Silicon Carbide Schottky Diode

650 V, 20 A

FFSH2065A

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 95 mJ
- High Surge Current Capacity
- Positive Temperature Coefficient
- Ease of Paralleling
- No Reverse Recovery / No Forward Recovery
- This Device is Pb−Free and is RoHS Compliant

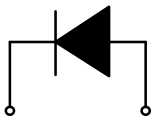
Applications

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

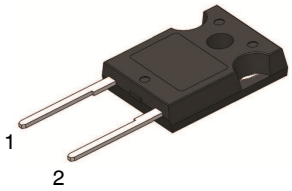
ON Semiconductor®

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V_{RRM}	I_F
650 V	20 A

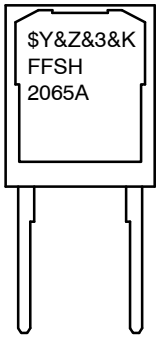


1. Cathode 2. Anode



TO−247−2LD
CASE 340CL

MARKING DIAGRAM



$Y	= ON Semiconductor Logo
&Z	= Assembly Plant Code
&3	= Numeric Date Code
&K	= Lot Code
FFSH2065A	= Specific Device Code

ORDERING INFORMATION

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

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ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, Unless otherwise specified)

Symbol	Parameter		FFSH2065A	Unit
V_{RRM}	Peak Repetitive Reverse Voltage		650	V
E_{AS}	Single Pulse Avalanche Energy (Note 1)		95	mJ
I_F	Continuous Rectified Forward Current	@ T_C < 146°C	20	A
		@ T_C < 135°C	25	
$I_{F, Max}$	Non−Repetitive Peak Forward Surge Current	T_C = 25°C, 10 μs	1100	A
		T_C = 150°C, 10 μs	1000	A
$I_{F, SM}$	Non−Repetitive Forward Surge Current	Half−Sine Pulse, t_p = 8.3 ms	105	A
$I_{F, RM}$	Repetitive Forward Surge Current	Half−Sine Pulse, t_p = 8.3 ms	58	A
P_{tot}	Power Dissipation	T_C = 25°C	183	W
		T_C = 150°C	31	W
T_J, T_{STG}	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_{AS} of 95 mJ is based on starting T_J = 25°C, L = 0.5 mH, I_{AS} = 19.5 A, V = 50 V.

THERMAL CHARACTERISTICS

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.82	°C/W

PACKAGE MARKING AND ORDERING INFORMATION

Part Number	Top Marking	Package	Packing Method	Reel Size	Tape Width	Quantity
FFSH2065A	FFSH2065A	TO247−2L	Tube	N/A	N/A	30 Units

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	–	1.50	1.75	V
		I_F = 20 A, T_C = 125°C	–	1.6	2.0	
		I_F = 20 A, T_C = 175°C	–	1.72	2.4	
I_R	Reverse Current	V_R = 650 V, T_C = 25°C	–	–	200	μA
		V_R = 650 V, T_C = 125°C	–	–	400	
		V_R = 650 V, T_C = 175°C	–	–	600	
Q_C	Total Capacitive Charge	V = 400 V	–	64	–	nC
C	Total Capacitance	V_R = 1 V, f = 100 kHz	–	1085	–	pF
		V_R = 200 V, f = 100 kHz	–	117	–	
		V_R = 400 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.

TYPICAL CHARACTERISTICS

(T_J = 25°C unless otherwise noted)

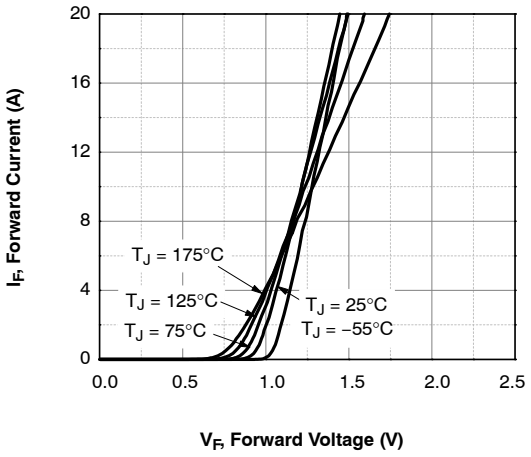


Figure 1. Forward Characteristics

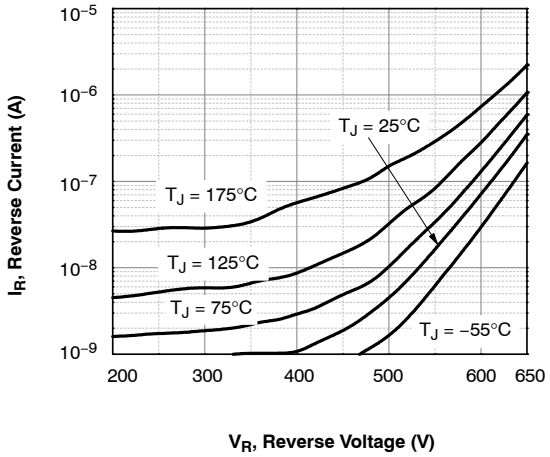


Figure 2. Reverse Characteristics

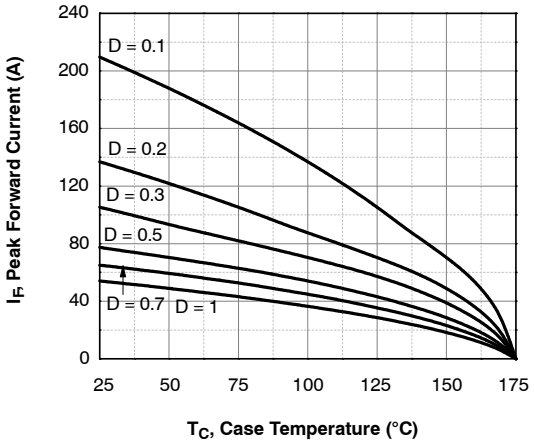


Figure 3. Current Derating

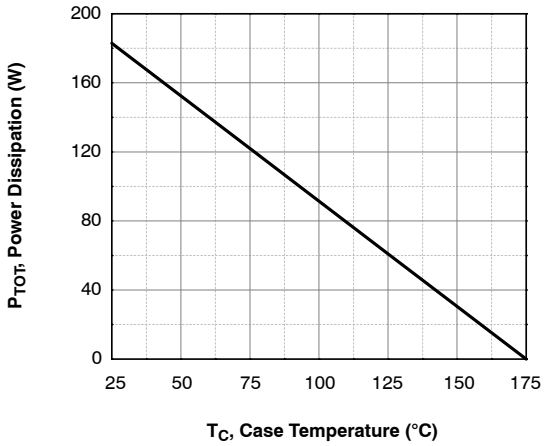


Figure 4. Power Derating

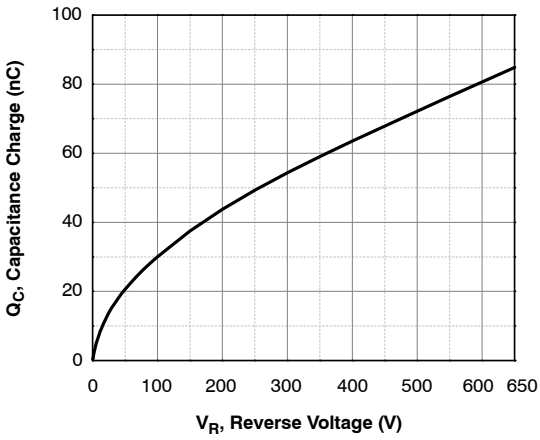


Figure 5. Capacitive Charge vs. Reverse Voltage

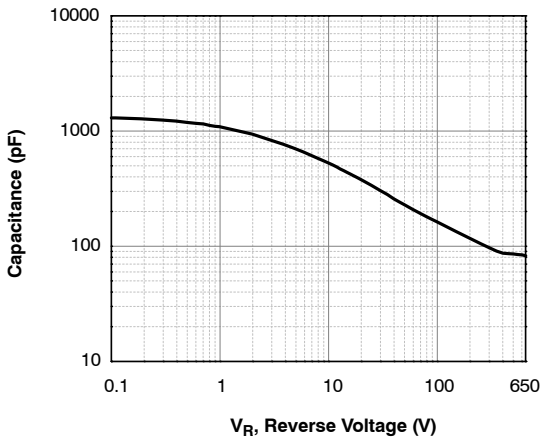


Figure 6. Capacitance vs. Reverse Voltage

TYPICAL CHARACTERISTICS (Continued)

(T_J = 25°C unless otherwise noted)

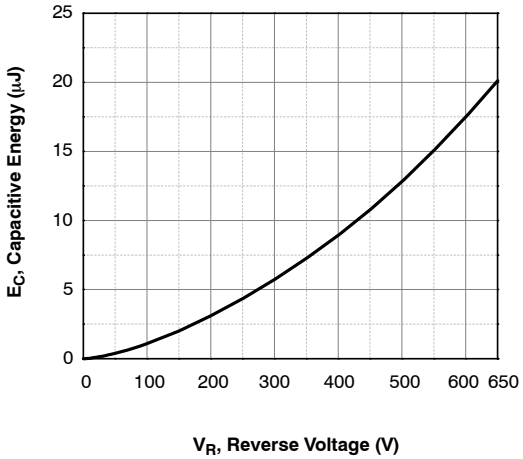


Figure 7. Capacitance Stored Energy

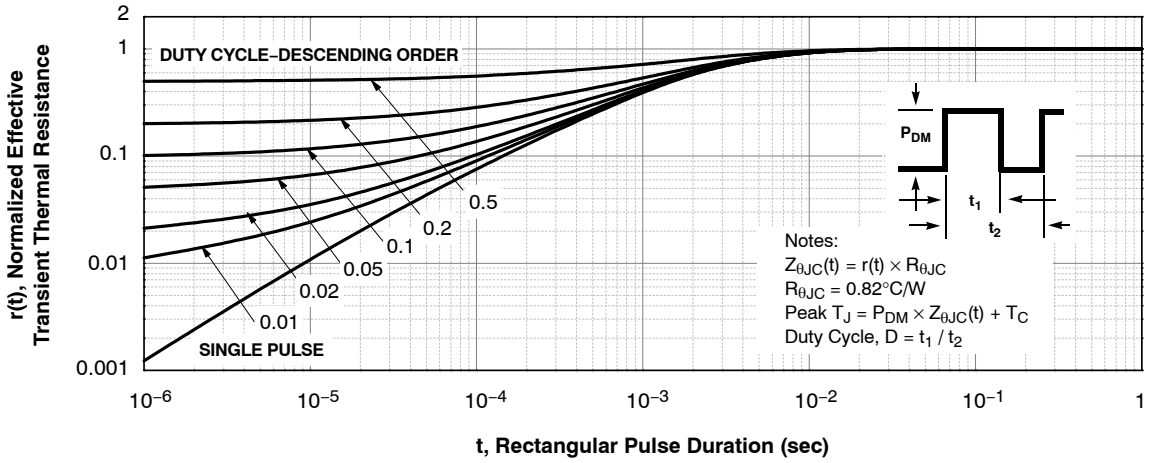


Figure 8. Junction−to−Case Transient Thermal Response Curve

TEST CIRCUIT AND WAVEFORMS

L = 0.5 mH
R < 0.1 Ω
V_{DD} = 50 V
EAVL = 1/2LI2 [$V_{R(AVL)}$/($V_{R(AVL)}$ − V_{DD})]
Q1 = IGBT (BV_{CES} > DUT $V_{R(AVL)}$)

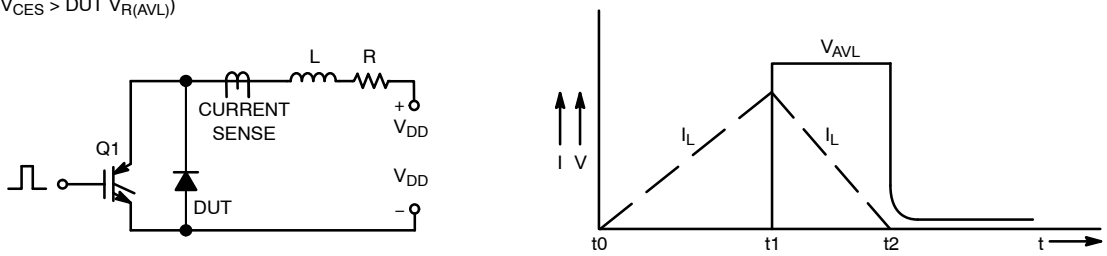


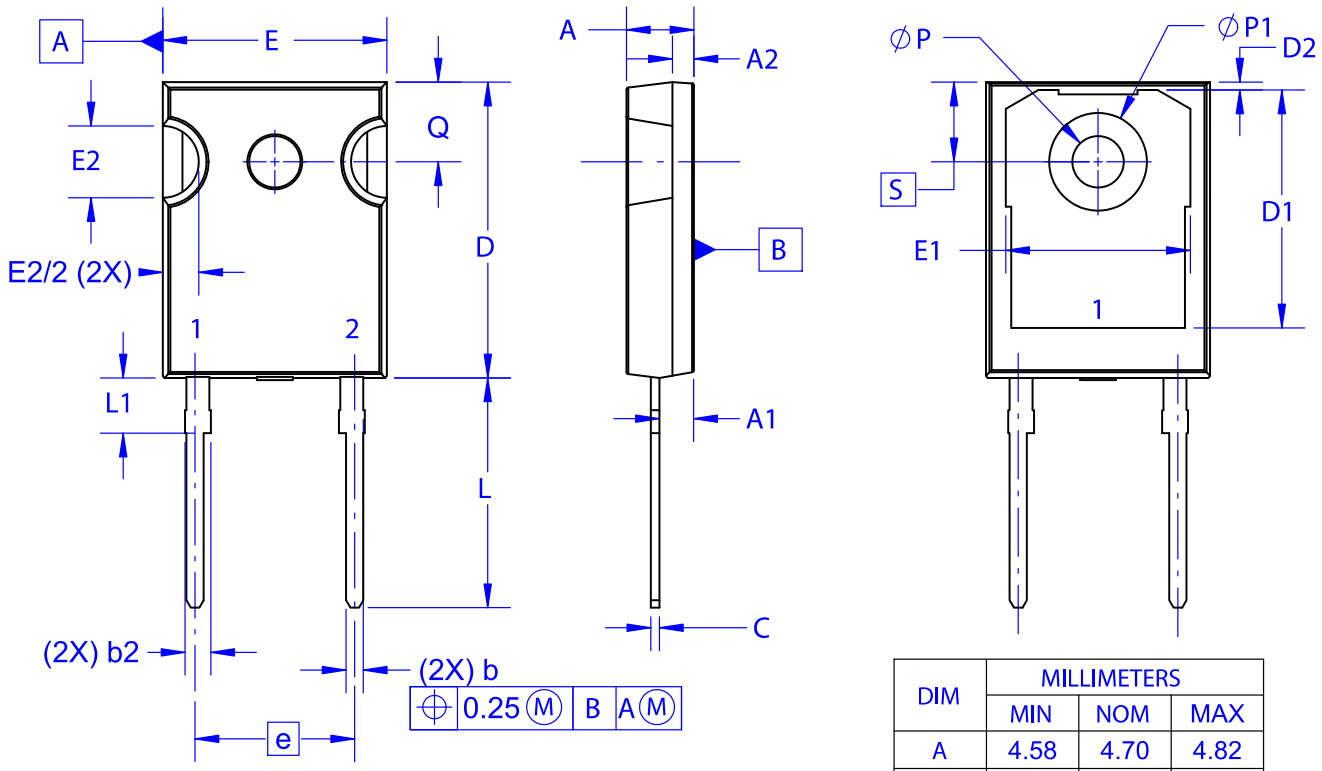
Figure 9. Unclamped Inductive Switching Test Circuit & Waveform

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

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TO−247−2LD
CASE 340CL
ISSUE A

DATE 03 DEC 2019

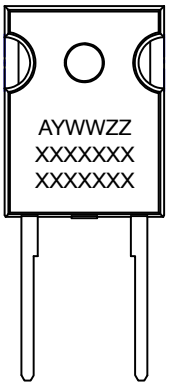


NOTES: UNLESS OTHERWISE SPECIFIED.

A. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
B. ALL DIMENSIONS ARE IN MILLIMETERS.
C. DRAWING CONFORMS TO 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	2.29	2.40	2.66
A2	1.30	1.50	1.70
b	1.17	1.26	1.35
b2	1.53	1.65	1.77
c	0.51	0.61	0.71
D	20.32	20.57	20.82
D1	16.37	16.57	16.77
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	15.75	16.00	16.25
L1	3.69	3.81	3.93
ØP	3.51	3.58	3.65
ØP1	6.61	6.73	6.85
Q	5.34	5.46	5.58
S	5.34	5.46	5.58

GENERIC MARKING DIAGRAM*



XXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
ZZ = Assembly Lot Code

*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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