



U74LVC04A

CMOS IC

HEX INVERTERS

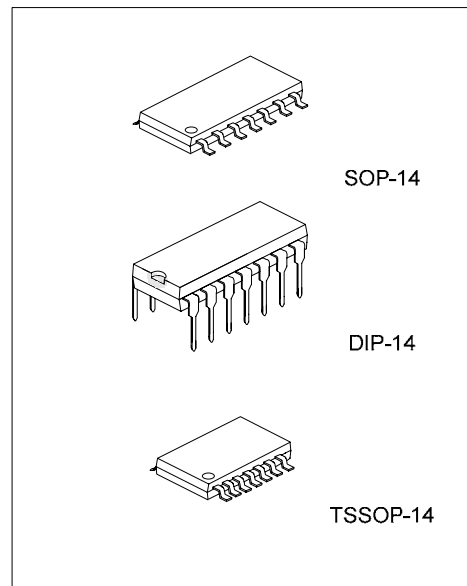
DESCRIPTION

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

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



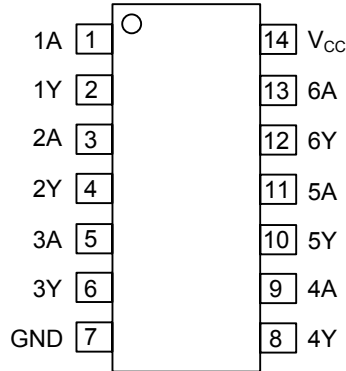
*Pb-free plating product number:
U74LVC04AL

ORDERING INFORMATION

| Ordering Number | | Package | Packing |
|-----------------|-------------------|----------|-----------|
| Normal | Lead Free Plating | | |
| U74LVC04A-D14-T | U74LVC04AL-D14-T | DIP-14 | Tube |
| U74LVC04A-S14-R | U74LVC04AL-S14-R | SOP-14 | Tape Reel |
| U74LVC04A-S14-T | U74LVC04AL-S14-T | SOP-14 | Tube |
| U74LVC04A-P14-R | U74LVC04AL-P14-R | TSSOP-14 | Tape Reel |
| U74LVC04A-P14-T | U74LVC04AL-P14-T | TSSOP-14 | Tube |

| | |
|--|---|
| <p>U74LVC04AL-D14-T</p> <p>(1)Packing Type (2)Package Type (3)Lead Plating</p> | <p>(1) R: Tape Reel, T: Tube (2) D14: DIP-14, S14: SOP-14, P14: TSSOP-14 (3) L: Lead Free Plating, Blank: Pb/Sn</p> |
|--|---|

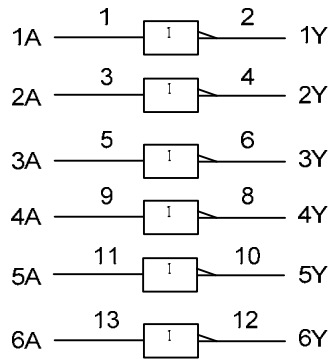
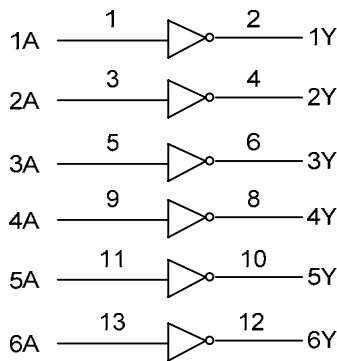
■ PIN CONFIGURATION



■ FUNCTION TABLE (each gate)

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

■ LOGIC DIAGRAM (positive logic)



IEC logic symbol

■ ABSOLUTE MAXIMUM RATINGS (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/ |
| Storage Temperature | T_{STG} | -65 ~ +150 | |

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 | |

■ STATIC CHARACTERISTICS ($T_A=25$)

| 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 |
| High-Level Output Voltage | V_{OH} | $V_{CC}=1.65V\sim 3.6V, I_{OH}=-100\mu A$ | $V_{CC}-0.2$ | | | 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} | $V_{CC}=1.65V\sim 3.6V, I_{OL}=100\mu A$ | | | 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 | ΔI_Q | $V_{CC}=2.7V \sim 3.6V$, 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 |

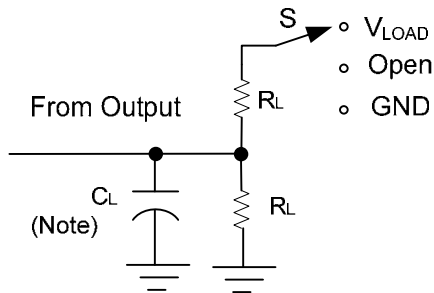
■ DYNAMIC CHARACTERISTICS (T_A=25)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|------------------------------------|-----------------------------|-----|-----|-----|------|
| Propagation Delay From Input (A) to Output(Y) | t _{PLH} /t _{PHL} | V _{CC} =1.8V±0.15V | 1 | 4.1 | 7.5 | ns |
| | | V _{CC} =2.5V±0.2V | 1 | 3.6 | 7 | ns |
| | | V _{CC} =2.7V | 1 | 3 | 5.3 | ns |
| | | V _{CC} =3.3V±0.3V | 1 | 2.5 | 4.3 | ns |

■ OPERATING CHARACTERISTICS (T_A=25)

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

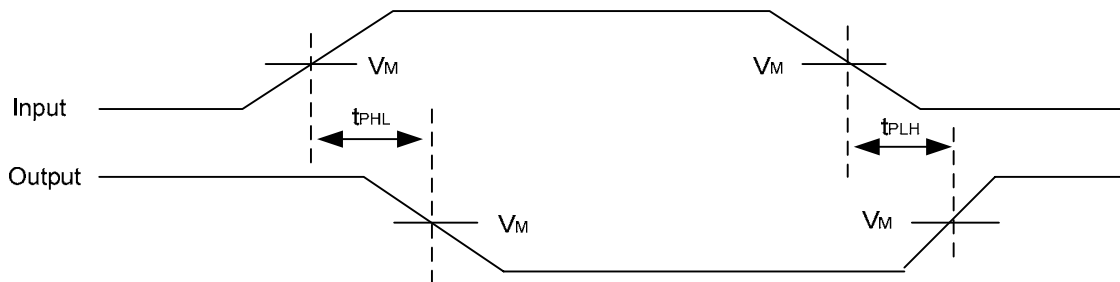
■ TEST CIRCUIT AND WAVEFORMS



| 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 |
|------------------|----------|--------------|------------|--------------|-------|--------------|-------|
| $1.8V \pm 0.15V$ | V_{CC} | $\leq 2ns$ | $V_{CC}/2$ | $2 * V_{CC}$ | 30pF | 1K Ω | 0.15V |
| $2.5V \pm 0.2V$ | V_{CC} | $\leq 2ns$ | $V_{CC}/2$ | $2 * V_{CC}$ | 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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