

# HD74LV2GT14A

## Triple Inverters with Schmitt-trigger Inputs / CMOS Logic Level Shifter

REJ03D0141-0200Z  
(Previous ADE-205-666A (Z))  
Rev.2.00  
Oct.16.2003

### Description

The HD74LV2GT14A has triple inverters with Schmitt-trigger inputs in an 8 pin package. The input protection circuitry on this device allows over voltage tolerance on the input, allowing the device to be used as a logic-level translator from 3.0 V CMOS Logic to 5.0 V CMOS Logic or from 1.8 V CMOS logic to 3.0 V CMOS Logic while operating at the high-voltage power supply. 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.

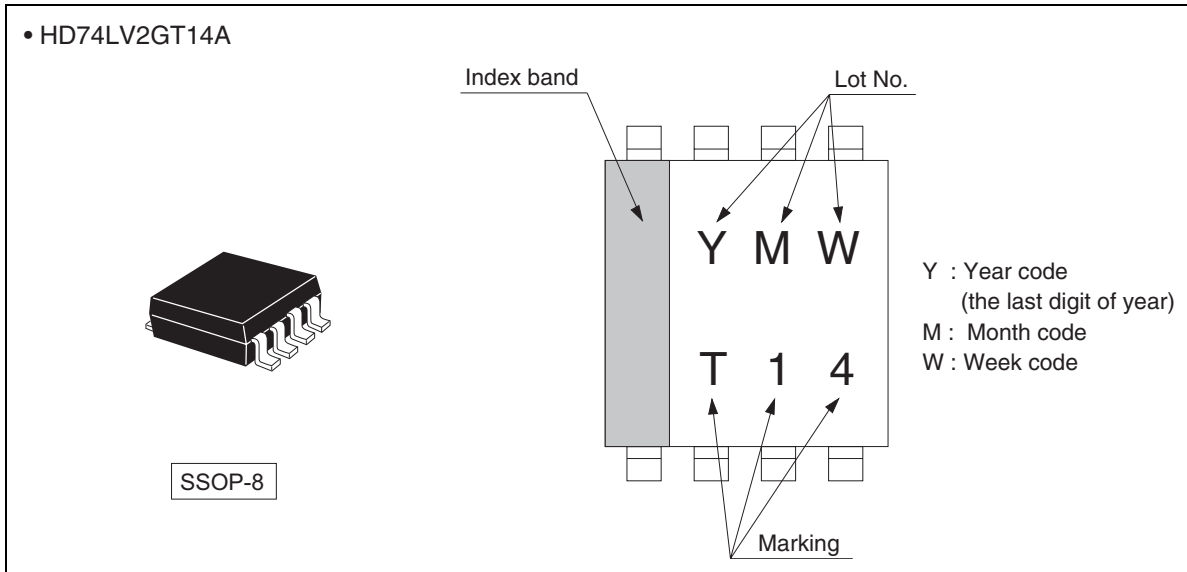
### Features

- The basic gate function is lined up as Renesas uni logic series.
- Supplied on emboss taping for high-speed automatic mounting.
- TTL compatible input level.  
Supply voltage range : 3.0 to 5.5 V  
Operating temperature range : -40 to +85°C
- Logic-level translate function  
3.0 V CMOS logic → 5.0 V CMOS logic (@V<sub>CC</sub> = 5.0 V)  
1.8 V or 2.5 V CMOS logic → 3.3 V CMOS logic (@V<sub>CC</sub> = 3.3 V)
- All inputs V<sub>IH</sub> (Max.) = 5.5 V (@V<sub>CC</sub> = 0 V to 5.5 V)  
All outputs V<sub>O</sub> (Max.) = 5.5 V (@V<sub>CC</sub> = 0 V)
- Output current ±6 mA (@V<sub>CC</sub> = 3.0 V to 3.6 V), ±12 mA (@V<sub>CC</sub> = 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)
HD74LV2GT14AUSE	SSOP-8 pin	TTP-8DBV	US	E (3,000 pcs/reel)

## HD74LV2GT14A

### Outline and Article Indication



### Function Table

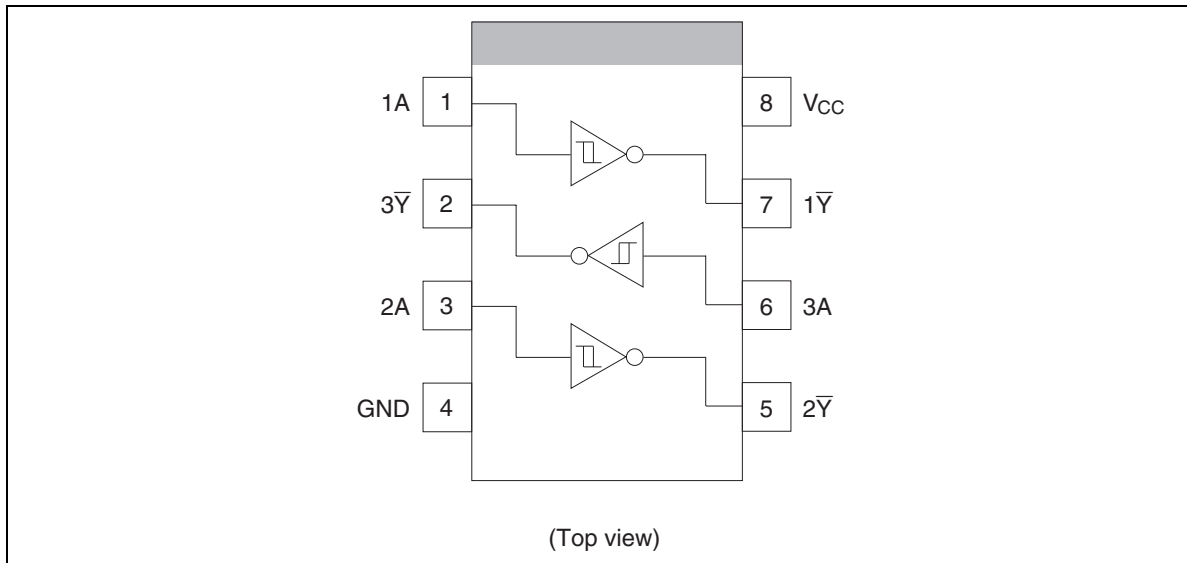
Input A	Output $\bar{Y}$
H	L
L	H

H : High level

L : Low level

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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
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 $^\circ\text{C}$ .

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### Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Conditions
Supply voltage range	$V_{CC}$	3.0	5.5	V	
Input voltage range	$V_I$	0	5.5	V	
Output voltage range	$V_O$	0	$V_{CC}$	V	
Output current	$I_{OL}$	—	6	mA	$V_{CC} = 3.0$ to $3.6$ V
		—	12		$V_{CC} = 4.5$ to $5.5$ V
	$I_{OH}$	—	-6	$V_{CC} = 3.0$ to $3.6$ V	
		—	-12	$V_{CC} = 4.5$ to $5.5$ V	
Operating free-air temperature	$T_a$	-40	85	°C	

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

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### Electrical Characteristic

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

Item	Symbol	$V_{CC}$ (V) *	Min	Typ	Max	Unit	Test condition
Input voltage	$V_T^+$	3.0	—	—	1.5	V	
		3.6	—	—	1.6		
		4.5	—	—	1.9		
		5.5	—	—	2.1		
	$V_T^-$	3.0	0.3	—	—		
		3.6	0.4	—	—		
		4.5	0.5	—	—		
		5.5	0.6	—	—		
	$\Delta V_T$	3.0	0.3	—	1.2		
		3.6	0.3	—	1.3		
		4.5	0.4	—	1.4		
		5.5	0.4	—	1.5		
Output voltage	$V_{OH}$	Min to Max	$V_{CC}-0.1$	—	—	V	$I_{OH} = -50 \mu\text{A}$
		3.0	2.48	—	—		$I_{OH} = -6 \text{ mA}$
		4.5	3.8	—	—		$I_{OH} = -12 \text{ mA}$
	$V_{OL}$	Min to Max	—	—	0.1		$I_{OL} = 50 \mu\text{A}$
		3.0	—	—	0.44		$I_{OL} = 6 \text{ mA}$
		4.5	—	—	0.55		$I_{OL} = 12 \text{ mA}$
Input current	$I_{IN}$	0 to 5.5	—	—	$\pm 1$	$\mu\text{A}$	$V_{IN} = 5.5 \text{ V}$ or GND
Quiescent supply current	$I_{CC}$	5.5	—	—	10	$\mu\text{A}$	$V_{IN} = V_{CC}$ or GND, $I_O = 0$
	$\Delta I_{CC}$	5.5	—	—	1.5	mA	One input $V_{IN} = 3.4 \text{ V}$ , other input $V_{CC}$ or GND
Output leakage current	$I_{OFF}$	0	—	—	5	$\mu\text{A}$	$V_{IN}$ or $V_O = 0$ to $5.5 \text{ V}$
Input capacitance	$C_{IN}$	5.0	—	3.0	—	pF	$V_{IN} = V_{CC}$ or GND

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

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### Switching Characteristics

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

Item	Symbol	Ta = 25°C			Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t <sub>PLH</sub>	—	7.5	12.5	1.0	14.5	ns	C <sub>L</sub> = 15 pF	A or B	$\bar{Y}$
	t <sub>PHL</sub>	—	10.0	15.0	1.0	17.0		C <sub>L</sub> = 50 pF		

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

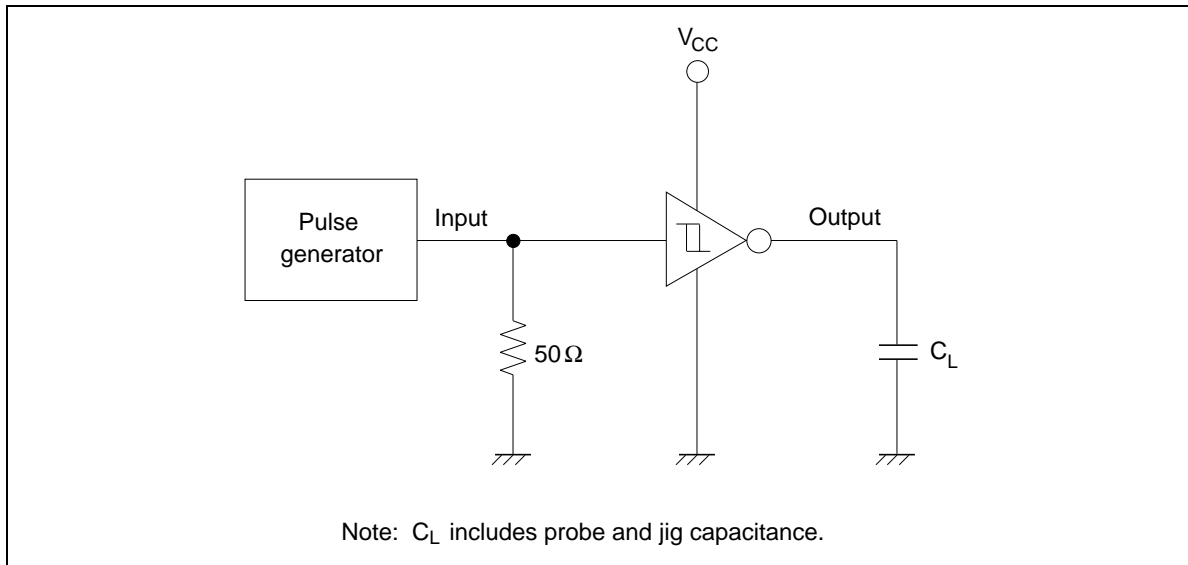
Item	Symbol	Ta = 25°C			Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t <sub>PLH</sub>	—	5.0	7.6	1.0	9.0	ns	C <sub>L</sub> = 15 pF	A	$\bar{Y}$
	t <sub>PHL</sub>	—	6.5	9.6	1.0	11.0		C <sub>L</sub> = 50 pF		

### Operating Characteristics

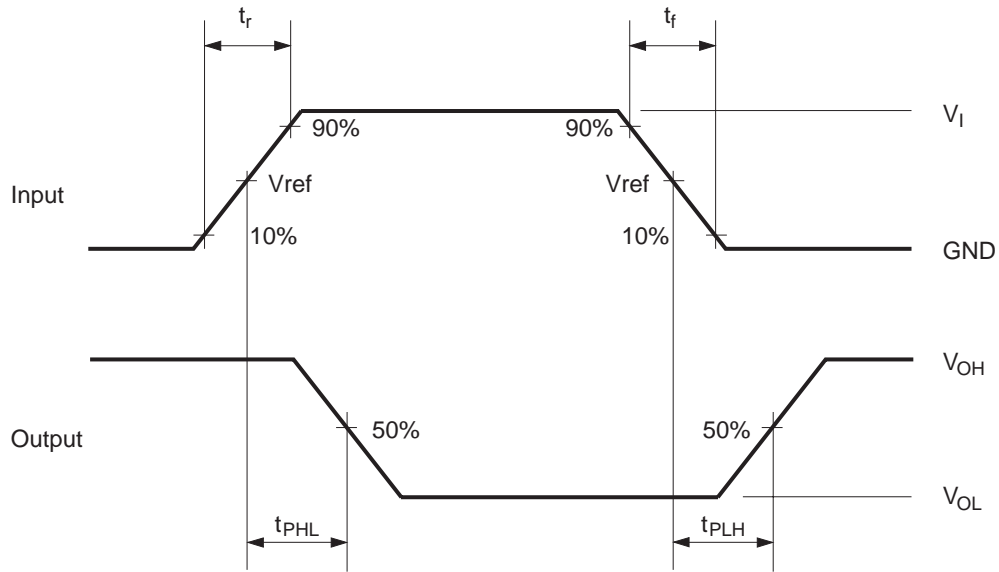
- C<sub>L</sub> = 50 pF

Item	Symbol	V <sub>CC</sub> (V)	Ta = 25°C			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	C <sub>PD</sub>	5.0	—	10.0	—	pF	f = 10 MHz

### Test Circuit



• Waveforms



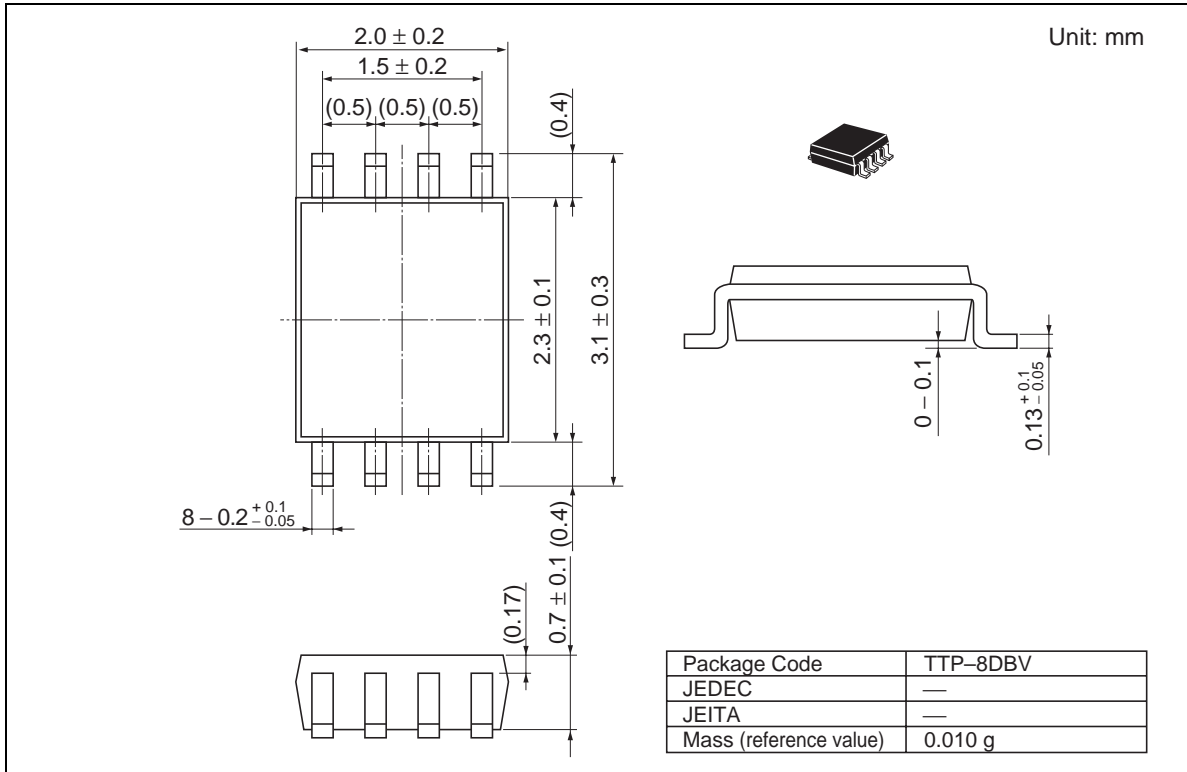
V <sub>CC</sub> (V)	INPUTS		V <sub>ref</sub>
	V <sub>I</sub>	t <sub>r</sub> / t <sub>f</sub>	
3.3±0.3	2.5 V	≤ 3.0 ns	50%
5.0±0.5	3 V	≤ 3.0 ns	1.5 V

- Notes: 1. Input waveform : PRR ≤ 1 MHz, Z<sub>o</sub> = 50 Ω.  
 2. The output are measured one at a time with one transition per measurement.



# HD74LV2GT14A

## Package Dimensions



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