



U74LVC1G10

CMOS IC

SINGLE 3-INPUT POSITIVE-NAND GATE

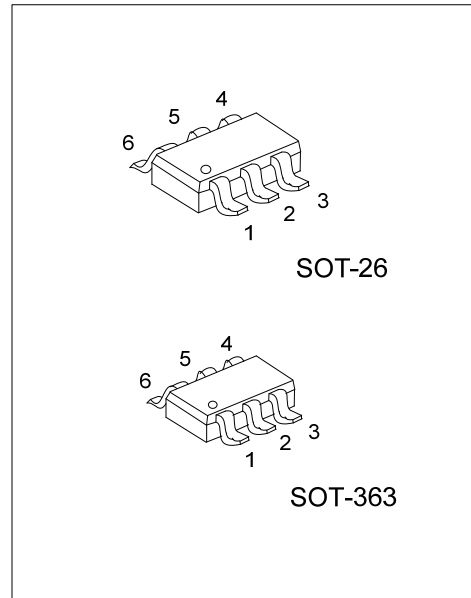
DESCRIPTION

The **U74LVC1G10** performs the Boolean function $Y = \overline{A \cdot B \cdot C}$ or $Y = \overline{\overline{A} + \overline{B} + \overline{C}}$ in positive logic.

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

FEATURES

- * Supports 5-V V_{CC} Operation
- * Inputs Accept Voltages to 5.5V
- * Max t_{pd} of 3.8ns at 3.3V
- * Low power consumption, I_{CC}=10μA (Max)
- * I_{off} supports Partial-Power-Down Mode
- * ±24mA output drive at 3.3V

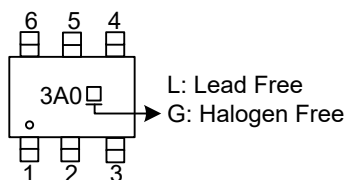


ORDERING INFORMATION

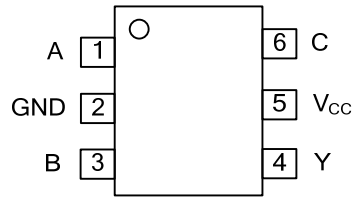
| Ordering Number | | Package | Packing |
|-------------------|-------------------|---------|-----------|
| Lead Free | Halogen Free | | |
| U74LVC1G10L-AG6-R | U74LVC1G10G-AG6-R | SOT-26 | Tape Reel |
| U74LVC1G10L-AL6-R | U74LVC1G10G-AL6-R | SOT-363 | Tape Reel |

| | |
|---|---|
| <p>U74LVC1G10G-AG6-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p> | <p>(1) R: Tape Reel</p> <p>(2) AG6: SOT-26, AL6: SOT-363</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p> |
|---|---|

MARKING



■ PIN CONFIGURATION

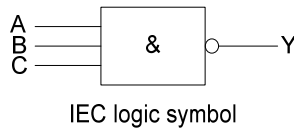
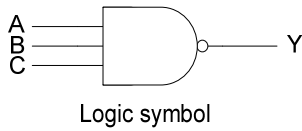


■ FUNCTION TABLE

| INPUTS | | | OUTPUT Y |
|--------|---|---|----------|
| A | B | C | |
| H | H | H | L |
| L | X | X | H |
| X | L | X | H |
| X | X | L | H |

Note: H: HIGH voltage level; L: LOW voltage level; X: Don't care.

■ LOGIC DIAGRAM (positive logic)



■ ABSOLUTE MAXIMUM RATING (Unless otherwise specified)

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|-----------|---------------------|------|
| Supply Voltage | | V_{CC} | -0.5 ~ +6.5 | V |
| Input Voltage | | V_{IN} | -0.5 ~ +6.5 | V |
| Output Voltage | Output in the high or low state | V_{OUT} | -0.5 ~ $V_{CC}+0.5$ | V |
| | Output in the high-impedance or power-off state | | -0.5 ~ +6.5 | V |
| V_{CC} or GND Current | | 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 ($V_{OUT}<0$) | | I_{OK} | -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-26 | θ_{JA} | 230 | °C/W |
| | SOT-363 | | 350 | °C/W |

■ RECOMMENDED OPERATING CONDITIONS (Unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|------------------------------------|---------------------|---|----------------------|-----|----------------------|------|
| Supply Voltage | V_{CC} | Operating | 1.65 | | 5.5 | V |
| Input Voltage | V_{IN} | | 0 | | 5.5 | V |
| Output Voltage | V_{OUT} | High or low state | 0 | | V_{CC} | V |
| High-level input voltage | V_{IH} | $V_{CC}=1.65V$ to $1.95V$ | $0.65 \times V_{CC}$ | | | V |
| | | $V_{CC}=2.3V$ to $2.7V$ | 1.7 | | | |
| | | $V_{CC}=3V$ to $3.6V$ | 2 | | | |
| | | $V_{CC}=4.5V$ to $5.5V$ | $0.7 \times V_{CC}$ | | | |
| Low-level input voltage | V_{IL} | $V_{CC}=1.65V$ to $1.95V$ | | | $0.35 \times V_{CC}$ | V |
| | | $V_{CC}=2.3V$ to $2.7V$ | | | 0.7 | |
| | | $V_{CC}=3V$ to $3.6V$ | | | 0.8 | |
| | | $V_{CC}=4.5V$ to $5.5V$ | | | $0.3 \times V_{CC}$ | |
| Input Transition Rise or Fall Rate | $\Delta t/\Delta v$ | $V_{CC}=1.8V \pm 0.15V$, $2.5V \pm 0.2V$ | | | 20 | ns/V |
| | | $V_{CC}=3.3V \pm 0.3V$ | | | 10 | |
| | | $V_{CC}=5V \pm 0.5V$ | | | 10 | |
| Operating 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} | $V_{CC}=1.65 \sim 5.5V, I_{OH}=-100\mu A$ | $V_{CC}-0.1$ | | | 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} | $V_{CC}=1.65 \sim 5.5V, I_{OL}=100\mu A$ | | | 0.1 | V |
| | | $V_{CC}=1.65V, I_{OL}=4mA$ | | | 0.45 | V |
| | | $V_{CC}=2.3V, I_{OL}=8mA$ | | | 0.30 | V |
| | | $V_{CC}=3.0V, I_{OL}=16mA$ | | | 0.40 | 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, $V_{CC}=0 \sim 5.5V$ | | | ± 5 | μA |
| Power OFF Leakage Current | I_{off} | V_{IN} or $V_{OUT}=5.5V, V_{CC}=0V$ | | | ± 10 | μA |
| Quiescent Supply Current | I_{CC} | $V_{IN}=5.5V$ or GND, $I_{OUT}=0$ $V_{CC}=1.65 \sim 5.5V$ | | | 10 | μA |
| Additional Quiescent Supply Current Per Input Pin | ΔI_{CC} | $V_{CC}=3V \sim 5.5V$, 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 | | 3.5 | | pF |

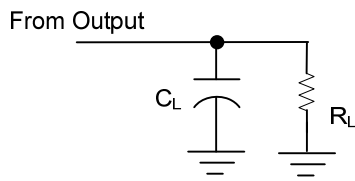
■ SWITCHING CHARACTERISTICS (Unless otherwise specified) (see Figure 1)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT | |
|--|-------------------|--------------------------------|------------|-----|-----|------|----|
| Propagation delay from input (A,B or C) to output(Y) | t_{PLH}/t_{PHL} | $V_{CC}=1.8V \pm 0.15V$ | $C_L=15pF$ | 2 | | 14.8 | ns |
| | | | $C_L=30pF$ | 2.5 | | 18 | |
| | | $V_{CC}=2.5V \pm 0.2V$ | $C_L=15pF$ | 1.3 | | 5.5 | ns |
| | | | $C_L=30pF$ | 1.6 | | 6.5 | |
| | | $V_{CC}=3.3V \pm 0.3V$ | $C_L=15pF$ | 0.8 | | 3.8 | ns |
| | | | $C_L=50pF$ | 1.4 | | 5 | |
| | | $V_{CC}=5V \pm 0.5V, C_L=50pF$ | $C_L=15pF$ | 0.6 | | 2.7 | ns |
| | | | $C_L=50pF$ | 1 | | 3.6 | |

■ OPERATING CHARACTERISTICS (Unless otherwise specified)

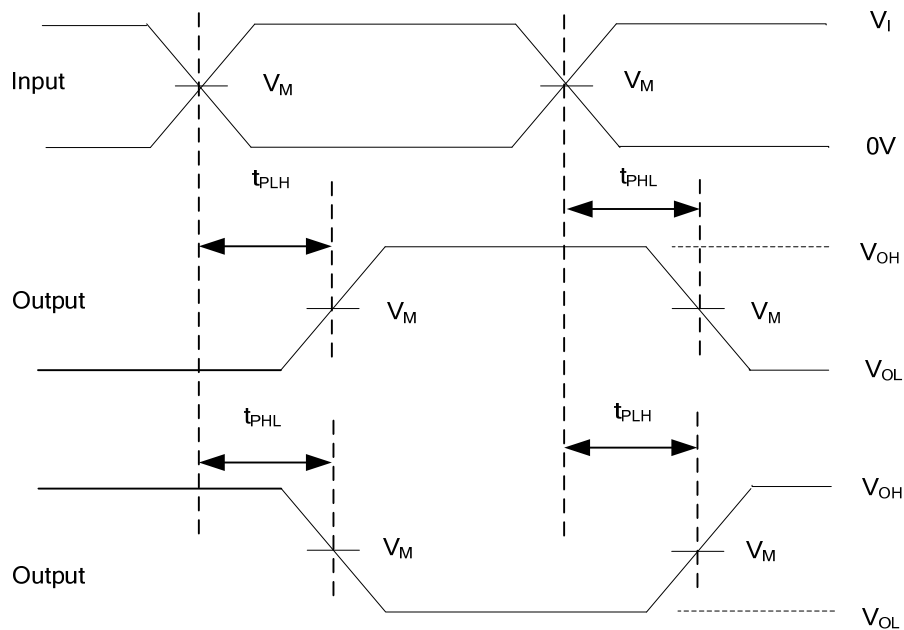
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|-------------------------------|----------|-----------------|---------------|-----|-----|------|
| Power Dissipation Capacitance | C_{PD} | $f=10MHz$ | $V_{CC}=1.8V$ | | 17 | pF |
| | | | $V_{CC}=2.5V$ | | 18 | pF |
| | | | $V_{CC}=3.3V$ | | 19 | pF |
| | | | $V_{CC}=5.0V$ | | 22 | pF |

■ TEST CIRCUIT AND WAVEFORMS



TEST CIRCUIT

| V_{CC} | INPUTS | | V_M | C_L | R_L |
|------------------|----------|--------------|------------|-------|--------------|
| | V_I | t_r / t_f | | | |
| $1.8V \pm 0.15V$ | V_{CC} | $\leq 2ns$ | $V_{CC}/2$ | 15pF | 1M Ω |
| | | | | 30pF | 1K Ω |
| $2.5V \pm 0.2V$ | V_{CC} | $\leq 2ns$ | $V_{CC}/2$ | 15pF | 1M Ω |
| | | | | 30pF | 500 Ω |
| $3.3V \pm 0.3V$ | 3V | $\leq 2.5ns$ | 1.5V | 15pF | 1M Ω |
| | | | | 50pF | 500 Ω |
| $5V \pm 0.5V$ | V_{CC} | $\leq 2.5ns$ | $V_{CC}/2$ | 15pF | 1M Ω |
| | | | | 50pF | 500 Ω |



PROPAGATION DELAY TIMES

Figure 1. Test Circuit and Voltage Waveforms

Note: 1. C_L includes probe and jig capacitance.

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

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