

HD74LV2GT86A

2-input Exclusive-OR Gate / CMOS Logic Level Shifter

REJ03D0147-0200Z
(Previous ADE-205-669A (Z))
Rev.2.00
Oct.20.2003

Description

The HD74LV2GT86A performs the Boolean functions $Y = A \oplus B$ or $Y = \overline{A}B + A\overline{B}$ in positive logic. A common application is as a true / complement element. If one of the inputs is low, the other input will be reproduced in true form at the output. If one of the inputs is high, the signal on the other input will be reproduced inverted form at the output. 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

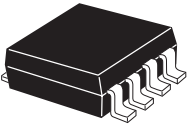
- The basic gate function is lined up as Renesas uni logic series.
- Supplied on emboss taping for high-speed automatic mounting.
- TTL compatible input level.
Supply voltage range : 3.0 to 5.5 V
Operating temperature range : -40 to +85°C
- Logic-level translate function
3.0 V CMOS logic → 5.0 V CMOS logic (@V_{CC} = 5.0 V)
1.8 V or 2.5 V CMOS logic → 3.3 V CMOS logic (@V_{CC} = 3.3 V)
- 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 ±6 mA (@V_{CC} = 3.0 V to 3.6 V), ±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)
HD74LV2GT86AUSE	SSOP-8 pin	TTP-8DBV	US	E (3,000 pcs/reel)

HD74LV2GT86A

Outline and Article Indication

• HD74LV2GT86A



SSOP-8

Index band

Lot No.

Y M W

T 8 6

Marking

Y : Year code
(the last digit of year)

M : Month code

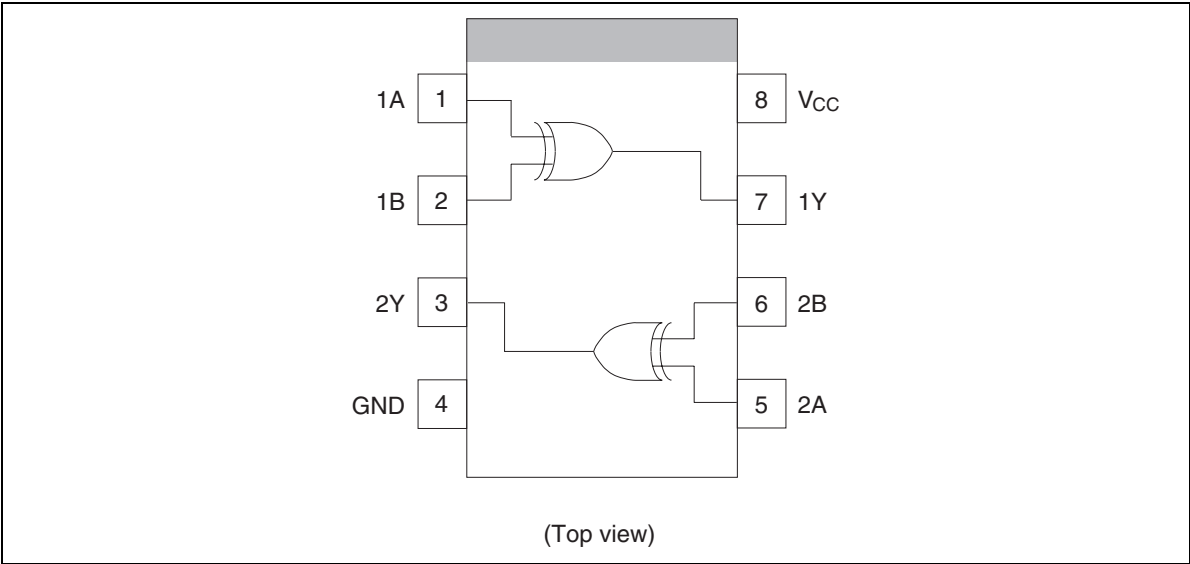
W : Week code

Function Table

Inputs		Output Y
A	B	
L	L	L
L	H	H
H	L	H
H	H	L
H: High level		
L: Low level		

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Pin Arrangement



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
Input diode current	I_{IK}	-20	mA	
Output diode current	I_{OK}	± 50	mA	
output current	I_{OUT}	± 25	mA	
V_{CC} , GND current	I_{CC} or I_{GND}	± 50	mA	
power dissipation	P_T	200	mW	
Storage temperature	T_{stg}	-65 to 150	$^{\circ}C$	

Recommended Operating Conditions

Item	Symbol	Ratings	Unit
Supply voltage	V_{CC}	3.0 to 5.5	V
Input voltage	V_{IN}	0 to 5.5	V
Output voltage	V_{OUT}	0 to V_{CC}	V
Operating temperature	T_{opr}	-40 to +85	$^{\circ}C$
Input rise / fall time	t_r , t_f	0 to 100 ($V_{CC} = 3.0$ to 3.6 V) 0 to 20 ($V_{CC} = 4.5$ to 5.5 V)	ns

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Electrical Characteristic

- $T_a = -40$ to 85°C

Item	Symbol	V _{CC} (V) *	Min	Typ	Max	Unit	Test condition
Input voltage	V _{IH}	3.0 to 3.6	1.5	—	—	V	
		4.5 to 5.5	2.0	—	—		
	V _{IL}	3.0 to 3.6	—	—	0.6		
		4.5 to 5.5	—	—	0.8		
Hysteresis voltage	V _H	3.3	—	0.10	—	V	V _T ⁺ – V _T [–]
		5.0	—	0.15	—		
Output voltage	V _{OH}	Min to Max	V _{CC} –0.1	—	—	V	I _{OH} = –50 μA
		3.0	2.48	—	—		I _{OH} = –6 mA
		4.5	3.8	—	—		I _{OH} = –12 mA
	V _{OL}	Min to Max	—	—	0.1	I _{OL} = 50 μA	
		3.0	—	—	0.44	I _{OL} = 6 mA	
		4.5	—	—	0.55	I _{OL} = 12 mA	
Input current	I _{IN}	0 to 5.5	—	—	±1	μA	V _{IN} = 5.5 V or GND
Quiescent supply current	I _{CC}	5.5	—	—	10	μA	V _{IN} = V _{CC} or GND, I _O = 0
	ΔI _{CC}	5.5	—	—	1.5	mA	One input V _{IN} = 3.4 V, other input V _{CC} or GND
Output leakage current	I _{OFF}	0	—	—	5	μA	V _O = 5.5 V
Input capacitance	C _{IN}	5.0	—	2.5	—	pF	V _{IN} = V _{CC} or GND

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

Switching Characteristics

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

Item	Symbol	$T_a = 25^\circ\text{C}$			$T_a = -40$ to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t_{PLH}	—	8.0	12.5	1.0	14.0	ns	$C_L = 15\ \text{pF}$	A or B	Y
	t_{PHL}	—	9.5	17.0	1.0	19.0		$C_L = 50\ \text{pF}$		

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

Item	Symbol	$T_a = 25^\circ\text{C}$			$T_a = -40$ to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t_{PLH}	—	5.5	7.5	1.0	8.5	ns	$C_L = 15\ \text{pF}$	A or B	Y
	t_{PHL}	—	6.5	10.3	1.0	11.5		$C_L = 50\ \text{pF}$		

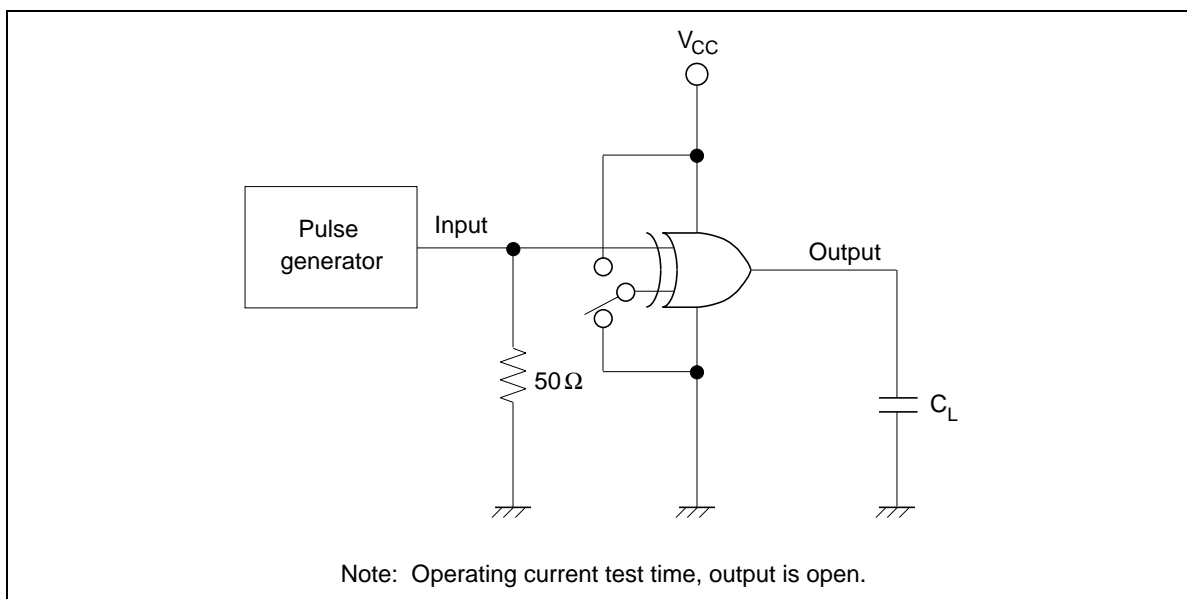
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Operating Characteristics

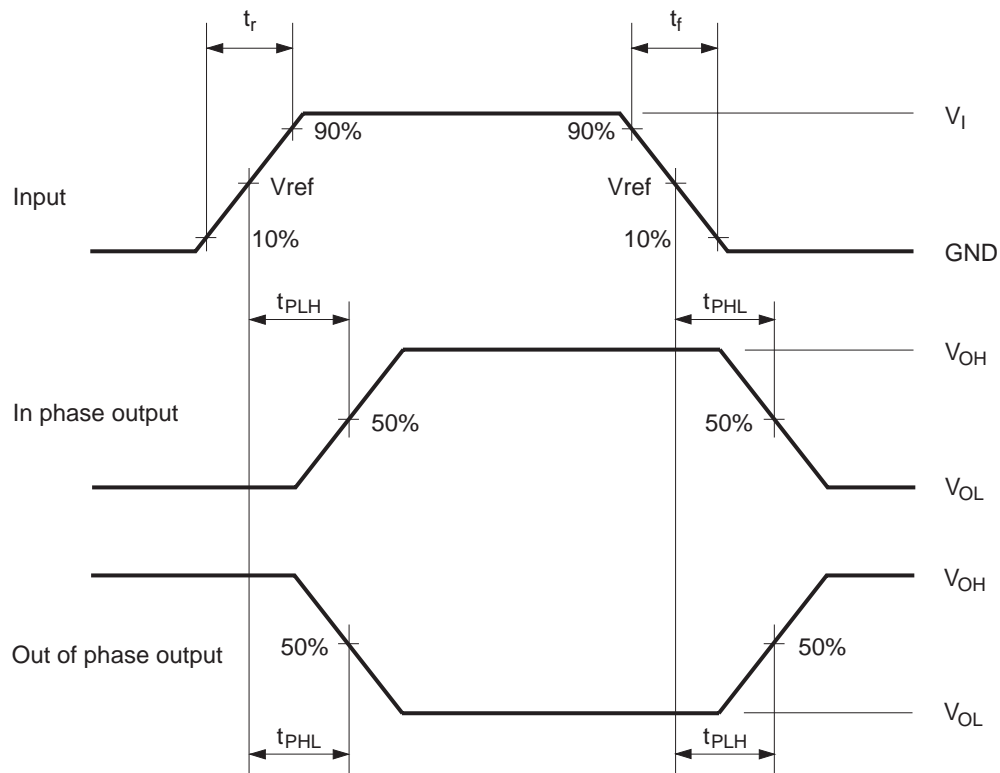
- $C_L = 50 \text{ pF}$

Item	Symbol	$V_{CC} \text{ (V)}$	$T_a = 25^\circ\text{C}$			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	C_{PD}	5.0	—	11.0	—	pF	$f = 10 \text{ MHz}$

Test Circuit



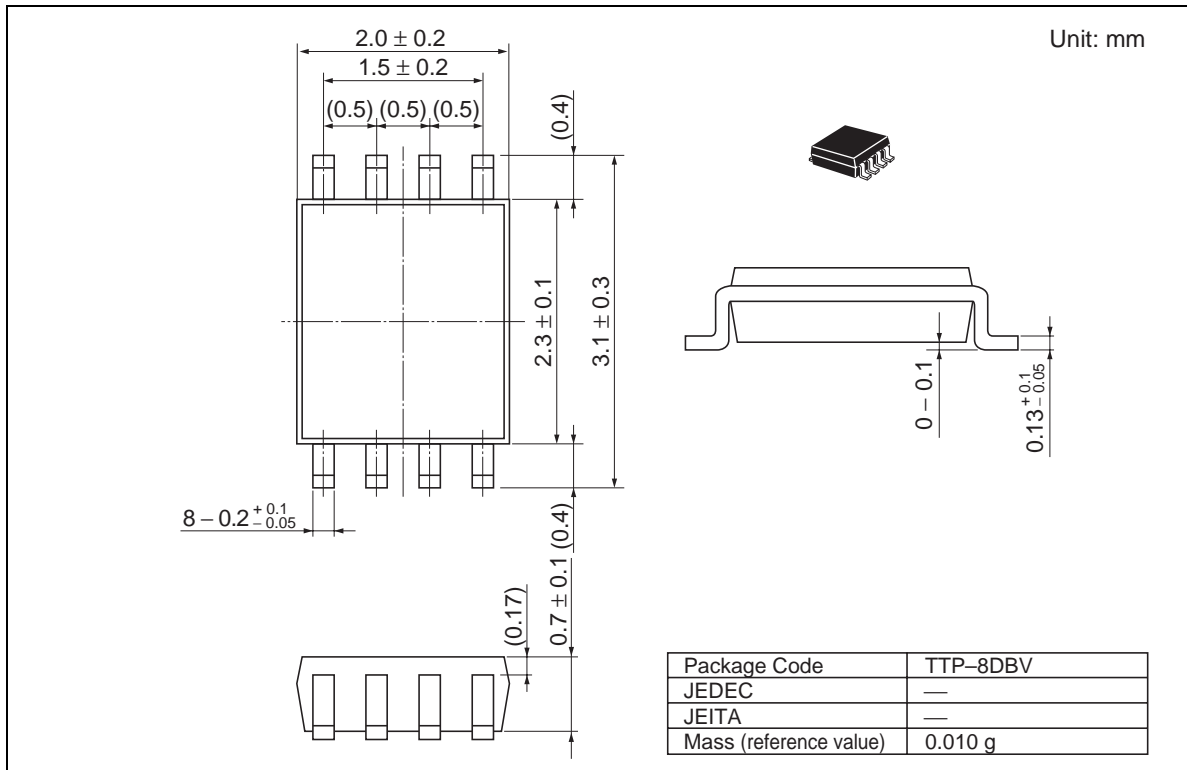
• Waveforms



V_{CC} (V)	INPUTS		V_{ref}
	V_I	t_r / t_f	
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, $Z_o = 50 \Omega$.
 2. The output are measured one at a time with one transition per measurement.

Package Dimensions



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Renesas Technology America, Inc.
450 Holger Way, San Jose, CA 95134-1368, U.S.A
Tel: <1> (408) 382-7500 Fax: <1> (408) 382-7501

Renesas Technology Europe Limited.
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, United Kingdom
Tel: <44> (1628) 585 100, Fax: <44> (1628) 585 900

Renesas Technology Europe GmbH
Dornacher Str. 3, D-85622 Feldkirchen, Germany
Tel: <49> (89) 380 70 0, Fax: <49> (89) 929 30 11

Renesas Technology Hong Kong Ltd.
7/F., North Tower, World Finance Centre, Harbour City, Canton Road, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2375-6836

Renesas Technology Taiwan Co., Ltd.
FL 10, #99, Fu-Hsing N. Rd., Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 2713-2999

Renesas Technology (Shanghai) Co., Ltd.
26/F., Ruijin Building, No.205 Maoming Road (S), Shanghai 200020, China
Tel: <86> (21) 6472-1001, Fax: <86> (21) 6415-2952

Renesas Technology Singapore Pte. Ltd.
1, Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: <65> 6213-0200, Fax: <65> 6278-8001