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February 2008

## FDC6901L Integrated Load Switch

### Features

- Three Programmable Slew Rates
- Reduces Inrush Current
- Minimizes EMI
- Normal Turn-Off Speed
- Low-Power CMOS Operates Over Wide Voltage Range
- High Performance Trench Technology for Extremely low  $R_{DS(ON)}$
- RoHS Compliant

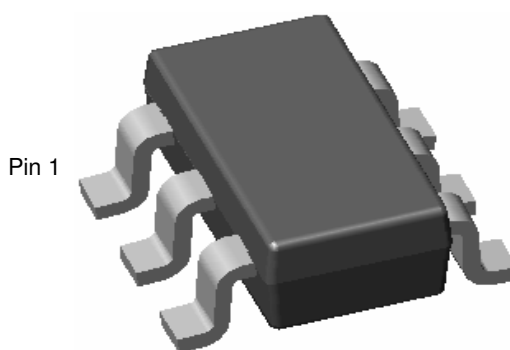
### Applications

- Load switch
- Power management



### General Description

This device is particularly suited for compact power management. In portable electronic equipment where 2.5V to 6V input capability is needed. This load switch integrates a Slew Rate Control Driver that drives a P-Channel Power MOSFET in one tiny SuperSOT™-6 package. The integrated slew rate control driver is specifically designed to control the turn on of the P-Channel MOSFET in order to limit the inrush current in battery switching applications with high capacitance loads. For turn-off, the IC pulls the MOSFET gate up quickly.

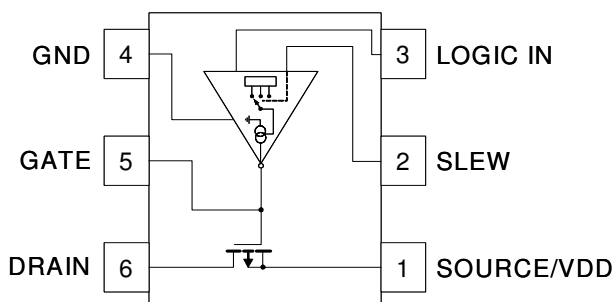


SuperSOT™-6

### Package Marking and Ordering Information

| Device Marking | Device   | Reel Size | Tape Width | Quantity   |
|----------------|----------|-----------|------------|------------|
| .901           | FDC6901L | 7"        | 8mm        | 3000 units |

## Pin Configuration



## Absolute Maximum Ratings

| Parameter                               | Min. | Max. | Unit |
|-----------------------------------------|------|------|------|
| Supply Voltage                          | -0.5 | 10   | V    |
| DC Input Voltage (Logic Inputs)         | -0.7 | 9    | V    |
| Power Dissipation                       |      |      |      |
| Storage Junction Temperature            | -55  | 150  | °C   |
| Thermal Resistance, Junction to Ambient |      | 180  | °C/W |
| Thermal Resistance, Junction to Case    |      | 60   | °C/W |

## Recommended Operating Range

| Parameter                      | Min. | Max. | Unit |
|--------------------------------|------|------|------|
| Supply Voltage                 | 2.7  | 6    | V    |
| Operating Junction Temperature | -55  | 150  | °C   |

## Electrical Characteristics

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

| Parameter                                                                | Symbol      | Conditions                                                               | Min.                | Typ. | Max.         | Units         |
|--------------------------------------------------------------------------|-------------|--------------------------------------------------------------------------|---------------------|------|--------------|---------------|
| <b>Logic Levels</b>                                                      |             |                                                                          |                     |      |              |               |
| Logic High Input Voltage                                                 | $V_{IH}$    | $V_{DD} = 2.7\text{V to } 6.0\text{V}$                                   | 70% $V_{DD}$        |      |              | V             |
| Logic Low Input Voltage                                                  | $V_{IL}$    | $V_{DD} = 2.7\text{V to } 6.0\text{V}$                                   |                     |      | 25% $V_{DD}$ | V             |
| <b>Off Characteristics - Slew Rate Control Driver</b>                    |             |                                                                          |                     |      |              |               |
| Supply Input Breakdown Voltage                                           | $BV_{DG}$   | $I_{DG} = 10\mu\text{A}$ , $V_{IN} = 0\text{V}$ , $V_{SLEW} = 0\text{V}$ | 9                   |      |              | V             |
| Slew Input Breakdown Voltage                                             | $BV_{SLEW}$ | $I_{SLEW} = 10\mu\text{A}$ , $V_{IN} = 0\text{V}$                        | 9                   |      |              | V             |
| Logic Input Breakdown Voltage                                            | $BV_{IN}$   | $I_{IN} = 10\mu\text{A}$ , $V_{SLEW} = 0\text{V}$                        | 9                   |      |              | V             |
| Supply Input Leakage Current                                             | $IR_{DG}$   | $V_{DG} = 8\text{V}$ , $V_{IN} = 0\text{V}$ , $V_{SLEW} = 0\text{V}$     |                     |      | 100          | nA            |
| Slew Input Leakage Current                                               | $IR_{SLEW}$ | $V_{SLEW} = 8\text{V}$ , $V_{IN} = 0\text{V}$                            |                     |      | 100          | nA            |
| Logic Input Leakage Current                                              | $IR_{IN}$   | $V_{IN} = 8\text{V}$ , $V_{SLEW} = 0\text{V}$                            |                     |      | 100          | nA            |
| <b>Off Characteristics - Slew Rate Control Driver + P-Channel MOSFET</b> |             |                                                                          |                     |      |              |               |
| MOSFET Breakdown Voltage                                                 | $BV_{DSS}$  | $I_D = -250\mu\text{A}$                                                  | 9                   |      |              | V             |
| MOSFET Leakage Current                                                   | $I_{DSS}$   | $V_R = 16\text{V}$                                                       |                     |      | 100          | nA            |
| <b>On Characteristics - Slew Rate Control Driver</b>                     |             |                                                                          |                     |      |              |               |
| Output/Gate Current                                                      | $I_G$       | $I_D = -250\mu\text{A}$                                                  | Slew Pin = Open     | 90   |              | $\mu\text{A}$ |
|                                                                          |             |                                                                          | Slew Pin = GND      | 1    |              | $\mu\text{A}$ |
|                                                                          |             |                                                                          | Slew Pin = $V_{DD}$ | 10   |              | nA            |

## Electrical Characteristics Cont.

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

| Parameter                                                                                                 | Symbol       | Conditions                                              | Min. | Typ. | Max. | Units |
|-----------------------------------------------------------------------------------------------------------|--------------|---------------------------------------------------------|------|------|------|-------|
| On Characteristics - P-Channel MOSFET                                                                     |              |                                                         |      |      |      |       |
| Gate Threshold Voltage                                                                                    | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -250\mu A$                      | -0.6 | -1   | -1.5 | V     |
| Static Drain-Source On Resistance                                                                         | $R_{DS(ON)}$ | $V_{GS} = -4.5V, I_D = -1.5A$                           |      | 120  | 145  | mΩ    |
|                                                                                                           |              | $V_{GS} = -2.5V, I_D = -1.2A$                           |      | 170  | 210  | mΩ    |
| On Characteristics - Slew Rate Control Driver + P-Channel MOSFET                                          |              |                                                         |      |      |      |       |
| Dropout Voltage                                                                                           | $V_{DROP}$   | $V_{DD} = 6V, V_{IN} = 2.5V \text{ to } 6V, I_L = 1.5A$ |      | 160  | 300  | mV    |
|                                                                                                           |              | $V_{DD} = 6V, V_{IN} = 2.5V \text{ to } 6V, I_L = 1.2A$ |      | 130  | 300  | mV    |
| Load Switch On Resistance                                                                                 | $R_{ON}$     | $V_{DD} = 6V, V_{IN} = 2.5V \text{ to } 6V, I_L = 1.5A$ |      | 105  | 180  | mΩ    |
|                                                                                                           |              | $V_{DD} = 6V, V_{IN} = 2.5V \text{ to } 6V, I_L = 1.2A$ |      | 110  | 210  | mΩ    |
| Load Current                                                                                              | $I_{LOAD}$   | $V_{GS} = 2.5\text{ V}, V_{DS} = 6\text{ V}$            | 3    |      |      | A     |
| P-Channel Switching Times ( $V_{SUPPLY} = 5.5V, V_{DD} = 5.5V, \text{Logic IN} = 5.5V, I_{LOAD} = 1.5A$ ) |              |                                                         |      |      |      |       |
| Delay On Time                                                                                             | $t_{dON}$    | Slew Pin = Open                                         |      | 6.2  |      | μs    |
|                                                                                                           |              | Slew Pin = GND                                          |      | 42   |      | μs    |
|                                                                                                           |              | Slew Pin = $V_{DD}$                                     |      | 115  |      | μs    |
| $V_{OUT}$ Rise Time                                                                                       | $t_R$        | Slew Pin = Open                                         |      | 6.75 |      | μs    |
|                                                                                                           |              | Slew Pin = GND                                          |      | 124  |      | μs    |
|                                                                                                           |              | Slew Pin = $V_{DD}$                                     |      | 162  |      | μs    |
| Output Slew Rate                                                                                          | dv/dt        | Slew Pin = Open                                         |      | 600  |      | V/ms  |
|                                                                                                           |              | Slew Pin = GND                                          |      | 41   |      | V/ms  |
|                                                                                                           |              | Slew Pin = $V_{DD}$                                     |      | 24   |      | V/ms  |

## Typical Characteristics

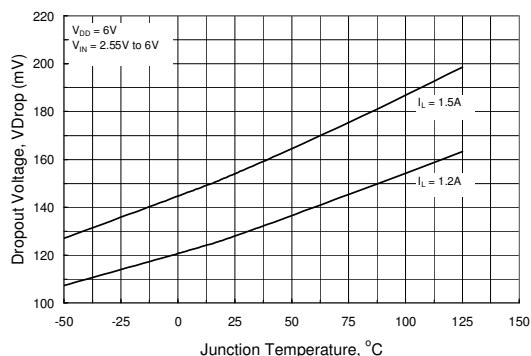


Figure 1. Dropout Voltage vs. Temperature  
(SLEW = OPEN)

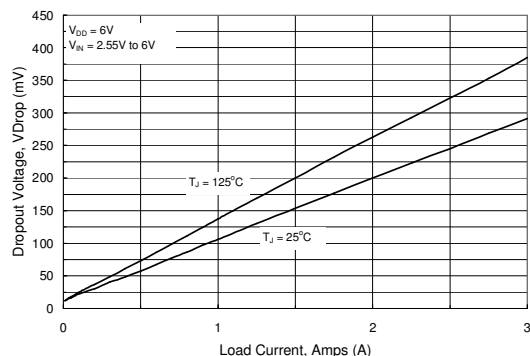


Figure 2. Dropout Voltage vs. Load Current  
(SLEW = OPEN)

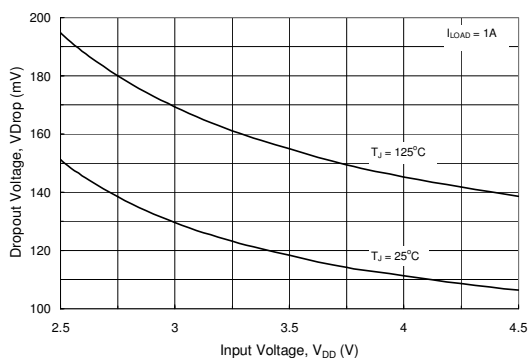


Figure 3. Dropout Voltage vs. Input Voltage  
(SLEW = OPEN)

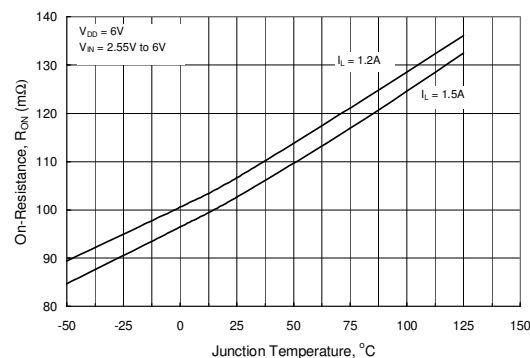


Figure 4. On Resistance vs. Temperature  
(SLEW = OPEN)

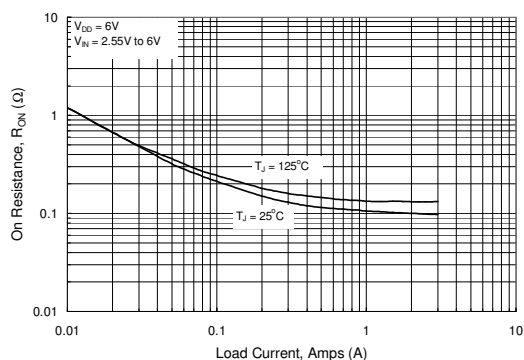


Figure 5. On Resistance vs. Load Current  
(SLEW = OPEN)

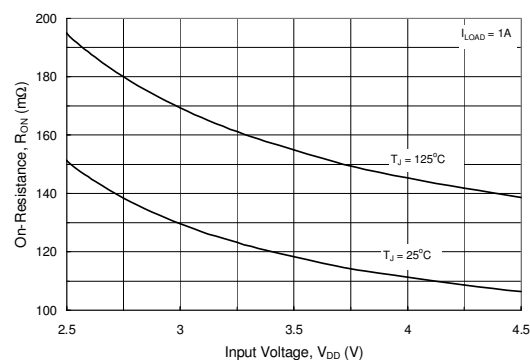


Figure 6. On Resistance vs. Input Voltage  
(SLEW = OPEN)

## Typical Characteristics

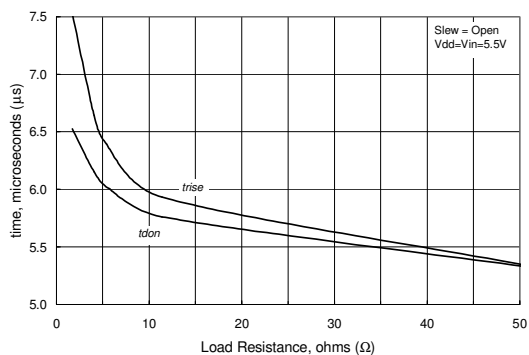


Figure 7. Switching Time vs. Load Resistance  
(SLEW = OPEN)

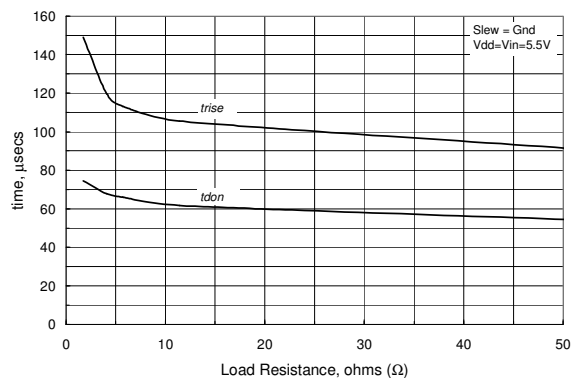


Figure 8. Switching Time vs. Load Resistance  
(SLEW = GROUND)

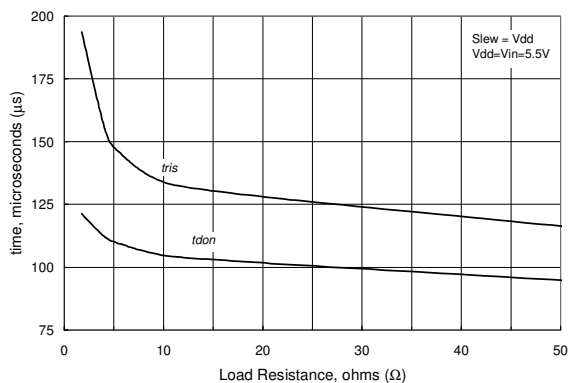


Figure 9. Switching Time vs. Load Resistance  
(SLEW = V<sub>DD</sub>)

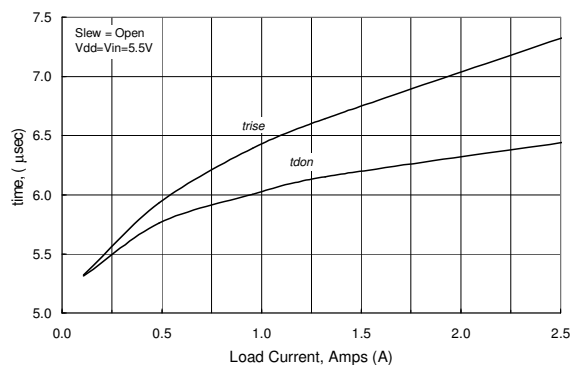


Figure 10. Switching Time vs. Load Current  
(SLEW = OPEN)

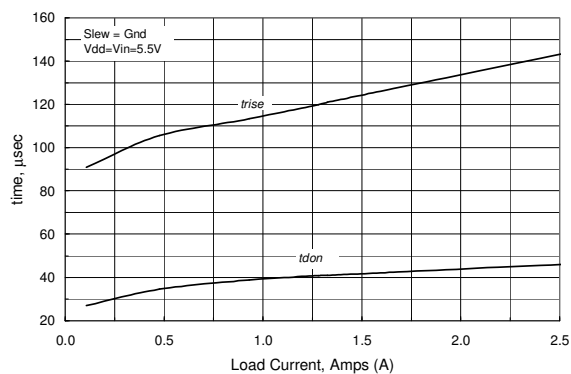


Figure 11. Switching Time vs. Load Current  
(SLEW = GROUND)

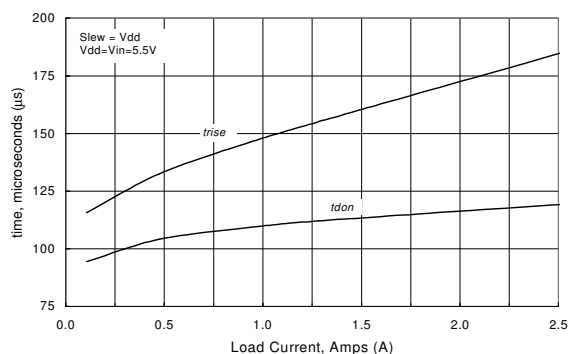
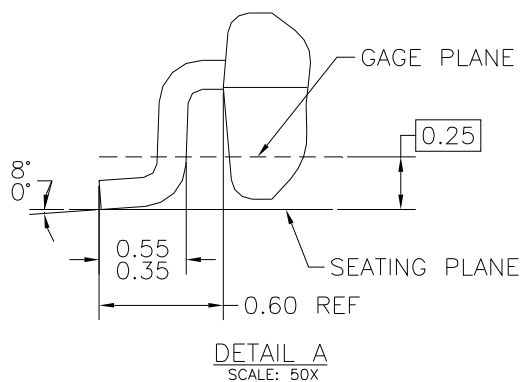
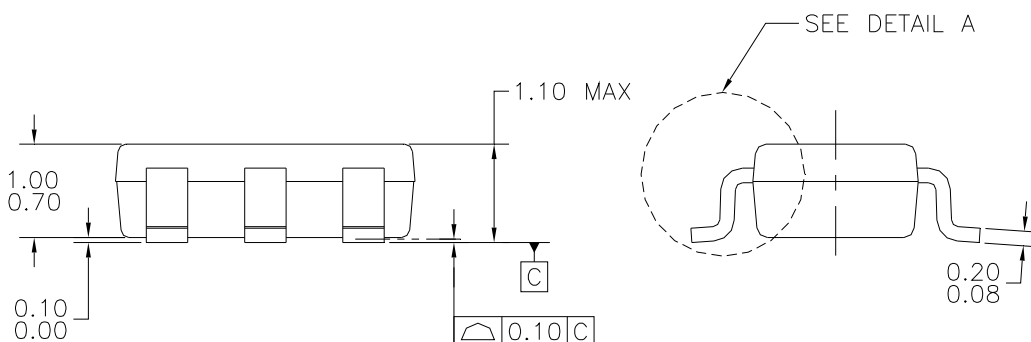
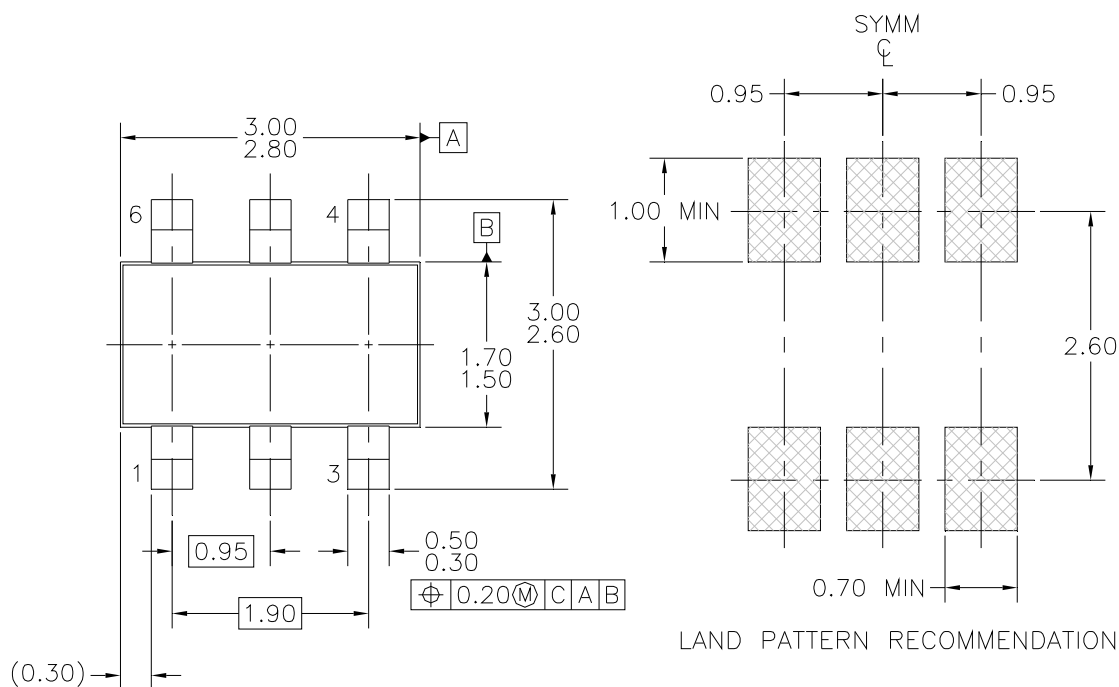


Figure 12. Switching Time vs. Load Current  
(SLEW = V<sub>DD</sub>)

## Dimensional Outline and Pad Layout



NOTES: UNLESS OTHERWISE SPECIFIED

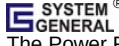
- A) THIS PACKAGE CONFORMS TO JEDEC MO-193, VAR. AA, ISSUE C, DATED JANUARY 2000.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.

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|                                                                                                |                                              | SuperSOT <sup>™</sup> -8               |                                                                                                    |

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