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June 2016

# FFD10UP20S 10 A, 200 V, Ultrafast Diode

FFD10UP20S — Ultrafast Diode

## Features

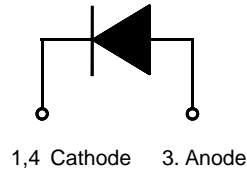
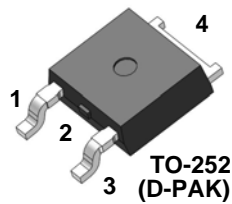
- Ultrafast Recovery,  $T_{rr} = 20.8 \text{ ns}$  (@  $I_F = 10 \text{ A}$ )
- Max Forward Voltage,  $V_F = 1.15 \text{ V}$  (@  $T_C = 25^\circ\text{C}$ )
- Reverse Voltage :  $V_{RRM} = 200 \text{ V}$
- Avalanche Energy Rated
- RoHS Compliant

## Description

The FFD10UP20S 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.

## Applications

- SMPS, Power Switching Circuits
- Output Rectifiers
- Freewheeling Diodes



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

Symbol	Parameter	Rating	Unit
$V_{RRM}$	Peak Repetitive Reverse Voltage	200	V
$V_{RWM}$	Working Peak Reverse Voltage	200	V
$I_{F(AV)}$	Average Rectified Forward Current @ $T_C = 115^\circ\text{C}$	10	A
$I_{FSM}$	Non-repetitive Peak Surge Current 60Hz Single Half-Sine Wave	100	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	3.0	$^\circ\text{C/W}$

## Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FFD10UP20S	F10UP20S	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	
$V_F^*$	Maximum Instantaneous Forward Voltage $I_F = 10\text{ A}$ $I_F = 10\text{ A}$	$T_C = 25^\circ\text{C}$	-	-	1.15	V
		$T_C = 100^\circ\text{C}$	-	-	1.10	
$I_R^*$	Maximum Instantaneous Reverse Current @ rated $V_R$	$T_C = 25^\circ\text{C}$	-	-	100	$\mu\text{A}$
		$T_C = 100^\circ\text{C}$	-	-	500	
$t_{rr}$	Reverse Recovery Time	-	20.8	-	ns	
$I_{rr}$	Reverse Recovery Current	-	2.8	-	A	
$Q_{rr}$	Reverse Recovery Charge ( $I_F = 10\text{ A}$ , $di_F/dt = 200\text{ A}/\mu\text{s}$ , $V_R = 130\text{ V}$ )	-	28.5	-	nC	
$t_{rr}$	Maximum Reverse Recovery Time ( $I_F = 1\text{ A}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$ )	-	-	35	ns	
$W_{AVL}$	Avalanche Energy ( $L = 40\text{ mH}$ )	10	-	-	mJ	

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

### Test Circuit and Waveforms

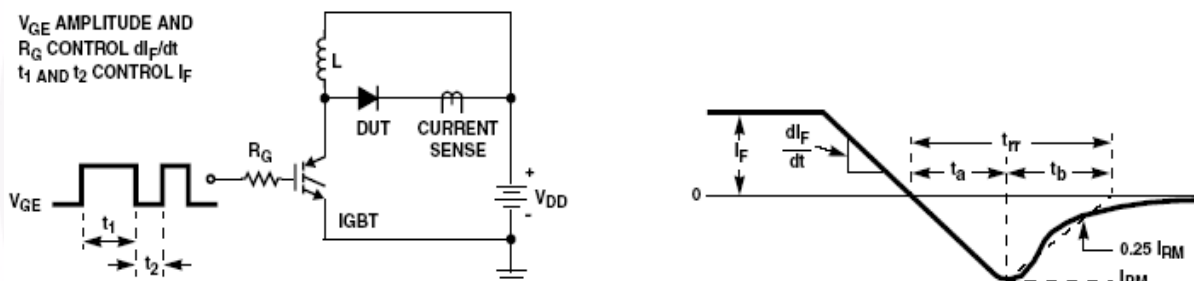


Figure 1. Diode Reverse Recovery Test Circuit & Waveform

$L = 40\text{mH}$

$R < 0.1\Omega$

$V_{DD} = 50\text{V}$

$E_{AVL} = 1/2LI^2 [V_{R(AVL)} / (V_{R(AVL)} - V_{DD})]$

$Q1 = \text{IGBT (}BV_{CES} > \text{DUT } V_{R(AVL)}\text{)}$

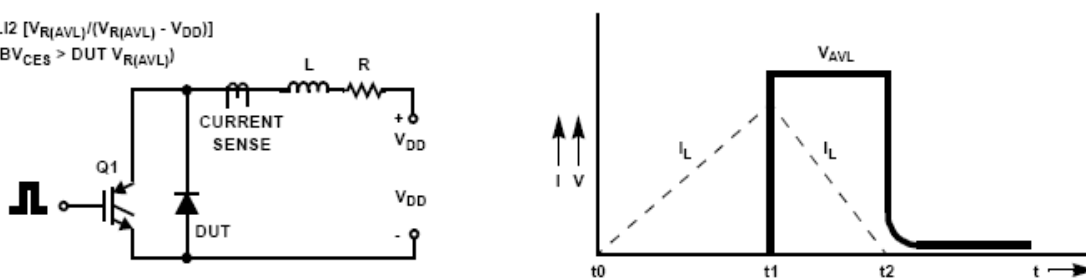
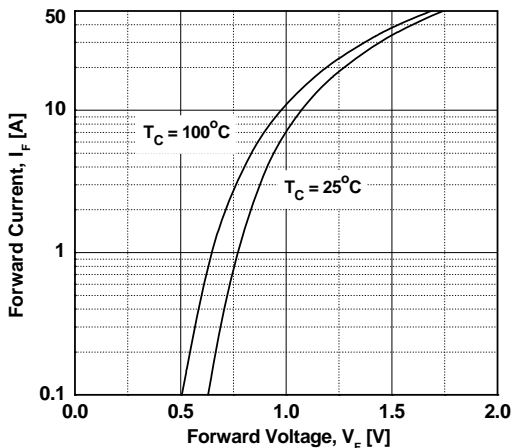


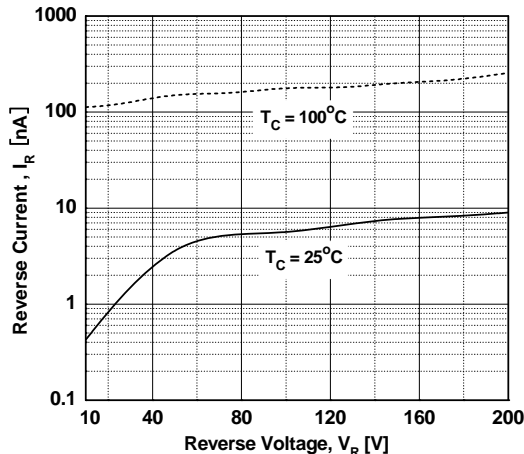
Figure 2. Unclamped Inductive Switching Test Circuit & Waveform

### Typical Performance Characteristics

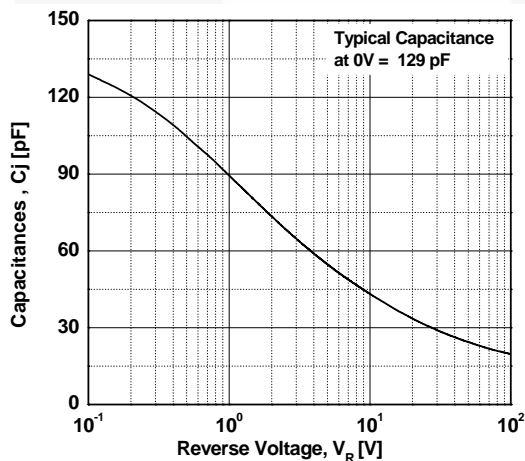
**Figure 3. Typical Forward Voltage Drop vs. Forward Current**



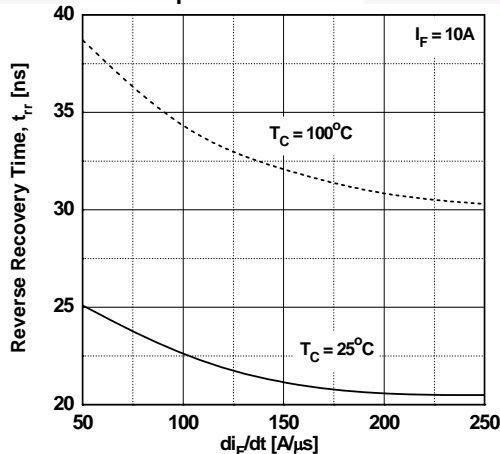
**Figure 4. Typical Reverse Current vs. Reverse Voltage**



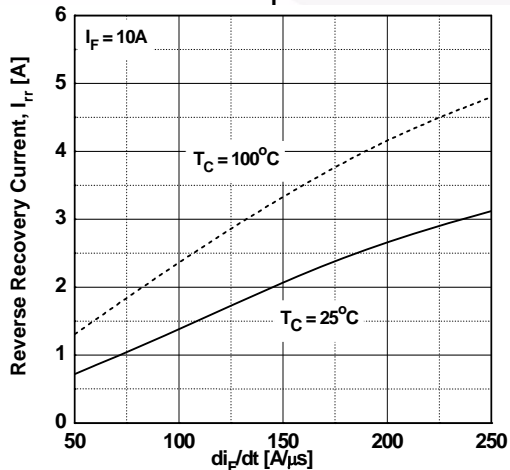
**Figure 5. Typical Junction Capacitance**



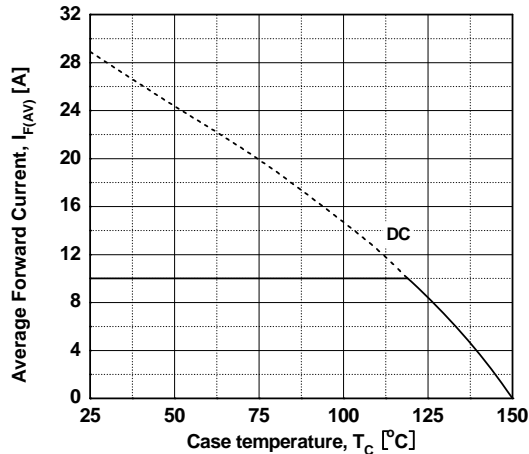
**Figure 6. Typical Reverse Recovery Time vs.  $di_F/dt$**

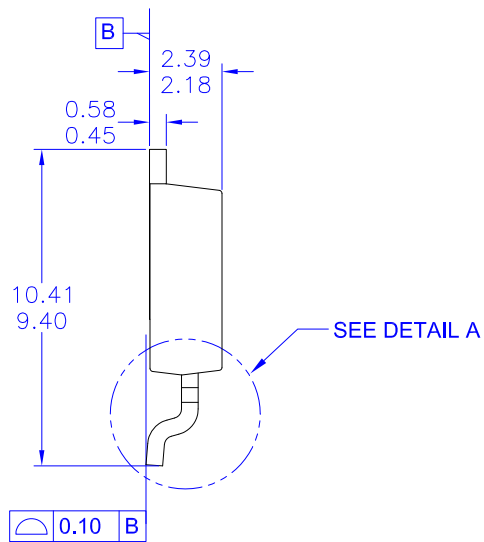
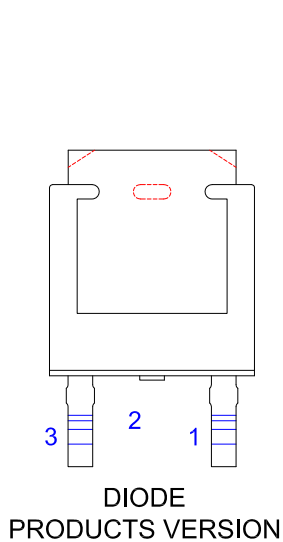
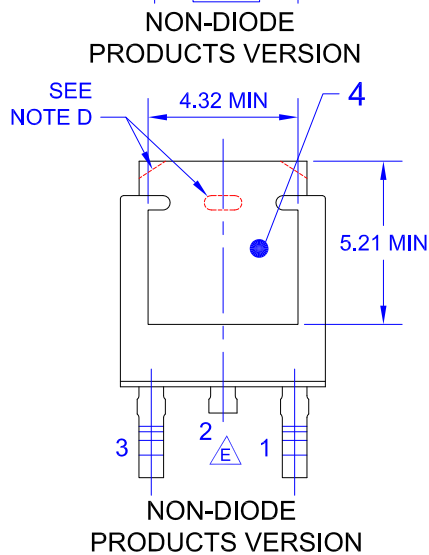
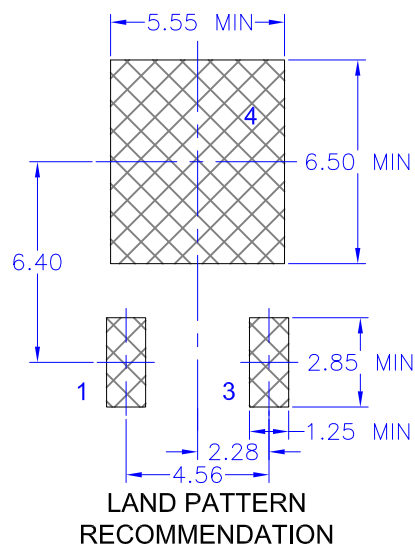
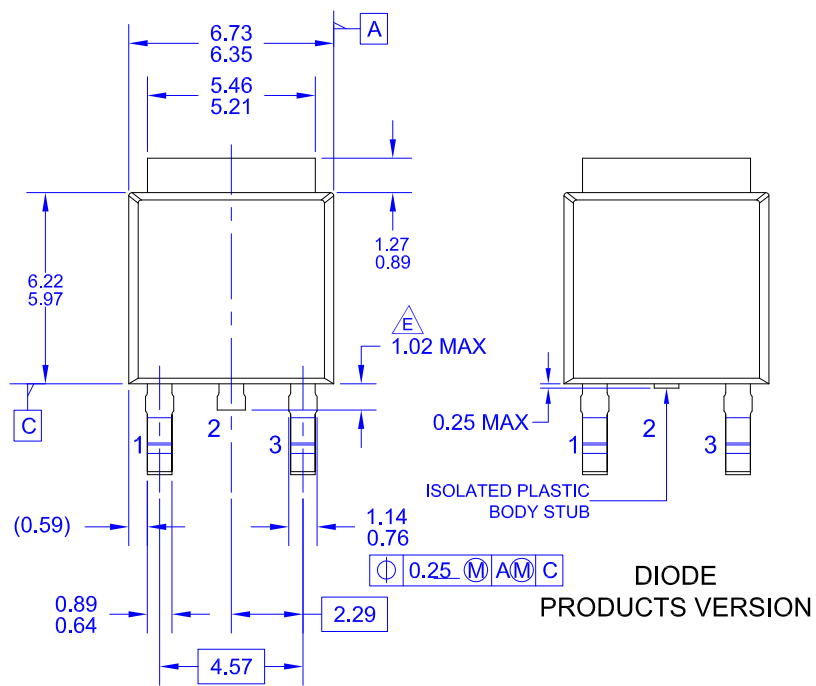


**Figure 7. Typical Reverse Recovery Current vs.  $di_F/dt$**



**Figure 8. Forward Current Derating Curve**





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- A) THIS PACKAGE CONFORMS TO JEDEC, TO-252, ISSUE C, VARIATION AA.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009.
- D) SUPPLIER DEPENDENT MOLD LOCKING HOLES OR CHAMFERED CORNERS OR EDGE PROTRUSION.
- E) TRIMMED METAL CENTER LEAD IS PRESENT ON FOR NON-DIODE PRODUCTS
- F) DIMENSIONS ARE EXCLUSIVE OF BURS, MOLD FLASH AND TIE BAR EXTRUSIONS.
- G) LAND PATTERN RECOMMENDATION IS BASED ON IPC7351A STD TO228P991X239-3N.
- H) DRAWING NUMBER AND REVISION: MKT-TO252A03REV11





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