

**U74LVC06A****CMOS IC****HEX INVERTER  
BUFFERS/DRIVERS WITH  
OPEN-DRAIN OUTPUTS****■ DESCRIPTION**

The **U74LVC06A** contain six independent inverter buffers/drivers with open drain outputs, and performs the Boolean function  $Y = \overline{A}$  in positive logic.

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

**■ FEATURES**

- \* Operate From 1.65V to 3.6V
- \* Inputs and Open-Drain Outputs Accept Voltages to 5.5V
- \*  $I_{OFF}$  Supports Partial-Power-Down Mode
- \* Low Power Dissipation

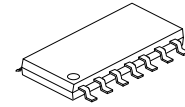
**■ ORDERING INFORMATION**

| Ordering Number  |                  | Package  | Packing   |
|------------------|------------------|----------|-----------|
| Lead Free        | Halogen Free     |          |           |
| U74LVC06AL-S14-R | U74LVC06AG-S14-R | SOP-14   | Tape Reel |
| U74LVC06AL-S14-T | U74LVC06AG-S14-T | SOP-14   | Tube      |
| U74LVC06AL-P14-R | U74LVC06AG-P14-R | TSSOP-14 | Tape Reel |
| U74LVC06AL-P14-T | U74LVC06AG-P14-T | TSSOP-14 | Tube      |

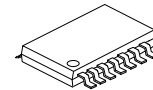
U74LVC06AL-S14-R

- (1) Packing Type
- (2) Package Type
- (3) Lead Free

- (1) R: Tape Reel, T: Tube
- (2) S14: SOP-14, P14: TSSOP-14
- (3) G: Halogen Free, L: Lead Free

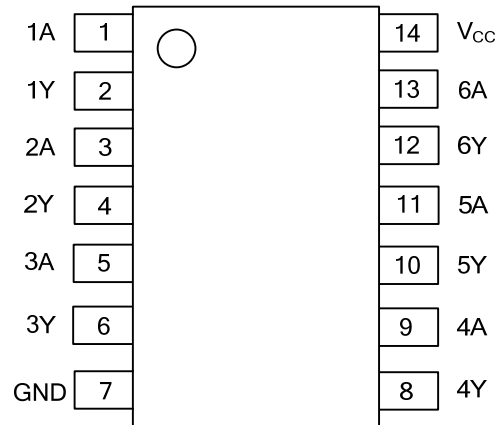


SOP-14



TSSOP-14

## ■ PIN CONFIGURATION

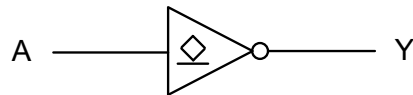


## ■ FUNCTION TABLE (Each Inverter)

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

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

## ■ LOGIC DIAGRAM (Each Inverter)



Logic Symbol

### ■ 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 ~ +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                                   | $T_{STG}$ | -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 | SOP-14   | 86      | °C/W |
|                     | TSSOP-14 | 113     | °C/W |

### ■ RECOMMENDED OPERATING CONDITIONS

| PARAMETER                | SYMBOL    | TEST CONDITIONS     | MIN  | TYP | MAX | UNIT |
|--------------------------|-----------|---------------------|------|-----|-----|------|
| Supply Voltage           | $V_{CC}$  | Operating           | 1.65 |     | 3.6 | V    |
|                          |           | Data retention only | 1.5  |     |     | V    |
| Input Voltage            | $V_{IN}$  |                     | 0    |     | 5.5 | V    |
| Output Voltage           | $V_{OUT}$ |                     | 0    |     | 5.5 | V    |
| Operating Temperature    | $T_A$     |                     | -40  |     | 85  | °C   |
| Low-Level Output Current | $I_{OL}$  | $V_{CC}=1.65V$      |      |     | 4   | mA   |
|                          |           | $V_{CC}=2.3V$       |      |     | 8   | mA   |
|                          |           | $V_{CC}=2.7V$       |      |     | 12  | mA   |
|                          |           | $V_{CC}=3V$         |      |     | 24  | mA   |

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

| PARAMETER                                         | SYMBOL        | TEST CONDITIONS                                                                                     | MIN                 | TYP | MAX                 | UNIT |
|---------------------------------------------------|---------------|-----------------------------------------------------------------------------------------------------|---------------------|-----|---------------------|------|
| High-Level Input Voltage                          | $V_{IH}$      | $V_{CC}=1.65V \sim 1.95V$                                                                           | $0.65 \cdot V_{CC}$ |     |                     | V    |
|                                                   |               | $V_{CC}=2.3V \sim 2.7V$                                                                             | 1.7                 |     |                     | V    |
|                                                   |               | $V_{CC}=2.7V \sim 3.6V$                                                                             | 2                   |     |                     | V    |
| Low-Level Input Voltage                           | $V_{IL}$      | $V_{CC}=1.65V \sim 1.95V$                                                                           |                     |     | $0.35 \cdot V_{CC}$ | V    |
|                                                   |               | $V_{CC}=2.3V \sim 2.7V$                                                                             |                     |     | 0.7                 | V    |
|                                                   |               | $V_{CC}=2.7V \sim 3.6V$                                                                             |                     |     | 0.8                 | V    |
| Low-Level Output Voltage                          | $V_{OL}$      | $I_{OL}=100\mu A$ , $V_{CC}=1.65 \sim 3.6V$                                                         |                     |     | 0.2                 | V    |
|                                                   |               | $I_{OL}=4mA$ , $V_{CC}=1.65V$                                                                       |                     |     | 0.45                | V    |
|                                                   |               | $I_{OL}=8mA$ , $V_{CC}=2.3V$                                                                        |                     |     | 0.7                 | V    |
|                                                   |               | $I_{OL}=12mA$ , $V_{CC}=2.7V$                                                                       |                     |     | 0.4                 | V    |
|                                                   |               | $I_{OL}=24mA$ , $V_{CC}=3.0V$                                                                       |                     |     | 0.55                | V    |
| Input Leakage Current                             | $I_{I(LEAK)}$ | $V_{IN}=5.5V$ or GND, $V_{CC}=3.6V$                                                                 |                     |     | ±1                  | μA   |
| Power OFF Leakage Current                         | $I_{OFF}$     | $V_{IN}$ or $V_{OUT}=5.5V$ , $V_{CC}=0V$                                                            |                     |     | ±1                  | μA   |
| Quiescent Supply Current                          | $I_Q$         | $V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$ , $V_{CC}=3.6V$                                                 |                     |     | 1                   | μA   |
| Additional Quiescent Supply Current Per Input Pin | $\Delta I_Q$  | $V_{CC}=2.7 \sim 3.6V$ , One input at $V_{CC}-0.6V$ , $I_{OUT}=0$ , Other inputs at $V_{CC}$ or GND |                     |     | 500                 | μA   |
| Input Capacitance                                 | $C_{IN}$      | $V_{IN}=V_{CC}$ or GND, $V_{CC}=3.3V$                                                               |                     | 5   |                     | pF   |

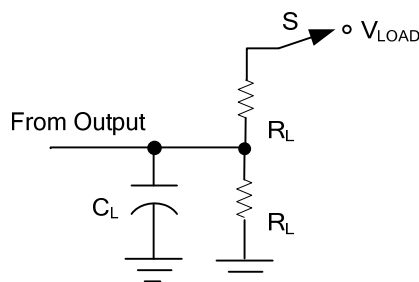
### ■ SWITCHING CHARACTERISTICS (T<sub>A</sub>=25°C ,unless otherwise specified)

| PARAMETER                                       | SYMBOL                              | TEST CONDITIONS                                 | MIN | TYP | MAX | UNIT |
|-------------------------------------------------|-------------------------------------|-------------------------------------------------|-----|-----|-----|------|
| Propagation delay from input (nA) to output(nY) | t <sub>PLZ</sub> / t <sub>PZL</sub> | V <sub>CC</sub> =1.8±0.15V, R <sub>L</sub> =1KΩ | 1.4 |     | 5.1 | ns   |
|                                                 |                                     | V <sub>CC</sub> =2.5±0.2V, R <sub>L</sub> =500Ω |     |     |     |      |
|                                                 |                                     | V <sub>CC</sub> =2.7V, R <sub>L</sub> =500Ω     | 1.0 |     | 3.7 | ns   |
|                                                 |                                     | V <sub>CC</sub> =3.3±0.3V, R <sub>L</sub> =500Ω |     |     |     |      |
|                                                 |                                     |                                                 |     |     |     |      |

### ■ OPERATING CHARACTERISTICS (T<sub>A</sub>=25°C)

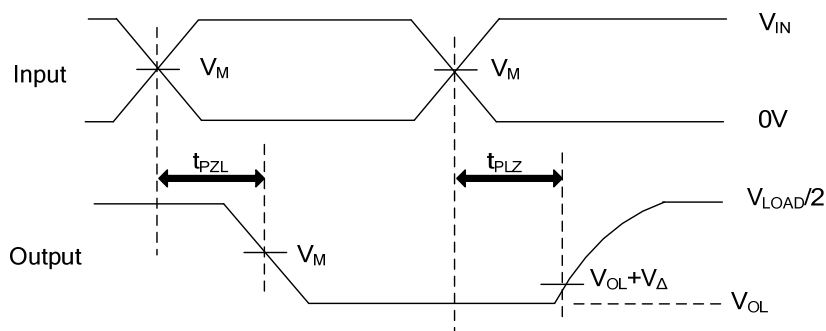
| PARAMETER                                  | SYMBOL          | TEST CONDITIONS            | MIN | TYP | MAX | UNIT |
|--------------------------------------------|-----------------|----------------------------|-----|-----|-----|------|
| Power Dissipation Capacitance Per Inverter | C <sub>PD</sub> | V <sub>CC</sub> =1.8±0.15V |     | 2.1 |     | pF   |
|                                            |                 | V <sub>CC</sub> =2.5±0.2V  |     | 2.3 |     | pF   |
|                                            |                 | V <sub>CC</sub> =3.3±0.3V  |     | 2.5 |     | pF   |

## ■ TEST CIRCUIT AND WAVEFORMS



TEST CIRCUIT

| $V_{CC}$         | INPUTS   |              | $V_M$      | $V_{LOAD}$        | $V_{\Delta}$ | $C_L$  | $R_L$       |
|------------------|----------|--------------|------------|-------------------|--------------|--------|-------------|
|                  | $V_{IN}$ | $t_R, t_F$   |            |                   |              |        |             |
| $1.8V \pm 0.15V$ | $V_{CC}$ | $\leq 2ns$   | $V_{CC}/2$ | $2 \times V_{CC}$ | $0.15V$      | $30pF$ | $1K\Omega$  |
| $2.5V \pm 0.2V$  | $V_{CC}$ | $\leq 2ns$   | $V_{CC}/2$ | $2 \times V_{CC}$ | $0.15V$      | $30pF$ | $500\Omega$ |
| $2.7V$           | $2.7V$   | $\leq 2.5ns$ | $1.5V$     | $6V$              | $0.3V$       | $50pF$ | $500\Omega$ |
| $3.3V \pm 0.3V$  | $2.7V$   | $\leq 2.5ns$ | $1.5V$     | $6V$              | $0.3V$       | $50pF$ | $500\Omega$ |



ENABLE AND DISABLE 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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