

HD74LV1GW57A

Configurable Multiple-Function Gate

HITACHI

ADE-205-717 (Z)

Rev.0
Feb. 2003

Description

The HD74LV1GW57A has configurable multiple-function gate in a 6 pin package. The Output state is determined by eight patterns of 3-bit input. The user can choose the logic functions AND, NAND, NOR, EX-NOR. 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.

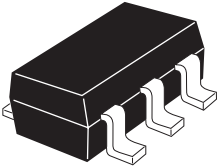
Features

- The basic gate function is lined up as hitachi 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 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

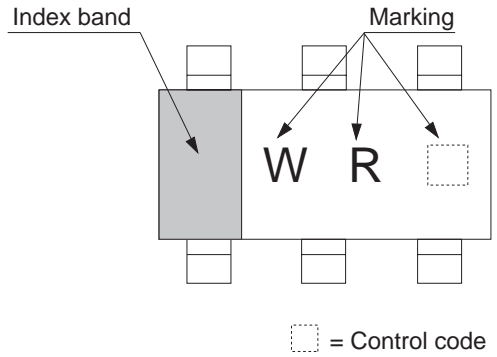
Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LV1GW57ACME	CMPAK-6 pin	CMPAK-6V(O)	CM	E (3,000 pcs / Reel)

Outline and Article Indication

• HD74LV1GW57A



CMPAK-6



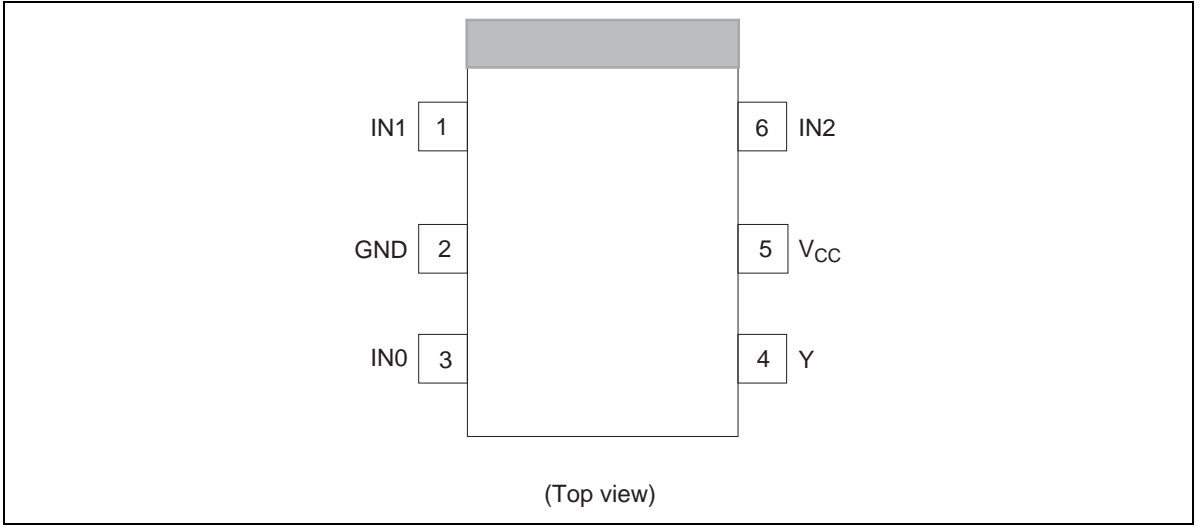
Function Table

Inputs			Output
IN2	IN1	IN0	Y
L	L	L	H
L	L	H	L
L	H	L	H
L	H	H	L
H	L	L	L
H	L	H	L
H	H	L	H
H	H	H	H

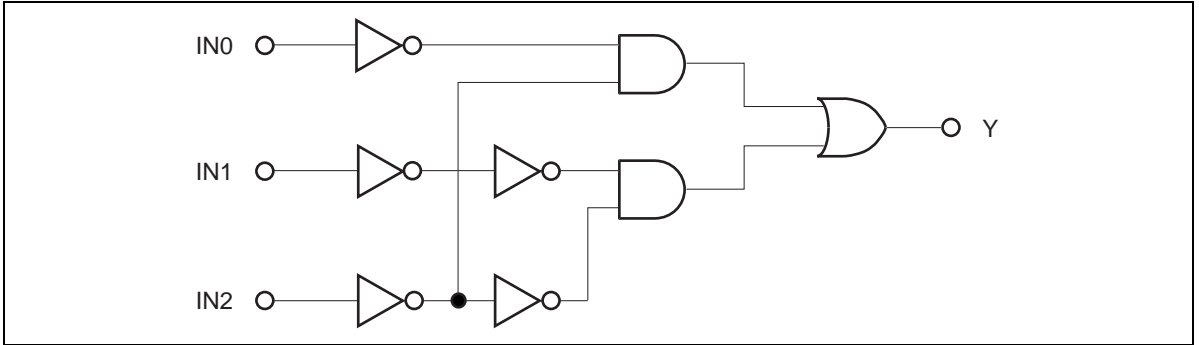
H : High level

L : Low level

Pin Arrangement



Logic Diagram



Function Selection Table

Logic Function	Figure No.
2-input AND	1
2-input AND with both inputs inverted	4
2-input NAND with one input inverted	2, 3
2-input OR with one input inverted	2, 3
2-input NOR	4
2-input NOR with both inputs inverted	1
2-input EX-NOR	5

Logic Configurations

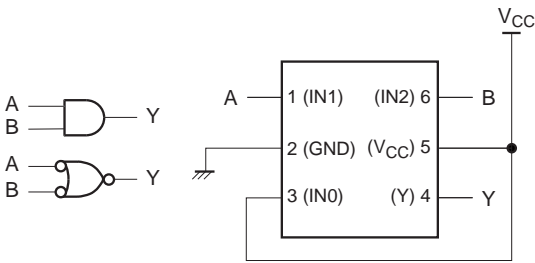


Figure 1. 2-inputs AND Gate

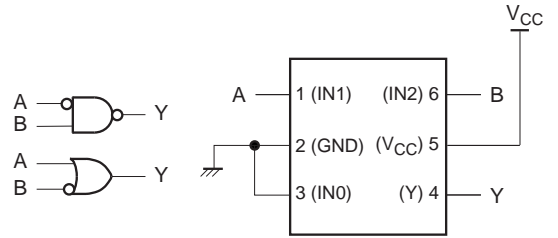


Figure 2. 2-inputs NAND Gate with A input inverted

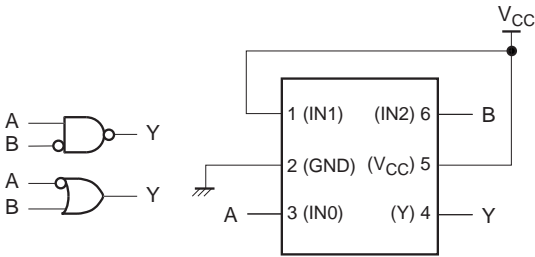


Figure 3. 2-inputs NAND Gate with B input inverted

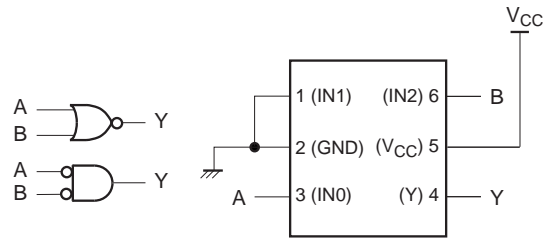


Figure 4. 2-inputs NOR Gate

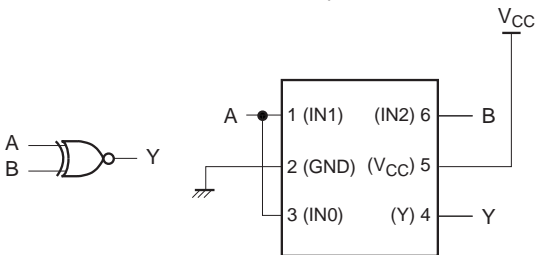


Figure 5. 2-inputs EX-NOR Gate

Absolute Maximum Ratings

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

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.

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	
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.

Electrical Characteristic

- $T_a = -40$ to 85°C

Item	Symbol	V_{CC} (V) *	Min	Typ	Max	Unit	Test condition	
Threshold voltage	V_{T^+}	1.65 to 1.95	—	—	$V_{CC} \times 0.75$	V		
		2.5	—	—	1.75			
		3.3	—	—	2.31			
		5.0	—	—	3.50			
	V_{T^-}	1.65 to 1.95	$V_{CC} \times 0.25$	—	—			
		2.5	0.75	—	—			
		3.3	0.99	—	—			
		5.0	1.5	—	—			
	ΔV_T	1.65 to 1.95	0.1	—	—	$V_{CC} \times 0.4$		
		2.5	0.25	—	—	1.0		
		3.3	0.33	—	—	1.32		
		5.0	0.5	—	—	2.0		
Output voltage	V_{OH}	Min to Max	$V_{CC} - 0.1$	—	—	V	$I_{OH} = -50 \mu\text{A}$	
		1.65	1.4	—	—		$I_{OH} = -1 \text{ mA}$	
		2.3	2.0	—	—		$I_{OH} = -2 \text{ mA}$	
		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		$I_{OL} = 50 \mu\text{A}$	
		1.65	—	—	0.3		$I_{OL} = 1 \text{ mA}$	
		2.3	—	—	0.4		$I_{OL} = 2 \text{ mA}$	
		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	—	—	± 1	μA	$V_{IN} = 5.5 \text{ V or GND}$	
Quiescent supply current	I_{CC}	5.5	—	—	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 5.5 V	
Input capacitance	C_{IN}	3.3	—	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.

Switching Characteristics

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

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 _{PLH}	—	15.8	29.4	1.0	33.0	ns	C _L = 15 pF	IN	Y
	t _{PHL}	—	22.6	40.9	1.0	45.0				

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

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 _{PLH}	—	9.4	17.6	1.0	21.0	ns	C _L = 15 pF	IN	Y
	t _{PHL}	—	12.6	22.6	1.0	26.5				

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

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 _{PLH}	—	7.0	11.0	1.0	13.0	ns	C _L = 15 pF	IN	Y
	t _{PHL}	—	9.5	14.5	1.0	16.5				

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

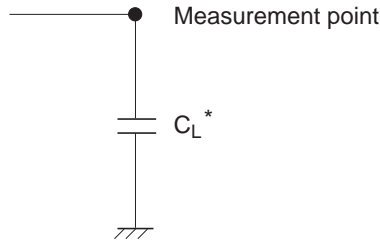
Item	Symbol	Ta = 25°C			Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t _{PLH}	—	4.8	6.8	1.0	8.0	ns	C _L = 15 pF	IN	Y
	t _{PHL}	—	6.3	8.8	1.0	10.0				

Operating Characteristics

- C_L = 50 pF

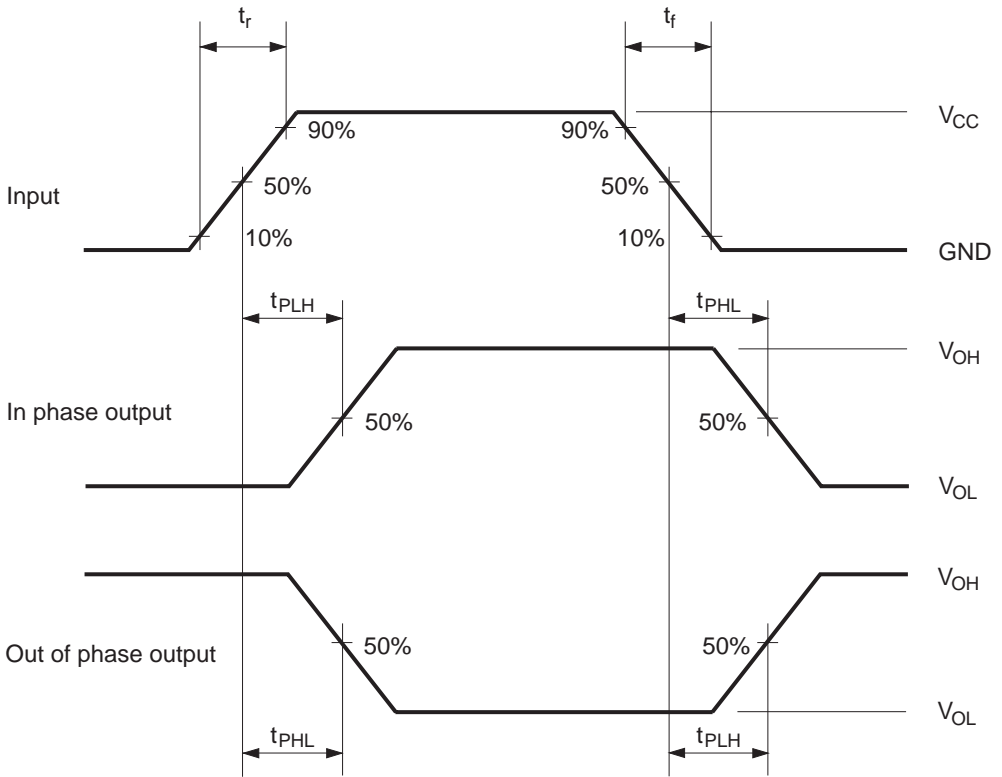
Item	Symbol	V _{CC} (V)	Ta = 25°C			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	C _{PD}	3.3	—	8.5	—	pF	f = 10 MHz
			5.0	—	10.0		

Test Circuit



Note: C_L includes probe and jig capacitance.

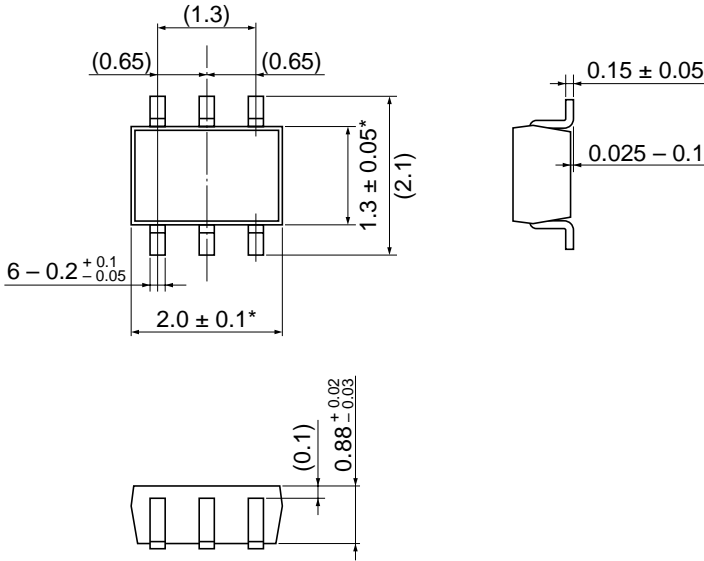
• Waveforms



- Notes: 1. Input waveform : $PRR \leq 1 \text{ MHz}$, $Z_o = 50 \Omega$, $t_r \leq 3 \text{ ns}$, $t_f \leq 3 \text{ ns}$.
 2. The output are measured one at a time with one transition per measurement.

Package Dimensions

Unit: mm



* Sn-Bi plating.

** The value does not include Resin Bar.
(One side: 0.15 mm (max))

Hitachi Code	CMPAK-6V(O)
JEDEC	—
JEITA	Conforms
Mass (reference value)	0.006 g

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