



U74LV00

CMOS IC

QUADRUPLE 2-INPUT NAND GATE

DESCRIPTION

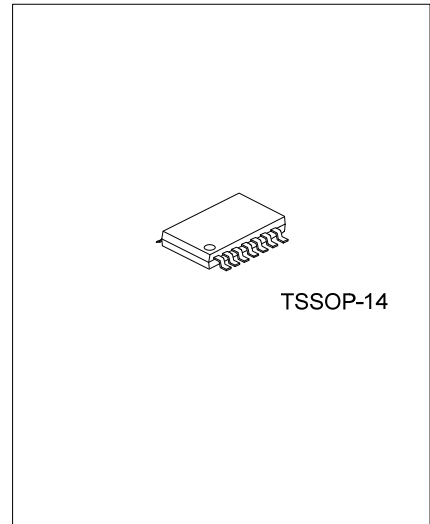
The **U74LV00** is designed for 2V to 5.5V V_{CC} operation.

The **U74LV00** provides the function $Y=A \cdot B$ or $Y=\overline{A} + \overline{B}$ in positive logic.

The device is fully specified for partial-power-down applications using I_{off} . The I_{off} circuitry disables the outputs, preventing damaging current backflow through the devices when it is powered down.

FEATURES

- * 2V to 5.5V V_{CC} Operation
- * Max t_{PD} of 6.5ns at 5V
- * Typical V_{OLP} (Output Ground Bounce) $<0.8V$ at $V_{CC}=3.3V, T_A=25^\circ C$
- * Typical V_{OHV} (output V_{OH} Undershoot) $>2.3V$ at $V_{CC}=3.3V, T_A=25^\circ C$
- * Support Mixed-Mode Voltage Operation on All Ports
- * I_{off} Supports Partial-Power-Down Mode Operation

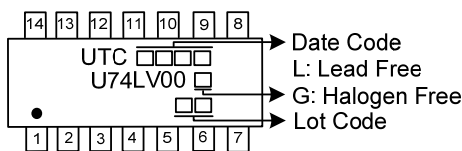


ORDERING INFORMATION

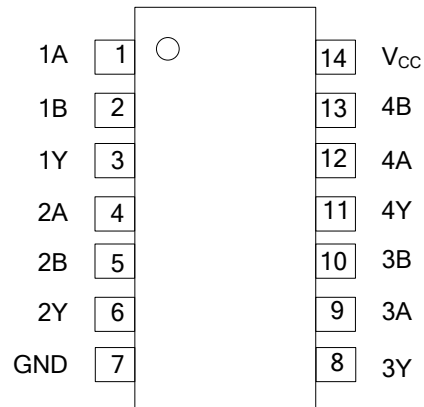
| Ordering Number | | Package | Packing |
|-----------------|----------------|----------|-----------|
| Lead Free | Halogen Free | | |
| U74LV00L-P14-R | U74LV00G-P14-R | TSSOP-14 | Tape Reel |

| | |
|---|---|
| <p>U74LV00G-P14-R</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p> | <p>(1) R: Tape Reel (2) P14: TSSOP-14 (3) G: Halogen Free and Lead Free, L: Lead Free</p> |
|---|---|

MARKING



■ PIN CONFIGURATION

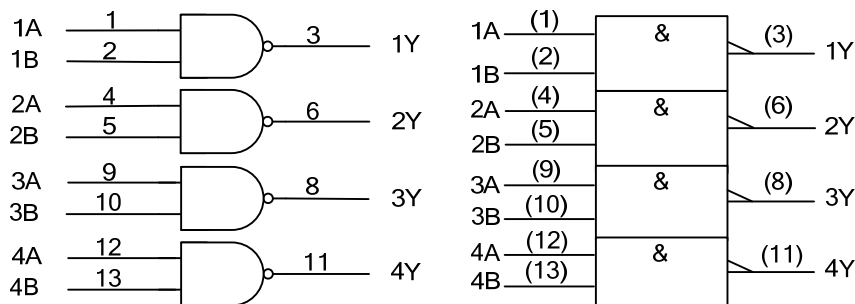


■ FUNCTION TABLE

| 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)



Logic Symbol

IEC Logic Symbol

■ ABSOLUTE MAXIMUM RATING (Unless otherwise specified)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|--|-----------|---------------------|------|
| Supply Voltage | V_{CC} | -0.5 ~ 7 | V |
| Input Voltage range(see note 2) | V_{IN} | -0.5 ~ 7 | V |
| Voltage range applied to any output in the high-impedance or power-off state(see note 2) | V_O | -0.5 ~ 7 | V |
| Output Voltage range(see note 2 and 3) | V_O | -0.5 ~ $V_{CC}+0.5$ | V |
| Continuous current through V_{CC} or GND | I_{CC} | ±50 | mA |
| Input Clamp Current ($V_{IN}<0$) | I_{IK} | -20 | mA |
| Output Clamp Current ($V_{OUT}<0$ or $V_{OUT}>V_{CC}$) | I_{OK} | -50 | mA |
| Continuous output current | I_O | ±25 | mA |
| Storage temperature ranges | T_{STG} | -65 ~ +150 | °C |

Note: 1. 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.

2. The input and output negative-voltage ratings may be exceeded if the output current ratings are observed.

3. The value is limited to 5.5V maximum.

■ THERMAL DATA

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---------------------|---------------|---------|------|
| Junction to Ambient | θ_{JA} | 113 | °C/W |

■ RECOMMENDED OPERATING CONDITIONS (Unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|------------------------------------|---------------------|-------------------------|--------------------|-----|--------------------|------|
| Supply Voltage | V_{CC} | Operating | 2 | | 5.5 | V |
| High-Level Input Voltage | V_{IH} | $V_{CC}=2V$ | 1.5 | | | V |
| | | $V_{CC}=2.3V$ to $2.7V$ | $V_{CC}\times 0.7$ | | | |
| | | $V_{CC}=3V$ to $3.6V$ | $V_{CC}\times 0.7$ | | | |
| | | $V_{CC}=4.5V$ to $5.5V$ | $V_{CC}\times 0.7$ | | | |
| Low-Level Input Voltage | V_{IL} | $V_{CC}=2V$ | | | 0.5 | V |
| | | $V_{CC}=2.3V$ to $2.7V$ | | | $V_{CC}\times 0.3$ | |
| | | $V_{CC}=3V$ to $3.6V$ | | | $V_{CC}\times 0.3$ | |
| | | $V_{CC}=4.5V$ to $5.5V$ | | | $V_{CC}\times 0.3$ | |
| Input Voltage | V_{IN} | | 0 | | 5.5 | V |
| Output Voltage | V_{OUT} | | 0 | | V_{CC} | V |
| Input transition rise or fall time | $\Delta t/\Delta v$ | $V_{CC}=2.3V$ to $2.7V$ | | | 200 | ns/V |
| | | $V_{CC}=3V$ to $3.6V$ | | | 100 | |
| | | $V_{CC}=4.5V$ to $5.5V$ | | | 20 | |
| Operating free-air Temperature | T_A | | -40 | | +125 | °C |

Note: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

■ ELECTRICAL CHARACTERISTICS (Unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---------------------------|----------------------|---|----------------------|-----|------|------|
| High-Level Output Voltage | V _{OH} | V _{CC} =2V to 5.5V, I _{OH} =-50μA | V _{CC} -0.1 | | | V |
| | | V _{CC} =2.3V, I _{OH} =-2mA | 2 | | | |
| | | V _{CC} =3V, I _{OH} =-6mA | 2.48 | | | |
| | | V _{CC} =4.5V, I _{OH} =-12mA | 3.8 | | | |
| Low-Level Output Voltage | V _{OL} | V _{CC} =2V to 5.5V, I _{OL} =50μA | | | 0.1 | V |
| | | V _{CC} =2.3V, I _{OL} =2mA | | | 0.4 | |
| | | V _{CC} =3V, I _{OL} =6mA | | | 0.44 | |
| | | V _{CC} =4.5V, I _{OL} =12mA | | | 0.55 | |
| Input Leakage Current | I _{I(LEAK)} | V _{IN} =5.5V or GND, V _{CC} =0 to 5.5V | | | ±1 | μA |
| Quiescent Supply Current | I _Q | V _{IN} =V _{CC} or GND, I _{OUT} =0, V _{CC} =5.5V | | | 20 | μA |
| Power OFF Leakage Current | I _{off} | V _{IN} or V _{OUT} =0 to 5.5V | | | 5 | μA |
| Input Capacitance | C _{IN} | V _{IN} =V _{CC} or GND, V _{CC} =3.3V | | 3.3 | | pF |
| | | V _{IN} =V _{CC} or GND, V _{CC} =5V | | 3.3 | | |

■ SWITCHING CHARACTERISTICS (Unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT | |
|---|-----------------|----------------------------|----------------------|-----|-----|------|----|
| Propagation Delay From Input (nA or nB) To Output(nY) | t _{PD} | V _{CC} =2.5±0.2V | C _L =15pF | | 7.1 | 12.9 | Ns |
| | | | C _L =50pF | | 9.6 | 16.6 | Ns |
| | | V _{CC} =3.3V±0.3V | C _L =15pF | | 5 | 7.9 | Ns |
| | | | C _L =50pF | | 6.9 | 11.4 | |
| | | V _{CC} =5±0.5V | C _L =15pF | | 3.6 | 5.5 | Ns |
| | | | C _L =50pF | | 4.9 | 7.5 | |

■ NOISE CHARACTERISTICS (V_{CC}=3.3V, C_L=50pF, T_A=25°C, unless otherwise specified)

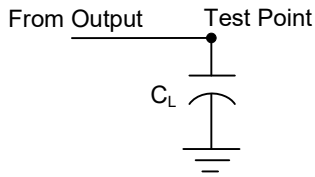
| PARAMETER | SYMBOL | MIN | TYP | MAX | UNIT |
|---|--------------------|------|------|------|------|
| Quiet Output, Maximum Dynamic V _{OL} | V _{OL(P)} | | 0.2 | 0.8 | V |
| Quiet Output, Minimum Dynamic V _{OL} | V _{OL(V)} | | -0.1 | -0.8 | V |
| Quiet Output, Minimum Dynamic V _{OH} | V _{OH(V)} | | 3.1 | | V |
| High-Level Dynamic Input Voltage | V _{IH(D)} | 2.31 | | | V |
| Low-Level Dynamic Input Voltage | V _{IL(D)} | | | 0.99 | V |

Note: Characteristics are for surface-mount packages only.

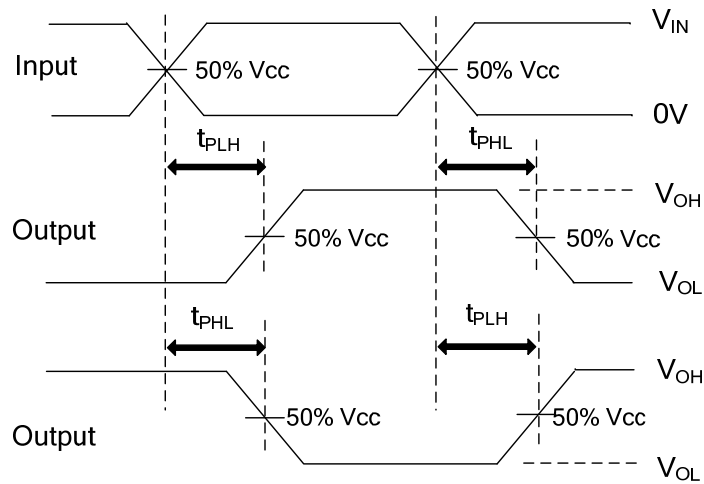
■ OPERATING CHARACTERISTICS (Unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|-------------------------------|-----------------|-----------------------|-------------------------------|-----|-----|------|
| Power Dissipation Capacitance | C _{PD} | V _{CC} =3.3V | C _L =50pF, f=10MHz | | 9.5 | pF |
| | | V _{CC} =5V | | | 11 | |

■ TEST CIRCUIT AND WAVEFORMS



TEST CIRCUIT



PROPAGATION DELAY TIMES

- Note: 1. C_L includes probe and jig capacitance.
 2. All input pulses are supplied by generators having the following characteristics:
 $PRR \leq 1\text{MHz}$, $Z_o=50\Omega$, $t_r \leq 3\text{ns}$, $t_f \leq 3\text{ns}$

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