
HD74LV1G04A

Inverter

HITACHI

ADE-205-317D (Z)
5th. Edition
April 2001

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Description

The HD74LV1G04A has an inverter 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.

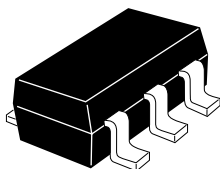
Features

- The basic gate function is lined up as hitachi uni logic series.
- Supplied on emboss taping for high speed automatic mounting.
- Electrical characteristics equivalent to the HD74LV04A
Supply voltage range : 1.65 to 5.5 V
Operating temperature range : -40 to +85°C
- All inputs V_{IH} (Max.) = 5.5 V (@ V_{CC} = 0 V to 5.5 V)
All outputs V_O (Max.) = 5.5 V (@ V_{CC} = 0 V)
- Output current ± 6 mA (@ V_{CC} = 3.0 V to 3.6 V), ± 12 mA (@ V_{CC} = 4.5 V to 5.5 V)
- All the logical input has hysteresis voltage for the slow transition.

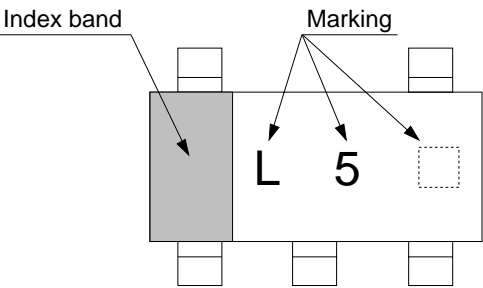
HD74LV1G04A


Outline and Article Indication

• HD74LV1G04A

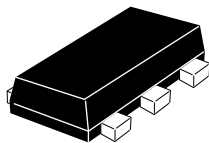


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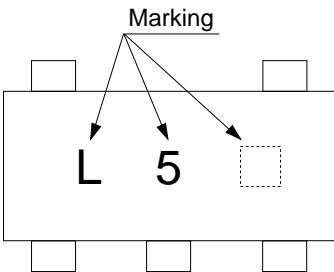


 = Control code
(— or blank)

• HD74LV1G04A



VSON-5



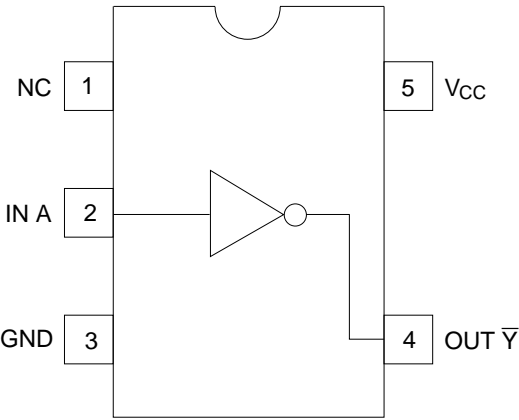
 = Control code

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 7.0	V	
Output voltage range ^{*1, 2}	V_O	-0.5 to $V_{CC} + 0.5$ -0.5 to 7.0	V	Output : H or L V_{CC} : OFF
Input clamp current	I_{IK}	-20	mA	$V_I < 0$
Output clamp current	I_{OK}	± 50	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}	± 50	mA	
Maximum power dissipation at $T_a = 25^{\circ}\text{C}$ (in still air) ^{*3}	P_T	200	mW	
Storage temperature	T_{stg}	-65 to 150	$^{\circ}\text{C}$	

- 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	Conditions
Supply voltage range	V_{CC}	1.65	5.5	V	
Input voltage range	V_I	0	5.5	V	
Output voltage range	V_O	0	V_{CC}	V	
Output current	I_{OL}	—	1	mA	$V_{CC} = 1.65 \text{ to } 1.95 \text{ V}$
		—	2		$V_{CC} = 2.3 \text{ to } 2.7 \text{ V}$
		—	6		$V_{CC} = 3.0 \text{ to } 3.6 \text{ V}$
		—	12		$V_{CC} = 4.5 \text{ to } 5.5 \text{ V}$
	I_{OH}	—	−1		$V_{CC} = 1.65 \text{ to } 1.95 \text{ V}$
		—	−2		$V_{CC} = 2.3 \text{ to } 2.7 \text{ V}$
		—	−6		$V_{CC} = 3.0 \text{ to } 3.6 \text{ V}$
		—	−12		$V_{CC} = 4.5 \text{ to } 5.5 \text{ V}$
Input transition rise or fall rate	$\Delta t / \Delta v$	0	300	ns / V	$V_{CC} = 1.65 \text{ to } 1.95 \text{ V}$
		0	200		$V_{CC} = 2.3 \text{ to } 2.7 \text{ V}$
		0	100		$V_{CC} = 3.0 \text{ to } 3.6 \text{ V}$
		0	20		$V_{CC} = 4.5 \text{ to } 5.5 \text{ V}$
Operating free-air temperature	T_a	−40	85	°C	

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

Electrical Characteristic

• Ta = -40 to 85°C

Item	Symbol	V _{CC} (V) *	Min	Typ	Max	Unit	Test condition
Input voltage	V _{IH}	1.65 to 1.95	V _{CC} ×0.75	—	—	V	
		2.3 to 2.7	V _{CC} ×0.7	—	—		
		3.0 to 3.6	V _{CC} ×0.7	—	—		
		4.5 to 5.5	V _{CC} ×0.7	—	—		
	V _{IL}	1.65 to 1.95	—	—	V _{CC} ×0.25		
		2.3 to 2.7	—	—	V _{CC} ×0.3		
		3.0 to 3.6	—	—	V _{CC} ×0.3		
		4.5 to 5.5	—	—	V _{CC} ×0.3		
Hysteresis voltage	V _H	1.8	—	0.25	—	V	V _T ⁺ - V _T ⁻
		2.5	—	0.30	—		
		3.3	—	0.35	—		
		5.0	—	0.45	—		
Output voltage	V _{OH}	Min to Max	V _{CC} -0.1	—	—	V	I _{OH} = -50 μA
		1.65	1.4	—	—		I _{OH} = -1 mA
		2.3	2.0	—	—		I _{OH} = -2 mA
		3.0	2.48	—	—		I _{OH} = -6 mA
		4.5	3.8	—	—		I _{OH} = -12 mA
	V _{OL}	Min to Max	—	—	0.1		I _{OL} = 50 μA
		1.65	—	—	0.3		I _{OL} = 1 mA
		2.3	—	—	0.4		I _{OL} = 2 mA
		3.0	—	—	0.44		I _{OL} = 6 mA
		4.5	—	—	0.55		I _{OL} = 12 mA
Input current	I _{IN}	0 to 5.5	—	—	±1	μA	V _{IN} = 5.5 V or GND
Quiescent supply current	I _{CC}	5.5	—	—	10	μA	V _{IN} = V _{CC} or GND, I _O = 0
Output leakage current	I _{OFF}	0	—	—	5	μA	V _{IN} or V _O = 0 to 5.5 V
Input capacitance	C _{IN}	3.3	—	3.0	—	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

• $V_{CC} = 1.8 \pm 0.15 \text{ V}$

Item	Symbol	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } 85^\circ\text{C}$		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t_{PLH}	—	12.6	22.0	1.0	24.0	ns	$C_L = 15 \text{ pF}$	A	\bar{Y}
	t_{PHL}	—	19.7	33.0	1.0	36.0		$C_L = 50 \text{ pF}$		

• $V_{CC} = 2.5 \pm 0.2 \text{ V}$

Item	Symbol	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } 85^\circ\text{C}$		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t_{PLH}	—	7.0	11.7	1.0	14.0	ns	$C_L = 15 \text{ pF}$	A	\bar{Y}
	t_{PHL}	—	10.5	15.5	1.0	18.0		$C_L = 50 \text{ pF}$		

• $V_{CC} = 3.3 \pm 0.3 \text{ V}$

Item	Symbol	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } 85^\circ\text{C}$		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t_{PLH}	—	5.0	7.1	1.0	8.5	ns	$C_L = 15 \text{ pF}$	A	\bar{Y}
	t_{PHL}	—	7.5	10.6	1.0	12.0		$C_L = 50 \text{ pF}$		

• $V_{CC} = 5.0 \pm 0.5 \text{ V}$

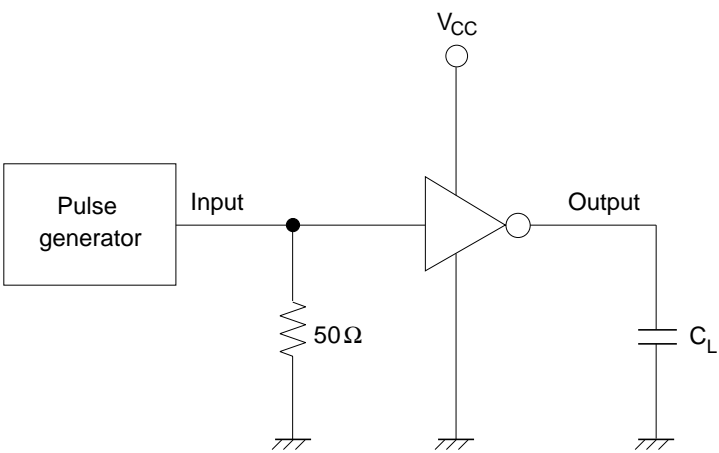
Item	Symbol	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } 85^\circ\text{C}$		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t_{PLH}	—	3.8	5.5	1.0	6.5	ns	$C_L = 15 \text{ pF}$	A	\bar{Y}
	t_{PHL}	—	5.3	7.5	1.0	8.5		$C_L = 50 \text{ pF}$		

Operating Characteristics

• $C_L = 50 \text{ pF}$

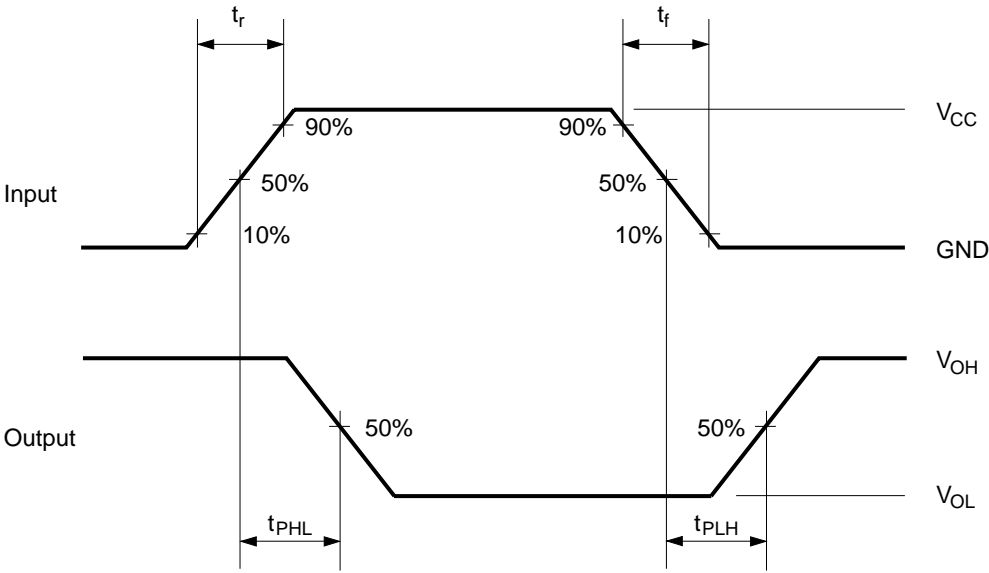
Item	Symbol	$V_{CC} \text{ (V)}$	$T_a = 25^\circ\text{C}$			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	C_{PD}	3.3	—	8.5	—	pF	$f = 10 \text{ MHz}$
		5.0	—	10.0	—		

Test Circuit



Note: C_L includes probe and jig capacitance.

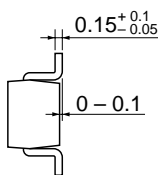
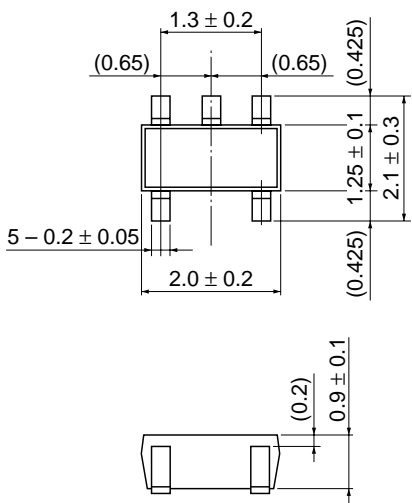
• Waveforms



- Notes: 1. Input waveform : $PRR \leq 1\text{ MHz}$, $Z_o = 50\ \Omega$, $t_r \leq 3\text{ ns}$, $t_f \leq 3\text{ ns}$.
2. The output are measured one at a time with one transition per measurement.

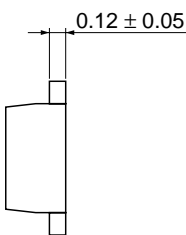
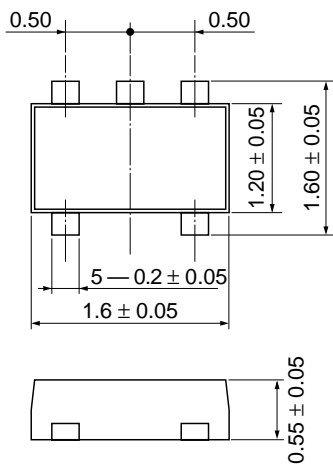
Package Dimensions

As of January, 2001
Unit: mm



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

As of January, 2001
Unit: mm



Hitachi Code	TNP-5D
JEDEC	—
EIAJ	—
Mass (reference value)	—

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