

FDC6901L Integrated Load Switch

Features

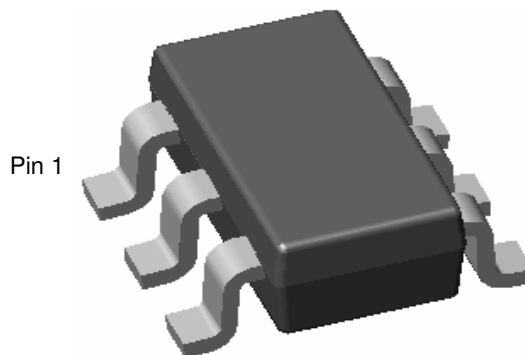
- Three Programmable Slew Rates
- Reduces Inrush Current
- Minimizes EMI
- Normal Turn-Off Speed
- Low-Power CMOS Operates Over Wide Voltage Range
- High Performance Trench Technology for Extremely low $R_{DS(ON)}$
- RoHS Compliant

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.

Applications

- Load switch
- Power management

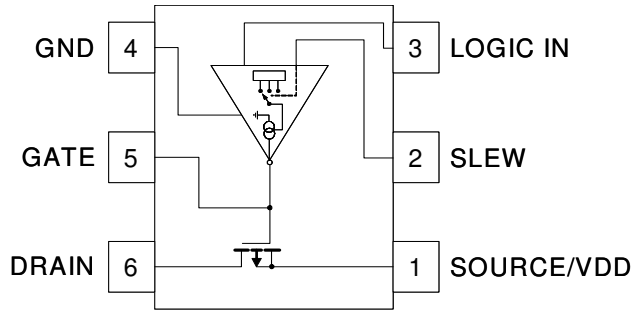


SuperSOT™-6

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°C unless otherwise noted

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Units |
|--|--------------------|--|----------------------------|------|---------------------|-------|
| Logic Levels | | | | | | |
| Logic High Input Voltage | V _{IH} | V _{DD} = 2.7V to 6.0V | 70% V _{DD} | | | V |
| Logic Low Input Voltage | V _{IL} | V _{DD} = 2.7V to 6.0V | | | 25% V _{DD} | V |
| Off Characteristics - Slew Rate Control Driver | | | | | | |
| Supply Input Breakdown Voltage | BV _{DG} | I _{DG} = 10μA, V _{IN} = 0V, V _{SLEW} = 0V | 9 | | | V |
| Slew Input Breakdown Voltage | BV _{SLEW} | I _{SLEW} = 10μA, V _{IN} = 0V | 9 | | | V |
| Logic Input Breakdown Voltage | BV _{IN} | I _{IN} = 10μA, V _{SLEW} = 0V | 9 | | | V |
| Supply Input Leakage Current | I _{RDG} | V _{DG} = 8V, V _{IN} = 0V, V _{SLEW} = 0V | | | 100 | nA |
| Slew Input Leakage Current | I _{RSLEW} | V _{SLEW} = 8V, V _{IN} = 0V | | | 100 | nA |
| Logic Input Leakage Current | I _{RIN} | V _{IN} = 8V, V _{SLEW} = 0V | | | 100 | nA |
| Off Characteristics - Slew Rate Control Driver + P-Channel MOSFET | | | | | | |
| MOSFET Breakdown Voltage | BV _{DSS} | I _D = -250μA | 9 | | | V |
| MOSFET Leakage Current | I _{DSS} | V _R = 16V | | | 100 | nA |
| On Characteristics - Slew Rate Control Driver | | | | | | |
| Output/Gate Current | I _G | I _D = -250μA | Slew Pin = Open | 90 | | μA |
| | | | Slew Pin = GND | 1 | | μA |
| | | | 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 | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -250\mu\text{A}$ | -0.6 | -1 | -1.5 | V |
| Static Drain-Source On Resistance | $R_{DS(ON)}$ | $V_{GS} = -4.5\text{V}, I_D = -1.5\text{A}$ | | 120 | 145 | $\text{m}\Omega$ |
| | | $V_{GS} = -2.5\text{V}, I_D = -1.2\text{A}$ | | 170 | 210 | $\text{m}\Omega$ |
| On Characteristics - Slew Rate Control Driver + P-Channel MOSFET | | | | | | |
| Dropout Voltage | V_{DROP} | $V_{DD} = 6\text{V}, V_{IN} = 2.5\text{V to } 6\text{V}, I_L = 1.5\text{A}$ | | 160 | 300 | mV |
| | | $V_{DD} = 6\text{V}, V_{IN} = 2.5\text{V to } 6\text{V}, I_L = 1.2\text{A}$ | | 130 | 300 | mV |
| Load Switch On Resistance | R_{ON} | $V_{DD} = 6\text{V}, V_{IN} = 2.5\text{V to } 6\text{V}, I_L = 1.5\text{A}$ | | 105 | 180 | $\text{m}\Omega$ |
| | | $V_{DD} = 6\text{V}, V_{IN} = 2.5\text{V to } 6\text{V}, I_L = 1.2\text{A}$ | | 110 | 210 | $\text{m}\Omega$ |
| Load Current | I_{LOAD} | $V_{GS} = 2.5\text{V}, V_{DS} = 6\text{V}$ | 3 | | | A |
| P-Channel Switching Times ($V_{SUPPLY} = 5.5\text{V}, V_{DD} = 5.5\text{V}, \text{Logic IN} = 5.5\text{V}, I_{LOAD} = 1.5\text{A}$) | | | | | | |
| Delay On Time | t_{dON} | Slew Pin | = Open | | 6.2 | μs |
| | | | = GND | | 42 | μs |
| | | | = V_{DD} | | 115 | μs |
| V_{OUT} Rise Time | t_R | Slew Pin | = Open | | 6.75 | μs |
| | | | = GND | | 124 | μs |
| | | | = V_{DD} | | 162 | μs |
| Output Slew Rate | dv/dt | Slew Pin | = Open | | 600 | V/ms |
| | | | = GND | | 41 | V/ms |
| | | | = V_{DD} | | 24 | V/ms |

Typical Characteristics

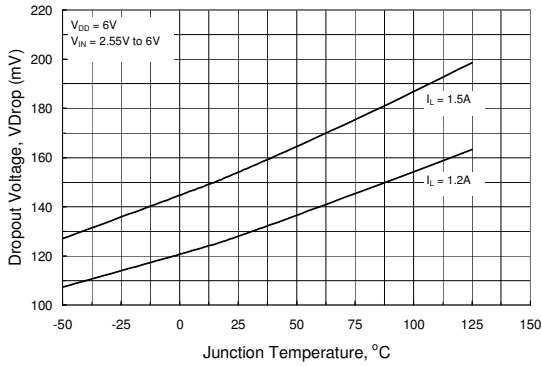


Figure 1. Dropout Voltage vs. Temperature (SLEW = OPEN)

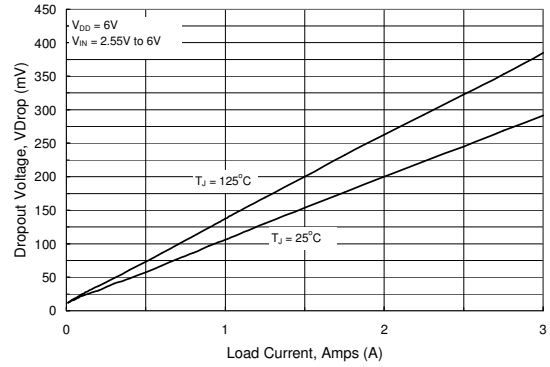


Figure 2. Dropout Voltage vs. Load Current (SLEW = OPEN)

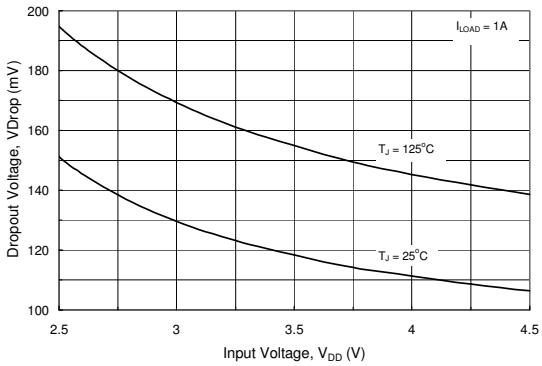


Figure 3. Dropout Voltage vs. Input Voltage (SLEW = OPEN)

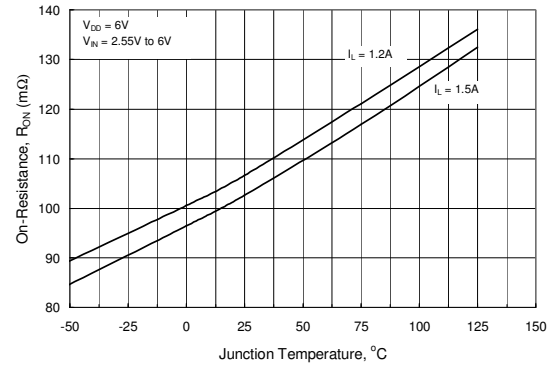


Figure 4. On Resistance vs. Temperature (SLEW = OPEN)

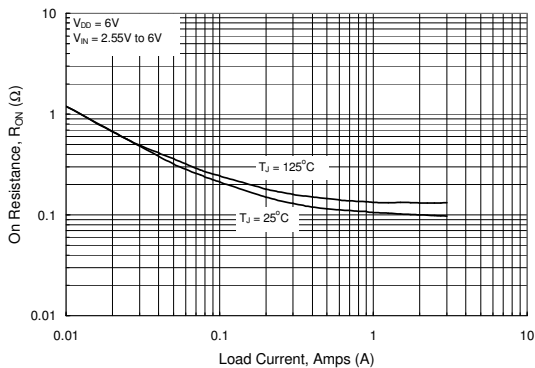


Figure 5. On Resistance vs. Load Current (SLEW = OPEN)

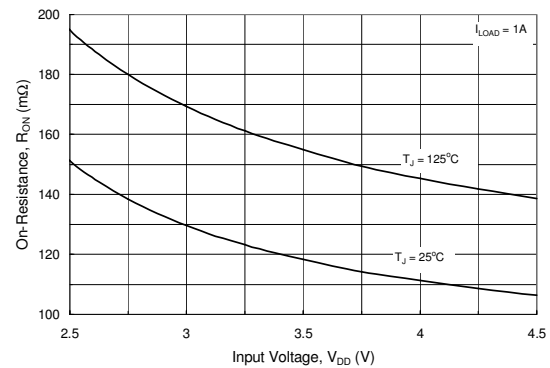


Figure 6. On Resistance vs. Input Voltage (SLEW = OPEN)

Typical Characteristics

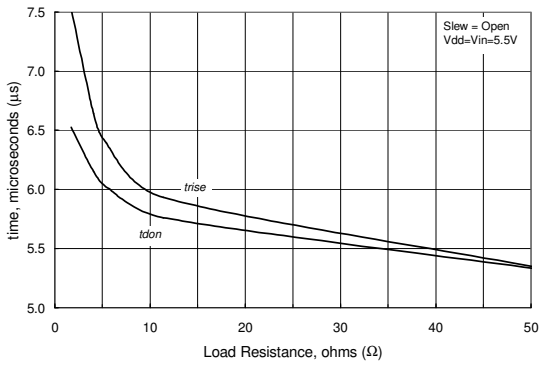


Figure 7. Switching Time vs. Load Resistance (SLEW = OPEN)

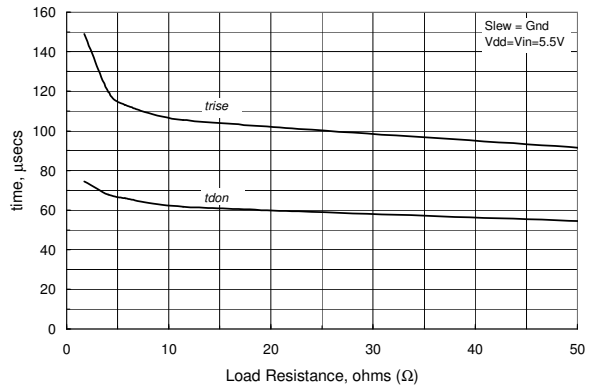


Figure 8. Switching Time vs. Load Resistance (SLEW = GROUND)

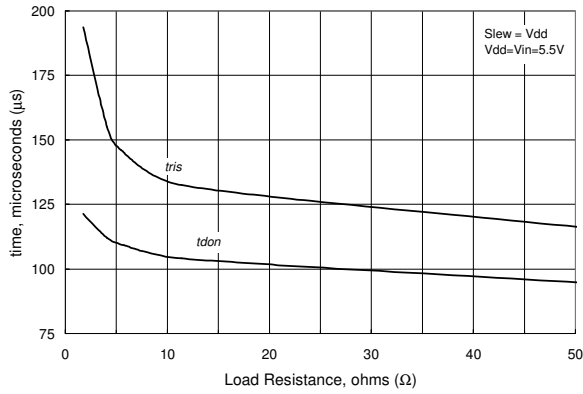


Figure 9. Switching Time vs. Load Resistance (SLEW = V_{DD})

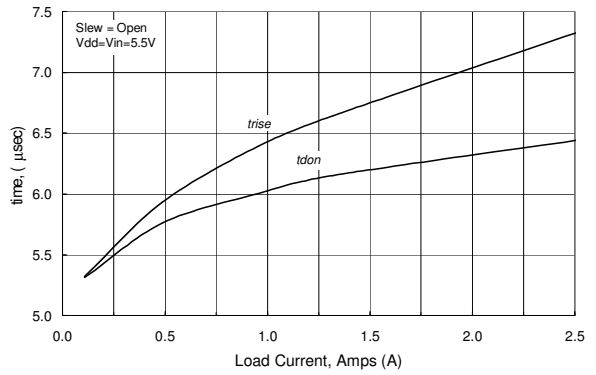


Figure 10. Switching Time vs. Load Current (SLEW = OPEN)

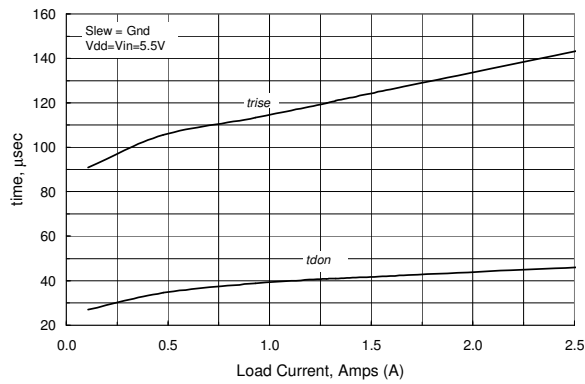


Figure 11. Switching Time vs. Load Current (SLEW = GROUND)

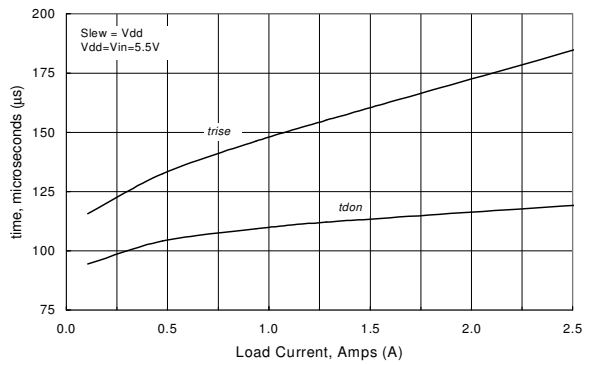
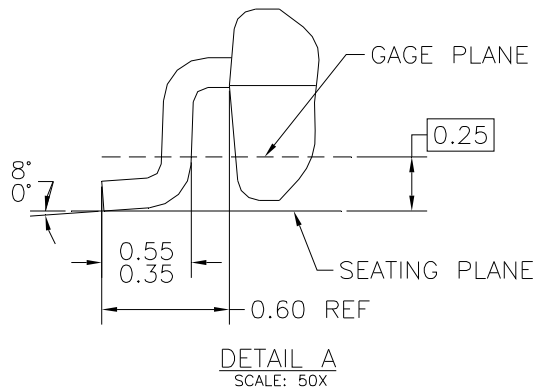
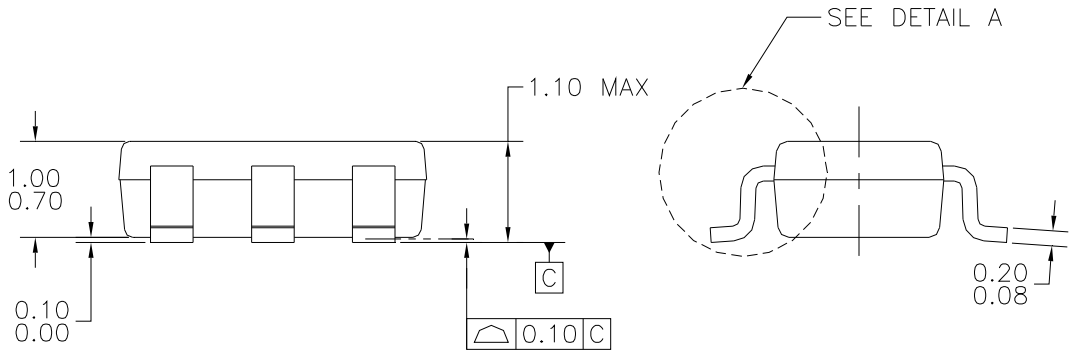
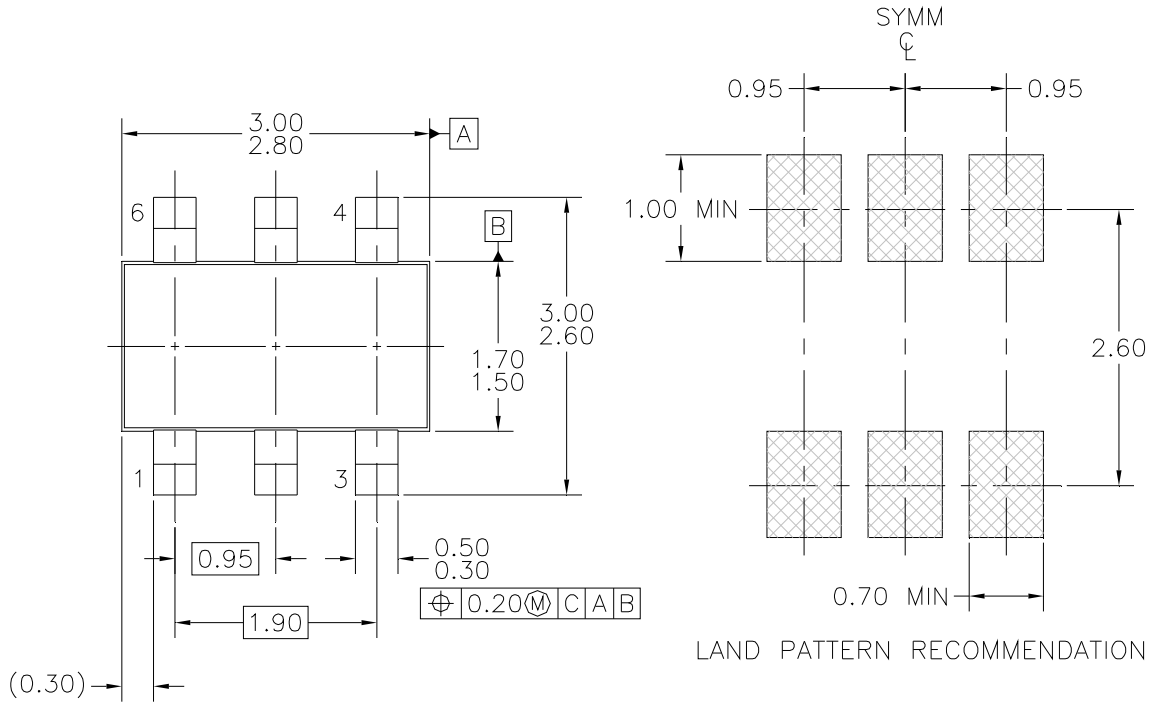


Figure 12. Switching Time vs. Load Current (SLEW = V_{DD})

Dimensional Outline and Pad Layout





- NOTES: UNLESS OTHERWISE SPECIFIED
- A) THIS PACKAGE CONFORMS TO JEDEC MO-193. VAR. AA, ISSUE C, DATED JANUARY 2000.
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