
HD74LV07A

Hex Buffers / Drivers with Open Drain Outputs

HITACHI

ADE-205-297 (Z)

1st Edition

July 1999

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} (Max.) = 5.5 V (@ $V_{CC} = 0\text{ V}$ to 5.5 V)
- All outputs V_O (Max.) = 5.5 V (@ $V_{CC} = 0\text{ V}$)
- Typical V_{OL} ground bounce $< 0.8\text{ V}$ (@ $V_{CC} = 3.3\text{ V}$, $T_a = 25^\circ\text{C}$)
- Typical V_{OH} undershoot $> 2.3\text{ V}$ (@ $V_{CC} = 3.3\text{ V}$, $T_a = 25^\circ\text{C}$)
- 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)

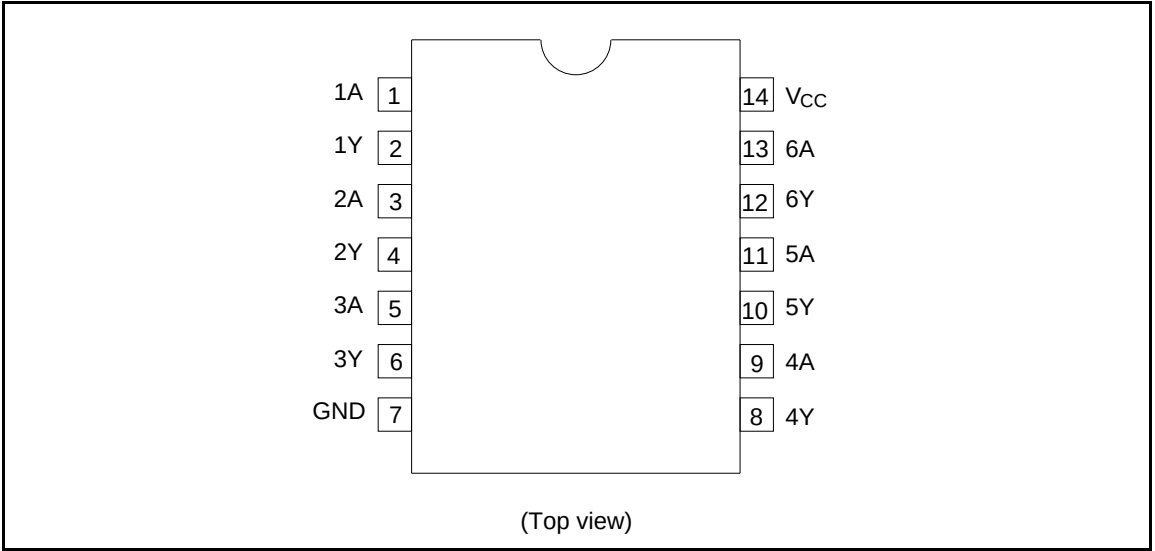
Function Table

Input A	Output Y
L	L
H	H

Note: H:High level

L:Low level

Pin Arrangement



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: 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	±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	785 500	mW	SOP 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..

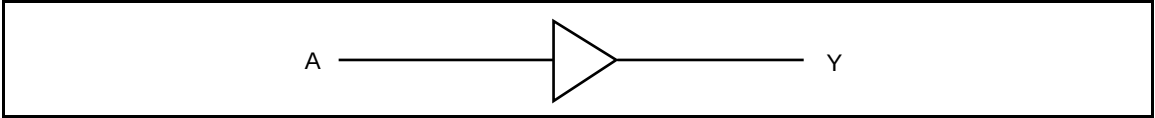
- 1.The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
- 2.This value is limited to 5.5 V maximum.
- 3.The maximum package power dissipation was calculated using a junction temperature of 150°C.

Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Conditions
Supply voltage range	V_{CC}	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

• Ta = -40 to 85°C

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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} × 0.7	—	—		
		3.0 to 3.6	V _{CC} × 0.7	—	—		
		4.5 to 5.5	V _{CC} × 0.7	—	—		
	V _{IL}	2.0	—	—	0.5		
		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		
Output voltage	V _{OL}	Min to Max	—	—	0.1	V	I _{OL} = 50 μA
		2.3	—	—	0.4		I _{OL} = 2 mA
		3.0	—	—	0.44		I _{OL} = 8 mA
		4.5	—	—	0.55		I _{OL} = 16 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	—	—	20	μA	V _{IN} = V _{CC} or GND, I _O = 0
Output leakage current	I _{OFF}	0	—	—	5	μA	V _O = 5.5 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 ± 0.2 V

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Ta = 25°C			Ta = -40 to 85°C							
Item	Symbol	Min	Typ	Max	Min	Max	Unit	Test Conditions	FROM (Input)	TO (Output)
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		

- $V_{CC} = 3.3 \pm 0.3 \text{ V}$
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		Ta = 25°C			Ta = -40 to 85°C					
Item	Symbol	Min	Typ	Max	Min	Max	Unit	Test Conditions	FROM (Input)	TO (Output)
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		

- $V_{CC} = 5.0 \pm 0.5 \text{ V}$
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		Ta = 25°C			Ta = -40 to 85°C					
Item	Symbol	Min	Typ	Max	Min	Max	Unit	Test Conditions	FROM (Input)	TO (Output)
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 pF
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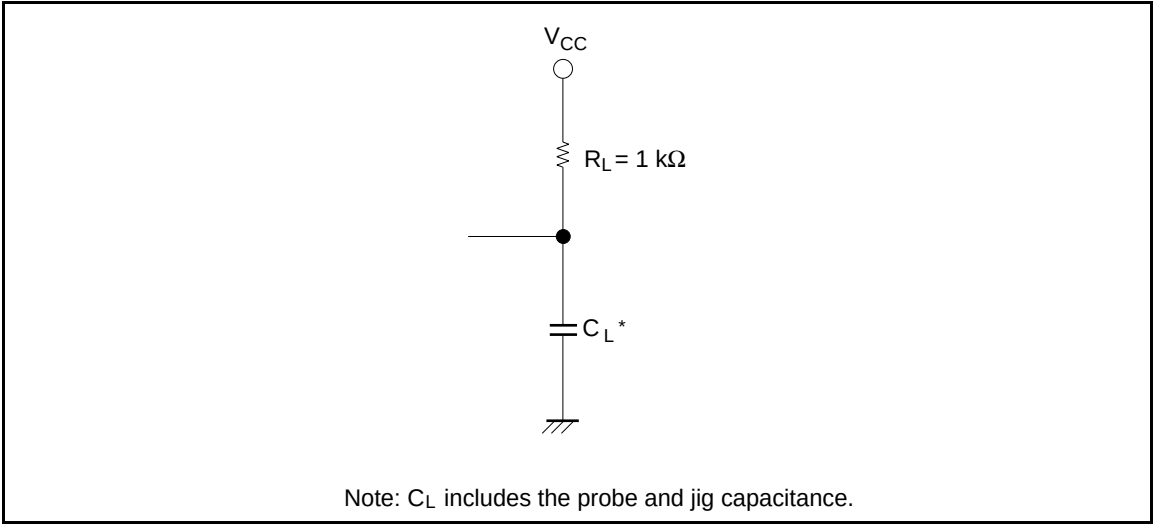
		Ta = 25°C						
Item	Symbol	V _{CC} (V)	Min	Typ	Max	Unit	Test Conditions	
Power dissipation capacitance	C _{PD}	3.3	—	9.6	—	pF	f = 10 MHz	
		5.0	—	11.4	—			

Noise Characteristics

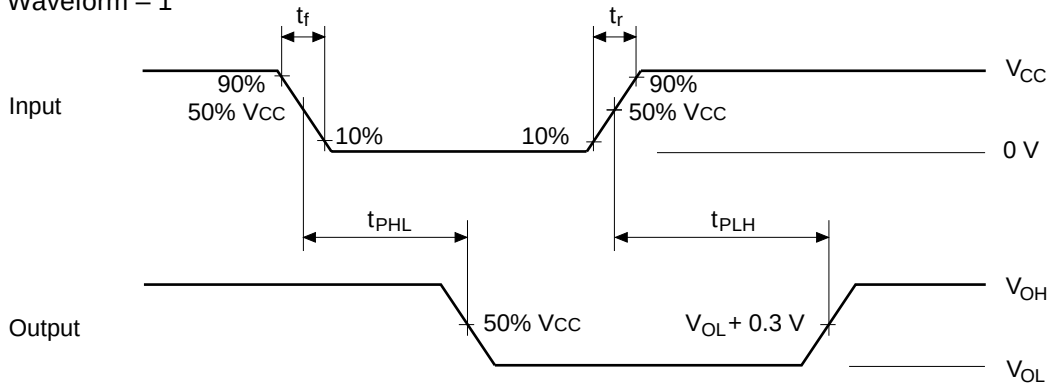
- $C_L = 50\text{ pF}$
-

Ta = 25°C						
Item	Symbol	V _{CC} (V)	Min	Typ	Max	Unit
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



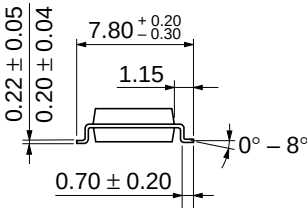
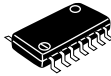
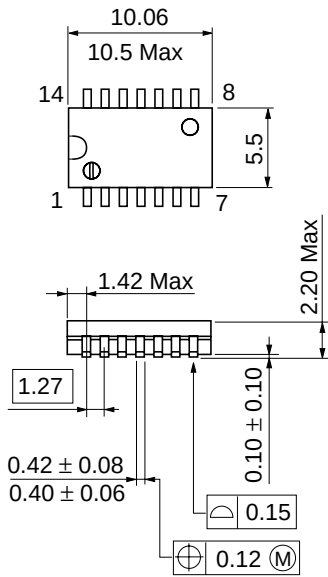
• Waveform – 1



- 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

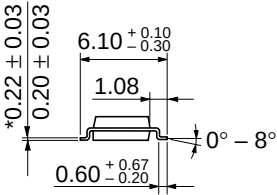
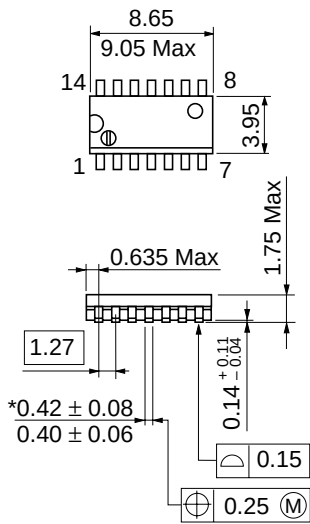
Unit: mm



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

Dimension including the plating thickness
Base material dimension

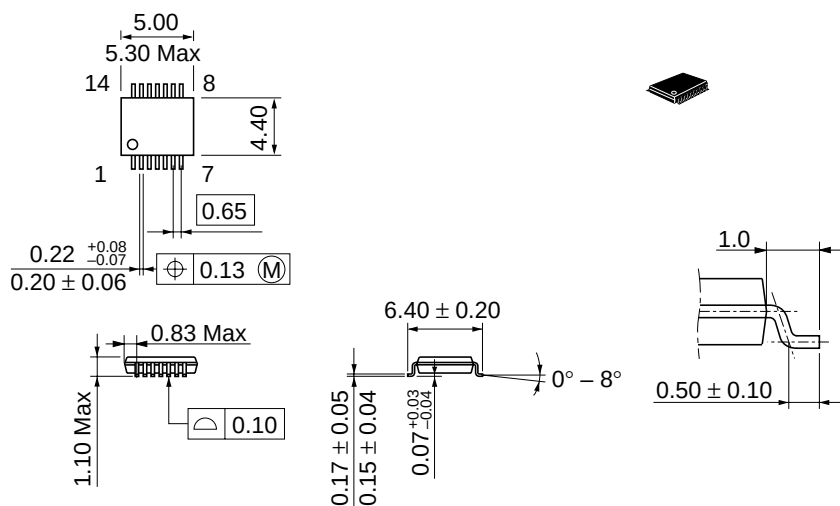
Unit: mm



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

*Dimension including the plating thickness
Base material dimension

Unit: mm



Dimension including the plating thickness
Base material dimension

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

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