

HD74LV126A

Quad. Bus Buffer Gates with 3-state Outputs

HITACHI

ADE-205-259 (Z)

1st Edition

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Description

The HD74LV126A features independent line drivers with three state outputs. Each output is disabled when the associated output enable (OE) input is low. To ensure the high impedance state during power up or power down, OE should be connected to GND through a pull-down resistor; the minimum value of the resistor is determined by the current sourcing capability of the driver. 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

Inputs		
OE	A	Output Y
H	H	H
H	L	L
L	X	Z

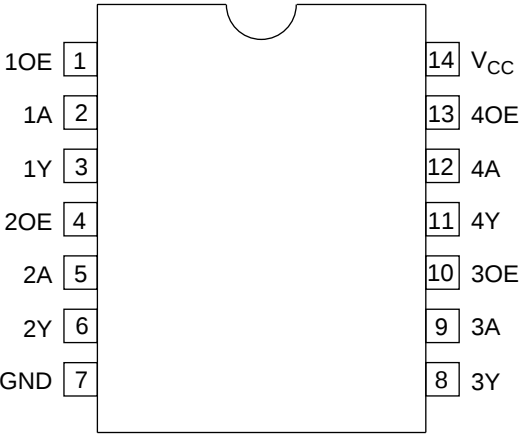
Note: H: High level

L: Low level

X: Immaterial

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: H or L V_{CC} : OFF or Output: Z
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}	±70	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.

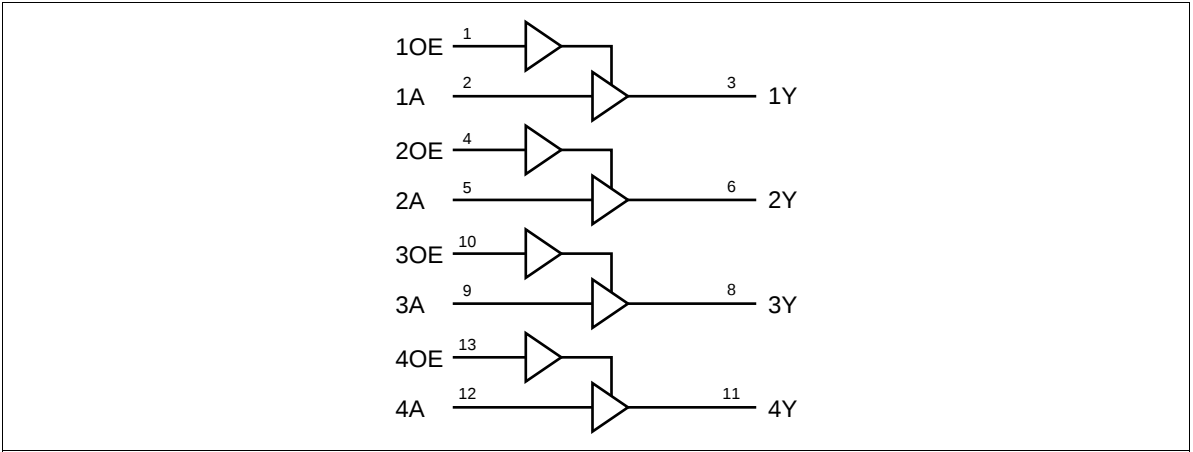
- 1. The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
- 2. This value is limited to 5.5 V maximum.
- 3. The maximum package power dissipation was calculated using a junction temperature of 150°C.

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	V _{CC}	V	H or L
		0	5.5		High impedance state
Output current	I _{OH}	—	−50	μA	V _{CC} = 2.0 V
		—	−2	mA	V _{CC} = 2.3 to 2.7 V
		—	−8		V _{CC} = 3.0 to 3.6 V
		—	−16		V _{CC} = 4.5 to 5.5 V
	I _{OL}	—	50	μA	V _{CC} = 2.0 V
		—	2	mA	V _{CC} = 2.3 to 2.7 V
		—	8		V _{CC} = 3.0 to 3.6 V
		—	16		V _{CC} = 4.5 to 5.5 V
Input transition rise or fall rate	Δt / Δv	0	200	ns/V	V _{CC} = 2.3 to 2.7 V
		0	100		V _{CC} = 3.0 to 3.6 V
		0	20		V _{CC} = 4.5 to 5.5 V
Operating free-air temperature	Ta	−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_{OH}	Min to Max	$V_{CC} - 0.1$	—	—	V	$I_{OH} = -50\ \mu\text{A}$
		2.3	2.0	—	—		$I_{OH} = -2\ \text{mA}$
		3.0	2.48	—	—		$I_{OH} = -8\ \text{mA}$
		4.5	3.8	—	—		$I_{OH} = -16\ \text{mA}$
	V_{OL}	Min to Max	—	—	0.1		$I_{OL} = 50\ \mu\text{A}$
		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	$V_I = 5.5\ \text{V}$ or GND
Off-state output current	I_{OZ}	5.5	—	—	± 5	μA	$V_O = V_{CC}$ or GND
Quiescent supply current	I_{CC}	5.5	—	—	20	μA	$V_I = V_{CC}$ or GND, $I_O = 0$
Output leakage current	I_{OFF}	0	—	—	5	μA	V_I or $V_O = 0\ \text{V}$ to $5.5\ \text{V}$
Input capacitance	C_{IN}	3.3	—	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

• $V_{CC} = 2.5 \pm 0.2\text{ V}$

		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}	—	7.1	13.0	1.0	15.5	ns	C _L = 15 pF	A	Y
	t _{PHL}	—	9.2	16.5	1.0	18.5		C _L = 50 pF		
Enable time	t _{ZH}	—	7.4	13.0	1.0	15.5	ns	C _L = 15 pF	OE	Y
	t _{ZL}	—	9.5	16.5	1.0	18.5		C _L = 50 pF		
Disable time	t _{HZ}	—	5.7	14.7	1.0	17.0	ns	C _L = 15 pF	OE	Y
	t _{LZ}	—	8.1	18.2	1.0	20.5		C _L = 50 pF		

• $V_{CC} = 3.3 \pm 0.3\text{ V}$

		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}	—	5.0	8.0	1.0	9.5	ns	C _L = 15 pF	A	Y
	t _{PHL}	—	6.4	11.5	1.0	13.0		C _L = 50 pF		
Enable time	t _{ZH}	—	5.1	8.0	1.0	9.5	ns	C _L = 15 pF	OE	Y
	t _{ZL}	—	6.6	11.5	1.0	13.0		C _L = 50 pF		
Disable time	t _{HZ}	—	4.4	9.7	1.0	11.5	ns	C _L = 15 pF	OE	Y
	t _{LZ}	—	6.1	13.2	1.0	15.0		C _L = 50 pF		

Switching Characteristics (cont)

- $V_{CC} = 5.0 \pm 0.5\text{ V}$

$T_a = 25^{\circ}\text{C}$ $T_a = -40\text{ to }85^{\circ}\text{C}$

Item	Symbol	Min	Typ	Max	Min	Max	Unit	Test Conditions	FROM (Input)	TO (Output)
Propa- gation delay time	t_{PLH}	—	3.5	5.5	1.0	6.5	ns	$C_L = 15\text{ pF}$	A	Y
	t_{PHL}	—	4.6	7.5	1.0	8.5		$C_L = 50\text{ pF}$		
Enable time	t_{ZH}	—	3.6	5.1	1.0	6.0	ns	$C_L = 15\text{ pF}$	OE	Y
	t_{ZL}	—	4.6	7.1	1.0	8.0		$C_L = 50\text{ pF}$		
Disable time	t_{HZ}	—	3.3	6.8	1.0	8.0	ns	$C_L = 15\text{ pF}$	OE	Y
	t_{LZ}	—	4.3	8.8	1.0	10.0		$C_L = 50\text{ pF}$		

Output-skew Characteristics

Item	Symbol	V _{CC} = (V)	Ta = 25°C		Ta = −40 to 85°C		Unit
			Min	Max	Min	Max	
Output skew	t _{sk (O)}	2.3 to 2.7	—	2.0	—	2.0	ns
		3.0 to 3.6	—	1.5	—	1.5	
		4.5 to 5.5	—	1.0	—	1.0	

Note: Skew between any outputs of the same package switching in the same direction. This parameter is warranted but not production tested.

Operating Characteristics

- C_L = 50 pF

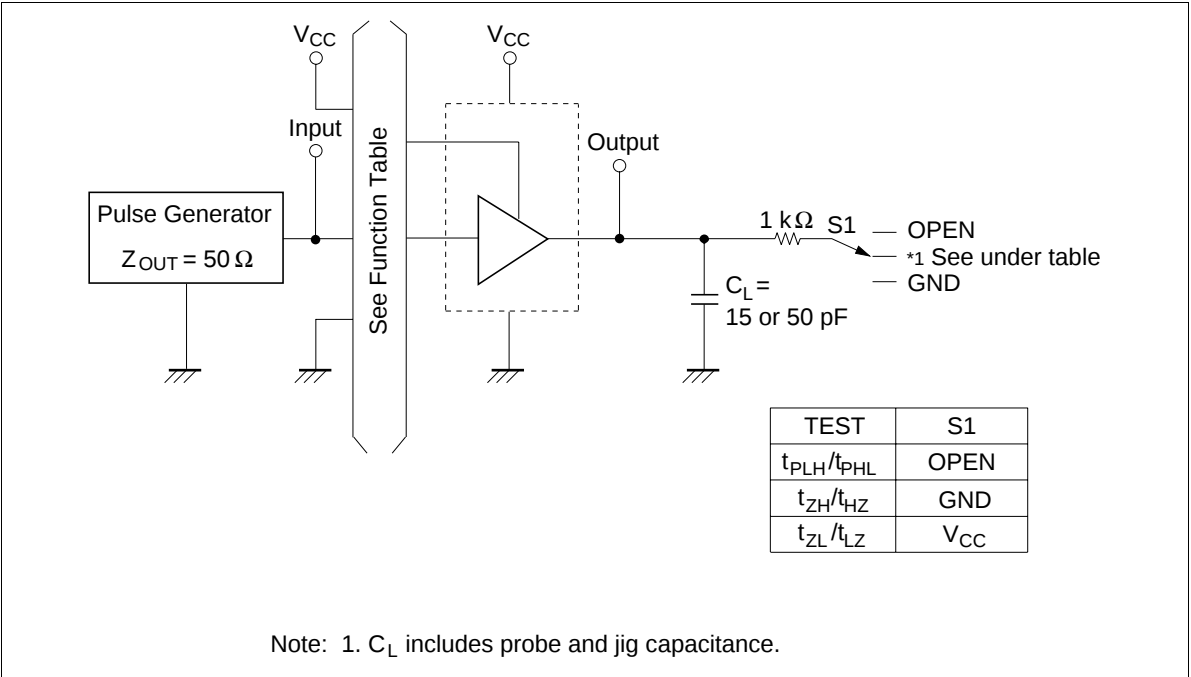
Item	Symbol	V _{CC} = (V)	Ta = 25°C			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	C _{PD}	3.3	—	23.0	—	pF	f = 10 MHz
		5.0	—	27.0	—		

Noise Characteristics

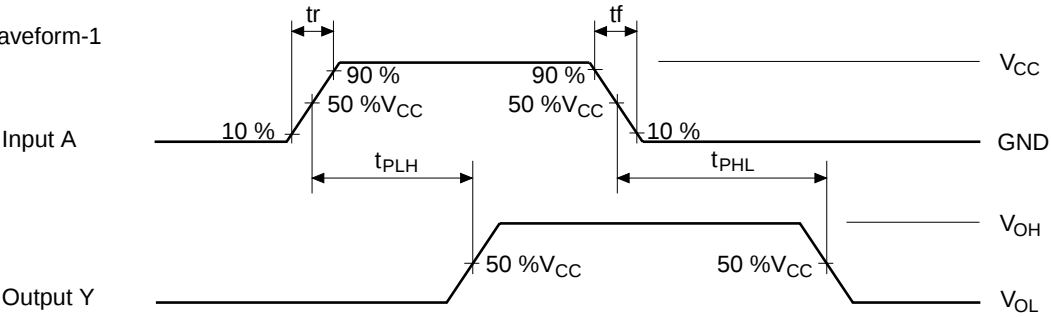
- C_L = 50 pF

Item	Symbol	V _{CC} = (V)	Ta = 25°C			Unit	Test Conditions
			Min	Typ	Max		
Quiet output, maximum dynamic V _{OL}	V _{OL (P)}	3.3	—	0.2	0.8	V	
Quiet output, minimum dynamic V _{OL}	V _{OL (V)}	3.3	—	−0.2	−0.8		
Quiet output, minimum dynamic V _{OH}	V _{OH (V)}	3.3	—	3.01	—		
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		

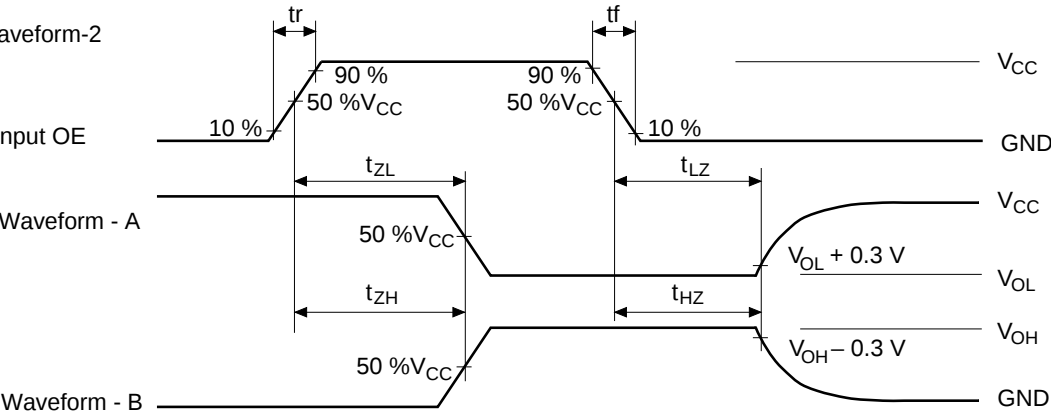
Test Circuit



• Waveform-1



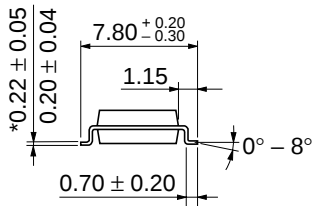
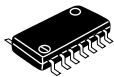
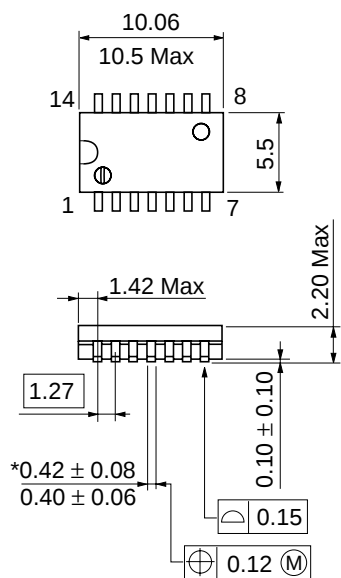
• Waveform-2



- Notes:
1. $t_r \leq 3 \text{ ns}$, $t_f \leq 3 \text{ ns}$
 2. Input waveform: $\text{PPR} \leq 1 \text{ MHz}$, duty cycle 50%
 3. Waveform-A is for an output with internal conditions such that the output is low except when disabled by the output control.
 4. Waveform-B is for an output with internal conditions such that the output is high except when disabled by the output control.

Package Dimensions

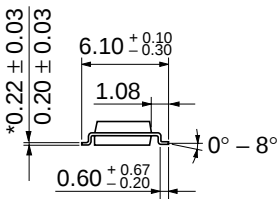
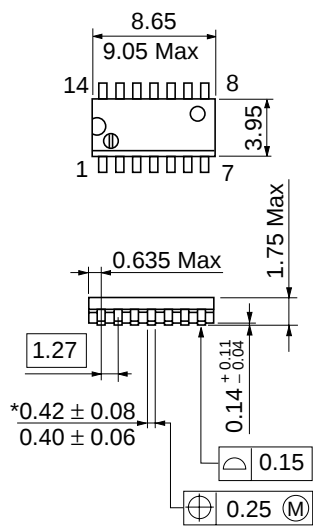
Unit: mm



*Dimension including the plating thickness
Base material dimension

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

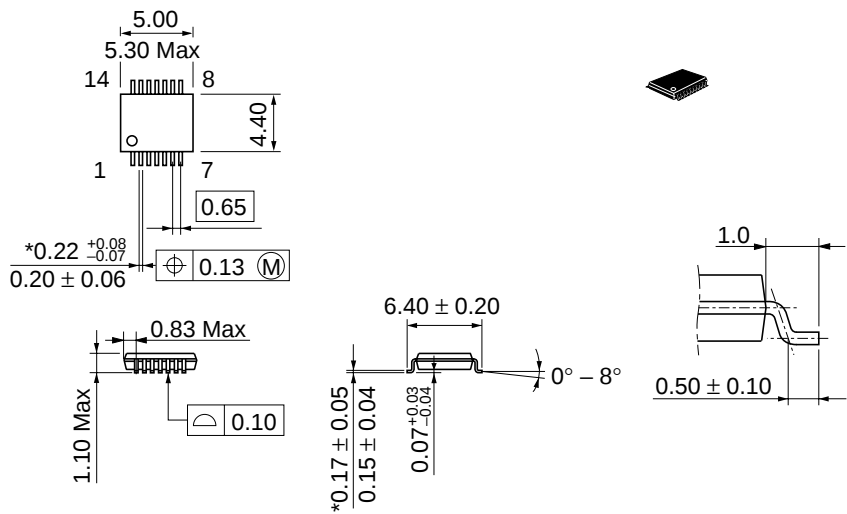
Unit: mm



*Dimension including the plating thickness
Base material dimension

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

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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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

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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 Straße 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) 778322
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Hitachi Asia (Hong Kong) Ltd. Group III (Electronic Components) 7/F., 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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