STEALTH™ Diode
50 A, 600 V

FFH50US60S-F085

ON Semiconductor®

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Description

The FFH50US60S−F085 is a STEALTH™ diode optimized for low loss performance in output rectification. The STEALTH family exhibits low reverse recovery current(I_{RR}),low V_F and soft recovery under typical operating conditions. It has a low forward−voltage drop and is of silicon nitride passivated.

This device is intended for use as a freewheel/clamping diode in various automotive switching power supplies and other power switching applications. Its low stored charge as well as Stealth and soft recovery characteristics minimize ringing and electrical noise while reduce the overall power loss.

Features

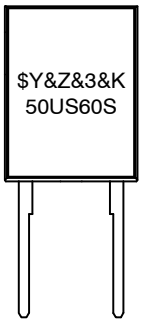
- Stealth Recovery, t_{rr} = 163 ns (Typ.) @ I_F = 50 A)
- Low Forward Voltage(V_F = 1.69 V (Max.) @ I_F = 50 A)
- Avalanche Energy Rated
- AEC−Q101 Qualified
- This Device is Pb−Free

Applications

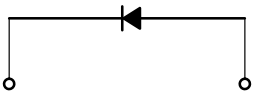
- Automotive DCDC Converter
- Automotive On Board Charger
- Switching Power Supply
- Power Switching Circuits

TO−247−2L

MARKING DIAGRAM



$Y	= ON Semiconductor Logo
&Z	= Assembly Plant Code
&3	= Numeric Date Code
&K	= Lot Code
50US60S	= Specific Device Code



ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Peak Repetitive Reverse Voltage	V_{RRM}	600	V
Working Peak Reverse Voltage	V_{RWM}	600	V
DC Blocking Voltage	V_R	600	V
Average Rectified Forward Current (T_C = 25 °C)	$I_{F(AV)}$	50	A
Non−repetitive Peak Surge Current (Halfwave 1 Phase 50 Hz)	I_{FSM}	150	A
Avalanche Energy (1 A, 40 mH)	E_{AVL}	20	mJ
Operating Junction and Storage Temperature	T_J, T_{STG}	−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.

ORDERING INFORMATION

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

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PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Package	Tube	Quantity
FFH50US60S	FFH50US60S−F085	TO247−2L	–	30

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
I_R	Instantaneous Reverse Current	V_R = 600 V	T_C = 25°C	–	–	100	μA
			T_C = 175°C	–	–	1000	μA
V_{FM} (Note 1)	Instantaneous Forward Voltage	I_F = 50 A	T_C = 25°C	–	1.27	1.69	V
			T_C = 175°C	–	1.19	1.57	V
t_{rr} (Note 2)	Reverse Recovery Time	I_F = 1 A, di/dt = 200 A/μs, V_R = 390 V	T_C = 25°C	–	41	82	ns
		I_F = 50 A, di/dt = 200 A/μs, V_R = 390 V	T_C = 25°C	–	163	–	ns
			T_C = 175°C	–	364	–	ns
ta tb Q_{rr}	Reverse Recovery Time Reverse Recovery Charge	I_F = 50 A, di/dt = 200 A/μs, V_R = 390 V	T_C = 25°C	–	65 98 886	– – –	ns ns nC

1. Pulse : Test Pulse width = 300 μs, Duty Cycle = 2%
2. Guaranteed by design

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.

TEST CIRCUITS AND WAVEFORMS

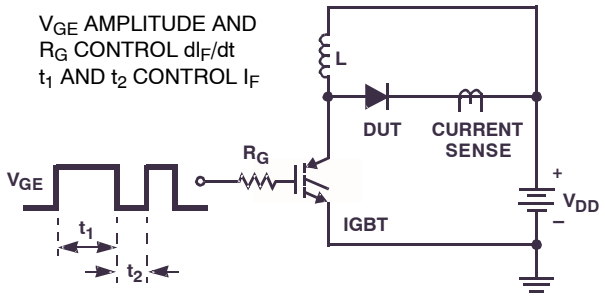

Figure 1. T_{rr} Test Circuit

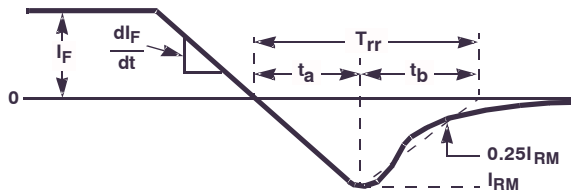

Figure 2. T_{rr} Waveforms and Definitions

I = 1 A
L = 40 mH
R < 0.1 Ω
$E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)}-V_{DD})]$
Q_1 = IGBT (BV_{CES} > DUT $V_{R(AVL)}$)

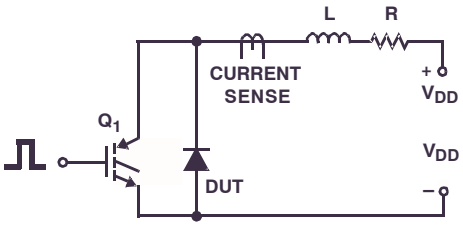

Figure 3. Avalanche Energy Test Circuit

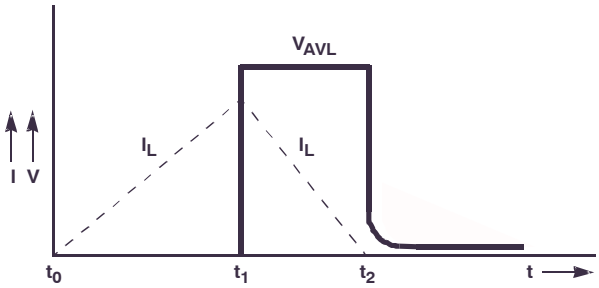

Figure 4. Avalanche Current and Voltage Waveforms

TYPICAL PERFORMANCE CHARECTERISTICS

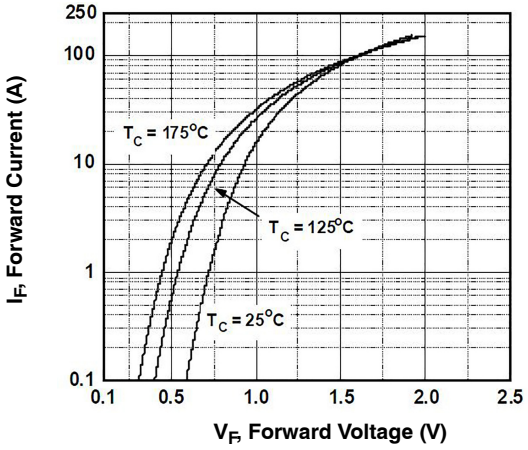

Figure 5. Typical Forward Voltage Drop vs. Forward Current

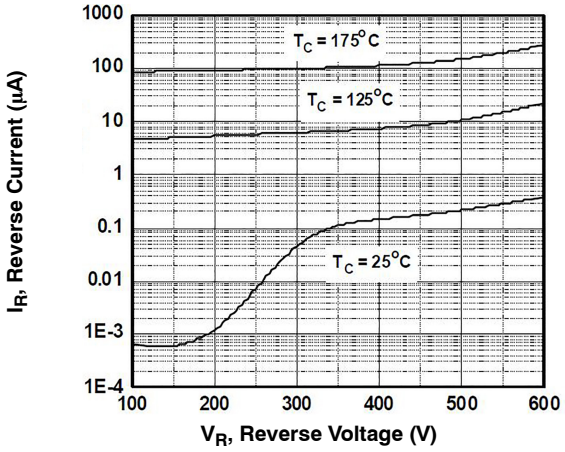

Figure 6. Typical Reverse Current vs. Reverse Voltage

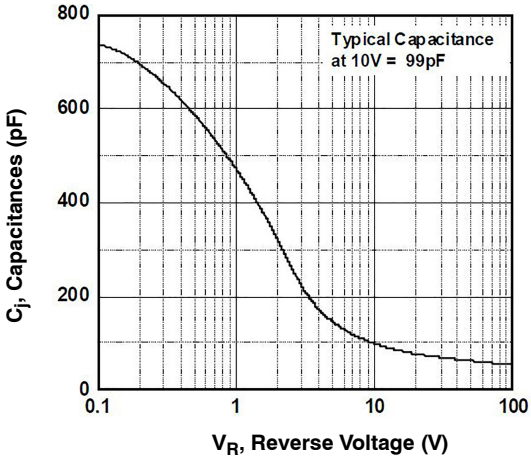

Figure 7. Typical Junction Capacitance

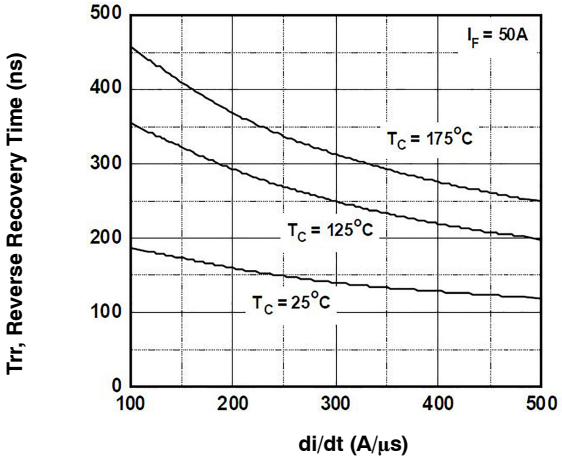

Figure 8. Typical Reverse Recovery Time vs. di/dt

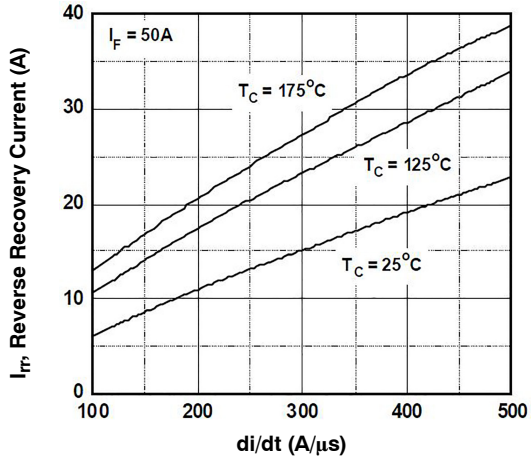

Figure 9. Typical Reverse Recovery Current vs. di/dt

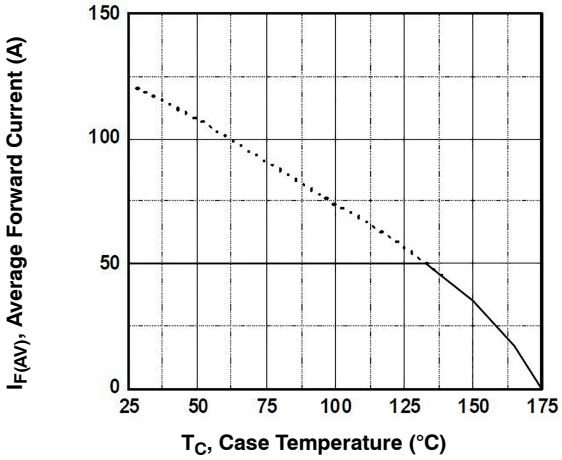

Figure 10. Forward Current Derating Curve

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

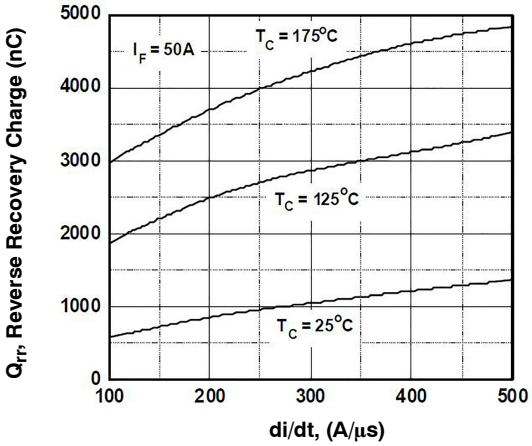

Figure 11. Reverse Recovery Charge

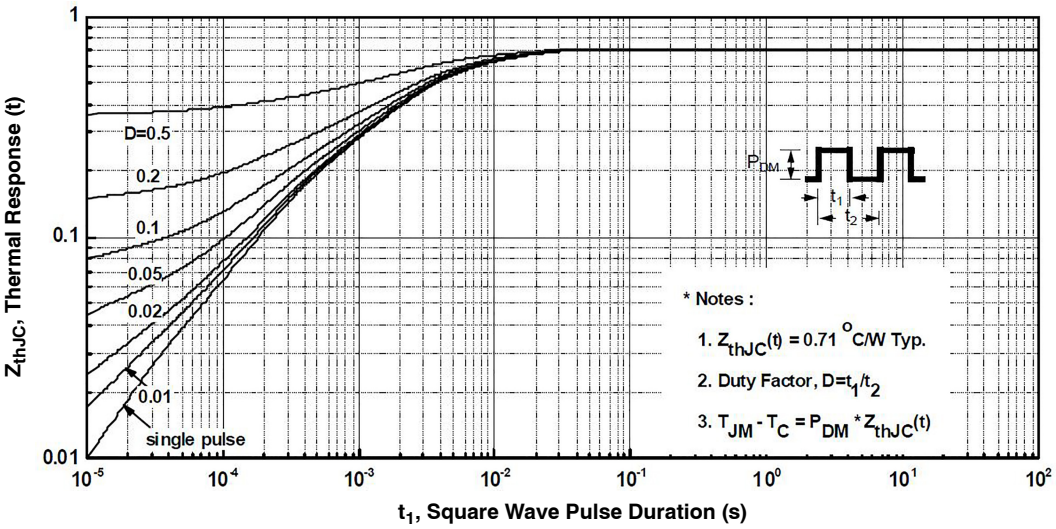

Figure 12. Transient Thermal Response Curve

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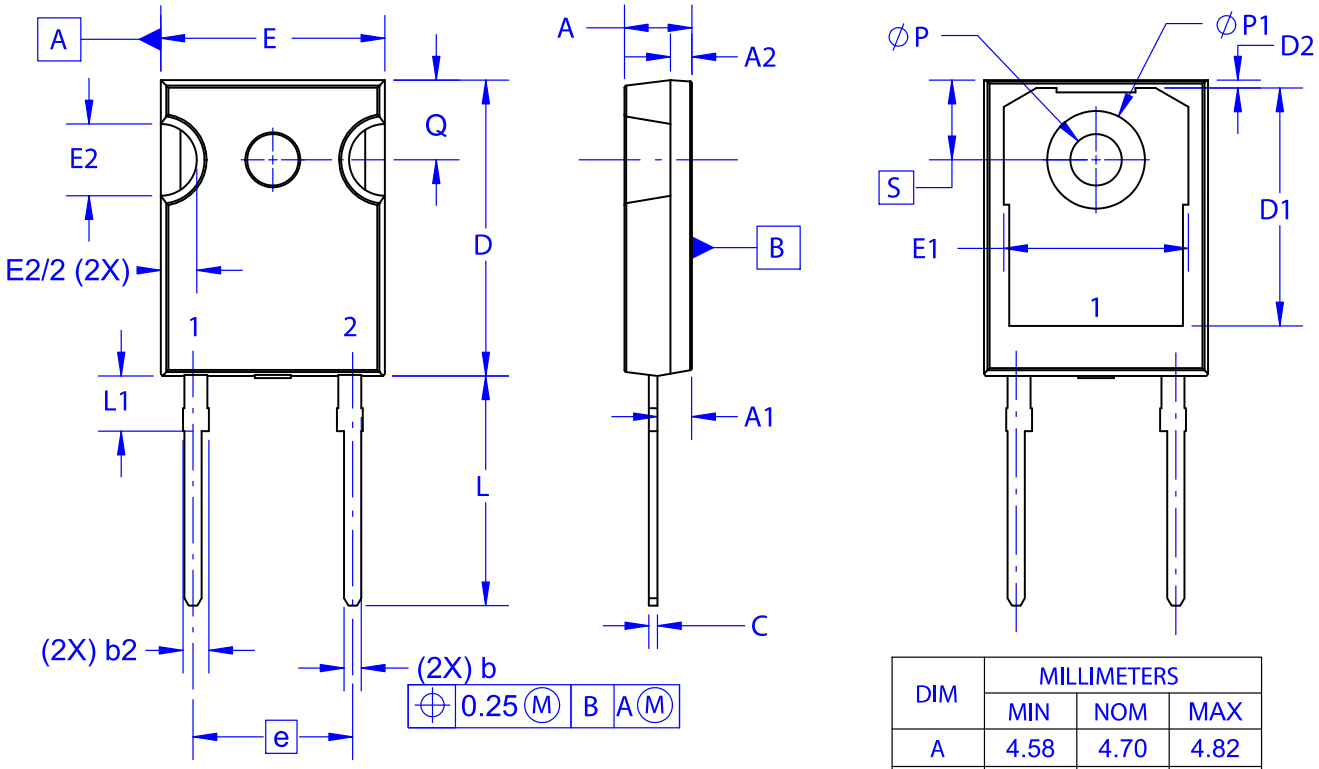
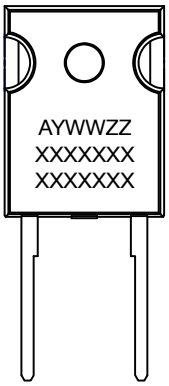


DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.58	4.70	4.82
A1	2.29	2.40	2.66
A2	1.30	1.50	1.70
b	1.17	1.26	1.35
b2	1.53	1.65	1.77
c	0.51	0.61	0.71
D	20.32	20.57	20.82
D1	16.37	16.57	16.77
D2	0.51	0.93	1.35
E	15.37	15.62	15.87
E1	12.81	~	~
E2	4.96	5.08	5.20
e	~	11.12	~
L	15.75	16.00	16.25
L1	3.69	3.81	3.93
∅P	3.51	3.58	3.65
∅P1	6.61	6.73	6.85
Q	5.34	5.46	5.58
S	5.34	5.46	5.58

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.

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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