



FDC6330L

FDC6330L

Integrated Load Switch

General Description

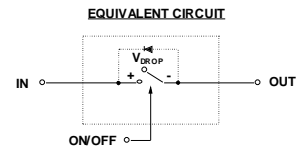
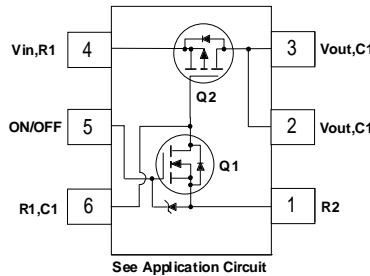
This device is particularly suited for compact power management in portable electronic equipment where 3V to 20V input and 2.3A output current capability are needed. This load switch integrates a small N-Channel power MOSFET (Q1) which drives a large P-Channel power MOSFET (Q2) in one tiny SuperSOT™-6 package.

Features

- $V_{DROP} = 0.2V @ V_{IN} = 12V, I_L = 2.5 A. R_{(ON)} = 0.08 \Omega$
 $V_{DROP} = 0.2V @ V_{IN} = 5V, I_L = 1.6 A. R_{(ON)} = 0.125 \Omega.$
- Control MOSFET (Q1) includes Zener protection for ESD ruggedness (>6kV Human Body Model).
- High performance PowerTrench™ technology for extremely low on-resistance.
- SuperSOT™-6 package design using copper lead frame for superior thermal and electrical capabilities.

Applications

- Power management
- Load actuation



SuperSOT™-6

Absolute Maximum Ratings T_A=25°C unless otherwise noted

| Symbol | Parameter | Ratings | Units |
|-----------------------------------|---|-------------|-------|
| V _{IN} | Input Voltage Range (Note 1) | 3 - 20 | V |
| V _{ON/OFF} | On/Off Voltage Range | 1.5 - 8 | V |
| I _D | Load Current - Continuous (Note 2) | 2.3 | A |
| | | 10 | |
| P _D | Maximum Power Dissipation (Note 1) | 0.7 | W |
| T _J , T _{stg} | Operating and Storage Temperature Range | -55 to +150 | °C |
| ESD | Electrostatic Discharge Rating MIL-STD-883D Human-Body-Model (100pf/1500 Ohm) | 6 | kV |

Thermal Characteristics

| | | | |
|------------------|--|-----|------|
| R _{θJA} | Thermal Resistance, Junction-to-Ambient (Note 2) | 180 | °C/W |
| R _{θJC} | Thermal Resistance, Junction-to-Case (Note 2) | 60 | °C/W |

Package Marking and Ordering Information

| Device Marking | Device | Reel Size | Tape width | Quantity |
|------------------------|----------|-----------|------------|------------|
| .330 (. Denotes pin 1) | FDC6330L | 7" | 8mm | 3000 units |

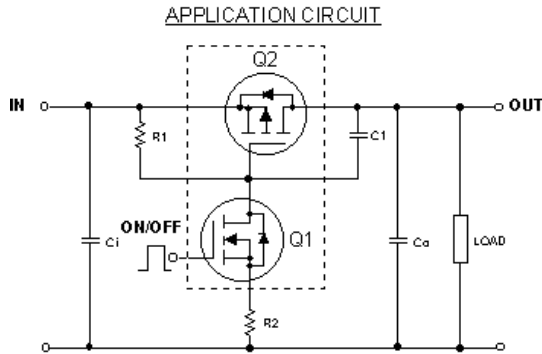
Electrical Characteristics T_A=25°C unless otherwise noted

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|------------------------------------|---------------------------------------|---|-----|----------------|---------------|-------|
| OFF Characteristics | | | | | | |
| I _{FL} | Leakage Current | V _{IN} = 20 V, V _{ON/OFF} = 0 V | | | 1 | μA |
| ON Characteristics (Note 3) | | | | | | |
| V _{DROP} | Conduction Voltage | V _{IN} = 12 V, V _{ON/OFF} = 3.3 V, I _L = 2.5 A | | | 0.2 | V |
| | | V _{IN} = 5 V, V _{ON/OFF} = 3.3 V, I _L = 1.6 A | | | 0.2 | V |
| R _(ON) | Q ₂ - Static On-Resistance | V _{GS} = -12 V, I _D = -2.3 A V _{GS} = -5 V, I _D = -1.9 A | | 0.054 0.081 | 0.08 0.125 | Ω |
| I _L | Load Current | V _{DROP} = 0.2 V, V _{IN} = 12 V, V _{ON/OFF} = 3.3 V | 2.5 | | | A |
| | | V _{DROP} = 0.2 V, V _{IN} = 5 V, V _{ON/OFF} = 3.3 V | 1.6 | | | |

Notes:

1. Range of V_{in} can be up to 30V, but R₁ and R₂ must be scaled such that V_{GS} of Q2 does not exceed 20V.
2. R_{θJA} is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. R_{θJC} is guaranteed by design while R_{θJA} is determined by the user's board design.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2.0%.

FDC6330L Load Switch Application



External Component Recommendation:

- For applications where Co ≤ 1μF.
- For slew rate control, select R2 in the range of 1k - 4.7kΩ .
- For additional in-rush current control, C1 ≤ 1000pF can be added.
- Select R1 so that the R1/R2 ratio ranges from 10 - 100. R1 is required to turn Q2 off.

Typical Characteristics (continued)

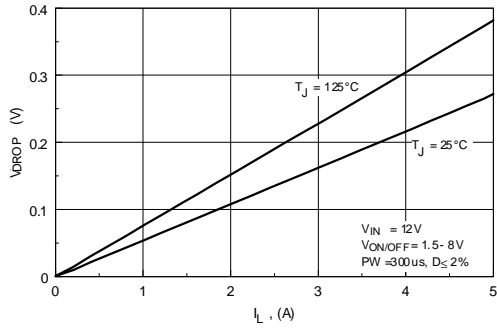


Figure 1. Conduction Voltage Drop Variation with Load Current.

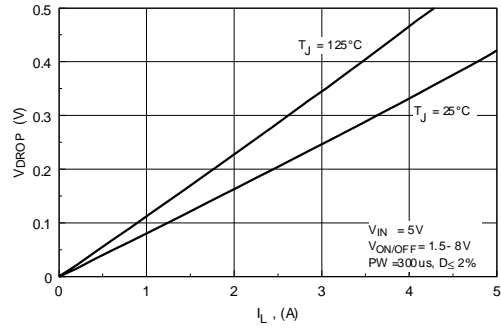


Figure 2. Conduction Voltage Drop Variation with Load Current.

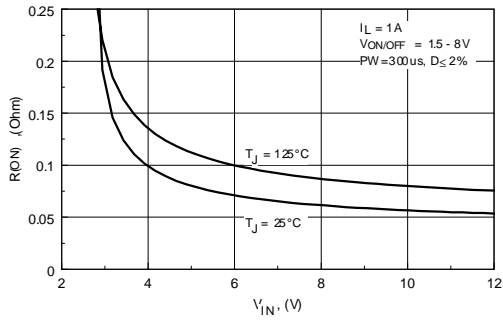


Figure 3. On-Resistance Variation with Input Voltage.

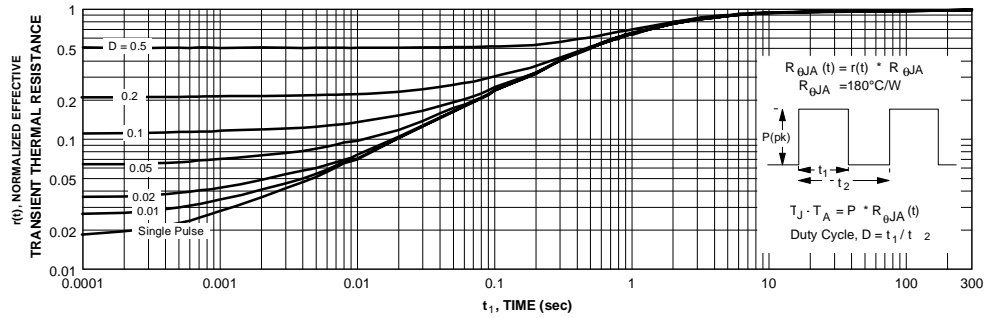
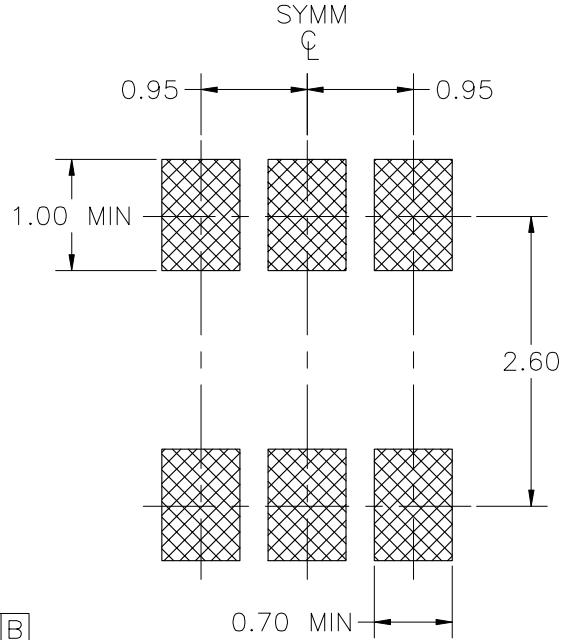
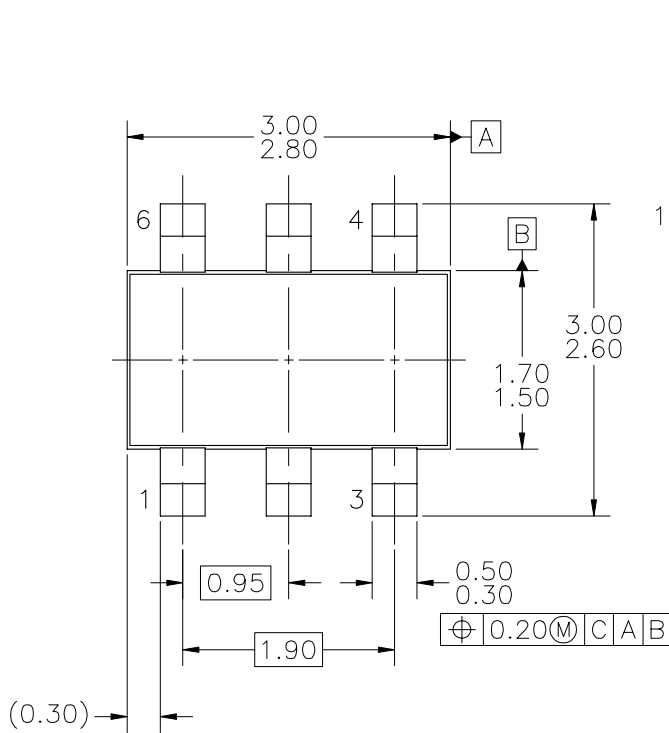


Figure 4. Transient Thermal Response Curve.

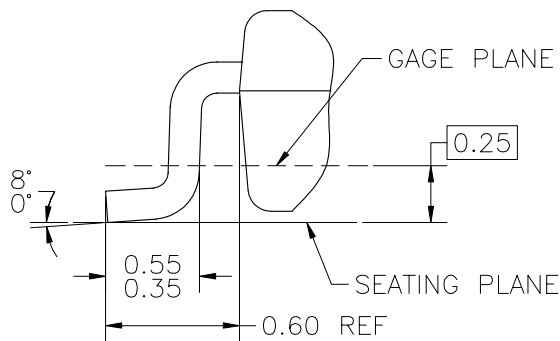
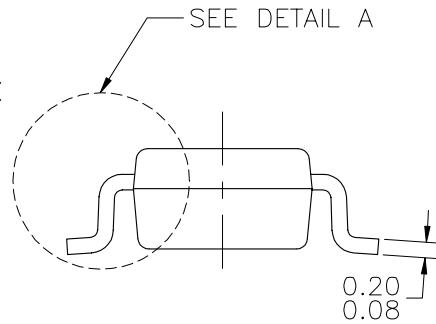
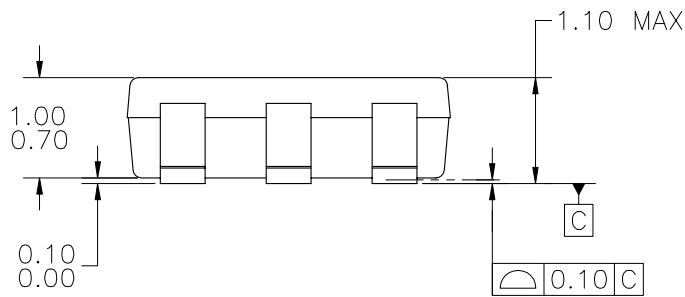
Thermal characterization performed using the conditions described in Note 2. Transient thermal response will change depending on the circuit board design.

THIS DRAWING IS THE PROPERTY OF FAIRCHILD SEMICONDUCTOR CORPORATION. NO USE THEREOF SHALL BE MADE OTHER THAN AS A REFERENCE FOR PROPOSALS AS SUBMITTED TO FAIRCHILD SEMICONDUCTOR CORPORATION FOR USE TO BE EXECUTED IN CONFORMITY WITH SUCH PROPOSALS UNLESS THE CONSENT OF SAID FAIRCHILD SEMICONDUCTOR CORPORATION HAS PREVIOUSLY BEEN OBTAINED. NO PART OF THIS DRAWING SHALL BE COPIED OR DUPLICATED OR ITS CONTENTS DISCLOSED. THE INFORMATION CONTAINED ON THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY.

| REVISIONS | | | | |
|-----------|--|-----------|----------------|----------|
| LTR | DESCRIPTION | E.C.N. | DATE | BY/APP'D |
| A | RELEASE TO DOCUMENT CONTROL | | 11209 07/18/96 | LUA |
| B | REDRAW AS PER STANDARD DRAWING TEMPLATE | 02799 | 05/19/99 | MRG |
| C | CHG TOTAL PKG THICKNESS FR 0.95-1.40 TO 1.10 MAX; CHG PKG THICKNESS FR 0.90-1.25 TO 0.70-1.00. CHG PROFILE HEIGHT FR 0.05-0.15 TO 0.00-0.10; CHG FOOT LANDING ANGLE FR 0-10° TO 0-8°; CHG GAGE PLANE FR 0.20 TO 0.25; REFLECT MO-193 VAR AA. | CB/068/00 | APR.17.2000 | MRG/GSB |
| D | REMOVED NOTE C) STANDARD LEAD FINISH: 150 MICRONS (3.81 MICROMETERS) MIN. TIN/LEAD (SOLDER) ON COPPER. | CB/149/05 | 17OCT2005 | ER |



LAND PATTERN RECOMMENDATION



DETAIL A
SCALE: 50X

NOTES: UNLESS OTHERWISE SPECIFIED

- A) THIS PACKAGE CONFORMS TO JEDEC MO-193. VAR. AA, ISSUE C, DATED JANUARY 2000.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.






MA06AREVD

| APPROVALS | | DATE | FAIRCHILD SEMICONDUCTOR™ | |
|---------------------------|--|-----------|---|------------|
| DRAWN: J. GOMEZ | | 17OCT2005 | CEBU PHILIPPINES | |
| CHECKED: E. ROSAL | | | MOLDED PACKAGE SUPERSOT, 6 LEADS, (MARKETING OUTLINE) | |
| APPROVED: M.R. GESTOLE | | | | |
| G.S. BAJE | | | SCALE 25:1 | SIZE A3 |
| PROJECTION | | | DRAWING NUMBER MKT-MA06A | REV D |
| FORMERLY: N/A | | | SHEET : 1 OF 1 | |



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.

- | | | | |
|---|--|---|---|
| AccuPower™ | F-PFS™ | OPTOPLANAR® |  SYSTEM GENERAL® |
| AttitudeEngine™ | FRFET® |  ® | TinyBoost® |
| Awinda® | Global Power Resource SM | Power Supply WebDesigner™ | TinyBuck® |
| AX-CAP®* | GreenBridge™ | PowerTrench® | TinyCalc™ |
| BitSiC™ | Green FPS™ | PowerXS™ | TinyLogic® |
| Build it Now™ | Green FPS™ e-Series™ | Programmable Active Droop™ | TINYOPTO™ |
| CorePLUS™ | Gmax™ | QFET® | TinyPower™ |
| CorePOWER™ | GTO™ | QS™ | TinyPWM™ |
| CROSSVOL™ | IntelliMAX™ | Quiet Series™ | TinyWire™ |
| CTL™ | ISOPLANAR™ | RapidConfigure™ | TranSiC™ |
| Current Transfer Logic™ | Making Small Speakers Sound Louder and Better™ |  ™ | TriFault Detect™ |
| DEUXPEED® | MegaBuck™ | Saving our world, 1mW/W/kW at a time™ | TRUECURRENT®* |
| Dual Cool™ | MICROCOUPLER™ | SignalWise™ | μSerDes™ |
| EcoSPARK® | MicroFET™ | SmartMax™ |  SerDes® |
| EfficientMax™ | MicroPak™ | SMART START™ | UHC® |
| ESBC™ | MicroPak2™ | Solutions for Your Success™ | Ultra FRFET™ |
|  ® | MillerDrive™ | SPM® | UniFET™ |
| Fairchild® | MotionMax™ | STEALTH™ | VCX™ |
| Fairchild Semiconductor® | MotionGrid® | SuperFET® | VisualMax™ |
| FACT Quiet Series™ | MTI® | SuperSOT™-3 | VoltagePlus™ |
| FACT® | MTX® | SuperSOT™-6 | XS™ |
| FAST® | MVN® | SuperSOT™-8 | Xsens™ |
| FastvCore™ | mWSaver® | SupreMOS® | 仙童™ |
| FETBench™ | OptoHiT™ | SyncFET™ | |
| FPS™ | OPTOLOGIC® | Sync-Lock™ | |

* 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. TO OBTAIN THE LATEST, MOST UP-TO-DATE DATASHEET AND PRODUCT INFORMATION, VISIT OUR WEBSITE AT [HTTP://WWW.FAIRCHILDSEMI.COM](http://www.fairchildsemi.com). 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:

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, 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.
2. 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, under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers 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 applications, 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 any 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. |