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October 2016

ON Semiconductor®
FFSH20120ADN_F155
Silicon Carbide Schottky Diode
1200 V, 20 A

Features

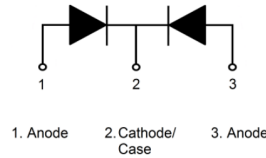
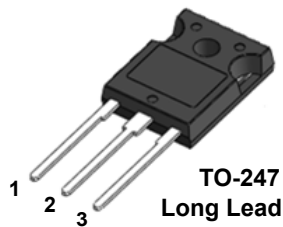
- Max Junction Temperature 175 °C
- Avalanche Rated 100 mJ
- High Surge Current Capacity
- Positive Temperature Coefficient
- Ease of Paralleling
- No Reverse Recovery / No Forward Recovery

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.

Applications

- General Purpose
- SMPS, Solar Inverter, UPS
- Power Switching Circuits



Absolute Maximum Ratings $T_C = 25\text{ °C}$ unless otherwise noted. (per leg)

Symbol	Parameter	Ratings	Unit	
V_{RRM}	Peak Repetitive Reverse Voltage	1200	V	
E_{AS}	Single Pulse Avalanche Energy (Note 1)	100	mJ	
I_F	Continuous Rectified Forward Current @ $T_C < 148\text{ °C}$	$10^* / 20^{**}$	A	
$I_{F, Max}$	Non-Repetitive Peak Forward Surge Current	$T_C = 25\text{ °C}, 10\ \mu s$	630	A
		$T_C = 150\text{ °C}, 10\ \mu s$	560	A
$I_{F, SM}$	Non-Repetitive Forward Surge Current	Half-Sine Pulse, $t_p = 8.3\text{ ms}$	96	A
$I_{F, RM}$	Repetitive Forward Surge Current	Half-Sine Pulse, $t_p = 8.3\text{ ms}$	46	A
P_{tot}	Power Dissipation	$T_C = 25\text{ °C}$	150	W
		$T_C = 150\text{ °C}$	25	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +175	°C	
	TO247 Mounting Torque, M3 Screw	60	Ncm	

Thermal Characteristic

Symbol	Parameter	Ratings	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max	$1^* / 0.44^{**}$	°C/W

* Per leg, ** Per Device

FFSH20120ADN_F155 — Silicon Carbide Schottky Diode

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FFSH20120ADN_F155	FFSH20120ADN	TO-247 Long Lead	Tube	N/A	N/A	30 units

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted. (per leg)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F = 10\text{ A}, T_C = 25^\circ\text{C}$	-	1.45	1.75	V
		$I_F = 10\text{ A}, T_C = 125^\circ\text{C}$	-	1.7	2	
		$I_F = 10\text{ A}, T_C = 175^\circ\text{C}$	-	2	2.4	
I_R	Reverse Current	$V_R = 1200\text{ V}, T_C = 25^\circ\text{C}$	-	-	200	μA
		$V_R = 1200\text{ V}, T_C = 125^\circ\text{C}$	-	-	300	
		$V_R = 1200\text{ V}, T_C = 175^\circ\text{C}$	-	-	400	
Q_C	Total Capacitive Charge	$V = 800\text{ V}$	-	62	-	nC
C	Total Capacitance	$V_R = 1\text{ V}, f = 100\text{ kHz}$	-	612	-	pF
		$V_R = 400\text{ V}, f = 100\text{ kHz}$	-	58	-	
		$V_R = 800\text{ V}, f = 100\text{ kHz}$	-	47	-	

Notes:

1: EAS of 100 mJ is based on starting $T_J = 25^\circ\text{C}$, $L = 0.5\text{ mH}$, $I_{AS} = 20\text{ A}$, $V = 150\text{ V}$.

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted (per leg).

Figure 1. Forward Characteristics

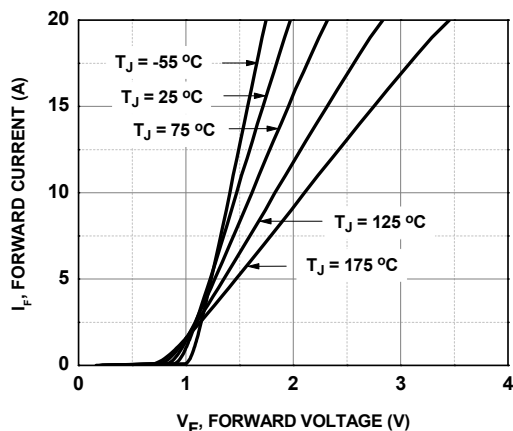


Figure 2. Reverse Characteristics

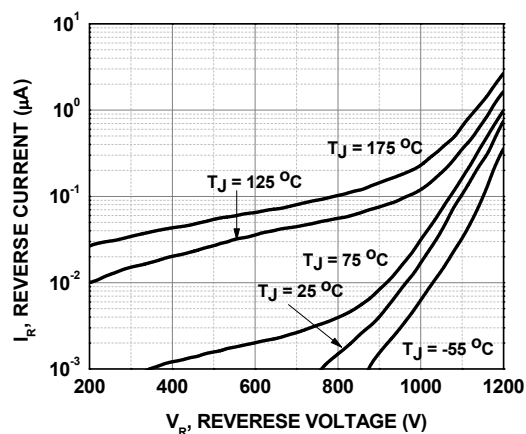


Figure 3. Reverse Characteristics

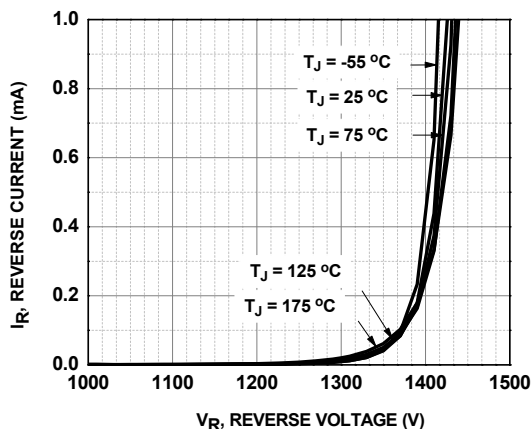
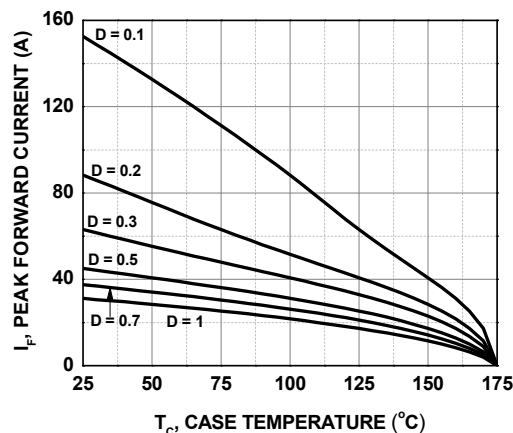


Figure 4. Current Derating



Typical Characteristics $T_J = 25\text{ }^\circ\text{C}$ unless otherwise noted (per leg, continue).

Figure 5. Power Derating

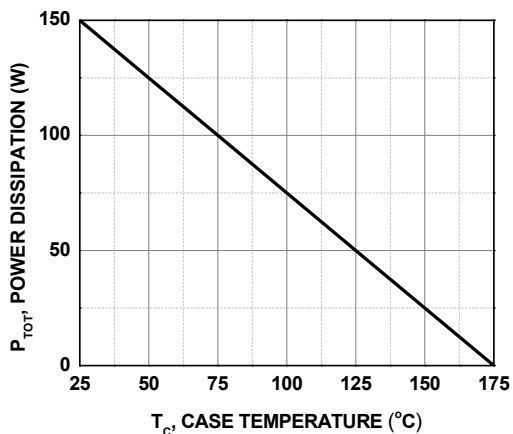


Figure 6. Capacitive Charge vs. Reverse Voltage

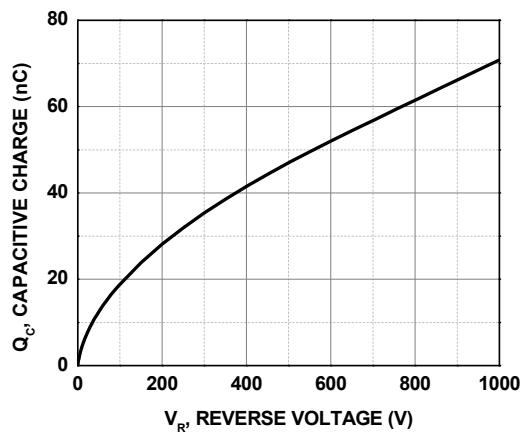


Figure 7. Capacitance vs. Reverse Voltage

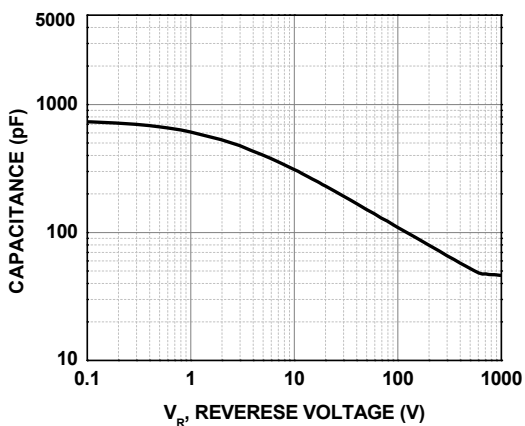


Figure 8. Capacitance Stored Energy

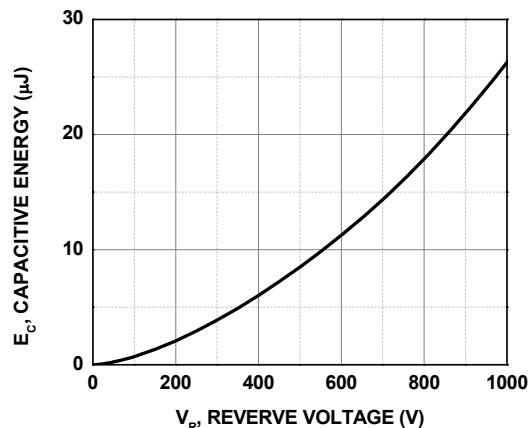
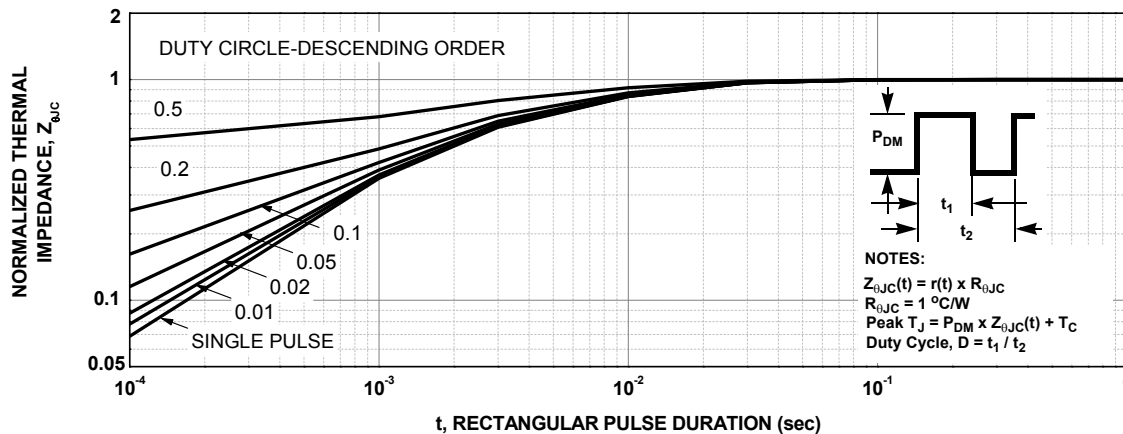


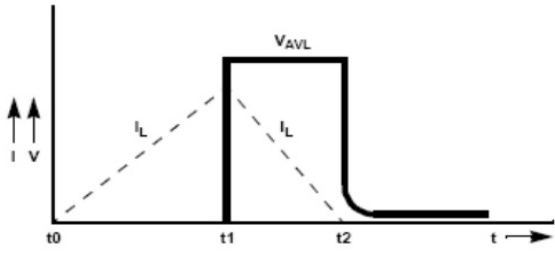
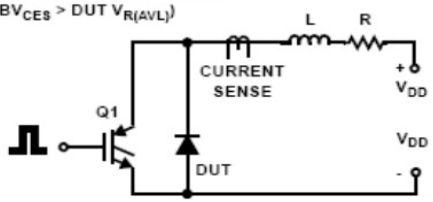
Figure 9. Junction-to-Case Transient Thermal Response Curve

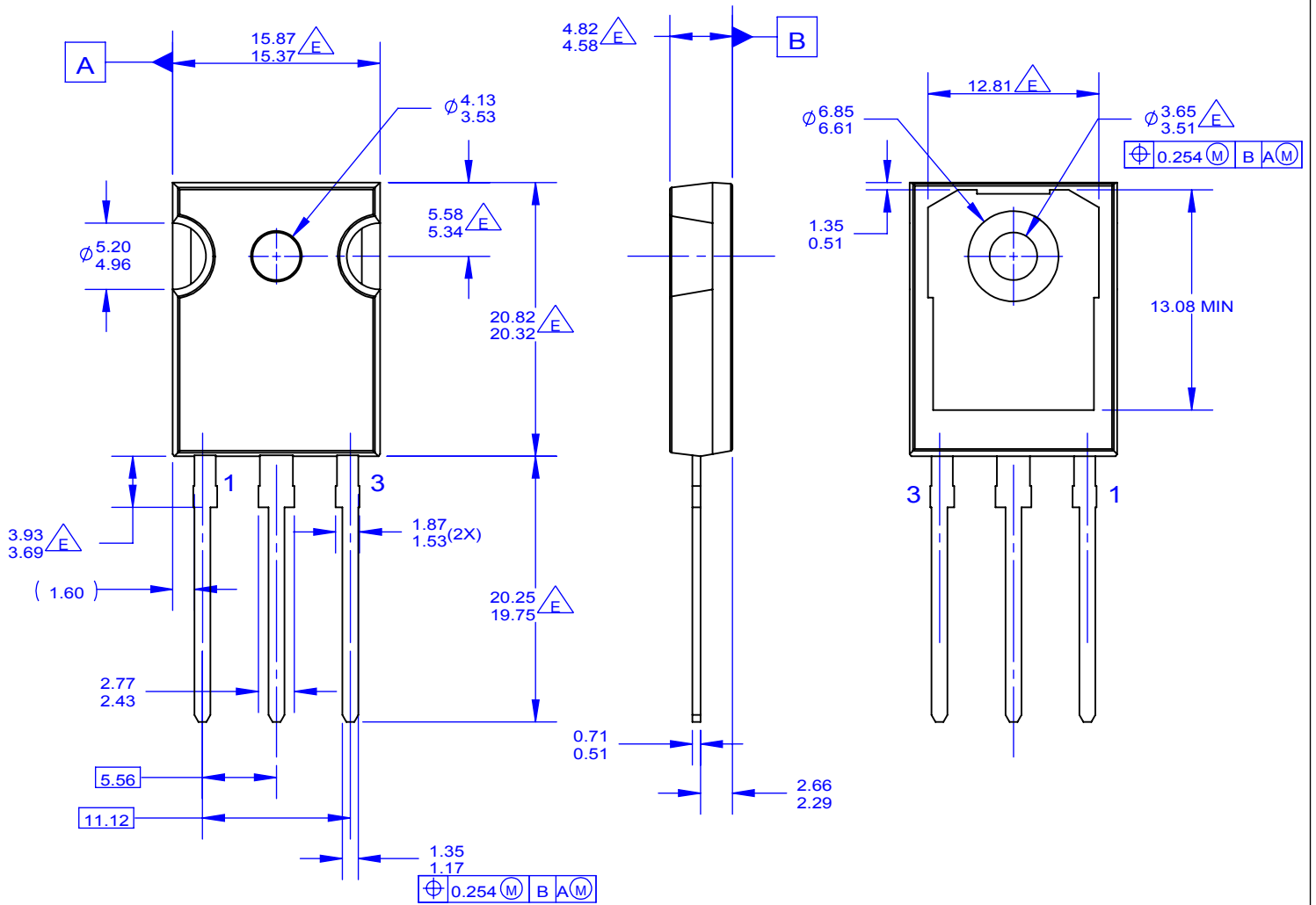


Test Circuit and Waveforms

Figure 10. Unclamped Inductive Switching Test Circuit & Waveform

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





NOTES: UNLESS OTHERWISE SPECIFIED.

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- C. ALL DIMENSIONS ARE IN MILLIMETERS.
- D. DRAWING CONFORMS TO ASME Y14.5 - 1994

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