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# FFD10UP20S 10 A, 200 V, Ultrafast Diode

## Features

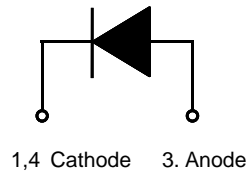
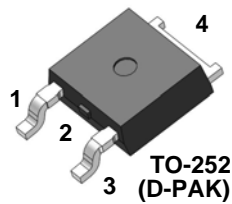
- Ultrafast Recovery,  $T_{rr} = 20.8 \text{ ns}$  (@  $I_F = 10 \text{ A}$ )
- Max Forward Voltage,  $V_F = 1.15 \text{ V}$  (@  $T_C = 25^\circ\text{C}$ )
- Reverse Voltage :  $V_{RRM} = 200 \text{ V}$
- Avalanche Energy Rated
- RoHS Compliant

## 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

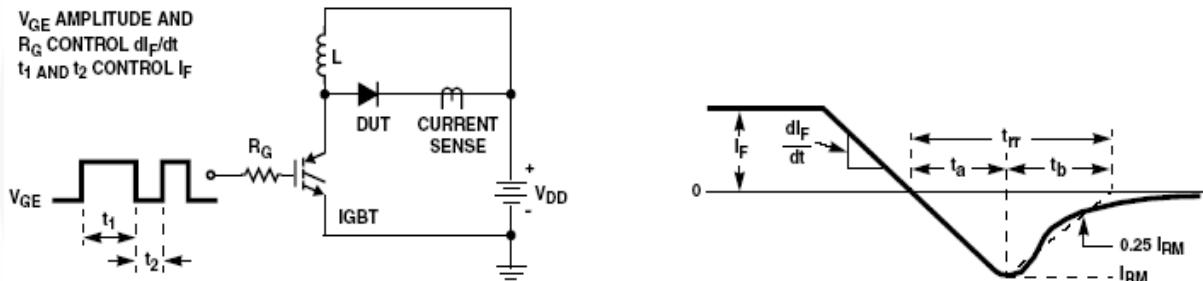
Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FFD10UP20S	F10UP20S	TO-252(D-PAK)	Reel	13" Dia	N/A	2500

**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%

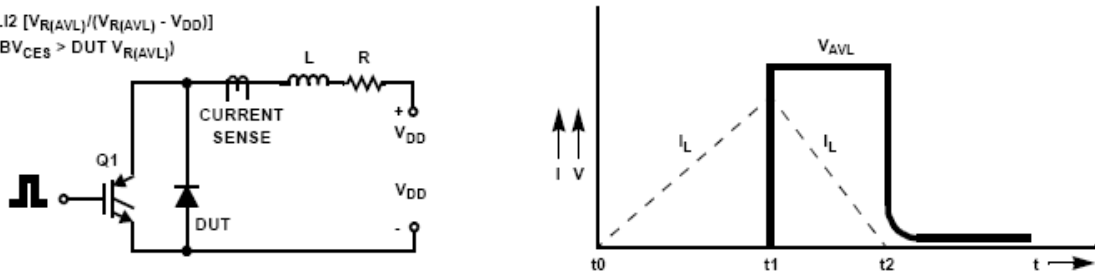
**Test Circuit and Waveforms**



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

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

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



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

### Typical Performance Characteristics

Figure 3. Typical Forward Voltage Drop vs. Forward Current

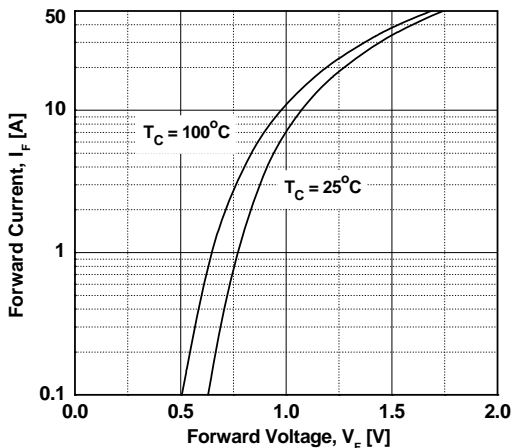


Figure 4. Typical Reverse Current vs. Reverse Voltage

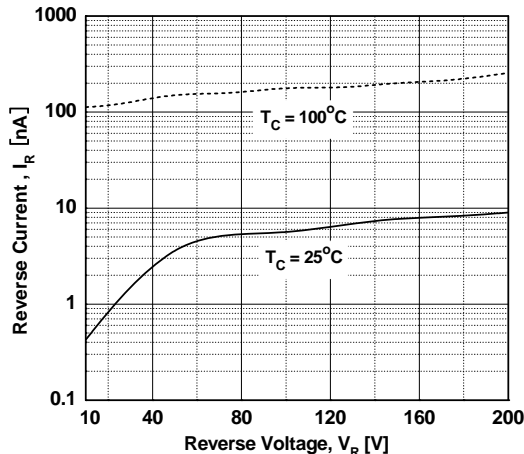


Figure 5. Typical Junction Capacitance

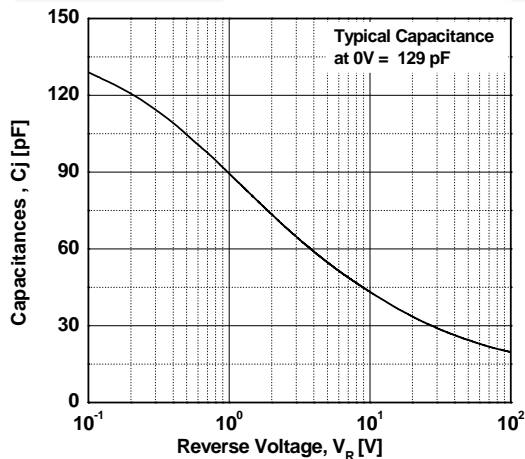


Figure 6. Typical Reverse Recovery Time vs.  $di_F/dt$

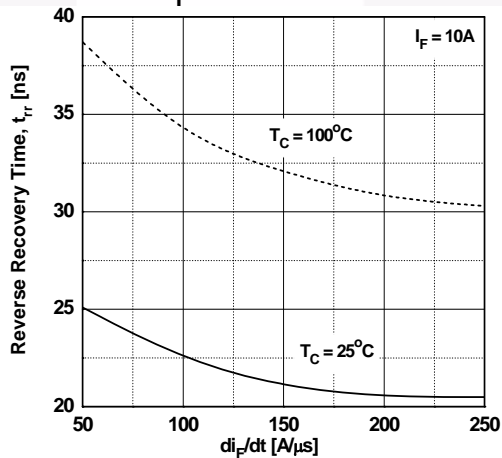


Figure 7. Typical Reverse Recovery Current vs.  $di_F/dt$

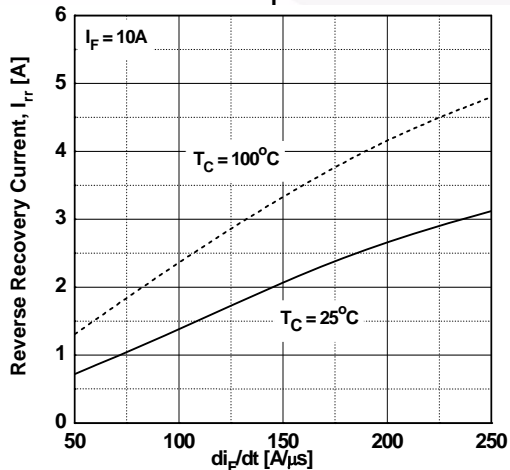
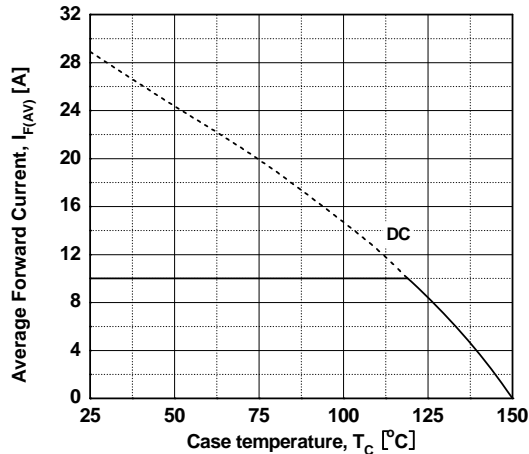
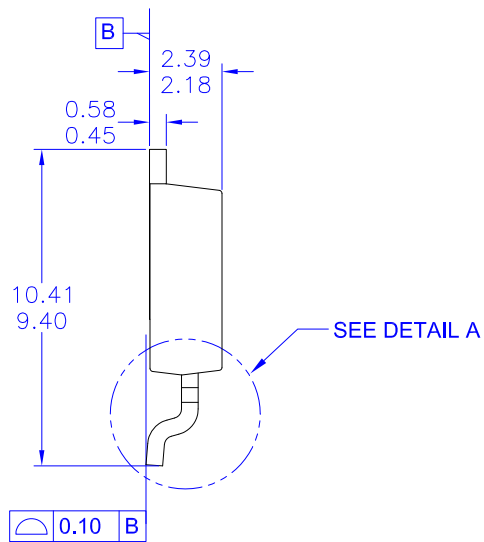
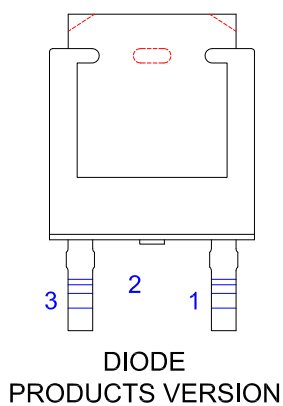
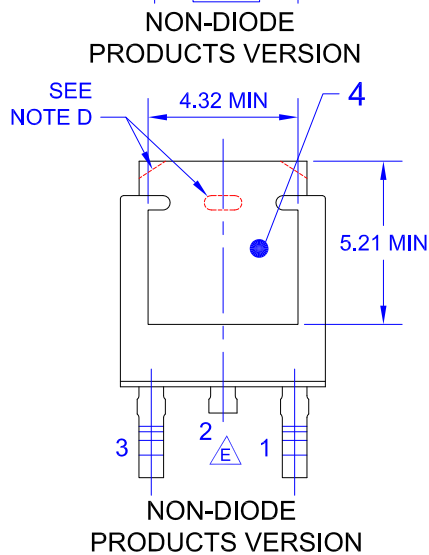
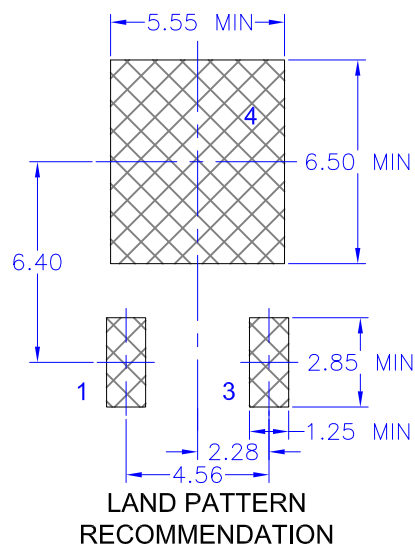
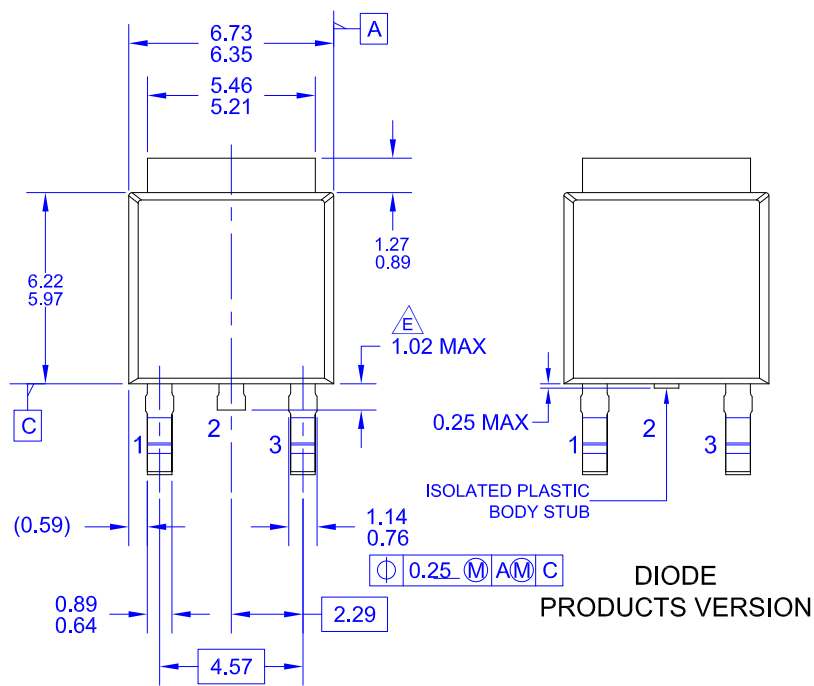


Figure 8. Forward Current Derating Curve





NOTES: UNLESS OTHERWISE SPECIFIED  
 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.

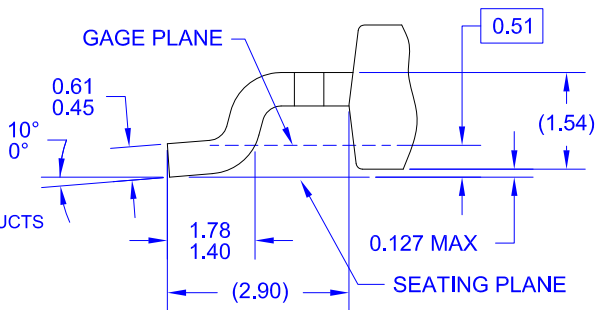
D) SUPPLIER DEPENDENT MOLD LOCKING HOLES OR CHAMFERED CORNERS OR EDGE PROTRUSION.

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



DETAIL A  
 (ROTATED -90°)  
 SCALE: 12X





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