

HD74UH00

2-input NAND Gate

HITACHI

ADE-205-014A(Z)

2nd Edition

August 1993

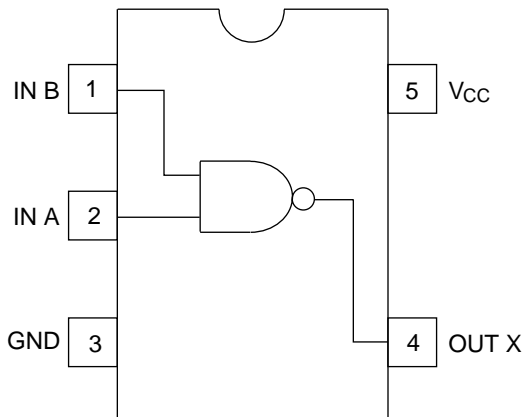
Description

The HD74UH00 is high speed CMOS two input NAND gate using silicon gate CMOS process. With CMOS low power dissipation, it provides high speed equivalent to LS-TTL series. The internal circuit of three stages construction with buffer provides wide noise margin and stable output.

Features

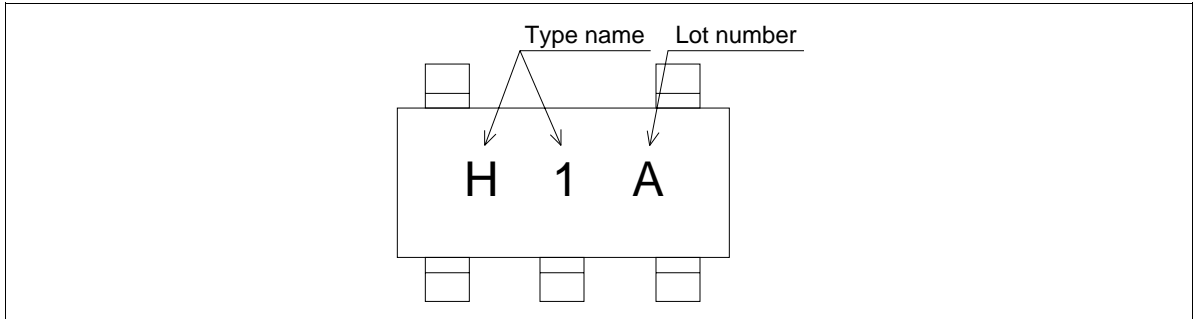
- Encapsulated in very small 5pins package of $2.9 \times 1.6 \times 1.1$ mm, the efficiency to mount on substrate is significantly improved.
- The basic gate function is lined up as hitachi uni logic series.
- Supplied on embos taping for high speed automatic mounting.
- Electrical characteristics equivalent to the HD74HC00
Supply voltage range: 2 to 6 V
Operating temperature range: -40 to $+85^{\circ}\text{C}$
- $|I_{OH}| = I_{OL} = 2$ mA (min)

Pin Arrangement



(Top view)

Article Indication



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Supply voltage	V_{CC}	-0.5 to +7.0	V
Input voltage	V_{IN}	-0.5 to $V_{CC} + 0.5$	V
Output voltage	V_{OUT}	-0.5 to $V_{CC} + 0.5$	V
Input diode current	I_{IK}	± 20	mA
Output diode current	I_{OK}	± 20	mA
Output current	I_{OUT}	± 25	mA
V_{CC} /GND current	I_{CC}, I_{GND}	± 25	mA
Power dissipation	P_T	200	mW
Storage temperature	T_{stg}	-65 to +150	°C

Recommended Operating Conditions

Item	Symbol	Ratings	Unit
Supply voltage	V_{CC}	2 to 6	V
Input voltage	V_{IN}	0 to V_{CC}	V
Output voltage	V_{OUT}	0 to V_{CC}	V
Operating temperature	T_{opr}	-40 to +85	°C
Input rise/fall time	t_r, t_f	0 to 1000 ($V_{CC} = 2.0$ V)	ns
		0 to 500 ($V_{CC} = 4.5$ V)	
		0 to 400 ($V_{CC} = 6.0$ V)	

Electrical Characteristics

Item	Symbol	Ta = 25°C		Ta = -40 to 85°C		Unit	Test Conditions			
		Min	Typ	Max	Min		Max	V _{CC}		
Input voltage	V _{IH}	1.5	—	—	1.5	—	V	2.0		
		3.15	—	—	3.15	—		4.5		
		4.2	—	—	4.2	—		6.0		
	V _{IL}	—	—	0.5	—	0.5	V	2.0		
		—	—	1.35	—	1.35		4.5		
		—	—	1.8	—	1.8		6.0		
Output voltage	V _{OH}	1.9	2.0	—	1.9	—	V	2.0	V _{IN} = V _{IH} or V _{IL} I _{OH} = -20 μA	
		4.4	4.5	—	4.4	—		4.5		
		5.9	6.0	—	5.9	—		6.0		
		4.18	4.31	—	4.31	—		4.5		I _{OH} = -2 mA
		5.68	5.80	—	5.63	—		6.0		I _{OH} = -2.6 mA
	V _{OL}	—	0.0	0.1	—	0.1	V	2.0	V _{IN} = V _{IH} I _{OL} = 20 μA	
		—	0.0	0.1	—	0.1		4.5		
		—	0.0	0.1	—	0.1		6.0		
		—	0.17	0.26	—	0.33		4.5		I _{OL} = 2 mA
		—	0.18	0.26	—	0.33		6.0		I _{OL} = 2.6 mA
Input current	I _{IN}	—	—	±0.1	—	±1.0	μA	6.0	V _{IN} = V _{CC} or GND	
Operating current	I _{CC}	—	—	1.0	—	10.0		6.0	V _{IN} = V _{CC} or GND	

Switching Characteristics

Item	Symbol	Ta = 25°C			Unit	Test Conditions
		Min	Typ	Max		
Output rise/fall time	t _{TLH}	—	5	10	ns	See Test circuit
	t _{THL}					
Propagation delay time	t _{PLH}	—	7	15	ns	See Test circuit
	t _{PHL}					

(C_L = 15 pF, t_r = t_f = 6 ns, V_{CC} = 5 V)

HD74UH00

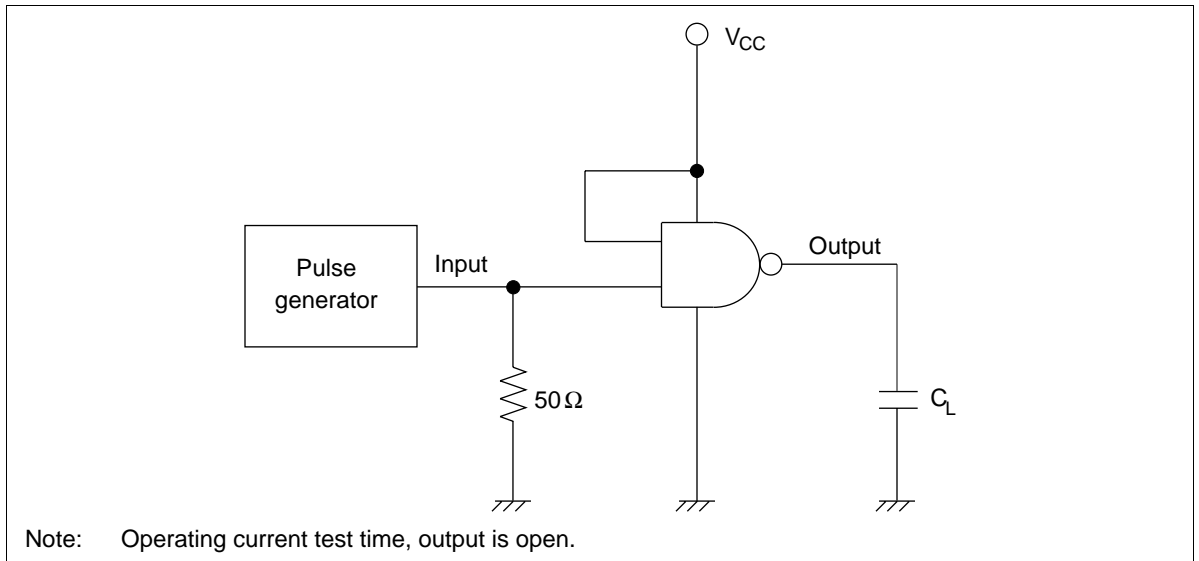
Item	Symbol	Ta = 25°C		Ta = -40 to 85°C		Unit	Test Conditions		
		Min	Typ	Max	Min		Max	V _{CC}	
Output rise/fall time	t _{TLH}	—	50	125	—	155	ns	2.0	See under figure
	t _{THL}	—	14	25	—	31		4.5	
		—	12	21	—	26		6.0	
Propagation delay time	t _{PLH}	—	48	100	—	125	ns	2.0	See under figure
	t _{PHL}	—	12	20	—	25		4.5	
		—	9	17	—	21		6.0	
Input capacitance	C _{IN}	—	5	10	—	10	pF	—	
Equivalent capacitance	C _{PD}	—	10	—	—	—		—	

(C_L = 50 pF, t_r = t_f = 6 ns)

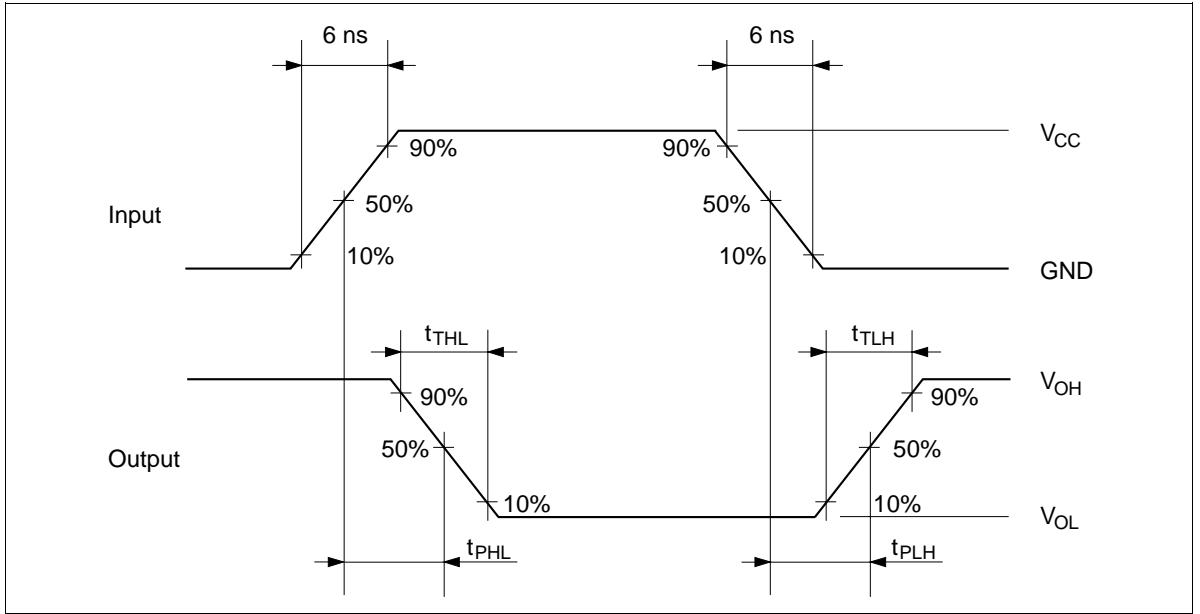
Note: C_{PD} is equivalent capacitance inside of the IC calculated from the operating current without load (see test circuit). The average operating current without load is calculated according to the expression below.

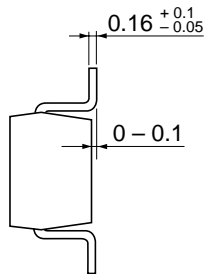
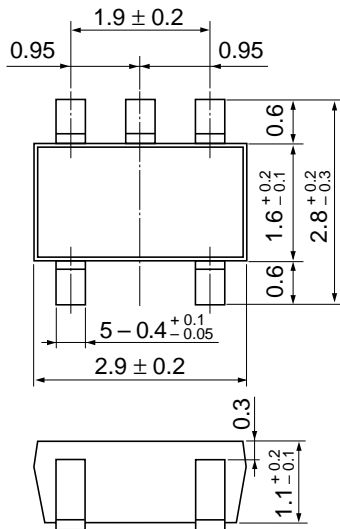
$$I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

Test Circuit



Waveforms





Hitachi Code	MPAK-5
JEDEC	—
EIAJ	—
Weight (reference value)	0.015 g

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