

# FDC6901L Integrated Load Switch

## Features

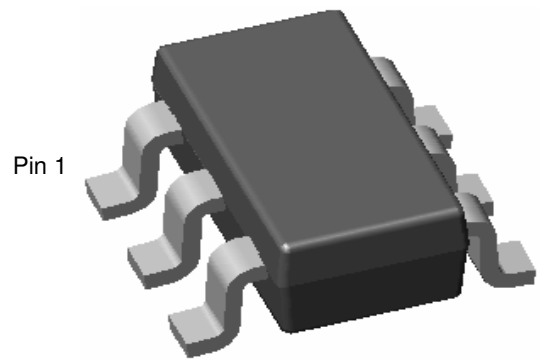
- Three Programmable Slew Rates
- Reduces Inrush Current
- Minimizes EMI
- Normal Turn-Off Speed
- Low-Power CMOS Operates Over Wide Voltage Range
- High Performance Trench Technology for Extremely low  $R_{DS(ON)}$
- RoHS Compliant

## 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

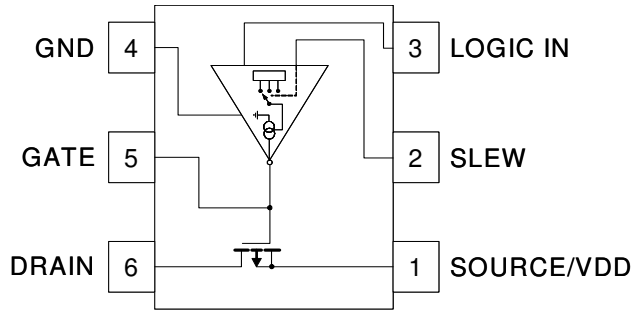


SuperSOT™-6

## 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

$T_A = 25^\circ\text{C}$  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
<b>On Characteristics - P-Channel MOSFET</b>						
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	$\text{m}\Omega$
<b>On Characteristics - Slew Rate Control Driver + P-Channel MOSFET</b>						
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
<b>P-Channel Switching Times</b> ( $V_{SUPPLY} = 5.5\text{V}, V_{DD} = 5.5\text{V}, \text{Logic IN} = 5.5\text{V}, I_{LOAD} = 1.5\text{A}$ )						
Delay On Time	$t_{dON}$	Slew Pin	= Open		6.2	$\mu\text{s}$
			= GND		42	$\mu\text{s}$
			= $V_{DD}$		115	$\mu\text{s}$
$V_{OUT}$ Rise Time	$t_R$	Slew Pin	= Open		6.75	$\mu\text{s}$
			= GND		124	$\mu\text{s}$
			= $V_{DD}$		162	$\mu\text{s}$
Output Slew Rate	dv/dt	Slew Pin	= Open		600	V/ms
			= GND		41	V/ms
			= $V_{DD}$		24	V/ms

## Typical Characteristics

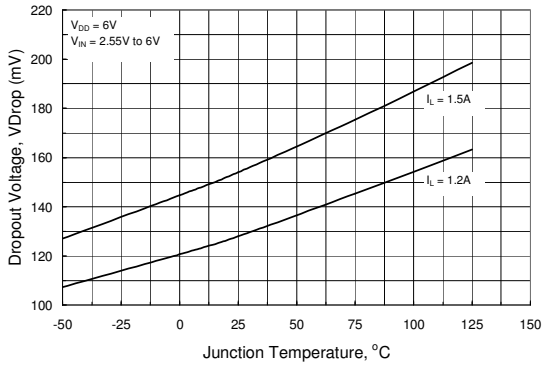


Figure 1. Dropout Voltage vs. Temperature (SLEW = OPEN)

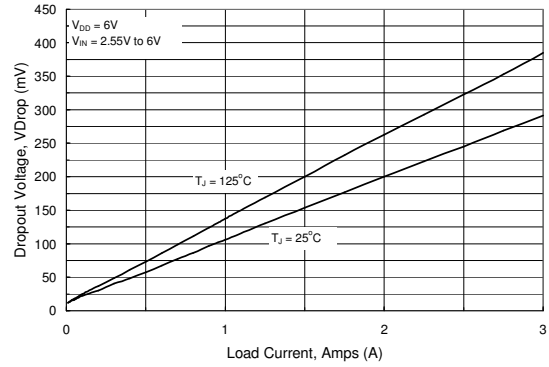


Figure 2. Dropout Voltage vs. Load Current (SLEW = OPEN)

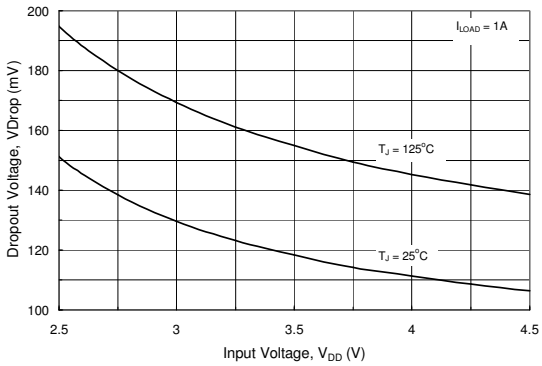


Figure 3. Dropout Voltage vs. Input Voltage (SLEW = OPEN)

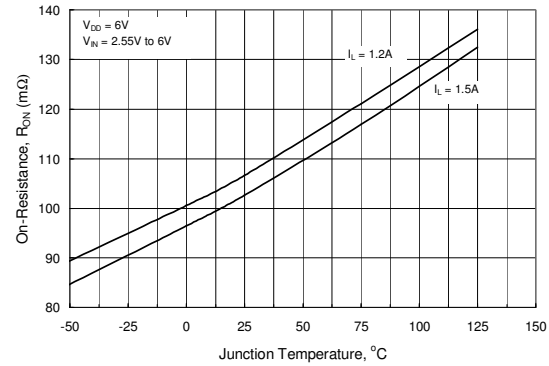


Figure 4. On Resistance vs. Temperature (SLEW = OPEN)

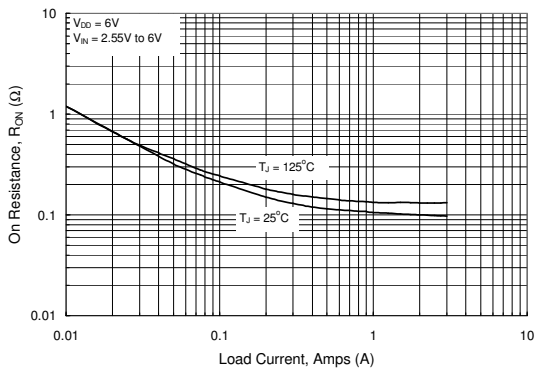


Figure 5. On Resistance vs. Load Current (SLEW = OPEN)

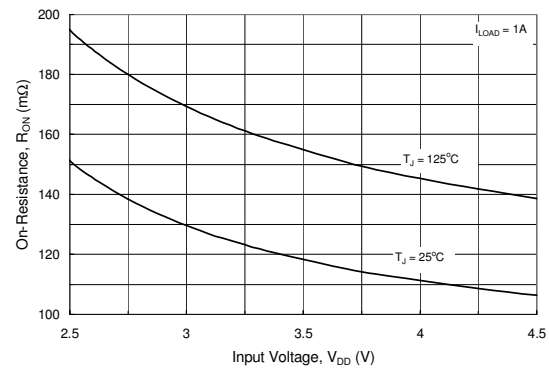


Figure 6. On Resistance vs. Input Voltage (SLEW = OPEN)

## Typical Characteristics

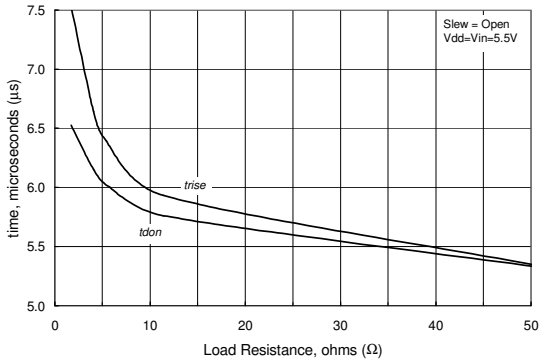


Figure 7. Switching Time vs. Load Resistance (SLEW = OPEN)

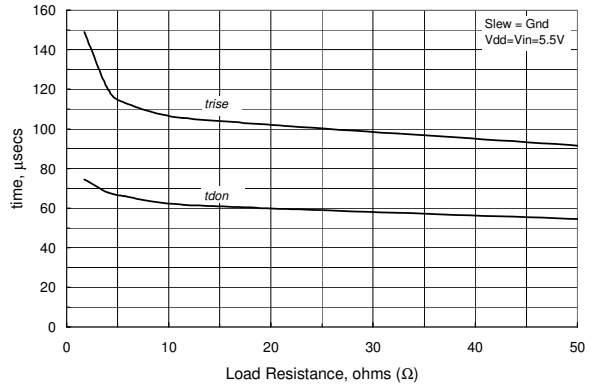


Figure 8. Switching Time vs. Load Resistance (SLEW = GROUND)

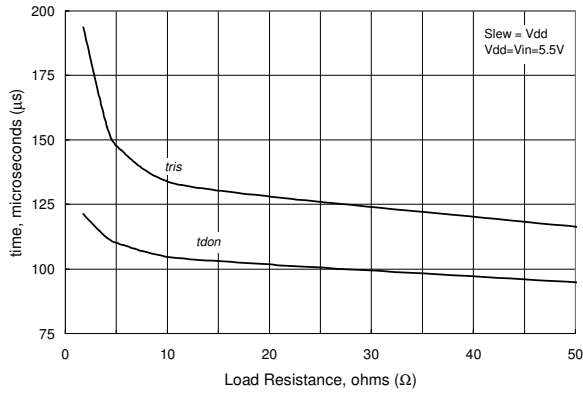


Figure 9. Switching Time vs. Load Resistance (SLEW = V<sub>DD</sub>)

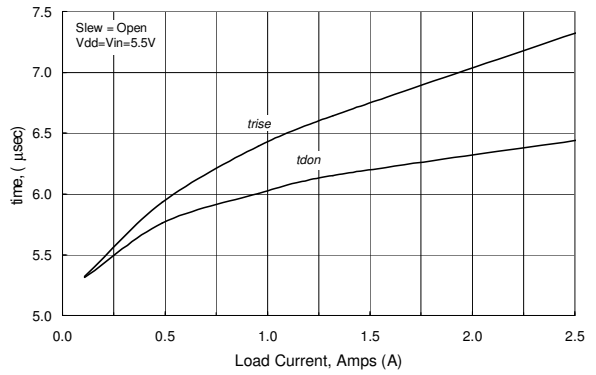


Figure 10. Switching Time vs. Load Current (SLEW = OPEN)

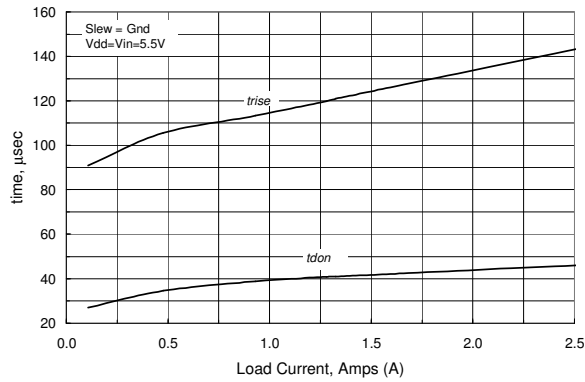


Figure 11. Switching Time vs. Load Current (SLEW = GROUND)

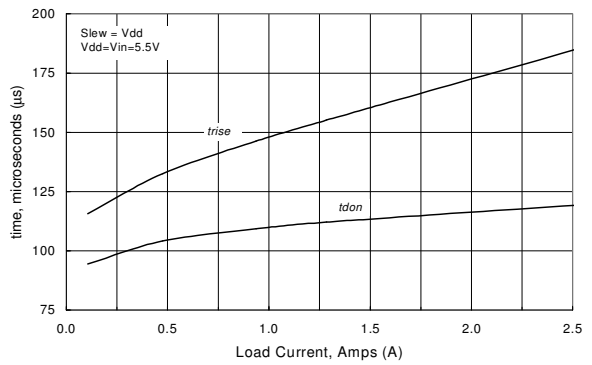
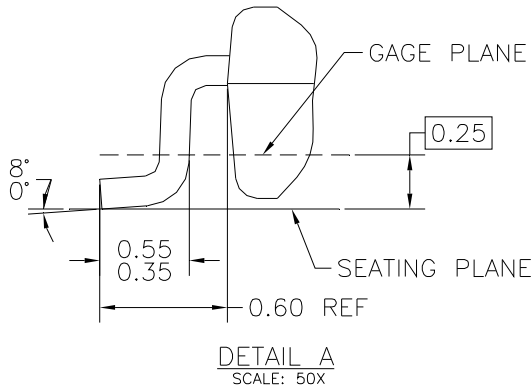
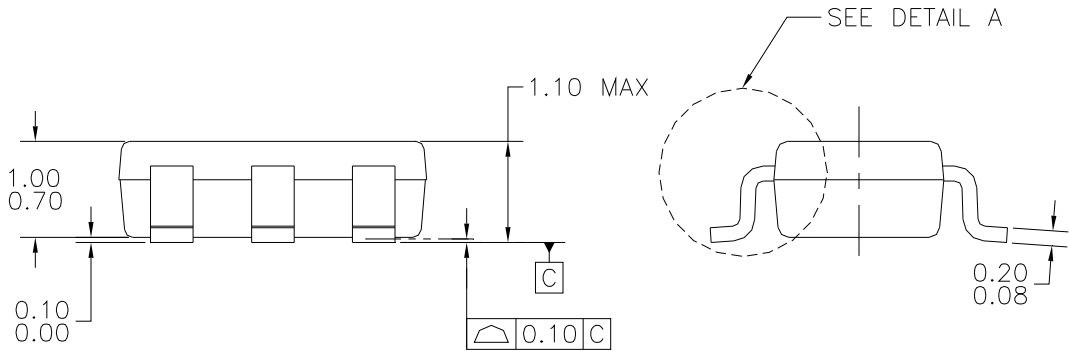
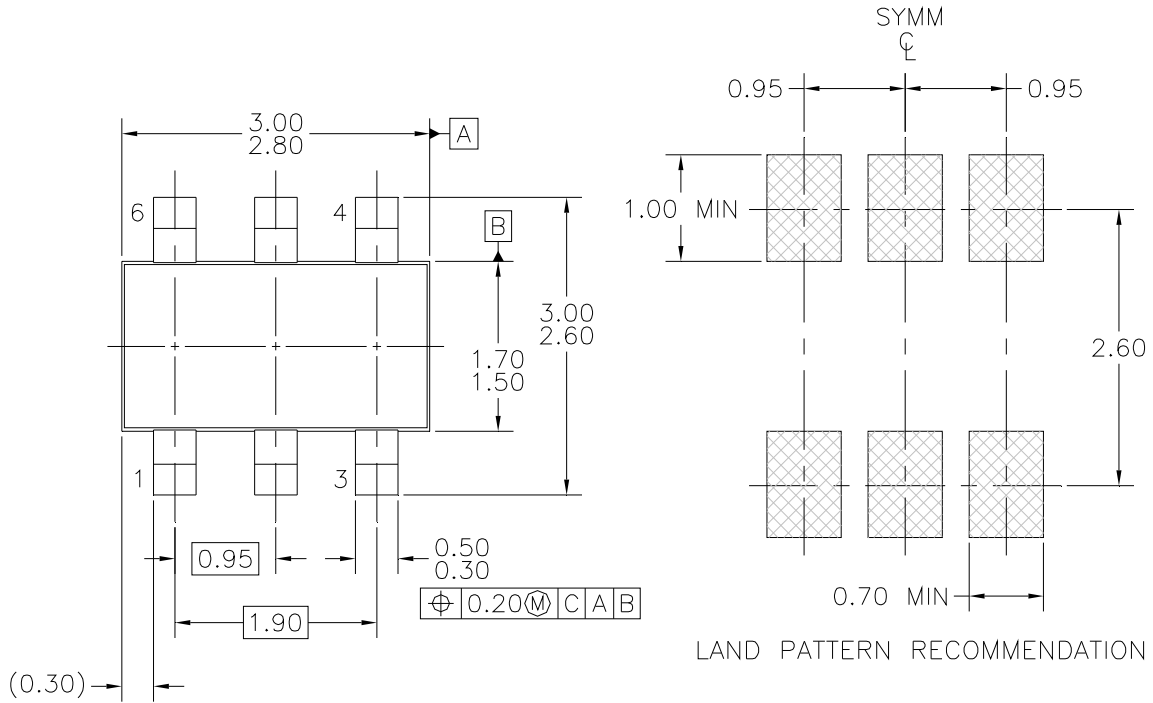


Figure 12. Switching Time vs. Load Current (SLEW = V<sub>DD</sub>)

### 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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