

# Silicon Carbide Schottky Diode

**1200 V, 40 A**

*Product Preview*

**FFSH40120A-F155**

## Description

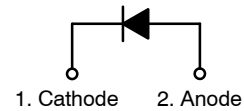
Silicon Carbide (SiC) Schottky Diodes use a completely new technology that provides superior switching performance and higher reliability compared to Silicon. No reverse recovery current, temperature independent switching characteristics, and excellent thermal performance sets Silicon Carbide as the 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

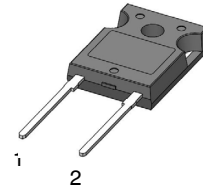
- Max Junction Temperature 175°C
- Avalanche Rated 420 mJ
- High Surge Current Capacity
- Positive Temperature Coefficient
- Ease of Paralleling
- No Reverse Recovery/No Forward Recovery
- This Device is Pb-Free, Halogen Free/BFR Free and RoHS Compliant

## Applications

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



Schottky Diode



TO-247-2LD  
CASE 340DC

## MARKING DIAGRAM



- A = Assembly Location
- Y = Year
- WW = Work Week
- ZZ = Assembly Lot Code

## ORDERING INFORMATION

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

This document contains information on a product under development. onsemi reserves the right to change or discontinue this product without notice.

# FFSH40120A-F155

## ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub> = 25°C unless otherwise noted)

Symbol	Parameter	Value	Unit	
V <sub>RRM</sub>	Peak Repetitive Reverse Voltage	1200	V	
E <sub>AS</sub>	Single Pulse Avalanche Energy (Note 1)	420	mJ	
I <sub>F</sub>	Continuous Rectified Forward Current @ T <sub>C</sub> < 155°C	40	A	
	Continuous Rectified Forward Current @ T <sub>C</sub> < 135°C	61		
I <sub>F, Max</sub>	Non-Repetitive Peak Forward Surge Current	T <sub>C</sub> = 25°C, 10 μs	1650	A
		T <sub>C</sub> = 150°C, 10 μs	1550	A
I <sub>F, SM</sub>	Non-Repetitive Forward Surge Current	Half-Sine Pulse, t <sub>p</sub> = 8.3 ms	270	A
I <sub>F, RM</sub>	Repetitive Forward Surge Current	Half-Sine Pulse, t <sub>p</sub> = 8.3 ms	120	A
P <sub>tot</sub>	Power Dissipation	T <sub>C</sub> = 25°C	682	W
		T <sub>C</sub> = 150°C	114	W
T <sub>J</sub> , T <sub>STG</sub>	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<sub>AS</sub> of 420 mJ is based on starting T<sub>J</sub> = 25°C, L = 0.5 mH, I<sub>AS</sub> = 41 A, V = 50 V.

## THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
R <sub>θJC</sub>	Thermal Resistance, Junction to Case, Max	0.22	°C/W

## ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
V <sub>F</sub>	Forward Voltage	I <sub>F</sub> = 40 A, T <sub>C</sub> = 25°C	-	1.45	1.75	V
		I <sub>F</sub> = 40 A, T <sub>C</sub> = 125°C	-	1.7	2.0	
		I <sub>F</sub> = 40 A, T <sub>C</sub> = 175°C	-	2.0	2.4	
I <sub>R</sub>	Reverse Current	V <sub>R</sub> = 1200 V, T <sub>C</sub> = 25°C	-	-	200	μA
		V <sub>R</sub> = 1200 V, T <sub>C</sub> = 125°C	-	-	300	
		V <sub>R</sub> = 1200 V, T <sub>C</sub> = 175°C	-	-	400	
Q <sub>C</sub>	Total Capacitive Charge	V = 800 V	-	220	-	nC
C	Total Capacitance	V <sub>R</sub> = 1 V, f = 100 kHz	-	2250	-	pF
		V <sub>R</sub> = 400 V, f = 100 kHz	-	204	-	
		V <sub>R</sub> = 800 V, f = 100 kHz	-	169	-	

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
FFSH40120A-F155	FFSH40120A	TO-247-2LD (Pb-Free/Halogen Free)	30 Units / Tube

TYPICAL CHARACTERISTICS

( $T_J = 25^\circ\text{C}$  unless otherwise noted)

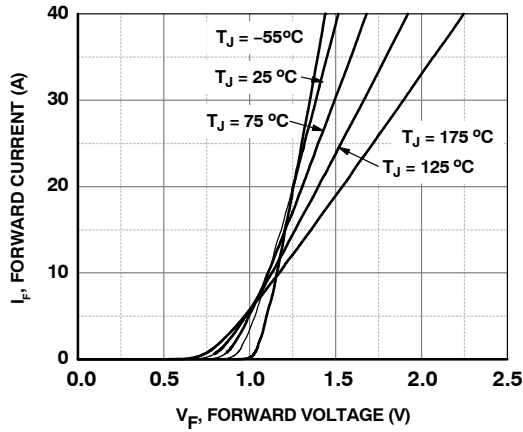


Figure 1. Forward Characteristics

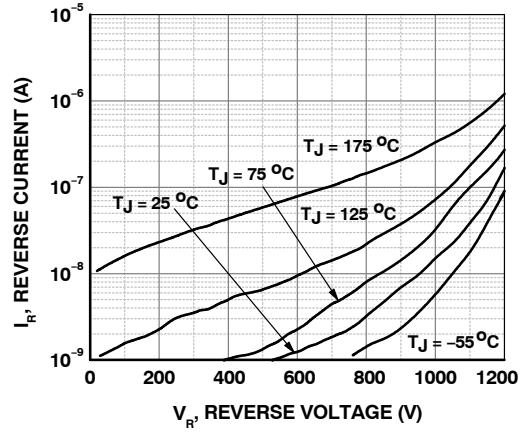


Figure 2. Reverse Characteristics

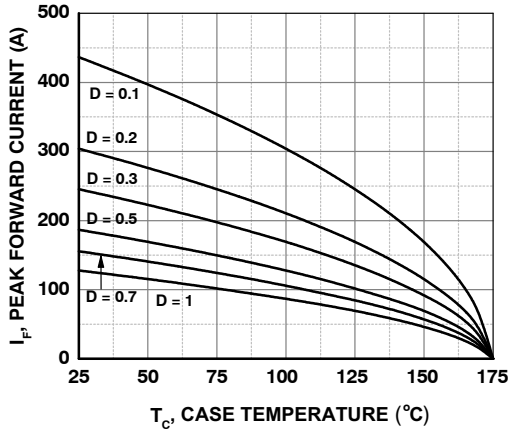


Figure 3. Current Derating

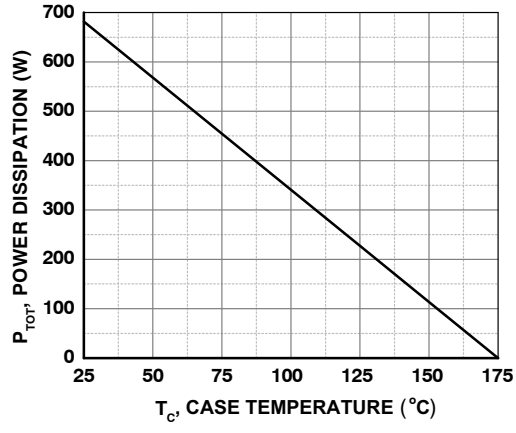


Figure 4. Power Derating

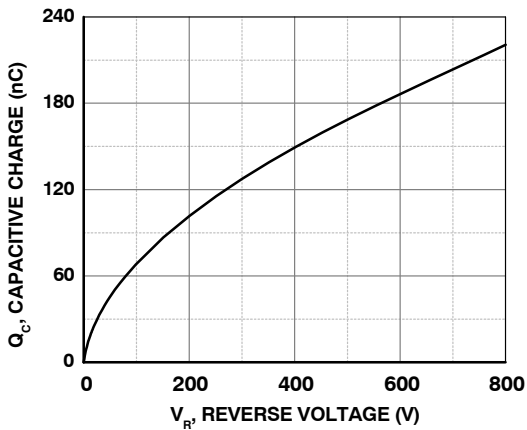


Figure 5. Capacitive Charge vs. Reverse Voltage

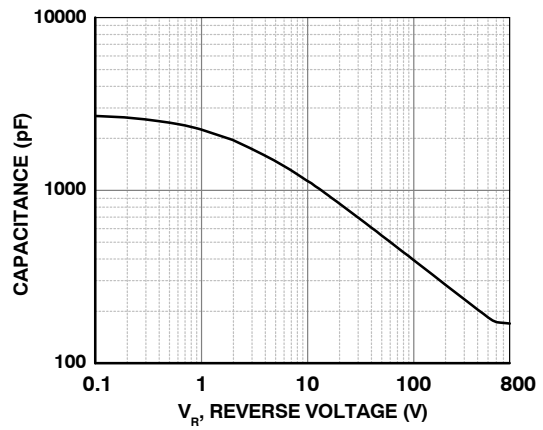


Figure 6. Capacitance vs. Reverse Voltage

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## TYPICAL CHARACTERISTICS

( $T_J = 25^\circ\text{C}$  unless otherwise noted)

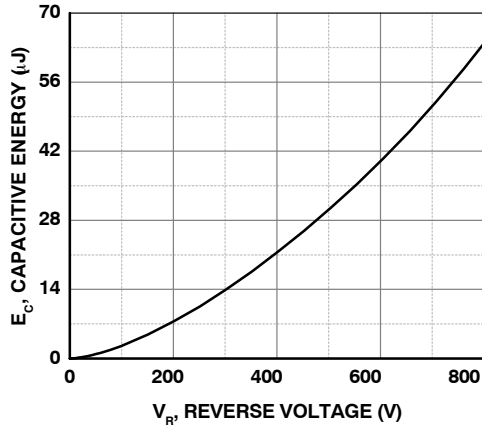


Figure 7. Capacitance Stored Energy

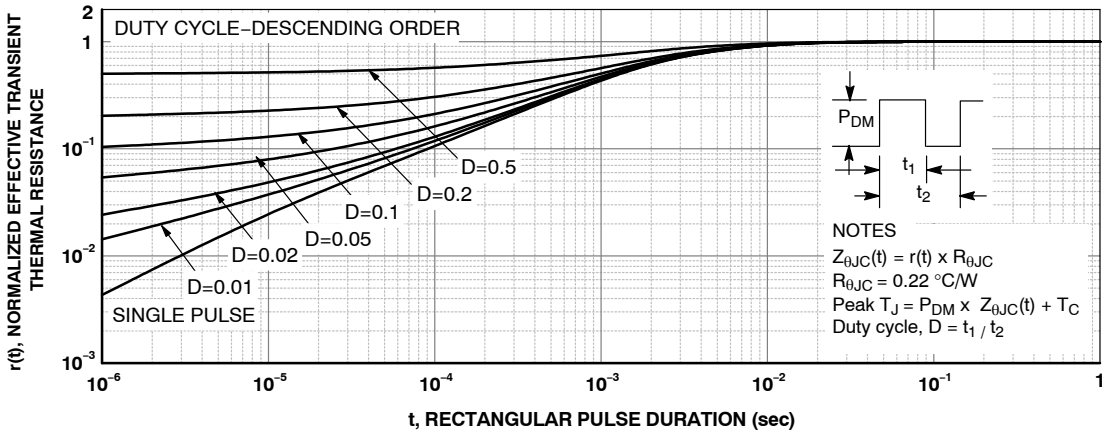


Figure 8. Junction-to-Case Transient Thermal Response Curve

## TEST CIRCUIT AND WAVEFORMS

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

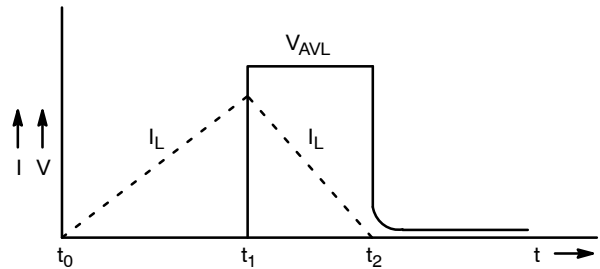
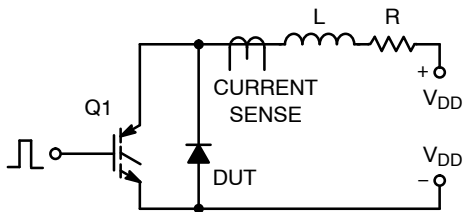
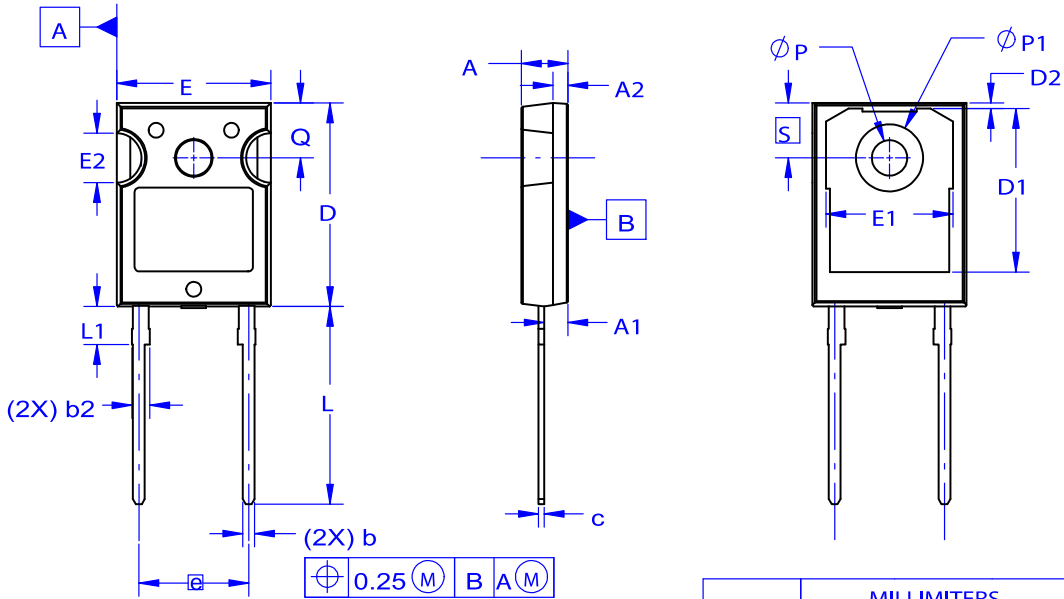


Figure 9. Unclamped Inductive Switching Test Circuit & Waveform

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## PACKAGE DIMENSIONS

TO-247-2LD  
CASE 340DC  
ISSUE O



**NOTES:**

- A. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS.
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSION AND TOLERANCE AS PER 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.

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	1.60	1.72	1.84
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	19.75	20.00	20.25
L1	3.69	3.81	3.93
$\phi P$	3.51	3.58	3.65
$\phi P1$	6.60	6.80	7.00
Q	5.34	5.46	5.58
S	5.34	5.46	5.58

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