

HD74UH04

Inverter

HITACHI

ADE-205-016A(Z)

2nd Edition

August 1993

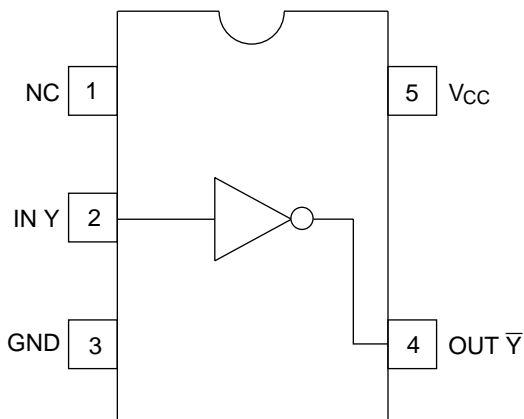
Description

The HD74UH04 is high speed CMOS inverter 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

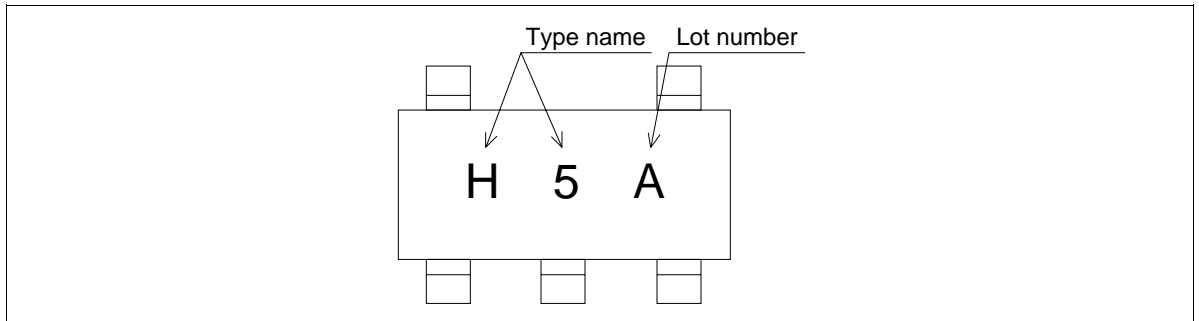
- Encapsulated in very small 5pins package of $2.9 \times 1.6 \times 1.1$ mm, the efficiency to mount on substrate is significantly improved.
- The basic gate function is lined up as hitachi uni logic series.
- Supplied on embos taping for high speed automatic mounting.
- Electrical characteristics equivalent to the HD74HC04
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 _{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
		—	0.0	0.1	—	0.1		V			2.0
	—	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)

HD74UH04

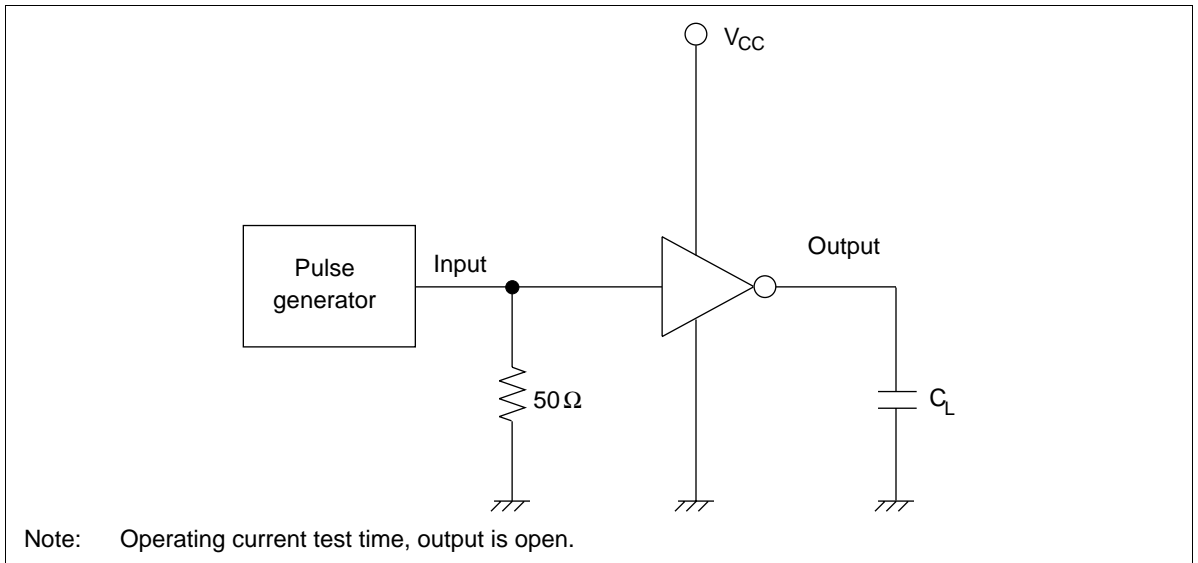
Item	Symbol	Ta = 25°C			Ta = -40 to 85°C		Unit	Test Conditions	
		Min	Typ	Max	Min	Max		V _{CC}	
Output rise/fall time	t _{TLH}	—	50	125	—	155	ns	2.0	See Test circuit
	t _{THL}	—	14	25	—	31		4.5	
		—	12	21	—	26		6.0	
Propagation delay time	t _{PLH}	—	48	100	—	125	ns	2.0	See Test circuit
	t _{PHL}	—	12	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)

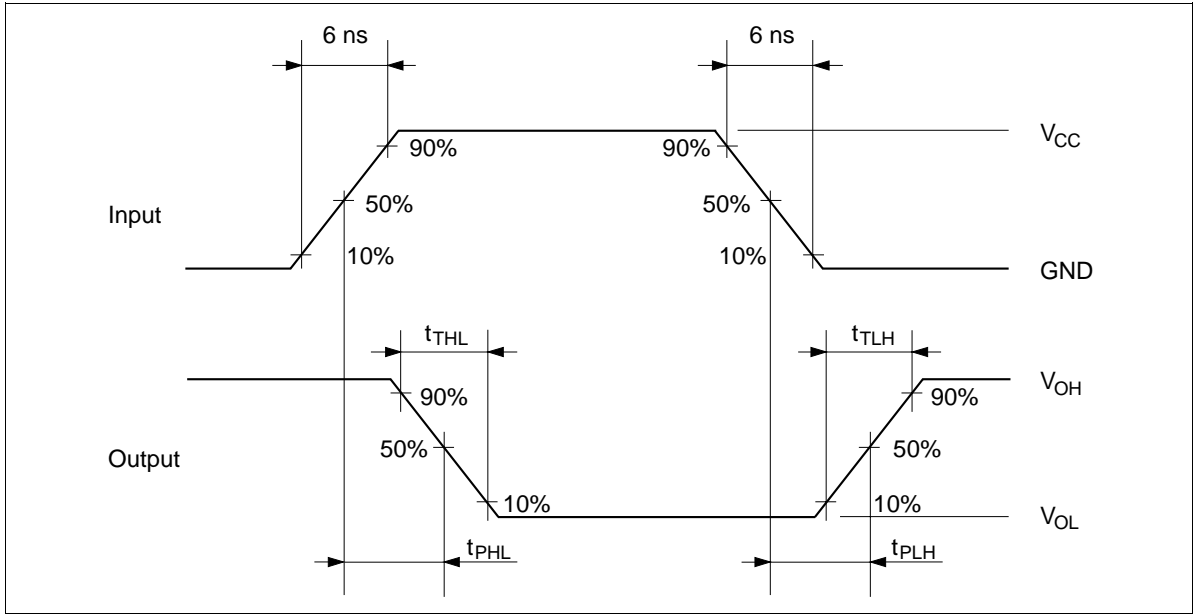
Note: C_{PD} is equivalent capacitance inside of the IC calculated from the operating current without load (see test circuit). The average operating current without load is calculated according to the expression below.

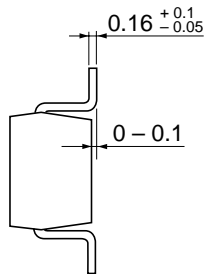
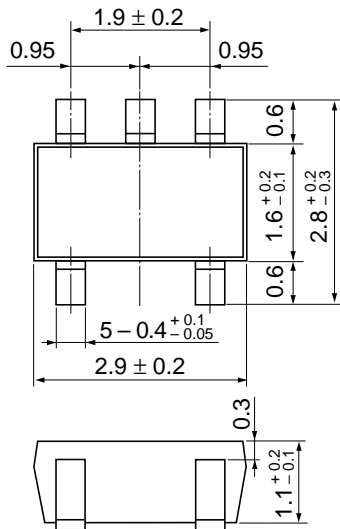
$$I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

Test Circuit



Waveforms





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

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