



## U74LVC00A

CMOS IC

### QUAD 2-INPUT NAND GATE

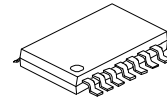
#### ■ DESCRIPTION

The **U74LVC00A** is a quad 2-input NAND gate which performs the Function  $Y = \overline{A \bullet B}$  or  $Y = \overline{A + B}$  in positive logic circuit.

This device has power-down protective circuit to prevent the device from destruction when it is powered down.

#### ■ FEATURES

- \* Operate From 1.5V to 3.6V
- \* Inputs Accept Voltages to 5.5V
- \* High Noise Immunity
- \* Low Power Dissipation
- \* Max  $t_{PD}$  of 5 ns at 3.3V



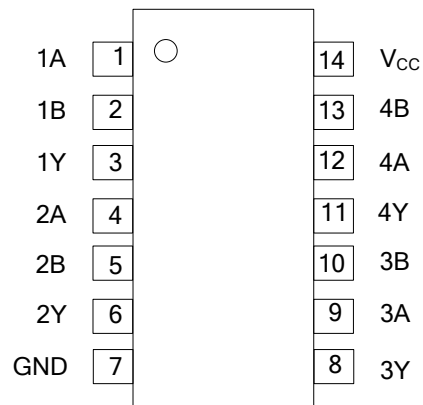
TSSOP-14

#### ■ ORDERING INFORMATION

| Ordering Number  | Package  | Packing   |
|------------------|----------|-----------|
| U74LVC00AG-P14-R | TSSOP-14 | Tape Reel |

|                  |                  |                     |
|------------------|------------------|---------------------|
| U74LVC00AG-P14-R | (1) Packing Type | (1) R: Tape Reel    |
|                  | (2) Package Type | (2) P14: TSSOP-14   |
|                  | (3) Halogen Free | (3) G: Halogen Free |

## PIN CONFIGURATION

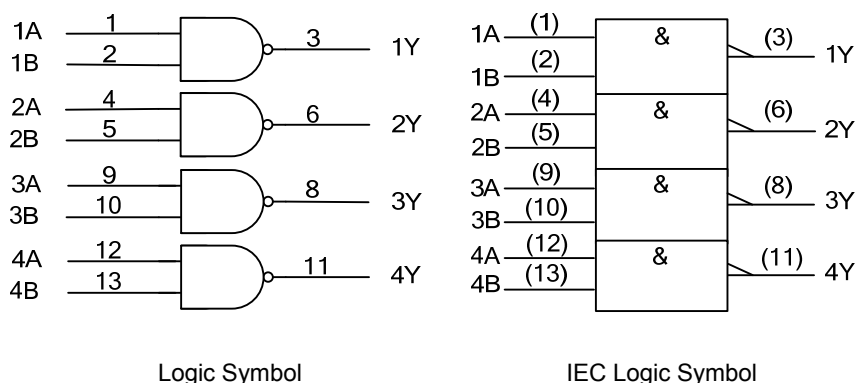


## FUNCTION TABLE

| INPUT(nA) | INPUT(nB) | OUTPUT(nY) |
|-----------|-----------|------------|
| H         | H         | L          |
| H         | L         | H          |
| L         | H         | H          |
| L         | L         | H          |

Note: H: HIGH voltage level; L: LOW voltage level.

## LOGIC DIAGRAM (Positive Logic)



## ■ ABSOLUTE MAXIMUM RATING

| PARAMETER                                                | SYMBOL    | RATINGS             | UNIT |
|----------------------------------------------------------|-----------|---------------------|------|
| Supply Voltage                                           | $V_{CC}$  | -0.5 ~ 6.5          | V    |
| Input Voltage                                            | $V_{IN}$  | -0.5 ~ 6.5          | V    |
| Output Voltage                                           | $V_{OUT}$ | -0.5 ~ $V_{CC}+0.5$ | V    |
| $V_{CC}$ or GND Current (Output In The Power-Off State)  | $I_{CC}$  | ±100                | mA   |
| Continuous Output Current ( $V_{OUT}=0$ to $V_{CC}$ )    | $I_{OUT}$ | ±50                 | mA   |
| Input Clamp Current ( $V_{IN}<0$ )                       | $I_{IK}$  | -50                 | mA   |
| Output Clamp Current ( $V_{OUT}<0$ or $V_{OUT}>V_{CC}$ ) | $I_{OK}$  | -50                 | mA   |
| Power Dissipation                                        | $P_D$     | 500                 | mW   |
| Storage Temperature                                      | $T_{STG}$ | -65 ~ +150          | °C   |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.  
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

## ■ RECOMMENDED OPERATING CONDITIONS

| PARAMETER                     | SYMBOL    | TEST CONDITIONS           | MIN                 | TYP | MAX                 | UNIT |
|-------------------------------|-----------|---------------------------|---------------------|-----|---------------------|------|
| Supply Voltage                | $V_{CC}$  | Operating                 | 1.65                |     | 3.6                 | V    |
| High-Level Input Voltage      | $V_{IH}$  | $V_{CC}=1.65V$ to $1.95V$ | $0.65 \cdot V_{CC}$ |     |                     | V    |
|                               |           | $V_{CC}=2.3V$ to $2.7V$   | 1.7                 |     |                     |      |
|                               |           | $V_{CC}=2.7V$ to $3.6V$   | 2                   |     |                     |      |
| Low-Level Input Voltage       | $V_{IL}$  | $V_{CC}=1.65V$ to $1.95V$ |                     |     | $0.35 \cdot V_{CC}$ | V    |
|                               |           | $V_{CC}=2.3V$ to $2.7V$   |                     |     | 0.7                 |      |
|                               |           | $V_{CC}=2.7V$ to $3.6V$   |                     |     | 0.8                 |      |
| Input Voltage                 | $V_{IN}$  |                           | 0                   |     | 5.5                 | V    |
| Output Voltage                | $V_{OUT}$ |                           | 0                   |     | $V_{CC}$            | V    |
| Operating Ambient Temperature | $T_A$     |                           | -40                 |     | 85                  | °C   |

■ ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

| PARAMETER                                         | SYMBOL        | TEST CONDITIONS                                                                                    | MIN          | TYP | MAX  | UNIT |
|---------------------------------------------------|---------------|----------------------------------------------------------------------------------------------------|--------------|-----|------|------|
| High-Level Output Voltage                         | $V_{OH}$      | $I_{OH}=-100\mu\text{A}$ $V_{CC}: 1.65V$ to $3.6V$                                                 | $V_{CC}-0.2$ |     |      | V    |
|                                                   |               | $I_{OH}=-4\text{mA}$ $V_{CC}=1.65V$                                                                | 1.2          |     |      | V    |
|                                                   |               | $I_{OH}=-8\text{mA}$ $V_{CC}=2.3V$                                                                 | 1.7          |     |      | V    |
|                                                   |               | $I_{OH}=-12\text{mA}$ $V_{CC}=2.7V$                                                                | 2.2          |     |      | V    |
|                                                   |               | $V_{CC}=3V$                                                                                        | 2.4          |     |      |      |
|                                                   |               | $I_{OH}=-24\text{mA}$ $V_{CC}=3.0V$                                                                | 2.2          |     |      | V    |
| Low-Level Output Voltage                          | $V_{OL}$      | $I_{OL}=100\mu\text{A}$ $V_{CC}: 1.65V$ to $3.6V$                                                  |              |     | 0.2  | V    |
|                                                   |               | $I_{OH}=4\text{mA}$ $V_{CC}=1.65V$                                                                 |              |     | 0.45 |      |
|                                                   |               | $I_{OH}=8\text{mA}$ $V_{CC}=2.3V$                                                                  |              |     | 0.7  |      |
|                                                   |               | $I_{OL}=12\text{mA}$ $V_{CC}=2.7V$                                                                 |              |     | 0.4  | V    |
|                                                   |               | $I_{OL}=24\text{mA}$ $V_{CC}=3.0V$                                                                 |              |     | 0.55 | V    |
| Input Leakage Current                             | $I_{I(LEAK)}$ | $V_{IN}=5.5V$ or GND, $V_{CC}=3.6V$                                                                |              |     | ±5   | μA   |
| Quiescent Supply Current                          | $I_Q$         | $V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$ , $V_{CC}=3.6V$                                                |              |     | 10   | μA   |
| Additional Quiescent Supply Current Per Input Pin | $\Delta I_Q$  | $V_{CC}=2.7 \sim 3.6V$ , One input at $V_{CC}-0.6V$ , Other inputs at $V_{CC}$ or GND, $I_{OUT}=0$ |              |     | 500  | μA   |
| Input Capacitance                                 | $C_{IN}$      | $V_{IN}=V_{CC}$ or GND                                                                             |              | 5   |      | pF   |

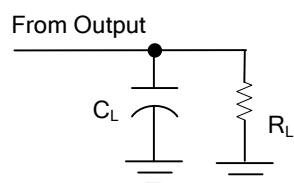
■ SWITCHING CHARACTERISTICS ( $T_A=25^\circ\text{C}$ )

| PARAMETER                                             | SYMBOL   | TEST CONDITIONS                                          | MIN | TYP | MAX | UNIT |
|-------------------------------------------------------|----------|----------------------------------------------------------|-----|-----|-----|------|
| Propagation Delay From Input (nA or nB) To Output(nY) | $t_{PD}$ | $V_{CC}=2.7V$ , $R_L=500\Omega$                          |     |     | 5.1 | ns   |
|                                                       |          | $V_{CC}=3.3\pm 0.3V$ , $R_L=500\Omega$ $C_L=50\text{pF}$ | 1   |     | 4.3 | ns   |

■ OPERATING CHARACTERISTICS ( $T_A=25^\circ\text{C}$ )

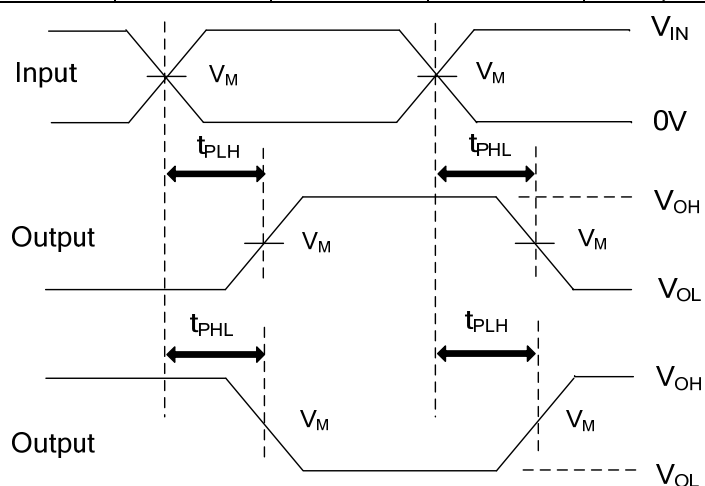
| PARAMETER                     | SYMBOL   | TEST CONDITIONS                                              | TYP | UNIT |
|-------------------------------|----------|--------------------------------------------------------------|-----|------|
| Power Dissipation Capacitance | $C_{PD}$ | $V_{CC}=3.3V\pm 0.3V$ , $C_L=50\text{pF}$ , $f=10\text{MHz}$ | 9.5 | pF   |

## ■ TEST CIRCUIT AND WAVEFORMS



TEST CIRCUIT

| $V_{CC}$         | INPUTS   |              | $V_M$      | $C_L$ | $R_L$        |
|------------------|----------|--------------|------------|-------|--------------|
|                  | $V_{IN}$ | $t_R / t_F$  |            |       |              |
| $1.8V \pm 0.15V$ | $V_{CC}$ | $\leq 2ns$   | $V_{CC}/2$ | 30pF  | 1K $\Omega$  |
| $2.5V \pm 0.2V$  | $V_{CC}$ | $\leq 2ns$   | $V_{CC}/2$ | 30pF  | 500 $\Omega$ |
| 2.7V             | 2.7V     | $\leq 2.5ns$ | 1.5V       | 50pF  | 500 $\Omega$ |
| $3.3V \pm 0.3V$  | 2.7V     | $\leq 2.5ns$ | 1.5V       | 50pF  | 500 $\Omega$ |



PROPAGATION DELAY TIMES

Note:  $C_L$  includes probe and jig capacitance.

All input pulses are supplied by generators having the following characteristics: PRR  $\leq 10MHz$ ,  $Z_o = 50\Omega$ .

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