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 ⊕ 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.

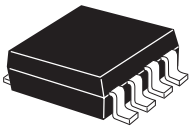
Features

- 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

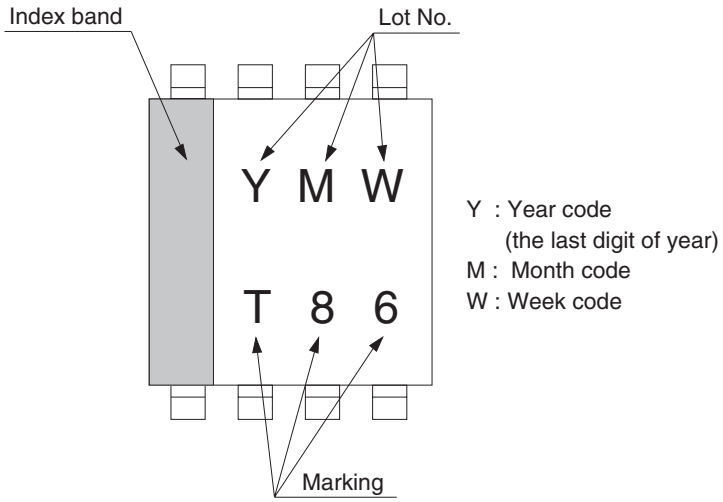
Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LV2GT86AUSE	SSOP-8 pin	TTP-8DBV	US	E (3,000 pcs/reel)

Outline and Article Indication

• HD74LV2GT86A



SSOP-8

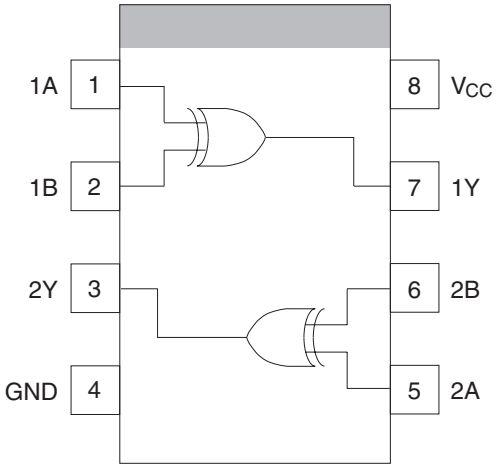


Function Table

Inputs		
A	**B**	**Output Y**
L	L	L
L	H	H
H	L	H
H	H	L

H: High level
L: Low level

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	V	Output : H or L
		–0.5 to 7.0		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	Tstg	–65 to 150	°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	°C
Input rise / fall time	t_r, t_f	0 to 100 (V_{CC} = 3.0 to 3.6 V)	ns
		0 to 20 (V_{CC} = 4.5 to 5.5 V)	

Electrical Characteristic

- Ta = –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 ± 0.3 V

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

- V_{CC} = 5.0 ±0.5 V

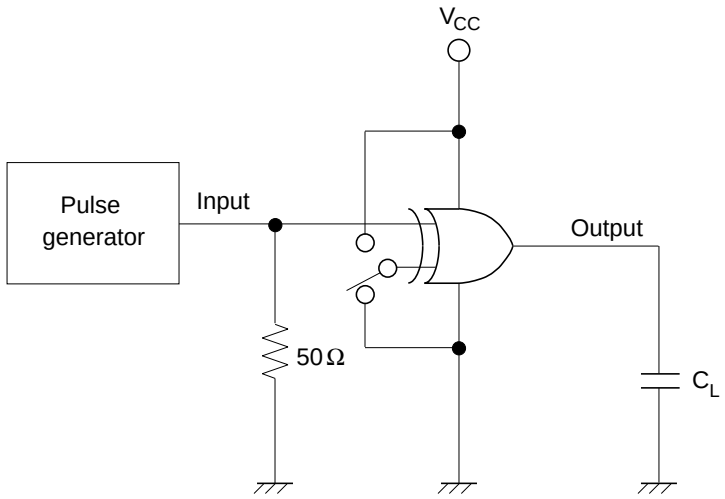
		Ta = 25°C			Ta = –40 to 85°C			Test	FROM	TO
Item	Symbol	Min	Typ	Max	Min	Max	Unit	Conditions	(Input)	(Output)
Propagation delay time	t_{PLH}	—	5.5	7.5	1.0	8.5	ns	C_L = 15 pF	A or B	Y
	t_{PHL}	—	6.5	10.3	1.0	11.5		C_L = 50 pF		

Operating Characteristics

- C_L = 50 pF

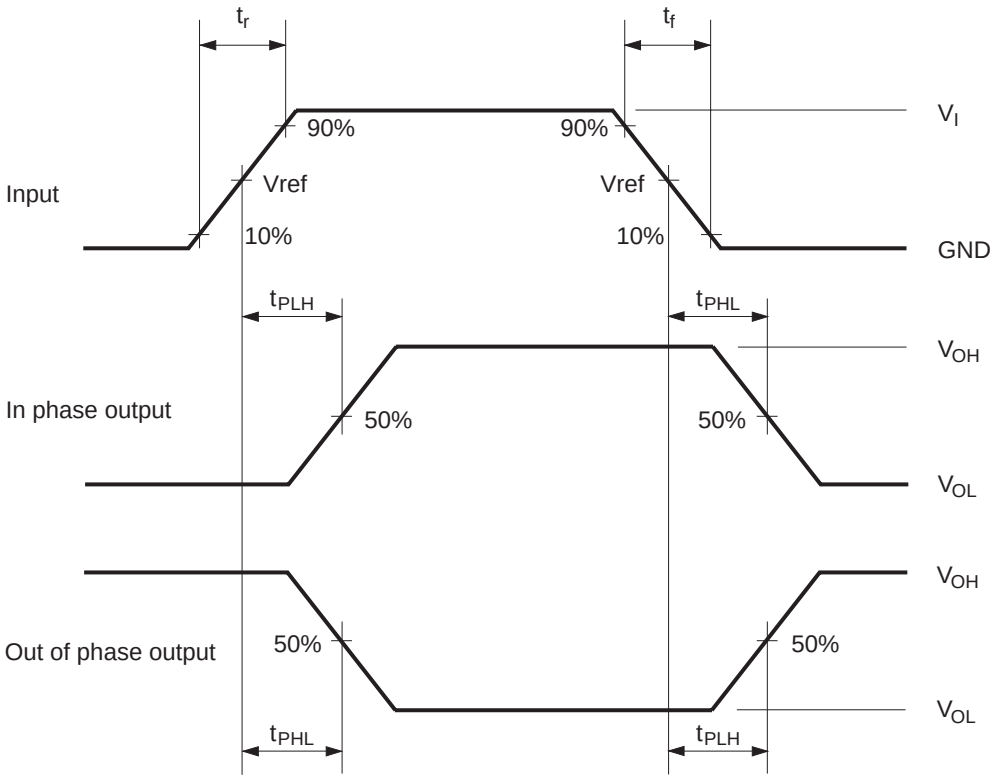
Item	Symbol	V_{CC} (V)	Ta = 25°C Min	Typ	Max	Unit	Test Conditions
Power dissipation capacitance	C_{PD}	5.0	—	11.0	—	pF	f = 10 MHz

Test Circuit



Note: Operating current test time, output is open.

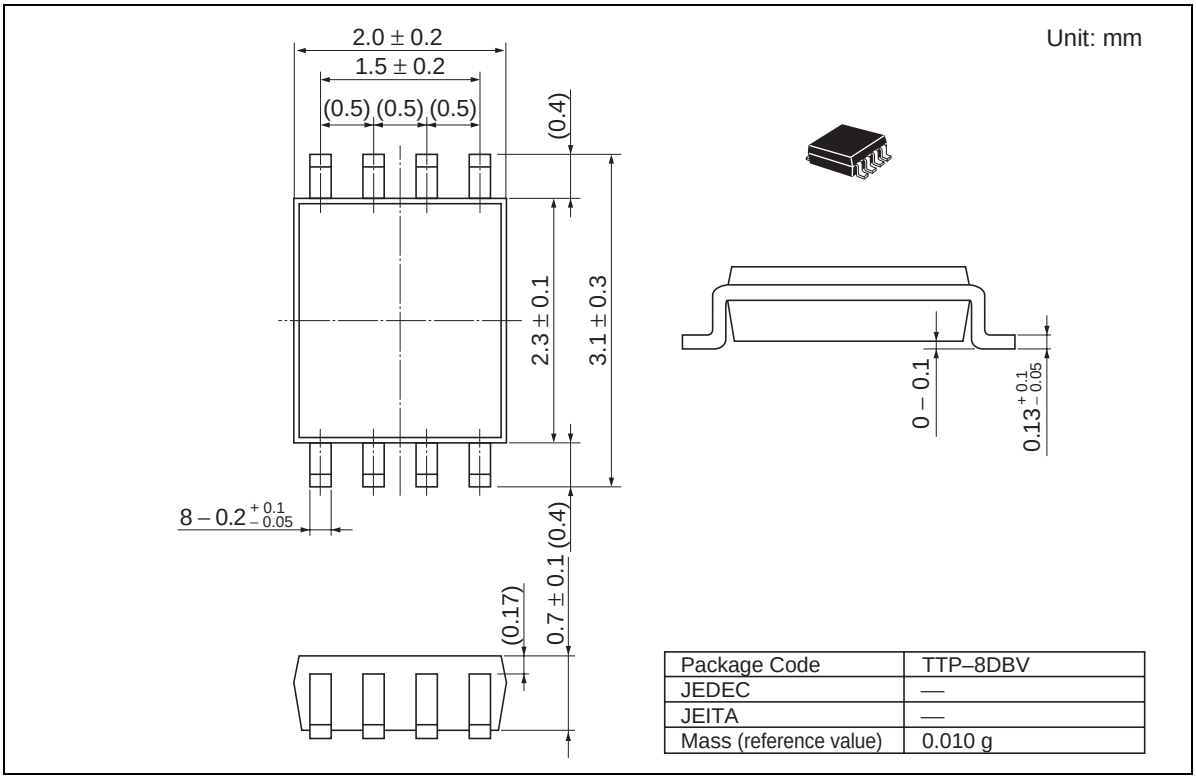
• **Waveforms**



V_{CC} (V)	INPUTS		Vref
	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, Zo = 50 Ω.
2. The output are measured one at a time with one transition per measurement.

Package Dimensions



Package Code	TTP–8DBV
JEDEC	—
JEITA	—
Mass (reference value)	0.010 g

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