

- ◆ CMOS 2-Input NAND Gate
- ◆ High Speed Operation  $t_{pd}=5\text{ns}$  TYP
- ◆ Operating Voltage Range 2V~5.5V
- ◆ Low Power Consumption  $1\mu\text{A}$  MAX

### Applications

- Palmtops
- Digital Equipment

### General Description

The XC74UL00AA is a 2-input CMOS NAND gate, manufactured using silicon gate CMOS fabrication. CMOS low power circuit operation makes high speed LS-TTL operations achievable.

With a wave forming buffer connected internally, stabilized output can be achieved as the circuit offers high noise immunity.

As the XC74UL00AA is integrated into mini molded, SSOT-25 and SOT-25 packages, high density mounting is possible.

### Features

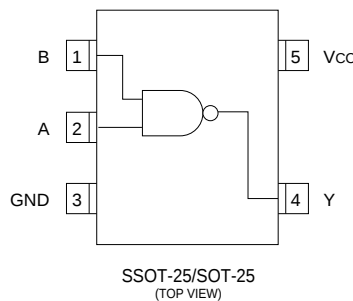
**High Speed Operation:**  $t_{pd}=5\text{ns}$  TYP

**Operating Voltage Range:** 2V~5.5V

**Low Power Consumption:**  $1\mu\text{A}$  MAX

**Space Saving Package:** SSOT-25 and SOT-25

### Pin Configuration



### Function

| INPUT |   | OUTPUT |
|-------|---|--------|
| A     | B | Y      |
| L     | L | H      |
| L     | H | H      |
| H     | L | H      |
| H     | H | L      |

H=High level, L=Low level

### Absolute Maximum Ratings

$T_a = -40^\circ\text{C} \sim 85^\circ\text{C}$

| PARAMETER                          | SYMBOL                             | RATINGS         | UNITS |
|------------------------------------|------------------------------------|-----------------|-------|
| Power Supply Voltage               | VCC                                | -0.5 ~ +6.0     | V     |
| Input Voltage                      | VIN                                | -0.5 ~ +6.0     | V     |
| Output Voltage                     | VOU                                | -0.5 ~ VCC +0.5 | V     |
| Input Diode Current                | I <sub>IK</sub>                    | -20             | mA    |
| Output Diode Current               | I <sub>OK</sub>                    | ±20             | mA    |
| Output Current                     | I <sub>OUT</sub>                   | ±25             | mA    |
| VCC, GND Current                   | I <sub>CC</sub> , I <sub>GND</sub> | ±50             | mA    |
| Continuous Total Power Dissipation | P <sub>d</sub>                     | 150             | mW    |
| Storage Temperature                | T <sub>stg</sub>                   | -65 ~ +150      | °C    |

Note: Voltage is all Ground standardized.

### Ordering Information

XC74UL xxxxxx

↑↑  
a b

| DESIGNATOR | DESCRIPTION                                                                                                               |
|------------|---------------------------------------------------------------------------------------------------------------------------|
| a          | Package Type<br>N=SSOT-25<br>M=SOT-25                                                                                     |
| b          | Device Orientation<br>R=Embossed Tape<br>(Orientation of Device:Right)<br>L=Embossed Tape<br>(Orientation of Device:Left) |

## DC Electrical Characteristics

| PARAMETER                | SYMBOL | CONDITIONS |                          | Ta=25℃    |      |     | Ta=-40~85℃ |      | UNITS |     |
|--------------------------|--------|------------|--------------------------|-----------|------|-----|------------|------|-------|-----|
|                          |        |            |                          | VCC(V)    | MIN  | TYP | MAX        | MIN  |       | MAX |
| Input Voltage            | VIH    | 2.0        |                          |           | 1.5  | -   | -          | 1.5  | -     | V   |
|                          |        | 3.0        |                          |           | 2.1  | -   | -          | 2.1  | -     |     |
|                          |        | 5.5        |                          |           | 3.85 | -   | -          | 3.85 | -     |     |
|                          | VIL    | 2.0        |                          |           | -    | -   | 0.5        | -    | 0.5   | V   |
|                          |        | 3.0        |                          |           | -    | -   | 0.9        | -    | 0.9   |     |
|                          |        | 5.5        |                          |           | -    | -   | 1.65       | -    | 1.65  |     |
| Output Voltage           | VOH    | 2.0        | VIN=VIH or VIL           | IOH=-50μA | 1.9  | 2.0 | -          | 1.9  | -     | V   |
|                          |        | 3.0        |                          |           | 2.9  | 3.0 | -          | 2.9  | -     |     |
|                          |        | 4.5        |                          |           | 4.4  | 4.5 | -          | 4.4  | -     |     |
|                          |        | 3.0        |                          | IOH=-4mA  | 2.58 | -   | -          | 2.48 | -     |     |
|                          |        | 4.5        |                          | IOH=-8mA  | 3.94 | -   | -          | 3.80 | -     |     |
|                          | VOL    | 2.0        | VIN=VIH                  | IOL=50μA  | -    | -   | 0.1        | -    | 0.1   | V   |
|                          |        | 3.0        |                          |           | -    | -   | 0.1        | -    | 0.1   |     |
|                          |        | 4.5        |                          |           | -    | -   | 0.1        | -    | 0.1   |     |
|                          |        | 3.0        |                          | IOL=4mA   | -    | -   | 0.36       | -    | 0.44  |     |
|                          |        | 4.5        |                          | IOL=8mA   | -    | -   | 0.36       | -    | 0.44  |     |
| Input Current            | IIN    | 5.5        | VIN=VCC or GND           |           | -0.1 | -   | 0.1        | -1.0 | 1.0   | μA  |
| Quiescent Supply Current | ICC    | 5.5        | VIN=VCC or GND. IOUT=0μA |           | -    | -   | 1.0        | -    | 10.0  |     |

## Switching Electrical Characteristics

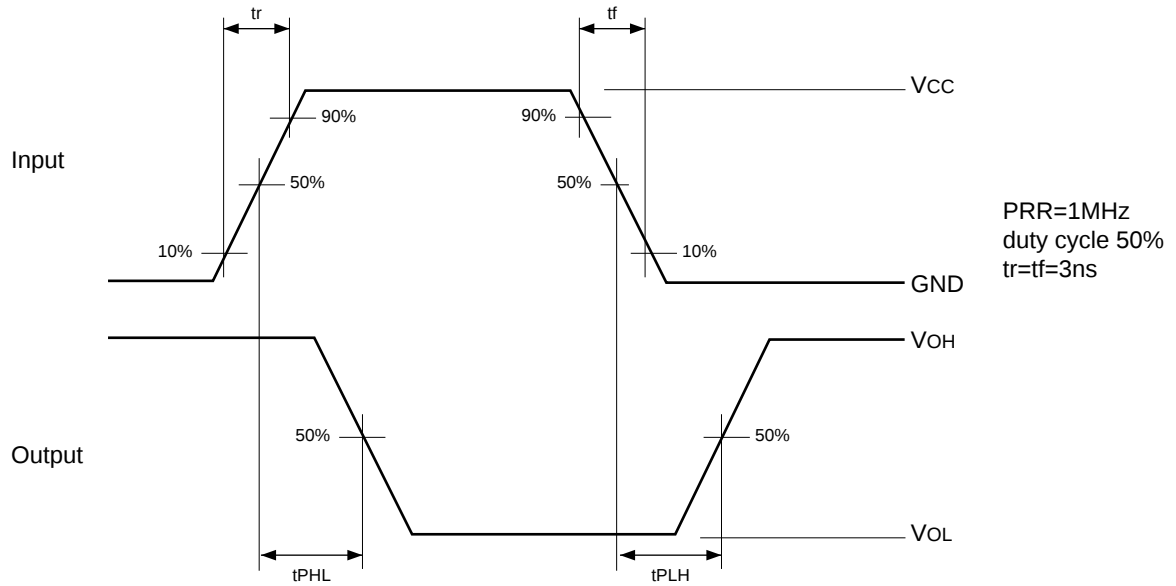
| PARAMETER                     | SYMBOL           | C <sub>L</sub> | V <sub>CC</sub> (V) | CONDITIONS                              | Ta=25°C |     |      | Ta=-40~85°C |     | UNITS |
|-------------------------------|------------------|----------------|---------------------|-----------------------------------------|---------|-----|------|-------------|-----|-------|
|                               |                  |                |                     |                                         | MIN     | TYP | MAX  | MIN         | MAX |       |
| Propagation Delay Time        | t <sub>PLH</sub> | 15pF           | 3.3                 |                                         | -       | 3.7 | 7.9  | 1           | 9.5 | ns    |
|                               |                  |                | 5.0                 |                                         | -       | 2.7 | 5.5  | 1           | 6.5 |       |
|                               |                  | 50pF           | 3.3                 |                                         | -       | 5.4 | 11.4 | 1           | 13  | ns    |
|                               |                  |                | 5.0                 |                                         | -       | 3.6 | 7.5  | 1           | 8.5 |       |
|                               | t <sub>PHL</sub> | 15pF           | 3.3                 |                                         | -       | 3.3 | 7.9  | 1           | 9.5 | ns    |
|                               |                  |                | 5.0                 |                                         | -       | 2.5 | 5.5  | 1           | 6.5 |       |
|                               |                  | 50pF           | 3.3                 |                                         | -       | 4.6 | 11.4 | 1           | 13  | ns    |
|                               |                  |                | 5.0                 |                                         | -       | 3.5 | 7.5  | 1           | 8.5 |       |
| Input Capacitance             | C <sub>IN</sub>  | -              | 5.0                 | V <sub>IN</sub> =V <sub>CC</sub> or GND | -       | 2   | 10   | -           | 10  | pF    |
| Power Dissipation Capacitance | C <sub>pd</sub>  |                |                     | No Load, f=1MHz                         | -       | 9.3 | -    | -           | -   | pF    |

tr=tf=3ns

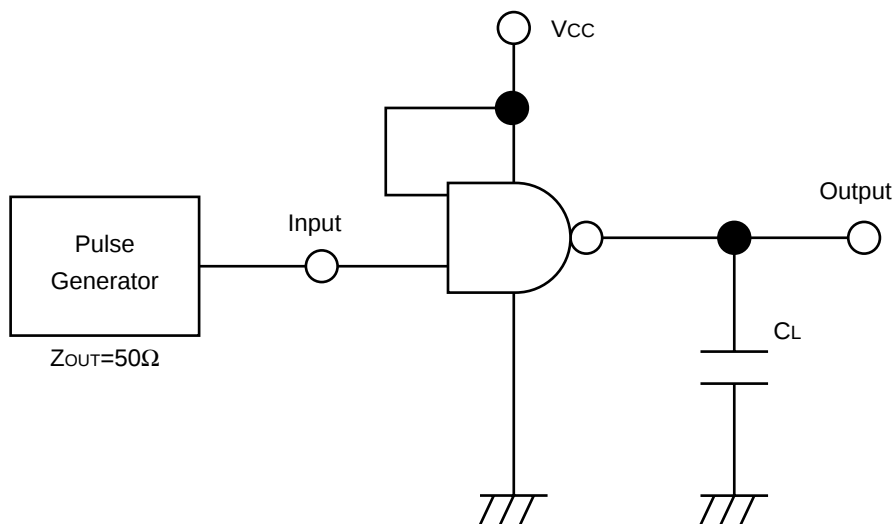
## Recommended Operating Conditions

| PARAMETER                | SYMBOL           | V <sub>CC</sub> (V) | CONDITIONS          | UNITS |
|--------------------------|------------------|---------------------|---------------------|-------|
| Supply Voltage           | V <sub>CC</sub>  | -                   | 2 ~ 5.5             | V     |
| Input Voltage            | V <sub>IN</sub>  | -                   | 0 ~ 5.5             | V     |
| Output Voltage           | V <sub>OUT</sub> | -                   | 0 ~ V <sub>CC</sub> | V     |
| Operating Temperature    | T <sub>opr</sub> | -                   | -40 ~ +85           | °C    |
| Output Current           | I <sub>OH</sub>  | 3.0                 | -4                  | mA    |
|                          |                  | 4.5                 | -8                  |       |
|                          | I <sub>OL</sub>  | 3.0                 | 4                   |       |
|                          |                  | 4.5                 | 8                   |       |
| Input Rise and Fall Time | tr, tf           | 3.3                 | 0 ~ 100             | ns/V  |
|                          |                  | 5.0                 | 0 ~ 20              |       |

## Waveforms



## Typical Application Circuit



Note: open output when measuring supply current