

FFB20UP20DN

10A, 200V Ultrafast Dual Rectifiers

Features

- High Reverse Voltage : $V_{RRM} = 200V$
- Avalanche Energy Rated
- Planar Construction

Applications

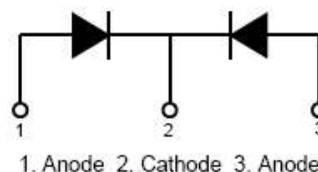
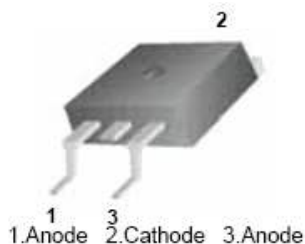
- Output Rectifiers
- Switching Mode Power Supply
- Free-wheeling diode for motor application
- Power switching circuits

Description

The FFB20UP20DN is an ultrafast rectifier. It has a low forward voltage drop and is a silicon nitride passivated ion-implanted epitaxial planar construction.

This device is intended for use as a freewheeling/clamping rectifier in a variety of switching power supplies and other power switching applications. Its low stored charge and hyperfast recovery minimize ringing and electrical noise in many power switching circuits, thus reducing power loss in the switching transistors.

Pin Assignments



Absolute Maximum Ratings $T_C = 25^\circ C$ unless otherwise noted

| Symbol | Parameter | Ratings | Units |
|----------------|---|-------------|------------|
| V_{RRM} | Peak Repetitive Reverse Voltage | 200 | V |
| V_{RWM} | Working Peak Reverse Voltage | 200 | V |
| V_R | DC Blocking Voltage | 200 | V |
| $I_{f(av)}$ | Average Rectified Forward Current @ $T_C = 155^\circ C$ | 10 | A |
| I_{FSM} | Non-repetitive Peak Surge Current 60Hz Single Half-Sine Wave | 100 | A |
| T_J, T_{STG} | Operating Junction and Storage Temperature | -55 to +175 | $^\circ C$ |

Thermal Characteristics $T_C = 25^\circ C$ unless otherwise noted

| Symbol | Parameter | Max | Units |
|-------------------|--|-----|--------------|
| $R_{\theta JC}^1$ | Maximum Thermal Resistance, Junction to Case | 3.5 | $^\circ C/W$ |

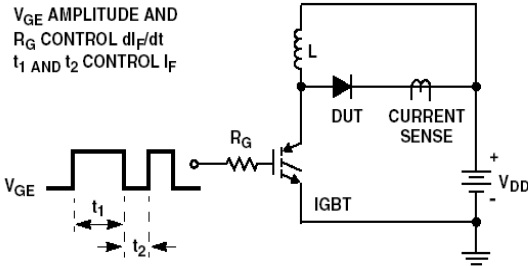
Package Marking and Ordering Information

| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|----------------|-----------|---------|-----------|------------|----------|
| F20UP20DN | F20UP20DN | TO-263 | 13" | 24mm | 800 |

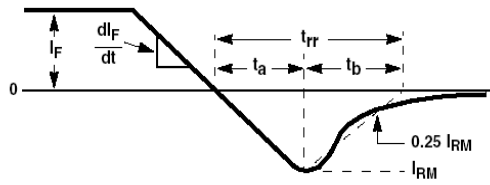
Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Min. | Typ. | Max | Units |
|-----------|---|------|------|------|---------------|
| V_F^2 | $I_F = 10\text{A}$ | - | - | 1.15 | V |
| | $I_F = 10\text{A}$ | - | - | 1.0 | V |
| I_R^2 | $V_R = 200\text{V}$ | - | - | 10 | μA |
| | $V_R = 200\text{V}$ | - | - | 250 | μA |
| t_{rr} | $I_F = 1\text{A}$, $di/dt = 200\text{A}/\mu\text{s}$, $V_{CC} = 130\text{V}$ | - | 15 | 25 | ns |
| | $I_F = 10\text{A}$, $di/dt = 200\text{A}/\mu\text{s}$, $V_{CC} = 130\text{V}$ | - | 27 | 40 | ns |
| t_a | $I_F = 10\text{A}$, $di/dt = 200\text{A}/\mu\text{s}$, $V_{CC} = 130\text{V}$ | - | 21 | - | ns |
| t_b | | - | 6 | - | ns |
| Q_{rr} | | - | 50 | - | nC |
| W_{AVL} | Avalanche Energy ($L = 20\text{mH}$) | 10 | - | - | mJ |

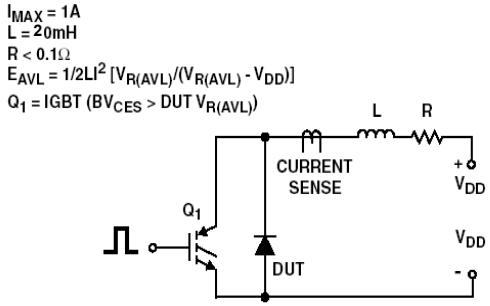
Notes
 1: R_{th_jc} value is specified for each die
 2: Pulse: Test Pulse width = 300S, Duty Cycle = 2%



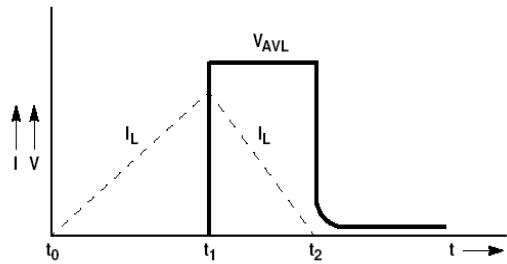
t_{rr} TEST CIRCUIT



t_{rr} WAVEFORMS AND DEFINITIONS



AVALANCHE ENERGY TEST CIRCUIT



AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

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

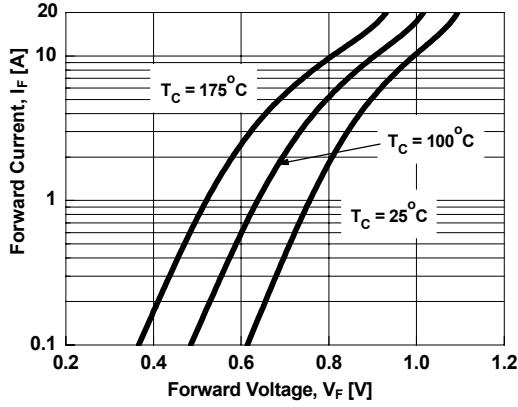


Figure 1. Typical Forward Voltage Drop

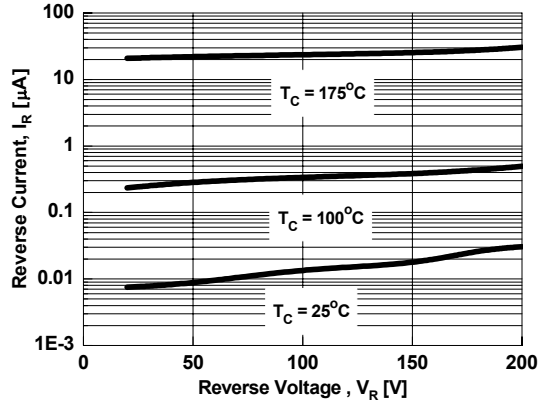


Figure 2. Typical Reverse Current

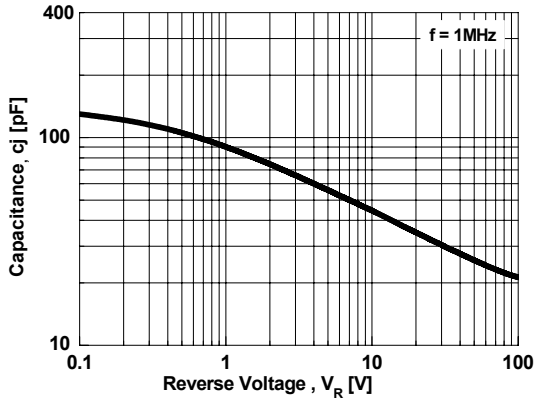


Figure 3. Typical Junction Capacitance

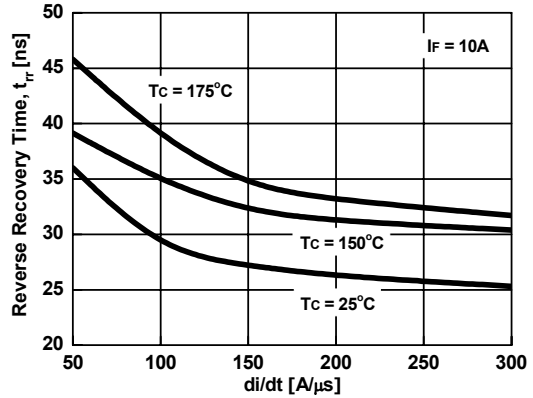


Figure 4. Typical Reverse Recovery Time

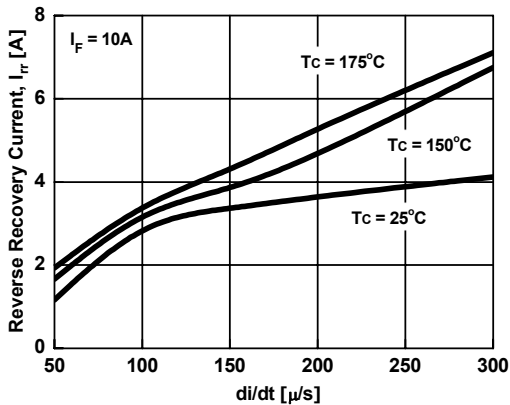


Figure 5. Typical Reverse Recovery Current

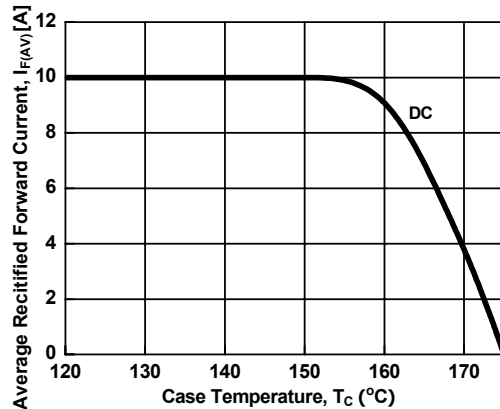
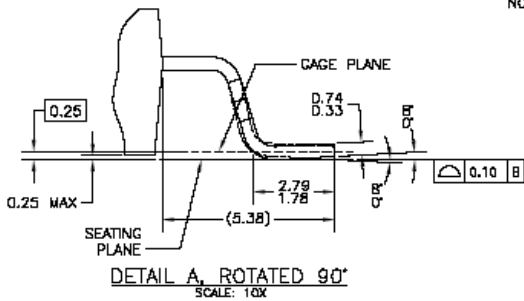
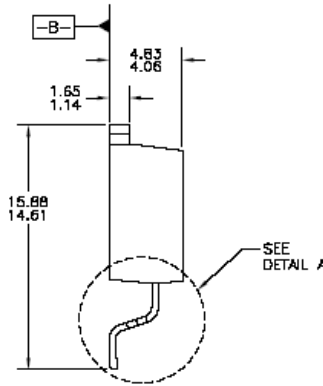
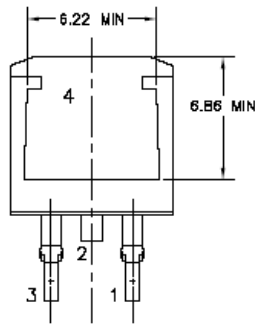
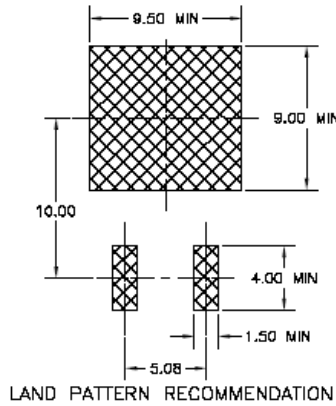
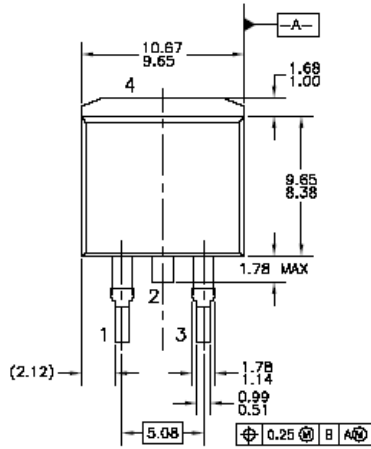


Figure 6. Case Temperature, T_C [$^\circ\text{C}$]

Package Dimensions

D2-PAK



- NOTES: UNLESS OTHERWISE SPECIFIED
- A) ALL DIMENSIONS ARE IN MILLIMETERS.
 - B) REFERENCE JEDEC, TO-263, ISSUE D, VARIATION AB, DATED JULY 2003.
 - C) DIMENSIONING AND TOLERANCING PER ANSI Y14.5M - 1982.
 - D) LOCATION OF THE PIN HOLE MAY VARY (LOWER LEFT CORNER, LOWER CENTER AND CENTER OF THE PACKAGE).
 - E) PRESENCE OF TRIMMED CENTER LEAD IS OPTIONAL.

T02B3AD2REVD

Dimensions in Millimeters

Ultrafast Recovery Power Rectifier

TRADEMARKS

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

| | | | | |
|--|---------------------------------|---------------------------------|------------------------------|-----------------------|
| ACE ^x [™] | FACT Quiet Series [™] | OCX [™] | SILENT SWITCHER [®] | UniFET [™] |
| ActiveArray [™] | GlobalOptoisolator [™] | OCXPro [™] | SMART START [™] | UltraFET [®] |
| Bottomless [™] | GTO [™] | OPTOLOGIC [®] | SPM [™] | VCX [™] |
| Build it Now [™] | HiSeC [™] | OPTOPLANAR [™] | Stealth [™] | Wire [™] |
| CoolFET [™] | I ² C [™] | PACMAN [™] | SuperFET [™] | |
| CROSSVOLT [™] | <i>i-Lo</i> [™] | POP [™] | SuperSOT [™] -3 | |
| DOMET [™] | ImpliedDisconnect [™] | Power247 [™] | SuperSOT [™] -6 | |
| EcoSPARK [™] | IntelliMAX [™] | PowerEdge [™] | SuperSOT [™] -8 | |
| E ² CMOS [™] | ISOPLANAR [™] | PowerSaver [™] | SyncFET [™] | |
| EnSigna [™] | LittleFET [™] | PowerTrench [®] | TCM [™] | |
| FACT [™] | MICROCOUPLER [™] | QFET [®] | TinyBoost [™] | |
| FAST [®] | MicroFET [™] | QS [™] | TinyBuck [™] | |
| FAST _r [™] | MicroPak [™] | QT Optoelectronics [™] | TinyPWM [™] | |
| FPS [™] | MICROWIRE [™] | Quiet Series [™] | TinyPower [™] | |
| FRFET [™] | MSX [™] | RapidConfigure [™] | TinyLogic [®] | |
| | MSXPro [™] | RapidConnect [™] | TINYOPTO [™] | |
| Across the board. Around the world. [™] | | SerDes [™] | TruTranslation [™] | |
| The Power Franchise [®] | | ScalarPump [™] | UHC [™] | |
| Programmable Active Droop [™] | | | | |

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:

- Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.
- A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS

Definition of Terms

| Datasheet Identification | Product Status | Definition |
|--------------------------|------------------------|--|
| Advance Information | Formative or In Design | This datasheet contains the design specifications for product development. Specifications may change in any manner without notice. |
| Preliminary | First Production | This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design. |
| No Identification Needed | Full Production | This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design. |
| Obsolete | Not In Production | This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only. |