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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

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Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

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HD74ALVC1G06

Single Inverter Buffer / Driver with Open Drain



ADE-205-628C (Z)

Rev.3
Feb. 2003

Description

The HD74ALVC1G06 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

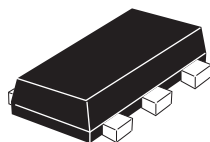
- The basic gate function is lined up as hitachi uni logic series.
- Supplied on emboss taping for high speed automatic mounting.
- Supply voltage range : 1.2 to 3.6 V
Operating temperature range : -40 to +85°C
- All inputs V_{IH} (Max.) = 3.6 V (@ V_{CC} = 0 V to 3.6 V)
All outputs V_o (Max.) = 3.6 V (@ V_{CC} = 0 V, Output : Z)
- Output current
2 mA (@ V_{CC} = 1.2 V)
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)
- Ordering Information

Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74ALVC1G06VSE	VSON-5 pin	TNP-5D	VS	E (3,000 pcs/reel)

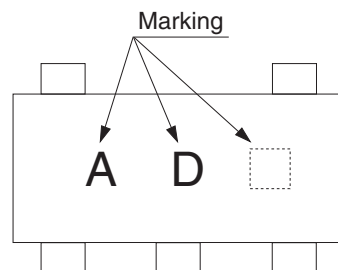
HD74ALVC1G06

Outline and Article Indication

- HD74ALVC1G06



VSON-5



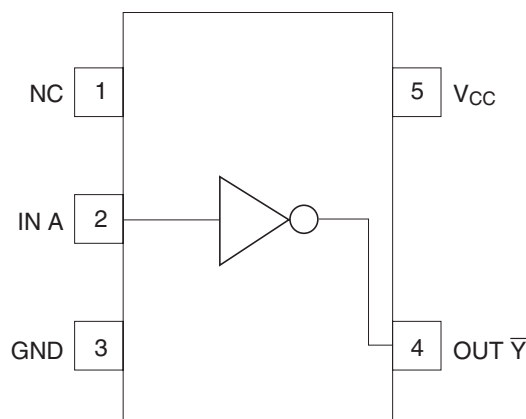
 = Control code

Function Table

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

H: High level
L: Low level
Z: High impedance

Pin Arrangement



(Top view)

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 $V_{CC}+0.5$ -0.5 to 4.6	V	Output : L V_{CC} : OFF or Output : Z
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 $T_a = 25^\circ\text{C}$ (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 4.6 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}	1.2	3.6	V	
Input voltage range	V_I	0	3.6	V	
Output voltage range	V_O	0	3.6	V	
Output current	I_{OL}	—	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		$V_{CC} = 3.0\text{ V}$
Input transition rise or fall rate	$\Delta t / \Delta v$	0	20	ns / V	$V_{CC} = 1.2$ to 2.7 V
		0	10		$V_{CC} = 3.3 \pm 0.3\text{ V}$
Operating free-air temperature	T_a	-40	85	$^\circ\text{C}$	

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
Input voltage	V _{IH}	1.2	V _{cc} ×0.75	—	—	V	
		1.4 to 1.6	V _{cc} ×0.7	—	—		
		1.65 to 1.95	V _{cc} ×0.7	—	—		
		2.3 to 2.7	1.7	—	—		
		3.0 to 3.6	2.0	—	—		
	V _{IL}	1.2	—	—	V _{cc} ×0.25		
		1.4 to 1.6	—	—	V _{cc} ×0.3		
		1.65 to 1.95	—	—	V _{cc} ×0.3		
		2.3 to 2.7	—	—	0.7		
		3.0 to 3.6	—	—	0.8		
Output voltage	V _{OL}	Min to Max	—	—	0.2	V	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
Off state output current	I _{OZ}	3.6	—	—	±5	μA	V _{OUT} = V _{CC} 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

(Ta = -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_{ZL} t_{LZ}	—	5.0	—	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_{ZL} t_{LZ}	1.0	—	7.0	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_{ZL} t_{LZ}	1.0	—	5.0	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_{ZL} t_{LZ}	0.5	—	3.5	ns	$C_L = 30 \text{ pF}$	A	\bar{Y}

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

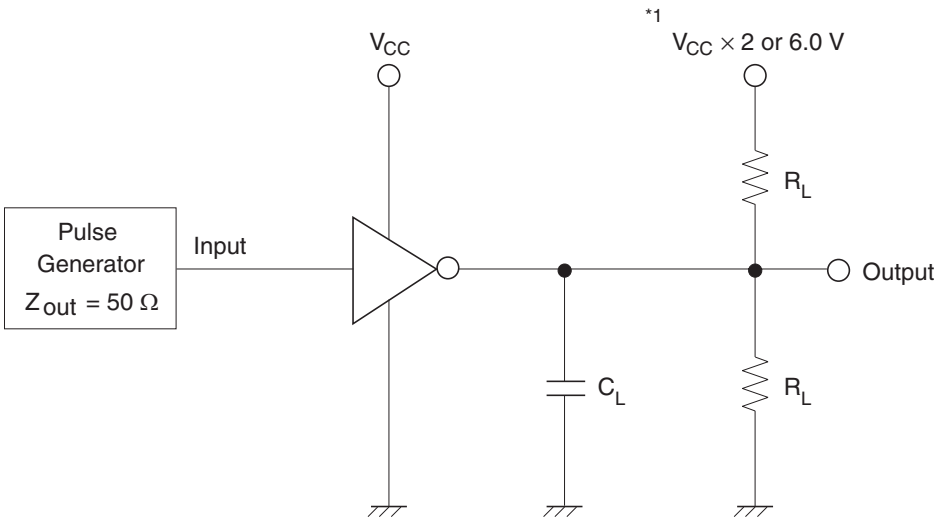
Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time	t_{ZL} t_{LZ}	0.5	—	2.5	ns	$C_L = 30 \text{ pF}$	A	\bar{Y}

Operating Characteristics

(Ta = 25°C)

Item	Symbol	V _{CC} (V)	Min	Typ	Max	Unit	Test conditions
Power dissipation capacitance	C _{PD}	1.5	—	1.5	—	pF	f = 10 MHz
		1.8	—	1.5	—		
		2.5	—	2.0	—		
		3.3	—	3.0	—		

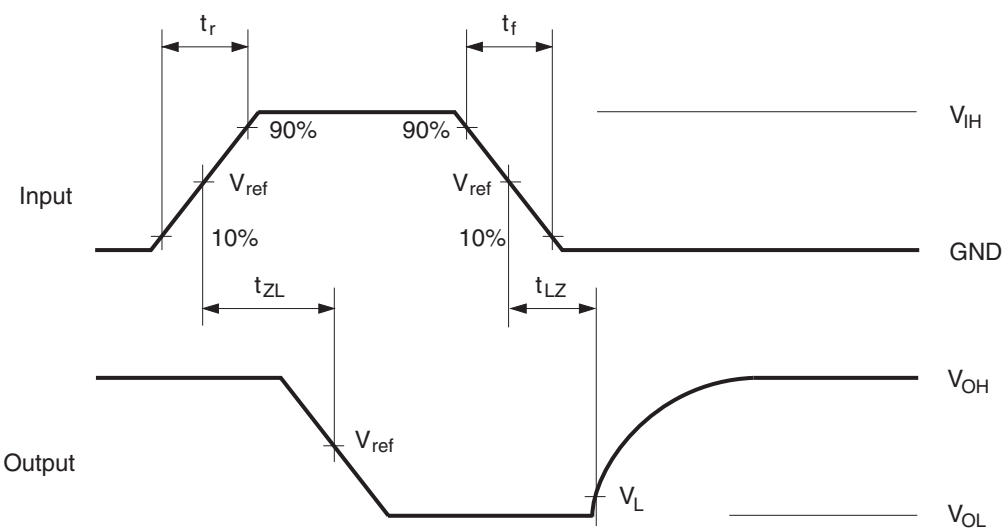
Test Circuit



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	V _{CC} = 3.3±0.3 V
R _L	2.0 kΩ	1.0 kΩ	500 Ω	500 Ω
C _L	15 pF	30 pF	30 pF	30 pF
*1	V _{CC} × 2	V _{CC} × 2	V _{CC} × 2	6.0 V

Note: C_L includes probe and jig capacitance.

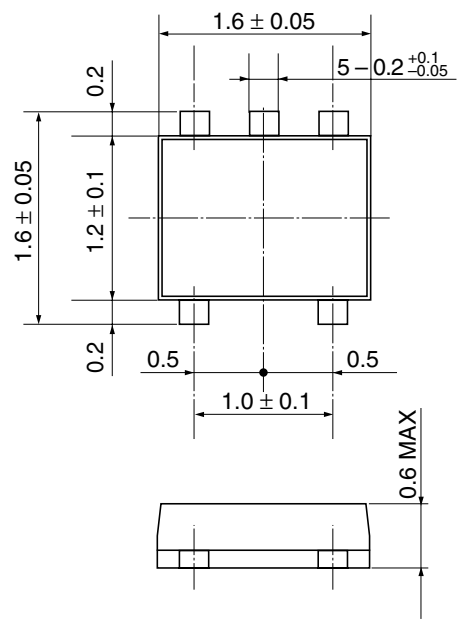
Waveforms



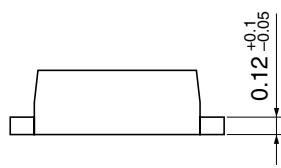
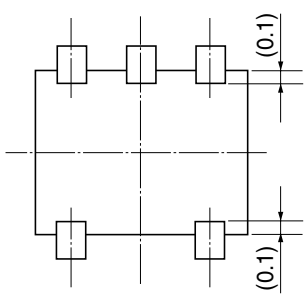
Symbol	$V_{CC} = 1.2\text{ V},$ $1.5 \pm 0.1\text{ V}$	$V_{CC} = 1.8 \pm 0.15\text{ V}$	$V_{CC} = 2.5 \pm 0.2\text{ V}$	$V_{CC} = 3.3 \pm 0.3\text{ V}$
t_r / t_f	2.0 ns	2.0 ns	2.5 ns	2.5 ns
V_{IH}	V_{CC}	V_{CC}	V_{CC}	2.7 V
V_{ref}	50%	50%	50%	1.5 V
V_L	$V_L = V_{OL} + 0.1\text{ V}$	$V_L = V_{OL} + 0.15\text{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

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

Package Dimensions



Unit: mm



*Sn-Bi plating

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

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