

February 2006



FFB20UP20S

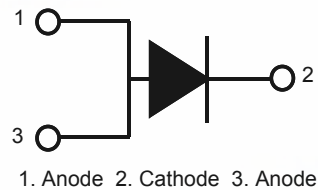
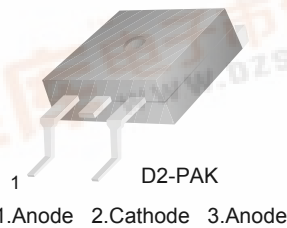
Ultrafast Recovery Power Rectifier

Features

- Ultrafast with Soft Recovery : < 45ns (@ $I_F = 20A$)
- 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



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

| Symbol | Parameter | Value | 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 @ $T_C = 115^\circ C$ | 20 | A |
| I_{FSM} | Non-repetitive Peak Surge Current 60Hz Single Half-Sine Wave | 200 | A |
| T_J, T_{STG} | Operating Junction and Storage Temperature | - 65 to +150 | $^\circ C$ |

Thermal Characteristics

| Symbol | Parameter | Max | Units |
|-----------------|--|-----|--------------|
| $R_{\theta JC}$ | Maximum Thermal Resistance, Junction to Case | 2.0 | $^\circ C/W$ |

Package Marking and Ordering Information

| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|----------------|--------------|---------|-----------|------------|----------|
| F20UP20S | FFB20UP20STM | D2-PAK | 13" Dia | - | 800 |

FFB20UP20S Ultrafast Recovery Power Rectifier

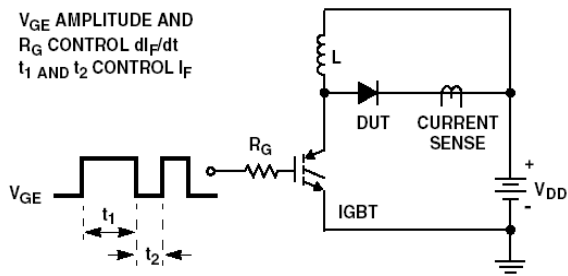


Electrical Characteristics T_C = 25°C unless otherwise noted

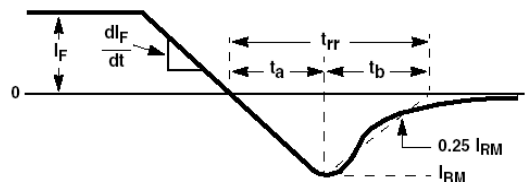
| Symbol | Parameter | Min. | Typ. | Max. | Units |
|-------------------|---|------|------|------|-------|
| V _{FM} * | I _F = 20A | - | - | 1.15 | V |
| | I _F = 20A | - | - | 1.0 | V |
| I _{RM} * | V _R = 200V | - | - | 100 | μA |
| | V _R = 200V | - | - | 500 | μA |
| t _{rr} | I _F = 1A, di/dt = 100A/μs, V _{CC} = 30V | - | - | 35 | ns |
| | I _F = 20A, di/dt = 200A/μs, V _{CC} = 130V | - | - | 45 | ns |
| t _a | I _F = 20A, di/dt = 200A/μs, V _{CC} = 130V | - | 11 | - | ns |
| t _b | | - | 13 | - | ns |
| Q _{rr} | | - | 21 | - | nC |
| W _{AVL} | Avalanche Energy (L = 40mH) | 20 | - | - | mJ |

* Pulse Test: Pulse Width=300μs, Duty Cycle=2%

Test Circuit and Waveforms

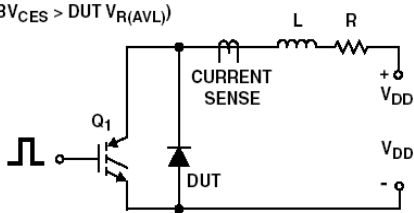


t_{rr} TEST CIRCUIT

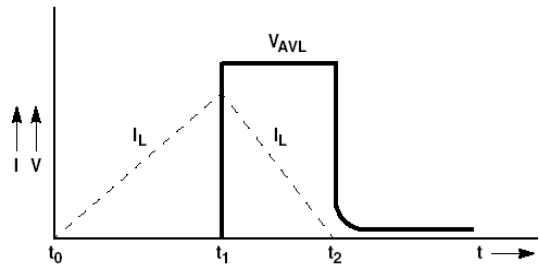


t_{rr} WAVEFORMS AND DEFINITIONS

I_{MAX} = 1A
L = 40mH
R < 0.1Ω
E_{AVL} = 1/2LI² [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]
Q₁ = IGBT (BV_{CES} > DUT V_{R(AVL)})



AVALANCHE ENERGY TEST CIRCUIT



AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

Typical Performance Characteristics

Figure 1. Typical Forward Voltage Drop

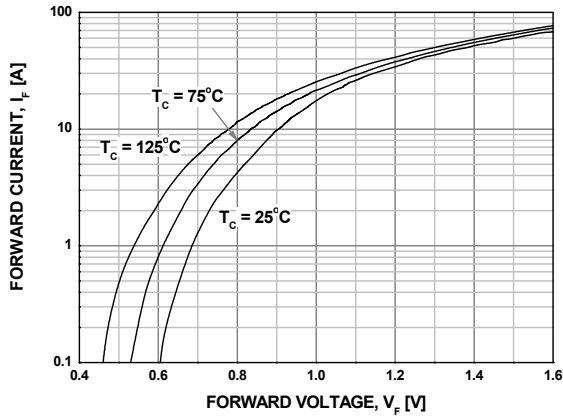


Figure 2. Typical Reverse Current

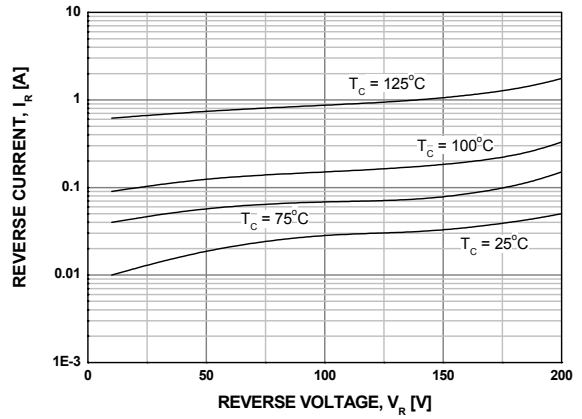


Figure 3. Typical Junction Capacitance

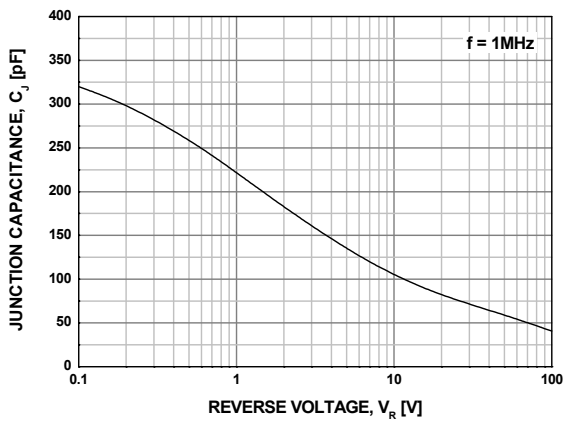


Figure 4. Typical Reverse Recovery Time

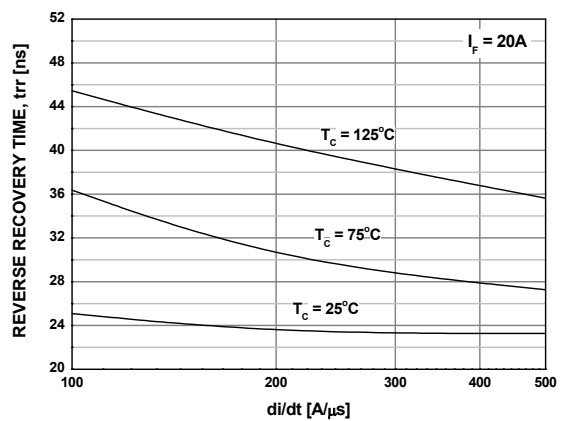


Figure 5. Typical Reverse Recovery Current

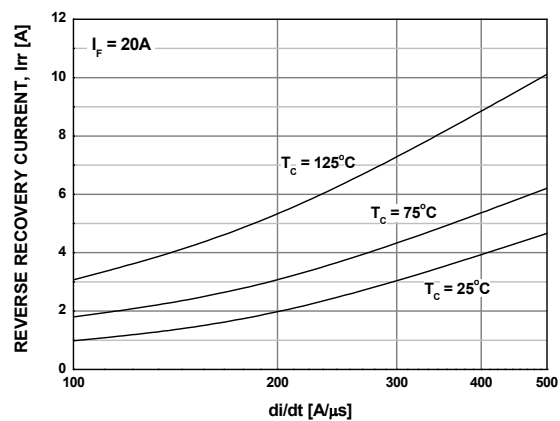
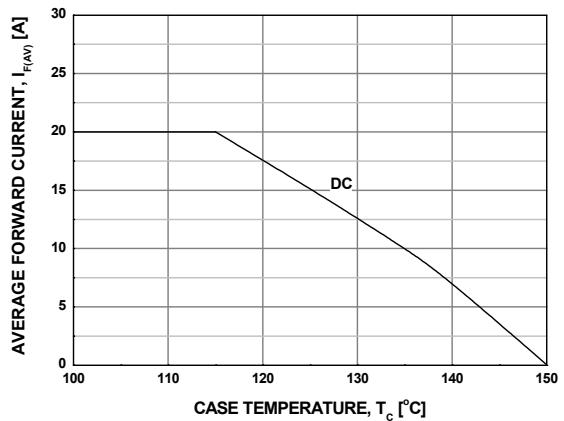
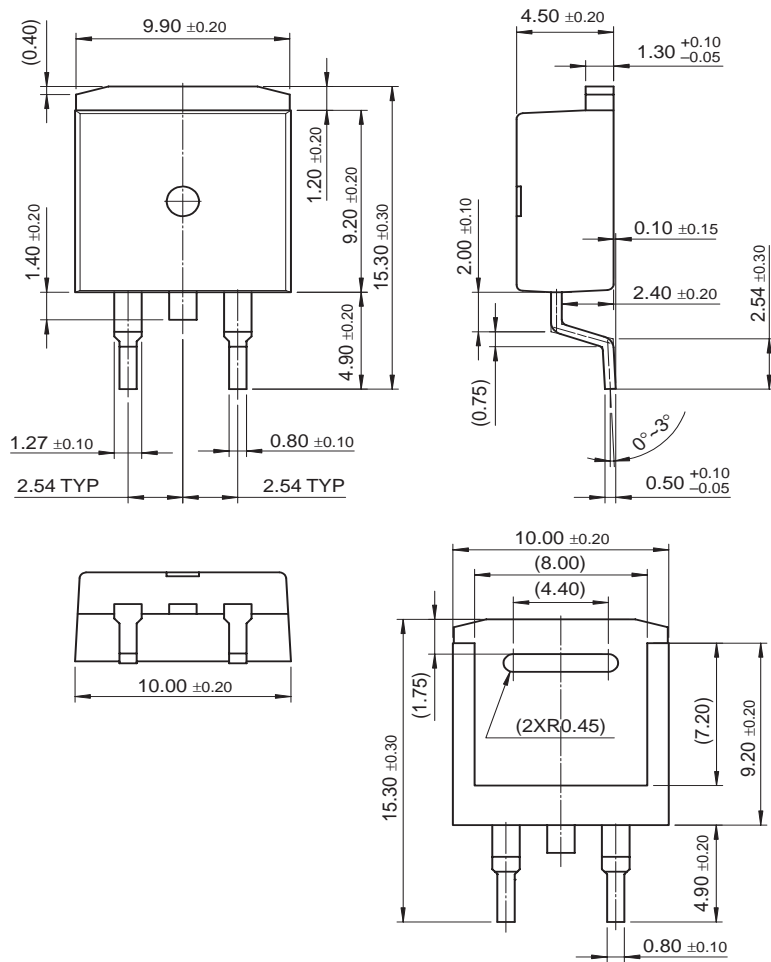


Figure 6. Forward Current Deration Curve



Package Dimensions

D²-PAK



Dimensions in Millimeters

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.

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

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.

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:

1. 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.
2. 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 in order 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 in order 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. |