HD74LVC16241

16-bit Buffers / Line Drivers with 3-state Outputs

HITACHI

ADE-205-073B(Z)
3rd Edition
November 1995

Description

The HD74LVC16241 has sixteen buffer drivers with three state outputs in a 48 pin package. This device is a non inverting buffer and has two active low enables ($1\overline{G}$, $4\overline{G}$), high enables (2G, 3G). 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 V to 5.5 V
- All inputs V_{IH} (Max.) = 5.5 V (@V_{CC} = 0 V to 5.5 V)
- Typical V_{OL} ground bounce < 0.8 V (@V_{CC} = 3.3 V, Ta = 25°C)
- Typical V_{OH} undershoot > 2.0 V (@V_{CC} = 3.3 V, Ta = 25°C)
- High output current ±24 mA (@V_{CC} = 3.0 V to 5.5 V)

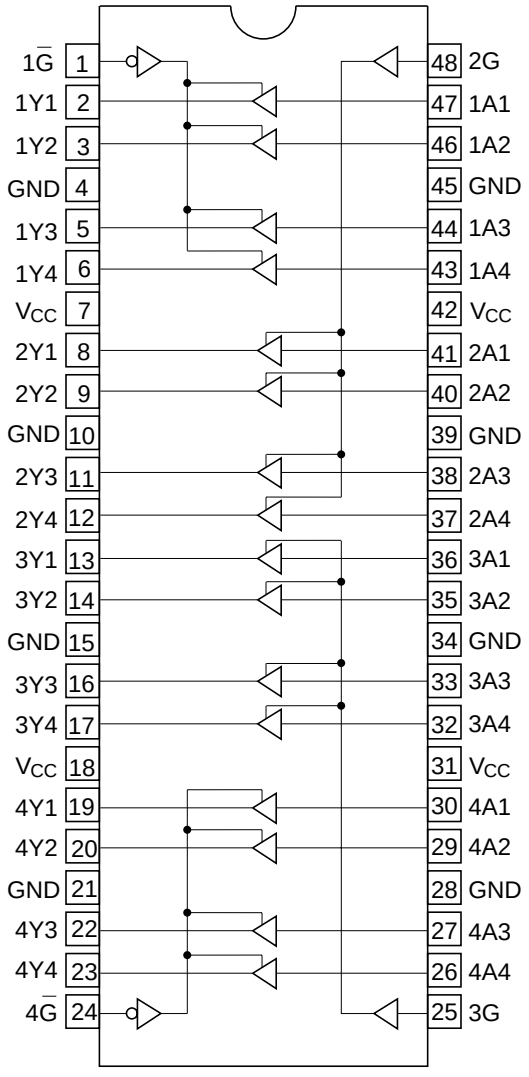
Function Table

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

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

Hitachi semiconductor

Pin Arrangement



(Top view)

Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Conditions
Supply voltage range	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 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	Rating	Unit	Conditions
Supply voltage	V_{CC}	1.5 to 5.5	V	Data retention
		2.0 to 5.5	V	At operation
Input / output voltage	V_I	0 to 5.5	V	$\overline{G}$, G, A
	V_O	0 to V_{CC}	V	Y
Operating temperature	Ta	–40 to 85	°C	
Output current	I_{OH}	–12	mA	V_{CC} = 2.7 V
		–24[*2]	mA	V_{CC} = 3.0 V to 5.5 V
	I_{OL}	12	mA	V_{CC} = 2.7 V
		24[*2]	mA	V_{CC} = 3.0 V to 5.5 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 ≤ 50%

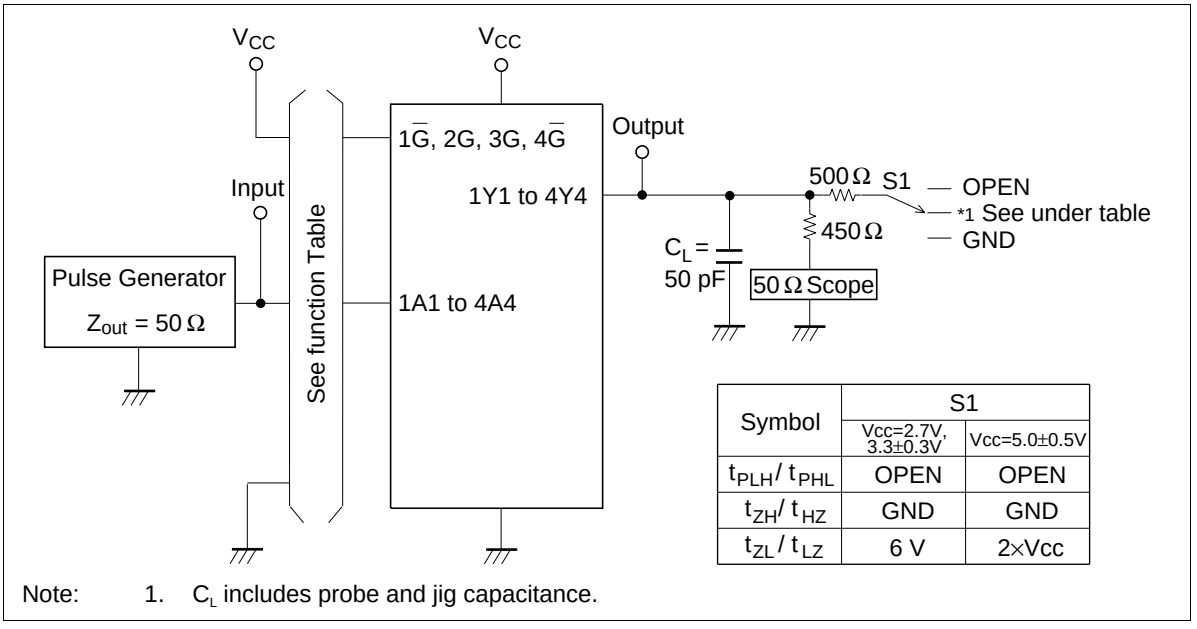
Electrical Characteristics

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

Switching Characteristics

			Ta = –40 to 85°C					
Item	**Symbol**	**V_{cc} (V)**	**Min**	**Typ**	**Max**	**Unit**	**From (Input)**	**To (Output)**
Propagation delay time	t_{PLH}	2.7	—	4.5	7.5	ns	A	Y
	t_{PHL}	3.3±0.3	1.5	3.5	6.5	ns		
		5.0±0.5	—	2.5	5.0	ns		
Output enable time	t_{ZH}	2.7	—	5.0	9.0	ns	$\overline{G}$, G	Y
	t_{ZL}	3.3±0.3	1.5	4.0	8.0	ns		
		5.0±0.5	—	3.0	7.0	ns		
Output disable time	t_{HZ}	2.7	—	4.5	8.5	ns	$\overline{G}$, G	Y
	t_{LZ}	3.3±0.3	1.5	4.0	7.5	ns		
		5.0±0.5	—	2.5	7.0	ns		
Input capacitance	C_{IN}	2.7	—	3.0	—	pF		
Output capacitance	C_O	2.7	—	15.0	—	pF		

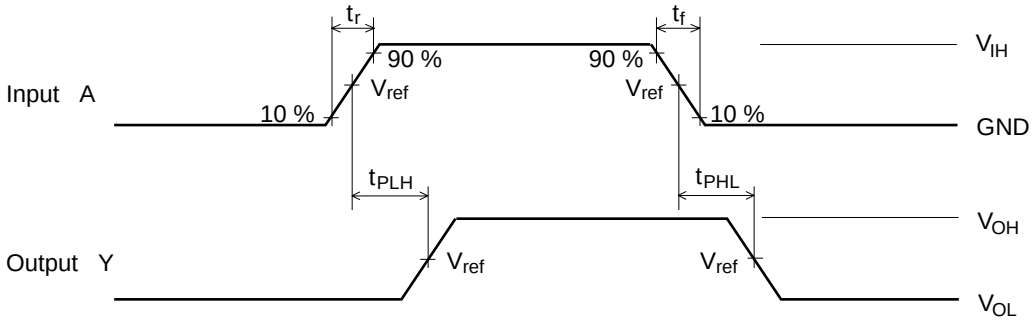
Test Circuit



Symbol	S1	
	Vcc=2.7V, 3.3±0.3V	Vcc=5.0±0.5V
t_{PLH}/ t_{PHL}	OPEN	OPEN
t_{ZH}/ t_{HZ}	GND	GND
t_{ZL}/ t_{LZ}	6 V	2×Vcc

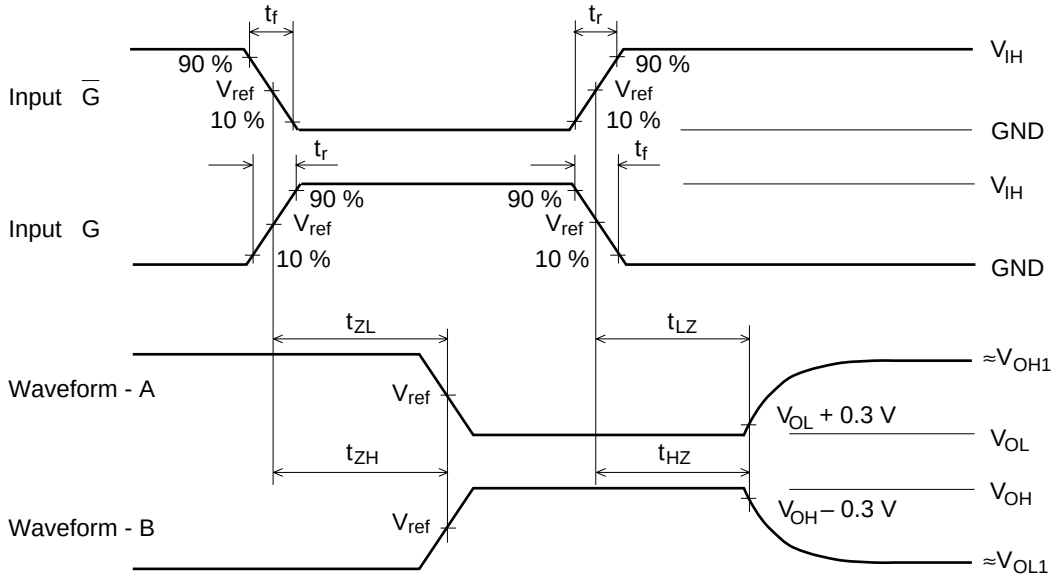
Note: 1. C_L includes probe and jig capacitance.

Waveforms – 1



Notes: 1. t_r = 2.5 ns, t_f = 2.5 ns
2. Input waveform : PRR = 10 MHz, duty cycle 50 %

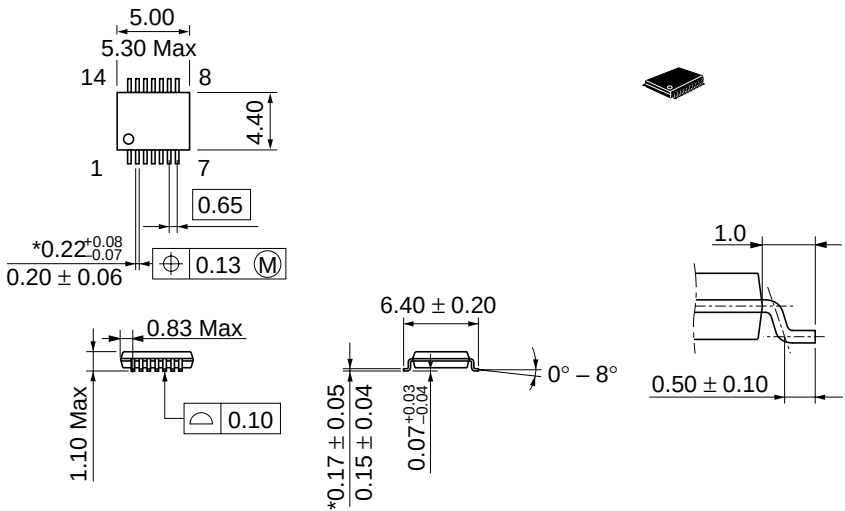
Waveforms – 2



TEST	Vcc=2.7V, 3.3±0.3V	Vcc=5.0±0.5V
V_{IH}	2.7 V	Vcc
V_{ref}	1.5 V	50%Vcc
V_{OH1}	3 V	Vcc
V_{OL1}	GND	GND

Notes:
1. t_r = 2.5 ns, t_f = 2.5 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.

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
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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

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

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