# SLF4004L7

## INVERTER Gate



Wireless
Silicon Discretes

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Never stop thinking.

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**SLF4004L7**
**Preliminary data sheet**
**Revision History:** **2002-01-16** Preliminary

Previous Version: --

| Page | Subjects (major changes since last revision) |
|---|---|
| all | first edition |
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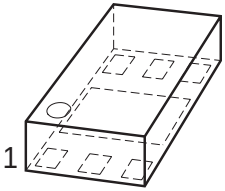
# ULTRA HIGH SPEED
# ULTRA LOW VOLTAGE
# INVERTER GATE




P-TSLP-7-2

## Features

- Low voltage operation : $V_{CC}$ = 0.9~3.6V
- High output drive : +/- 30 mA
- Input and output voltages : max. 3.6V
- Ultra high speed operation : $t_{pd}$ = 2.2ns (typ.) @ 3.3V
- Low power dissipation
- Balanced propagation delay
- Symmetrical output impedance
- Very small leadless package
- ESD performance : HBM > +/- 2000V

**ESD:** Electrostatic discharge sensitive device, observe handling precaution!

| Type | Marking | Pin Configuration | | | | | | Package |
|---|---|---|---|---|---|---|---|---|
| SLF4004L7 | L04 | 1 = IN A | 2 = NC | 3, 5 = NC | 4 = OUT | 6 = VCC | 7 = GND | P-TSLP-7-2 |

**Preliminary**

## Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Supply voltage range | $V_{CC}$ | -0.3 to 4.6 | V |
| DC input voltage | $V_{IN}$ | -0.3 to 3.6 | V |
| DC output voltage | $V_{OUT}$ | -0.3 to $V_{CC}$ | V |
| DC output current | $I_{OUT}$ | +/- 50 | mA |
| Total power dissipation, $T_S$ < tbd°C | $P_{tot}$ | tbd | mW |
| Junction temperature | $T_j$ | 125 | °C |
| Operating temperature range | $T_{OP}$ | -40 to +85 | °C |
| Storage temperature range | $T_{STG}$ | -65 to +150 | °C |
| Thermal resistance: junction-soldering point | $R_{th\ JS}$ | tbd | K/W |

## Recommended Operating Range

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Supply voltage operating | $V_{opr}$ | 0.9 to 3.6 | V |
| DC input voltage | $V_{IN}$ | 0 to 3.6 | V |
| Operating temperature range | $T_{OP}$ | -40 to +85 | °C |

**Preliminary**

## DC Electrical Characteristics

| Parameter | Symbol | VCC (V) | min. | typ. | max. | Unit | Conditions |
|---|---|---|---|---|---|---|---|
| HIGH level input voltage | $V_{IH}$ | 0.9 | $V_{CC}$ - 0.3 | | | V | |
| | | 1.2 | $V_{CC}$ - 0.3 | | | | |
| | | 1.5 | $V_{CC}$ - 0.4 | | | | |
| | | 1.8 | $V_{CC}$ - 0.45 | | | | |
| | | 2.3 | $V_{CC}$ - 0.5 | | | | |
| | | 3.3 | $V_{CC}$ - 0.5 | | | | |
| LOW level input voltage | $V_{IL}$ | 0.9 | | | 0.3 | V | |
| | | 1.2 | | | 0.3 | | |
| | | 1.5 | | | 0.4 | | |
| | | 1.8 | | | 0.45 | | |
| | | 2.3 | | | 0.5 | | |
| | | 3.3 | | | 0.5 | | |
| HIGH level output voltage | $V_{OH}$ | 0.9 ~ 3.6 | $V_{CC}$ - 0.1 | | | V | $I_{OH}$=-100uA |
| | | 0.9 | 0.7 | 0.85 | | V | $I_{OH}$=-0.5mA |
| | | 1.2 | 0.9 | 1.1 | | | $I_{OH}$=-2mA |
| | | 1.5 | 1.2 | 1.35 | | | $I_{OH}$=-4mA |
| | | 1.8 | 1.35 | 1.5 | | | $I_{OH}$=-10mA |
| | | 2.3 | 1.9 | 2.0 | | | $I_{OH}$=-10mA |
| | | 3.3 | 2.9 | 3.1 | | | $I_{OH}$=-10mA |
| LOW level output voltage | $V_{OL}$ | 0.9 ~ 3.6 | | | 0.1 | V | $I_{OL}$=100uA |
| | | 0.9 | | 0.05 | 0.2 | V | $I_{OH}$=0.5mA |
| | | 1.2 | | 0.1 | 0.25 | | $I_{OH}$=2mA |
| | | 1.5 | | 0.15 | 0.3 | | $I_{OH}$=4mA |
| | | 1.8 | | 0.2 | 0.3 | | $I_{OL}$=10mA |
| | | 2.3 | | 0.2 | 0.3 | | $I_{OL}$=10mA |
| | | 3.3 | | 0.15 | 0.3 | | $I_{OL}$=10mA |
| Input leakage current | $I_{IN}$ | 0.9 ~ 3.6 | | | 1 | uA | |
| Quiescent supply current | $I_{CC}$ | 0.9 ~ 3.6 | | | 10 | uA | $V_I$=$V_{CC}$ or GND<br>$I_O$=0 |

**Preliminary**

## AC Electrical Characteristics

| Parameter | Symbol | VCC (V) | min. | typ. | max. | Unit | Conditions |
|---|---|---|---|---|---|---|---|
| Propagation delay time | $t_{pLH}$ $t_{pHL}$ | 0.9 | | 13 | | ns | $C_L$=15pF, $R_L$=1MOhm |
| | | 1.2 | | 4 | | | $C_L$=15pF, $R_L$=2,2KOhm |
| | | 1.5 | | 2.7 | | | |
| | | 1.8 | | 3.5 | | | $C_L$=50pF, $R_L$=500Ohm |
| | | 2.3 | | 2.6 | | | |
| | | 3.3 | | 2.2 | | | |

(Ta=25 ˚C, Input $t_{rise}$=$t_{fall}$=3ns, Fig. 1, 2)

## Capacitive Characteristics

| Parameter | Symbol | VCC (V) | typ. | Unit | Conditions |
|---|---|---|---|---|---|
| Input capacitance | $C_{IN}$ | 0.9 ~ 3.6 | 2 | pF | |
| Power dissipation capacitance | $C_{PD}$ | 0.9 ~ 3.6 | 10 | pF | $f_{IN}$ = 10 MHz (see Note below) |

CPD is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be optained by the equation:

$I_{CC}$(operation) = $C_{PD}$ * $V_{CC}$ * $f_{IN}$ + $I_{CC}$

**Testcircuit**

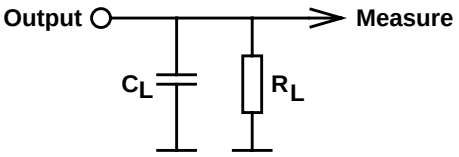



**Figure 1 Testcircuit**

**Preliminary**

## AC Test Waveforms

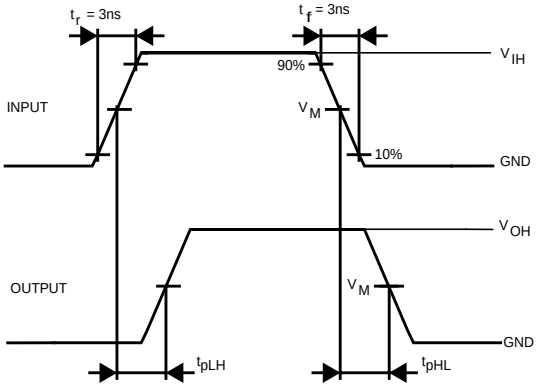


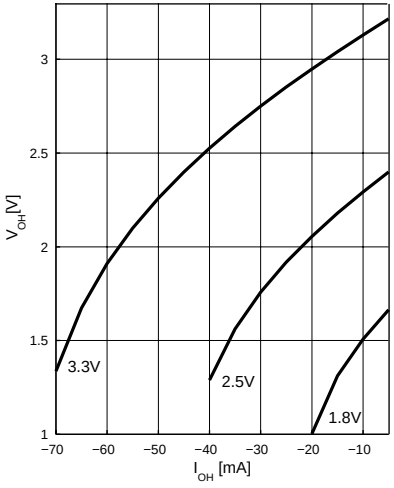

**Figure 2 Test Waveforms**

## Output Voltage as Function of Output Current

### Highlevel Output Voltage

$V_{OH} = f(I_{OH})$

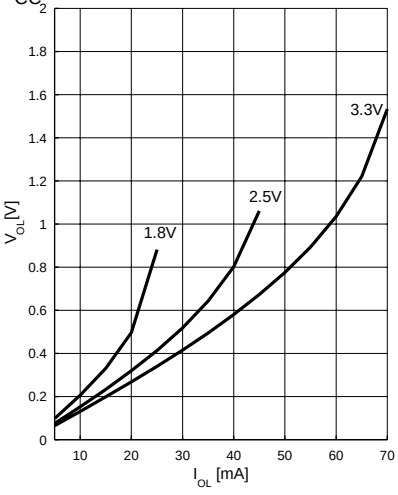
$V_{CC}$ = parameter




### Lowlevel Output Voltage

$V_{OL} = f(I_{OL})$

$V_{CC_2}$ = parameter

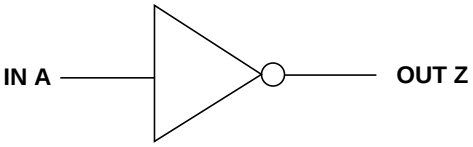


**Preliminary**

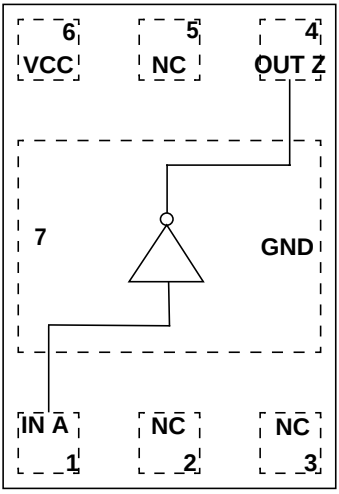
## Truth Table

| INPUT | OUTPUT |
|---|---|
| IN A | OUT Z |
| L | H |
| H | L |

## Logic Symbol




## Connection Diagram




Top View

**Preliminary**

**Outline Drawing P-TSLP-7-2**