

# 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

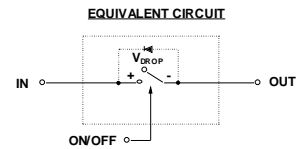
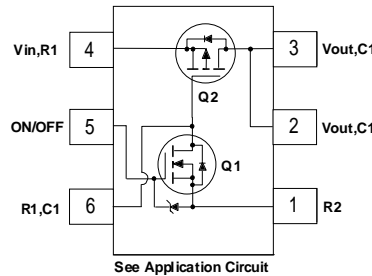
- Power management
- Load actuation

### Features

- $V_{DROP} = 0.2V @ V_{IN} = 12V, I_L = 2.5 A. R_{(ON)} = 0.08 \Omega$   
 $V_{DROP} = 0.2V @ V_{IN} = 5V, I_L = 1.6 A. R_{(ON)} = 0.125 \Omega.$
- 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.



SuperSOT™-6



### Absolute Maximum Ratings T<sub>A</sub>=25°C unless otherwise noted

| Symbol                            | Parameter   | Ratings     | Units |
|-----------------------------------|---|-------------|-------|
| V <sub>IN</sub>                   | Input Voltage Range (Note 1)  | 3 - 20      | V     |
| V <sub>ON/OFF</sub>               | On/Off Voltage Range  | 1.5 - 8     | V     |
| I <sub>D</sub>                    | Load Current - Continuous (Note 2)  | 2.3         | A     |
|                                   |   | 10          |       |
| P <sub>D</sub>                    | Maximum Power Dissipation (Note 1)  | 0.7         | W     |
| T <sub>J</sub> , T <sub>stg</sub> | 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 <sub>θJA</sub> | Thermal Resistance, Junction-to-Ambient (Note 2) | 180 | °C/W |
| R <sub>θJC</sub> | 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 |

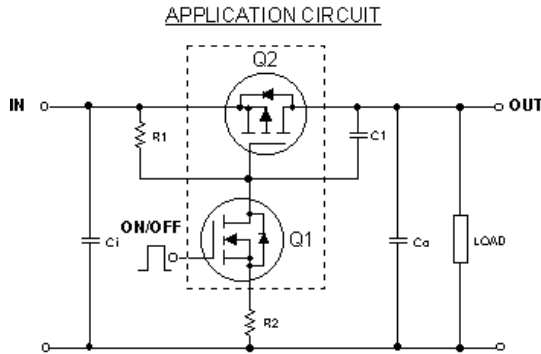
**Electrical Characteristics** T<sub>A</sub>=25°C unless otherwise noted

| Symbol                             | Parameter                             | Test Conditions   | Min | Typ            | Max           | Units |
|------------------------------------|---------------------------------------|---|-----|----------------|---------------|-------|
| <b>OFF Characteristics</b>         |                                       |   |     |                |               |       |
| I <sub>FL</sub>                    | Leakage Current                       | V <sub>IN</sub> = 20 V, V <sub>ON/OFF</sub> = 250 μA  |     |                | 1             | μA    |
| <b>ON Characteristics</b> (Note 3) |                                       |   |     |                |               |       |
| V <sub>DROP</sub>                  | Conduction Voltage                    | V <sub>IN</sub> = 12 V, V <sub>ON/OFF</sub> = 3.3 V, I <sub>L</sub> = 2.5 A                         |     |                | 0.2           | V     |
|                                    |                                       | V <sub>IN</sub> = 5 V, V <sub>ON/OFF</sub> = 3.3 V, I <sub>L</sub> = 1.6 A                          |     |                | 0.2           | V     |
| R <sub>(ON)</sub>                  | Q <sub>2</sub> - Static On-Resistance | V <sub>GS</sub> = -12 V, I <sub>D</sub> = -2.3 A<br>V <sub>GS</sub> = -5 V, I <sub>D</sub> = -1.9 A |     | 0.054<br>0.081 | 0.08<br>0.125 | Ω     |
| I <sub>L</sub>                     | Load Current                          | V <sub>DROP</sub> = 0.2 V, V <sub>IN</sub> = 12 V, V <sub>ON/OFF</sub> = 3.3 V                      | 2.5 |                |               | A     |
|                                    |                                       | V <sub>DROP</sub> = 0.2 V, V <sub>IN</sub> = 5 V, V <sub>ON/OFF</sub> = 3.3 V                       | 1.6 |                |               |       |

Notes:

1. Range of V<sub>in</sub> can be up to 30V, but R<sub>1</sub> and R<sub>2</sub> must be scaled such that V<sub>GS</sub> of Q2 does not exceed 20V.
2. R<sub>θJA</sub> 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<sub>θJC</sub> is guaranteed by design while R<sub>θJA</sub> is determined by the user's board design.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2.0%.

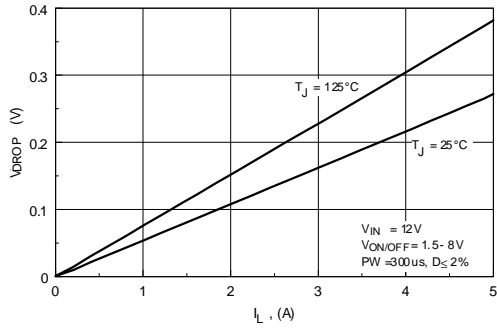
**FDC6330L Load Switch Application**



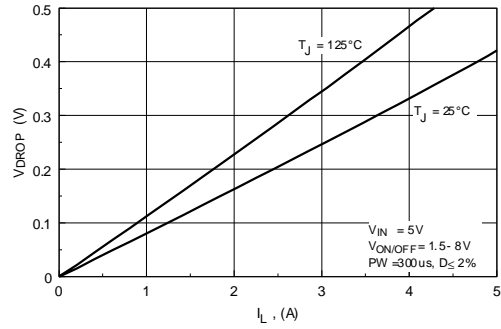
**External Component Recommendation:**

- 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.

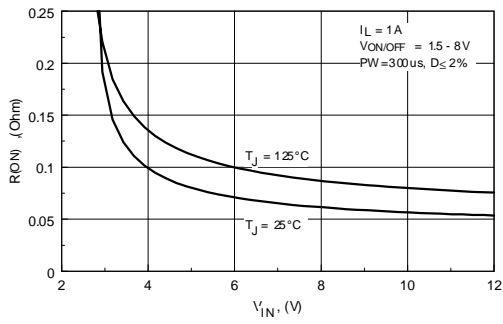
**Typical Characteristics** (continued)



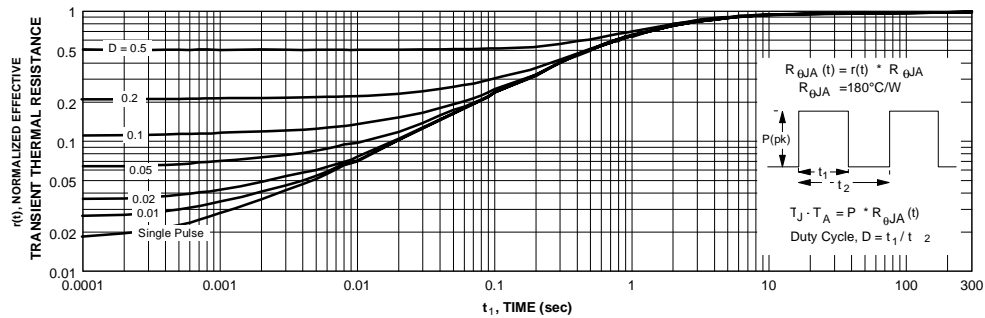
**Figure 1. Conduction Voltage Drop Variation with Load Current.**



**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.

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