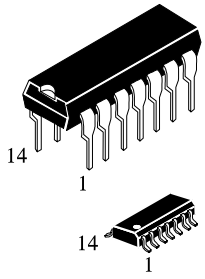
**IN74HCT30A**

# 8-Input NAND Gate

The IN74HCT30A is high-speed Si-gate CMOS device and is pin compatible with low power Schottky TTL (LSTTL) . The device provide the 8-input NAND function.

- Outputs Directly Interface to CMOS, NMOS, and TTL
- Operating Voltage Range: 4.5 to 5.5 V
- Low Input Current: 1.0 μA
- High Noise Immunity Characteristic of CMOS Devices

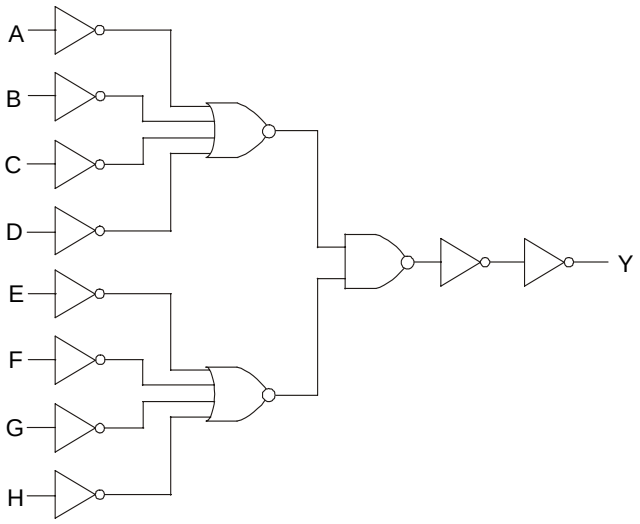



**ORDERING INFORMATION**

| | |
|---|---|
| IN74HCT30AN | Plastic |
| IN74HCT30AD | SOIC |

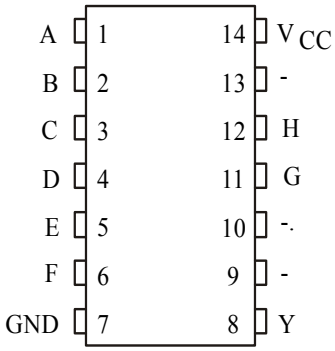
$T_A$ = -55° ÷ 125° C for all packages

## LOGIC DIAGRAM




PIN 14 =$V_{CC}$
PIN 7 = GND

## PIN ASSIGNMENT




## FUNCTION TABLE

| Inputs | | | | | | | | Output |
|---|---|---|---|---|---|---|---|---|
| A | B | C | D | E | F | G | H | Y |
| L | X | X | X | X | X | X | X | H |
| X | L | X | X | X | X | X | X | H |
| X | X | L | X | X | X | X | X | H |
| X | X | X | L | X | X | X | X | H |
| X | X | X | X | L | X | X | X | H |
| X | X | X | X | X | L | X | X | H |
| X | X | X | X | X | X | L | X | H |
| X | X | X | X | X | X | X | L | H |
| H | H | H | H | H | H | H | H | L |

X = don’t care

## MAXIMUM RATINGS*

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CC}$ | DC Supply Voltage (Referenced to GND) | -0.5 to +7.0 | V |
| $V_{IN}$ | DC Input Voltage (Referenced to GND) | -1.5 to $V_{CC}$ +1.5 | V |
| $V_{OUT}$ | DC Output Voltage (Referenced to GND) | -0.5 to $V_{CC}$ +0.5 | V |
| $I_{IN}$ | DC Input Current, per Pin | ±20 | mA |
| $I_{OUT}$ | DC Output Current, per Pin | ±25 | mA |
| $I_{CC}$ | DC Supply Current, $V_{CC}$ and GND Pins | ±50 | mA |
| $P_D$ | Power Dissipation in Still Air, Plastic DIP**<br>SOIC Package** | 750<br>500 | mW |
| Tstg | Storage Temperature | -65 to +150 | °C |
| $T_L$ | Lead Temperature, 1 mm from Case for 10 Seconds<br>(Plastic DIP or SOIC Package) | 260 | °C |

*Maximum Ratings are those values beyond which damage to the device may occur.
Functional operation should be restricted to the Recommended Operating Conditions.
**Derating - Plastic DIP: - 10 mW/°C from 65° to 125°C
SOIC Package: : - 7 mW/°C from 65° to 125°C

## RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | | Min | Max | Unit |
|---|---|---|---|---|---|
| $V_{CC}$ | DC Supply Voltage (Referenced to GND) | | 4.5 | 5.5 | V |
| $V_{IN}$, $V_{OUT}$ | DC Input Voltage, Output Voltage (Referenced to GND) | | 0 | $V_{CC}$ | V |
| $T_A$ | Operating Temperature, All Package Types | | -55 | +125 | °C |
| $t_r$, $t_f$ | Input Rise and Fall Time (Figure 1) | $V_{CC}$ =2.0 V<br>$V_{CC}$ =4.5 V<br>$V_{CC}$ =6.0 V | 0<br>0<br>0 | 1000<br>500<br>400 | ns |

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation, $V_{IN}$ and $V_{OUT}$ should be constrained to the range GND≤($V_{IN}$ or $V_{OUT}$)≤$V_{CC}$.

Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or $V_{CC}$). Unused outputs must be left open.

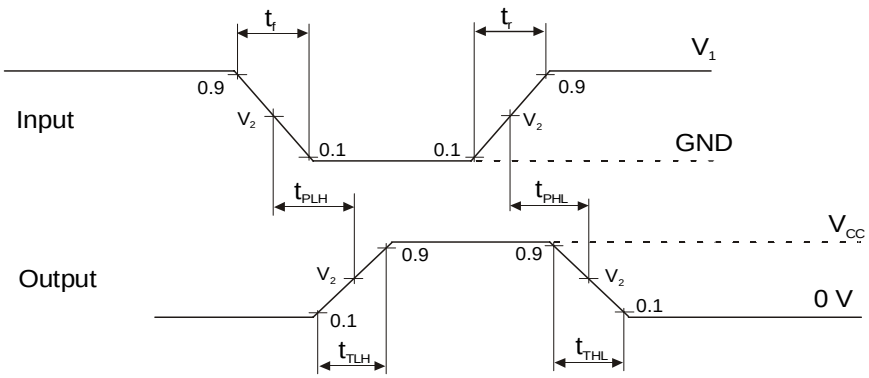
**DC ELECTRICAL CHARACTERISTICS** (Voltages Referenced to GND)

| Symbol | Parameter | Test Conditions | $V_{CC}$ V | Guaranteed Limit | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | 25 °C to -55°C | ≤85 °C | ≤125 °C | |
| $V_{IH}$ | Minimum High-Level Input Voltage | $V_{OUT}$≤0.1V or $V_{OUT}$ ≥$V_{CC}$-0.1V<br>$\|I_{OUT}\|$ ≤ 20 μA | 4.5<br>5.5 | 2.0<br>2.0 | 2.0<br>2.0 | 2.0<br>2.0 | V |
| $V_{IL}$ | Maximum Low -Level Input Voltage | $V_{OUT}$≤0.1V or $V_{OUT}$ ≥$V_{CC}$-0.1V<br>$\|I_{OUT}\|$ ≤ 20 μA | 4.5<br>5.5 | 0.8<br>0.8 | 0.8<br>0.8 | 0.8<br>0.8 | V |
| $V_{OH}$ | Minimum High-Level Output Voltage | $V_{IN}$=$V_{IH}$ or $V_{IL}$<br>$\|I_{OUT}\|$ ≤ - 20 μA | 4.5<br>5.5 | 4.4<br>5.4 | 4.4<br>5.4 | 4.4<br>5.4 | V |
| | | $V_{IN}$= $V_{IH}$ or $V_{IL}$<br>$\|I_{OUT}\|$ ≤ - 4.0 mA | 4.5 | 3.98 | 3.84 | 3.70 | |
| $V_{OL}$ | Maximum Low-Level Output Voltage | $V_{IN}$= $V_{IH}$ or $V_{IL}$<br>$\|I_{OUT}\|$ ≤ 20 μA | 4.5<br>5.5 | 0.1<br>0.1 | 0.1<br>0.1 | 0.1<br>0.1 | V |
| | | $V_{IN}$= $V_{IH}$ or $V_{IL}$<br>$\|I_{OUT}\|$ ≤ 4.0 mA | 4.5 | 0.26 | 0.33 | 0.4 | |
| $I_{IL}$ | Maximum Low-Level Input Leakage Current | $V_{IN}$= 0 V | 5.5 | -0.1 | -1.0 | -1.0 | μA |
| $I_{IH}$ | Maximum High-Level Input Leakage Current | $V_{IN}$= $V_{CC}$ | 5.5 | 0.1 | 1.0 | 1.0 | μA |
| $I_{CC}$ | Maximum Quiescent Supply Current (per Package) | $V_{IN}$=$V_{CC}$ or 0 V<br>$I_{OUT}$=0 μA | 5.5 | 2.0 | 20 | 40 | μA |
| $I_{CCT}$ | Maximum Additional Quiescent Supply Current | $V_{IN}$=2.4V any one input, $V_{IN}$=0 V or $V_{CC}$, others inputs<br>$I_{OUT}$=0 μA | 5.5 | ≤-55°C | | 25°C ÷ -125°C | mA |
| | | | | 2.9 | | 2.4 | |

## AC ELECTRICAL CHARACTERISTICS ($C_L$=50pF,Input $t_r$=$t_f$=6.0 ns)

| Symbol | Parameter | $V_{CC}$ V | Guaranteed Limit | | | Unit |
|---|---|---|---|---|---|---|
| | | | 25 °C to -55°C | ≤85°C | ≤125°C | |
| $t_{PHL}$, $t_{PLH}$ | Maximum Propagation Delay (Figure 1) | 4.5 | 41 | 52 | 63 | ns |
| $t_{THL}$, $t_{TLH}$ | Maximum Output Transition Time (Figure 1) | 4.5 | 15 | 19 | 22 | ns |
| $C_{IN}$ | Maximum Input Capacitance | 5.0 | 10 | 10 | 10 | pF |

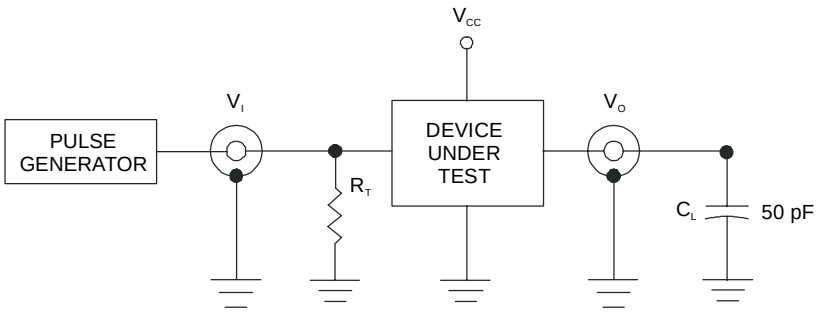
| | | | |
|---|---|---|---|
| $C_{PD}$ | Power Dissipation Capacitance (Per Gate)<br>Used to determine the no-load dynamic power consumption:<br>$P_D=C_{PD}V_{CC}^2f+I_{CC}V_{CC}$ | $T_A$=25°C,$V_{CC}$=5.0 V<br>27 | pF |




$V_1$ = 3 V

$V_2$ = 1.3 V

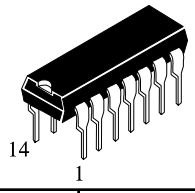
Figure 1. Switching Waveforms

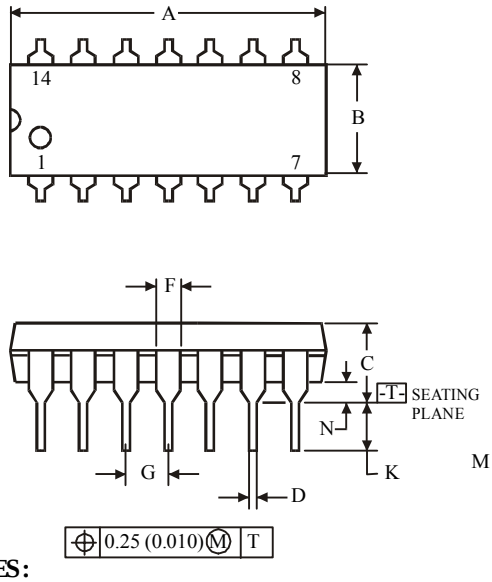



Termination resistance $R_T$ – should be equal to $Z_{OUT}$ of pulse generators

Figure 2. Test Circuit

**N SUFFIX PLASTIC DIP**
**(MS - 001AA)**



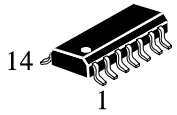



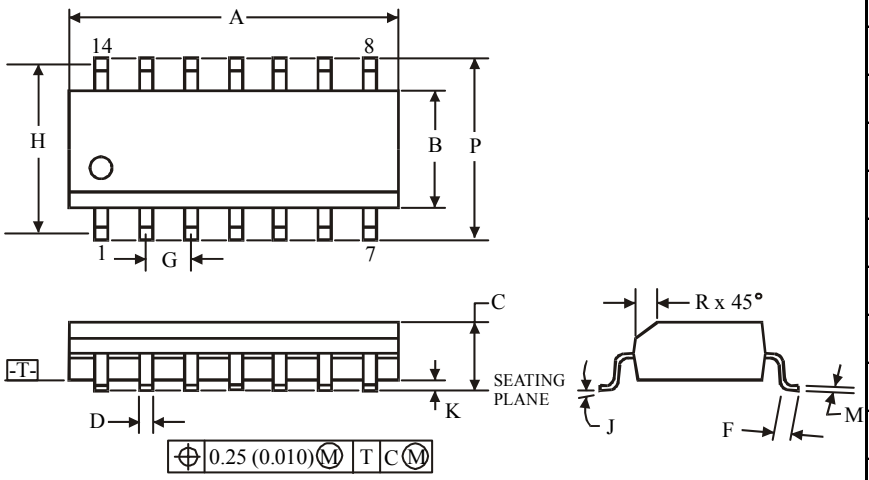

| | Dimension, mm | |
|---|---|---|
| **Symbol** | **MIN** | **MAX** |
| **A** | 18.67 | 19.69 |
| **B** | 6.1 | 7.11 |
| **C** | | 5.33 |
| **D** | 0.36 | 0.56 |
| **F** | 1.14 | 1.78 |
| **G** | 2.54 | |
| **H** | 7.62 | |
| **J** | 0° | 10° |
| **K** | 2.92 | 3.81 |
| **L** | 7.62 | 8.26 |
| **M** | 0.2 | 0.36 |
| **N** | 0.38 | |

**NOTES:**

1. Dimensions “A”, “B” do not include mold flash or protrusions.
   Maximum mold flash or protrusions 0.25 mm (0.010) per side.

**D SUFFIX SOIC**
**(MS - 012AB)**




| | Dimension, mm | |
|---|---|---|
| **Symbol** | **MIN** | **MAX** |
| **A** | 8.55 | 8.75 |
| **B** | 3.8 | 4 |
| **C** | 1.35 | 1.75 |
| **D** | 0.33 | 0.51 |
| **F** | 0.4 | 1.27 |
| **G** | 1.27 | |
| **H** | 5.27 | |
| **J** | 0° | 8° |
| **K** | 0.1 | 0.25 |
| **M** | 0.19 | 0.25 |
| **P** | 5.8 | 6.2 |
| **R** | 0.25 | 0.5 |

**NOTES:**

1. Dimensions A and B do not include mold flash or protrusion.
2. Maximum mold flash or protrusion 0.15 mm (0.006) per side
   for A; for B – 0.25 mm (0.010) per side.