



U74AHC1G132

CMOS IC

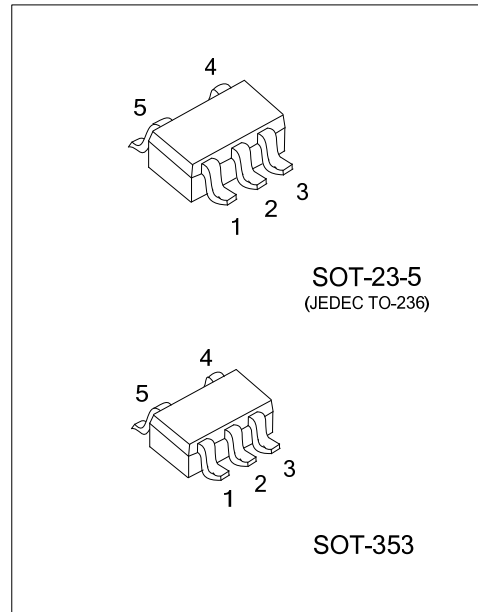
SINGLE 2-INPUT NAND GATE WITH SCHMITT-TRIGGER INPUTS

DESCRIPTION

The **U74AHC1G132** contains one 2-input NAND gate with Schmitt-trigger inputs designed for 2V to 5.5V V_{CC} operation and performs the Boolean function $Y = \overline{A \cdot B}$ or $Y = \overline{A} + \overline{B}$ in positive logic.

Because of Schmitt action, this device has different input threshold levels for positive-going (V_{T+}) and negative-going (V_{T-}) signals.

This device can be triggered from the slowest of input ramps and still give clean jitter-free output signals.



FEATURES

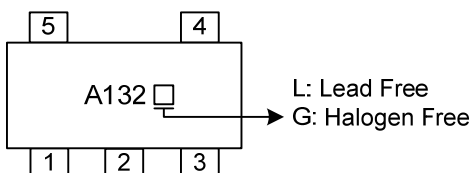
- * Operation voltage range: 2 ~ 5.5V
- * Max t_{pd} of 7.7 ns at 5 V
- * Low static power consumption; $I_{CC}=2\mu A$ (Max.)
- * $\pm 8mA$ output drive at 5 V

ORDERING INFORMATION

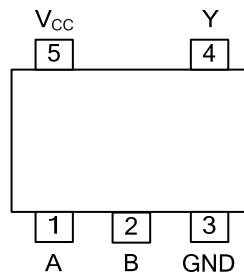
| Ordering Number | | Package | Packing |
|--------------------|--------------------|----------|-----------|
| Lead Free | Halogen Free | | |
| U74AHC1G132L-AE5-R | U74AHC1G132G-AE5-R | SOT-23-5 | Tape Reel |
| U74AHC1G132L-AL5-R | U74AHC1G132G-AL5-R | SOT-353 | Tape Reel |

| | |
|--|---|
| <p>U74AHC1G132G-AE5-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p> | <p>(1) R: Tape Reel (2) AE5: SOT-23-5, AL5: SOT-353 (3) G: Halogen Free and Lead Free, L: Lead Free</p> |
|--|---|

MARKING



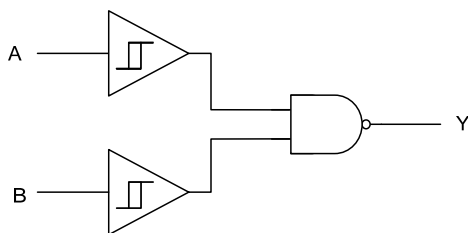
■ PIN CONFIGURATION



■ FUNCTION TABLE (each gate)

| INPUTS | | OUTPUT |
|--------|---|--------|
| A | B | Y |
| H | H | L |
| L | X | H |
| X | L | H |

■ LOGIC DIAGRAM (positive logic)



■ ABSOLUTE MAXIMUM RATING

| PARAMETER | SYMBOL | CONDITIONS | RATINGS | UNIT |
|------------------------------------|-----------|-------------------------------------|-----------------------|------|
| Supply Voltage | V_{CC} | | -0.5 ~ +7.0 | V |
| Input Voltage | V_{IN} | | -0.5 ~ +7.0 | V |
| Output Voltage | V_{OUT} | | -0.5 ~ $V_{CC} + 0.5$ | V |
| Continuous V_{CC} or GND Current | I_{CC} | | ±50 | mA |
| Continuous Output Current | I_{OUT} | $V_{OUT}=0 \sim V_{CC}$ | ±25 | mA |
| Input Clamp Current | I_{IK} | $V_{IN} < 0$ | -20 | mA |
| Output Clamp Current | I_{OK} | $V_{OUT} < 0$ or $V_{OUT} > V_{CC}$ | ±20 | mA |
| Operating Temperature | T_{OPR} | | -40 ~ + 85 | °C |
| Storage Temperature Range | 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 and output voltage ratings may be exceeded if the input and output current ratings are observed.

■ RECOMMENDED OPERATING CONDITIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|------------------------------------|---------------------|-----------------------|-----|-----|----------|------|
| Supply Voltage | V_{CC} | Operating | 2.0 | 5.0 | 5.5 | V |
| Input Voltage | V_{IN} | | 0 | | 5.5 | V |
| Output Voltage | V_{OUT} | High or low state | 0 | | V_{CC} | V |
| Operating Temperature | T_A | | -40 | | +85 | °C |
| Input Transition Rise or Fall Rate | $\Delta t/\Delta v$ | $V_{CC}=3.3 \pm 0.3V$ | | | 100 | ns/V |
| | | $V_{CC}=5.0 \pm 0.5V$ | | | 20 | ns/V |

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

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--|--------------|--|-------------------|------|------|------|
| Positive-going input threshold voltage | V_{T+} | $V_{CC}=3.0V$ | 1.2 | | 2.2 | V |
| | | $V_{CC}=4.5V$ | 1.75 | | 3.15 | |
| | | $V_{CC}=5.5V$ | 2.15 | | 3.85 | |
| Negative-going input threshold voltage | V_{T-} | $V_{CC}=3.0V$ | 0.9 | | 1.9 | V |
| | | $V_{CC}=4.5V$ | 1.35 | | 2.75 | |
| | | $V_{CC}=5.5V$ | 1.65 | | 3.35 | |
| Hysteresis ($V_{T+} - V_{T-}$) | ΔV_T | $V_{CC}=3V$ | 0.3 | | 1.2 | V |
| | | $V_{CC}=4.5V$ | 0.4 | | 1.4 | |
| | | $V_{CC}=5.5V$ | 0.5 | | 1.6 | |
| High-Level Output Voltage | V_{OH} | $V_{CC}=2.0V$ | $I_{OH}=-50\mu A$ | 1.9 | 2.0 | V |
| | | $V_{CC}=3.0V$ | | 2.9 | 3.0 | |
| | | $V_{CC}=4.5V$ | | 4.4 | 4.5 | |
| | | $V_{CC}=3.0V, I_{OL}=-4mA$ | 2.58 | | | |
| | | $V_{CC}=4.5V, I_{OL}=-8mA$ | 3.94 | | | |
| Low-Level Output Voltage | V_{OL} | $V_{CC}=2.0V$ | $I_{OL}=-50\mu A$ | | 0.1 | V |
| | | $V_{CC}=3.0V$ | | | 0.1 | |
| | | $V_{CC}=4.5V$ | | | 0.1 | |
| | | $V_{CC}=3.0V, I_{OL}=-4mA$ | | 0.36 | | |
| | | $V_{CC}=4.5V, I_{OL}=-8mA$ | | 0.36 | | |
| Input Leakage Current | $I_{(LEAK)}$ | $V_{CC}=0V \sim 5.5V, V_{IN}=5.5V$ or GND | | | ±0.1 | μA |
| Quiescent Supply Current | I_{CC} | $V_{CC}=5.0V, V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$ | | | 2 | μA |
| Input Capacitance | C_I | $V_{CC}=5.0V, V_{IN}=V_{CC}$ or GND | | 2 | 10 | pF |

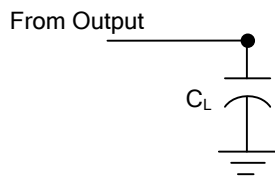
■ SWITCHING CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise specified) (see Figure 1)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT | |
|--|-------------------|-----------------------|------------|-----|-----|------|----|
| Propagation delay from input (A or B) to output(Y) | t_{PLH}/t_{PHL} | $V_{CC}=3.0V\pm 3.6V$ | $C_L=15pF$ | | 5.6 | 11.9 | ns |
| | | | $C_L=50pF$ | | 7.6 | 15.4 | |
| | | $V_{CC}=4.5V\pm 5.5V$ | $C_L=15pF$ | | 3.9 | 7.7 | ns |
| | | | $C_L=50pF$ | | 5.3 | 9.7 | |

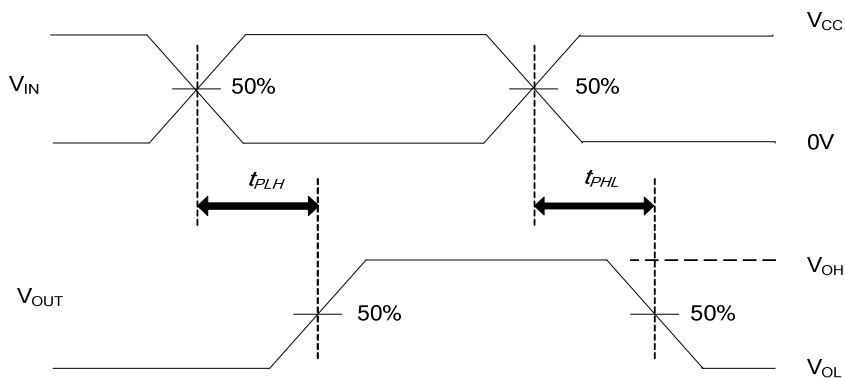
■ OPERATING CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|-------------------------------|----------|--|-----|-----|-----|------|
| Power Dissipation Capacitance | C_{PD} | $V_{CC}=5.0V$, $f=1\text{MHZ}$, No load. | | 11 | | pF |

■ TEST CIRCUIT AND WAVEFORMS



TEST CIRCUIT



PROPAGATION DELAY TIMES

- Notes: 1. C_L includes probe and jig capacitance.
 2. All input pulses are supplied by generators having the following characteristics: PRR $\leq 1\text{MHz}$, $Z_o = 50\Omega$, $t_r \leq 3\text{ns}$, $t_f \leq 3\text{ns}$.

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