



## U74LVC17A

CMOS IC

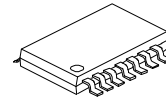
### HEX SCHMITT-TRIGGER BUFFER

#### ■ DESCRIPTION

The UTC **U74LVC17A** is a high-performance, low-power, low-voltage, Si-gate CMOS device and provides six non-inverting buffers with Schmitt trigger action. It is capable for transforming slowly changing input signals into sharply defined, jitter-free output signals.

#### ■ FEATURES

- \* Operate From 1.65V to 5.5V
- \* 5 V Tolerant Input/Output For Interfacing With 5 V Logic
- \*  $\pm 32$  mA Output Drive ( $V_{CC} = 4.5V$ )
- \* CMOS Low-Power Consumption And High Noise Immunity
- \*  $I_{OFF}$  Supports Partial-Power-Down Mode Operation
- \* Latch-Up Performance Exceeds 100 mA



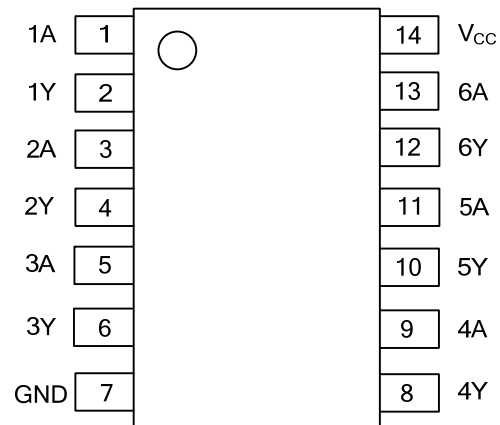
TSSOP-14

#### ■ ORDERING INFORMATION

| Ordering Number  | Package  | Packing   |
|------------------|----------|-----------|
| U74LVC17AG-P14-R | TSSOP-14 | Tape Reel |

|                  |                  |                     |
|------------------|------------------|---------------------|
| U74LVC17AG-P14-R | (1) Packing Type | (1) R: Tape Reel    |
|                  | (2) Package Type | (2) P14: TSSOP-14   |
|                  | (3) Halogen Free | (3) G: Halogen Free |

## ■ PIN CONFIGURATION

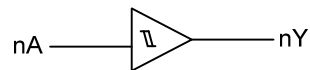


## ■ FUNCTION TABLE (Each Gate)

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

Note: H=High level, L=Low Level

## ■ LOGIC SYMBOL (Each Gate)



## ■ ABSOLUTE MAXIMUM RATING

| PARAMETER                 | SYMBOL          | RATINGS            | UNIT |
|---------------------------|-----------------|--------------------|------|
| Supply Voltage            | $V_{CC}$        | -0.5~6.5           | V    |
| Input Voltage (Note 2)    | $V_{IN}$        | -0.5~6.5           | V    |
| Output Voltage (Note 2,3) | High-Impedance  | -0.5~6.5           | V    |
|                           | Power-Off State |                    |      |
|                           | High State      | -0.5~ $V_{CC}+0.5$ | V    |
|                           | Low State       |                    |      |
| Input Clamp Current       | $I_{IK}$        | -50                | mA   |
| Output Clamp Current      | $I_{OK}$        | -50                | mA   |
| Output Current            | $I_{OUT}$       | ±50                | mA   |
| $V_{CC}$ or GND Current   | $I_{CC}$        | ±100               | mA   |
| Junction Temperature      | $T_J$           | 150                | °C   |
| Storage Temperature       | $T_{STG}$       | -65 ~ +150         | °C   |

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

3. The value of  $V_{CC}$  is provided in the recommended operating conditions table.

## ■ RECOMMENDED OPERATING CONDITIONS

| PARAMETER                     | SYMBOL       | TEST CONDITIONS          | MIN  | TYP | MAX      | UNIT |
|-------------------------------|--------------|--------------------------|------|-----|----------|------|
| Supply Voltage                | $V_{CC}$     | Operating                | 1.65 |     | 5.5      | V    |
| High-Level Input Voltage      | $V_{T+}$     | $V_{CC} = 1.65\text{ V}$ | 0.70 |     | 1.40     | V    |
|                               |              | $V_{CC} = 2.3\text{ V}$  | 1.00 |     | 1.70     | V    |
|                               |              | $V_{CC} = 3.0\text{ V}$  | 1.30 |     | 2.20     | V    |
|                               |              | $V_{CC} = 4.5\text{ V}$  | 1.90 |     | 3.10     | V    |
|                               |              | $V_{CC} = 5.5\text{ V}$  | 2.20 |     | 3.70     | V    |
| Low-Level Input Voltage       | $V_{T-}$     | $V_{CC} = 1.65\text{ V}$ | 0.30 |     | 0.70     | V    |
|                               |              | $V_{CC} = 2.3\text{ V}$  | 0.40 |     | 1.00     | V    |
|                               |              | $V_{CC} = 3.0\text{ V}$  | 0.60 |     | 1.30     | V    |
|                               |              | $V_{CC} = 4.5\text{ V}$  | 1.10 |     | 2.00     | V    |
|                               |              | $V_{CC} = 5.5\text{ V}$  | 1.40 |     | 2.50     | V    |
| Hysteresis Voltage            | $\Delta V_T$ | $V_{CC} = 1.65\text{ V}$ | 0.30 |     | 0.80     | V    |
|                               |              | $V_{CC} = 2.3\text{ V}$  | 0.40 |     | 0.90     | V    |
|                               |              | $V_{CC} = 3.0\text{ V}$  | 0.40 |     | 1.10     | V    |
|                               |              | $V_{CC} = 4.5\text{ V}$  | 0.60 |     | 1.30     | V    |
|                               |              | $V_{CC} = 5.5\text{ V}$  | 0.70 |     | 1.40     | V    |
| Input Voltage                 | $V_{IN}$     |                          | 0    |     | 5.5      | V    |
| Output Voltage                | $V_{OUT}$    | High or Low State        | 0    |     | $V_{CC}$ | V    |
| Ambient Operating Temperature | $T_{OPR}$    |                          | -40  |     | 85       | °C   |

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

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

| PARAMETER                           | SYMBOL               | TEST CONDITIONS                                                                                                           | MIN                  | TYP | MAX  | UNIT |
|-------------------------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------|----------------------|-----|------|------|
| High-Level Output Voltage           | V <sub>OH</sub>      | I <sub>OH</sub> = -100μA V <sub>CC</sub> = 1.65~5.5 V                                                                     | V <sub>CC</sub> -0.1 |     |      | V    |
|                                     |                      | I <sub>OH</sub> = -4mA V <sub>CC</sub> = 1.65 V                                                                           | 1.20                 |     |      |      |
|                                     |                      | I <sub>OH</sub> = -8mA V <sub>CC</sub> = 2.3 V                                                                            | 1.90                 |     |      |      |
|                                     |                      | I <sub>OH</sub> = -16mA V <sub>CC</sub> = 3.0 V                                                                           | 2.40                 |     |      |      |
|                                     |                      | I <sub>OH</sub> = -24 mA V <sub>CC</sub> = 3.0 V                                                                          | 2.30                 |     |      |      |
|                                     |                      | I <sub>OH</sub> = -32mA V <sub>CC</sub> = 4.5 V                                                                           | 3.80                 |     |      |      |
| Low-Level Output Voltage            | V <sub>OL</sub>      | I <sub>OL</sub> = 100μA V <sub>CC</sub> = 1.65~5.5 V                                                                      |                      |     | 0.10 | V    |
|                                     |                      | I <sub>OL</sub> = 4mA V <sub>CC</sub> = 1.65 V                                                                            |                      |     | 0.45 |      |
|                                     |                      | I <sub>OL</sub> = 8mA V <sub>CC</sub> = 2.3 V                                                                             |                      |     | 0.30 |      |
|                                     |                      | I <sub>OL</sub> = 12mA V <sub>CC</sub> = 3.0 V                                                                            |                      |     | 0.40 |      |
|                                     |                      | I <sub>OL</sub> = 24mA V <sub>CC</sub> = 3.0 V                                                                            |                      |     | 0.55 |      |
|                                     |                      | I <sub>OL</sub> = 32mA V <sub>CC</sub> = 4.5 V                                                                            |                      |     | 0.55 |      |
| Input Leakage Current               | I <sub>I(LEAK)</sub> | V <sub>IN</sub> = 0 to 5.5V, V <sub>CC</sub> = 0~5.5 V                                                                    |                      |     | ±5   | μA   |
| Power OFF Leakage Current           | I <sub>OFF</sub>     | V <sub>IN</sub> or V <sub>O</sub> = 5.5V, V <sub>CC</sub> = 0                                                             |                      |     | ±10  | μA   |
| Quiescent Supply Current            | I <sub>Q</sub>       | V <sub>IN</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0, V <sub>CC</sub> = 1.65~5.5 V                                |                      |     | 10   | μA   |
| Additional Quiescent Supply Current | ΔI <sub>Q</sub>      | One input at V <sub>CC</sub> -0.6v, Other inputs at V <sub>CC</sub> or GND, I <sub>O</sub> = 0, V <sub>CC</sub> = 3~5.5 V |                      |     | 500  | μA   |
| Input Capacitance                   | C <sub>IN</sub>      | V <sub>O</sub> = V <sub>CC</sub> or GND, V <sub>CC</sub> = 3.3 V                                                          |                      | 4   |      | pF   |

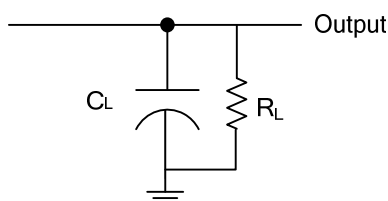
### ■ SWITCHING CHARACTERISTICS (See Test Circuit And Waveforms)

| PARAMETER                  | SYMBOL                              | TEST CONDITIONS                                    | MIN                   | TYP | MAX | UNIT |
|----------------------------|-------------------------------------|----------------------------------------------------|-----------------------|-----|-----|------|
| Propagation Delay nA to nY | t <sub>PLH</sub> / t <sub>PHL</sub> | V <sub>CC</sub> = 1.8V±0.15V, R <sub>L</sub> = 1KΩ | C <sub>L</sub> = 30pF | 3.9 | 9.3 | ns   |
|                            |                                     | V <sub>CC</sub> = 2.5V±0.2V, R <sub>L</sub> = 500Ω |                       | 1.9 | 5.7 | ns   |
|                            |                                     | V <sub>CC</sub> = 3.3V±0.3V, R <sub>L</sub> = 500Ω | C <sub>L</sub> = 50pF | 2.2 | 5.4 | ns   |
|                            |                                     | V <sub>CC</sub> = 5.0V±0.5V, R <sub>L</sub> = 500Ω |                       | 1.5 | 4.3 | ns   |

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

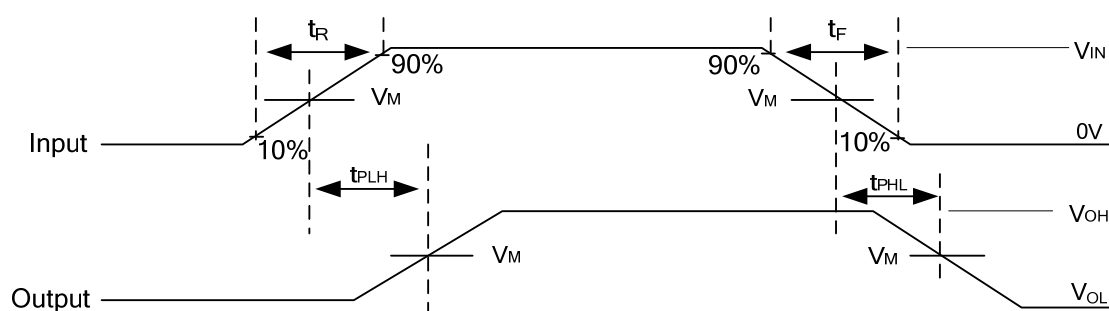
| PARAMETER                     | SYMBOL          | TEST CONDITIONS |                       | TYP | UNIT |
|-------------------------------|-----------------|-----------------|-----------------------|-----|------|
| Power Dissipation Capacitance | C <sub>PD</sub> | f=10MHz         | V <sub>CC</sub> =1.8V | 17  | pF   |
|                               |                 |                 | V <sub>CC</sub> =2.5V | 18  | pF   |
|                               |                 |                 | V <sub>CC</sub> =3.3V | 19  | pF   |
|                               |                 |                 | V <sub>CC</sub> =5V   | 21  | pF   |

## ■ TEST CIRCUITS AND WAVEFORMS



| $V_{CC}$    | $V_{IN}$ | $t_R, t_F$          | $V_M$      | $C_L$ | $R_L$        |
|-------------|----------|---------------------|------------|-------|--------------|
| 1.65V~1.95V | $V_{CC}$ | $\leq 2\text{ns}$   | $V_{CC}/2$ | 30pF  | 1k $\Omega$  |
| 2.3V~2.7V   | $V_{CC}$ | $\leq 2\text{ns}$   | $V_{CC}/2$ | 30pF  | 500 $\Omega$ |
| 3.0V~3.6V   | 3V       | $\leq 2.5\text{ns}$ | 1.5V       | 50pF  | 500 $\Omega$ |
| 4.5V~5.5V   | $V_{CC}$ | $\leq 2.5\text{ns}$ | $V_{CC}/2$ | 50pF  | 500 $\Omega$ |

Definitions for test circuit:  $R_L$  = Load resistance,  $C_L$  = Load capacitance including jig and probe capacitance.



- Notes:
1.  $V_{OL}$  and  $V_{OH}$  are typical output drop that occur with the output load.
  2.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{PD}$ .

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