
HD74LVC16244A

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

HITACHI

ADE-205-119B(Z)

3rd Edition

Decemver 1996

Description

The HD74LVC16244A has sixteen line drivers with three state outputs in a 48 pin package. This device is a non inverting buffer and has two active low enables ($1\bar{G}$ to $4\bar{G}$). 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 Y
\bar{G}	A	
H	X	Z
L	H	H
L	L	L

H: High level

L: Low level

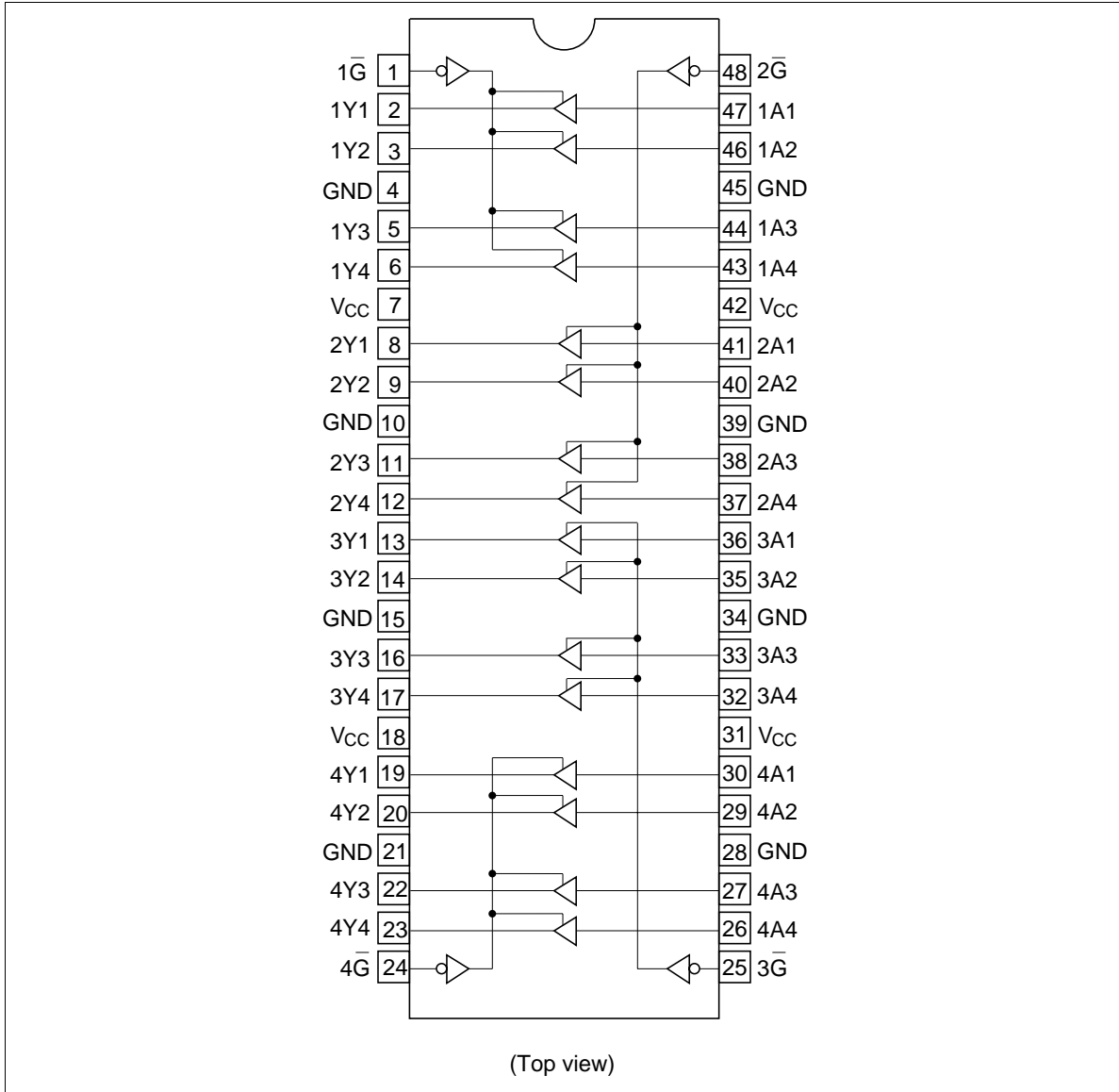
X: Immaterial

Z: High impedance



HD74LVC16244A

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	$V_I = -0.5\text{ V}$
Input voltage	V_I	-0.5 to 6.0	V	
Output diode current	I_{OK}	-50	mA	$V_O = -0.5\text{ V}$
		50	mA	$V_O = V_{CC} + 0.5\text{ V}$
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	\bar{G} , A
		0 to V_{CC}	V	Output "H" or "L"
				Output "Z" or V_{CC} :OFF
Operating temperature	Ta	-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 $\leq 50\%$

HD74LVC16244A

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} ×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	2.2	—	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}	2.7 to 5.5	—	±5.0	μA	V _{IN} = V _{CC} , GND V _{OUT} = 5.5 V or GND
	Output leak current	I _{OFF}	0	—	20	μA	V _{IN} / V _{OUT} = 5.5 V
Quiescent supply current	I _{CC}	2.7 to 3.6	—	±20	μA	V _{IN} / V _{OUT} = 3.6 to 5.5 V	
		2.7 to 5.5	—	20	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

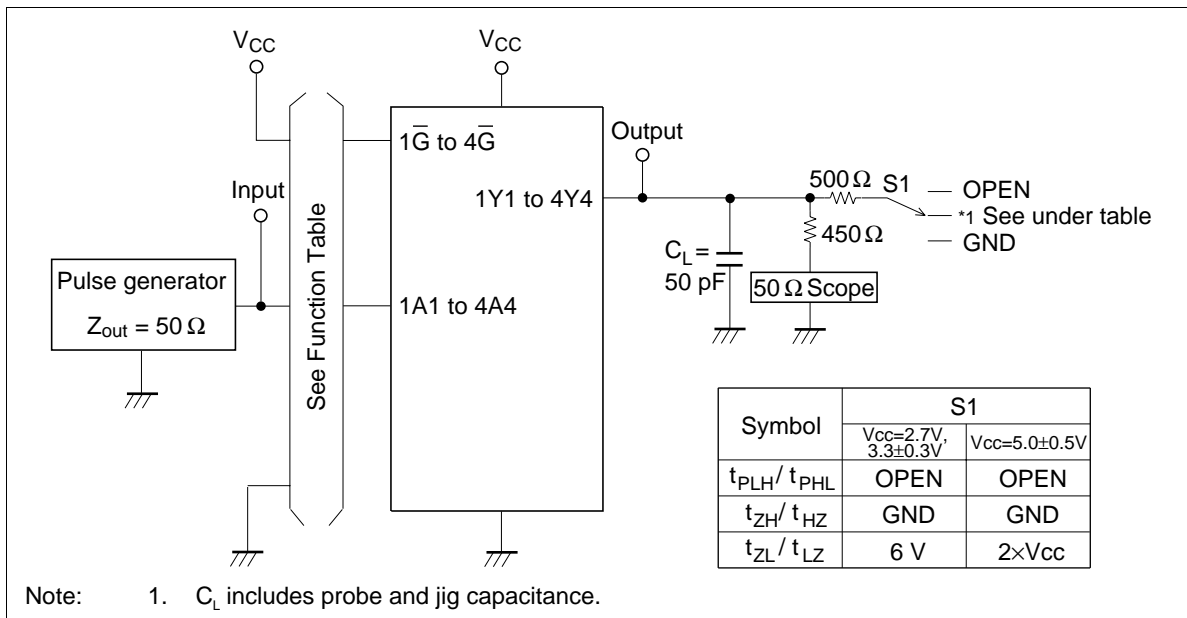
$T_a = -40 \text{ to } 85^\circ\text{C}$

Item	Symbol	V_{CC} (V)	Min	Typ	Max	Unit	From (Input)	To (Output)
Propagation delay time	t_{PLH}	2.7	—	—	5.8	ns	A	Y
	t_{PHL}	3.3 ± 0.3	1.5	—	5.2	ns		
		5.0 ± 0.5	—	—	4.0	ns		
Output enable time	t_{ZH}	2.7	—	—	8.2	ns	\bar{G}	Y
	t_{ZL}	3.3 ± 0.3	1.5	—	7.5	ns		
		5.0 ± 0.5	—	—	5.5	ns		
Output disable time	t_{HZ}	2.7	—	—	7.7	ns	\bar{G}	Y
	t_{LZ}	3.3 ± 0.3	1.5	—	7.0	ns		
		5.0 ± 0.5	—	—	6.0	ns		
Between output pins skew ^{*1}	t_{OSLH}	2.7	—	—	—	ns		
	t_{OSHL}	3.3 ± 0.3	—	—	1.0	ns		
		5.0 ± 0.5	—	—	1.0	ns		
Input capacitance	C_{IN}	2.7	—	3.0	—	pF		
Output capacitance	C_O	2.7	—	15.0	—	pF		

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

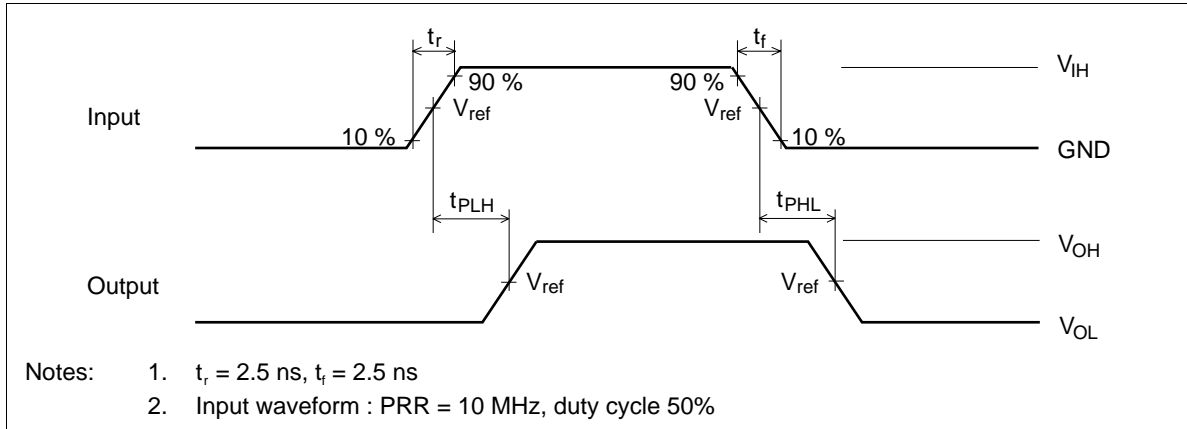
$$tos_{LH} = |t_{PLHm} - t_{PLHn}|, tos_{HL} = |t_{PHLm} - t_{PHLn}|$$

Test Circuit

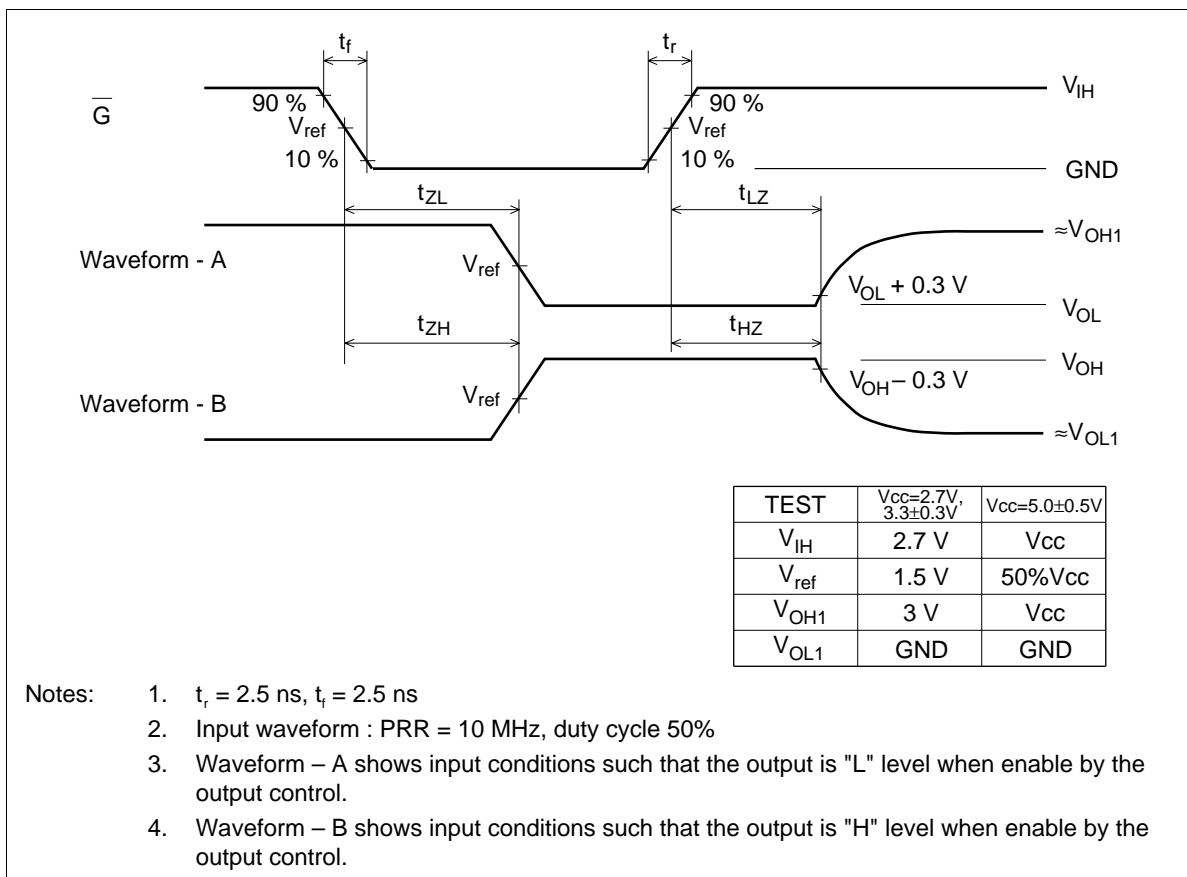


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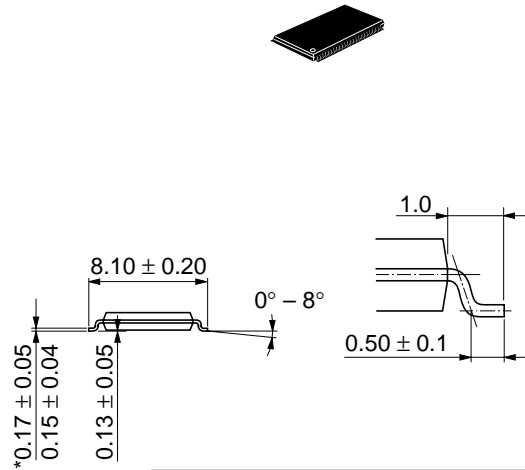
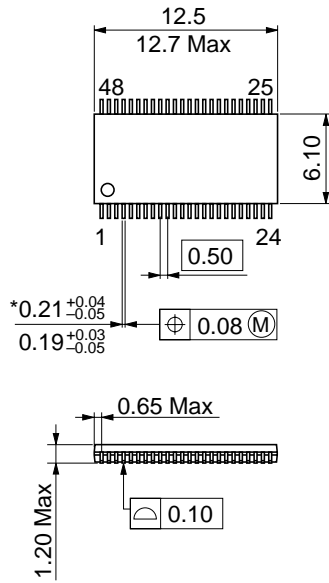
Waveforms – 1



Waveforms – 2



Unit: mm



*Dimension including the plating thickness
Base material dimension

Hitachi Code	TTP-48DB
JEDEC	—
EIAJ	—
Weight (reference value)	0.20 g

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