

HD74LV07A

Hex Buffers / Drivers with Open Drain Outputs

HITACHI

ADE-205-297B (Z)
3rd Edition
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Description

The HD74LV07A has six buffers / drivers with open drain outputs in a 14-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

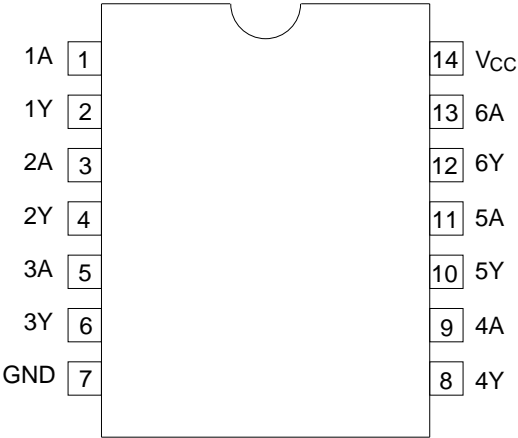
- $V_{CC} = 2.0\text{ V}$ to 5.5 V operation
- All inputs $V_{IH}(\text{Max.}) = 5.5\text{ V}$ ($@V_{CC} = 0\text{ V}$ to 5.5 V)
- All outputs $V_O(\text{Max.}) = 5.5\text{ V}$ ($@V_{CC} = 0\text{ V}$)
- All outputs $V_O(\text{Max.}) = 5.5\text{ V}$ ($@V_{CC} = 2.0\text{ V}$ to 5.5 V , Output “Z” state)
- Typical V_{OL} ground bounce $< 0.8\text{ V}$ ($@V_{CC} = 3.3\text{ V}$, $T_a = 25^\circ\text{C}$)
- Output current $\pm 8\text{ mA}$ ($@V_{CC} = 3.0\text{ V}$ to 3.6 V), $\pm 16\text{ mA}$ ($@V_{CC} = 4.5\text{ V}$ to 5.5 V)

Function Table

Input A	Output Y
L	L
H	Z

Note: 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 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: Z or L V_{CC} : OFF
Input clamp current	I_{IK}	−20	mA	$V_I < 0$
Output clamp current	I_{OK}	±50	mA	$V_O < 0$
Continuous output current	I_O	±35	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	785	mW	SOP
		500		TSSOP
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.

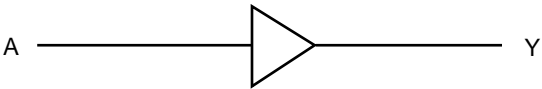
1. The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
2. This value is limited to 7.0 V maximum.
3. The maximum package power dissipation was calculated using a junction temperature of 150°C.

Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Conditions
Supply voltage range	V_{cc}	2.0	5.5	V	
Input voltage range	V_I	0	5.5	V	
Output voltage range	V_O	0	5.5	V	
Output current	I_{OL}	—	50	μA	$V_{cc} = 2.0\text{ V}$
		—	2	mA	$V_{cc} = 2.3\text{ to }2.7\text{ V}$
		—	8		$V_{cc} = 3.0\text{ to }3.6\text{ V}$
		—	16		$V_{cc} = 4.5\text{ to }5.5\text{ V}$
Input transition rise or fall rate	$\Delta t / \Delta v$	0	200	ns/V	$V_{cc} = 2.3\text{ to }2.7\text{ V}$
		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.

Logic Diagram



DC Electrical Characteristics

- $T_a = -40$ to 85°C

Item	Symbol	V_{CC} (V)*	Min	Typ	Max	Unit	Test Conditions
Input voltage	V_{IH}	2.0	1.5	—	—	V	
		2.3 to 2.7	$V_{CC} \times 0.7$	—	—		
		3.0 to 3.6	$V_{CC} \times 0.7$	—	—		
		4.5 to 5.5	$V_{CC} \times 0.7$	—	—		
	V_{IL}	2.0	—	—	0.5		
		2.3 to 2.7	—	—	$V_{CC} \times 0.3$		
		3.0 to 3.6	—	—	$V_{CC} \times 0.3$		
		4.5 to 5.5	—	—	$V_{CC} \times 0.3$		
Output voltage	V_{OL}	Min to Max	—	—	0.1	V	$I_{OL} = 50\ \mu\text{A}$
		2.3	—	—	0.4		$I_{OL} = 2\ \text{mA}$
		3.0	—	—	0.44		$I_{OL} = 8\ \text{mA}$
		4.5	—	—	0.55		$I_{OL} = 16\ \text{mA}$
Input current	I_{IN}	0 to 5.5	—	—	± 1	μA	$V_{IN} = 5.5\ \text{V}$ or GND
Off state output current	I_{OZ}	Min to Max	—	—	2.5	μA	$V_O = 5.5\ \text{V}$
Quiescent supply current	I_{CC}	5.5	—	—	20	μA	$V_{IN} = V_{CC}$ or GND, $I_O = 0$
Output leakage current	I_{OFF}	0	—	—	5	μA	V_I or $V_O = 0$ to $5.5\ \text{V}$
Input capacitance	C_{IN}	3.3	—	2.3	—	pF	$V_I = V_{CC}$ or GND

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

Switching Characteristics

• $V_{CC} = 2.5 \pm 0.2 \text{ V}$

Item	Symbol	Ta = 25°C			Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t _{PLH}	—	4.7	10.4	1.0	13.0	ns	C _L = 15 pF	A	Y
		—	9.5	15.2	1.0	18.0		C _L = 50 pF		
	t _{PHL}	—	5.4	10.4	1.0	13.0		C _L = 15 pF		
		—	7.9	15.2	1.0	18.0		C _L = 50 pF		

• $V_{CC} = 3.3 \pm 0.3 \text{ V}$

Item	Symbol	Ta = 25°C			Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t _{PLH}	—	4.0	7.1	1.0	8.5	ns	C _L = 15 pF	A	Y
		—	7.3	10.6	1.0	12.0		C _L = 50 pF		
	t _{PHL}	—	4.3	7.1	1.0	8.5		C _L = 15 pF		
		—	5.8	10.6	1.0	12.0		C _L = 50 pF		

• $V_{CC} = 5.0 \pm 0.5 \text{ V}$

Item	Symbol	Ta = 25°C			Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t _{PLH}	—	3.3	5.5	1.0	6.5	ns	C _L = 15 pF	A	Y
		—	5.6	7.5	1.0	8.5		C _L = 50 pF		
	t _{PHL}	—	3.4	5.5	1.0	6.5		C _L = 15 pF		
		—	4.1	7.5	1.0	8.5		C _L = 50 pF		

Operating Characteristics

- $C_L = 50 \text{ pF}$

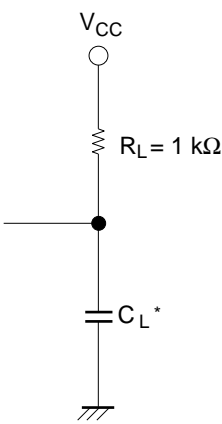
Item	Symbol	$V_{CC} \text{ (V)}$	$T_a = 25^\circ\text{C}$			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	C_{PD}	3.3	—	9.6	—	pF	$f = 10 \text{ MHz}$
		5.0	—	11.4	—		

Noise Characteristics

- $C_L = 50 \text{ pF}$

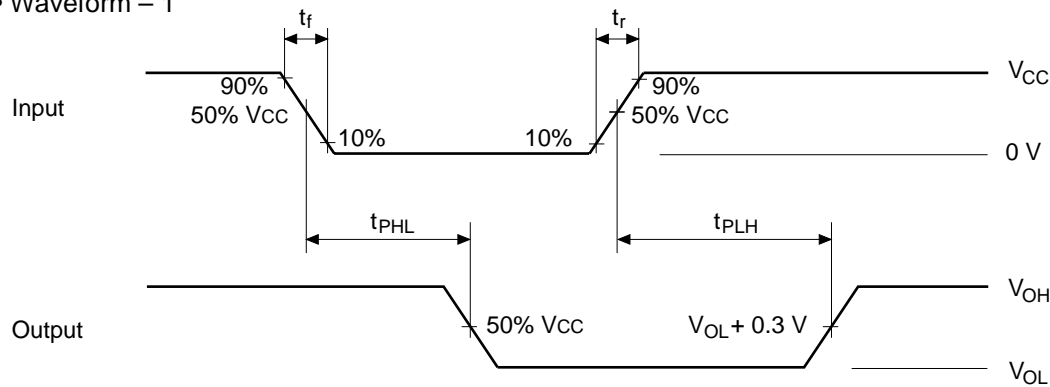
Item	Symbol	$V_{CC} \text{ (V)}$	$T_a = 25^\circ\text{C}$			Unit	Test Conditions
			Min	Typ	Max		
Quiet output, maximum dynamic V_{OL}	$V_{OL(P)}$	3.3	—	0.3	0.8	V	
Quiet output, minimum dynamic V_{OL}	$V_{OL(V)}$	3.3	—	−0.1	−0.8		
High-level dynamic input voltage	$V_{IH(D)}$	3.3	2.31	—	—	V	
Low-level dynamic input voltage	$V_{IL(D)}$	3.3	—	—	0.99		

Test Circuit



Note: C_L includes the probe and jig capacitance.

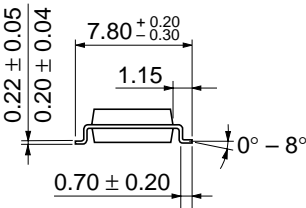
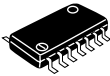
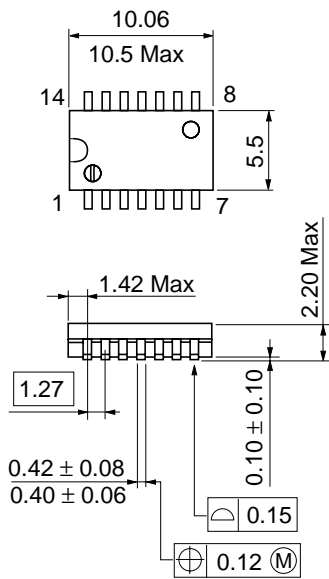
• Waveform – 1



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

Package Dimensions

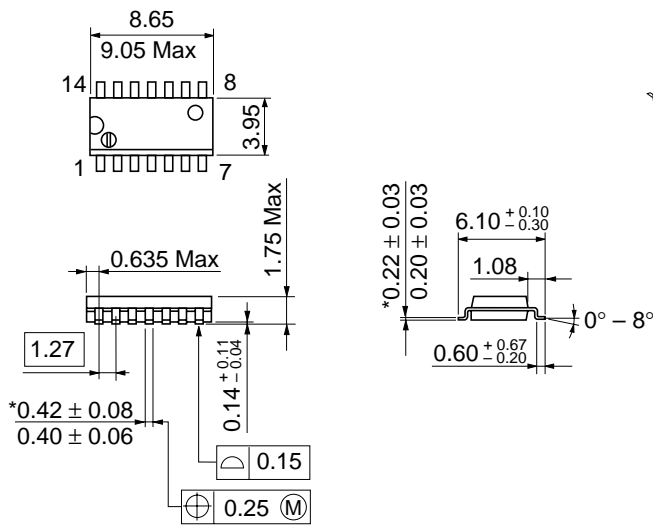
Unit: mm



Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-14DA
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.23 g

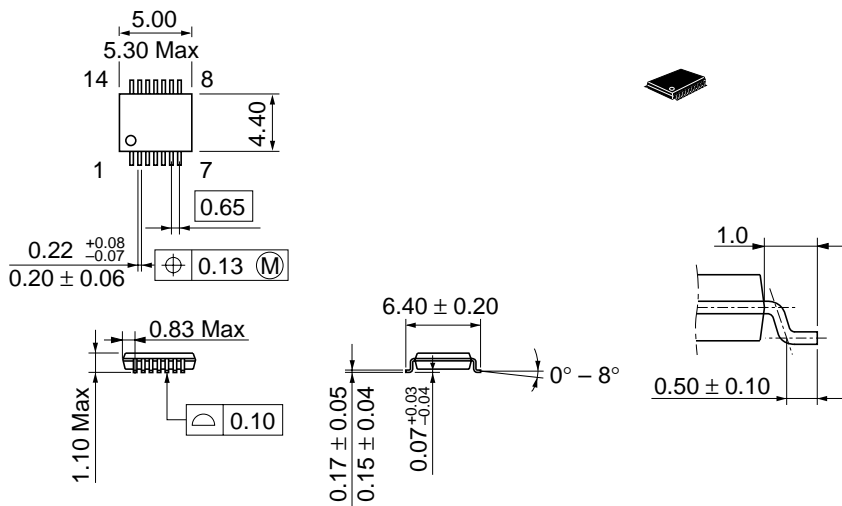
Unit: mm



Hitachi Code	FP-14DN
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	0.13 g

*Dimension including the plating thickness
Base material dimension

Unit: mm



Hitachi Code	TTP-14D
JEDEC	—
EIAJ	—
Weight (reference value)	0.05 g

Dimension including the plating thickness
Base material dimension

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HITACHI

Hitachi, Ltd.

Semiconductor & Integrated Circuits.
Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan
Tel: Tokyo (03) 3270-2111 Fax: (03) 3270-5109

URL	NorthAmerica	:	http://semiconductor.hitachi.com/
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For further information write to:

Hitachi Semiconductor
(America) Inc.
179 East Tasman Drive,
San Jose, CA 95134
Tel: <1> (408) 433-1990
Fax: <1> (408) 433-0223

Hitachi Europe GmbH
Electronic Components Group
Dornacher StraÙe 3
D-85622 Feldkirchen, Munich
Germany
Tel: <49> (89) 9 9180-0
Fax: <49> (89) 9 29 30 00

Hitachi Europe Ltd.
Electronic Components Group.
Whitebrook Park
Lower Cookham Road
Maidenhead
Berkshire SL6 8YA, United Kingdom
Tel: <44> (1628) 585000
Fax: <44> (1628) 585160

Hitachi Asia Ltd.
16 Collyer Quay #20-00
Hitachi Tower
Singapore 049318
Tel: 535-2100
Fax: 535-1533

Hitachi Asia Ltd.
Taipei Branch Office
3rd Flr, Hung Kuo Building, No.167,
Tun Hwa North Road, Taipei (105)
Taiwan
Tel: <886> (2) 2718-3666
Fax: <886> (2) 2718-8180
Telex: 23222 HAS-TP

Hitachi Asia (Hong Kong) Ltd.
Group III (Electronic Components)
7th Flr, North Tower, World Finance Centre,
Harbour City, Canton Road, Tsim Sha Tsui,
Kowloon, Hong Kong
Tel: <852> (2) 735 9218
Fax: <852> (2) 730 0281
Telex: 40815 HITEC HX

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