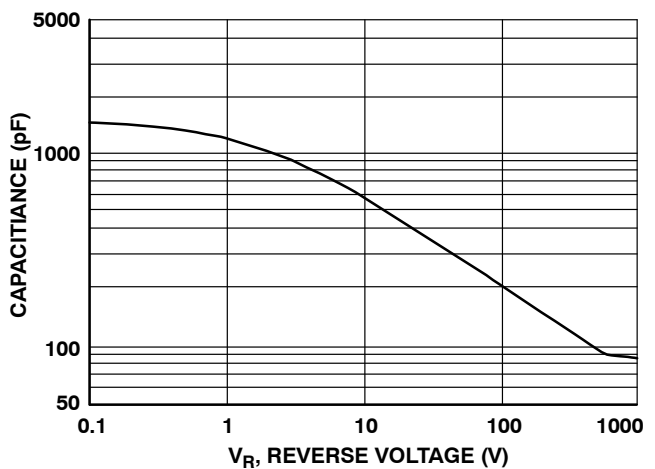


Figure 6. Capacitive Charge vs. Reverse Voltage

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

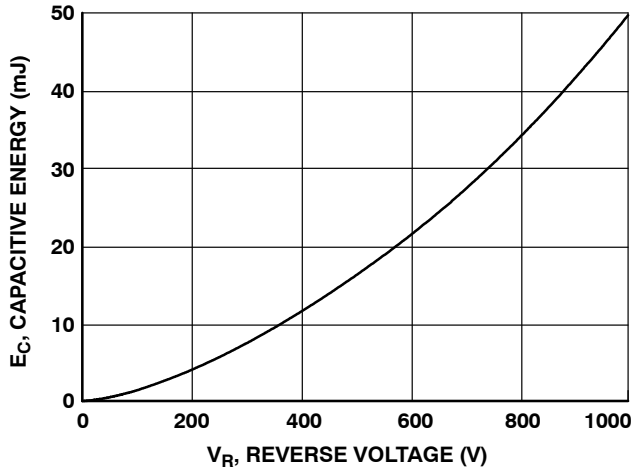


Figure 7. Capacitance Stored Energy

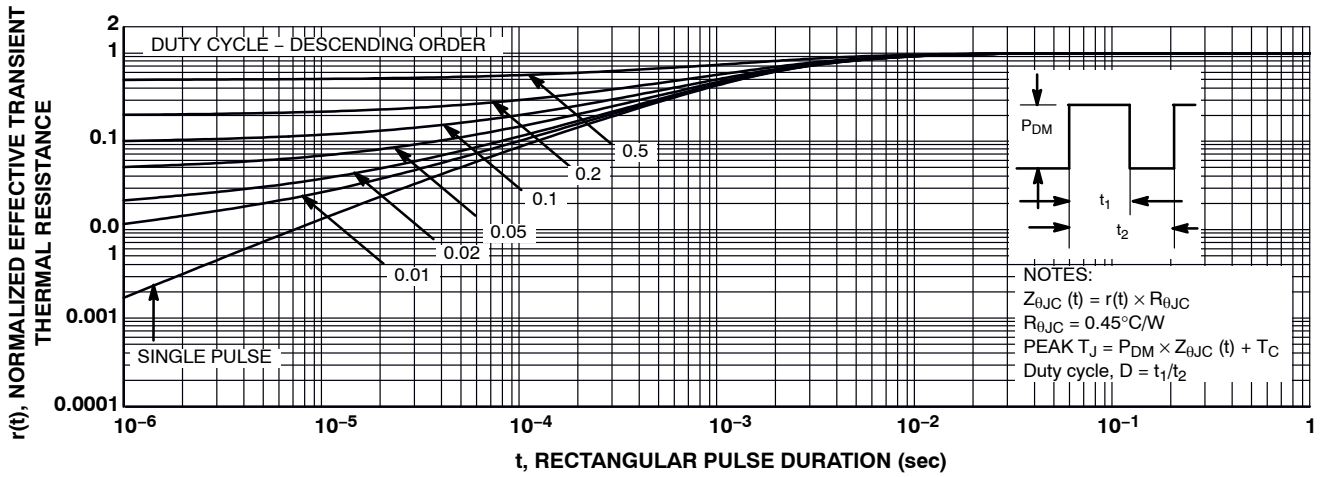


Figure 8. Junction-to-Case Transient Thermal Response Curve

TEST CIRCUIT AND WAVEFORMS

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

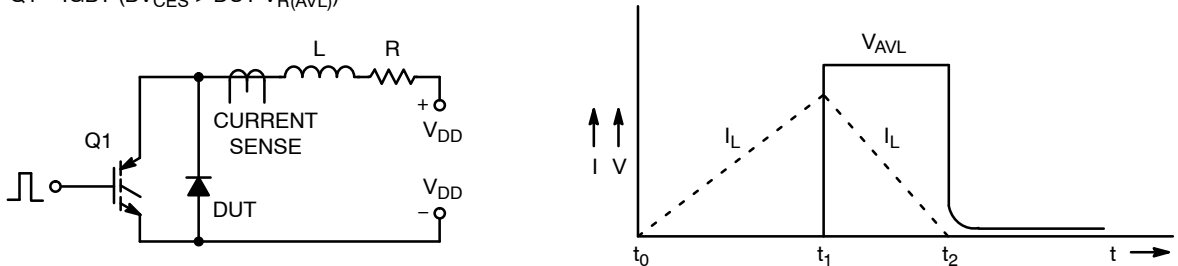


Figure 9. Unclamped Inductive Switching Test Circuit & Waveform

MECHANICAL CASE OUTLINE

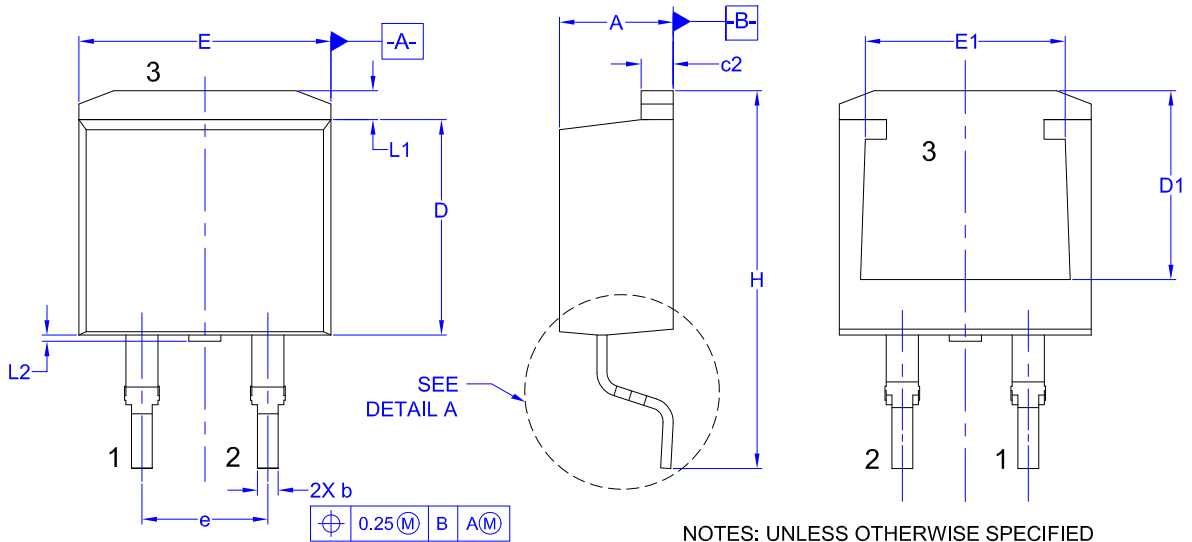
PACKAGE DIMENSIONS

ON Semiconductor®

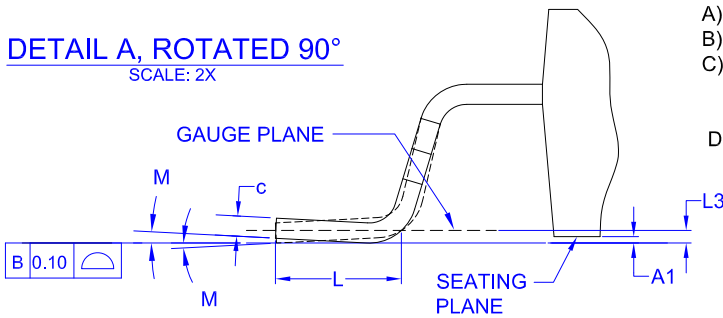


D²PAK2 (TO-263-2L) CASE 418BK ISSUE O

DATE 02 AUG 2018

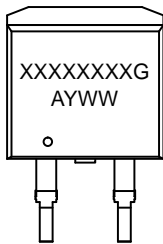


DETAIL A, ROTATED 90°
SCALE: 2X



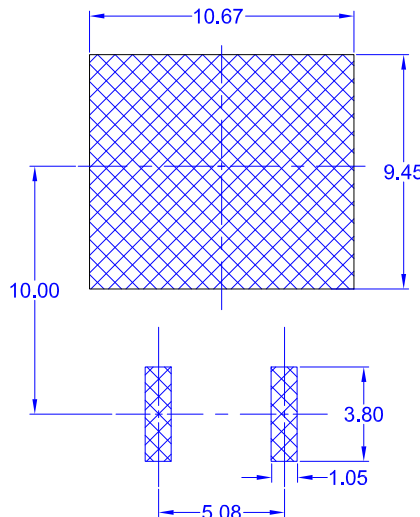
- NOTES: UNLESS OTHERWISE SPECIFIED
- A) ALL DIMENSIONS ARE IN MILLIMETERS.
 - B) REFERENCE JEDEC, TO-263, VARIATION AB.
 - C) DIMENSIONING AND TOLERANCING PER DIMENSIONING AND TOLERANCING PER ASME Y14.5 - 2009.
 - D) LANDPATTERN RECOMMENDATION PER IPC TO254P1524X482-3N

GENERIC MARKING DIAGRAM*



- XXX = Specific Device Code
- A = Assembly Location
- Y = Year
- WW = Work Week
- G = Pb-Free Package

*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.



LAND PATTERN RECOMMENDATION
UNLESS NOTED, ALL DIMS TYPICAL

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.06	4.57	4.83
A1	0.00	0.10	0.25
b	0.51	0.81	0.99
c	0.30	0.407	0.74
c2	1.14	1.30	1.65
D	8.38	8.69	9.65
D1	7.30	7.80	8.30
E	9.65	10.16	10.67
E1	8.00	8.62	9.00
e	5.08 BSC		
H	14.60	15.35	15.88
L	1.78	2.54	2.79
L1	0.90	1.29	1.68
L2	0.00	0.15	0.25
L3	0.25 BSC		
M	0°	4°	8°

DOCUMENT NUMBER:	98AON93788G	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	D²PAK2 (TO-263-2L)	PAGE 1 OF 1

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 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. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

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. 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:

Email Requests to: orderlit@onsemi.com

ON Semiconductor Website: www.onsemi.com

TECHNICAL SUPPORT

North American Technical Support:
Voice Mail: 1 800-282-9855 Toll Free USA/Canada
Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:

Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative