



U74LVC1G00

CMOS IC

SINGLE 2-INPUT NAND GATE

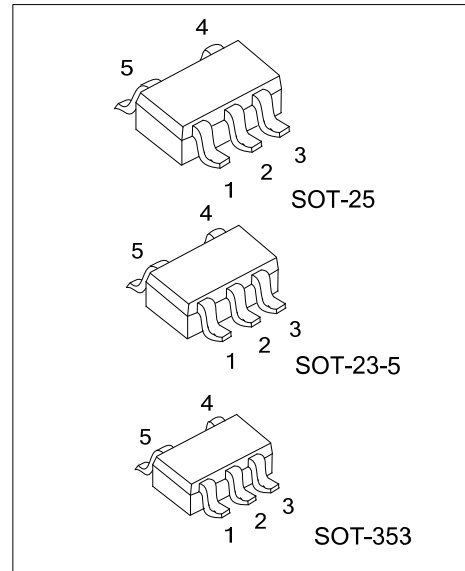
DESCRIPTION

The **U74LVC1G00** is a 2-input NAND gate device which provides the Function $Y=A \bullet B$ or $Y=\overline{A + B}$ in positive logic.

This device has power-down protective circuit preventing device from destruction when it is powered down.

FEATURES

- * Operate From 1.65V to 5.5V
- * Inputs Accept Voltages To 5.5V
- * High Noise Immunity
- * Low Power Dissipation
- * Max t_{PD} of 3.8 ns at 3.3V

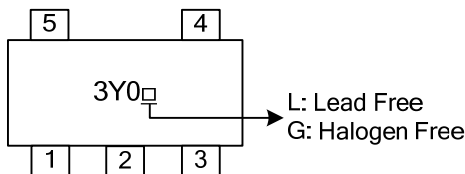


ORDERING INFORMATION

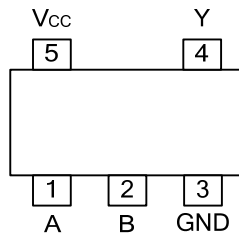
| Ordering Number | | Package | Packing |
|-------------------|-------------------|----------|-----------|
| Lead Free | Halogen Free | | |
| U74LVC1G00L-AE5-R | U74LVC1G00G-AE5-R | SOT-23-5 | Tape Reel |
| U74LVC1G00L-AF5-R | U74LVC1G00G-AF5-R | SOT-25 | Tape Reel |
| U74LVC1G00L-AL5-R | U74LVC1G00G-AL5-R | SOT-353 | Tape Reel |

| | |
|---|--|
| <p>U74LVC1G00G-AE5-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p> | <p>(1) R: Tape Reel (2) AE5: SOT-23-5, AF5: SOT-25, AL5: SOT-353 (3) G: Halogen Free and Lead Free, L: Lead Free</p> |
|---|--|

MARKING



■ PIN CONFIGURATION

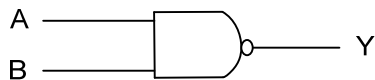


■ FUNCTION TABLE

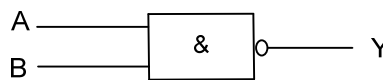
| INPUT(A) | INPUT(B) | OUTPUT(Y) |
|----------|----------|-----------|
| H | H | L |
| H | L | H |
| L | H | H |
| L | L | H |

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

■ LOGIC DIAGRAM (positive logic)



Logic symbol



IEC logic symbol

■ ABSOLUTE MAXIMUM RATING

| PARAMETER | SYMBOL | CONDITIONS | RATINGS | UNIT |
|---------------------------|-----------|---------------------------------|---------------------|------|
| Supply Voltage | V_{CC} | | -0.5 ~ +6.5 | V |
| Input Voltage | V_{IN} | | -0.5 ~ +6.5 | V |
| Output Voltage | V_{OUT} | Output in the Power-off state | -0.5 ~ +6.5 | V |
| | | Output in the High or Low state | -0.5 ~ $V_{CC}+0.5$ | V |
| V_{CC} or GND Current | I_{CC} | Output in the Power-off state | ±100 | mA |
| Continuous Output Current | I_{OUT} | $V_{OUT}=0\sim V_{CC}$ | ±50 | mA |
| Input Clamp Current | I_{IK} | $V_{IN}<0$ | -50 | mA |
| Output Clamp Current | I_{OK} | $V_{OUT}<0$ | -50 | mA |
| Storage Temperature Range | 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.

■ THERMAL DATA

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---------------------|----------|---------|------|
| Junction to Ambient | SOT-23-5 | 280 | °C/W |
| | SOT-25 | 230 | |
| | SOT-353 | 350 | |

■ RECOMMENDED OPERATING CONDITIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|------------------------------------|-------------|--------------------------------------|------|-----|----------|------|
| Supply Voltage | V_{CC} | Operating | 1.65 | | 5.5 | V |
| | | Data retention only | 1.5 | | | V |
| Input Voltage | V_{IN} | | 0 | | 5.5 | V |
| Output Voltage | V_{OUT} | High or Low state | 0 | | V_{CC} | V |
| High-level Output Current | I_{OH} | $V_{CC}=1.65V$ | | | -4 | mA |
| | | $V_{CC}=2.3V$ | | | -8 | mA |
| | | $V_{CC}=3V$ | | | -16 | mA |
| | | $V_{CC}=3V$ | | | -24 | mA |
| | | $V_{CC}=4.5V$ | | | -32 | mA |
| Low-level Output Current | I_{OL} | $V_{CC}=1.65V$ | | | 4 | mA |
| | | $V_{CC}=2.3V$ | | | 8 | mA |
| | | $V_{CC}=3V$ | | | 16 | mA |
| | | $V_{CC}=3V$ | | | 24 | mA |
| | | $V_{CC}=4.5V$ | | | 32 | mA |
| Operating Temperature | T_A | | -40 | | 125 | °C |
| Input Transition Rise or Fall Rate | t_R / t_F | $V_{CC}=1.8V\pm 0.15V, 2.5V\pm 0.2V$ | | | 20 | ns/V |
| | | $V_{CC}=3.3V\pm 0.3V$ | | | 10 | ns/V |
| | | $V_{CC}=5V\pm 0.5V$ | | | 5 | ns/V |

■ ELECTRICAL CHARACTERISTICS (T_A =25°C, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|----------------------|---|----------------------|-----|----------------------|------|
| High-Level Input Voltage | V _{IH} | V _{CC} =1.65V~1.95V | 0.65×V _{CC} | | | V |
| | | V _{CC} =2.3V~2.7V | 1.7 | | | V |
| | | V _{CC} =3V~3.6V | 2 | | | V |
| | | V _{CC} =4.5V~5.5V | 0.7×V _{CC} | | | V |
| Low-Level Input Voltage | V _{IL} | V _{CC} =1.65V~1.95V | | | 0.35×V _{CC} | V |
| | | V _{CC} =2.3V~2.7V | | | 0.7 | V |
| | | V _{CC} =3V~3.6V | | | 0.8 | V |
| | | V _{CC} =4.5V~5.5V | | | 0.3×V _{CC} | V |
| High-Level Output Voltage | V _{OH} | V _{CC} =1.65~5.5V, I _{OH} =-100μA | V _{CC} -0.1 | | | V |
| | | V _{CC} =1.65V, I _{OH} =-4mA | 1.2 | | | V |
| | | V _{CC} =2.3V, I _{OH} =-8mA | 1.9 | | | V |
| | | V _{CC} =3.0V, I _{OH} =-16mA | 2.4 | | | V |
| | | V _{CC} =3.0V, I _{OH} =-24mA | 2.3 | | | V |
| | | V _{CC} =4.5V, I _{OH} =-32mA | 3.8 | | | V |
| Low-Level Output Voltage | V _{OL} | V _{CC} =1.65~5.5V, I _{OL} =100μA | | | 0.1 | V |
| | | V _{CC} =1.65V, I _{OL} =4mA | | | 0.45 | V |
| | | V _{CC} =2.3V, I _{OL} =8mA | | | 0.3 | V |
| | | V _{CC} =3.0V, I _{OL} =16mA | | | 0.4 | V |
| | | V _{CC} =3.0V, I _{OL} =24mA | | | 0.55 | V |
| | | V _{CC} =4.5V, I _{OL} =32mA | | | 0.55 | V |
| Input Leakage Current | I _{I(LEAK)} | V _{IN} =5.5V or GND, V _{CC} =0 ~ 5.5V | | | ±5 | μA |
| Power OFF Leakage Current | I _{OFF} | V _{IN} or V _{OUT} =5.5V, V _{CC} =0V | | | ±10 | μA |
| Quiescent Supply Current | I _Q | V _{IN} =V _{CC} or GND, I _{OUT} =0, V _{CC} =1.65~5.5V | | | 10 | μA |
| Additional Quiescent Supply Current Per Input Pin | ΔI _Q | V _{CC} =3~5.5V, One input at V _{CC} -0.6V, Other inputs at V _{CC} or GND | | | 500 | μA |
| Input Capacitance | C _I | V _{CC} =3.3V, V _{IN} =V _{CC} or GND | | 4 | | pF |

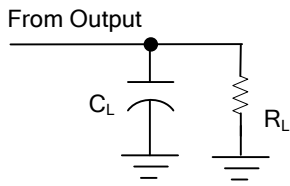
■ SWITCHING CHARACTERISTICS (T_A=25°C, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--|-------------------------------------|---|---|-----|-----|------|
| Propagation delay from input (A or B) to output(Y) | t _{PLH} / t _{PHL} | V _{CC} =1.8±0.15V | C _L =15pF R _L =1MΩ | 2.2 | 7.2 | ns |
| | | V _{CC} =2.5±0.2V | | 0.9 | 4.4 | ns |
| | | V _{CC} =3.3±0.3V | | 0.8 | 3.8 | ns |
| | | V _{CC} =5±0.5V | | 0.8 | 3.4 | ns |
| | | V _{CC} =1.8±0.15V, R _L =1KΩ | C _L =30pF | 3.1 | 9 | ns |
| | | V _{CC} =2.5±0.2V, R _L =500Ω | | 1.3 | 5.5 | ns |
| | | V _{CC} =3.3±0.3V, R _L =500Ω | | 1 | 4.7 | ns |
| | | V _{CC} =5±0.5V, R _L =500Ω | | 1 | 4 | ns |

■ OPERATING CHARACTERISTICS (f=10MHz, T_A=25°C, unless otherwise specified)

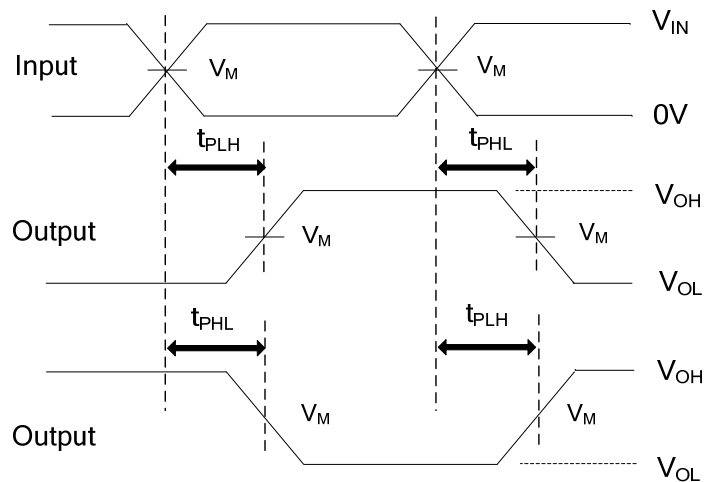
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|-------------------------------|-----------------|-----------------------|-----|-----|-----|------|
| Power Dissipation Capacitance | C _{PD} | V _{CC} =1.8V | | 22 | | pF |
| | | V _{CC} =2.5V | | 22 | | |
| | | V _{CC} =3.3V | | 23 | | |
| | | V _{CC} =5.0V | | 25 | | |

■ TEST CIRCUIT AND WAVEFORMS



TEST CIRCUIT

| V_{CC} | Inputs | | V_M | C_L | R_L |
|------------|----------|------------|------------|-------|-------|
| | V_{IN} | t_R, t_F | | | |
| 1.8V±0.15V | V_{CC} | ≤2ns | $V_{CC}/2$ | 15pF | 1MΩ |
| 2.5V±0.2V | V_{CC} | ≤2ns | $V_{CC}/2$ | 15pF | 1MΩ |
| 3.3V±0.3V | 3V | ≤2.5ns | 1.5V | 15pF | 1MΩ |
| 5V±0.5V | V_{CC} | ≤2.5ns | $V_{CC}/2$ | 15pF | 1MΩ |

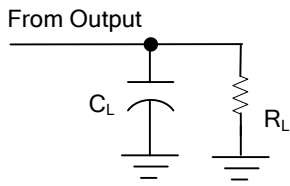


PROPAGATION DELAY TIMES

Note: C_L includes probe and jig capacitance.

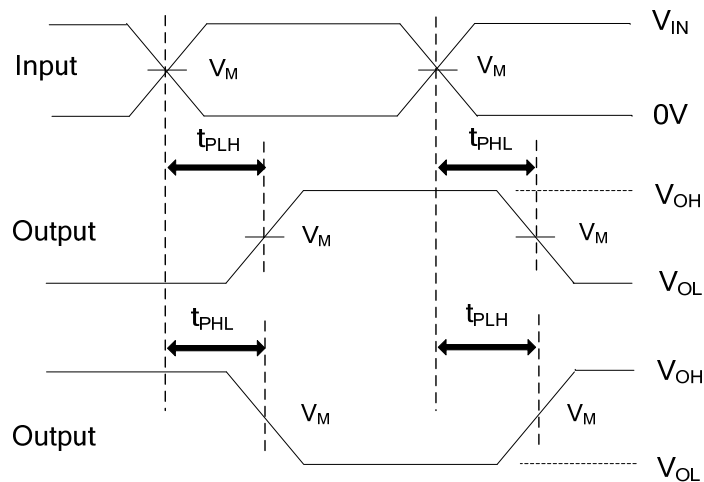
All input pulses are supplied by generators having the following characteristics: $P_{RR} \leq 10\text{MHz}$, $Z_O = 50\Omega$.

■ TEST CIRCUIT AND WAVEFORMS (Cont.)



TEST CIRCUIT

| V _{CC} | Inputs | | V _M | C _L | R _L |
|-----------------|-----------------|---------------------------------|--------------------|----------------|----------------|
| | V _{IN} | t _R , t _F | | | |
| 1.8V±0.15V | V _{CC} | ≤2ns | V _{CC} /2 | 30pF | 1KΩ |
| 2.5V±0.2V | V _{CC} | ≤2ns | V _{CC} /2 | 30pF | 500Ω |
| 3.3V±0.3V | 3V | ≤2.5ns | 1.5V | 50pF | 500Ω |
| 5V±0.5V | V _{CC} | ≤2.5ns | V _{CC} /2 | 50pF | 500Ω |



PROPAGATION DELAY TIMES

Note: C_L includes probe and jig capacitance.

All input pulses are supplied by generators having the following characteristics: P_{RR} ≤10MHz, Z_O = 50Ω.

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.