

HD74UH04

Inverter

REJ03D0201-0400Z
(Previous ADE-205-016B (Z))
Rev.4.00
Feb.02.2004

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.

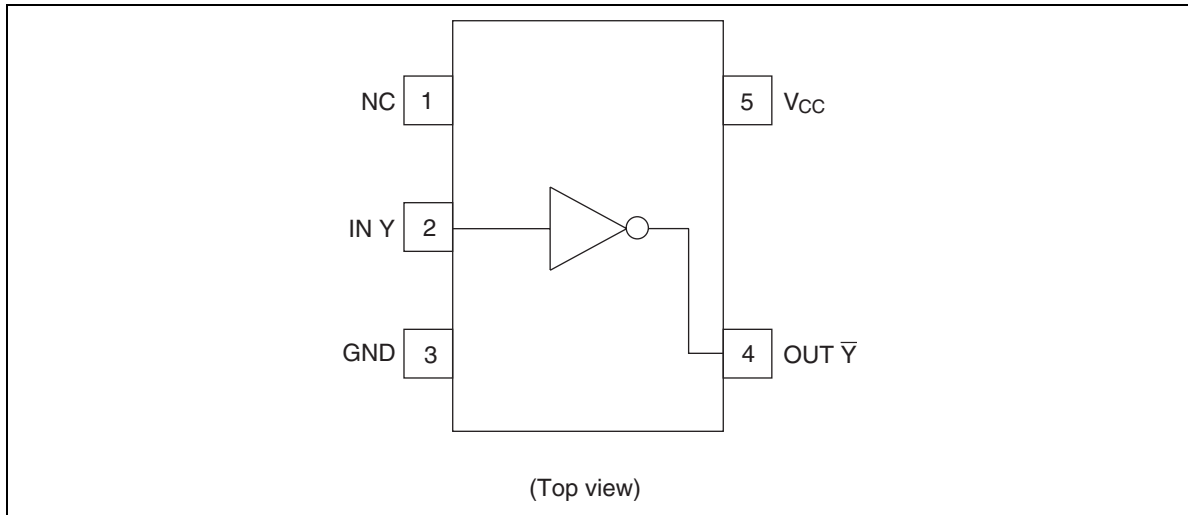
Features

- 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 Renesas uni logic series.
- Supplied on emboss 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)
- Ordering Information

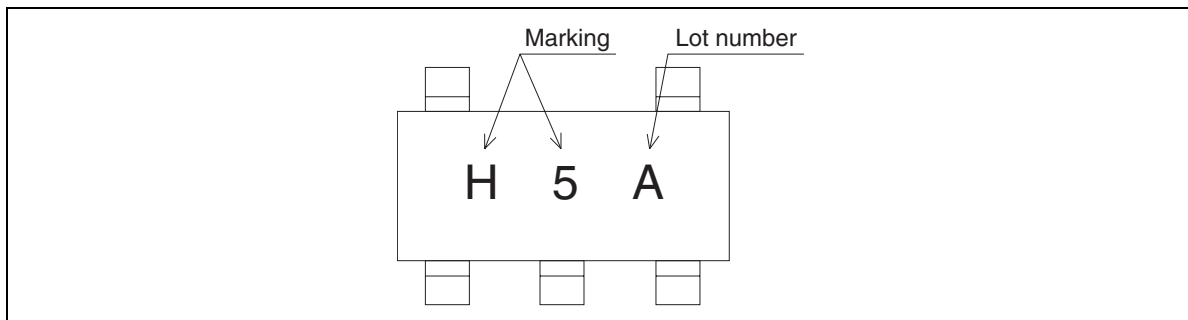
Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74UH04EL	MPAK-5 pin	MPAK-5V	–	EL (3,000 pcs/reel)

HD74UH04

Pin Arrangement



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	$^{\circ}C$

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

tem	Symbol	V_{CC} (V)	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } 85^\circ\text{C}$		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Input voltage	V_{IH}	2.0	1.5	—	—	1.5	—	V		
		4.5	3.15	—	—	3.15	—			
		6.0	4.2	—	—	4.2	—			
	V_{IL}	2.0	—	—	0.5	—	0.5	V		
		4.5	—	—	1.35	—	1.35			
		6.0	—	—	1.8	—	1.8			
Output voltage	V_{OH}	2.0	1.9	2.0	—	1.9	—	V	$V_{IN} = V_{IL}$ $I_{OH} = -20 \mu\text{A}$	
		4.5	4.4	4.5	—	4.4	—			
		6.0	5.9	6.0	—	5.9	—			
		4.5	4.18	4.31	—	4.31	—			$I_{OH} = -2 \text{ mA}$
		6.0	5.68	5.80	—	5.63	—			
	V_{OL}	2.0	—	0.0	0.1	—	0.1	V	$V_{IN} = V_{IH}$ $I_{OL} = 20 \mu\text{A}$	
		4.5	—	0.0	0.1	—	0.1			
		6.0	—	0.0	0.1	—	0.1			
		4.5	—	0.17	0.26	—	0.33			$I_{OL} = 2 \text{ mA}$
		6.0	—	0.18	0.26	—	0.33			
Input current	I_{IN}	6.0	—	—	± 0.1	—	± 1.0	μA	$V_{IN} = V_{CC}$ or GND	
Operating current	I_{CC}	6.0	—	—	1.0	—	10.0		$V_{IN} = V_{CC}$ or GND	

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Switching Characteristics

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

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}					

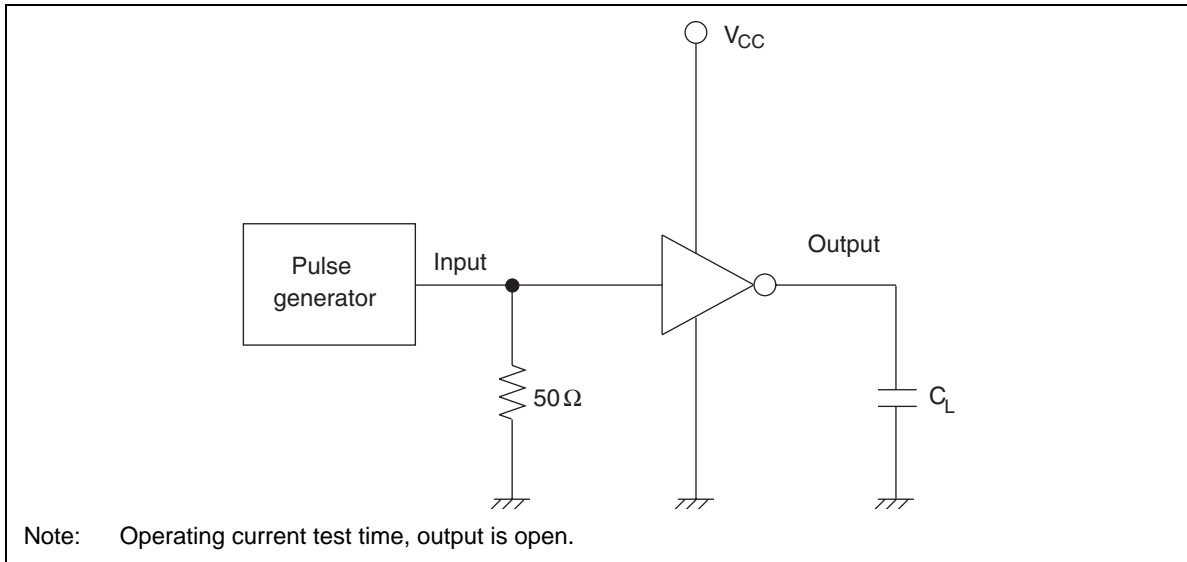
($C_L = 50 \text{ pF}$, $t_r = t_f = 6 \text{ ns}$)

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

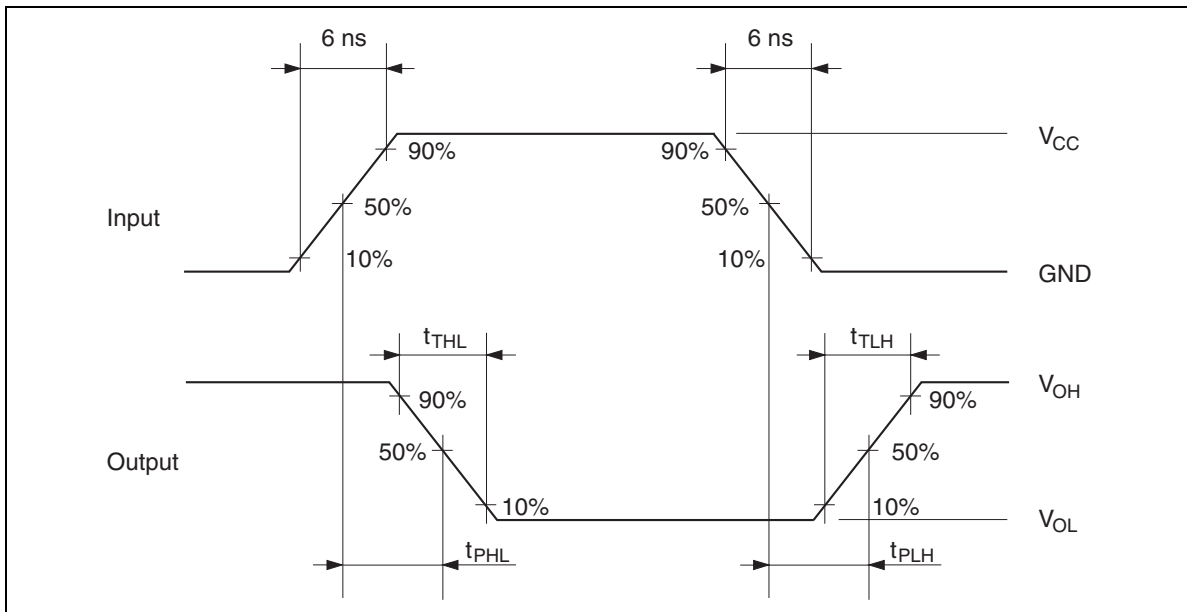
Note: C_{PD} is equivalent capacitance inside of the IC calculated from the operating current without load (see test circuit). The average operating current without load is calculated according to the expression below.

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

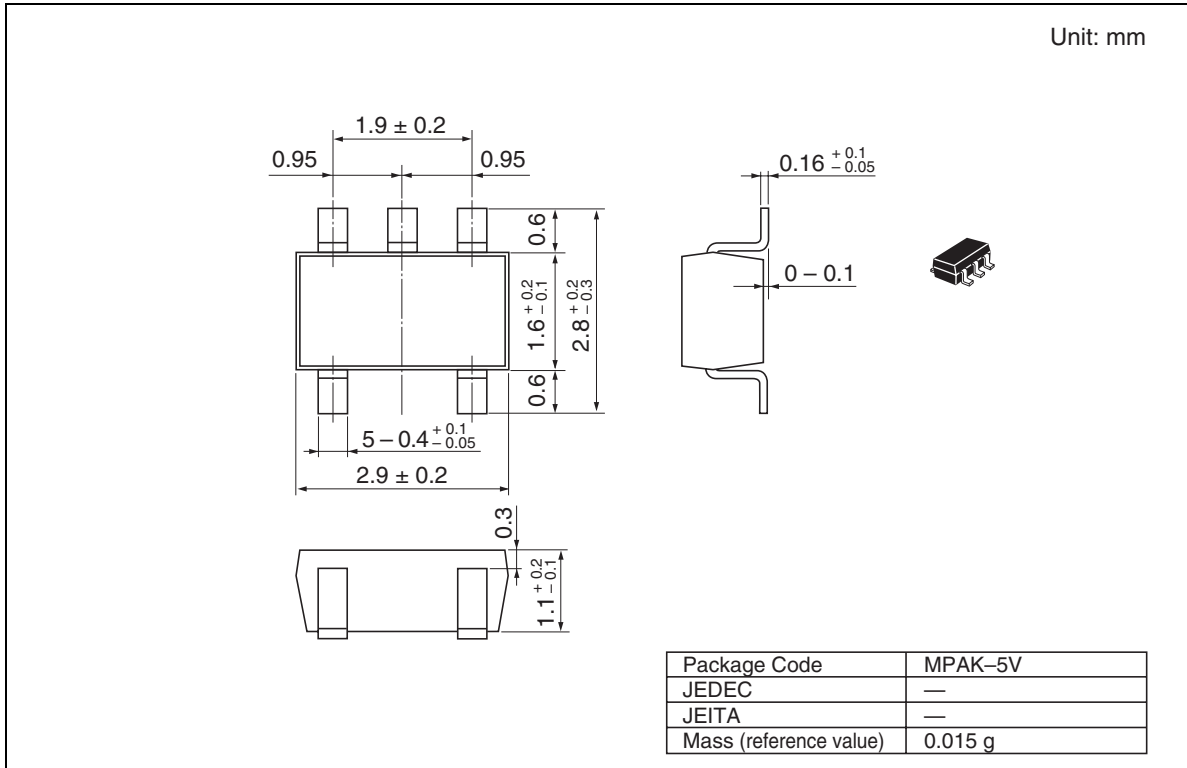
Test Circuit



Waveforms



Package Dimensions >



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