

# FFPF10UP60S

## 10 A, 600 V Ultrafast Diode

### Description

The FFPF10UP60S is an ultrafast diode with low forward voltage drop and rugged UIS capability. This device is intended for use as freewheeling and clamping diodes in a variety of switching power supplies and other power switching applications. It is specially suited for use in switching power supplies and industrial applications as welder and UPS application.

### Features

- Ultrafast Recovery,  $t_{RR} = 40 \text{ ns}$  (@  $I_F = 1 \text{ A}$ )
- Max Forward Voltage,  $V_F = 2.2 \text{ V}$  (@  $T_C = 25^\circ\text{C}$ )
- 600 V Reverse Voltage and High Reliability
- Avalanche Energy Rated
- This Device is Pb-Free and is RoHS Compliant

### Applications

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

### ABSOLUTE MAXIMUM RATINGS

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

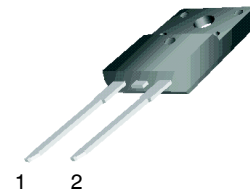
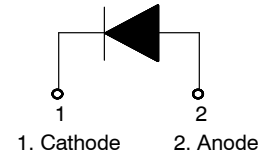
Symbol	Parameter	Rating	Unit
$V_{RRM}$	Peak Repetitive Reverse Voltage	600	V
$V_{RWM}$	Working Peak Reverse Voltage	600	V
$I_{F(AV)}$	Average Rectified Forward Current @ $T_C = 60^\circ\text{C}$	10	A
$I_{FSM}$	Non-repetitive Peak Surge Current 60Hz Single Half-Sine Wave	50	A
$T_J, T_{STG}$	Operating Junction and Storage Temperature	- 65 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.



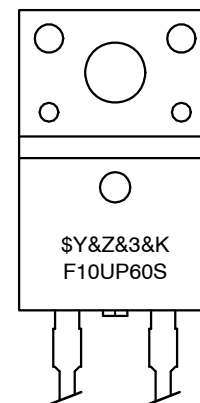
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TO-220, 2-Lead  
CASE 221AS

### MARKING DIAGRAM



\$Y = ON Semiconductor Logo  
&Z&3 = Data Code (Year & Week)  
&K = Lot  
F10UP60S = Specific Device Code

### ORDERING INFORMATION

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

# FFPF10UP60S

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

Symbol	Parameter	Max.	Unit
$R_{\theta JC}$	Maximum Thermal Resistance, Junction to Case	4.5	$^\circ\text{C}/\text{W}$

## PACKAGE MARKING AND ORDERING INFORMATION

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FFPF10UP60STU	F10UP60S	TO-220F-2L	Tube	N/A	N/A	30

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

Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_F$ (Note 1)	Maximum Instantaneous Forward Voltage $I_F = 10\text{ A}$ $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	-	-	2.2 2.0	V
$I_R$ (Note 1)	Maximum Instantaneous Reverse Current @ rated $V_R$ $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	-	-	100 500	$\mu\text{A}$
$t_{RR}$	$I_F = 1\text{ A}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$ $T_C = 25^\circ\text{C}$	-	-	25	ns
$t_{RR}$ $I_{RR}$ $Q_{RR}$	Reverse Recovery Time Reverse Recovery Current Reverse Recovery Charge ( $I_F = 8\text{ A}$ , $di_F/dt = 200\text{ A}/\mu\text{s}$ , $V_R = 390\text{ V}$ )	-	34 1.0 17	40 1.5 30	ns A nC
$t_{RR}$	Maximum Reverse Recovery Time ( $I_F = 10\text{ A}$ , $di_F/dt = 200\text{ A}/\mu\text{s}$ , $V_R = 390\text{ V}$ )	-	58	-	ns
$W_{AVL}$	Avalanche Energy ( $L = 40\text{ mH}$ )	20	-	-	mJ

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.

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

## Test Circuit and Waveforms

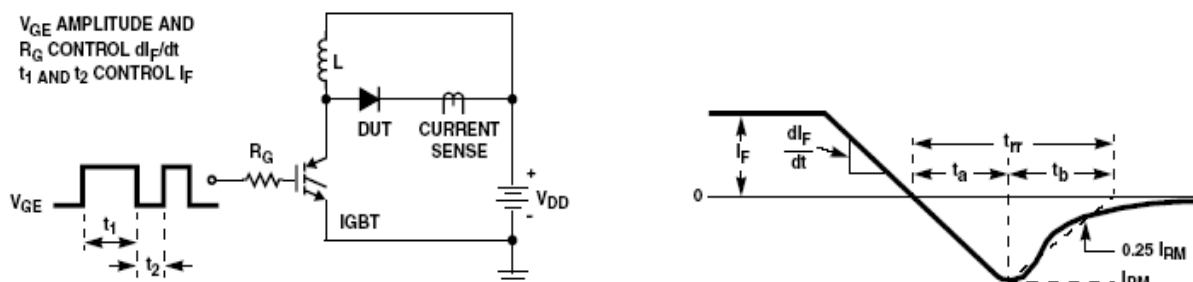


Figure 1. Diode Reverse Recovery Test Circuit & Waveform

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

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

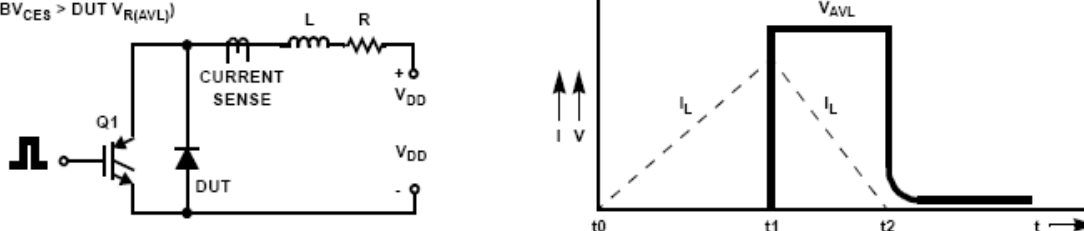


Figure 2. Unclamped Inductive Switching Test Circuit & Waveform

# FFPF10UP60S

## TYPICAL PERFORMANCE CHARACTERISTICS

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

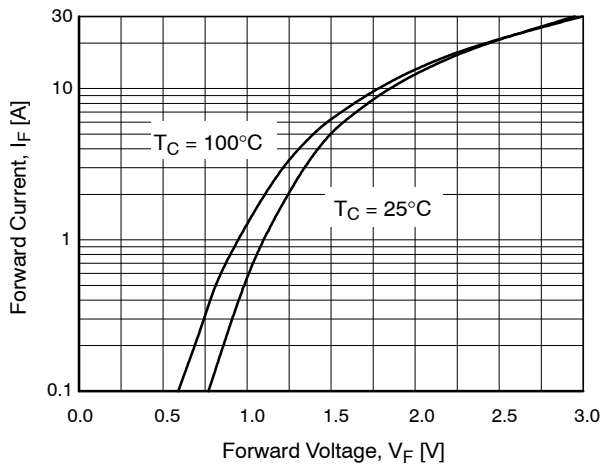


Figure 3. Typical Forward Voltage Drop

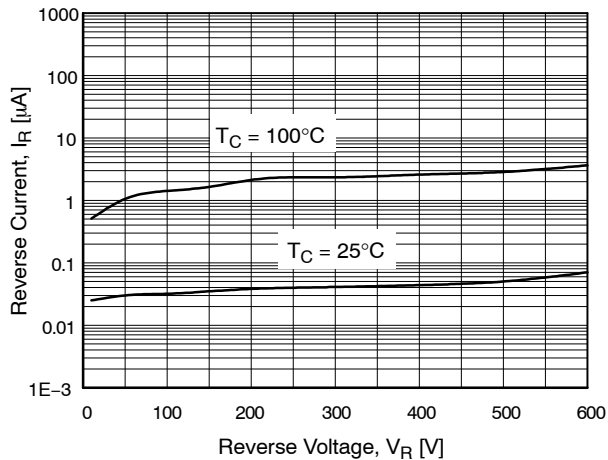


Figure 4. Typical Reverse Current

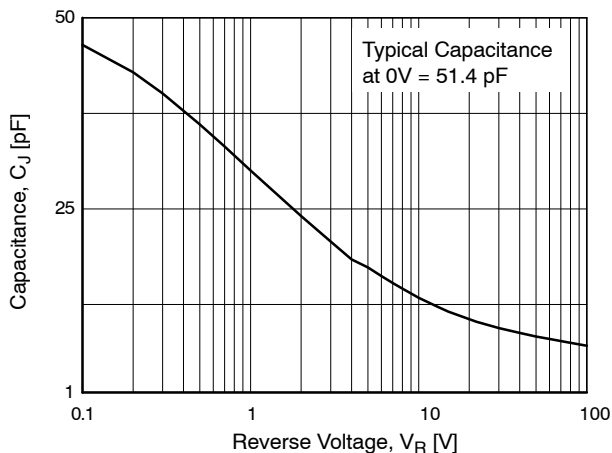


Figure 5. Typical Junction Capacitance

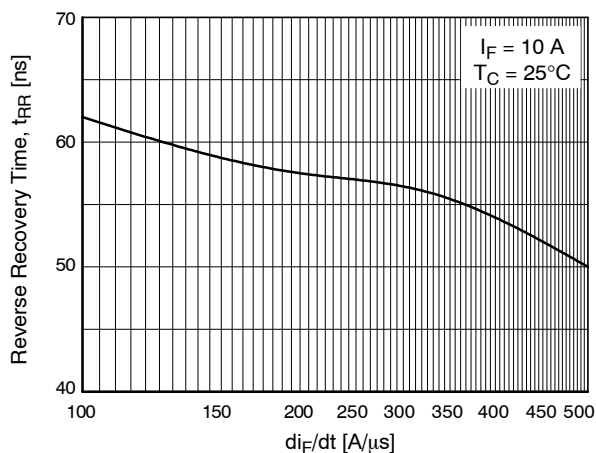


Figure 6. Typical Reverse Recovery Time

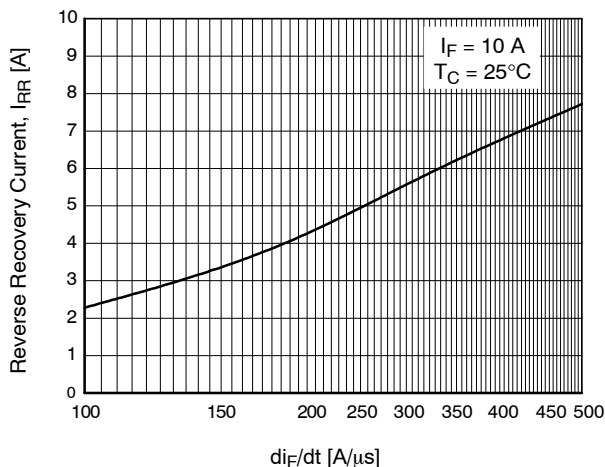


Figure 7. Typical Reverse Recovery Current

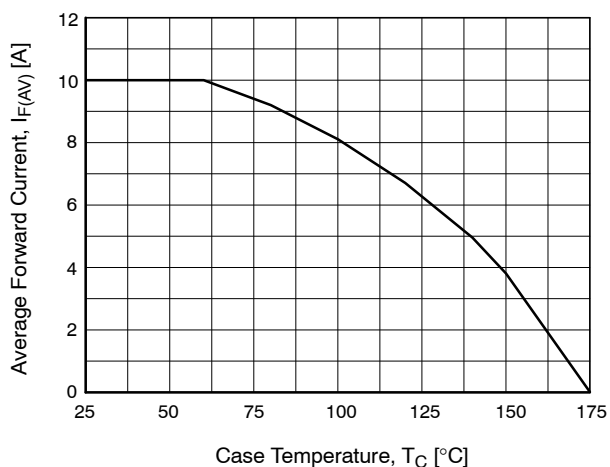


Figure 8. Forward Current Derating Curve

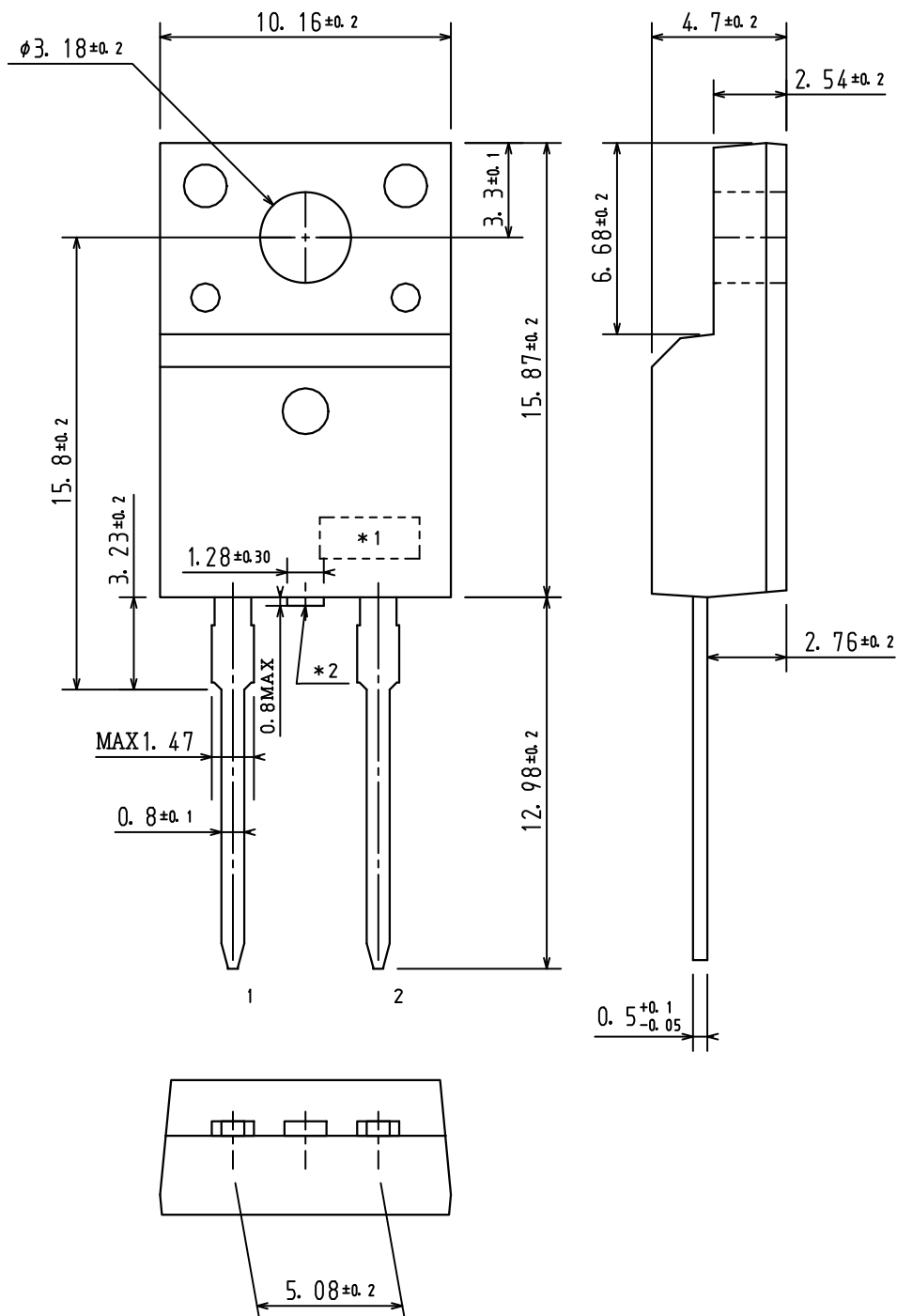
**MECHANICAL CASE OUTLINE**  
**PACKAGE DIMENSIONS**

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**TO-220 Fullpack, 2-Lead / TO-220F-2FS**  
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