

FFSB20120A-F085

Silicon Carbide Schottky Diode

1200 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 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

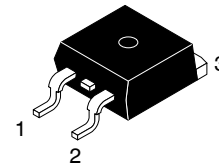
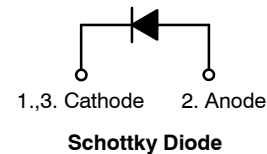
Applications

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



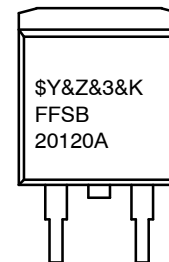
ON Semiconductor®

www.onsemi.com



**D²PAK-3(TO-263, 3-LEAD)
CASE 418AJ**

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°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°C	20	A	
	Continuous Rectified Forward Current @ T _C < 135°C	32		
I _{F, Max}	Non-Repetitive Peak Forward Surge Current	T _C = 25°C, 10 μs	1190	A
		T _C = 150°C, 10 μs	990	
I _{F, SM}	Non-Repetitive Forward Surge Current	Half-Sine Pulse, tp = 8.3 ms	135	A
I _{F, RM}	Repetitive Forward Surge Current	Half-Sine Pulse, tp = 8.3 ms	74	A
P _{tot}	Power Dissipation	T _C = 25°C	333	W
		T _C = 150°C	55	W
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.

THERMAL CHARACTERISTICS

Symbol	Parameter	Ratings	Unit
R _{θJC}	Thermal Resistance, Junction to Case, Max	0.45	°C/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°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Unit
V _F	Forward Voltage	I _F = 20 A, T _C = 25°C	-	1.45	1.75	V
		I _F = 20 A, T _C = 125°C	-	1.7	2	
		I _F = 20 A, T _C = 175°C	-	2	2.4	
I _R	Reverse Current	V _R = 1200 V, T _C = 25°C	-	-	200	μA
		V _R = 1200 V, T _C = 125°C	-	-	300	
		V _R = 1200 V, T _C = 175°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.

1. E_{AS} of 200 mJ is based on starting T_J = 25°C, L = 0.5 mH, I_{AS} = 29 A, V = 50 V.

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

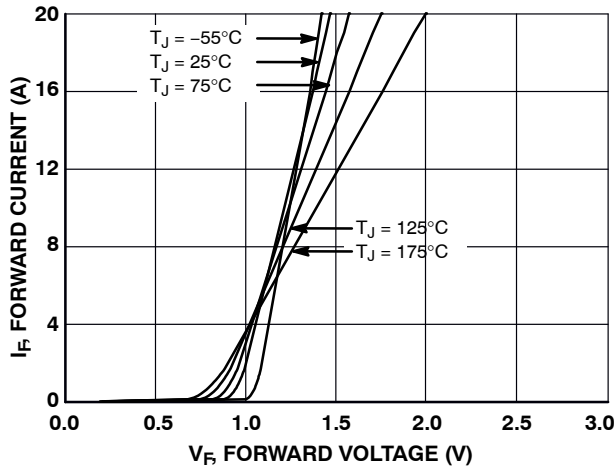


Figure 1. Forward Characteristics

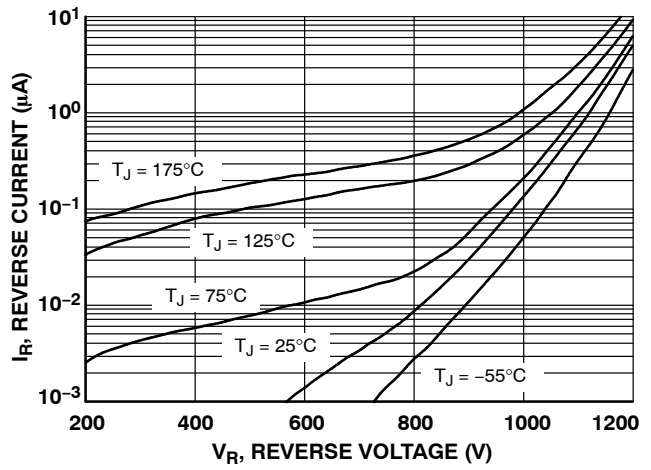


Figure 2. Reverse Characteristics

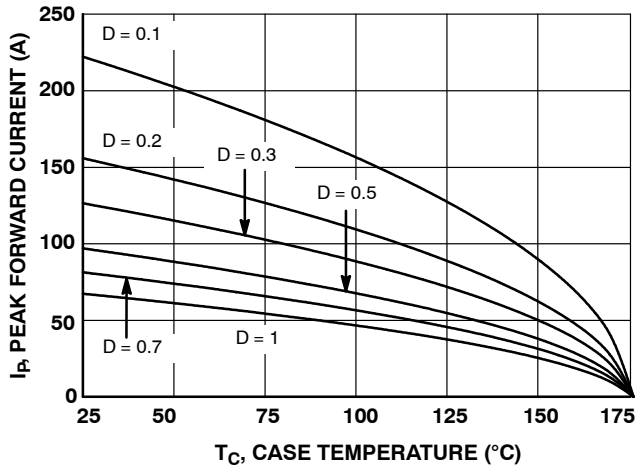


Figure 3. Current Derating

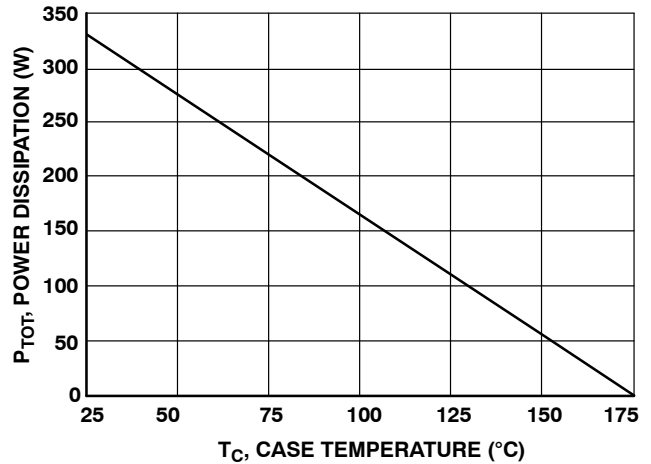


Figure 4. Power Derating

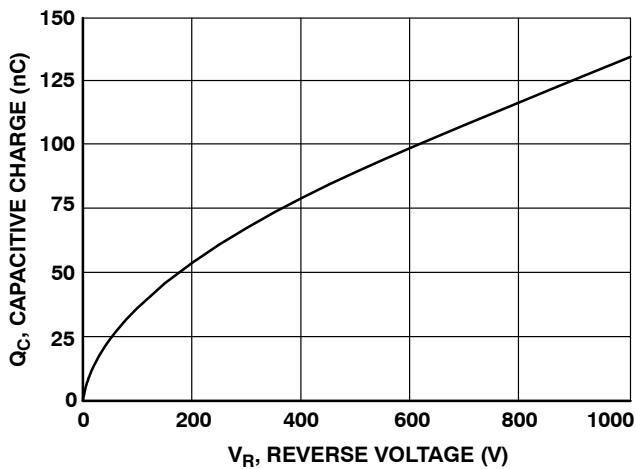


Figure 5. Capacitive Charge vs. Reverse Voltage

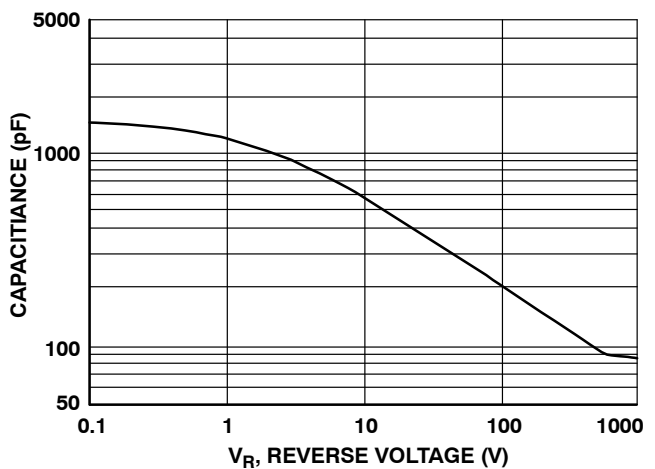


Figure 6. Capacitive Charge vs. Reverse Voltage

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

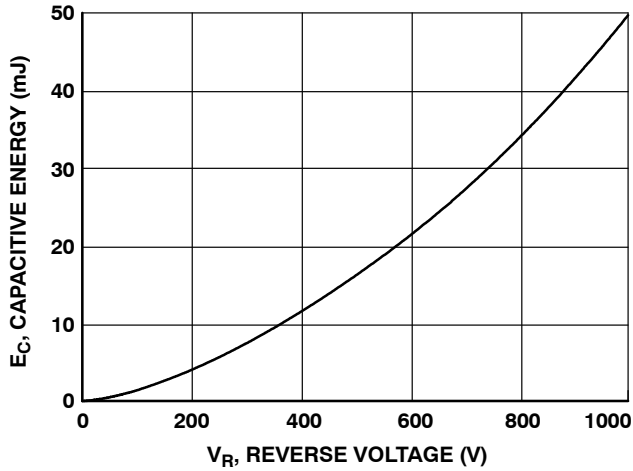


Figure 7. Capacitance Stored Energy

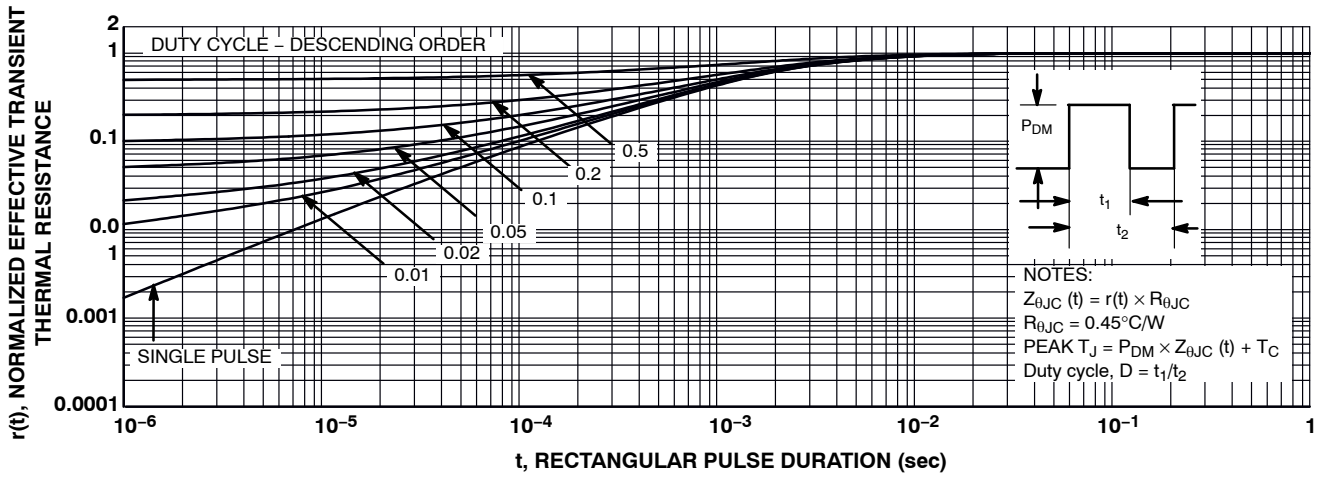


Figure 8. Junction-to-Case Transient Thermal Response Curve

TEST CIRCUIT AND WAVEFORMS

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

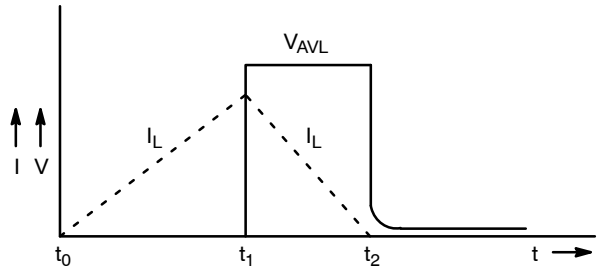
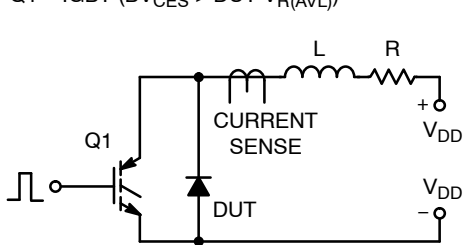
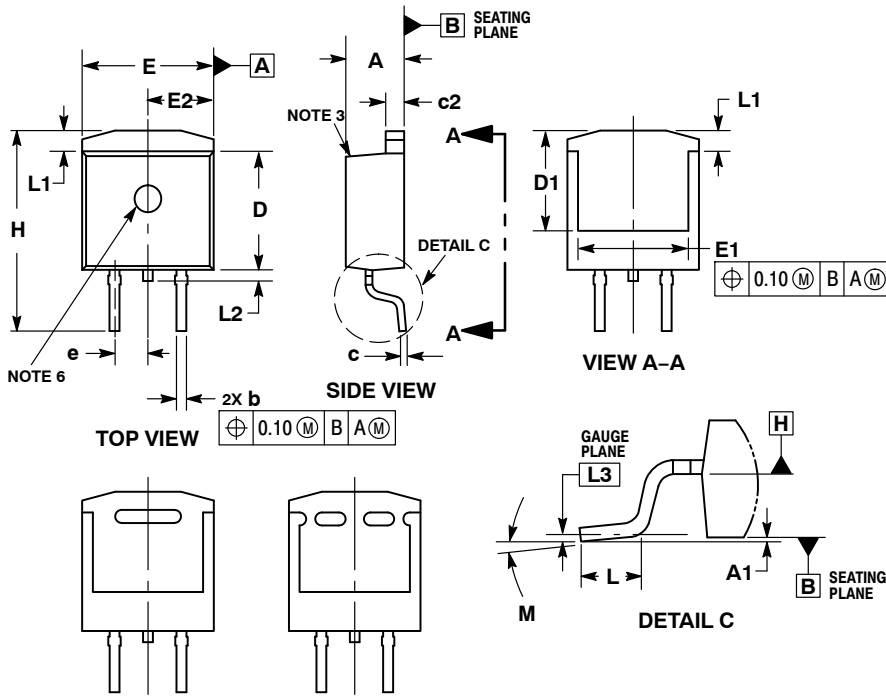


Figure 9. Unclamped Inductive Switching Test Circuit & Waveform

FFSB20120A-F085

PACKAGE DIMENSIONS

D²PAK-3 (TO-263, 3-LEAD)
CASE 418AJ



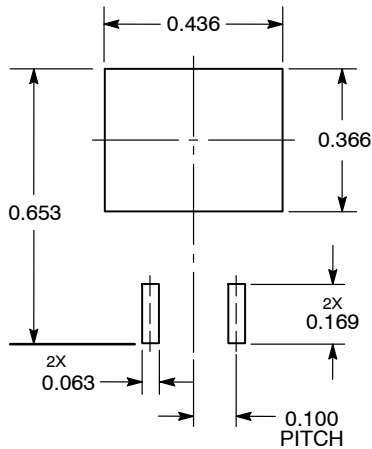
NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. CHAMFER OPTIONAL
4. 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.
5. THERMAL PAD CONTOUR IS OPTIONAL WITHIN DIMENSIONS E, L1, D1 AND E1.
6. OPTIONAL MOLD FEATURE

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°	


VIEW A-A
OPTIONAL CONSTRUCTIONS

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: INCHES

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

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:

Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910

ON Semiconductor Website: www.onsemi.com
Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative