

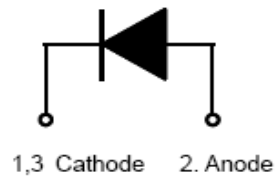
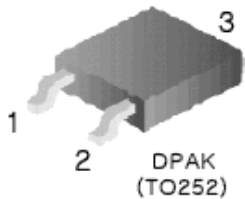
## FFD06UP20S

### Features

- Ultrafast with soft recovery,  $t_{rr} < 35\text{ns}$
- Reverse Voltage, 200V
- Forward Voltage  $< 1.1\text{V}$  @  $T_C$  100°C
- RoHS compliant

### Applications

- Power switching circuits
- Output rectifiers
- Freewheeling diodes
- Switching mode power supply



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

Symbol	Parameter	Ratings	Units
$V_{RRM}$	Peak Repetitive Reverse Voltage	200	V
$I_{F(AV)}$	Average Rectified Forward Current @ $T_C = 125^\circ\text{C}$	6	A
$I_{FSM}$	Non-repetitive Peak Surge Current 60Hz Single Half-Sine Wave	60	A
$T_J, T_{STG}$	Operating and Storage Temperature Range	-65 to +150	°C

### Thermal Characteristics

Symbol	Parameter	Ratings	Units
$R_{\theta JC}$	Maximum Thermal Resistance, Junction to Case	5.1	°C/W

### Package Marking and Ordering Information

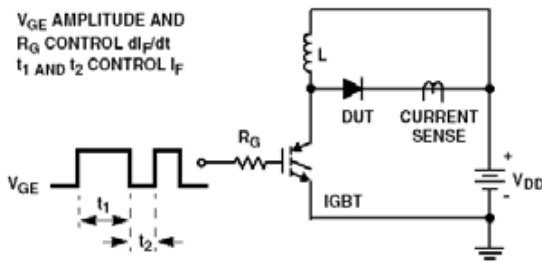
Device Marking	Device	Package	Reel Size	Tape Width	Quantity
F06UP20S	FFD06UP20S	TO-252	13" Dia	-	2500

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

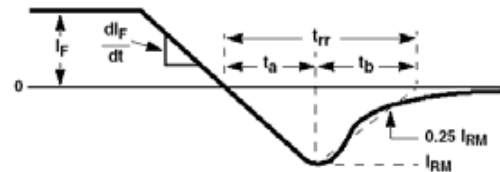
Symbol	Parameter	Min.	Typ.	Max.	Units
$V_{FM}^*$	Maximum Instantaneous Forward Voltage				
	$I_F = 6\text{A}$ $T_C = 25^\circ\text{C}$ $I_F = 6\text{A}$ $T_C = 100^\circ\text{C}$	-	-	1.15 1.10	V
$I_{RM}^*$	Maximum Instantaneous Reverse Current @ rated $V_R$	-	-	100 500	$\mu\text{A}$
$t_{rr}$ $I_{rr}$ $Q_{rr}$	Reverse Recovery Time	-	18.6	-	ns
	Reverse Recovery Current	-	2.9	-	A
	Reverse Recovery Charge ( $I_F = 6\text{A}$ , $di/dt = 200\text{A}/\mu\text{s}$ )	-	26.8	-	nC
$t_{rr}$	Maximum Reverse Recovery Time ( $I_F = 1\text{A}$ , $di/dt = 100\text{A}/\mu\text{s}$ )	-	-	35	ns
$W_{AVL}$	Avalanche Energy ( $L = 40\text{mH}$ )	5	-	-	mJ

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

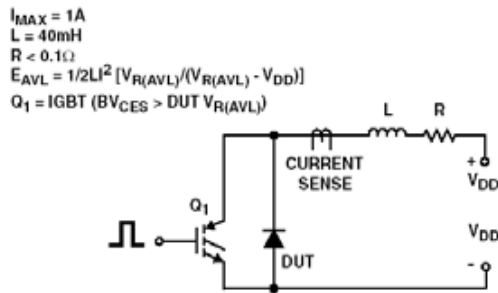
**Test Circuit and Waveforms**



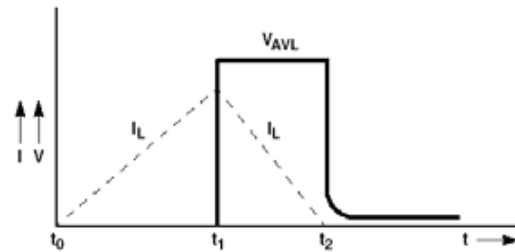
$t_{rr}$  TEST CIRCUIT



$t_{rr}$  WAVEFORMS AND DEFINITIONS



AVALANCHE ENERGY TEST CIRCUIT



AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

Typical Performance Characteristics

Figure 1. Typical Forward Voltage Drop vs. Forward Current

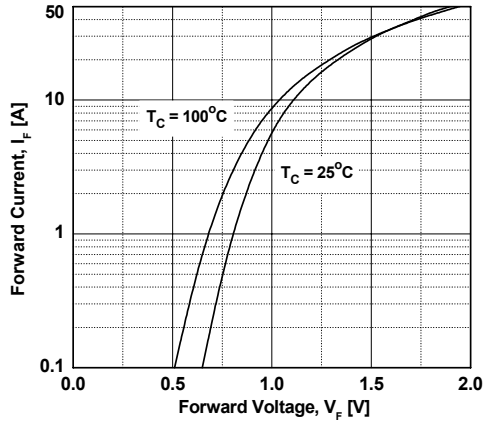


Figure 2. Typical Reverse Current vs. Reverse Voltage

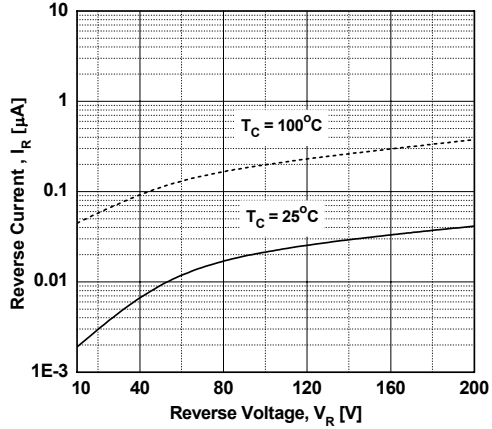


Figure 3. Typical Junction Capacitance

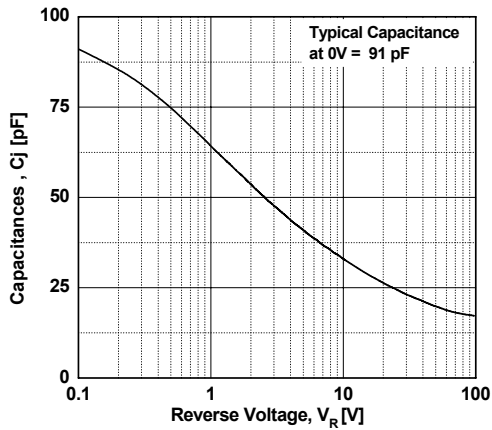


Figure 4. Typical Reverse Recovery Time vs. di/dt

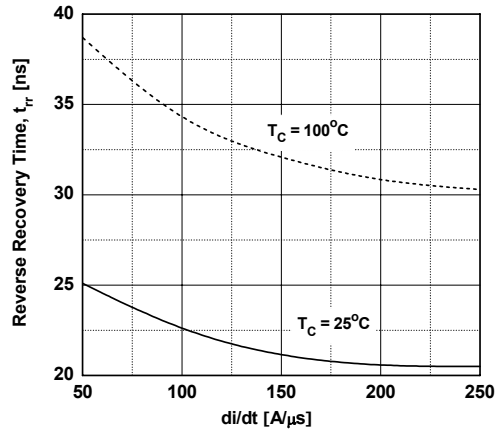


Figure 5. Typical Reverse Recovery Current vs. di/dt

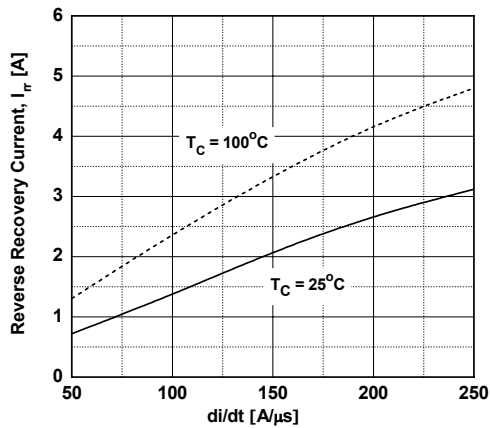
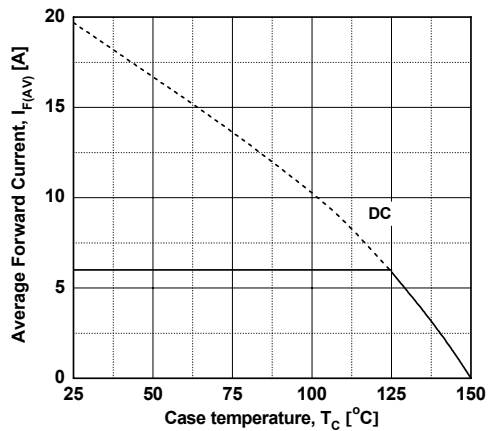
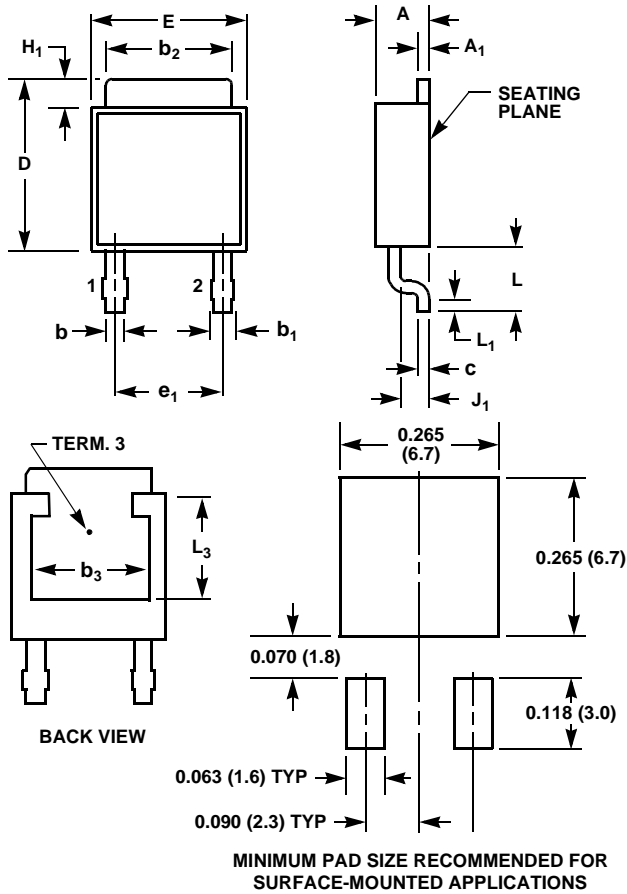


Figure 6. Forward Current Derating Curve



# Mechanical Dimensions

## D-PAK



SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.086	0.094	2.19	2.38	-
A <sub>1</sub>	0.018	0.022	0.46	0.55	3, 4
b	0.028	0.032	0.72	0.81	3, 4
b <sub>1</sub>	0.033	0.040	0.84	1.01	3
b <sub>2</sub>	0.205	0.215	5.21	5.46	3, 4
b <sub>3</sub>	0.190	-	4.83	-	2
c	0.018	0.022	0.46	0.55	3, 4
D	0.270	0.290	6.86	7.36	-
E	0.250	0.265	6.35	6.73	-
e <sub>1</sub>	0.180 BSC		4.57 BSC		6
H <sub>1</sub>	0.035	0.045	0.89	1.14	-
J <sub>1</sub>	0.040	0.045	1.02	1.14	-
L	0.100	0.115	2.54	2.92	-
L <sub>1</sub>	0.020	-	0.51	-	3, 5
L <sub>3</sub>	0.170	-	4.32	-	2

**NOTES:**






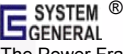
1. No current JEDEC outline for this package.
2. L<sub>3</sub> and b<sub>3</sub> dimensions establish a minimum mounting surface for terminal 3.
3. Dimension (without solder).
4. Add typically 0.002 inches (0.05mm) for solder plating.
5. L<sub>1</sub> is the terminal length for soldering.
6. Position of lead to be measured 0.090 inches (2.28mm) from bottom of dimension D.
7. Controlling dimension: Inch.
8. Revision 8 dated 5-99.

Dimensions in Millimeters



**TRADEMARKS**

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

- |   |   |   |   |
|---|---|---|---|
| Build it Now™   | FRFET®  | Programmable Active Droop™  | <br>the power franchise<br>TinyBoost™<br>TinyBuck™<br>TinyLogic®<br>TINYOPTO™<br>TinyPower™<br>TinyPWM™<br>TinyWire™<br>μSerDes™<br><br>SerDes®<br>UHC®<br>Ultra FRFET™<br>UniFET™<br>VCX™<br>VisualMax™<br>XS™ |
| CorePLUS™   | Global Power Resource <sup>SM</sup>   | QFET®   |   |
| CorePOWER™  | Green FPS™  | QS™   |   |
| CROSSVOLT™  | Green FPS™ e-Series™  | Quiet Series™   |   |
| CTL™  | GTO™  | RapidConfigure™   |   |
| Current Transfer Logic™   | IntelliMAX™   |  ™       |   |
| EcoSPARK®   | ISOPLANAR™  | Saving our world, 1mW /W /kW at a time™   |   |
| EfficientMax™   | MegaBuck™   | SmartMax™   |   |
| EZSWITCH™ *   | MICROCOUPLER™   | SMART START™  |   |
|  ™ | MicroFET™   | SPM®  |   |
|  ™ | MicroPak™   | STEALTH™  |   |
| Fairchild®  | MillerDrive™  | SuperFET™   |   |
| Fairchild Semiconductor®  | MotionMax™  | SuperSOT™-3   |   |
| FACT Quiet Series™  | Motion-SPM™   | SuperSOT™-6   |   |
| FACT®   | OPTOLOGIC®  | SuperSOT™-8   |   |
| FAST®   | OPTOPLANAR®   | SupreMOS™   |   |
| FastvCore™  |  ™ | SyncFET™  |   |
| FlashWriter® *  | PDP SPM™  |  SYSTEM® |   |
| FPS™  | Power-SPM™  | The Power Franchise®  |   |
| F-PFS™  | PowerTrench®  |   |   |
|   | PowerXS™  |   |   |

\* EZSWITCH™ and FlashWriter® are trademarks of System General Corporation, used under license by Fairchild Semiconductor.

**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, and (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 a significant injury of the user.
- A critical component in 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.

**ANTI-COUNTERFEITING POLICY**

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, [www.fairchildsemi.com](http://www.fairchildsemi.com), under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufactures of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed application, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address and warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

**PRODUCT STATUS DEFINITIONS**  
Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; 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	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

Rev. I37