

HD74LV157A

Quad. 2-to-1 line Data Selectors / Multiplexers
(Noninverted Outputs)

HITACHI

ADE-205-263 (Z)

1st Edition

March 1999

Description

The HD74LV157A has four 2-input digital multiplexers with common select and strobe inputs. When the strobe input is low, a 4-bit word is selected from one of two sources and is routed to the four outputs. The device provides true data.

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 $\pm 6\text{ mA}$ (@ $V_{CC} = 3.0\text{ V}$ to 3.6 V), $\pm 12\text{ mA}$ (@ $V_{CC} = 4.5\text{ V}$ to 5.5 V)

Function Table

Inputs

STB	SEL	A	B	Output
H	X	X	X	L
L	L	L	X	L
L	L	H	X	H
L	H	X	L	L
L	H	X	H	H

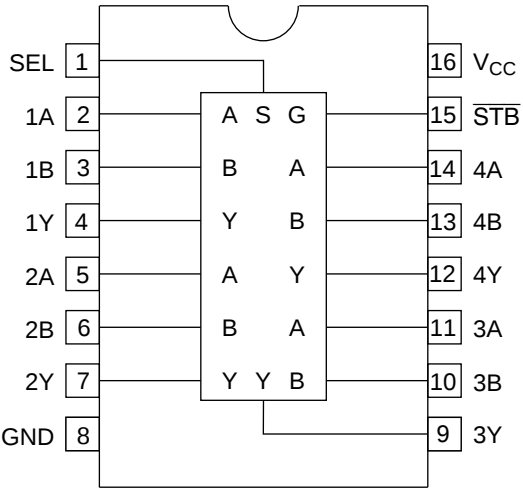
Note: H: High level

L: Low level

X: Immaterial

HD74LV157A

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
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	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.

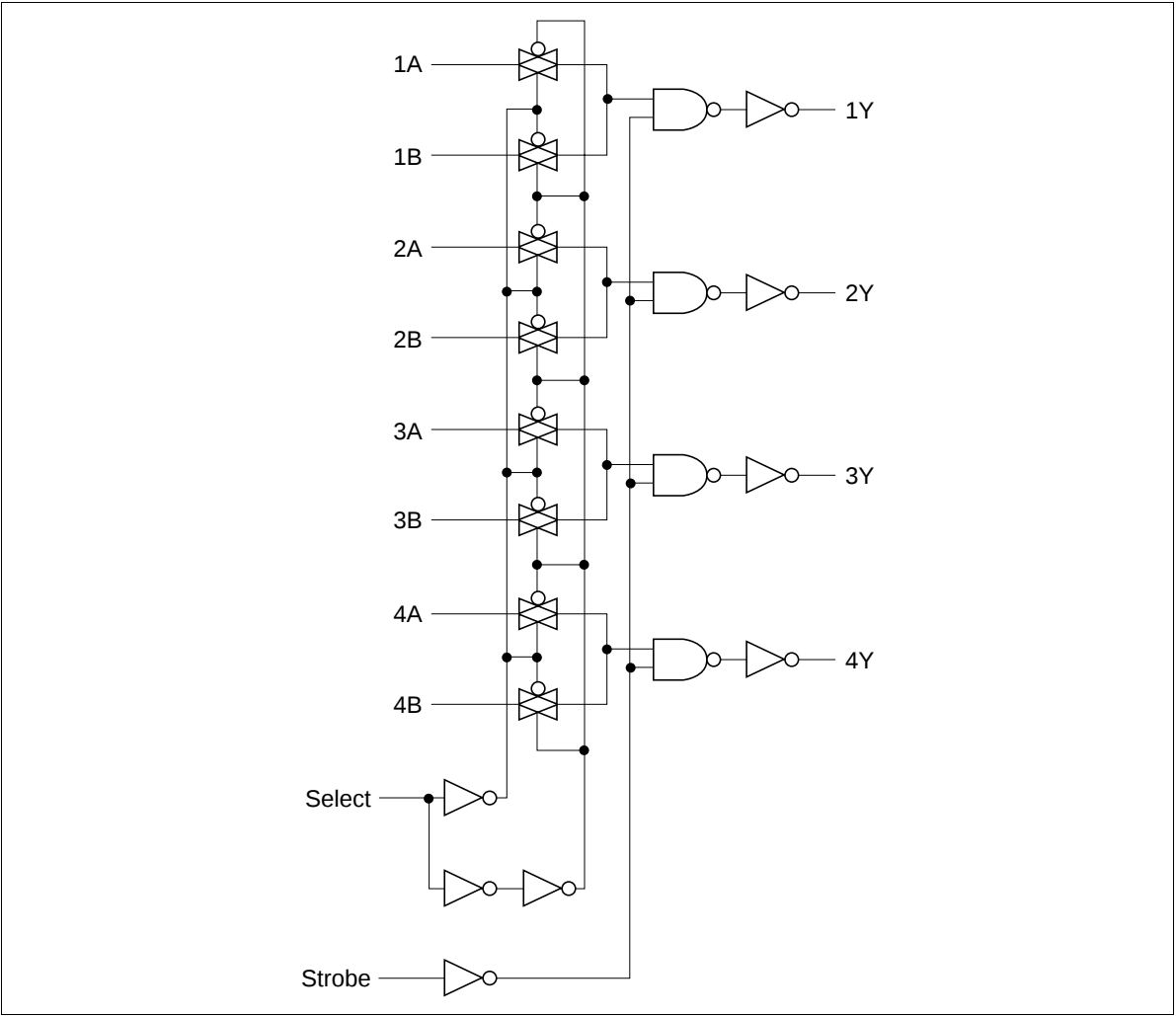
- 1. The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
- 2. This value is limited to 5.5 V maximum.
- 3. The maximum package power dissipation was calculated using a junction temperature of 150°C.

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
Output current	I _{OH}	—	−50	μA	V _{CC} = 2.0 V
		—	−2	mA	V _{CC} = 2.3 to 2.7 V
		—	−6		V _{CC} = 3.0 to 3.6 V
		—	−12		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
		—	6		V _{CC} = 3.0 to 3.6 V
		—	12		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

• Ta = -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} × 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 _{OH}	Min to Max	V _{CC} - 0.1	—	—	V	I _{OH} = -50 μA
		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
		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 _I = 5.5 V 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 V to 5.5 V
Input capacitance	C _{IN}	3.3	—	1.9	—	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

• $V_{CC} = 2.5 \pm 0.2 \text{ V}$

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

Item	Symbol	Min	Typ	Max	Min	Max	Unit	Test Conditions	FROM (Input)	TO (Output)
Propa- gation delay time	t_{PLH}/t_{PHL}	—	9.8	15.9	1.0	19.5	ns	$C_L = 15 \text{ pF}$	A or B	Y
		—	13.3	18.8	1.0	22.0		$C_L = 50 \text{ pF}$		
		—	15.5	19.4	1.0	23.5		$C_L = 15 \text{ pF}$	SEL	
		—	15.7	22.3	1.0	26.0		$C_L = 50 \text{ pF}$		
		—	15.8	19.8	1.0	24.0		$C_L = 15 \text{ pF}$	$\overline{\text{STB}}$	
		—	14.8	22.7	1.0	26.5		$C_L = 50 \text{ pF}$		

• $V_{CC} = 3.3 \pm 0.3 \text{ V}$

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

Item	Symbol	Min	Typ	Max	Min	Max	Unit	Test Conditions	FROM (Input)	TO (Output)
Propa- gation delay time	t_{PLH}/t_{PHL}	—	6.2	9.7	1.0	11.5	ns	$C_L = 15 \text{ pF}$	A or B	Y
		—	8.7	13.2	1.0	15.0		$C_L = 50 \text{ pF}$		
		—	8.4	13.2	1.0	15.5		$C_L = 15 \text{ pF}$	SEL	
		—	10.9	16.7	1.0	19.0		$C_L = 50 \text{ pF}$		
		—	8.7	13.6	1.0	16.0		$C_L = 15 \text{ pF}$	$\overline{\text{STB}}$	
		—	11.2	17.1	1.0	19.5		$C_L = 50 \text{ pF}$		

Switching Characteristics (cont)

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

Item	Symbol	Ta = 25°C			Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propa- gation delay time	t_{PLH}/t_{PHL}	—	4.1	6.4	1.0	7.5	ns	$C_L = 15\text{ pF}$	A or B	Y
		—	5.6	8.4	1.0	9.5		$C_L = 50\text{ pF}$		
		—	5.3	8.1	1.0	9.5		$C_L = 15\text{ pF}$	SEL	
		—	6.8	10.1	1.0	11.5		$C_L = 50\text{ pF}$		
		—	5.6	8.6	1.0	10.0		$C_L = 15\text{ pF}$	STB	
		—	7.1	10.6	1.0	12.0		$C_L = 50\text{ pF}$		

Operating Characteristics

- $C_L = 50\text{ pF}$

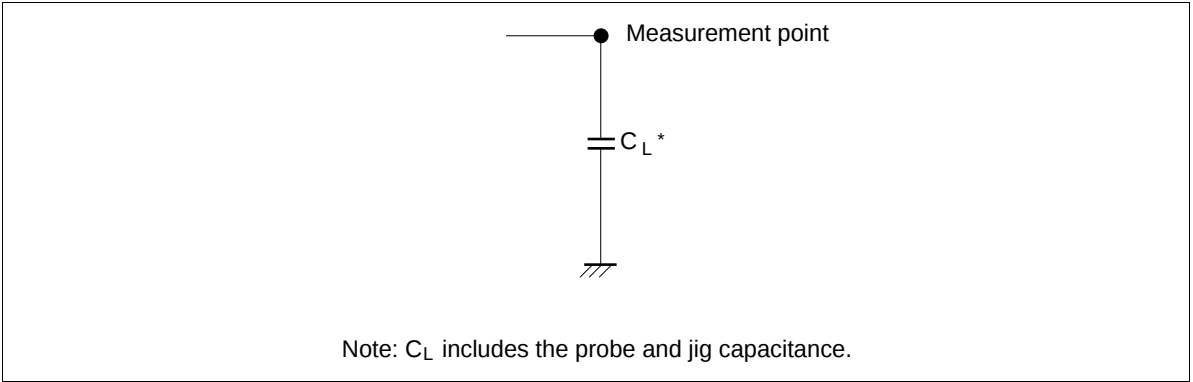
Item	Symbol	$V_{CC}\text{ (V)}$	Ta = 25°C			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	C_{PD}	3.3	—	10.0	—	pF	f = 10 MHz
		5.0	—	12.0	—		

Noise Characteristics

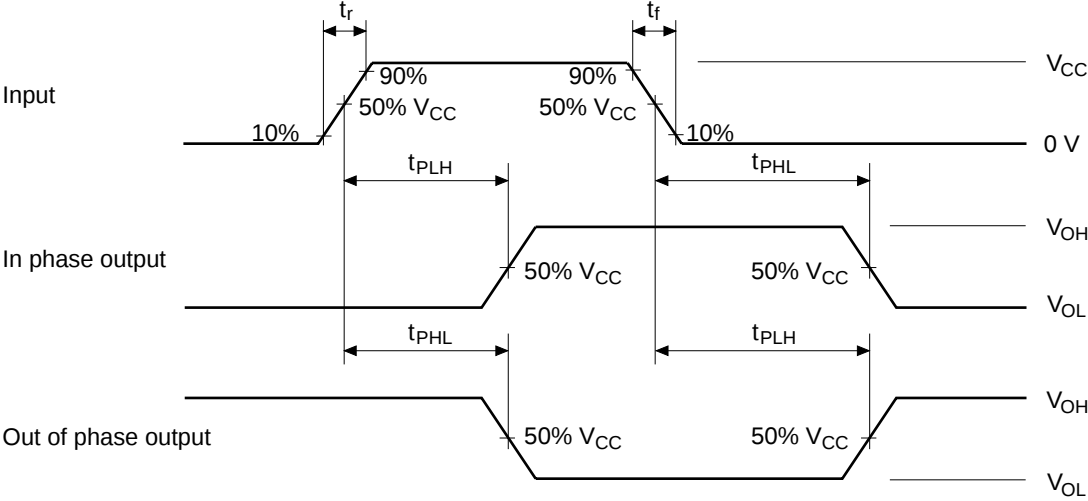
- $C_L = 50\text{ pF}$

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	—	0.3	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	—	3.0	—		
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

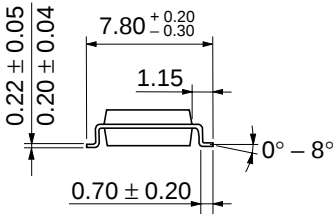
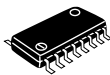
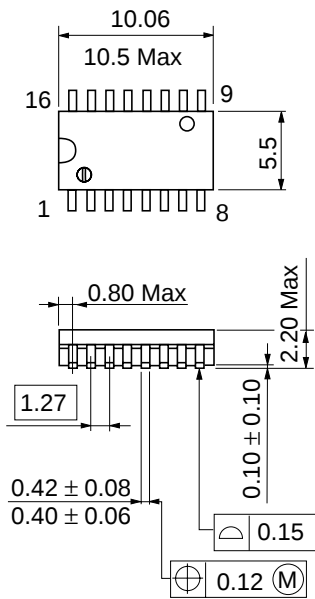


• Waveform



- 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 is measured one at a time with one transition per measurement.

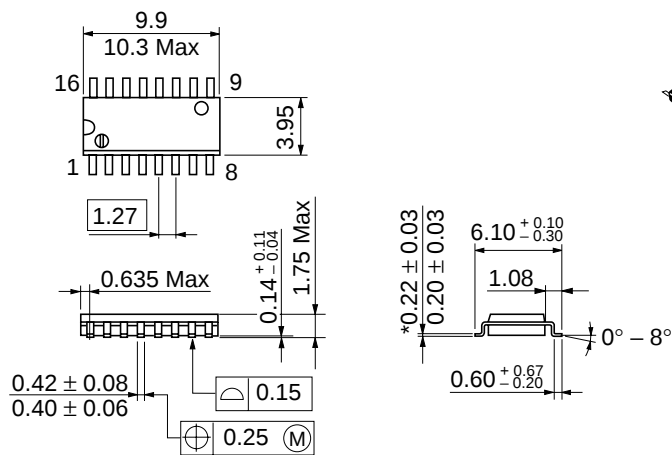
Package Dimensions



Dimension including the plating thickness
Base material dimension

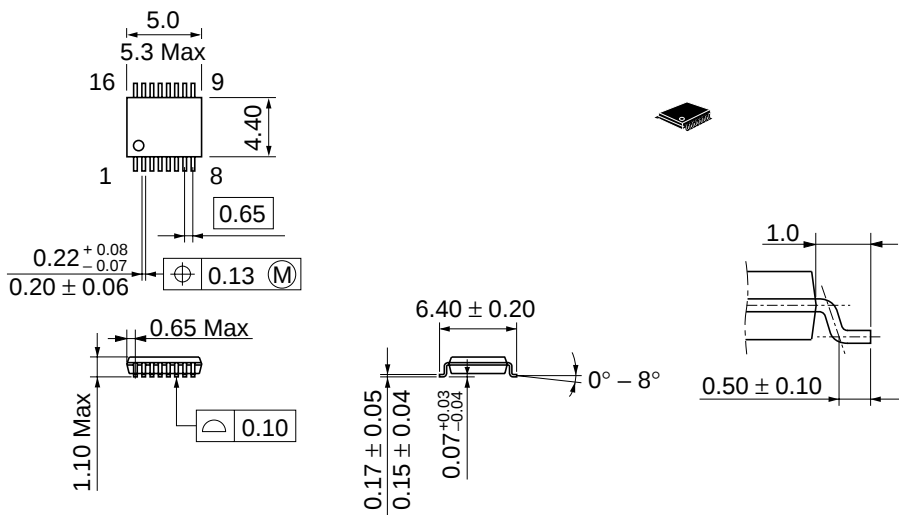
Hitachi Code	FP-16DA
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.24 g

Unit: mm



Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-16DN
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	0.15 g



Dimension including the plating thickness
Base material dimension

Hitachi Code	TTP-16DA
JEDEC	—
EIAJ	—
Weight (reference value)	0.05 g

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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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Hitachi Asia Pte. Ltd. 16 Collyer Quay #20-00 Hitachi Tower Singapore 049318 Tel: 535-2100 Fax: 535-1533 Hitachi Asia Ltd. Taipei Branch Office 3F, Hung Kuo Building. No.167, Tun-Hwa North Road, Taipei (105) Tel: <886> (2) 2718-3666 Fax: <886> (2) 2718-8180
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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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