
HD74LVC240A

Octal Buffers / Line Drivers with 3-state Outputs

HITACHI

ADE-205-109B(Z)
3rd Edition
December 1996

Description

The HD74LVC240A has eight inverter drivers with three state outputs in a 20 pin package. This device is a inverting buffer and has two active low enables ($1\overline{G}$ and $2\overline{G}$). Each enable independently controls four buffers. Low voltage and high speed operation is suitable at the battery drive product (note type personal computer) and low power consumption extends the life of a battery for long time operation.

Features

- $V_{CC} = 2.0\text{ V to }5.5\text{ V}$
- All inputs $V_{IH}(\text{Max.}) = 5.5\text{ V} (@V_{CC} = 0\text{ V to }5.5\text{ V})$
- All outputs $V_{OUT}(\text{Max.}) = 5.5\text{ V} (@V_{CC} = 0\text{ V or output off state})$
- 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 $> 2.0\text{ V} (@V_{CC} = 3.3\text{ V, }T_a = 25^\circ\text{C})$
- High output current $\pm 24\text{ mA} (@V_{CC} = 3.0\text{ V to }5.5\text{ V})$

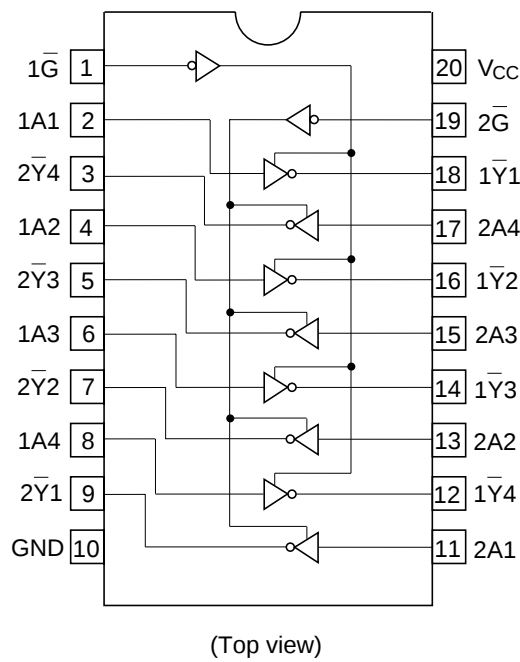
Function Table

Inputs		Output $\overline{Y}$
$\overline{G}$	A	
H	X	Z
L	H	L
L	L	H

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

HD74LVC240A

Pin Arrangement



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Conditions
Supply voltage	V_{CC}	-0.5 to 6.0	V	
Input diode current	I_{IK}	-50	mA	$V_I = -0.5$ V
Input voltage	V_I	-0.5 to 6.0	V	
Output diode current	I_{OK}	-50	mA	$V_O = -0.5$ V
		50	mA	$V_O = V_{CC} + 0.5$ V
Output voltage	V_O	-0.5 to $V_{CC} + 0.5$	V	Output "H" or "L"
		-0.5 to 6.0	V	Output "Z" or V_{CC} :OFF
Output current	I_O	± 50	mA	
V_{CC} , GND current / pin	I_{CC} or I_{GND}	100	mA	
Storage temperature	Tstg	-65 to +150	°C	

Note: 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.

Recommended Operating Conditions

Item	Symbol	Ratings	Unit	Conditions
Supply voltage	V_{CC}	1.5 to 5.5	V	Data hold
		2.0 to 5.5	V	At operation
Input / output voltage	V_I	0 to 5.5	V	$\overline{G}$, A
	V_O	0 to V_{CC}	V	Output "H" or "L"
		0 to 5.5	V	Output "Z" or V_{CC} :OFF
Operating temperature	T_a	-40 to 85	°C	
Output current	I_{OH}	-12	mA	$V_{CC} = 2.7\text{ V}$
		-24 ^{*2}	mA	$V_{CC} = 3.0\text{ V to }5.5\text{ V}$
	I_{OL}	12	mA	$V_{CC} = 2.7\text{ V}$
		24 ^{*2}	mA	$V_{CC} = 3.0\text{ V to }5.5\text{ V}$
Input rise / fall time ^{*1}	t_r, t_f	10	ns/V	

Notes: 1. This item guarantees maximum limit when one input switches.

Waveform : Refer to test circuit of switching characteristics.

2. duty cycle $\leq 50\%$

Electrical Characteristics

Item	Symbol	V_{CC} (V)	Ta = -40 to 85°C		Unit	Test Conditions
			Min	Max		
Input voltage	V_{IH}	2.7 to 3.6	2.0	—	V	
		4.5 to 5.5	$V_{CC} \times 0.7$	—	V	
	V_{IL}	2.7 to 3.6	—	0.8	V	
		4.5 to 5.5	—	$V_{CC} \times 0.3$	V	
Output voltage	V_{OH}	2.7 to 5.5	$V_{CC} - 0.2$	—	V	$I_{OH} = -100 \mu A$
		2.7	2.2	—	V	$I_{OH} = -12 \text{ mA}$
		3.0	2.4	—	V	
		3.0	2.2	—	V	$I_{OH} = -24 \text{ mA}$
		4.5	3.8	—	V	
	V_{OL}	2.7 to 5.5	—	0.2	V	$I_{OL} = 100 \mu A$
		2.7	—	0.4	V	$I_{OL} = 12 \text{ mA}$
		3.0	—	0.55	V	$I_{OL} = 24 \text{ mA}$
		4.5	—	0.55	V	
Input current	I_{IN}	0 to 5.5	—	± 5.0	μA	$V_{IN} = 5.5 V_{CC}$ or GND
Off state output current	I_{OZ}	2.7 to 5.5	—	± 5.0	μA	$V_{IN} = V_{CC}, \text{ GND}$ $V_{OUT} = 5.5 \text{ V or GND}$
Output leak current	I_{OFF}	0	—	20	μA	$V_{IN} / V_{OUT} = 5.5 \text{ V}$
Quiescent supply current	I_{CC}	2.7 to 3.6	—	± 10	μA	$V_{IN} / V_{OUT} = 3.6 \text{ to } 5.5 \text{ V}$
		2.7 to 5.5	—	10	μA	$V_{IN} = V_{CC}$ or GND
	ΔI_{CC}	3.0 to 3.6	—	500	μA	$V_{IN} = \text{one input at } (V_{CC} - 0.6)V,$ other inputs at V_{CC} or GND

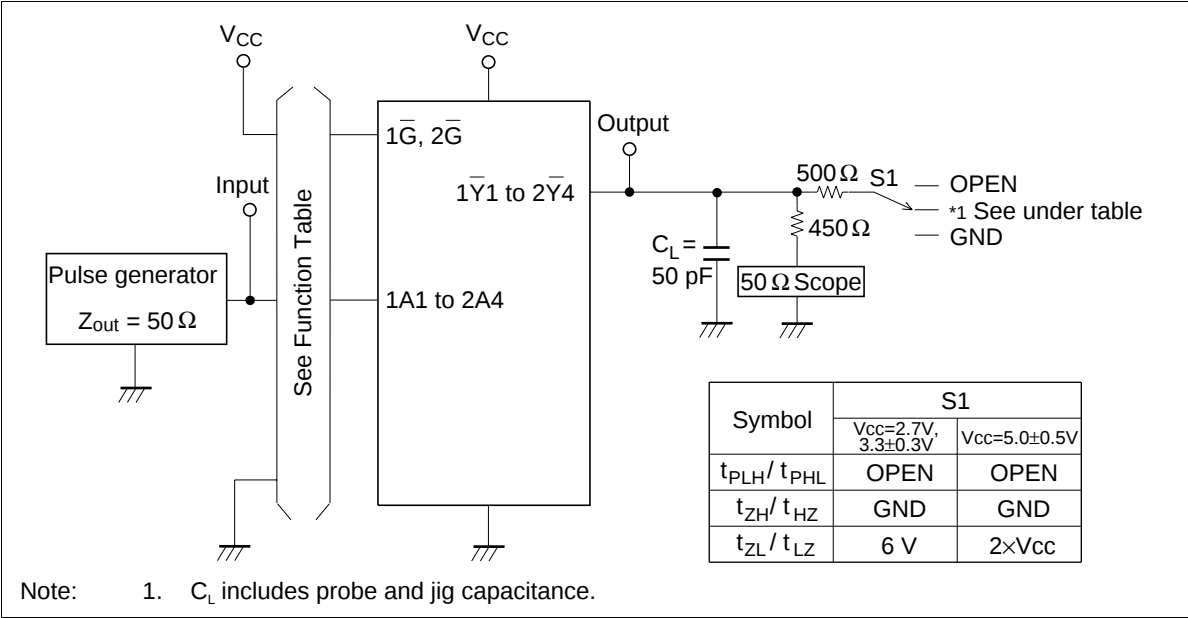
Switching Characteristics

Ta = -40 to 85°C								
Item	Symbol	Vcc (V)	Min	Typ	Max	Unit	From (Input)	To (Output)
Propagation delay time	tPLH	2.7	—	—	7.5	ns	A	$\bar{Y}$
	tPHL	3.3±0.3	1.5	—	6.5	ns		
		5.0±0.5	—	—	5.0	ns		
Output enable time	tZH	2.7	—	—	9.0	ns	$\bar{G}$	$\bar{Y}$
	tZL	3.3±0.3	1.5	—	8.0	ns		
		5.0±0.5	—	—	6.5	ns		
Output disable time	tHZ	2.7	—	—	8.0	ns	$\bar{G}$	$\bar{Y}$
	tLZ	3.3±0.3	1.5	—	7.0	ns		
		5.0±0.5	—	—	6.0	ns		
Between outut pins skew ^{*1}	tOSLH	2.7	—	—	—	ns		
	tOSHL	3.3±0.3	—	—	1.0	ns		
		5.0±0.5	—	—	1.0	ns		
Input capacitance	CIN	2.7	—	3.0	—	pF		
Output capacitance	CO	2.7	—	15.0	—	pF		

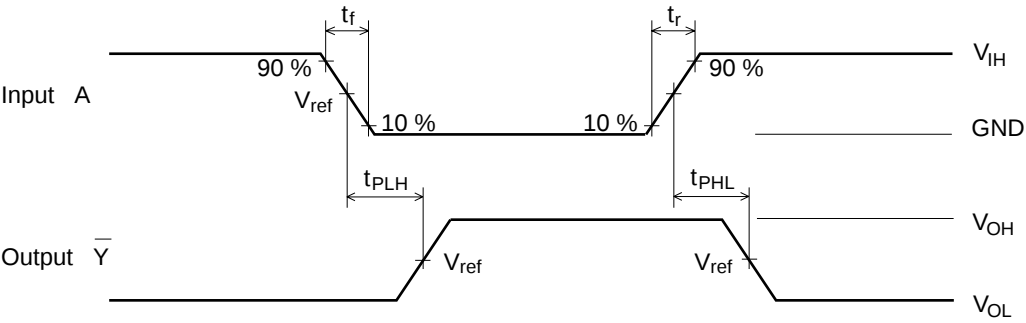
Note: 1. This parameter is characterized but not tested.

$$tos_{LH} = |t_{PLHm} - t_{PLHn}|, tos_{HL} = |t_{PHLm} - t_{PHLn}|$$

Test Circuit

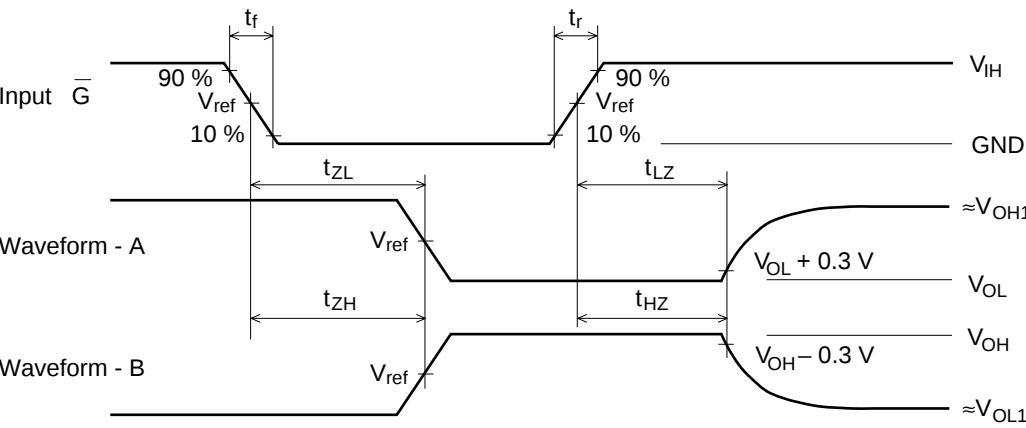


Waveforms – 1



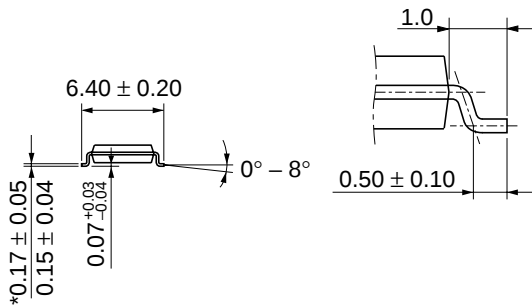
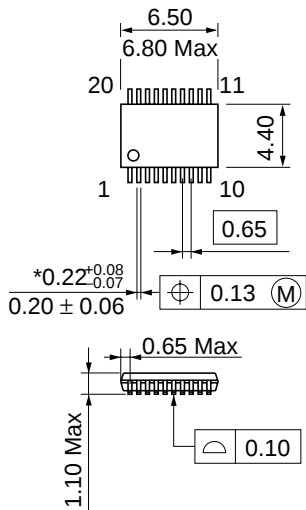
- Notes:
- 1. $t_r = 2.5 \text{ ns}$, $t_f = 2.5 \text{ ns}$
 - 2. Input waveform : PRR = 10 MHz, duty cycle 50%

Waveforms – 2



TEST	$V_{CC}=2.7\text{V}, 3.3\pm0.3\text{V}$	$V_{CC}=5.0\pm0.5\text{V}$
V_{IH}	2.7 V	V_{CC}
V_{ref}	1.5 V	50% V_{CC}
V_{OH1}	3 V	V_{CC}
V_{OL1}	GND	GND

- Notes:
- 1. $t_r = 2.5 \text{ ns}$, $t_f = 2.5 \text{ ns}$
 - 2. Input waveform : PRR = 10 MHz, duty cycle 50%
 - 3. Waveform – A shows input conditions such that the output is "L" level when enable by the output control.
 - 4. Waveform – B shows input conditions such that the output is "H" level when enable by the output control.



*Dimension including the plating thickness
Base material dimension

Hitachi Code	TTP-20DA
JEDEC	—
EIAJ	—
Weight (reference value)	0.07 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

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 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 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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