# UNISONIC TECHNOLOGIES CO., LTD

# TRIPLE INVERTER GATE

SOP-8
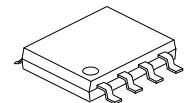
## ◼ DESCRIPTION

The **U74LVC3G04** is a triple inverter gate which provides the Boolean function $Y = \overline{A}$ .

This 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 device when it is powered down.

## ◼ FEATURES
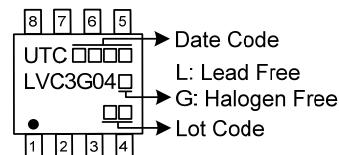
* Wide supply voltage range from 1.65V to 5.5V
* Inputs accept voltages up to 5.5V
* $I_{OFF}$ supports partial-power-down mode
* Low static power consumption; $I_{CC}$=10µA (Max.)

## ◼ ORDERING INFORMATION
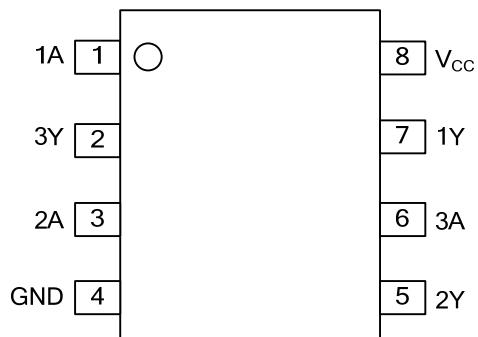
| Ordering Number | | Package | Packing |
|---|---|---|---|
| Free Plating | Halogen Free | | |
| U74LVC3G04L-S08-R | U74LVC3G04G-S08-R | SOP-8 | Tape Reel |

U74LVC3G04G-S08-R

- (1)Packing Type
- (2)Package Type
- (3)Green Package

(1) R: Tape Reel

(2) S08: SOP-8

(3) G: Halogen Free and Lead Free, L: Lead Free

## ◼ MARKING

```
8 7 6 5
UTC □□□□    → Date Code
LVC3G04□      L: Lead Free
            → G: Halogen Free
  □□        → Lot Code
1 2 3 4
```

# U74LVC3G04

■ **PIN CONFIGURATION**

```
         ┌───────────────┐
  1A  [1]│  ○            │[8]  Vcc
         │               │
  3Y  [2]│               │[7]  1Y
         │               │
  2A  [3]│               │[6]  3A
         │               │
 GND  [4]│               │[5]  2Y
         └───────────────┘
```
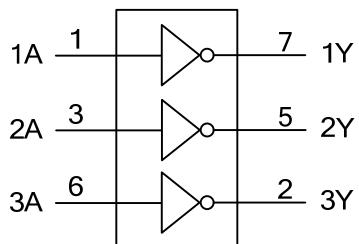
■ **FUNCTION TABLE**
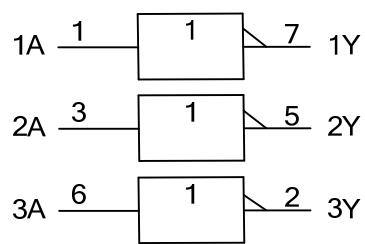
| INPUT(A) | OUTPUT(Y) |
|----------|-----------|
| H        | L         |
| L        | H         |

Note: H: High voltage level; L: Low voltage level

■ **LOGIC DIAGRAM** (positive logic)

Logic symbol                    IEC logic symbol

# U74LVC3G04

■ **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 high or low state | -0.5 ~ $V_{CC}$ +0.5 | V |
| | | Output in the power-off state | -0.5 ~ +6.5 | V |
| Continuous $V_{CC}$ or GND Current | $I_{CC}$ | | ±100 | mA |
| Continuous Output Current | $I_{OUT}$ | $V_{OUT}$=0V ~ $V_{CC}$ | ±50 | mA |
| Input Clamp Current | $I_{IK}$ | $V_{IN}$<0V | -50 | mA |
| Output Clamp Current | $I_{OK}$ | $V_{OUT}$>$V_{CC}$ or $V_{OUT}$<0V | -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.

■ **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 |
| Operating Temperature | $T_A$ | | -40 | | 125 | °C |
| Input Transition Rise or Fall Rate | $\Delta t/\Delta v$ | $V_{CC}$=1.8V±0.15V, 2.5V±0.2V | | | 20 | ns/V |
| | | $V_{CC}$=3.3V±0.3V | | | 10 | ns/V |
| | | $V_{CC}$=5V±0.5V | | | 5 | ns/V |

Note: This condition is only determined from design. It can't be 100% tested in mass production.

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

| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| High-level Input Voltage | $V_{IH}$ | $V_{CC}$=1.8±0.15V | | 0.65×$V_{CC}$ | | | V |
| | | $V_{CC}$=2.5±0.2V | | 1.7 | | | V |
| | | $V_{CC}$=3.3±0.3V | | 2 | | | V |
| | | $V_{CC}$=5±0.5V | | 0.7×$V_{CC}$ | | | V |
| Low-level Input Voltage | $V_{IL}$ | $V_{CC}$=1.8±0.15V | | | | 0.35×$V_{CC}$ | V |
| | | $V_{CC}$=2.5±0.2V | | | | 0.7 | V |
| | | $V_{CC}$=3.3±0.3V | | | | 0.8 | V |
| | | $V_{CC}$=5±0.5V | | | | 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 |
| | | | $I_{OH}$=-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 |
| | | | $I_{OL}$=24mA | | | 0.55 | V |
| | | $V_{CC}$=4.5V, $I_{OL}$=32mA | | | | 0.55 | V |

# U74LVC3G04

■ **ELECTRICAL CHARACTERISTICS (Cont.)**

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Input Leakage Current | $I_{I(LEAK)}$ | $V_{CC}$=0 ~ 5.5V, $V_{IN}$=5.5V or GND | | | ±5 | µA |
| Power OFF Leakage Current | $I_{off}$ | $V_{CC}$=0V, $V_{IN}$ or $V_{OUT}$=5.5V | | | ±10 | µA |
| Quiescent Supply Current | $I_{CC}$ | $V_{CC}$=1.65 ~ 5.5V, $V_{IN}$=$V_{CC}$ or GND, $I_{OUT}$=0A | | | 10 | µA |
| Additional Quiescent Supply Current Per Input Pin | $\Delta I_{CC}$ | $V_{CC}$=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 | | 3.5 | | pF |
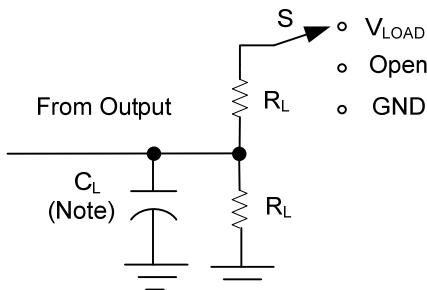
■ **SWITCHING CHARACTERISTICS** ($T_A$ =25°C , unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Propagation delay from input (A) to output(Y) | $t_{PD}$ | $V_{CC}$=1.8±0.15V,$C_L$=30pF, $R_L$=1kΩ | 3.2 | | 7.9 | ns |
| | | $V_{CC}$=2.5±0.2V,$C_L$=30pF, $R_L$=500Ω | 1.5 | | 4.4 | ns |
| | | $V_{CC}$=3.3±0.3V,$C_L$=50pF, $R_L$=500Ω | 1.4 | | 4.1 | ns |
| | | $V_{CC}$=5±0.5V,$C_L$=50pF, $R_L$=500Ω | 1.1 | | 3.2 | 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 | | 16 | | pF |
| | | $V_{CC}$=2.5V | | 16 | | pF |
| | | $V_{CC}$=3.3V | | 16 | | pF |
| | | $V_{CC}$=5V | | 18 | | pF |
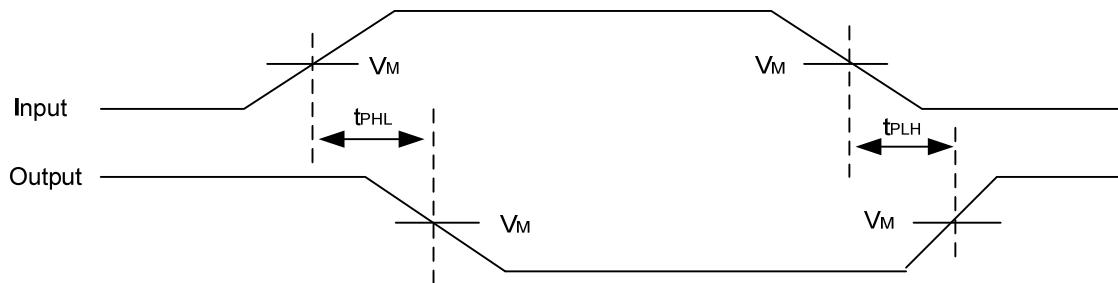
■ **TEST CIRCUIT AND WAVEFORMS**

S —o V$_{LOAD}$
o Open
From Output   R$_L$   o GND

C$_L$
(Note)

R$_L$

| TEST | S |
|---|---|
| t$_{PLH}$/t$_{PHL}$ | Open |
| t$_{PLZ}$/t$_{PZL}$ | V$_{LOAD}$ |
| t$_{PHZ}$/t$_{PZH}$ | GND |

Note: C$_L$ includes probe and jig capacitance.

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

Input / Output waveform with V$_M$, t$_{PHL}$, t$_{PLH}$.

Notes: 1. C$_L$ includes probe and jig capacitance.
2. All input pulses are supplied by generators having the following characteristics: PRR ≤10MHz, Z$_O$ = 50Ω.