FAIRCHILD SEMICONDUCTOR®

November 2007

# FFP04H60S

## Features

- High Speed Switching, $t_{rr}$ < 45ns @ $I_F$ = 4A
- High Reverse Voltage and High Reliability
- Low Forward Voltage, $V_F$ < 2.1V @ 4A
- RoHS compliant

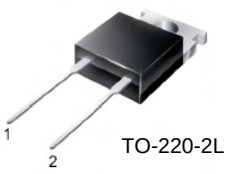
## Applications

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

## 4A, 600V Hyperfast 2 Rectifier

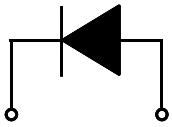
The FFP04H60S is a hyperfast 2 rectifier and silicon nitride passivated ion-implanted epitaxial planar construction.

This device is intended for use as freewheeling/clamping rectifiers in a variety of switching power supplies and other power swithching applications. Its low stored charge and hyperfast soft recovery minimize ringing and electrical noise in many power switching circuits reducing power loss in the switching transistors.




TO-220-2L

1. Cathode 2. Anode



1. Cathode 2. Anode

## Absolute Maximum Ratings $T_C$ = 25°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 @ $T_C$ = 135°C | 4 | A |
| $I_{FSM}$ | Non-repetitive Peak Surge Current 60Hz Single Half-Sine Wave | 40 | A |
| $T_J$, $T_{STG}$ | Operating Junction and Storage Temperature | -65 to +150 | °C |

*Drain current limited by maximum junction temperature

## Thermal Characteristics

| Symbol | Parameter | Ratings | Units |
|---|---|---|---|
| $R_{\theta JC}$ | Maximum Thermal Resistance, Junction to Case | 2.55 | °C/W |

## Package Marking and Ordering Information

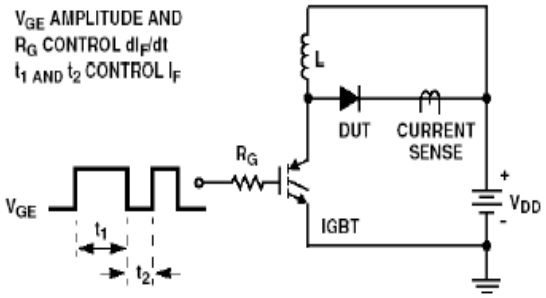
| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|---|---|---|---|---|---|
| F04H60S | FFP04H60STU | TO-220-2L | - | - | 50 |

## Electrical Characteristics $T_C = 25^oC$ unless otherwise noted

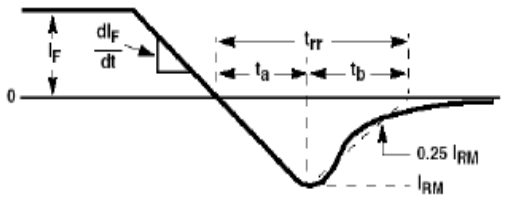
| Symbol | Parameter | | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $V_{FM}1$ | $I_F$ = 4A<br>$I_F$ = 4A | $T_C = 25^oC$<br>$T_C = 125^oC$ | -<br>- | -<br>- | 2.1<br>1.7 | V |
| $I_{RM}1$ | $V_R$ = 600V<br>$V_R$ = 600V | $T_C = 25^oC$<br>$T_C = 125^oC$ | -<br>- | -<br>- | 100<br>200 | μA |
| $t_{rr}$ | ($I_F$ = 1A, di/dt = 100A/μs, $V_R$ = 30V)<br>($I_F$ = 4A, di/dt = 100A/μs, $V_{CC}$ = 390V) | $T_C = 25^oC$ | - | 21<br>33 | 35<br>45 | ns |
| $I_{rr}$<br>$Q_{rr}$ | ($I_F$ = 4A, di/dt = 100A/μs, $V_R$ = 390V) | $T_C = 25^oC$ | -<br>- | 1.9<br>31 | -<br>- | A<br>nC |
| $W_{AVL}$ | Avalanche Energy ( L = 40mH) | | 4 | - | - | mJ |

**Notes:**
1: Pulse: Test Pulse width = 300μs, Duty Cycle = 2%

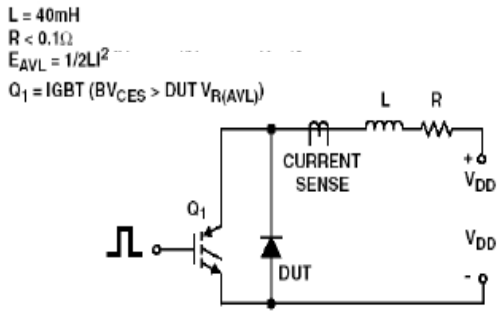
## Test Circuit and Waveforms



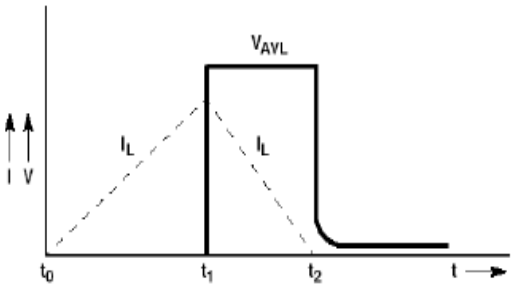

$t_{rr}$ TEST CIRCUIT




$t_{rr}$ WAVEFORMS AND DEFINITIONS




AVALANCHE ENERGY TEST CIRCUIT




AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

## Typical Performance Characteristics

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

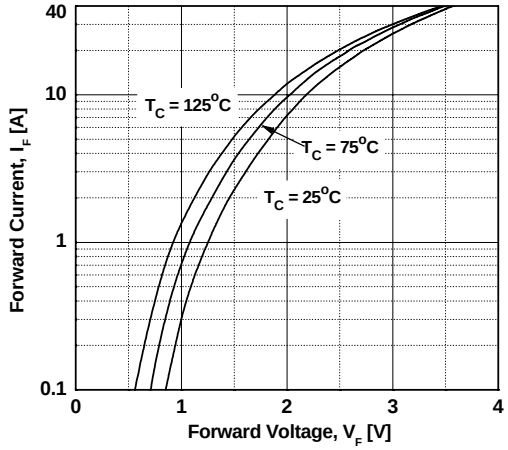



**Figure 2. Typical Reverse Current vs. Reverse Voltage**

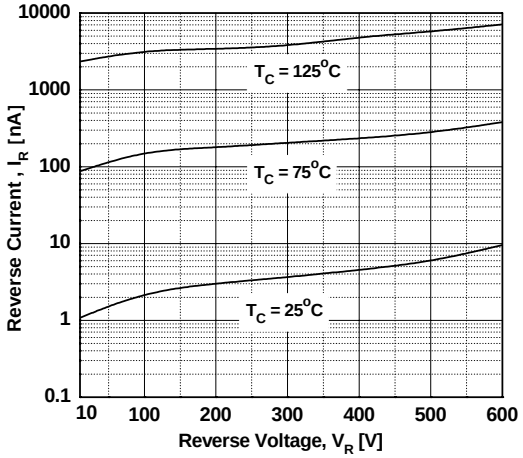



**Figure 3.Typical Junction Capacitance**

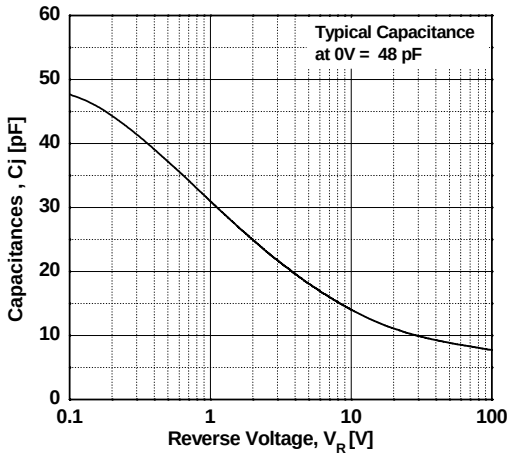



**Figure 4. Typical Reverse Recovery Time vs. di/dt**

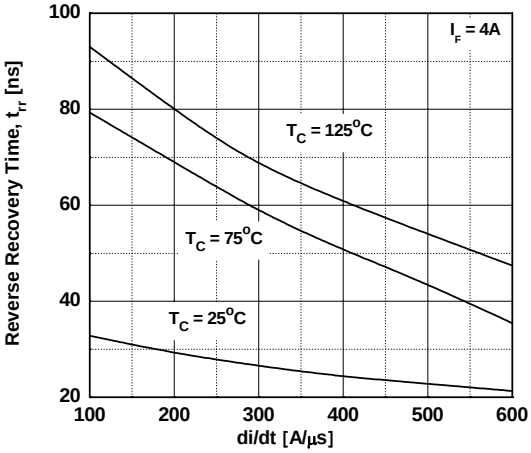



**Figure 5. Typical Reverse Recovery Current vs. di/dt**

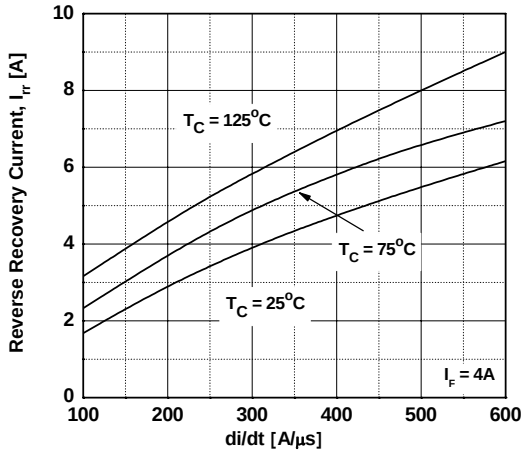
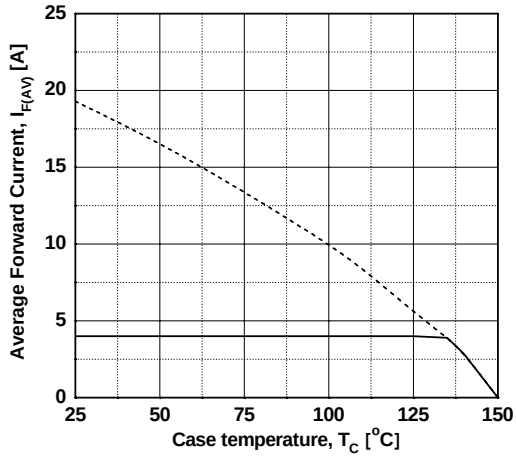
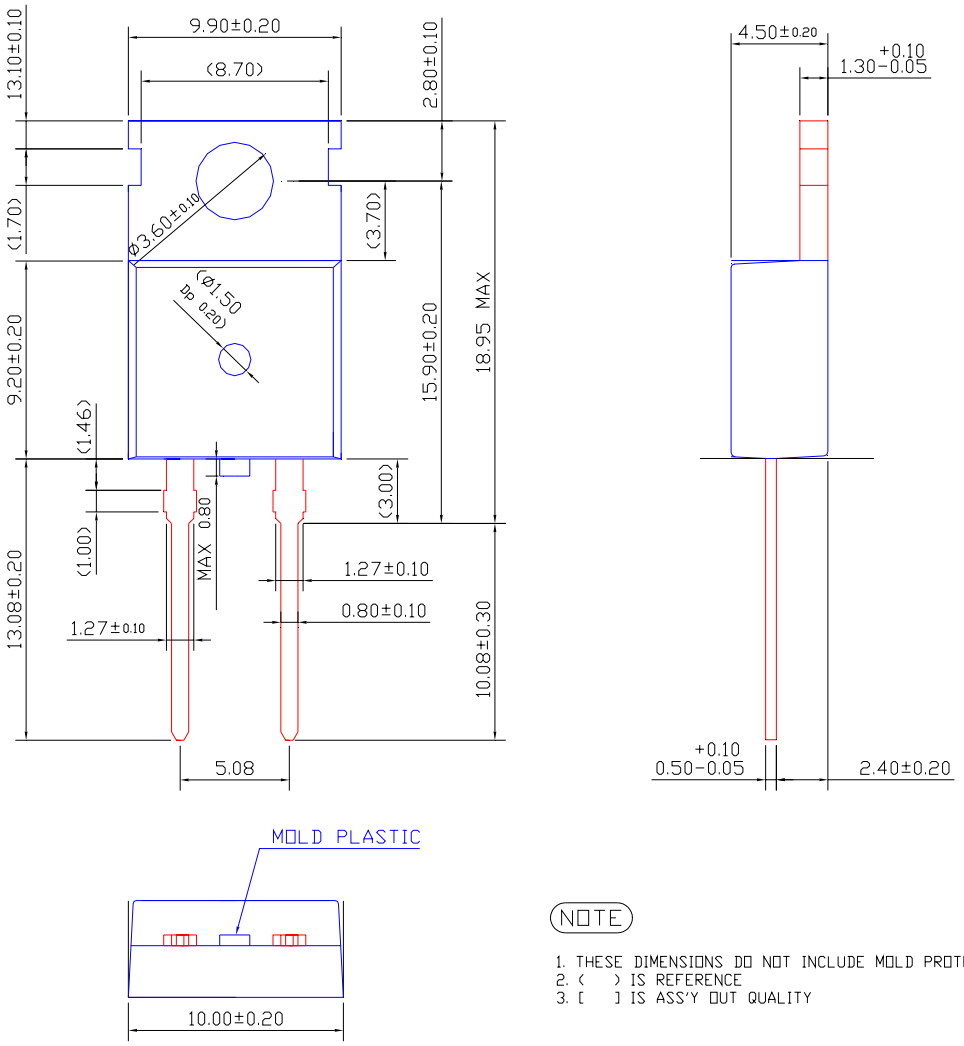



**Figure 6. Forward Current Derating Curve**



## Mechanical Dimensions

# TO-220-2L




NOTE

1. THESE DIMENSIONS DO NOT INCLUDE MOLD PROTRUSION.
2. ( ) IS REFERENCE
3. [ ] IS ASS'Y OUT QUALITY

Dimensions in Millimeters

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