

HD74ALVC1G14

Schmitt-trigger Inverter Buffer

HITACHI

ADE-205-627A (Z)

Rev.1
Aug. 2001

Description

The HD74ALVC1G14 has an inverter with schmitt-trigger input in a 5 pin package. Low voltage and high speed operation is suitable for the battery powered products (e.g., notebook computers), and the low power consumption extends the battery life.

Features

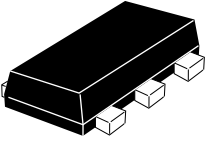
- The basic gate function is lined up as hitachi uni logic series.
- Supplied on emboss taping for high speed automatic mounting.
- Supply voltage range : 1.2 to 3.6 V
Operating temperature range : -40 to +85°C
- All inputs V_{IH} (Max.) = 3.6 V (@ V_{CC} = 0 V to 3.6 V)
All outputs V_O (Max.) = 3.6 V (@ V_{CC} = 0 V)
- Output current ± 2 mA (@ V_{CC} = 1.2)
 ± 4 mA (@ V_{CC} = 1.4 V to 1.6 V)
 ± 6 mA (@ V_{CC} = 1.65 V to 1.95 V)
 ± 18 mA (@ V_{CC} = 2.3 V to 2.7 V)
 ± 24 mA (@ V_{CC} = 3.0 V to 3.6 V)
- All the logical input has hysteresis voltage for the slow transition.
- Package type

Package type	Package code	Package suffix	Taping code
VSON-5 pin	TNP-5D	VS	E (3,000 pcs / Reel)

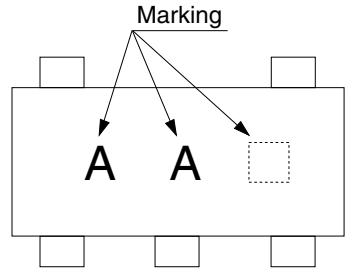
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Outline and Article Indication

- HD74ALVC1G14



VSON-5



 = Control code

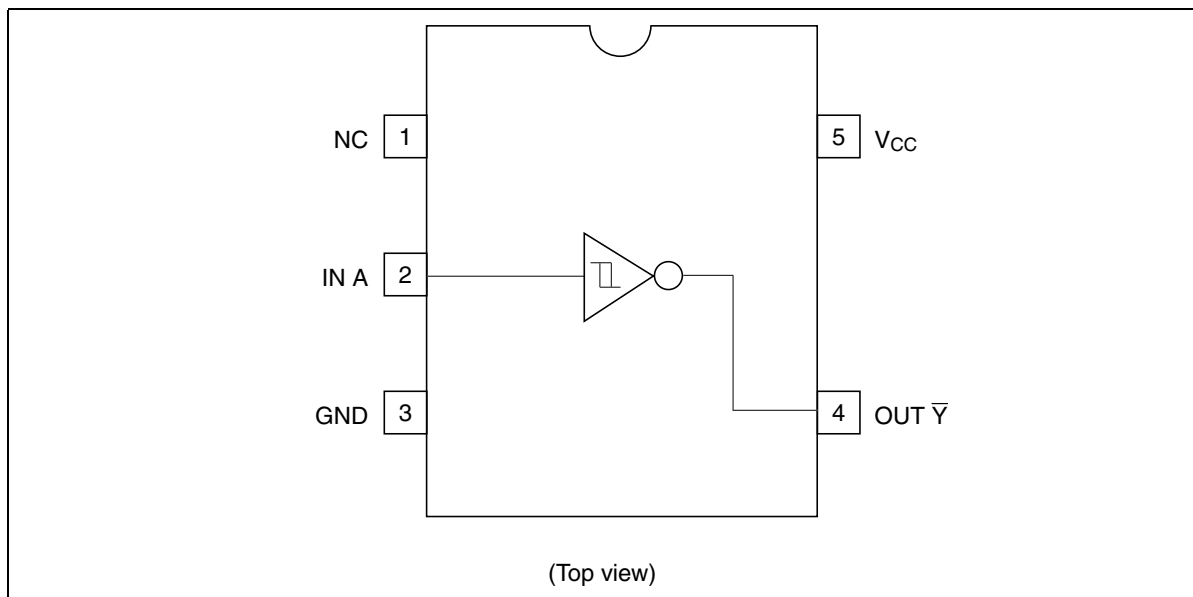
Function Table

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

H: High level

L: Low level

Pin Arrangement



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Conditions
Supply voltage range	V _{CC}	-0.5 to 4.6	V	
Input voltage range ¹	V _I	-0.5 to 4.6	V	
Output voltage range ^{1,2}	V _O	-0.5 to V _{CC} +0.5	V	Output : H or L
		-0.5 to 4.6		V _{CC} : OFF
Input clamp current	I _{IK}	-50	mA	V _I < 0
Output clamp current	I _{OK}	±50	mA	V _O < 0 or V _O > V _{CC}
Continuous output current	I _O	±50	mA	V _O = 0 to V _{CC}
Continuous current through V _{CC} or GND	I _{CC} or I _{GND}	±100	mA	
Maximum power dissipation at Ta = 25°C (in still air) ³	P _T	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 4.6 V maximum.
 - 3. The maximum package power dissipation was calculated using a junction temperature of 150°C.

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Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Conditions
Supply voltage range	V_{CC}	1.2	3.6	V	
Input voltage range	V_I	0	3.6	V	
Output voltage range	V_O	0	V_{CC}	V	
Output current	I_{OH}	—	-2	mA	$V_{CC} = 1.2\text{ V}$
		—	-4		$V_{CC} = 1.4\text{ V}$
		—	-6		$V_{CC} = 1.65\text{ V}$
		—	-18		$V_{CC} = 2.3\text{ V}$
		—	-24		$V_{CC} = 3.0\text{ V}$
	I_{OL}	—	2	$V_{CC} = 1.2\text{ V}$	
		—	4	$V_{CC} = 1.4\text{ V}$	
		—	6	$V_{CC} = 1.65\text{ V}$	
		—	18	$V_{CC} = 2.3\text{ V}$	
		—	24	$V_{CC} = 3.0\text{ V}$	
Operating free-air temperature	T_a	-40	85	°C	

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

Electrical Characteristics

(Ta = -40 to 85°C)

Item	Symbol	V _{cc} (V) †	Min	Typ	Max	Unit	Test conditions	
Threshold voltage	V _T ⁺	1.2	—	—	V _{cc} ×0.8	V		
		1.4 to 1.6	—	—	V _{cc} ×0.75			
		1.65 to 1.95	—	—	V _{cc} ×0.7			
		2.3 to 2.7	—	—	1.7			
		3.0 to 3.6	—	—	2.0			
	V _T ⁻	1.2	V _{cc} ×0.2	—	—			
		1.4 to 1.6	V _{cc} ×0.25	—	—			
		1.65 to 1.95	V _{cc} ×0.3	—	—			
		2.3 to 2.7	0.7	—	—			
		3.0 to 3.6	0.8	—	—			
	ΔV _T	1.2	0.1	—	0.4			
		1.4 to 1.6	0.1	—	0.6			
		1.65 to 1.95	0.15	—	0.8			
		2.3 to 2.7	0.25	—	1.0			
		3.0 to 3.6	0.25	—	1.2			
Output voltage	V _{OH}	Min to Max	V _{cc} -0.2	—	—	V	I _{OH} = -100 μA	
		1.2	0.9	—	—		I _{OH} = -2 mA	
		1.4	1.1	—	—		I _{OH} = -4 mA	
		1.65	1.2	—	—		I _{OH} = -6 mA	
		2.3	1.7	—	—		I _{OH} = -18 mA	
		3.0	2.2	—	—		I _{OH} = -24 mA	
	V _{OL}	Min to Max	—	—	0.2	I _{OL} = 100 μA		
		1.2	—	—	0.3	I _{OL} = 2 mA		
		1.4	—	—	0.3	I _{OL} = 4 mA		
		1.65	—	—	0.3	I _{OL} = 6 mA		
		2.3	—	—	0.55	I _{OL} = 18 mA		
		3.0	—	—	0.55	I _{OL} = 24 mA		
	Input current	I _{IN}	3.6	—	—	±5	μA	V _{IN} = 3.6 V or GND
	Quiescent supply current	I _{CC}	3.6	—	—	10	μA	V _{IN} = V _{CC} or GND, I _O = 0
	Output leakage current	I _{OFF}	0	—	—	5	μA	V _{IN} or V _{OUT} = 0 to 3.6 V
Input capacitance	C _{IN}	3.3	—	4.5	—	pF	V _{IN} = V _{CC} or GND	

Note: For conditions shown as Min or Max, use the appropriate values under recommended operating conditions.

Switching Characteristics

($T_a = -40$ to 85°C)

- $V_{CC} = 1.2\text{ V}$

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time	t_{PLH} t_{PHL}	—	7.0	—	ns	$C_L = 15\text{ pF}$	A	\bar{Y}

- $V_{CC} = 1.5\pm 0.1\text{ V}$

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time	t_{PLH} t_{PHL}	2.0	—	8.0	ns	$C_L = 15\text{ pF}$	A	\bar{Y}

- $V_{CC} = 1.8\pm 0.15\text{ V}$

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time	t_{PLH} t_{PHL}	1.5	—	6.0	ns	$C_L = 30\text{ pF}$	A	\bar{Y}

- $V_{CC} = 2.5\pm 0.2\text{ V}$

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time	t_{PLH} t_{PHL}	1.0	—	4.5	ns	$C_L = 30\text{ pF}$	A	\bar{Y}

- $V_{CC} = 3.3\pm 0.3\text{ V}$

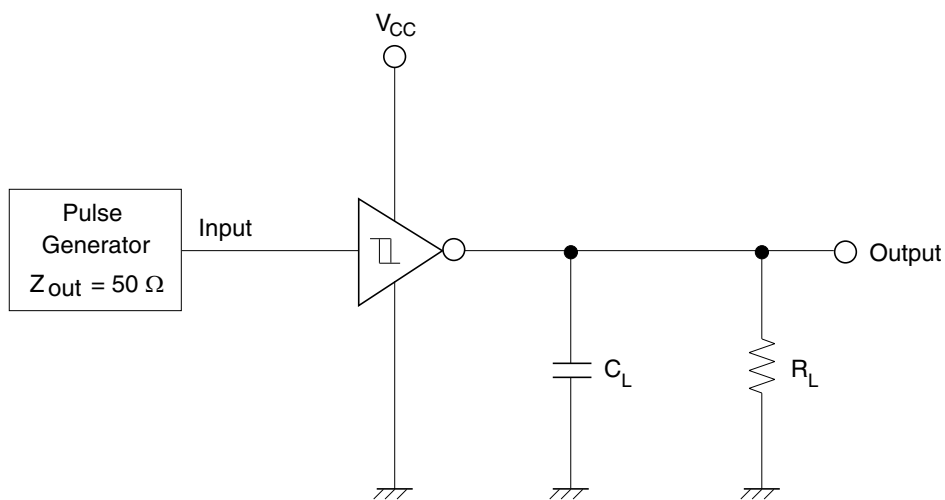
Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time	t_{PLH} t_{PHL}	1.0	—	3.5	ns	$C_L = 30\text{ pF}$	A	\bar{Y}

Operating Characteristics

(Ta = 25°C)

Item	Symbol	V _{CC} (V)	Min	Typ	Max	Unit	Test conditions
Power dissipation capacitance	C _{PD}	1.5	—	10.5	—	pF	f = 10 MHz
		1.8	—	10.5	—		
		2.5	—	11.0	—		
		3.3	—	11.5	—		

Test Circuit

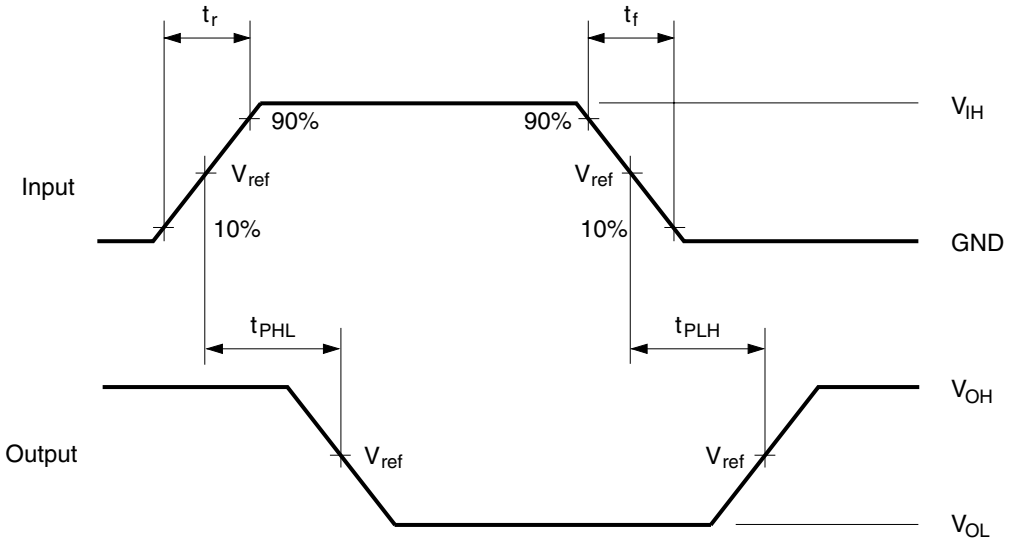


Symbol	V _{CC} = 1.2 V, 1.5±0.1 V	V _{CC} = 1.8±0.15 V	V _{CC} = 2.5±0.2 V, 3.3±0.3 V
R _L	2.0 kΩ	1.0 kΩ	500 Ω
C _L	15 pF	30 pF	30 pF

Note: C_L includes probe and jig capacitance.

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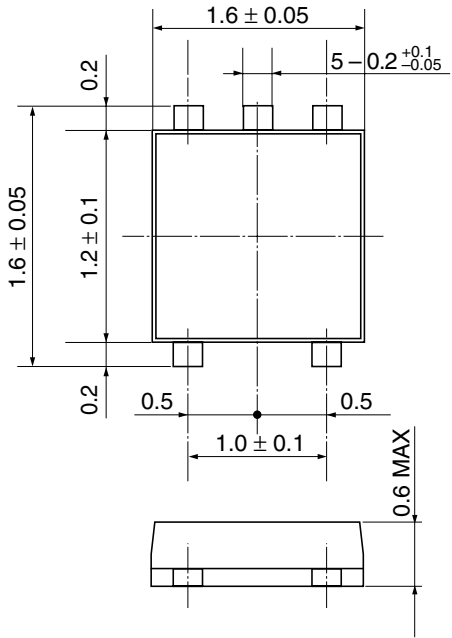
Waveforms



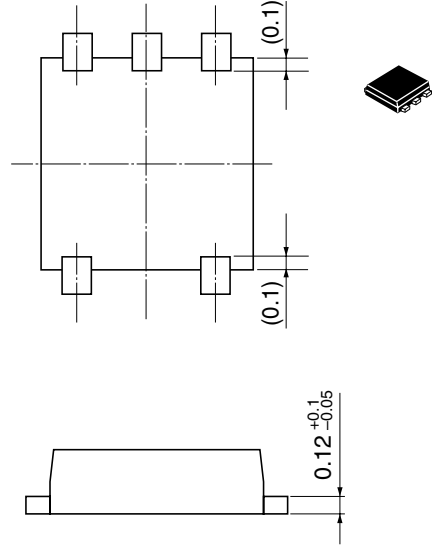
Symbol	$V_{CC} = 1.2 \text{ V},$ $1.5 \pm 0.1 \text{ V},$ $1.8 \pm 0.15 \text{ V}$	$V_{CC} = 2.5 \pm 0.2 \text{ V}$	$V_{CC} = 3.3 \pm 0.3 \text{ V}$
t_r / t_f	2.0 ns	2.5 ns	2.5 ns
V_{IH}	V_{CC}	V_{CC}	2.7 V
V_{ref}	50%	50%	1.5 V

Note: Input waveform : PRR = 10 MHz, duty cycle 50%

Package Dimensions



As of July, 2001
Unit: mm



Hitachi Code	TNP-5D
JEDEC	—
JEITA	—
Mass (reference value)	0.002 g

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