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December 2014

# FFH50US60S\_F085 50A, 600V Stealth Diode



## Features

- Stealth Recovery ( $t_{rr}=163\text{ns(Typ.)}$  @  $I_F=50\text{A}$ )
- Low Forward Voltage ( $V_F=1.69\text{V(Max.)}$  @  $I_F=50\text{A}$ )
- Avalanche Energy Rated
- AEC-Q101 Qualified

## Applications

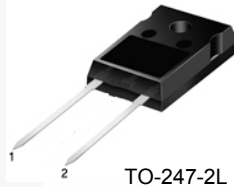
- Automotive DCDC Converter
- Automotive On Board Charger
- Switching Power Supply
- Power Switching Circuits

## 50A,600V Stealth Diode

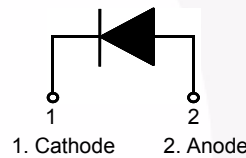
The FFH50US60S\_F085 is a Stealth™ diode optimized for low loss performance in output rectification. The STEALTH™ family exhibits low reverse recovery current ( $I_{RR}$ ), low  $V_F$  and soft recovery under typical operating conditions. It has a low forward-voltage drop and is of silicon nitride passivated.

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.

## Pin Assignments



1. Cathode 2. Anode



## Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

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

## Thermal Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Maximum Thermal Resistance, Junction to Case	0.71	$^\circ\text{C/W}$
$R_{\theta JA}$	Maximum Thermal Resistance, Junction to Ambient	30	$^\circ\text{C/W}$

## Package Marking and Ordering Information

Device Marking	Device	Package	Tube	Quantity
FFH50US60S	FFH50US60S_F085	TO-247-2L	-	30

FFH50US60S\_F085 50A, 600V Stealth Diode

## Electrical Characteristics T<sub>C</sub> = 25°C unless otherwise noted

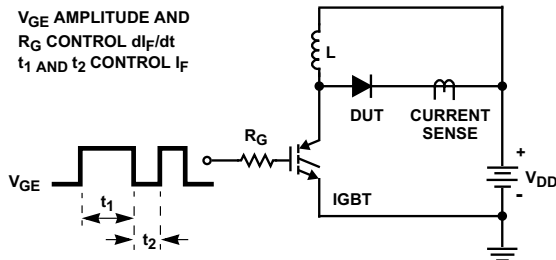
Symbol	Parameter	Conditions	Min.	Typ.	Max	Units	
I <sub>R</sub>	Instantaneous Reverse Current	V <sub>R</sub> = 600V	T <sub>C</sub> = 25 °C	-	-	100	uA
			T <sub>C</sub> = 175 °C	-	-	1000	uA
V <sub>FM</sub> <sup>1</sup>	Instantaneous Forward Voltage	I <sub>F</sub> = 50A	T <sub>C</sub> = 25 °C	-	1.27	1.69	V
			T <sub>C</sub> = 175 °C	-	1.19	1.57	V
t <sub>rr</sub> <sup>2</sup>	Reverse Recovery Time	I <sub>F</sub> = 1A, di/dt = 200A/μs, V <sub>R</sub> = 390V	T <sub>C</sub> = 25 °C	-	41	82	ns
			I <sub>F</sub> = 50A, di/dt = 200A/μs, V <sub>R</sub> = 390V	T <sub>C</sub> = 25 °C	-	163	-
			T <sub>C</sub> = 175 °C	-	364	-	ns
t <sub>a</sub>	Reverse Recovery Time	I <sub>F</sub> = 50A, di/dt = 200A/μs, V <sub>R</sub> = 390V	T <sub>C</sub> = 25 °C	-	65	-	ns
t <sub>b</sub>	Reverse Recovery Time			-	98	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge			-	886	-	nC

### Notes:

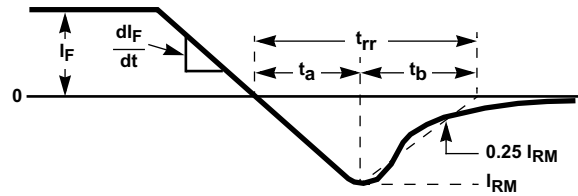
1. Pulse : Test Pulse width = 300μs, Duty Cycle = 2%
2. Guaranteed by design

## Test Circuit and Waveforms

### t<sub>rr</sub> Test Circuit

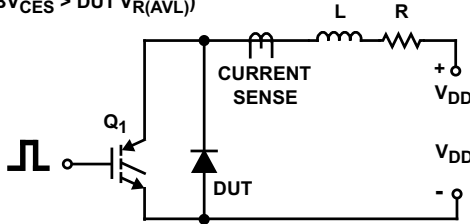


### t<sub>rr</sub> Waveforms and Definitions

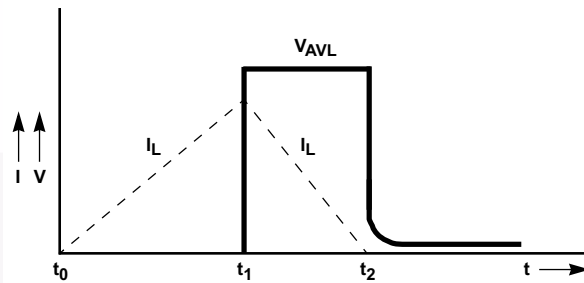


### Avalanche Energy Test Circuit

- I = 1A
- L = 40mH
- R < 0.1Ω
- E<sub>AVL</sub> = 1/2LI<sup>2</sup> [V<sub>R(AVL)</sub>/(V<sub>R(AVL)</sub> - V<sub>DD</sub>)]
- Q<sub>1</sub> = IGBT (BV<sub>CES</sub> > DUT V<sub>R(AVL)</sub>)

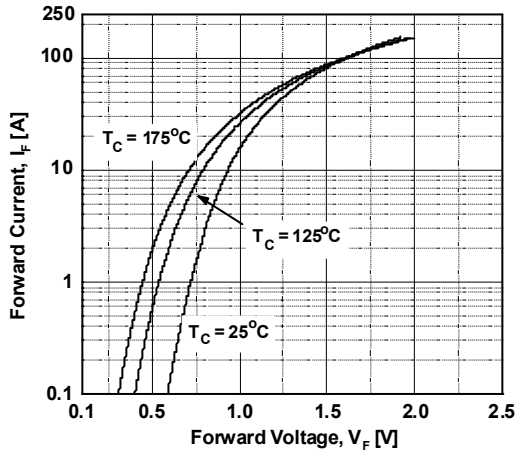


### Avalanche Current and Voltage Waveforms

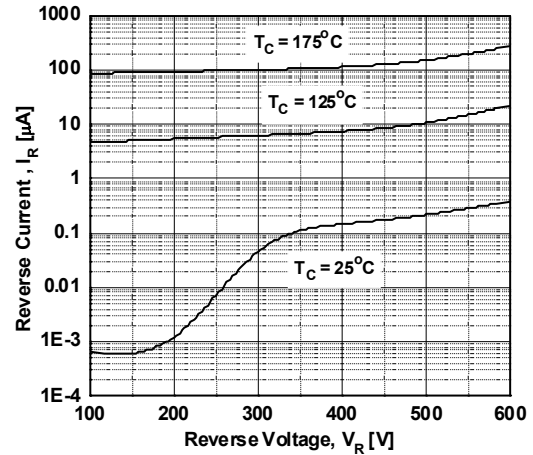


## Typical Performance Characteristics

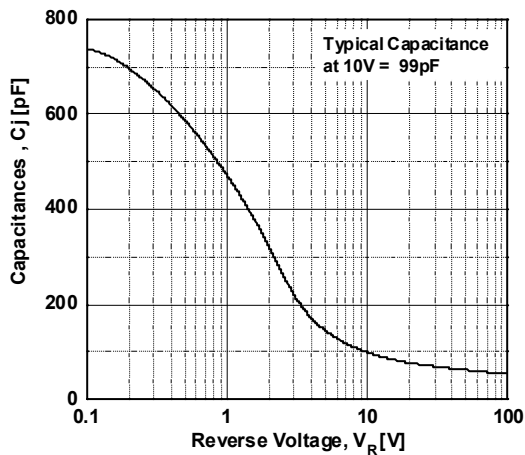
**Figure 1. Typical Forward Voltage Drop vs. Forward Current**



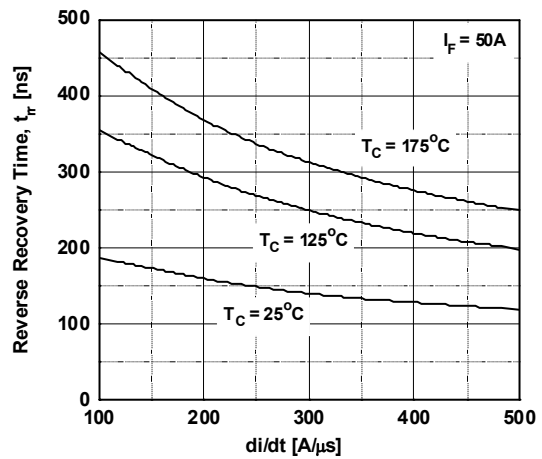
**Figure 2. Typical Reverse Current vs. Reverse Voltage**



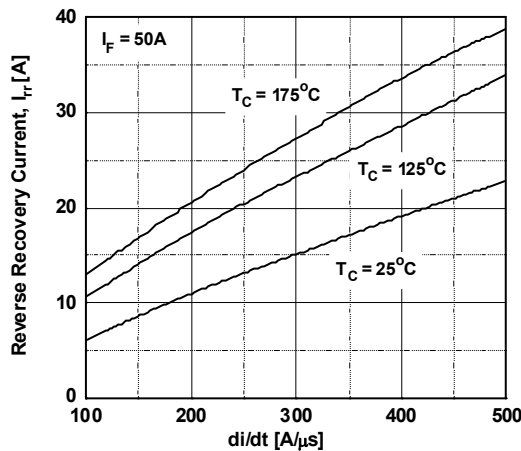
**Figure 3. Typical Junction Capacitance**



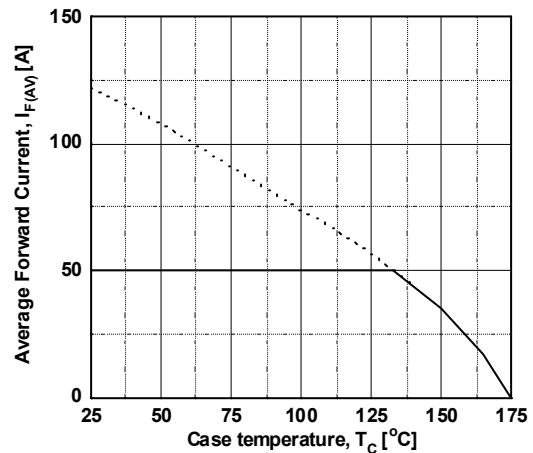
**Figure 4. Typical Reverse Recovery Time vs. di/dt**



**Figure 5. Typical Reverse Recovery Current vs. di/dt**



**Figure 6. Forward Current Derating Curve**



Typical Performance Characteristics (Continued)

Figure 7. Reverse Recovery Charge

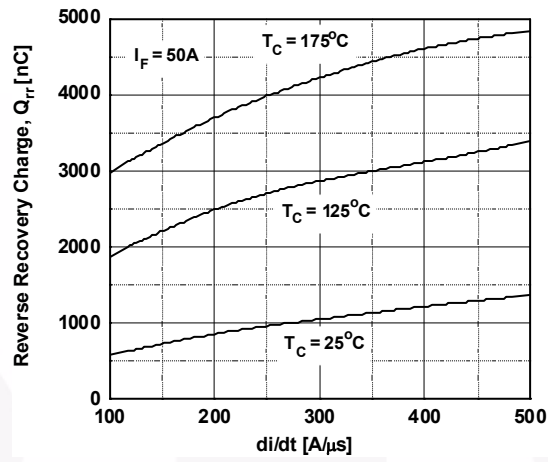
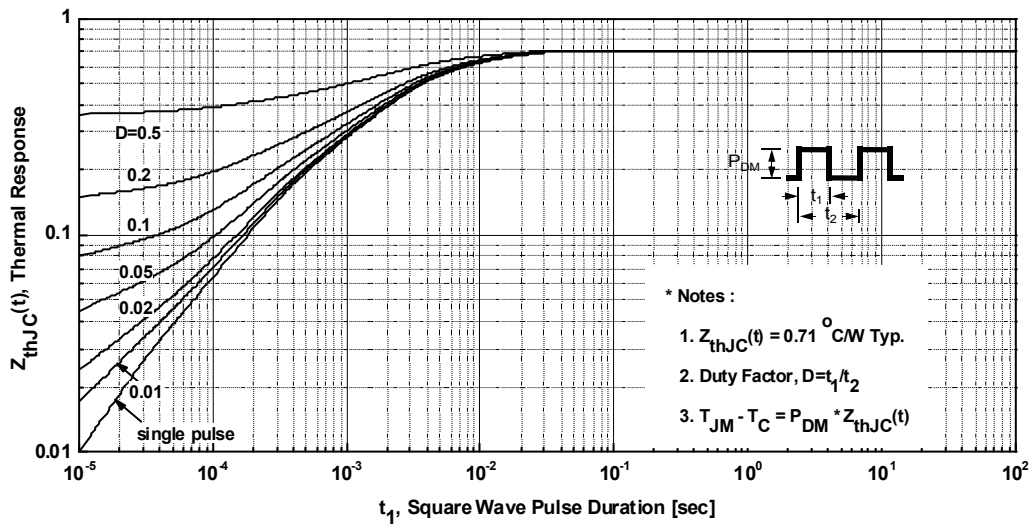
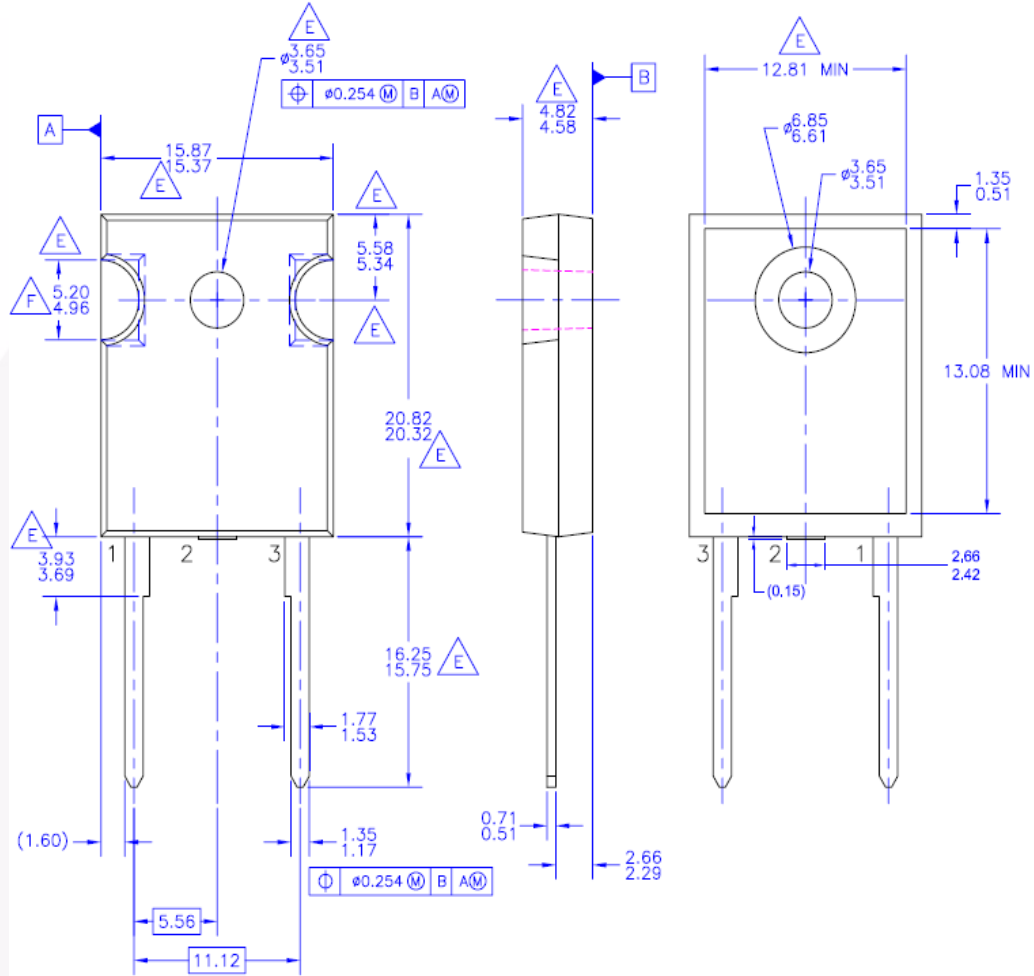


Figure 8. Transient Thermal Response Curve



Mechanical Dimensions

TO-247-2L



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  - B. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
  - C. ALL DIMENSIONS ARE IN MILLIMETERS.
  - D. DRAWING CONFORMS TO ASME Y14.5 - 1994
  - $\triangle E$ . DOES NOT COMPLY JEDEC STANDARD VALUE
  - $\triangle F$ . NOTCH MAY BE SQUARE
  - G. DRAWING FILENAME: MKT-TO247B02\_REV02

Dimensions in Millimeters



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