



# HD74LV2G241A

## Dual Bus Buffer Noninverted with 3-state Output

REJ03D0103-0500Z  
(Previous ADE-205-350D (Z))  
Rev.5.00  
Sep.30.2003

### Description

The HD74LV2G241A has dual bus buffer noninverted with 3-state output in an 8 pin package. Two noninverters are included in one circuit. Each circuit can be independently controlled by the enable signal  $\overline{OE}$  or OE, which enables outputs when receiving a low or high-level signal, respectively. 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

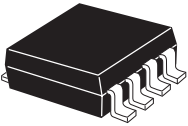
- The basic gate function is lined up as Renesas uni logic series.
- Supplied on emboss taping for high-speed automatic mounting.
- Supply voltage range : 1.65 to 5.5 V  
Operating temperature range : -40 to +85°C
- All inputs  $V_{IH}$  (Max.) = 5.5 V (@  $V_{CC}$  = 0 V to 5.5 V)  
All outputs  $V_O$  (Max.) = 5.5 V (@  $V_{CC}$  = 0 V, Output : Z)
- 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.
- Ordering Information

Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LV2G241AUSE	SSOP-8 pin	TTP-8DBV	US	E (3,000 pcs/reel)

HD74LV2G241A

Outline and Article Indication

• HD74LV2G241A



SSOP-8

Index band

Lot No.

Y M W

L 4 1

Marking

Y : Year code  
(the last digit of year)

M : Month code

W : Week code

Function Table

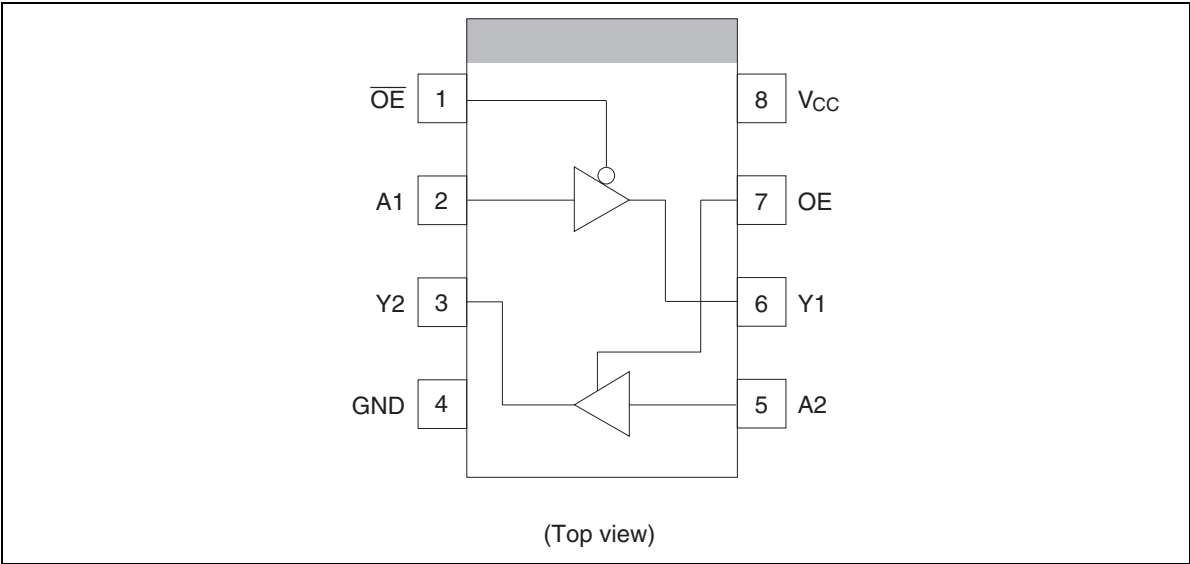
Inputs		Output Y
OE	A	
L	L	L
L	H	H
H	X	Z

Inputs		Output Y
OE	A	
H	L	L
H	H	H
L	X	Z

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

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Pin Arrangement



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Test Conditions
Supply voltage range	$V_{CC}$	-0.5 to 7.0	V	
Input voltage range <sup>*1</sup>	$V_I$	-0.5 to 7.0	V	
Output voltage range <sup>*1, 2</sup>	$V_O$	-0.5 to $V_{CC} + 0.5$ -0.5 to 7.0	V	Output : H or L $V_{CC}$ : OFF or output : Z
Input clamp current	$I_{IK}$	-20	mA	$V_I < 0$
Output clamp current	$I_{OK}$	$\pm 50$	mA	$V_O < 0$ or $V_O > V_{CC}$
Continuous output current	$I_O$	$\pm 25$	mA	$V_O = 0$ to $V_{CC}$
Continuous current through $V_{CC}$ or GND	$I_{CC}$ or $I_{GND}$	$\pm 50$	mA	
Maximum power dissipation at $T_a = 25^\circ\text{C}$ (in still air) <sup>*3</sup>	$P_T$	200	mW	
Storage temperature	$T_{stg}$	-65 to 150	$^\circ\text{C}$	

- 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.

**HD74LV2G241A****Recommended Operating Conditions**

Item	Symbol	Min	Max	Unit	Conditions
Supply voltage range	$V_{CC}$	1.65	5.5	V	
Input voltage range	$V_I$	0	5.5	V	
Output voltage range	$V_O$	0	$V_{CC}$	V	
		0	5.5		Output Z
Output current	$I_{OL}$	—	1	mA	$V_{CC} = 1.65$ to $1.95$ V
		—	2		$V_{CC} = 2.3$ to $2.7$ V
		—	6		$V_{CC} = 3.0$ to $3.6$ V
		—	12		$V_{CC} = 4.5$ to $5.5$ V
	$I_{OH}$	—	–1		$V_{CC} = 1.65$ to $1.95$ V
		—	–2		$V_{CC} = 2.3$ 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 $\Delta t / \Delta v$		0	300	ns / V	$V_{CC} = 1.65$ to $1.95$ V
		0	200		$V_{CC} = 2.3$ 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 $T_a$		–40	85	°C	

Note: Unused or floating inputs must be held high or low.

**HD74LV2G241A****Electrical Characteristic**

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

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>	Min to Max	—	—	±5	μA	V <sub>O</sub> = 5.5 V 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>IN</sub> or V <sub>O</sub> = 0 to 5.5 V
Input capacitance	C <sub>IN</sub>	3.3	—	3.0	—	pF	V <sub>IN</sub> = V <sub>CC</sub> or GND

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

**HD74LV2G241A****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	$t_{PLH}$	—	13.5	23.5	1.0	26.0	ns	$C_L = 15 \text{ pF}$	A	Y
	$t_{PHL}$	—	19.0	33.0	1.0	36.0		$C_L = 50 \text{ pF}$		
Enable time	$t_{ZH}$	—	13.7	26.5	1.0	29.0	ns	$C_L = 15 \text{ pF}$	OE, $\overline{OE}$	Y
	$t_{ZL}$	—	20.5	36.0	1.0	38.0		$C_L = 50 \text{ pF}$		
Disable time	$t_{HZ}$	—	8.3	20.0	1.0	22.5	ns	$C_L = 15 \text{ pF}$	OE, $\overline{OE}$	Y
	$t_{LZ}$	—	13.0	29.5	1.0	32.0		$C_L = 50 \text{ pF}$		

- $V_{CC} = 2.5 \pm 0.2 \text{ V}$

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	$t_{PLH}$	—	6.3	11.6	1.0	14.0	ns	$C_L = 15 \text{ pF}$	A	Y
	$t_{PHL}$	—	8.2	14.4	1.0	17.0		$C_L = 50 \text{ pF}$		
Enable time	$t_{ZH}$	—	7.4	13.0	1.0	15.5	ns	$C_L = 15 \text{ pF}$	OE, $\overline{OE}$	Y
	$t_{ZL}$	—	9.5	16.5	1.0	18.5		$C_L = 50 \text{ pF}$		
Disable time	$t_{HZ}$	—	5.7	14.7	1.0	17.0	ns	$C_L = 15 \text{ pF}$	OE, $\overline{OE}$	Y
	$t_{LZ}$	—	8.1	18.2	1.0	20.5		$C_L = 50 \text{ pF}$		

- $V_{CC} = 3.3 \pm 0.3 \text{ V}$

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	$t_{PLH}$	—	4.6	7.5	1.0	9.0	ns	$C_L = 15 \text{ pF}$	A	Y
	$t_{PHL}$	—	5.9	11.0	1.0	12.5		$C_L = 50 \text{ pF}$		
Enable time	$t_{ZH}$	—	5.1	8.0	1.0	9.5	ns	$C_L = 15 \text{ pF}$	OE, $\overline{OE}$	Y
	$t_{ZL}$	—	6.6	11.5	1.0	13.0		$C_L = 50 \text{ pF}$		
Disable time	$t_{HZ}$	—	4.4	9.7	1.0	11.5	ns	$C_L = 15 \text{ pF}$	OE, $\overline{OE}$	Y
	$t_{LZ}$	—	6.1	13.2	1.0	15.0		$C_L = 50 \text{ pF}$		

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Switching Characteristics (cont)

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

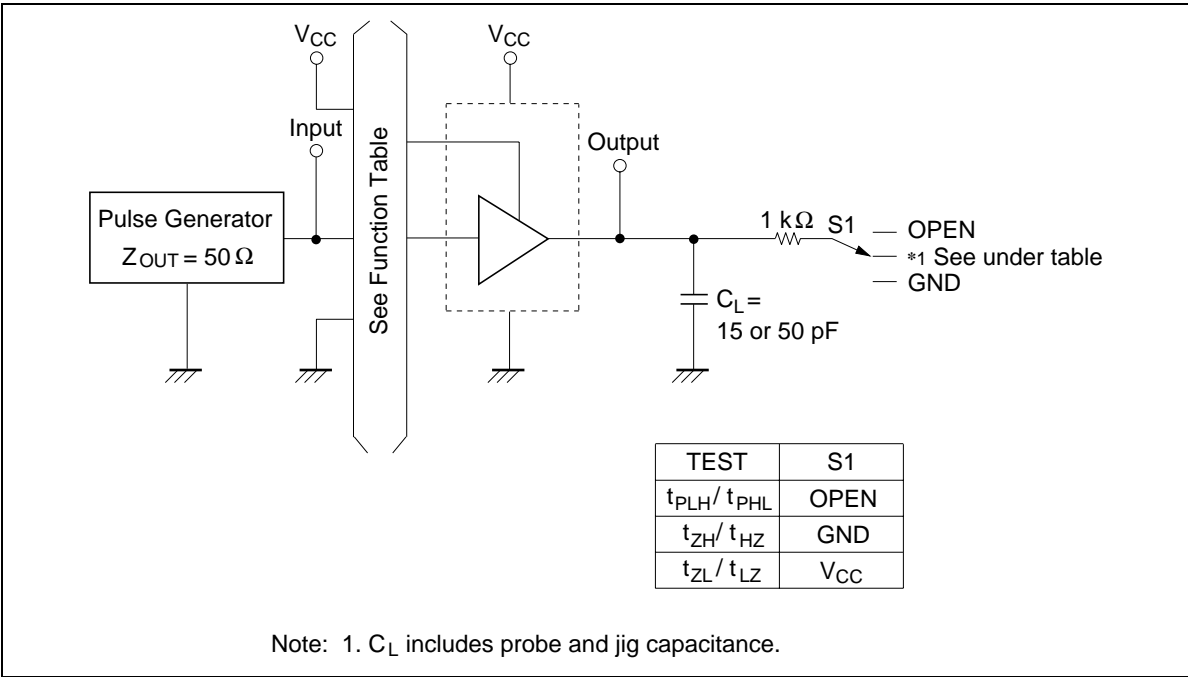
Item	Symbol	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } 85^\circ\text{C}$		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	$t_{PLH}$	—	3.4	5.5	1.0	6.5	ns	$C_L = 15 \text{ pF}$	A	Y
	$t_{PHL}$	—	4.4	7.5	1.0	8.5		$C_L = 50 \text{ pF}$		
Enable time	$t_{ZH}$	—	3.6	5.1	1.0	6.0	ns	$C_L = 15 \text{ pF}$	OE, $\overline{\text{OE}}$	Y
	$t_{ZL}$	—	4.6	7.1	1.0	8.0		$C_L = 50 \text{ pF}$		
Disable time	$t_{HZ}$	—	3.3	6.8	1.0	8.0	ns	$C_L = 15 \text{ pF}$	OE, $\overline{\text{OE}}$	Y
	$t_{LZ}$	—	4.3	8.8	1.0	10.0		$C_L = 50 \text{ pF}$		

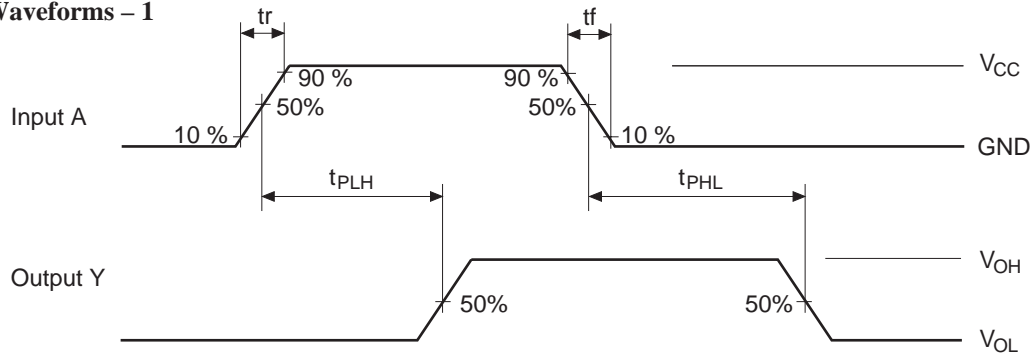
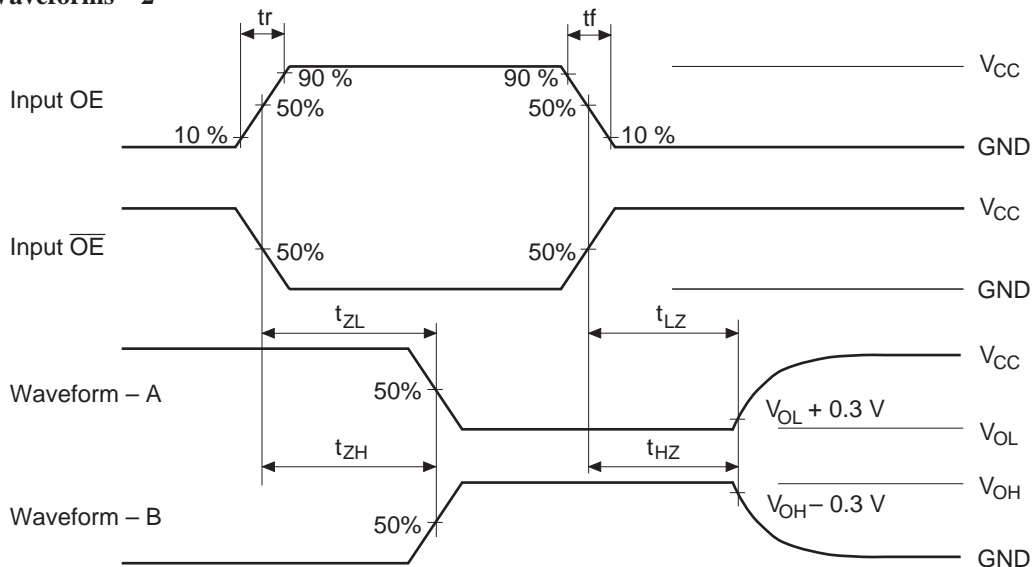
Operating Characteristics

- $C_L = 50 \text{ pF}$

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	—	10.5	—	pF	$f = 10 \text{ MHz}$
		5.0	—	11.5	—		

Test Circuit



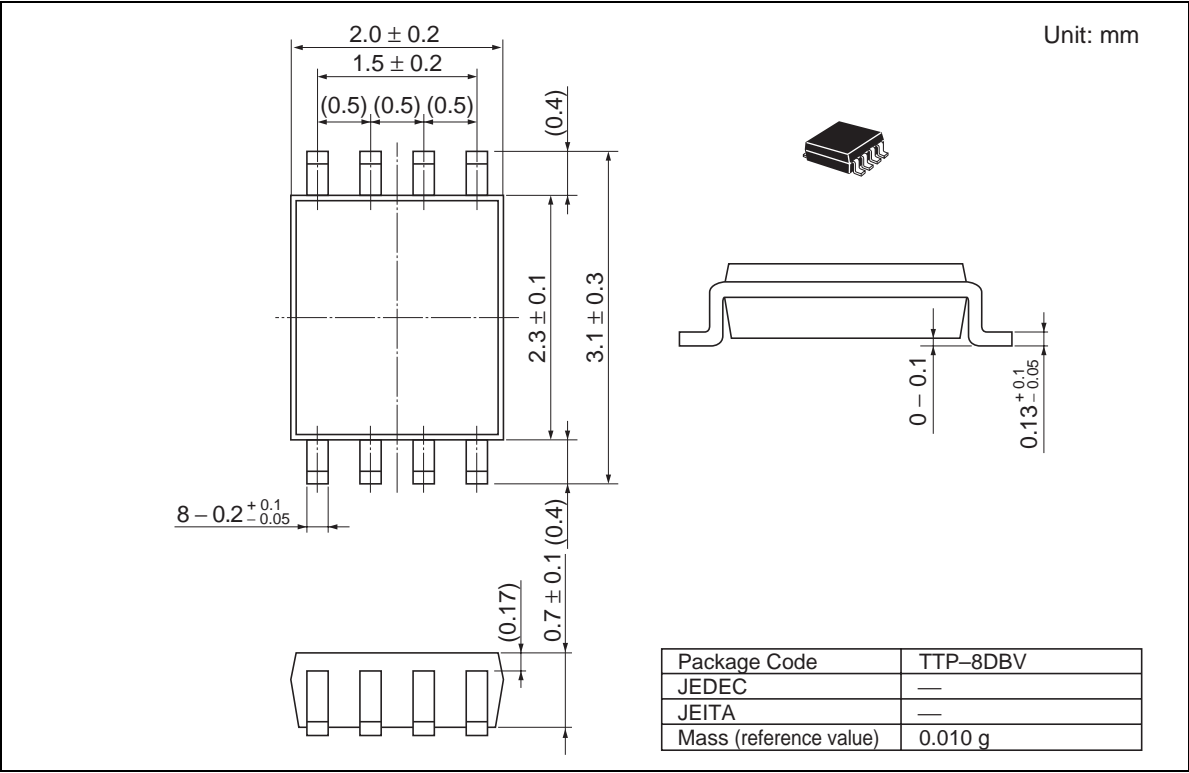
**HD74LV2G241A****• Waveforms – 1****• Waveforms – 2**

- Notes:
1. Input waveform :  $\text{PRR} \leq 1\text{ MHz}$ ,  $Z_o = 50\ \Omega$ ,  $t_r \leq 3\text{ ns}$ ,  $t_f \leq 3\text{ ns}$ .
  2. Waveform – A is for an output with internal conditions such that the output is low except when disabled by the output control.
  3. Waveform – B is for an output with internal conditions such that the output is high except when disabled by the output control.
  4. The output are measured one at a time with one transition per measurement.



HD74LV2G241A

Package Dimensions



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