



# FFH60UP60S, FFH60UP60S3

## Features

- High Speed Switching,  $t_{rr} < 80\text{ns}$
- High Reverse Voltage and High Reliability
- Avalanche Energy Rated
- Low Forward Voltage,  $V_F < 1.7\text{V}$
- RoHS compliant

## Applications

- General Purpose
- Switching Mode Power Supply
- Free-wheeling diode for motor application
- Power switching circuits

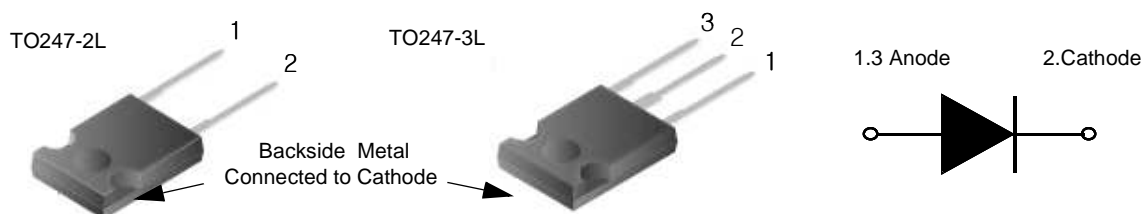
## 60A, 600V Ultrafast Rectifier

The FFH60UP60S and FFH60UP60S3 are ultrafast rectifiers with low forward voltage drop. It is a silicon nitride passivated ion-implanted epitaxial planar construction.

These devices are intended for use as freewheeling/clamping rectifiers in a variety of switching power supplies and other power switching applications. Its low stored charge minimize ringing and electrical noise in many power switching circuits reducing power loss in the switching transistors.



## Pin Assignments



## 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 @ $T_C = 119^\circ\text{C}$   | 60          | A                |
| $I_{FSM}$      | Non-repetitive Peak Surge Current<br>60Hz Single Half-Sine Wave | 600         | A                |
| $T_J, T_{STG}$ | Operating and Storage Temperature Range                         | -65 to +150 | $^\circ\text{C}$ |

## Thermal Characteristics

| Symbol          | Parameter                                    | Ratings | Units              |
|-----------------|--|---------|--------------------|
| $R_{\theta JC}$ | Maximum Thermal Resistance, Junction to Case | 0.4     | $^\circ\text{C/W}$ |

## Package Marking and Ordering Information

| Device Marking | Device      | Package  | Reel Size | Tape Width | Quantity |
|----------------|-------------|----------|-----------|------------|----------|
| FFH60UP60S     | FFH60UP60S  | TO247-2L | -         | -          | 30       |
| FFH60UP60S3    | FFH60UP60S3 | TO247-3L | -         | -          | 30       |

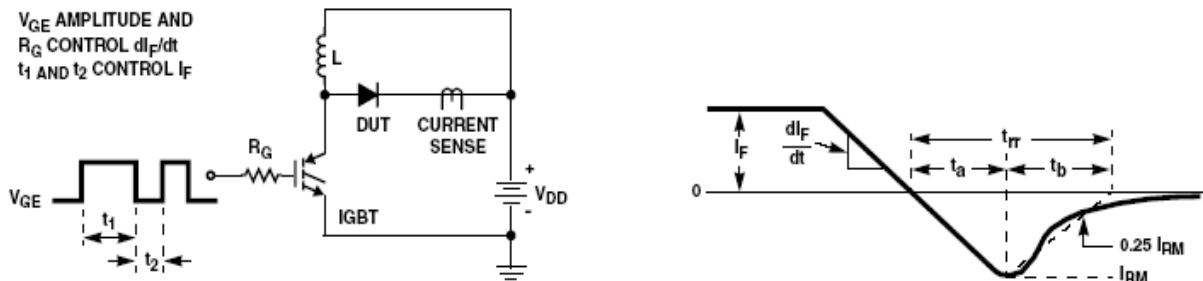
**Electrical Characteristics**  $T_C = 25^\circ\text{C}$  unless otherwise noted

| Symbol    | Parameter  | Min. | Typ.       | Max.       | Units         |
|-----------|--|------|------------|------------|---------------|
| $V_{FM1}$ | $I_F = 60\text{A}$<br>$T_C = 25^\circ\text{C}$<br>$T_C = 125^\circ\text{C}$  | -    | 1.4<br>1.3 | 1.7<br>-   | V             |
| $I_{RM1}$ | $V_R = 600\text{V}$<br>$T_C = 25^\circ\text{C}$<br>$T_C = 125^\circ\text{C}$   | -    | -          | 100<br>500 | $\mu\text{A}$ |
| $t_{rr}$  | $I_F = 60\text{A}$ , $di/dt = 200\text{A}/\mu\text{s}$ , $V_{CC} = 390\text{V}$<br>$T_C = 25^\circ\text{C}$<br>$T_C = 125^\circ\text{C}$ | -    | 60<br>138  | 80<br>-    | ns            |
| $W_{AVL}$ | Avalanche Energy ( $L = 40\text{mH}$ )   | 50   | -          | -          | mJ            |

**Notes:**

1: Pulse: Test Pulse width =  $300\mu\text{s}$ , Duty Cycle = 2%

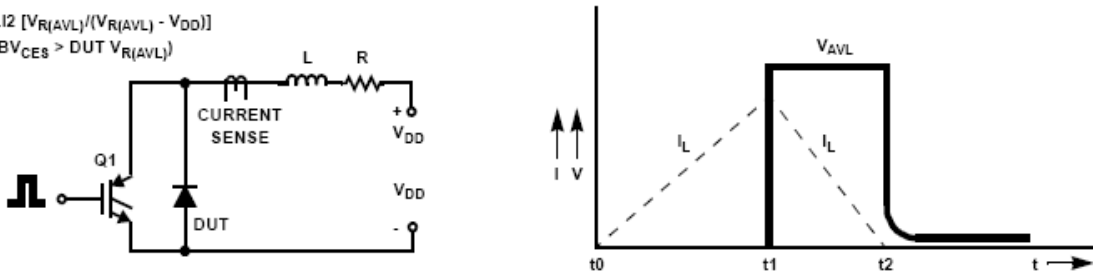
**Trr test circuit and waveform**



**Avalanch energy test circuit and waveform**

$L = 40\text{mH}$   
 $R < 0.1\Omega$   
 $V_{DD} = 50\text{V}$

$E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$   
 $Q1 = \text{IGBT } (BV_{CES} > \text{DUT } V_{R(AVL)})$



## Typical Performance Characteristics

Figure 1. Typical Forward Voltage Drop vs. Forward Current

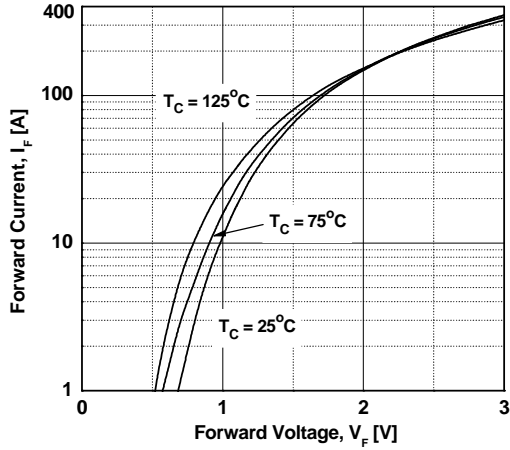


Figure 3. Typical Junction Capacitance

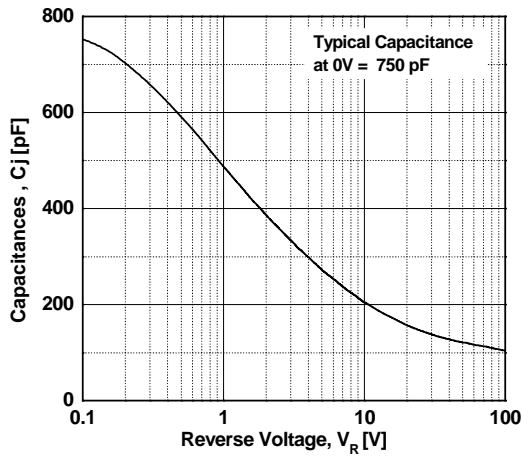


Figure 5. Typical Reverse Recovery Current vs. di/dt

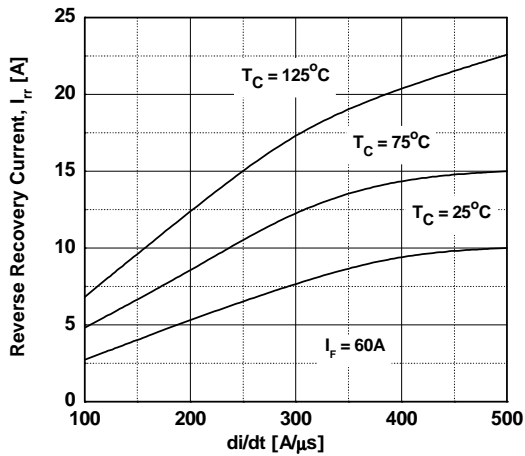


Figure 2. Typical Reverse Current vs. Reverse Voltage

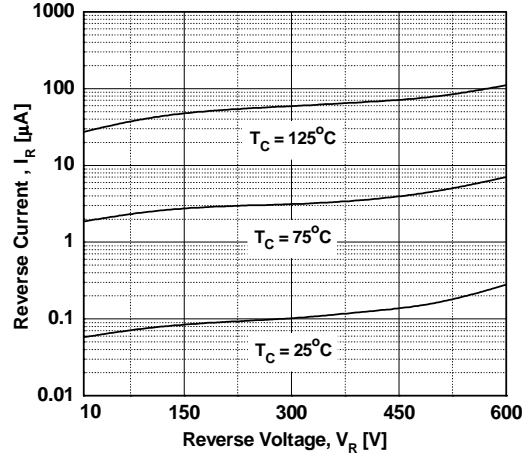


Figure 4. Typical Reverse Recovery Time vs. di/dt

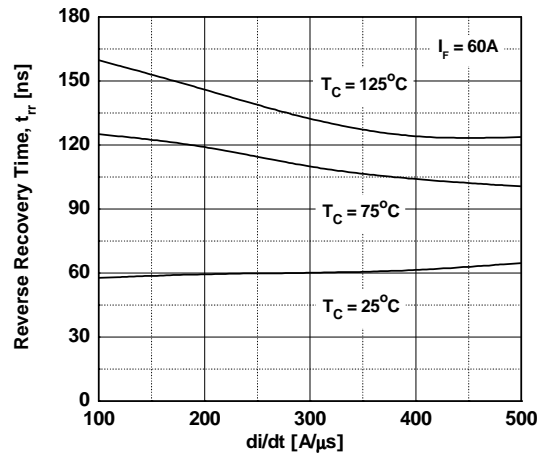
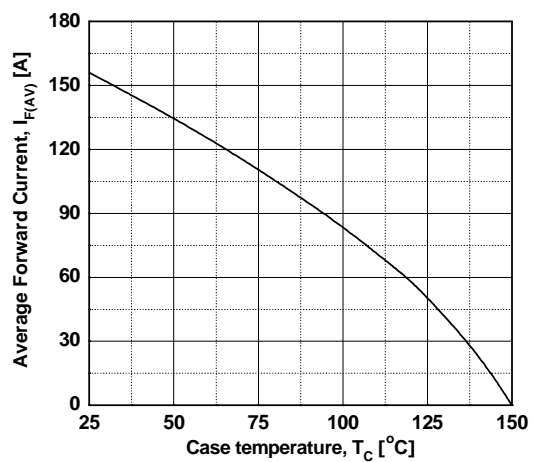
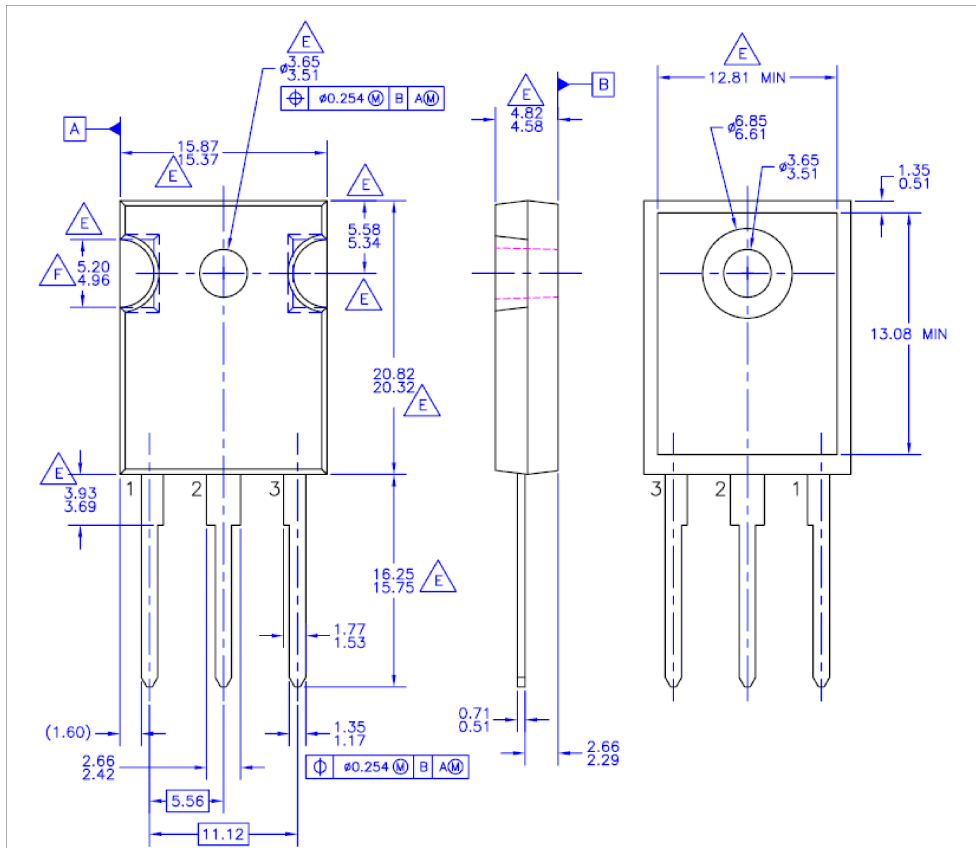


Figure 6. Forward Current Derating Curve










# TO247-3L





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