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November 2014

FFPF10UP60S — Ultrafast Diode

FFPF10UP60S

10 A, 600 V Ultrafast Diode

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
- RoHS Compliant

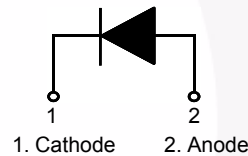
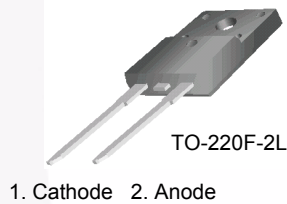
Applications

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

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.

Pin Assignments



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 | $^\circ\text{C}$ |

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 | FFPF10UP60S | TO-220F-2L | Tube | N/A | N/A | 30 |

Electrical Characteristics T_C = 25°C unless otherwise noted

| Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|--|---|-------------|-----------------|---------------|
| V _F ¹ | Maximum Instantaneous Forward Voltage I _F = 10 A I _F = 10 A | T _C = 25 °C T _C = 100 °C | - - | 2.2 2.0 | V |
| I _R ¹ | Maximum Instantaneous Reverse Current @ rated V _R | T _C = 25 °C T _C = 100 °C | - - | 100 500 | μA |
| t _{rr} | I _F = 1 A, di _F /dt = 100 A/μs, V _R = 30 V | T _C = 25 °C | - | 25 | ns |
| t _{rr} I _{rr} Q _{rr} | Reverse Recovery Time Reverse Recovery Current Reverse Recovery Charge (I _F = 8 A, di _F /dt = 200 A/μs, V _R = 390 V) | | - - - | 34 1.0 17 | ns A nC |
| t _{rr} | Maximum Reverse Recovery Time (I _F = 10 A, di _F /dt = 200 A/μs, V _R = 390 V) | | - | 58 | ns |
| W _{AVL} | Avalanche Energy (L = 40 mH) | | 20 | - | mJ |

Notes:

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

Test Circuit and Waveforms

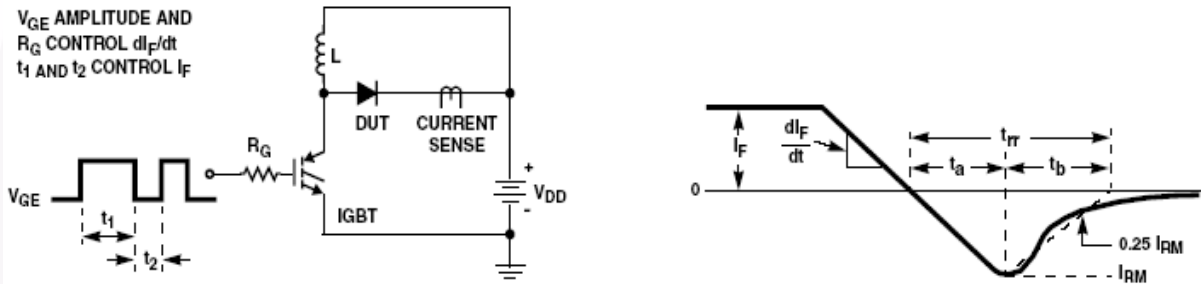


Figure 1. Diode Reverse Recovery Test Circuit & Waveform

L = 40mH
R < 0.1Ω
V_{DD} = 50V

EAVL = 1/2LI₂ [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]
Q1 = IGBT (BV_{CES} > DUT V_{R(AVL)})

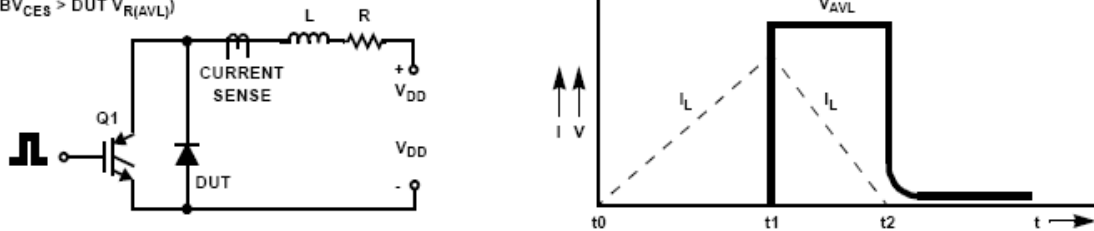


Figure 2. Unclamped Inductive Switching Test Circuit & Waveform

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

Figure 3. Typical Forward Voltage Drop

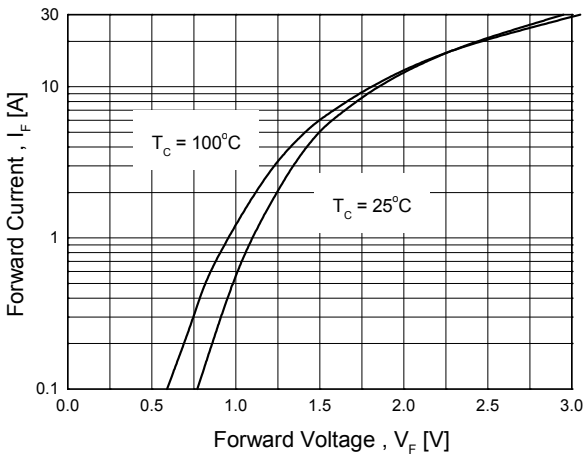


Figure 4. Typical Reverse Current

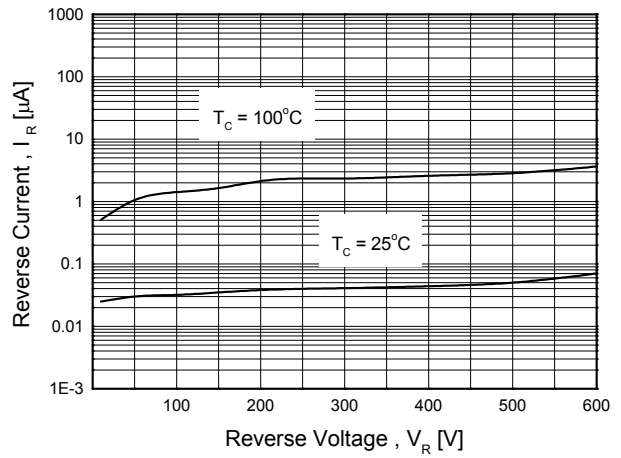


Figure 5. Typical Junction Capacitance

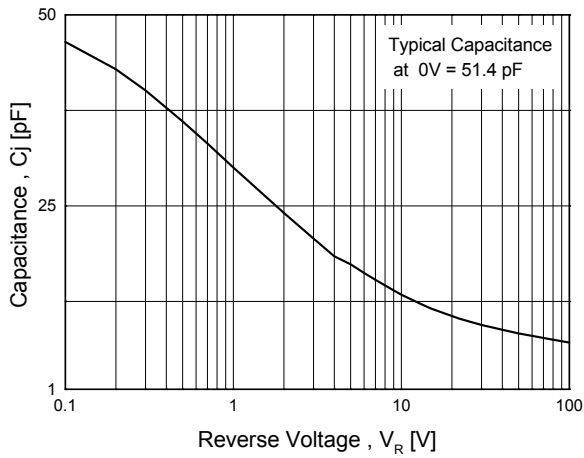


Figure 6. Typical Reverse Recovery Time

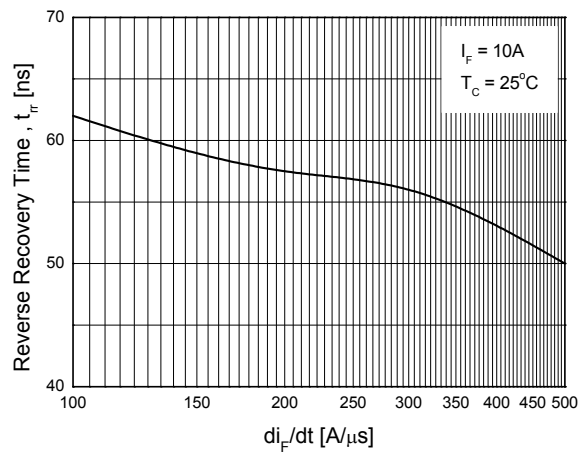


Figure 7. Typical Reverse Recovery Current

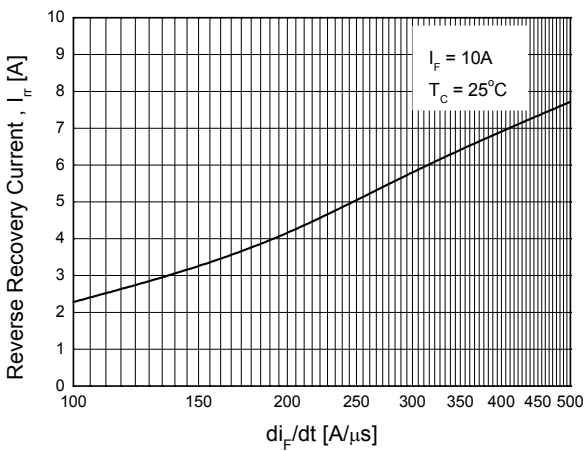
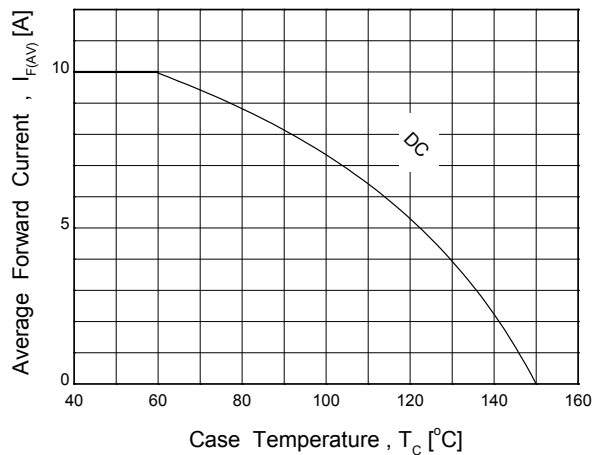
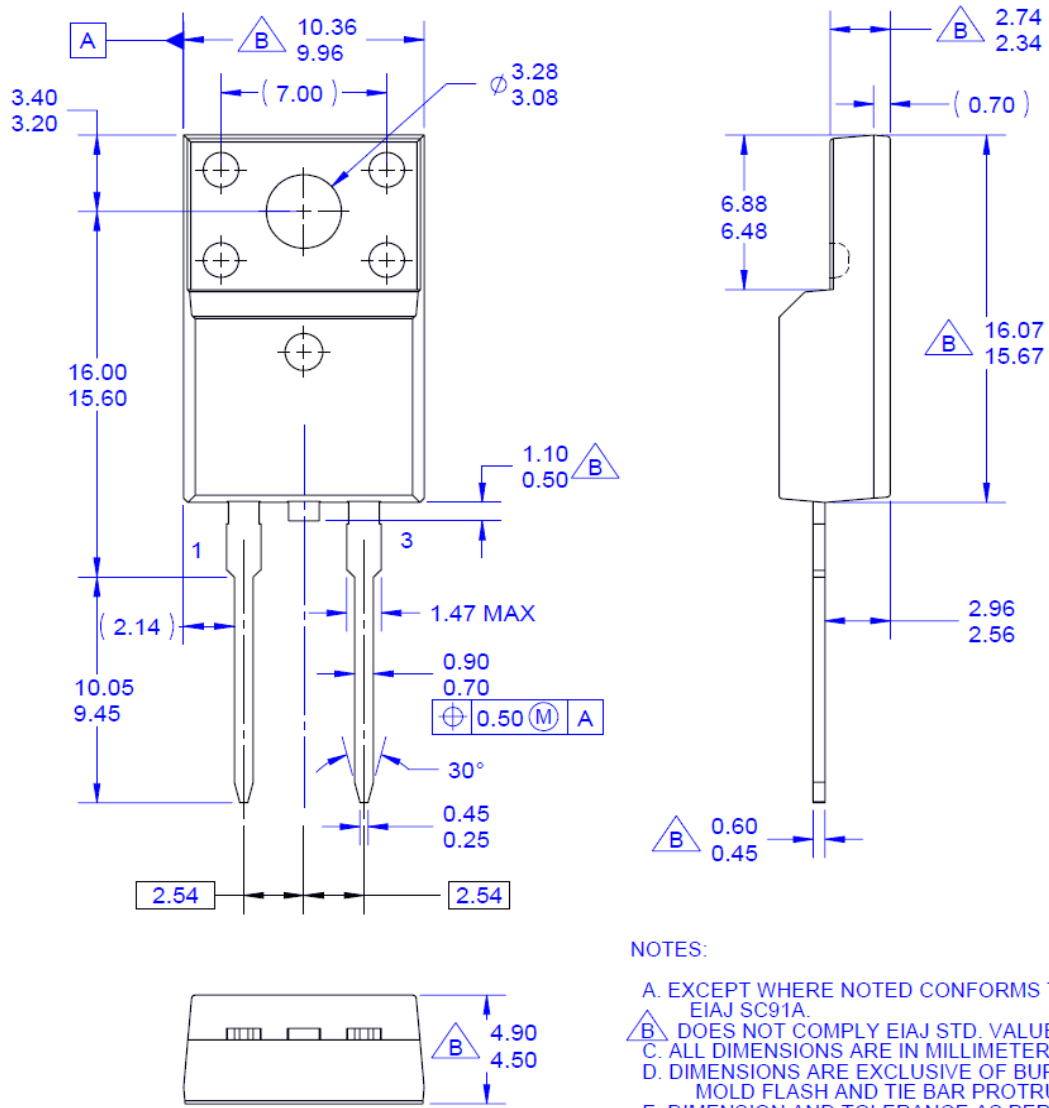


Figure 8. Forward Current Deration Curve



Mechanical Dimensions



NOTES:

- A. EXCEPT WHERE NOTED CONFORMS TO EIAJ SC91A.
- B. DOES NOT COMPLY EIAJ STD. VALUE.
- C. ALL DIMENSIONS ARE IN MILLIMETERS.
- D. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS.
- E. DIMENSION AND TOLERANCE AS PER ASME Y14.5-1994.
- F. DRAWING FILE NAME: TO220C02REV2

Figure 9. TO-220F 2L - 2LD; TO220; MOLDED; FULL PACK

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