

# STEALTH™ Diode

## 50 A, 600 V

### FFH50US60S-F085

#### 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

#### ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

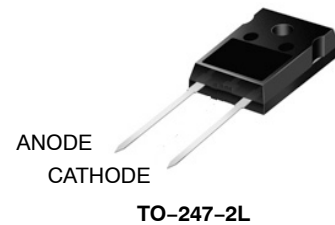
Rating	Symbol	Value	Unit
Peak Repetitive Reverse Voltage	$V_{RRM}$	600	V
Working Peak Reverse Voltage	$V_{RWM}$	600	V
DC Blocking Voltage	$V_R$	600	V
Average Rectified Forward Current ( $T_C = 25^\circ\text{C}$ )	$I_{F(AV)}$	50	A
Non-repetitive Peak Surge Current (Halfwave 1 Phase 50 Hz)	$I_{FSM}$	150	A
Avalanche Energy (1 A, 40 mH)	$E_{AVL}$	20	mJ
Operating Junction and Storage Temperature	$T_J, T_{STG}$	-55 to +175	$^\circ\text{C}$

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.

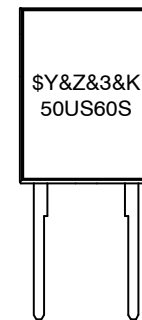


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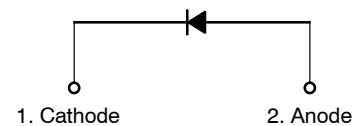
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#### MARKING DIAGRAM



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



#### ORDERING INFORMATION

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

# FFH50US60S-F085

## PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Package	Tube	Quantity
FFH50US60S	FFH50US60S-F085	TO247-2L	-	30

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit		
$I_R$	Instantaneous Reverse Current	$V_R = 600\text{ V}$	$T_C = 25^\circ\text{C}$	-	-	100	$\mu\text{A}$	
			$T_C = 175^\circ\text{C}$	-	-	1000	$\mu\text{A}$	
$V_{FM}$ (Note 1)	Instantaneous Forward Voltage	$I_F = 50\text{ A}$	$T_C = 25^\circ\text{C}$	-	1.27	1.69	V	
			$T_C = 175^\circ\text{C}$	-	1.19	1.57	V	
$t_{rr}$ (Note 2)	Reverse Recovery Time	$I_F = 1\text{ A}$ , $di/dt = 200\text{ A}/\mu\text{s}$ , $V_R = 390\text{ V}$	$T_C = 25^\circ\text{C}$	-	41	82	ns	
			$T_C = 25^\circ\text{C}$	$I_F = 50\text{ A}$ , $di/dt = 200\text{ A}/\mu\text{s}$ , $V_R = 390\text{ V}$	-	163	-	ns
				$T_C = 175^\circ\text{C}$	-	364	-	ns
$t_a$ $t_b$ $Q_{rr}$	Reverse Recovery Time Reverse Recovery Charge	$I_F = 50\text{ A}$ , $di/dt = 200\text{ A}/\mu\text{s}$ , $V_R = 390\text{ V}$	$T_C = 25^\circ\text{C}$	-	65 98 886	- - -	ns ns nC	

1. Pulse : Test Pulse width = 300  $\mu\text{s}$ , 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

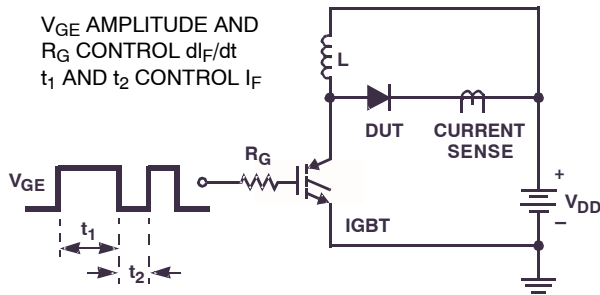


Figure 1.  $T_{rr}$  Test Circuit

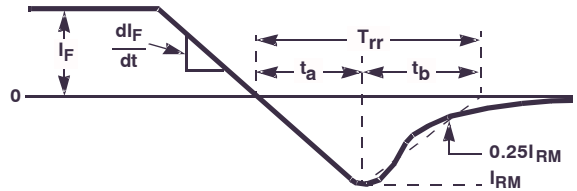


Figure 2.  $T_{rr}$  Waveforms and Definitions

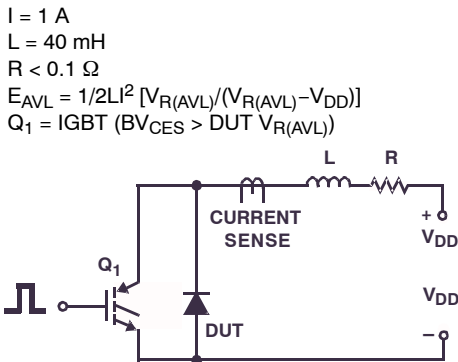


Figure 3. Avalanche Energy Test Circuit

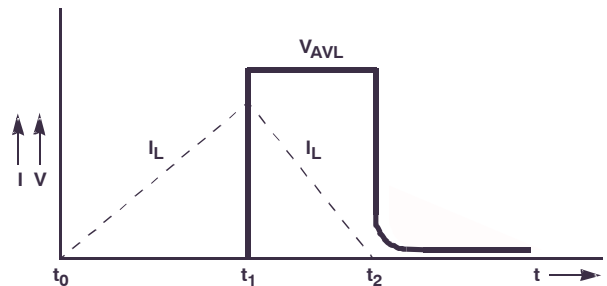


Figure 4. Avalanche Current and Voltage Waveforms

TYPICAL PERFORMANCE CHARECTERISTICS

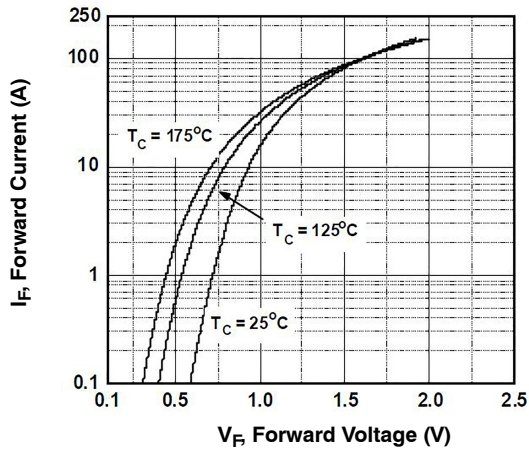


Figure 5. Typical Forward Voltage Drop vs. Forward Current

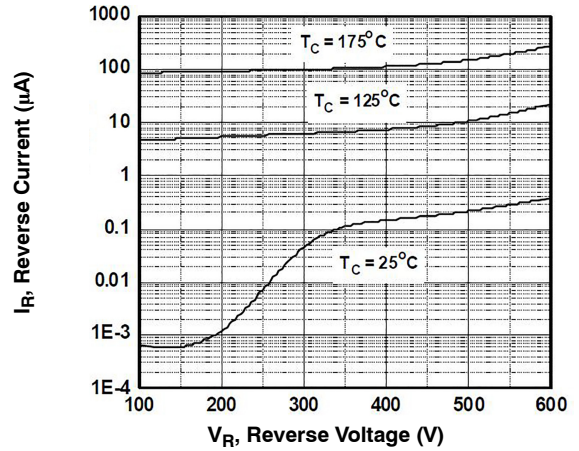


Figure 6. Typical Reverse Current vs. Reverse Voltage

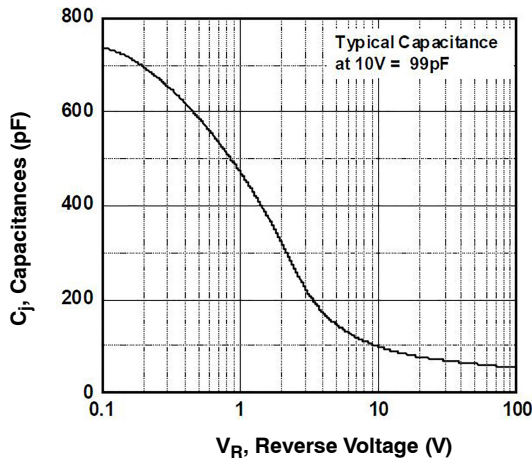


Figure 7. Typical Junction Capacitance

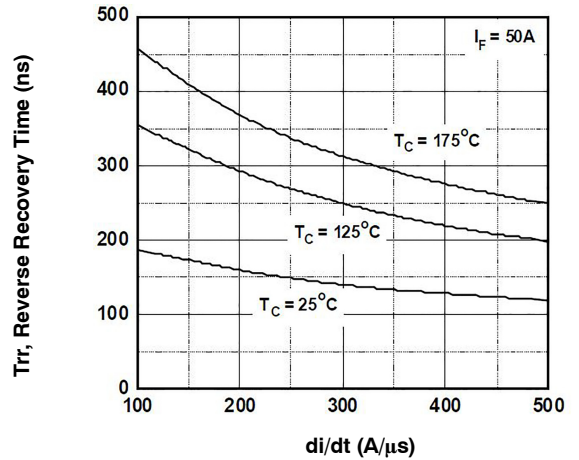


Figure 8. Typical Reverse Recovery Time vs. di/dt

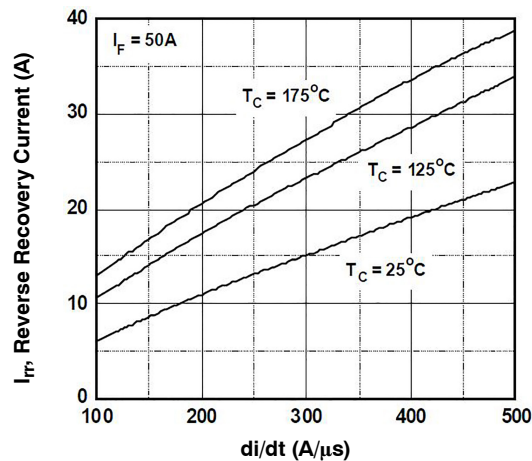


Figure 9. Typical Reverse Recovery Current vs. di/dt

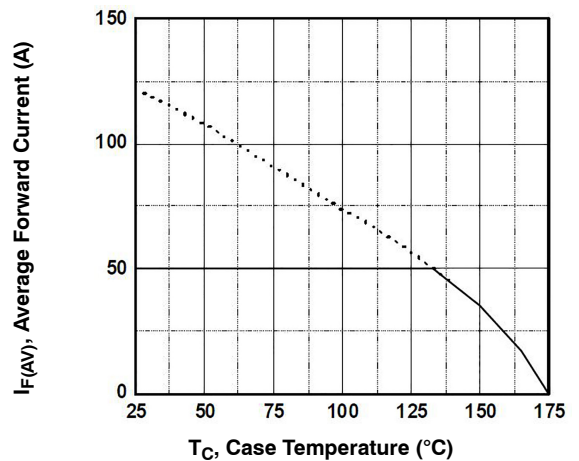


Figure 10. Forward Current Derating Curve

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

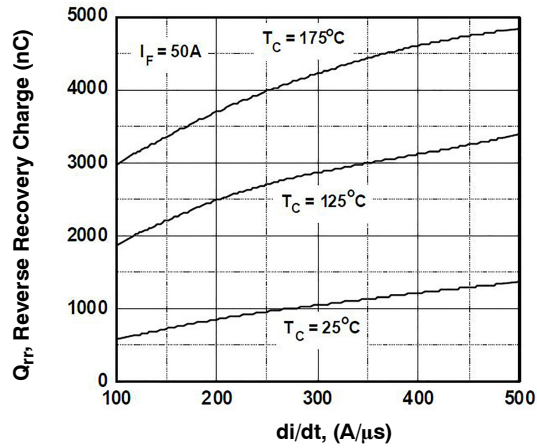


Figure 11. Reverse Recovery Charge

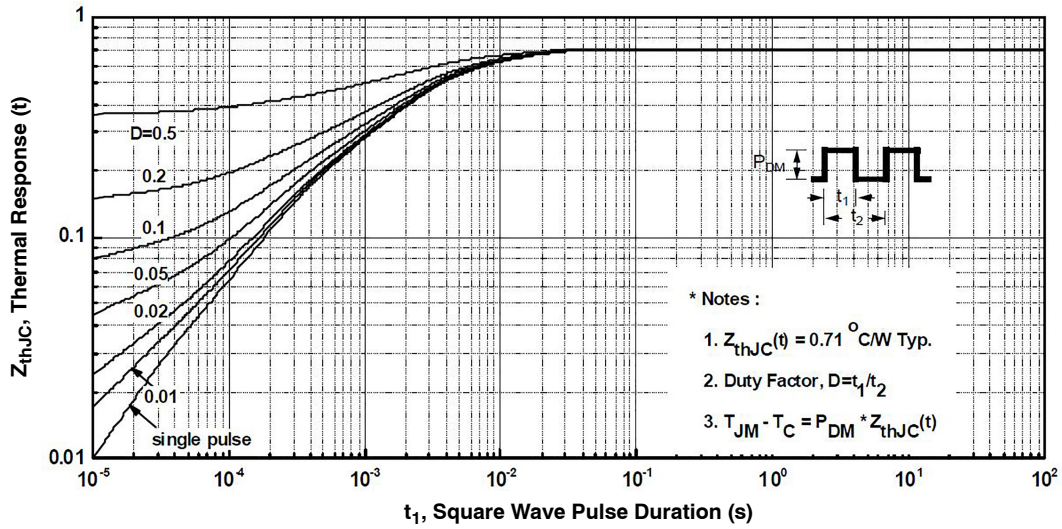


Figure 12. Transient Thermal Response Curve

# MECHANICAL CASE OUTLINE

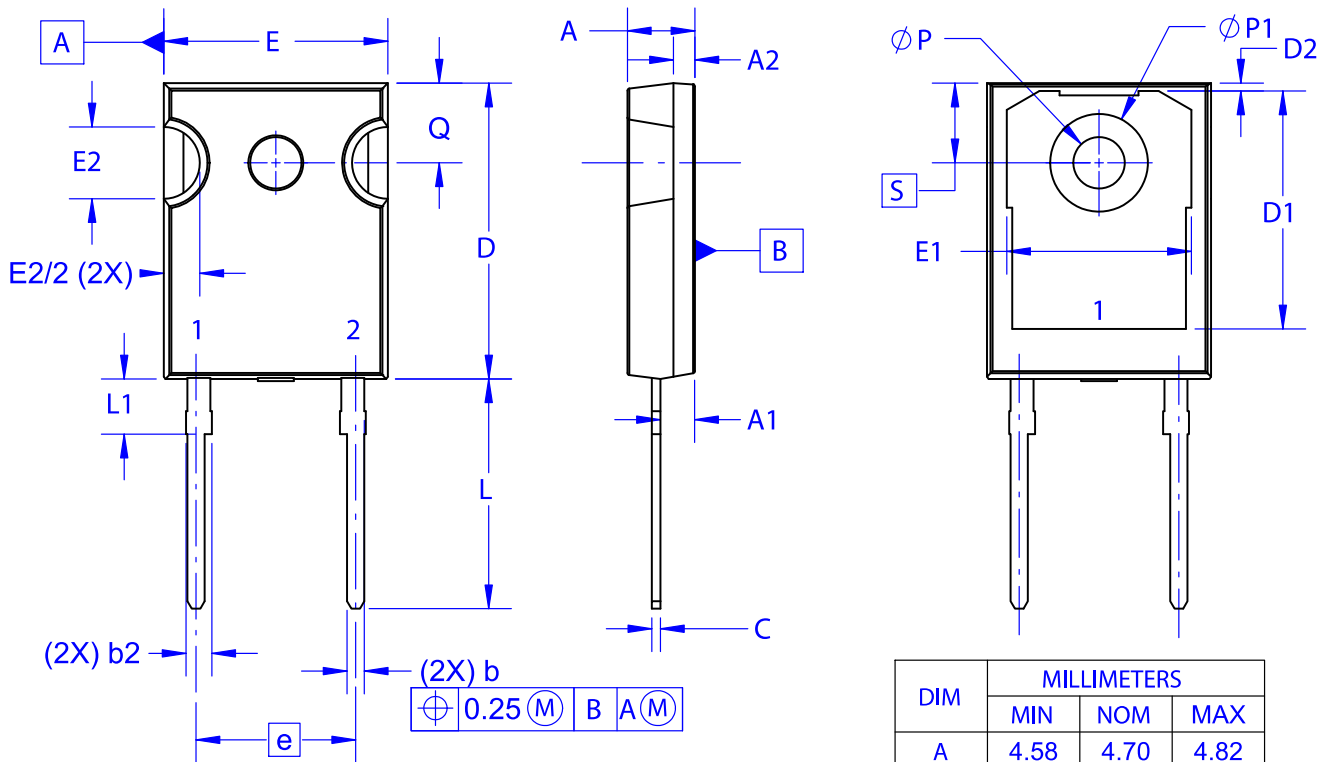
## PACKAGE DIMENSIONS

ON Semiconductor®



TO-247-2LD  
CASE 340CL  
ISSUE A

DATE 03 DEC 2019



⊕ 0.25 (M) B A (M)

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.

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

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<b>DESCRIPTION:</b>	<b>TO-247-2LD</b>	<b>PAGE 1 OF 1</b>

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