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November 2014



FFD04H60S — Hyperfast II Diode

# FFD04H60S

## Hyperfast II Diode

### Features

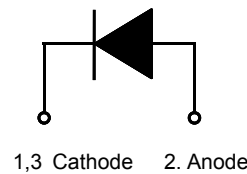
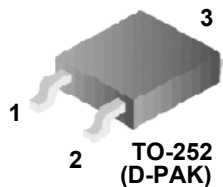
- Hyperfast Recovery,  $t_{rr} = 60 \text{ ns}$  (@  $I_F = 4 \text{ A}$ )
- Max Forward Voltage,  $V_F = 2.1 \text{ V}$  (@  $T_C = 25^\circ\text{C}$ )
- 600 V Reverse Voltage and High Reliability
- Avalanche Energy Rated
- RoHS Compliant

### Description

The FFD04H60S is a hyperfast II diode and silicon nitride passivated ion-implanted epitaxial planar construction. This device is intended for use as freewheeling/clamping diodes in a variety of switching power supplies and other power switching 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.

### Applications

- General Purpose
- SMPS, Power Switching Circuits
- Free-Wheeling Diode for Motor Application



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

Symbol	Parameter	Ratings	Unit
$V_{RRM}$	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 @ $T_C = 130^\circ\text{C}$	4	A
$I_{FSM}$	Non-repetitive Peak Surge Current 60Hz Single Half-Sine Wave	40	A
$T_J, T_{STG}$	Operating and Storage Temperature Range	-65 to +175	$^\circ\text{C}$

### Thermal Characteristics

Symbol	Parameter	Max.	Unit
$R_{\theta JC}$	Maximum Thermal Resistance, Junction to Case	4.0	$^\circ\text{C/W}$

### Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FFD04H60S	F04H60S	TO-252(D-PAK)	Reel	13" Dia	N/A	2500

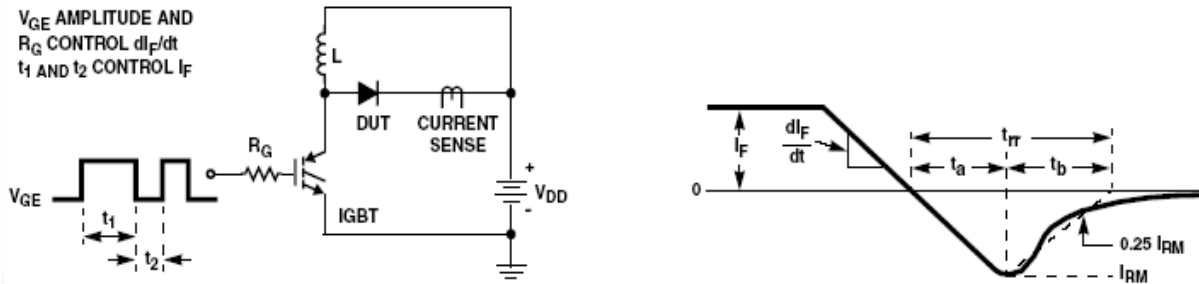
**Electrical Characteristics**  $T_C = 25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
$V_{F1}$	$I_F = 4\text{ A}$ $I_F = 4\text{ A}$	$T_C = 25^\circ\text{C}$ $T_C = 125^\circ\text{C}$	- -	2.1 1.7	V
$I_{R1}$	$V_R = 600\text{ V}$ $V_R = 600\text{ V}$	$T_C = 25^\circ\text{C}$ $T_C = 125^\circ\text{C}$	- -	100 200	$\mu\text{A}$
$t_{rr}$	$I_F = 1\text{ A}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$ $I_F = 4\text{ A}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$ , $V_R = 390\text{ V}$	$T_C = 25^\circ\text{C}$ $T_C = 25^\circ\text{C}$	- -	19 25 60	ns
$I_{rr}$ $Q_{rr}$	$I_F = 4\text{ A}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$ , $V_R = 390\text{ V}$	$T_C = 25^\circ\text{C}$	- -	1.5 18	A nC
$W_{AVL}$	Avalanche Energy ( $L = 40\text{ mH}$ )	4	-	-	mJ

**Notes:**

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

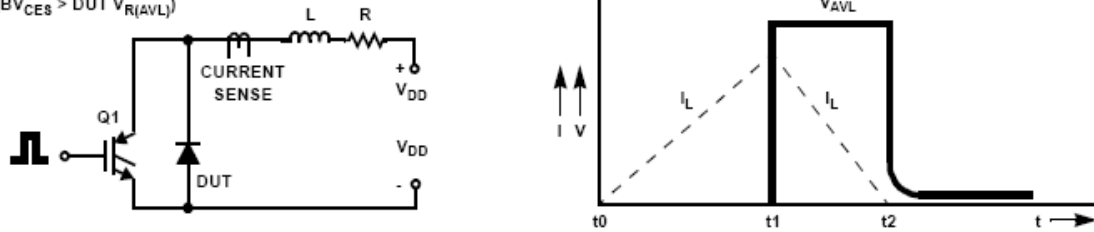
**Test Circuit and Waveforms**



**Figure 1. Diode Reverse Recovery Test Circuit & Waveform**

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

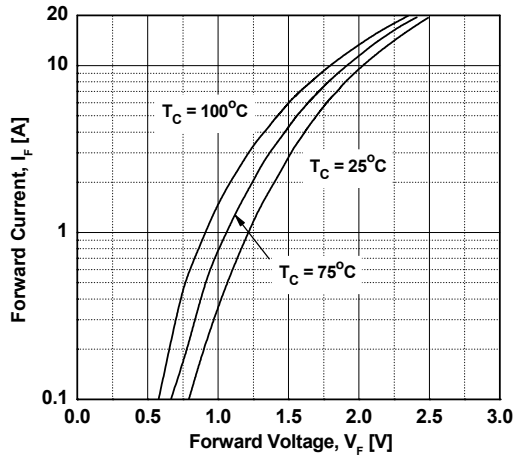
$E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$   
 $Q1 = \text{IGBT } (BV_{CES} > \text{DUT } V_{R(AVL)})$



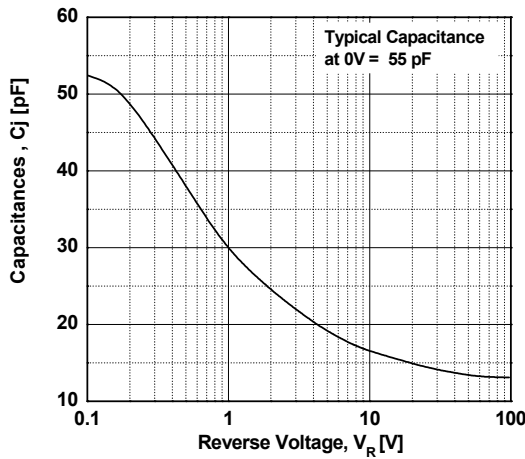
**Figure 2. Unclamped Inductive Switching Test Circuit & Waveform**

## Typical Performance Characteristics

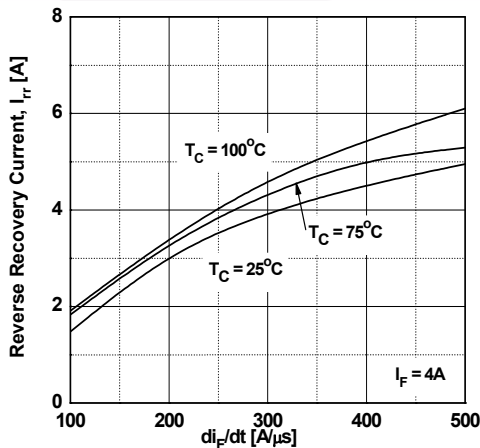
**Figure 3. Typical Forward Voltage Drop vs. Forward Current**



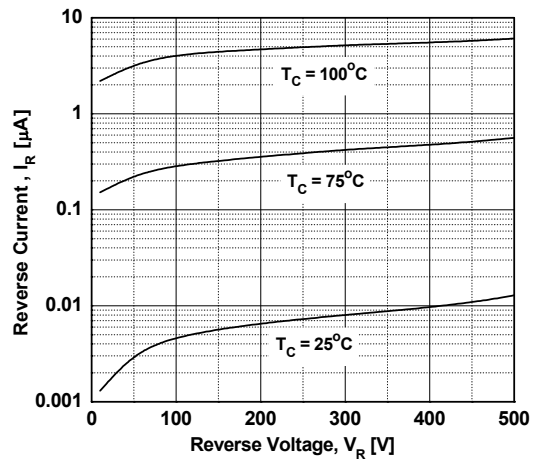
**Figure 5. Typical Junction Capacitance**



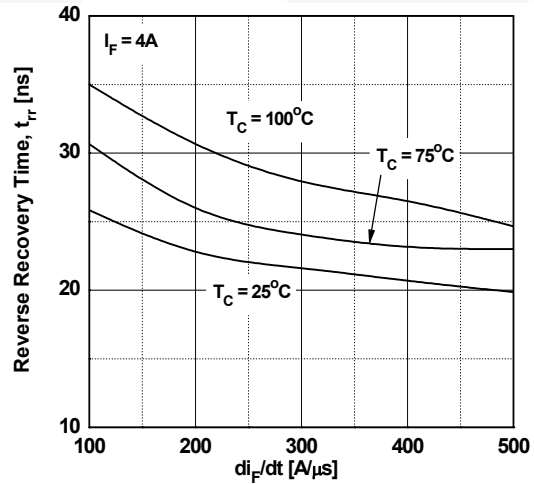
**Figure 7. Typical Reverse Recovery Current vs. di/dt**



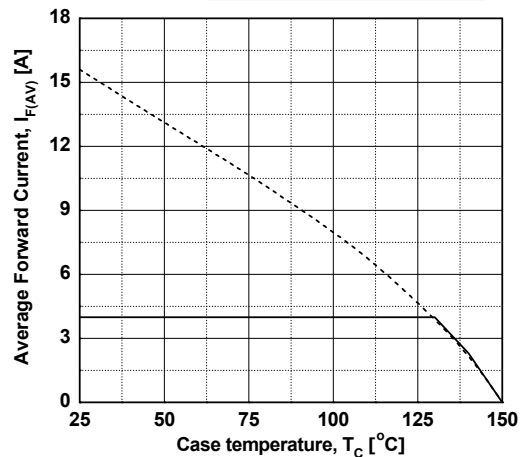
**Figure 4. Typical Reverse Current vs. Reverse Voltage**



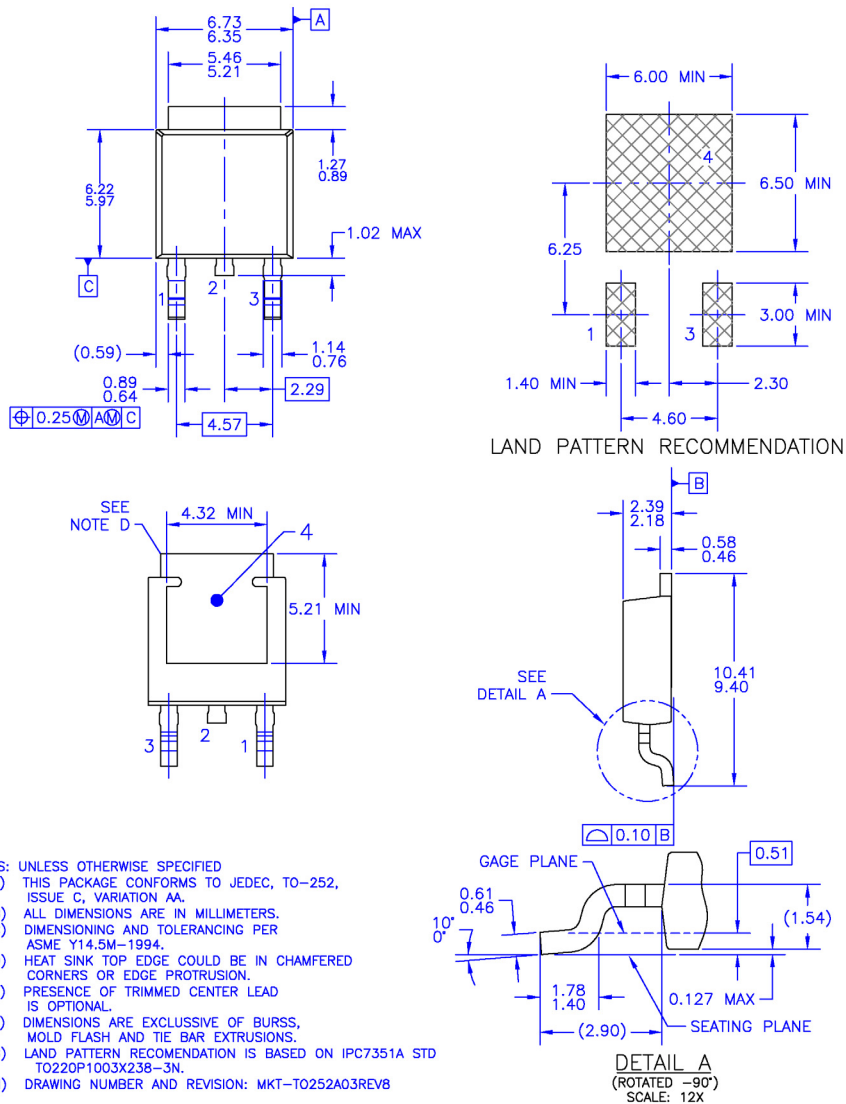
**Figure 6. Typical Reverse Recovery Time vs. di/dt**



**Figure 8. Forward Current Derating Curve**



### Mechanical Dimensions



**Figure 9. TO-252 3L (DPAK) - TO252 (D-PAK), MOLDED, 3 LEAD, OPTION AA&AB**

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