

HD74HC1GU04

Unbuffered Inverter

HITACHI

ADE-205-298B (Z)
3rd. Edition
April 2001

Description

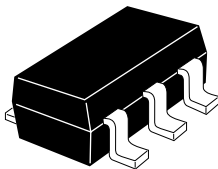
The HD74HC1GU04 is high speed CMOS unbuffered inverter using silicon gate CMOS process. With CMOS low power dissipation, it provides high speed equivalent to LS-TTL series.

Features

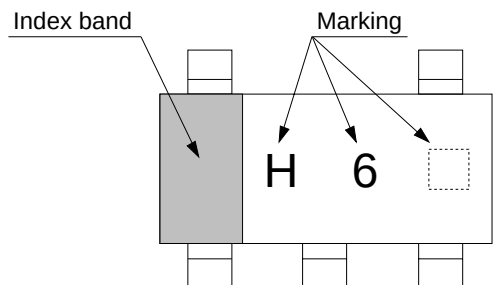
- The basic gate function is lined up as hitachi uni logic series.
- Supplied on emboss taping for high speed automatic mounting.
- Supply voltage range : 2 to 6 V
Operating temperature range : -40 to +85°C
- $|I_{OH}| = I_{OL} = 2 \text{ mA (min)}$

Outline and Article Indication

- HD74HC1GU04



CMPAK-5



□ = Control code
(— or blank)

HD74HC1GU04

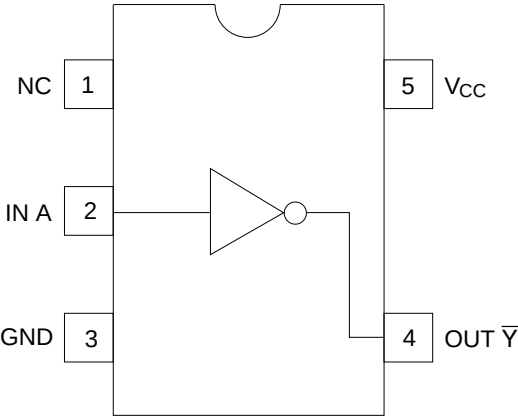
Function Table

Input A	Output $\bar{Y}$
H	L
L	H

H : High level

L : Low level

Pin Arrangement



(Top view)

Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Test Conditions
Supply voltage range	V_{CC}	−0.5 to 7.0	V	
Input voltage range ^{*1}	V_I	−0.5 to $V_{CC} + 0.5$	V	
Output voltage range ^{*1, 2}	V_O	−0.5 to $V_{CC} + 0.5$	V	Output : H or L
Input clamp current	I_{IK}	±20	mA	$V_I < 0$ or $V_I > V_{CC}$
Output clamp current	I_{OK}	±20	mA	$V_O < 0$ or $V_O > V_{CC}$
Continuous output current	I_O	±25	mA	$V_O = 0$ to V_{CC}
Continuous current through V_{CC} or GND	I_{CC} or I_{GND}	±25	mA	
Maximum power dissipation P_T at $T_a = 25^\circ\text{C}$ (in still air) ^{*3}		200	mW	
Storage temperature	T_{stg}	−65 to 150	°C	

Notes: The absolute maximum ratings are values which must not individually be exceeded, and furthermore, no two of which may be realized at the same time.

1. The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
2. This value is limited to 5.5 V maximum.
3. The maximum package power dissipation was calculated using a junction temperature of 150°C.

Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Test Conditions
Supply voltage range	V_{CC}	2	6	V	
Input voltage range	V_I	0	V_{CC}	V	
Output voltage range	V_O	0	V_{CC}	V	
Output current	I_{OL}	—	2.0	mA	$V_{CC} = 4.5\text{ V}$
		—	2.6		$V_{CC} = 6.0\text{ V}$
	I_{OH}	—	−2.0	mA	$V_{CC} = 4.5\text{ V}$
		—	−2.6		$V_{CC} = 6.0\text{ V}$
Operating temperature	T_a	−40	85	°C	

Note: Unused or floating inputs must be held high or low.

Electrical Characteristics

Item	Symbol	V _{CC} (V)	T _a = 25°C			T _a = -40 to 85°C		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Input voltage	V _{IH}	2.0	1.7	—	—	1.7	—	V		
		4.5	3.6	—	—	3.6	—			
		6.0	4.8	—	—	4.8	—			
	V _{IL}	2.0	—	—	0.3	—	0.3			
		4.5	—	—	0.9	—	0.9			
		6.0	—	—	1.2	—	1.2			
Output voltage	V _{OH}	2.0	1.8	2.0	—	1.8	—	V	V _{IN} = V _{IL}	I _{OH} = -20 μA
		4.5	4.0	4.5	—	4.0	—			
		6.0	5.5	6.0	—	5.5	—			
		4.5	4.18	4.31	—	4.13	—			
		6.0	5.68	5.80	—	5.63	—			
	V _{OL}	2.0	—	0.0	0.2	—	0.2	V _{IN} = V _{IH}	I _{OL} = 20 μA	
		4.5	—	0.01	0.5	—	0.5			
		6.0	—	0.04	0.5	—	0.5			
		4.5	—	0.17	0.26	—	0.33			
		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			

Switching Characteristics

Item	Symbol	T _a = 25°C			Unit	Test Conditions
		Min	Typ	Max		
Output rise / fall time	t _{TLH} t _{THL}	—	4	10	ns	Test circuit
Propagation delay time	t _{PLH} t _{PHL}	—	3	15	ns	Test circuit

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

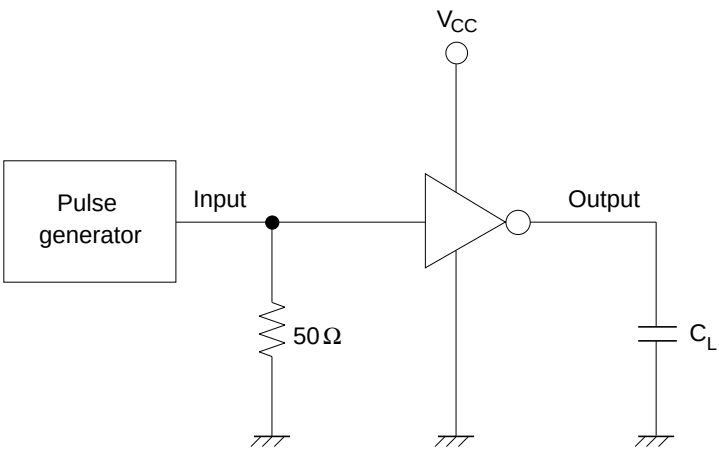
Item	Symbol	T _a = 25°C			T _a = -40 to 85°C		Unit	Test Conditions	
		V _{CC}	Min	Typ	Max	Min			Max
Output rise / fall time	t _{TLH}	2.0	—	25	125	—	155	ns	Test circuit
	t _{THL}	4.5	—	12	25	—	31		
		6.0	—	10	21	—	26		
Propagation delay time	t _{PLH}	2.0	—	17	100	—	125	ns	Test circuit
	t _{PHL}	4.5	—	7	20	—	25		
		6.0	—	6.5	17	—	21		
Input capacitance	C _{IN}	—	—	2.5	5	—	5	pF	
Equivalent capacitance	C _{PD}	—	—	10	—	—	—	pF	

(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.

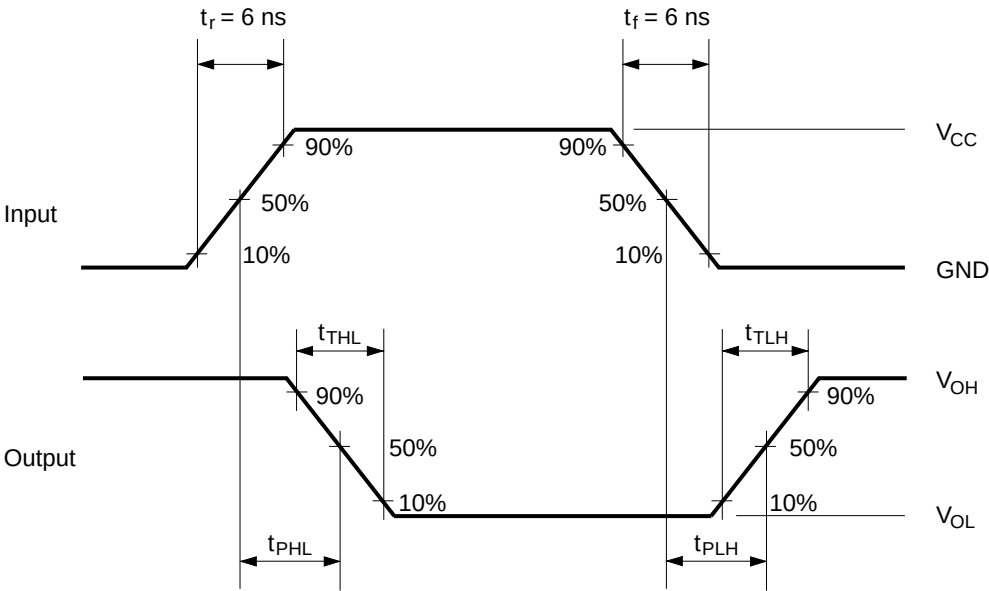
$$I_{CC}(\text{opr}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

Test Circuit



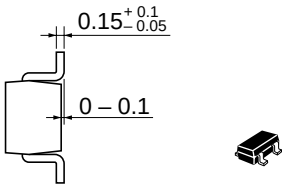
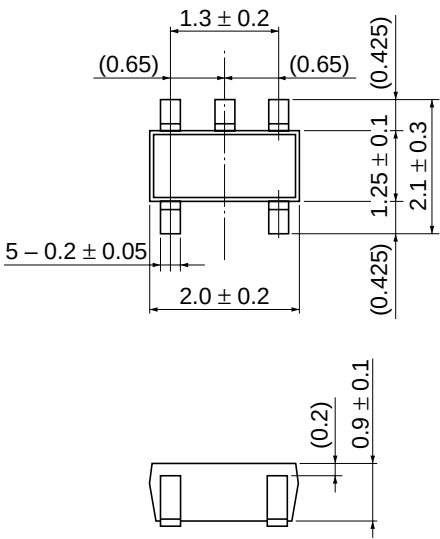
Note: 1. C_L includes probe and jig capacitance.

• Waveforms



Package Dimensions

As of January, 2001
Unit: mm



Hitachi Code	CMPAK-5
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.006 g

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