



March 2015

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.

Applications

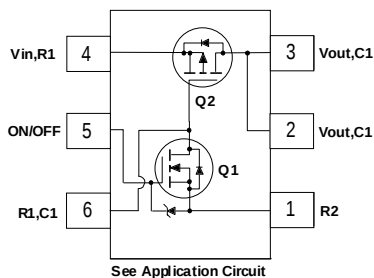
- Power management
- Load actuation

Features

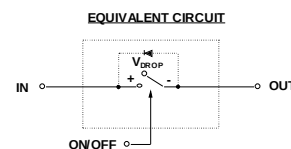
- $V_{\text{DROP}} = 0.2\text{V} @ V_{\text{IN}} = 12\text{V}, I_{\text{L}} = 2.5\text{A}, R_{\text{(ON)}} = 0.08\ \Omega$
 $V_{\text{DROP}} = 0.2\text{V} @ V_{\text{IN}} = 5\text{V}, I_{\text{L}} = 1.6\text{A}, R_{\text{(ON)}} = 0.125\ \Omega$
- Control MOSFET (Q1) includes Zener protection for ESD 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.



SuperSOT™-6



See Application Circuit



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

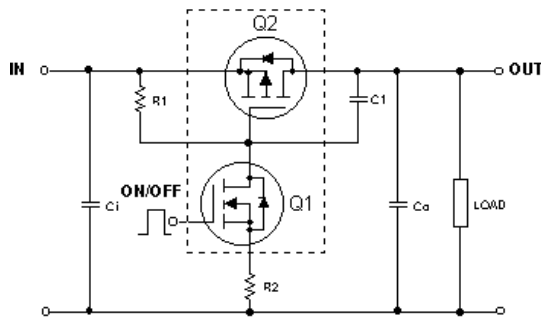
Device Marking	Device	Reel Size	Tape width	Quantity
.330 (. Denotes pin 1)	FDC6330L	7"	8mm	3000 units

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
OFF Characteristics						
I_{FL}	Leakage Current	$V_{IN} = 20\text{ V}, V_{ON/OFF} = 0\text{ V}$			1	μA
ON Characteristics (Note 3)						
V_{DROP}	Conduction Voltage	$V_{IN} = 12\text{ V}, V_{ON/OFF} = 3.3\text{ V}, I_L = 2.5\text{ A}$			0.2	V
		$V_{IN} = 5\text{ V}, V_{ON/OFF} = 3.3\text{ V}, I_L = 1.6\text{ A}$			0.2	V
$R_{(ON)}$	Q_2 - Static On-Resistance	$V_{GS} = -12\text{ V}, I_D = -2.3\text{ A}$ $V_{GS} = -5\text{ V}, I_D = -1.9\text{ A}$		0.054 0.081	0.08 0.125	Ω
I_L	Load Current	$V_{DROP} = 0.2\text{ V}, V_{IN} = 12\text{ V}, V_{ON/OFF} = 3.3\text{ V}$	2.5			A
		$V_{DROP} = 0.2\text{ V}, V_{IN} = 5\text{ V}, V_{ON/OFF} = 3.3\text{ V}$	1.6			

Notes:

1. Range of V_{IN} can be up to 30V, but R_1 and R_2 must be scaled such that V_{GS} of Q_2 does not exceed 20V.
2. $R_{\theta JA}$ 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. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design.
3. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2.0\%$.

FDC6330L Load Switch ApplicationAPPLICATION CIRCUIT**External Component Recommendation:**For applications where $C_0 \leq 1\mu\text{F}$.For slew rate control, select R_2 in the range of $1\text{k} - 4.7\text{k}\Omega$.For additional in-rush current control, $C_1 \leq 1000\text{pF}$ can be added.Select R_1 so that the R_1/R_2 ratio ranges from 10 - 100. R_1 is required to turn Q_2 off.

Typical Characteristics (continued)

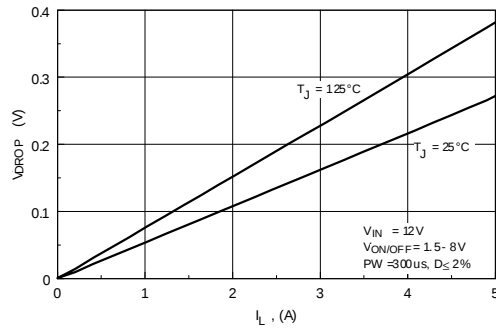


Figure 1. Conduction Voltage Drop Variation with Load Current.

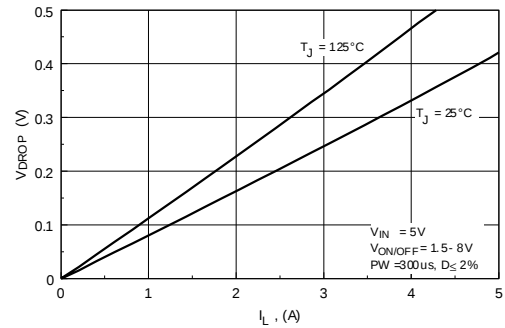


Figure 2. Conduction Voltage Drop Variation with Load Current.

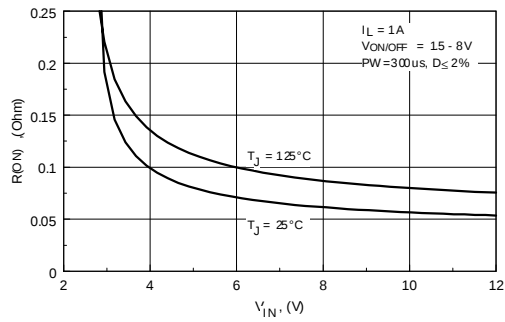


Figure 3. On-Resistance Variation with Input Voltage.

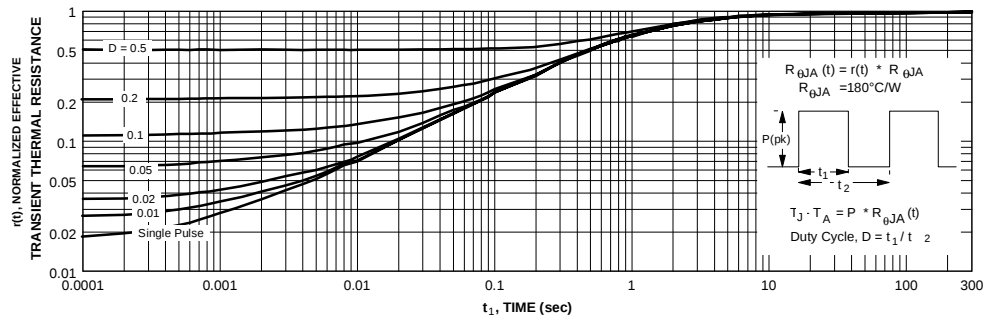


Figure 4. Transient Thermal Response Curve.

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



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™
AttitudeEngine™
Awinda®
AX-CAP®*
BitSiC™
Build it Now™
CorePLUS™
CorePOWER™
CROSSVOLT™
CTL™
Current Transfer Logic™
DEUXPEED®
Dual Cool™
EcoSPARK®
EfficientMax™
ESBC™
F®
Fairchild®
Fairchild Semiconductor®
FACT Quiet Series™
FACT®
FastvCore™
FETBench™
FPS™

F-PFS™
FRFET®
Global Power ResourceSM
GreenBridge™
Green FPS™
Green FPS™ e-Series™
Gmax™
GTO™
IntelliMAX™
ISOPLANAR™
Making Small Speakers Sound Louder
and Better™
MegaBuck™
MICROCOUPLER™
MicroFET™
MicroPak™
MicroPak2™
MillerDrive™
MotionMax™
MotionGrid®
MTi®
MTx®
MVN®
mWSaver®
OptoHit™
OPTOLOGIC®

OPTOPLANAR®
®
Power Supply WebDesigner™
PowerTrench®
PowerXS™
Programmable Active Droop™
QFET®
QS™
Quiet Series™
RapidConfigure™
™
Saving our world, 1mW/W/kW at a time™
SignalWise™
SmartMax™
SMART START™
Solutions for Your Success™
SPM®
STEALTH™
SuperFET®
SuperSOT™-3
SuperSOT™-6
SuperSOT™-8
SupreMOS®
SyncFET™
Sync-Lock™

 SYSTEM
GENERAL®*
TinyBoost®
TinyBuck®
TinyCalc™
TinyLogic®
TINYOPTO™
TinyPower™
TinyPWM™
TinyWire™
TranSiC™
TriFault Detect™
TRUECURRENT®*
μSerDes™
 SerDes®
UHC®
Ultra FRFET™
UniFET™
VCX™
VisualMax™
VoltagePlus™
XS™
Xsens™
仙童®

* 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.

AUTHORIZED USE

Unless otherwise specified in this data sheet, this product is a standard commercial product and is not intended for use in applications that require extraordinary levels of quality and reliability. This product may not be used in the following applications, unless specifically approved in writing by a Fairchild officer: (1) automotive or other transportation, (2) military/aerospace, (3) any safety critical application – including life critical medical equipment – where the failure of the Fairchild product reasonably would be expected to result in personal injury, death or property damage. Customer's use of this product is subject to agreement of this Authorized Use policy. In the event of an unauthorized use of Fairchild's product, Fairchild accepts no liability in the event of product failure. In other respects, this product shall be subject to Fairchild's Worldwide Terms and Conditions of Sale, unless a separate agreement has been signed by both Parties.

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 Terms of Use

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.

Rev. I77