



U74LVC04A

CMOS IC

HEX INVERTERS

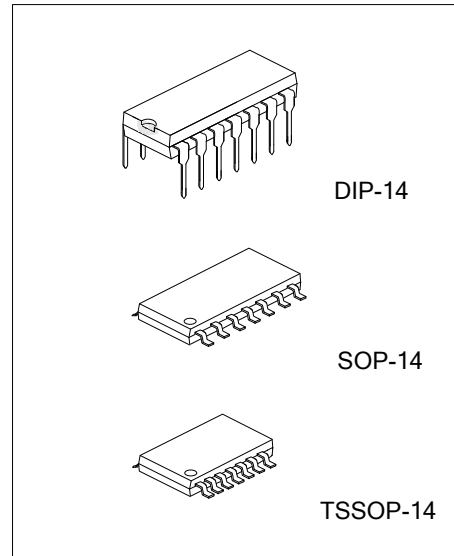
DESCRIPTION

The UTC **U74LVC04A** consists of six independent inverters, it provides the function $Y = \bar{A}$.

Inputs can be driven from either 3.3V or 5V devices, so the device can be used in a mix 3.3V/5V system.

FEATURES

- * Operation Voltage Range: 1.65~3.6V
- * Low Power Dissipation
- * Input accept voltage to 5.5V



ORDERING INFORMATION

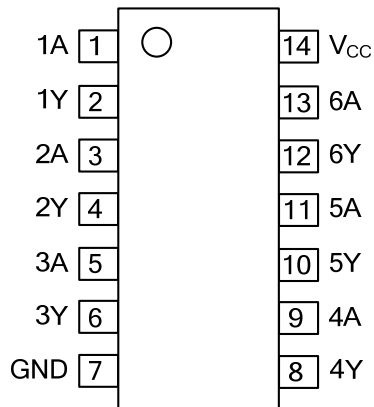
| Ordering Number | | Package | Packing |
|------------------|------------------|----------|-----------|
| Lead Free | Halogen Free | | |
| U74LVC04AL-D14-T | U74LVC04AG-D14-T | DIP-14 | Tube |
| - | U74LVC04AG-S14-R | SOP-14 | Tape Reel |
| - | U74LVC04AG-P14-R | TSSOP-14 | Tape Reel |

| | |
|-------------------------|--|
| <p>U74LVC04AL-D14-R</p> | <p>(1) R: Tape Reel, T: Tube (2) P14: TSSOP-14, S14: SOP-14, D14: DIP-14 (3) L: Lead Free, G: Halogen Free and Lead Free</p> |
|-------------------------|--|

MARKING

| SOP-14 | TSSOP-14 |
|--------|----------|
| | |

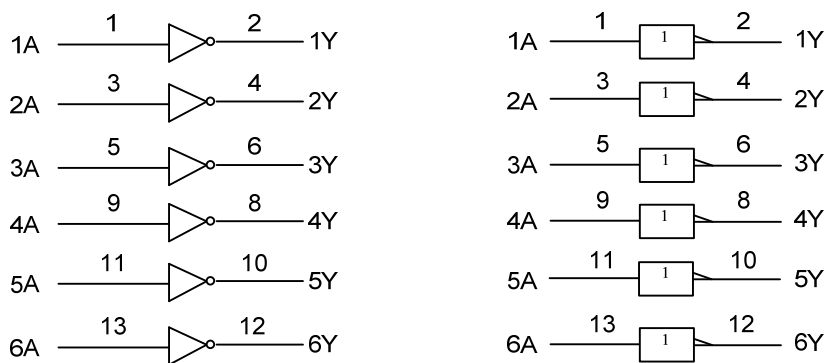
■ PIN CONFIGURATION



■ FUNCTION TABLE (each gate)

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

■ LOGIC DIAGRAM (positive logic)



IEC logic symbol

■ ABSOLUTE MAXIMUM RATINGS (T_A = 25°C, 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(active mode) | V _{OUT} | -0.5~V _{CC} +0.5 | V |
| Input Clamp Current(V _{IN} <0) | I _{IK} | -50 | mA |
| Output Clamp Current(V _{OUT} <0) | I _{OK} | -50 | mA |
| Output Current | I _{OUT} | ±50 | mA |
| V _{CC} or GND Current | I _{CC} | ±100 | mA |
| Power Dissipation | P _D | 500 | mW |
| Derated Above 60°C | | 5.5 | mW/°C |
| 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.

■ RECOMMENDED OPERATING CONDITIONS

| PARAMETER | SYMBOL | 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 | | V _{CC} | V |
| Operating Temperature | T _A | | -40 | | 125 | °C |

■ STATIC 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} = 2.7V~3.6V | 2 | | | 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} = 2.7V~3.6V | | | 0.8 | V |
| High-Level Output Voltage | V _{OH} | V _{CC} = 1.65V~3.6V, I _{OH} =-100μA | V _{CC} -0.2 | | | V |
| | | V _{CC} = 1.65V, I _{OH} =-4mA | 1.29 | | | V |
| | | V _{CC} = 2.3V, I _{OH} =-8mA | 1.9 | | | V |
| | | V _{CC} = 2.7V, I _{OH} =-12mA | 2.2 | | | V |
| | | V _{CC} = 3V, I _{OH} =-12mA | 2.4 | | | V |
| Low-Level Output Voltage | V _{OL} | V _{CC} = 1.65V~3.6V, I _{OL} =100μA | | | 0.1 | V |
| | | V _{CC} = 1.65V, I _{OL} =4mA | | | 0.24 | V |
| | | V _{CC} = 2.3V, I _{OL} =8mA | | | 0.3 | V |
| | | V _{CC} = 2.7V, I _{OL} =12mA | | | 0.4 | V |
| | | V _{CC} = 3V, I _{OL} =24mA | | | 0.55 | V |
| Input Leakage Current | I _{I(LEAK)} | V _{CC} = 3.6V, V _{IN} =5.5V or GND | | | ±1 | μA |
| Quiescent Supply Current | I _Q | V _{CC} = 3.6V, V _{IN} =V _{CC} or GND, I _{OUT} =0 | | | 1 | μA |
| Additional quiescent Supply Current | Δ I _Q | V _{CC} = 2.7V ~ 3.6V One input at V _{CC} - 0.6V, other inputs at V _{CC} or GND | | | 500 | μA |
| Input Capacitance | C _{IN} | V _{CC} = 3.3V, V _{IN} =V _{CC} or GND | | 5 | | pF |

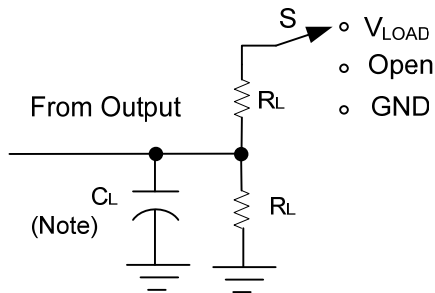
■ DYNAMIC CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|-------------------|-----------------------|-----|-----|-----|------|
| Propagation Delay From Input (A) to Output(Y) | t_{PLH}/t_{PHL} | $V_{CC}=1.8V\pm0.15V$ | 1 | 4.1 | 7.5 | ns |
| | | $V_{CC}=2.5V\pm0.2V$ | 1 | 3.6 | 7 | ns |
| | | $V_{CC}=2.7V$ | 1 | 3 | 5.3 | ns |
| | | $V_{CC}=3.3V\pm0.3V$ | 1 | 2.5 | 4.3 | ns |

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

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|-------------------------------|--------|-------------------------------|-----|-----|-----|------|
| Power Dissipation Capacitance | Cpd | $V_{CC}=1.8V, f=10\text{MHz}$ | | 6 | | pF |
| | | $V_{CC}=2.5V, f=10\text{MHz}$ | | 7 | | pF |
| | | $V_{CC}=3.3V, f=10\text{MHz}$ | | 8 | | pF |

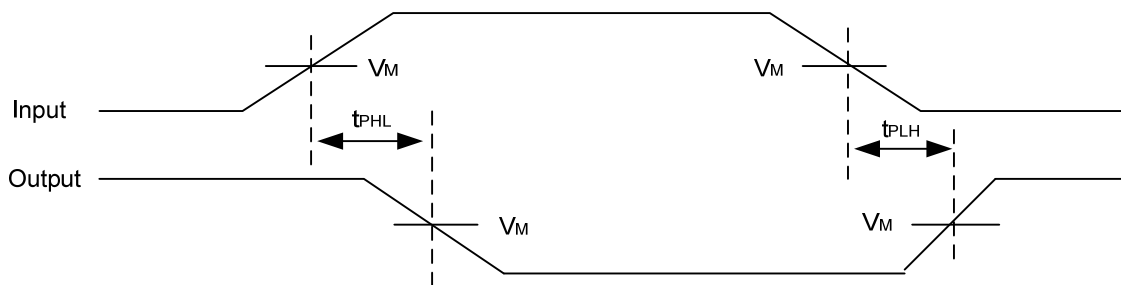
■ TEST CIRCUIT AND WAVEFORMS



| TEST | S |
|-------------------|------------|
| t_{PLH}/t_{PHL} | Open |
| t_{PHZ}/t_{PZH} | GND |
| t_{PLZ}/t_{PZL} | V_{LOAD} |

Note: C_L includes probe and jig capacitance.

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



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