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# HD74LV2G245A

Dual Bus Transceivers with 3–state Outputs

## HITACHI

ADE-205-354 (Z)  
1st. Edition  
May 2000

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### Description

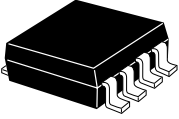
The HD74LV2G245A has two buffers with three state output in a 8 pin package. When DIR is high, data is transferred from the A inputs to the B outputs, and when DIR is low, data is transferred from the B inputs to the A outputs. The A and B buses are separated by making the enable input ( $\overline{OE}$ ) high level. 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

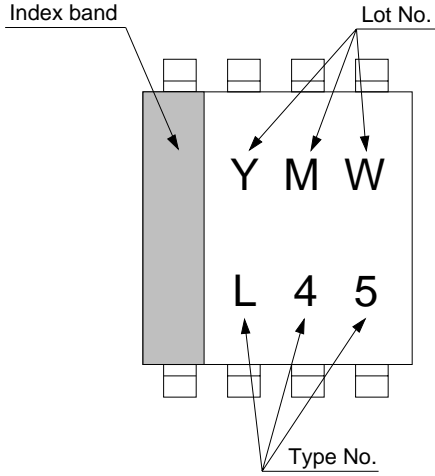
- The basic gate function is lined up as hitachi uni logic series.
- Supplied on emboss taping for high speed automatic mounting.
- Electrical characteristics equivalent to the HD74LV245A  
Supply voltage range : 1.65 to 5.5 V  
Operating temperature range :  $-40$  to  $+85^{\circ}\text{C}$
- All inputs  $V_{IH}$  (Max.) = 5.5 V (@  $V_{CC} = 0$  V to 5.5 V)  
All outputs  $V_O$  (Max.) = 5.5 V (@  $V_{CC} = 0$  V)
- Output current  $\pm 6$  mA (@  $V_{CC} = 3.0$  V to 3.6 V),  $\pm 12$  mA (@  $V_{CC} = 4.5$  V to 5.5 V)
- All the logical input has hysteresis voltage for the slow transition.

## Outline and Article Indication

• HD74LV2G245A



US-8



Y : Year code  
(the last digit of year)  
M : Month code  
W : Week code

## Function Table

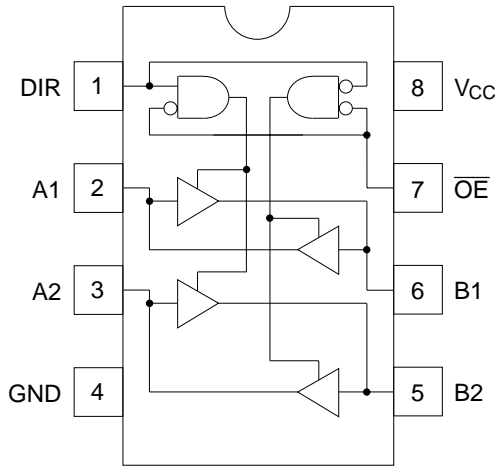
Inputs		Operation
$\overline{OE}$	DIR	
L	L	B data to A bus
L	H	A data to B bus
H	X	Isolation

H : High level

L : Low level

X : Immaterial

Pin Arrangement



(Top view)

**Absolute Maximum Ratings**

Item	Symbol	Ratings	Unit	Test Conditions
Supply voltage	$V_{CC}$	-0.5 to 7.0	V	
Input voltage	$V_{IN}$	-0.5 to 7.0	V	
Output voltage	$V_{OUT}$	-0.5 to $V_{CC} + 0.5$ -0.5 to 7.0	V	Output : H or L $V_{CC}$ : OFF or Output : Z
Input diode current	$I_{IK}$	-20	mA	
Output diode current	$I_{OK}$	$\pm 50$	mA	
Output current	$I_{OUT}$	$\pm 25$	mA	
$V_{CC}$ , GND current	$I_{CC}$ or $I_{GND}$	$\pm 50$	mA	
Power dissipation	$P_T$	200	mW	
Storage temperature	$T_{stg}$	-65 to 150	$^{\circ}C$	

**Recommended Operating Conditions**

Item	Symbol	Ratings	Unit	Test Conditions
Supply voltage	$V_{CC}$	1.65 to 5.5	V	
Input voltage	$V_{IN}$	0 to 5.5	V	
Output voltage	$V_{OUT}$	0 to $V_{CC}$ 0 to 5.5	V	Output : H or L High impedance state
Operating temperature	$T_{opr}$	-40 to +85	$^{\circ}C$	
Input rise / fall time	$t_r, t_f$	0 to 300 ( $V_{CC} = 1.65$ to $1.95$ V) 0 to 200 ( $V_{CC} = 2.3$ to $2.7$ V) 0 to 100 ( $V_{CC} = 3.0$ to $3.6$ V) 0 to 20 ( $V_{CC} = 4.5$ to $5.5$ V)	ns	

**Electrical Characteristic**

• Ta = -40 to 85°C

Item	Symbol	V <sub>CC</sub> (V) *	Min	Typ	Max	Unit	Test condition
Input voltage	V <sub>IH</sub>	1.65 to 1.95	V <sub>CC</sub> ×0.75	—	—	V	
		2.3 to 2.7	V <sub>CC</sub> ×0.7	—	—		
		3.0 to 3.6	V <sub>CC</sub> ×0.7	—	—		
		4.5 to 5.5	V <sub>CC</sub> ×0.7	—	—		
	V <sub>IL</sub>	1.65 to 1.95	—	—	V <sub>CC</sub> ×0.25		
		2.3 to 2.7	—	—	V <sub>CC</sub> ×0.3		
		3.0 to 3.6	—	—	V <sub>CC</sub> ×0.3		
		4.5 to 5.5	—	—	V <sub>CC</sub> ×0.3		
Hysteresis voltage	V <sub>H</sub>	1.8	—	0.25	—	V	V <sub>T</sub> <sup>+</sup> - V <sub>T</sub> <sup>-</sup>
		2.5	—	0.30	—		
		3.3	—	0.35	—		
		5.0	—	0.45	—		
Output voltage	V <sub>OH</sub>	Min to Max	V <sub>CC</sub> -0.1	—	—	V	I <sub>OH</sub> = -50 μA
		1.65	1.4	—	—		I <sub>OH</sub> = -1 mA
		2.3	2.0	—	—		I <sub>OH</sub> = -2 mA
		3.0	2.48	—	—		I <sub>OH</sub> = -6 mA
		4.5	3.8	—	—		I <sub>OH</sub> = -12 mA
	V <sub>OL</sub>	Min to Max	—	—	0.1		I <sub>OL</sub> = 50 μA
		1.65	—	—	0.3		I <sub>OL</sub> = 1 mA
		2.3	—	—	0.4		I <sub>OL</sub> = 2 mA
		3.0	—	—	0.44		I <sub>OL</sub> = 6 mA
		4.5	—	—	0.55		I <sub>OL</sub> = 12 mA
Input current	I <sub>IN</sub>	0 to 5.5	—	—	±1	μA	V <sub>IN</sub> = 5.5 V or GND
Off state output current	I <sub>OZ</sub>	5.5	—	—	±5	μA	V <sub>O</sub> = V <sub>CC</sub> or GND
Quiescent supply current	I <sub>CC</sub>	5.5	—	—	10	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0
Output leakage current	I <sub>OFF</sub>	0	—	—	5	μA	V <sub>O</sub> = 5.5 V
Input capacitance	C <sub>IN</sub>	3.3	—	3.0	—	pF	V <sub>IN</sub> = V <sub>CC</sub> or GND
Output capacitance	C <sub>O</sub>	3.3	—	5.5	—	pF	V <sub>O</sub> = V <sub>CC</sub> or GND

Note: For conditions shown as Min or Max, use the appropriate values under recommended operating conditions.

## Switching Characteristics

•  $V_{CC} = 1.8 \pm 0.15 \text{ V}$

Item	Symbol	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } 85^\circ\text{C}$		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	$t_{PLH}$	—	14.0	25.0	1.0	27.0	ns	$C_L = 15 \text{ pF}$	A or B	B or A
	$t_{PHL}$	—	20.5	34.0	1.0	36.5		$C_L = 50 \text{ pF}$		
Enable time	$t_{ZH}$	—	21.5	38.0	1.0	40.5	ns	$C_L = 15 \text{ pF}$	$\overline{OE}$	A or B
	$t_{ZL}$	—	28.0	50.0	1.0	53.5		$C_L = 50 \text{ pF}$		
Disable time	$t_{HZ}$	—	16.5	26.0	1.0	28.0	ns	$C_L = 15 \text{ pF}$	$\overline{OE}$	A or B
	$t_{LZ}$	—	25.0	34.0	1.0	36.0		$C_L = 50 \text{ pF}$		

•  $V_{CC} = 2.5 \pm 0.2 \text{ V}$

Item	Symbol	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } 85^\circ\text{C}$		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	$t_{PLH}$	—	8.3	13.0	1.0	15.0	ns	$C_L = 15 \text{ pF}$	A or B	B or A
	$t_{PHL}$	—	11.2	15.9	1.0	18.0		$C_L = 50 \text{ pF}$		
Enable time	$t_{ZH}$	—	11.8	19.9	1.0	22.0	ns	$C_L = 15 \text{ pF}$	$\overline{OE}$	A or B
	$t_{ZL}$	—	14.1	22.7	1.0	26.0		$C_L = 50 \text{ pF}$		
Disable time	$t_{HZ}$	—	11.8	18.1	1.0	20.0	ns	$C_L = 15 \text{ pF}$	$\overline{OE}$	A or B
	$t_{LZ}$	—	17.6	23.1	1.0	25.0		$C_L = 50 \text{ pF}$		

•  $V_{CC} = 3.3 \pm 0.3 \text{ V}$

Item	Symbol	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } 85^\circ\text{C}$		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	$t_{PLH}$	—	5.9	8.4	1.0	10.0	ns	$C_L = 15 \text{ pF}$	A or B	B or A
	$t_{PHL}$	—	7.9	11.9	1.0	13.5		$C_L = 50 \text{ pF}$		
Enable time	$t_{ZH}$	—	8.2	13.2	1.0	15.5	ns	$C_L = 15 \text{ pF}$	$\overline{OE}$	A or B
	$t_{ZL}$	—	9.9	16.7	1.0	19.0		$C_L = 50 \text{ pF}$		
Disable time	$t_{HZ}$	—	9.6	16.5	1.0	19.5	ns	$C_L = 15 \text{ pF}$	$\overline{OE}$	A or B
	$t_{LZ}$	—	13.9	19.8	1.0	22.0		$C_L = 50 \text{ pF}$		

Switching Characteristics (cont)

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

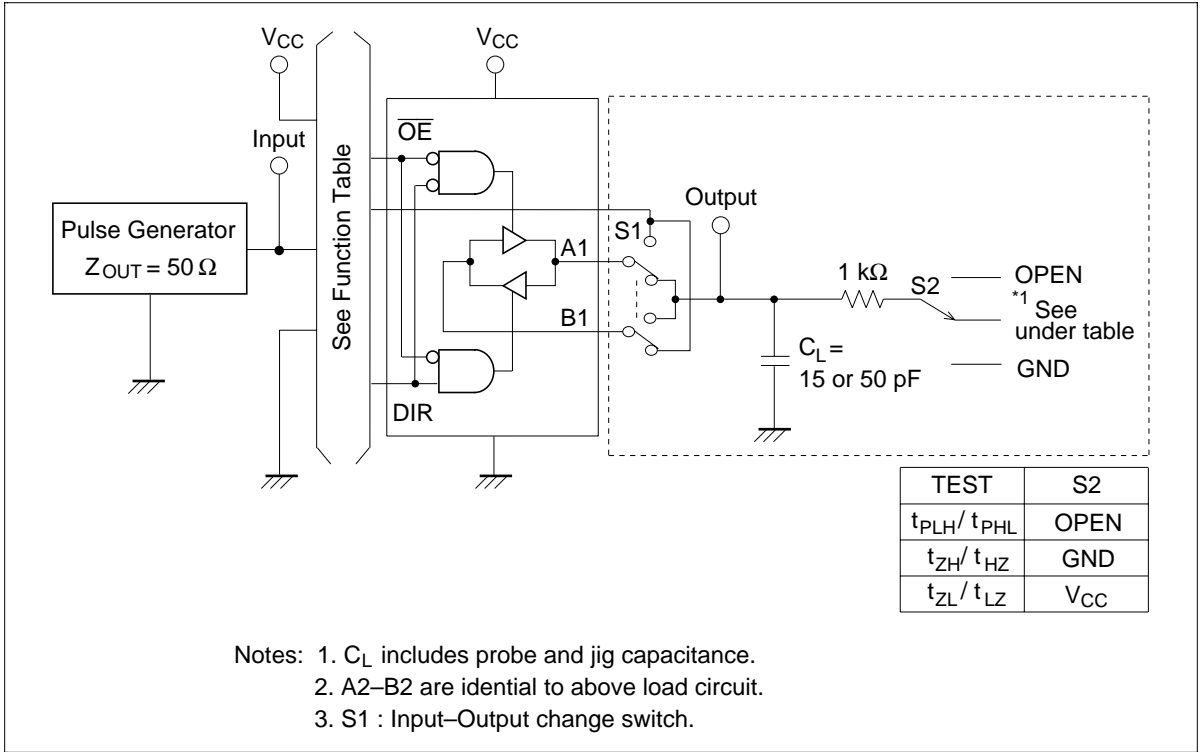
Item	Symbol	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } 85^\circ\text{C}$		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	$t_{PLH}$	—	4.3	5.5	1.0	6.5	ns	$C_L = 15 \text{ pF}$	A or B	B or A
	$t_{PHL}$	—	5.6	7.5	1.0	8.5		$C_L = 50 \text{ pF}$		
Enable time	$t_{ZH}$	—	5.7	8.5	1.0	10.0	ns	$C_L = 15 \text{ pF}$	$\overline{OE}$	A or B
	$t_{ZL}$	—	7.0	10.6	1.0	12.0		$C_L = 50 \text{ pF}$		
Disable time	$t_{HZ}$	—	7.8	12.8	1.0	14.2	ns	$C_L = 15 \text{ pF}$	$\overline{OE}$	A or B
	$t_{LZ}$	—	10.9	14.7	1.0	16.0		$C_L = 50 \text{ pF}$		

Operating Characteristics

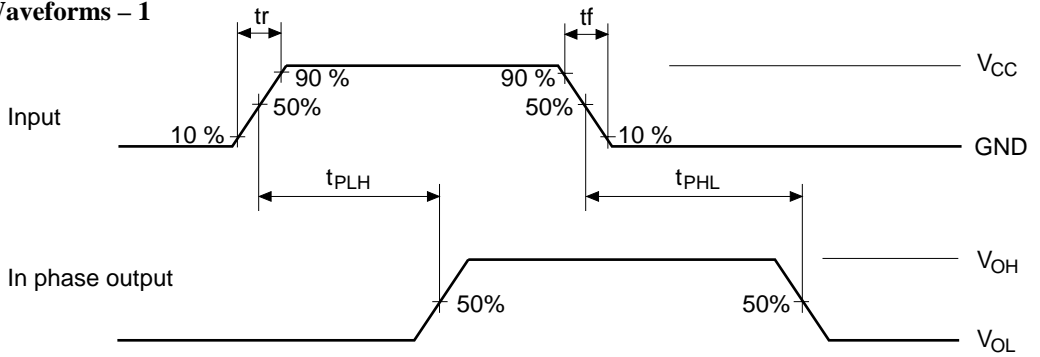
- $C_L = 50 \text{ pF}$

Item	Symbol	$V_{CC} \text{ (V)}$	$T_a = 25^\circ\text{C}$			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	$C_{PD}$	3.3	—	20.0	—	pF	$f = 10 \text{ MHz}$
		5.0	—	25.0	—		

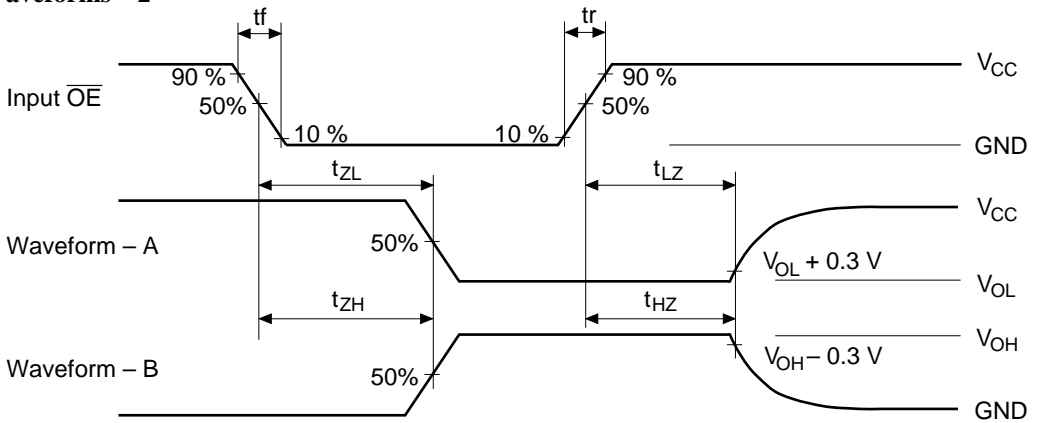
## Test Circuit



• Waveforms – 1



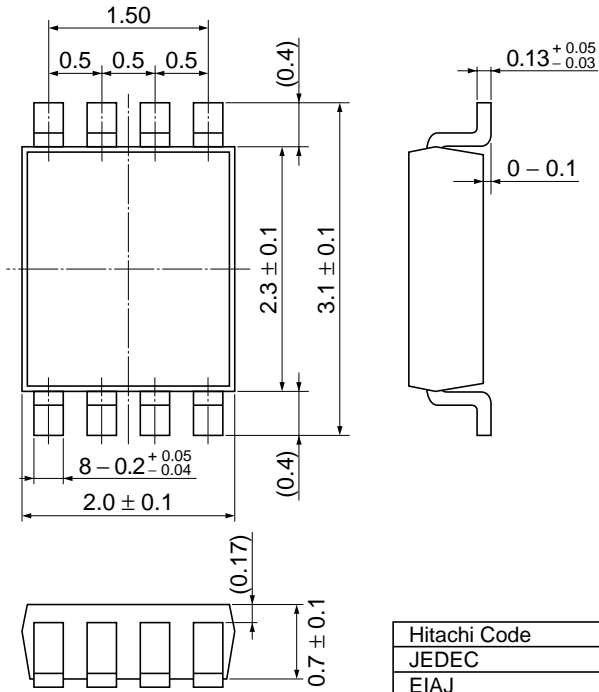
• Waveforms – 2



- Notes:
1.  $t_r \leq 3\text{ ns}$ ,  $t_f \leq 3\text{ ns}$
  2. Input waveform : PRR  $\leq 1\text{ MHz}$ , 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



Hitachi Code	US-8
JEDEC	SSOP-8
EIAJ	—
Mass (reference value)	—

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