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April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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HD74ALVC2G86

Dual 2-input Exclusive-OR Gates

REJ03D0170-0300Z
(Previous ADE-205-614B (Z))
Rev.3.00
Dec.18.2003

Description

The HD74ALVC2G86 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. 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.

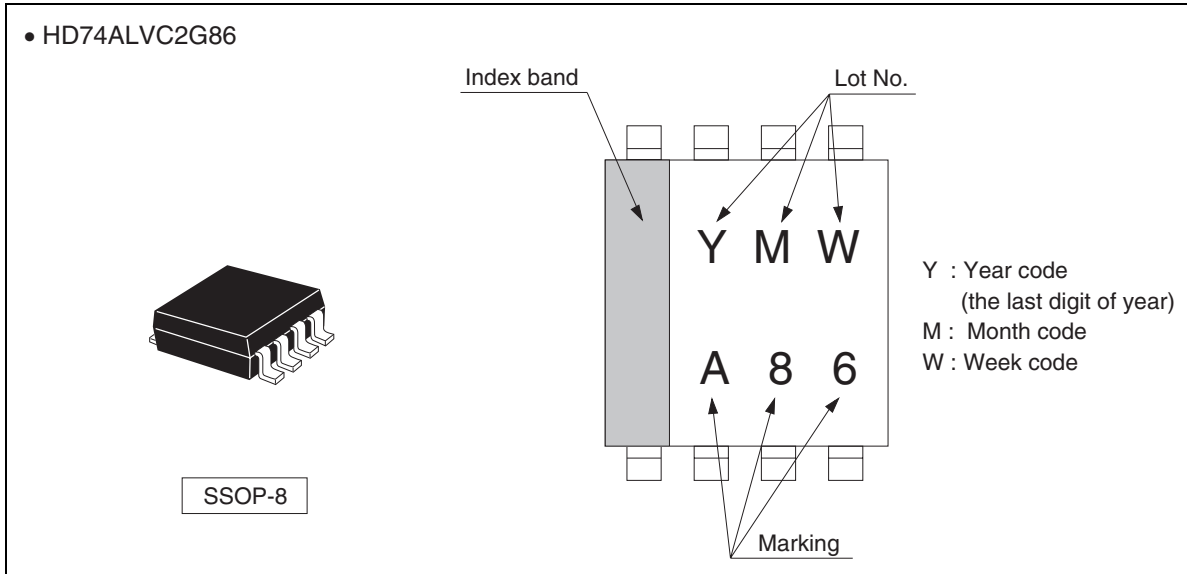
Features

- The basic gate function is lined up as Renesas uni logic series.
- Supplied on emboss taping for high-speed automatic mounting.
- Supply voltage range : 1.2 to 3.6 V
Operating temperature range: -40 to +85°C
- All inputs V_{IH} (Max.) = 3.6 V (@ $V_{CC} = 0$ V to 3.6 V)
All outputs V_O (Max.) = 3.6 V (@ $V_{CC} = 0$ V)
- Output current ± 2 mA (@ $V_{CC} = 1.2$ V)
 ± 4 mA (@ $V_{CC} = 1.4$ V to 1.6 V)
 ± 6 mA (@ $V_{CC} = 1.65$ V to 1.95 V)
 ± 18 mA (@ $V_{CC} = 2.3$ V to 2.7 V)
 ± 24 mA (@ $V_{CC} = 3.0$ V to 3.6 V)

- Ordering Information

Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74ALVC2G86USE	SSOP-8 pin	TTP-8DBV	US	E (3,000 pcs/reel)

Outline and Article Indication



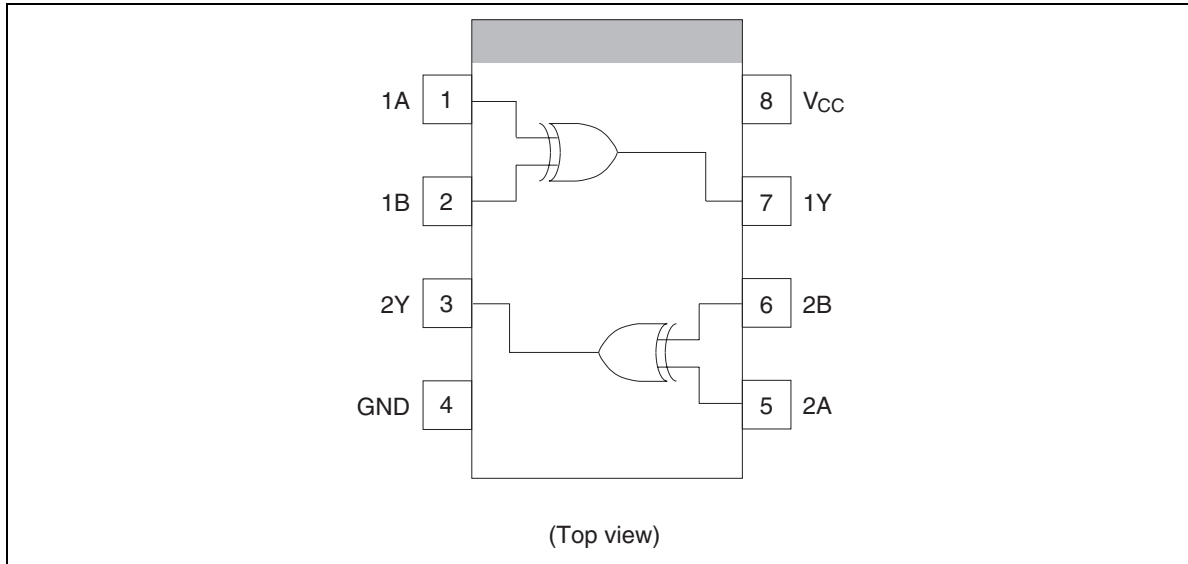
Function Table

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



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Conditions
Supply voltage range	V_{CC}	-0.5 to 4.6	V	
Input voltage range ^{*1}	V_I	-0.5 to 4.6	V	
Output voltage range ^{*1,2}	V_O	-0.5 to $V_{CC}+0.5$ -0.5 to 4.6	V	Output : H or L V_{CC} : OFF
Input clamp current	I_{IK}	-50	mA	$V_I < 0$
Output clamp current	I_{OK}	± 50	mA	$V_O < 0$ or $V_O > V_{CC}$
Continuous output current	I_O	± 50	mA	$V_O = 0$ to V_{CC}
Continuous current through V_{CC} or GND	I_{CC} or I_{GND}	± 100	mA	
Maximum power dissipation at $T_a = 25^\circ\text{C}$ (in still air) ^{*3}	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 4.6 V maximum.
 3. The maximum package power dissipation was calculated using a junction temperature of 150°C.

HD74ALVC2G86

Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Conditions
Supply voltage range	V_{CC}	1.2	3.6	V	
Input voltage range	V_I	0	3.6	V	
Output voltage range	V_O	0	V_{CC}	V	
Output current	I_{OH}	—	-2	mA	$V_{CC} = 1.2\text{ V}$
		—	-4		$V_{CC} = 1.4\text{ V}$
		—	-6		$V_{CC} = 1.65\text{ V}$
		—	-18		$V_{CC} = 2.3\text{ V}$
		—	-24		$V_{CC} = 3.0\text{ V}$
	I_{OL}	—	2	$V_{CC} = 1.2\text{ V}$	
		—	4	$V_{CC} = 1.4\text{ V}$	
		—	6	$V_{CC} = 1.65\text{ V}$	
		—	18	$V_{CC} = 2.3\text{ V}$	
		—	24	$V_{CC} = 3.0\text{ V}$	
Input transition rise or fall rate	$\Delta t / \Delta v$	0	20	ns / V	$V_{CC} = 1.2\text{ to }2.7\text{ V}$
		0	10		$V_{CC} = 3.3\pm 0.3\text{ V}$
Operating free-air temperature	T_a	-40	85	°C	

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

Electrical Characteristics

(Ta = -40 to 85°C)

Item	Symbol	V _{CC} (V)*	Min	Typ	Max	Unit	Test conditions		
Input voltage	V _{IH}	1.2	V _{CC} ×0.75	—	—	V			
		1.4 to 1.6	V _{CC} ×0.7	—	—				
		1.65 to 1.95	V _{CC} ×0.7	—	—				
		2.3 to 2.7	1.7	—	—				
		3.0 to 3.6	2.0	—	—				
	V _{IL}	1.2	—	—	V _{CC} ×0.25				
		1.4 to 1.6	—	—	V _{CC} ×0.3				
		1.65 to 1.95	—	—	V _{CC} ×0.3				
		2.3 to 2.7	—	—	0.7				
		3.0 to 3.6	—	—	0.8				
Output voltage	V _{OH}	Min to Max	V _{CC} -0.2	—	—	V	I _{OH} = -100 μA		
		1.2	0.9	—	—		I _{OH} = -2 mA		
		1.4	1.1	—	—		I _{OH} = -4 mA		
		1.65	1.2	—	—		I _{OH} = -6 mA		
		2.3	1.7	—	—		I _{OH} = -18 mA		
		3.0	2.2	—	—		I _{OH} = -24 mA		
	V _{OL}	Min to Max	—	—	0.2	I _{OL} = 100 μA			
		1.2	—	—	0.3	I _{OL} = 2 mA			
		1.4	—	—	0.3	I _{OL} = 4 mA			
		1.65	—	—	0.3	I _{OL} = 6 mA			
		2.3	—	—	0.55	I _{OL} = 18 mA			
		3.0	—	—	0.55	I _{OL} = 24 mA			
		Input current	I _{IN}	3.6	—	—	±5	μA	V _{IN} = 3.6 V or GND
		Quiescent supply current	I _{CC}	3.6	—	—	10	μA	V _{IN} = V _{CC} or GND, I _O = 0
Output leakage current	I _{OFF}	0	—	—	5	μA	V _{IN} or V _O = 0 to 3.6 V		
Input capacitance	C _{IN}	3.3	—	4.5	—	pF	V _{IN} = V _{CC} or GND		

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

HD74ALVC2G86

Switching Characteristics

($T_a = -40$ to 85°C)

$V_{CC} = 1.2$ V

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time	t_{PLH} t_{PHL}	—	7.5	—	ns	$C_L = 15$ pF	A or B	Y

$V_{CC} = 1.5 \pm 0.1$ V

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time	t_{PLH} t_{PHL}	2.0	—	8.0	ns	$C_L = 15$ pF	A or B	Y

$V_{CC} = 1.8 \pm 0.15$ V

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time	t_{PLH} t_{PHL}	1.5	—	6.0	ns	$C_L = 30$ pF	A or B	Y

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

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time	t_{PLH} t_{PHL}	1.0	—	4.0	ns	$C_L = 30$ pF	A or B	Y

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

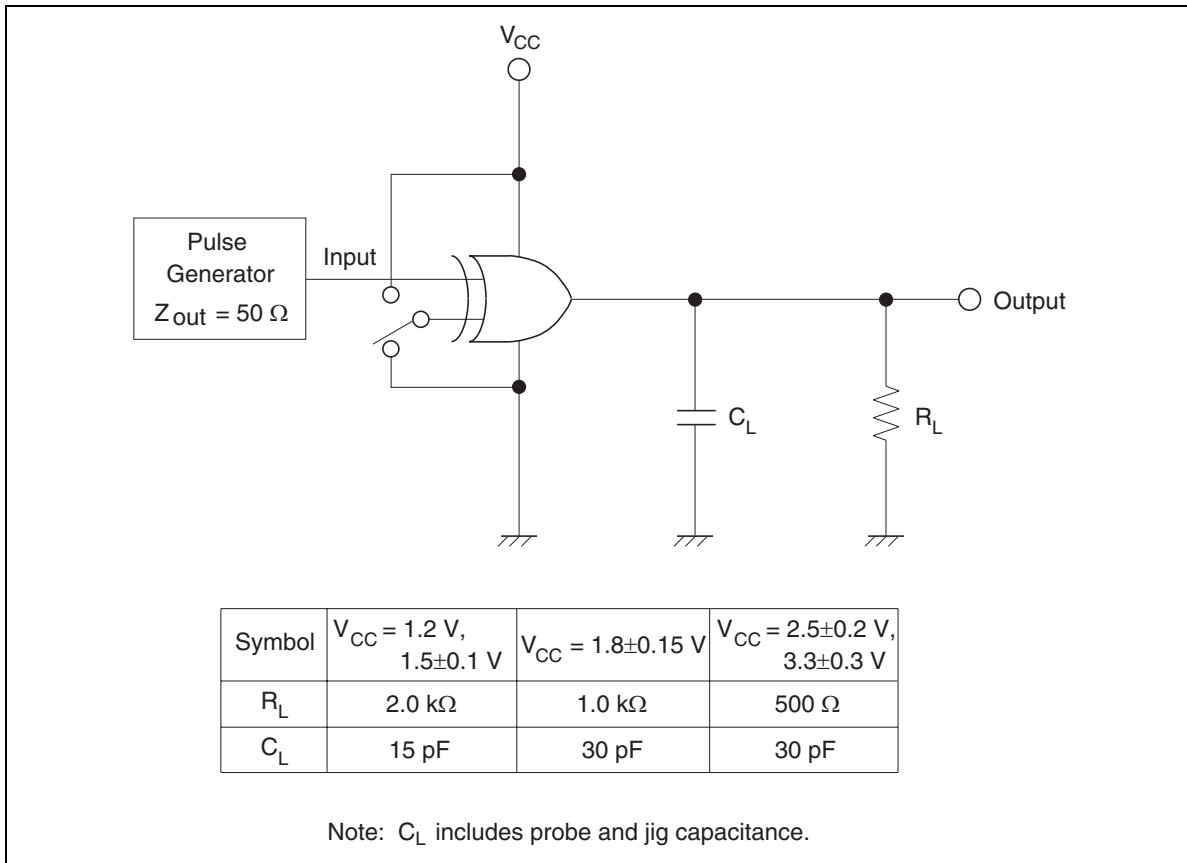
Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time	t_{PLH} t_{PHL}	1.0	—	3.0	ns	$C_L = 30$ pF	A or B	Y

Operating Characteristics

(Ta = 25°C)

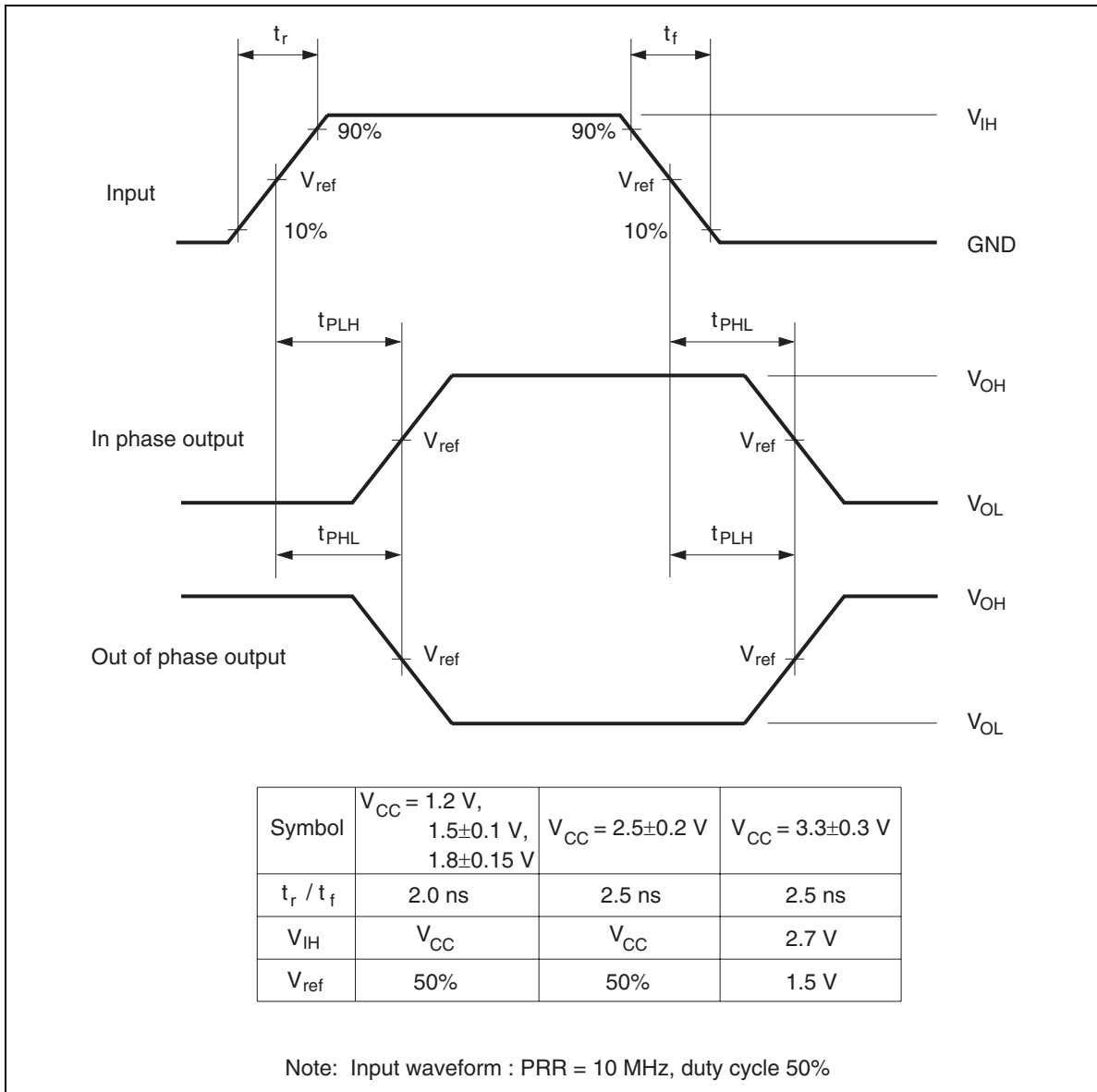
Item	Symbol	V _{CC} (V)	Min	Typ	Max	Unit	Test conditions
Power dissipation capacitance	C _{PD}	1.5	—	10.5	—	pF	f = 10 MHz
		1.8	—	10.5	—		
		2.5	—	10.5	—		
		3.3	—	11.5	—		

Test Circuit

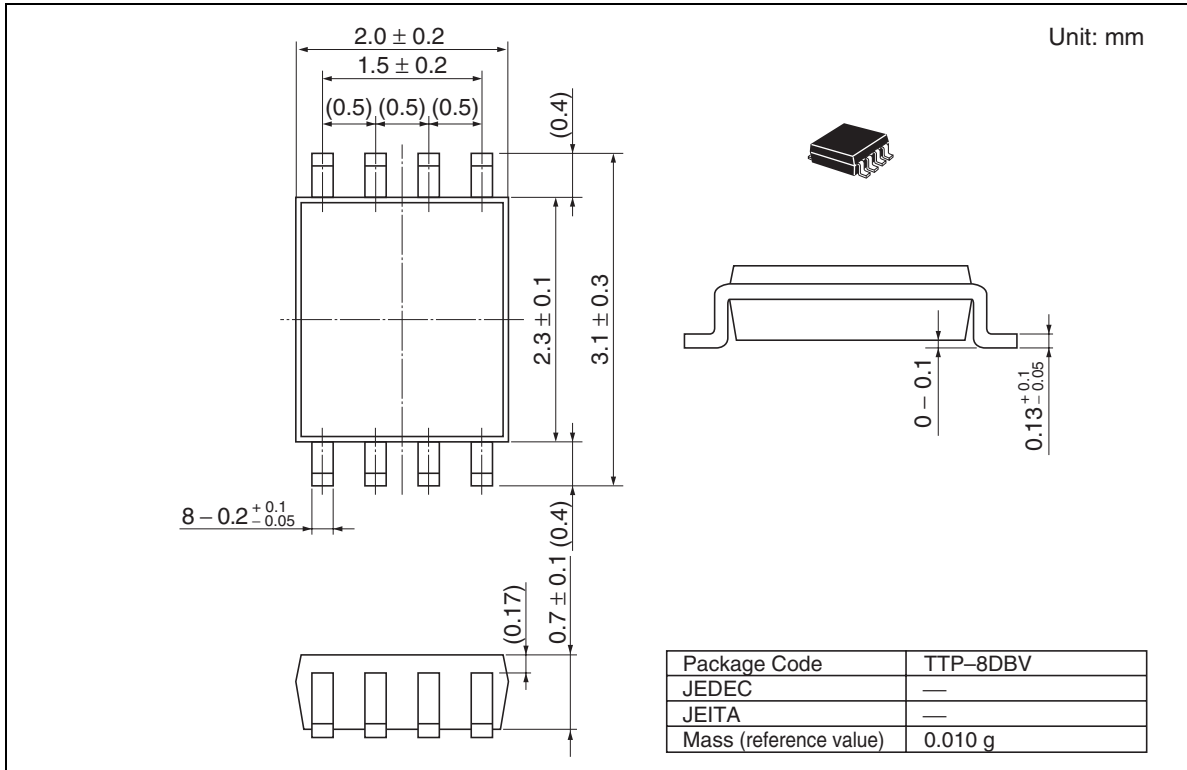


HD74ALVC2G86

Waveforms



Package Dimensions



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