



U74HC86

CMOS IC

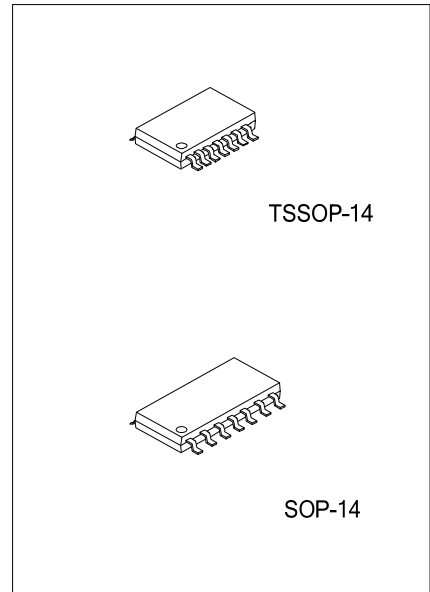
QUAD 2-INPUT EXCLUSIVE-OR GATES

DESCRIPTION

The **U74HC86** contains four independent 2-input exclusive-or gates, it provides the Boolean function $Y=A\oplus B$ or $Y=\overline{A}B+A\overline{B}$ in positive logic.

FEATURES

* Operation Voltage range: 2~6V

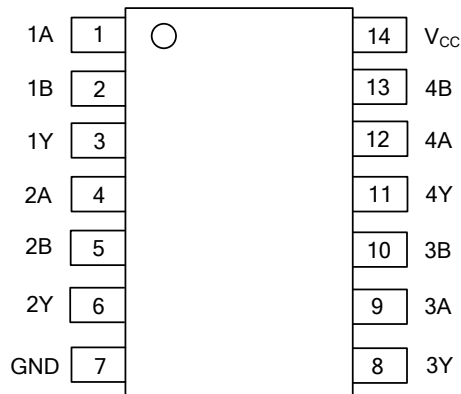


ORDERING INFORMATION

| Ordering Number | Package | Packing |
|-----------------|----------|-----------|
| U74HC86G-S14-R | SOP-14 | Tape Reel |
| U74HC86G-P14-R | TSSOP-14 | Tape Reel |

| | |
|--|--|
| <p>U74HC86G-P14-T</p> <p>(1)Packing Type (2)Package Type (3)Halogen Free</p> | <p>(1) R: Tape Reel (2) P14: TSSOP-14, S14: SOP-14 (3) G: Halogen Free</p> |
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■ PIN CONFIGURATION



■ FUNCTION TABLE

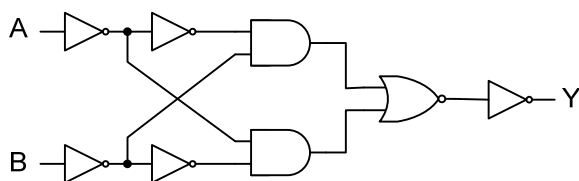
| INPUTS(A) | INPUTS(B) | OUTPUT(Y) |
|-----------|-----------|-----------|
| L | L | L |
| L | H | H |
| H | L | H |
| H | H | L |

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

■ LOGIC SYMBOL



■ LOGIC DIAGRAM



■ ABSOLUTE MAXIMUM RATING

| PARAMETER | SYMBOL | RATINGS | UNIT |
|-------------------------------|-----------|-------------|------|
| Supply Voltage | V_{CC} | -0.5~7 | V |
| V_{CC} or GND Current | I_{CC} | ± 50 | mA |
| Output Current | I_{OUT} | ± 25 | mA |
| Input Clamp Current | I_{IK} | ± 20 | mA |
| Output Clamp Current | I_{OK} | ± 20 | mA |
| Ambient Operating Temperature | T_{OPR} | -40 ~ + 85 | °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.

■ THERMAL DATA

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---------------------|----------|---------------|-------|
| Junction to Ambient | SOP-14 | θ_{JA} | °C /W |
| | TSSOP-14 | | |
| | | 113 | |

■ RECOMMENDED OPERATING CONDITIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--------------------------|------------|-------------------|------|-----|----------|---------|
| Supply Voltage | V_{CC} | | 2 | 5 | 6 | V |
| High-level Input Voltage | V_{IH} | $V_{CC}=2.0V$ | 1.5 | | | V |
| | | $V_{CC}=4.5V$ | 3.15 | | | |
| | | $V_{CC}=6.0V$ | 4.2 | | | |
| Low-level Input Voltage | V_{IL} | $V_{CC}=2.0V$ | 0 | | 0.5 | V |
| | | $V_{CC}=4.5V$ | 0 | | 1.35 | |
| | | $V_{CC}=6.0V$ | 0 | | 1.8 | |
| Input Voltage | V_{IN} | | 0 | | V_{CC} | V |
| Output Voltage | V_{OUT} | High or low state | 0 | | V_{CC} | V |
| Input Rise or Fall Times | t_R, t_F | $V_{CC}=2.0V$ | | | 1 | μs |
| | | $V_{CC}=4.5V$ | | | 0.5 | |
| | | $V_{CC}=6.0V$ | | | 0.4 | |

■ ELECTRICAL CHARACTERISTICS ($T_a=25^\circ C$)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---------------------------|---------------|---|------|-----------|-----------|---------|
| Output Voltage High-Level | V_{OH} | $V_{CC}=2.0V, I_{OH}=-20\mu A, V_{IN}=V_{IH}$ or V_{IL} | 1.9 | 1.998 | | V |
| | | $V_{CC}=4.5V, I_{OH}=-20\mu A, V_{IN}=V_{IH}$ or V_{IL} | 4.4 | 4.499 | | |
| | | $V_{CC}=6.0V, I_{OH}=-20\mu A, V_{IN}=V_{IH}$ or V_{IL} | 5.9 | 5.999 | | |
| | | $V_{CC}=4.5V, I_{OH}=-4mA, V_{IN}=V_{IH}$ or V_{IL} | 3.98 | 4.3 | | |
| | | $V_{CC}=6.0V, I_{OH}=-5.2mA, V_{IN}=V_{IH}$ or V_{IL} | 5.48 | 5.8 | | |
| Output Voltage Low-Level | V_{OL} | $V_{CC}=2.0V, I_{OL}=20\mu A, V_{IN}=V_{IH}$ or V_{IL} | | 2 | 100 | mV |
| | | $V_{CC}=4.5V, I_{OL}=20\mu A, V_{IN}=V_{IH}$ or V_{IL} | | 1 | 100 | |
| | | $V_{CC}=6.0V, I_{OL}=20\mu A, V_{IN}=V_{IH}$ or V_{IL} | | 1 | 100 | |
| | | $V_{CC}=4.5V, I_{OL}=4mA, V_{IN}=V_{IH}$ or V_{IL} | | 170 | 260 | |
| | | $V_{CC}=6.0V, I_{OL}=5.2mA, V_{IN}=V_{IH}$ or V_{IL} | | 150 | 260 | |
| Input Leakage Current | $I_{I(LEAK)}$ | $V_{CC}=6.0V, V_{IN}=V_{CC}$ or 0 | | ± 0.1 | ± 100 | nA |
| Quiescent Supply Current | I_Q | $V_{CC}=6.0V, V_{IN}=V_{CC}$ or 0, $I_{OUT}=0$ | | | 2 | μA |
| Input Capacitance | C_I | $V_{CC}=2.0V\sim 6.0V$ | | 3 | 10 | pF |

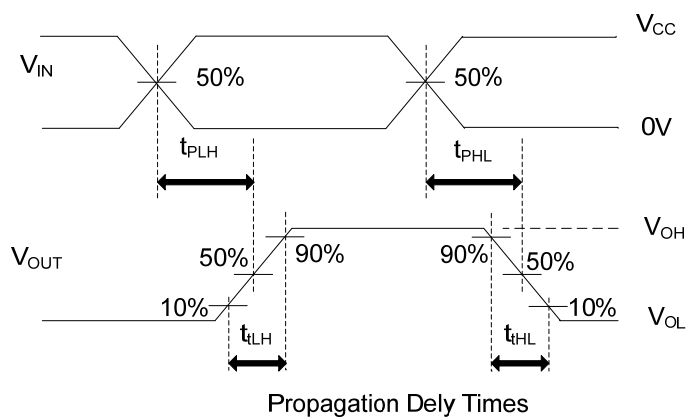
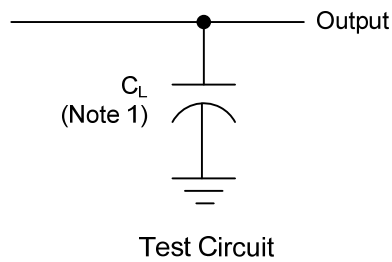
■ SWITCHING CHARACTERISTICS (see test circuit and waveforms)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--|-------------------|-------------------------|-----|-----|-----|------|
| Propagation Delay from Input (A or B) to Output(Y) | t_{PLH}/t_{PHL} | $V_{CC}=2.0V, C_L=50pF$ | | 40 | 100 | ns |
| | | $V_{CC}=4.5V, C_L=50pF$ | | 12 | 20 | |
| | | $V_{CC}=6.0V, C_L=50pF$ | | 10 | 17 | |
| To Output(Y) | t_t | $V_{CC}=2.0V, C_L=50pF$ | | 28 | 75 | ns |
| | | $V_{CC}=4.5V, C_L=50pF$ | | 8 | 15 | |
| | | $V_{CC}=6.0V, C_L=50pF$ | | 6 | 13 | |

■ OPERATING CHARACTERISTICS ($T_a=25^{\circ}C$)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|-------------------------------|----------|-----------------|-----|-----|-----|------|
| Power Dissipation Capacitance | C_{PD} | No load | | 35 | | pF |

■ TEST CIRCUIT AND WAVEFORMS(Cont.)



- Note: 1. C_L includes probe and jig capacitance.
 2. $PRR \leq 1\text{MHz}$, $Z_o = 50\Omega$, $t_R = 6\text{ns}$, $t_F = 6\text{ns}$.

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