HD74HC1G14

## Inverter with Schmitt–trigger Input

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Description

The HD74HC1G14 is high speed CMOS schmitt–trigger 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.
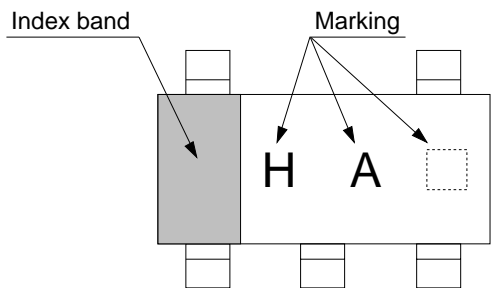
Features

- The basic gate function is lined up as hitachi uni logic series.

- Supplied on emboss taping for high speed automatic mounting.

- Electrical characteristics equivalent to the HD74HC14
  Supply voltage range : 2 to 6 V
  Operating temperature range : –40 to +85°C

- $|I_{OH}| = I_{OL} = 2$ mA (min)

Outline and Article Indication

- HD74HC1G14

Index band

Marking

H   A
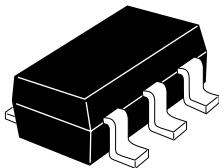
CMPAK–5

☐ = Control code
(— or blank)

Hitachi
semiconductor

HD74HC1G14

Function Table

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

H : High level
L : Low level

Pin Arrangement
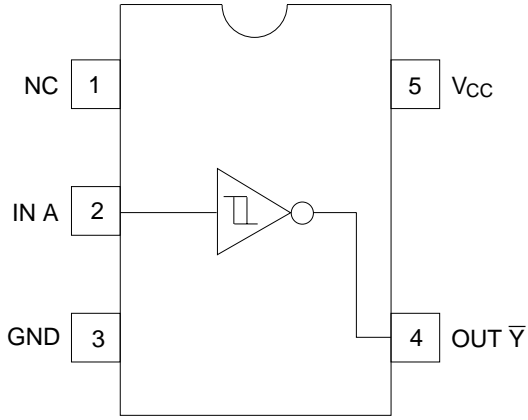
(Top view)

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 at Ta = 25°C (in still air) [3]	P_T	200	mW	
Storage temperature	Tstg	–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 caluculated 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	$V_{CC} = 4.5$ V
		—	2.6		$V_{CC} = 6.0$ V
	I_{OH}	—	–2.0	mA	$V_{CC} = 4.5$ V
		—	–2.6		$V_{CC} = 6.0$ V
Operating temperature	Ta	–40	85	°C	

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

Electrical Characteristics

Item	Symbol	V_{cc} (V)	$T_a = 25°C$ Min	Typ	Max	$T_a = -40$ to $85°C$ Min	Max	Unit	Test Conditions	
Threshold voltage	V_T^+	2.0	1.0	1.29	1.5	1.0	1.5	V		
		4.5	2.3	2.73	3.15	2.3	3.15			
		6.0	3.0	3.56	4.2	3.0	4.2			
	V_T^-	2.0	0.3	0.70	0.9	0.3	0.9			
		4.5	1.13	1.66	2.0	1.13	2.0			
		6.0	1.5	2.24	2.6	1.5	2.6			
	ΔV_T	2.0	0.3	0.59	1.0	0.3	1.0			
		4.5	0.6	1.08	1.4	0.6	1.4			
		6.0	0.8	1.31	1.7	0.8	1.7			
Output voltage	V_{OH}	2.0	1.9	2.0	—	1.9	—	V	$V_{IN} = V_{IL}$	$I_{OH} = -20$ μA
		4.5	4.4	4.5	—	4.4	—			
		6.0	5.9	6.0	—	5.9	—			
		4.5	4.18	4.31	—	4.13	—			$I_{OH} = -2$ mA
		6.0	5.68	5.80	—	5.63	—			$I_{OH} = -2.6$ mA
	V_{OL}	2.0	—	0.0	0.1	—	0.1		$V_{IN} = V_{IH}$	$I_{OL} = 20$ μA
		4.5	—	0.0	0.1	—	0.1			
		6.0	—	0.0	0.1	—	0.1			
		4.5	—	0.17	0.26	—	0.33			$I_{OL} = 2$ mA
		6.0	—	0.18	0.26	—	0.33			$I_{OL} = 2.6$ mA
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	μA	$V_{IN} = V_{CC}$ or GND	

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Switching Characteristics

Item	Symbol	$T_a = 25°C$			Unit	Test Conditions
		Min	Typ	Max		
Output rise / fall time	t_{TLH} t_{THL}	—	5	8	ns	Test circuit
Propagation delay time	t_{PLH} t_{PHL}	—	10	21	ns	Test circuit

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

Item	Symbol	V_{CC}	$T_a = 25°C$			$T_a = -40$ to 85°C		Unit	Test Conditions
			Min	Typ	Max	Min	Max		
Output rise / fall time	t_{TLH}	2.0	—	50	125	—	145	ns	Test circuit
	t_{THL}	4.5	—	14	25	—	30		
		6.0	—	12	21	—	24		
Propagation delay time	t_{PLH}	2.0	—	48	100	—	125	ns	Test circuit
	t_{PHL}	4.5	—	12	20	—	25		
		6.0	—	9	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.
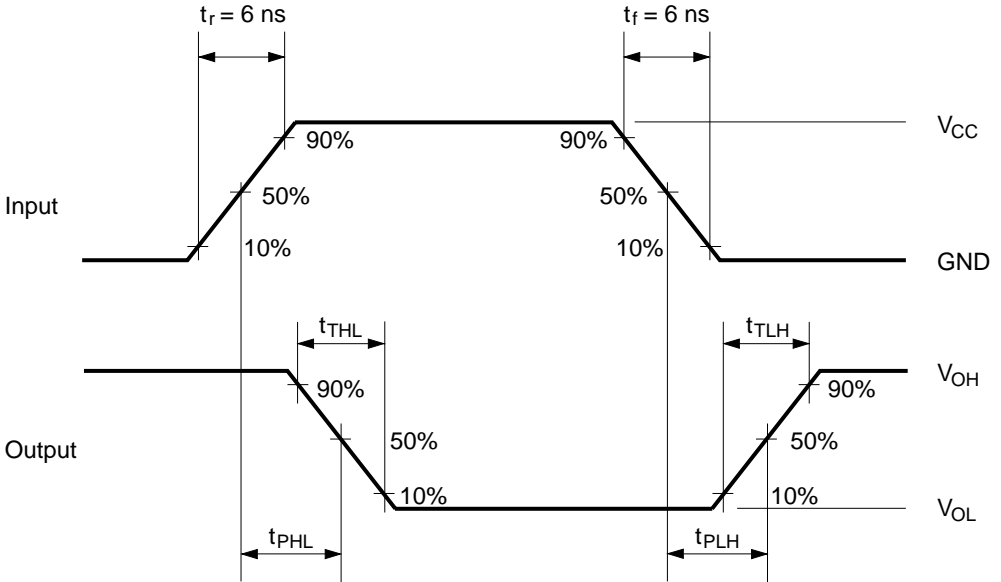
I_{CC} (opr) = $C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$

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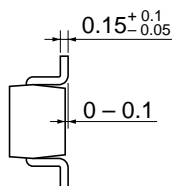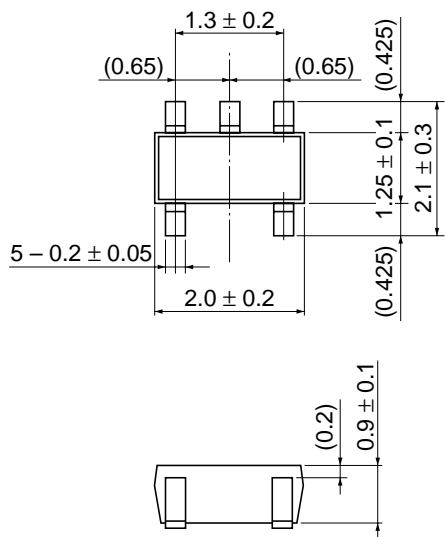## Test Circuit
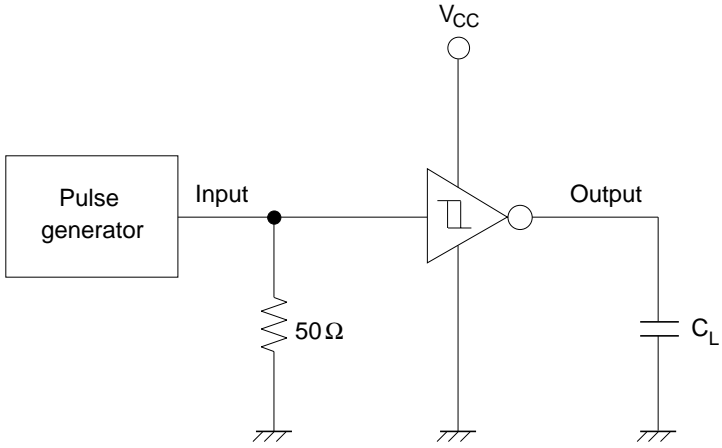
Note: 1. C_L includes probe and jig capacitance.

- **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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