

# 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

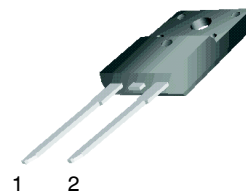
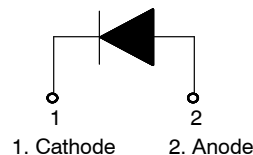
| Symbol         | Parameter                                                       | Rating          | Unit             |
|----------------|-----------------------------------------------------------------|-----------------|------------------|
| $V_{RRM}$      | Peak Repetitive Reverse Voltage      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



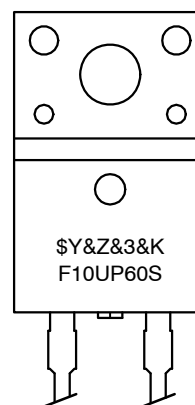
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TO-220, 2-Lead  
CASE 221AS

### 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          |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------|-----------------|---------------|
| $V_F$<br>(Note 1)                | Maximum Instantaneous Forward Voltage<br>$I_F = 10\text{ A}$<br>$I_F = 10\text{ A}$<br>$T_C = 25^\circ\text{C}$<br>$T_C = 100^\circ\text{C}$                         | –<br>–      | –<br>–          | 2.2<br>2.0      | V             |
| $I_R$<br>(Note 1)                | Maximum Instantaneous Reverse Current<br>@ rated $V_R$<br>$T_C = 25^\circ\text{C}$<br>$T_C = 100^\circ\text{C}$                                                      | –<br>–      | –<br>–          | 100<br>500      | $\mu\text{A}$ |
| $t_{RR}$                         | $I_F = 1\text{ A}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$<br>$T_C = 25^\circ\text{C}$                                                          | –           | –               | 25              | ns            |
| $t_{RR}$<br>$I_{RR}$<br>$Q_{RR}$ | Reverse Recovery Time<br>Reverse Recovery Current<br>Reverse Recovery Charge<br>( $I_F = 8\text{ A}$ , $di_F/dt = 200\text{ A}/\mu\text{s}$ , $V_R = 390\text{ V}$ ) | –<br>–<br>– | 34<br>1.0<br>17 | 40<br>1.5<br>30 | ns<br>A<br>nC |
| $t_{RR}$                         | Maximum Reverse Recovery Time<br>( $I_F = 10\text{ A}$ , $di_F/dt = 200\text{ A}/\mu\text{s}$ , $V_R = 390\text{ V}$ )                                               | –           | 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

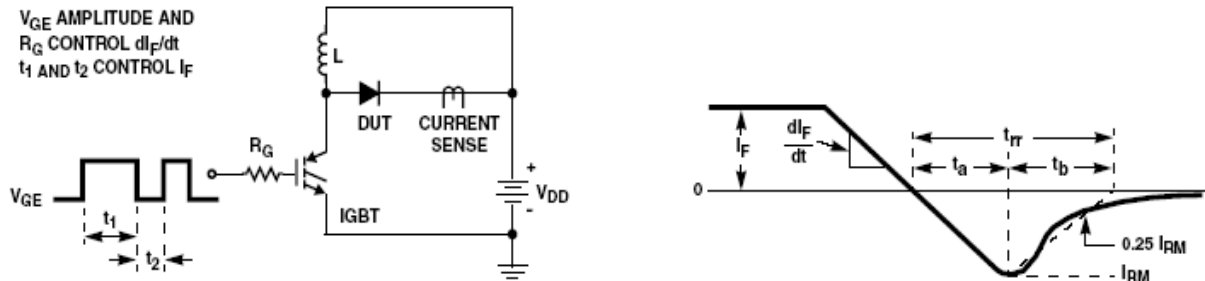


Figure 1. Diode Reverse Recovery Test Circuit & Waveform

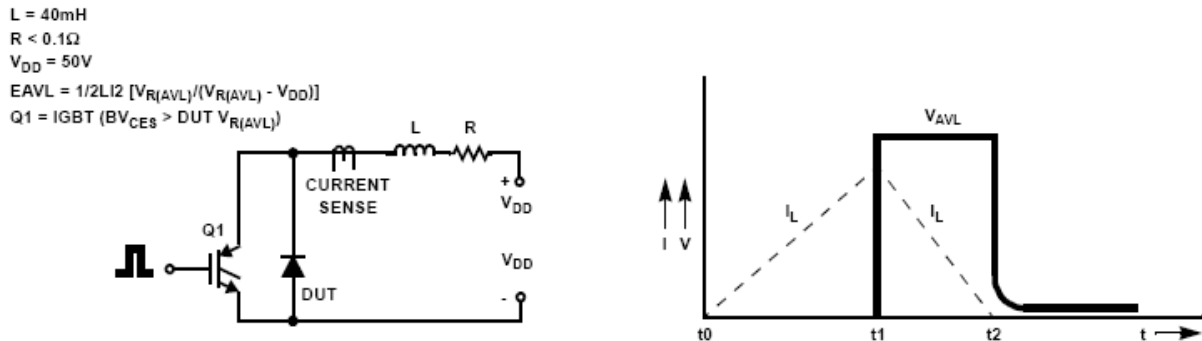


Figure 2. Unclamped Inductive Switching Test Circuit & Waveform

# FFPF10UP60S

## TYPICAL PERFORMANCE CHARACTERISTICS

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

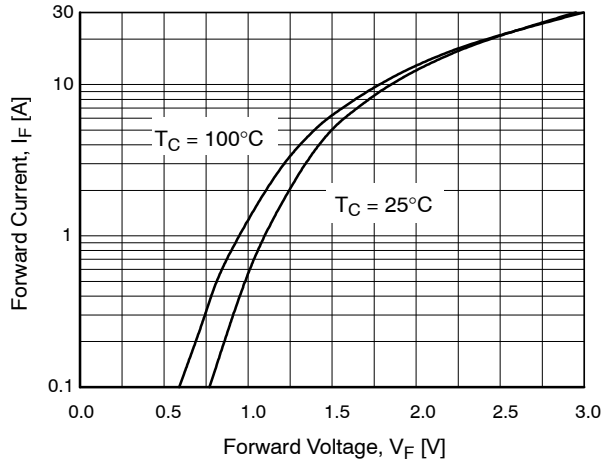


Figure 3. Typical Forward Voltage Drop

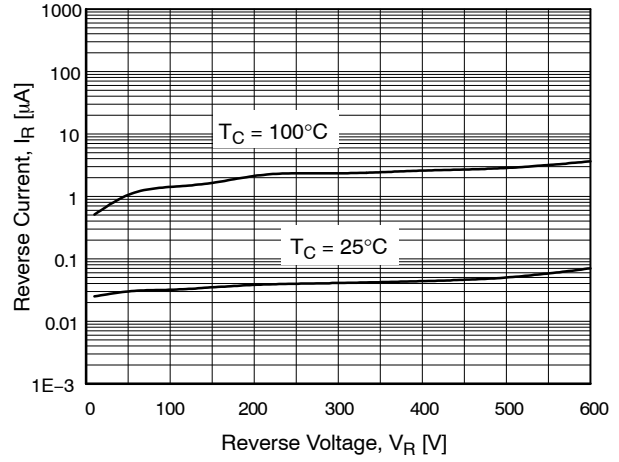


Figure 4. Typical Reverse Current

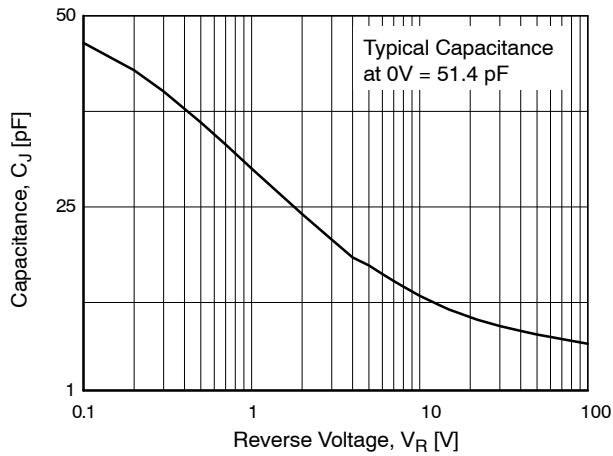


Figure 5. Typical Junction Capacitance

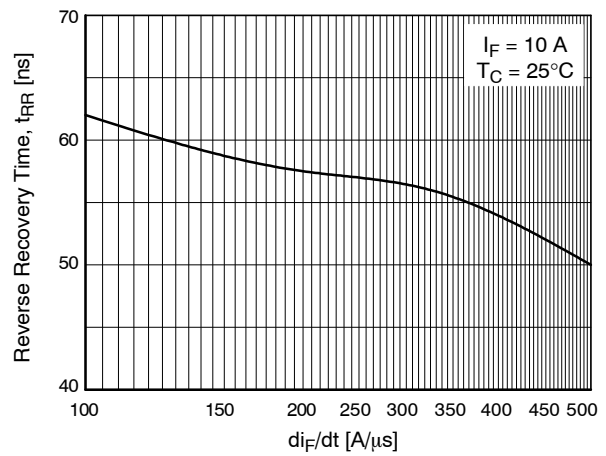


Figure 6. Typical Reverse Recovery Time

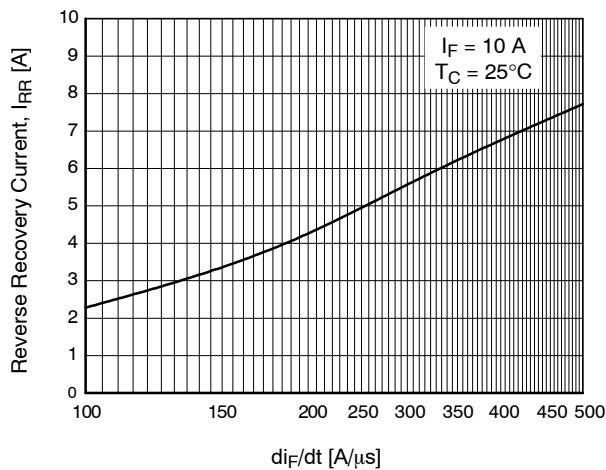


Figure 7. Typical Reverse Recovery Current

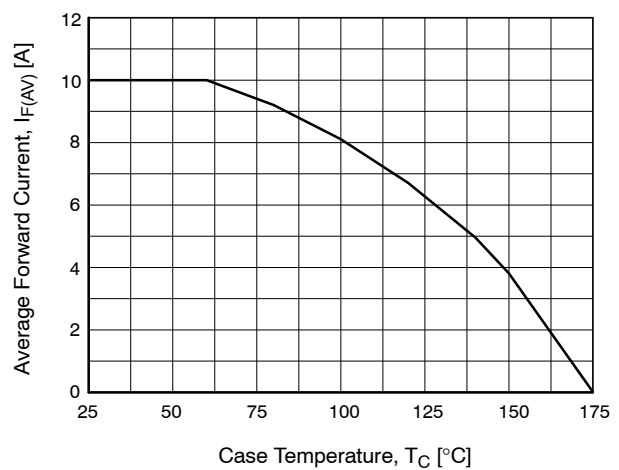
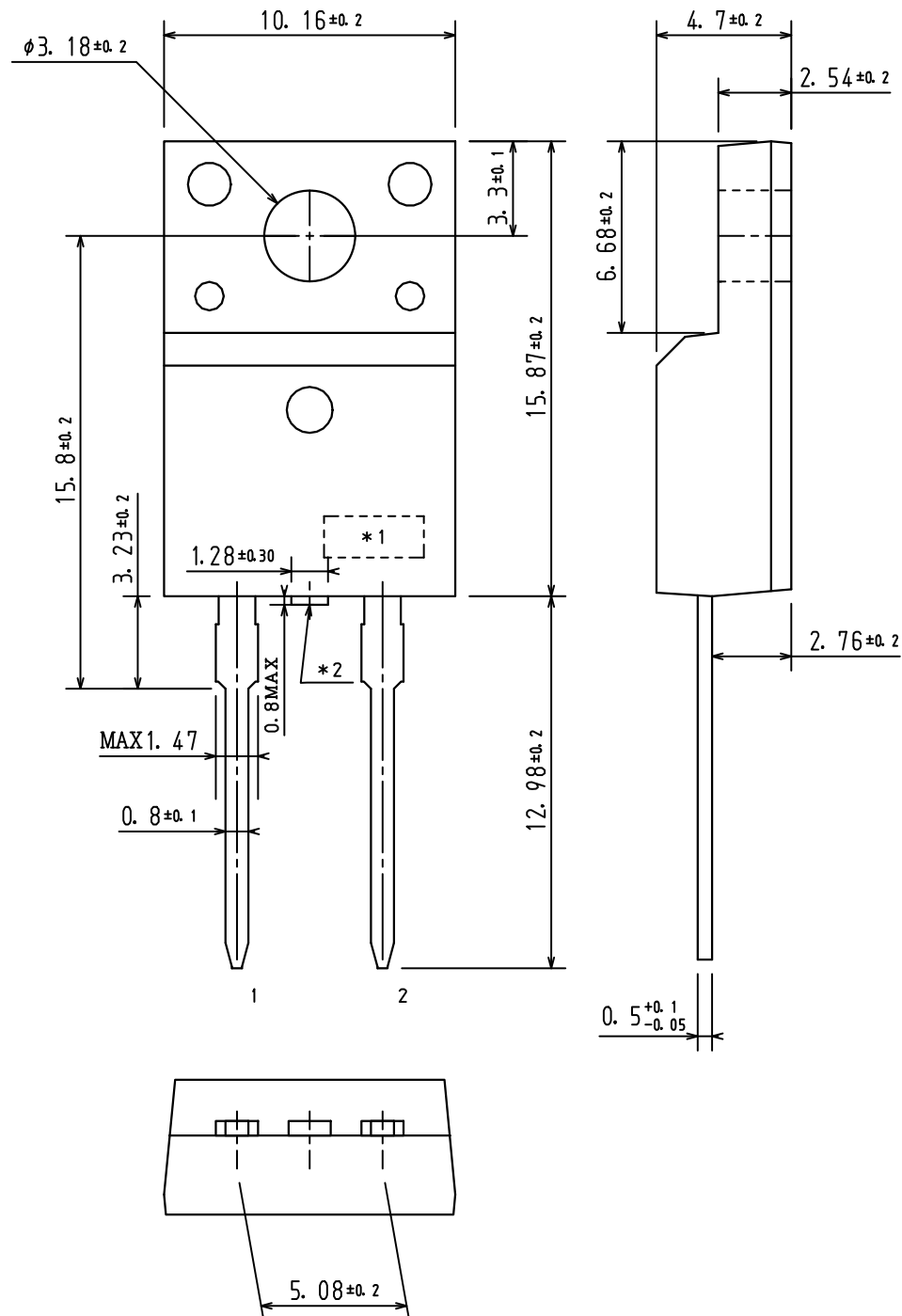


Figure 8. Forward Current Derating Curve

**TO-220 Fullpack, 2-Lead / TO-220F-2FS**  
CASE 221AS  
ISSUE O

DATE 29 FEB 2012



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| <b>DESCRIPTION:</b>     | <b>TO-220 FULLPACK, 2-LEAD / TO-220F-2FS</b> | <b>PAGE 1 OF 1</b>                                                                                                                                                                  |

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