

HD74LV1GW97A

Configurable Multiple-Function Gate

HITACHI

ADE-205-719 (Z)

Rev.0
Feb. 2003

Description

The HD74LV1GW97A 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, OR, NOR, INVERTER, Non-Invert Buffer, Data Selector. 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

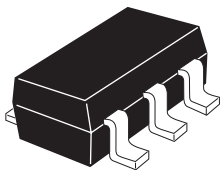
- The basic gate function is lined up as hitachi uni logic series.
- Supplied on emboss taping for high speed automatic mounting.
- Supply voltage range : 1.65 to 5.5 V
Operating temperature range : -40 to +85°C
- All inputs V_{IH} (Max.) = 5.5 V (@ V_{CC} = 0 V to 5.5 V)
All outputs V_O (Max.) = 5.5 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) |
|-----------------|--------------|--------------|----------------------|--------------------------------|
| HD74LV1GW97ACME | COMPAK-6 pin | COMPAK-6V(O) | CM | E (3,000 pcs / Reel) |

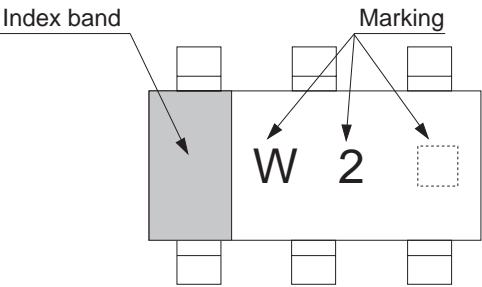
HD74LV1GW97A

Outline and Article Indication

• HD74LV1GW97A



CMPAK-6



 = Control code

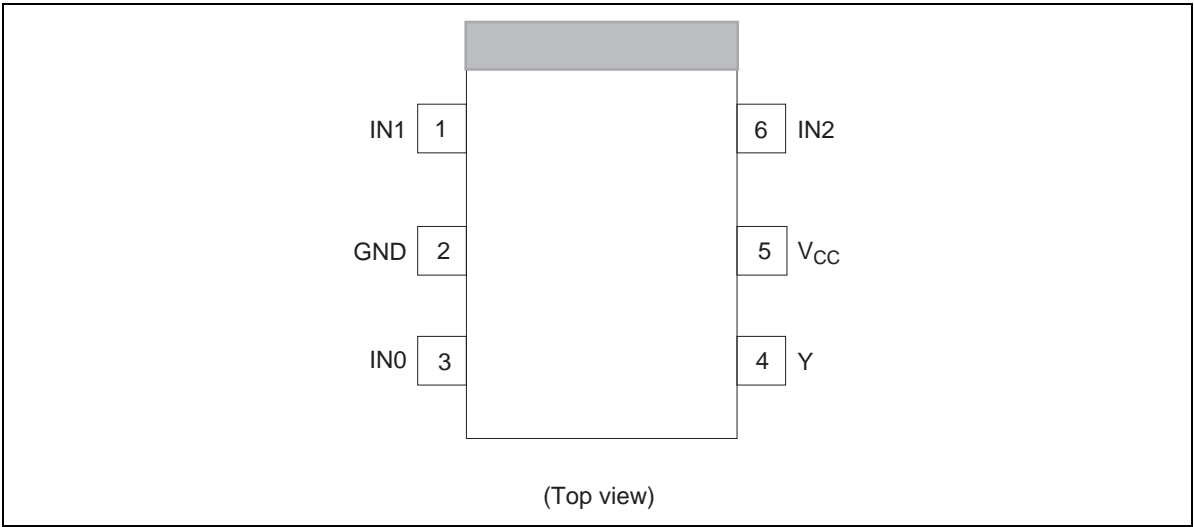
Function Table

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

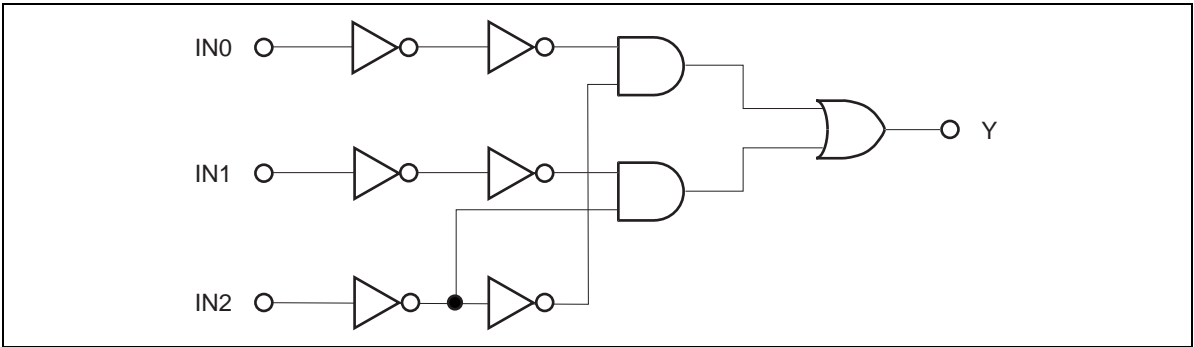
H : High level

L : Low level

Pin Arrangement



Logic Diagram



Function Selection Table

| Logic Function | Figure No. |
|---------------------------------------|------------|
| 2 to 1 data Selector | 1 |
| 2-inputs AND | 2 |
| 2-inputs OR with one input inverted | 3 |
| 2-inputs NAND with one input inverted | 3 |
| 2-inputs AND with one input inverted | 4 |
| 2-inputs NOR with one input inverted | 4 |
| 2-inputs OR | 5 |
| Inverter | 6 |
| Non-Inverter Buffer | 7 |

Logic Configurations

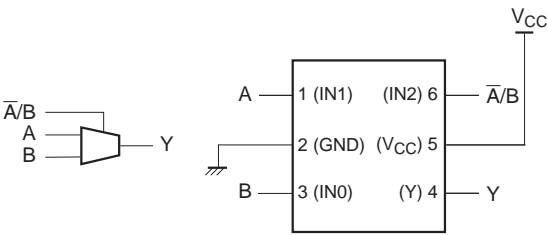


Figure 1. 2 to 1 Data Selector

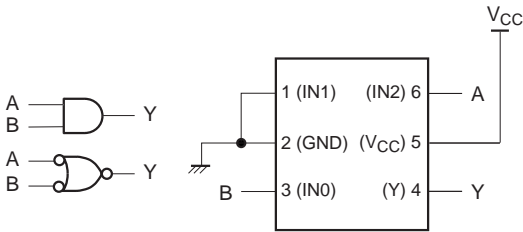


Figure 2. 2-inputs AND Gate

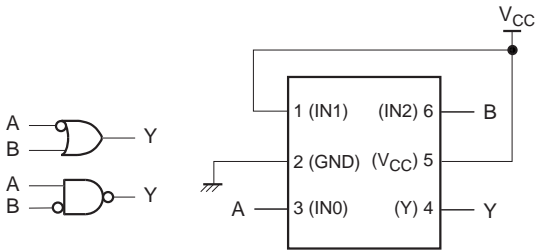


Figure 3. 2-inputs OR Gate with A input inverted

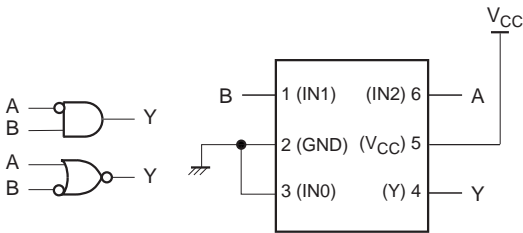


Figure 4. 2-inputs AND Gate with A input inverted

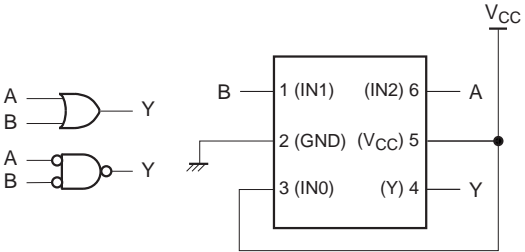


Figure 5. 2-inputs OR Gate

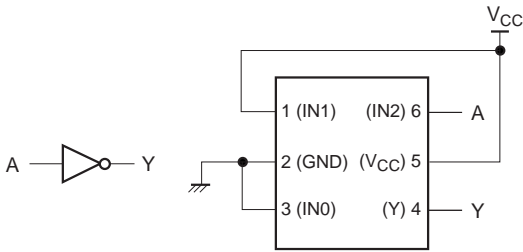


Figure 6. Inverter

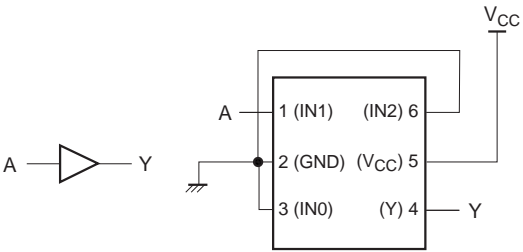


Figure 7. Non-Invert Buffer

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 | V | Output : H or L |
| | | −0.5 to 7.0 | | 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 Ta = 25°C (in still air) ^{*3} | P _T | 200 | mW | |
| Storage temperature | Tstg | −65 to 150 | °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

- Ta = -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} ×0.75 | V | |
| | | 2.5 | — | — | 1.75 | | |
| | | 3.3 | — | — | 2.31 | | |
| | | 5.0 | — | — | 3.50 | | |
| | V _T ⁻ | 1.65 to 1.95 | V _{CC} ×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} ×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 μA |
| | | 1.65 | 1.4 | — | — | | I _{OH} = -1 mA |
| | | 2.3 | 2.0 | — | — | | I _{OH} = -2 mA |
| | | 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 |
| | | 1.65 | — | — | 0.3 | | I _{OL} = 1 mA |
| | | 2.3 | — | — | 0.4 | | I _{OL} = 2 mA |
| | | 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 |
| 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 | | C _L = 50 pF | | |

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

| 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 | | C _L = 50 pF | | |

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

| 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 | | C _L = 50 pF | | |

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

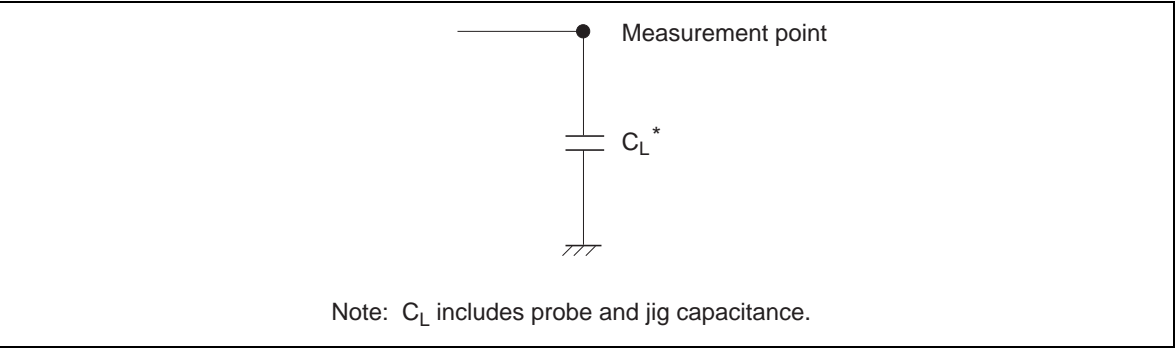
| Item | Symbol | Ta = 25°C | | | Ta = -40 to 85°C | | Unit | Test Conditions | FROM (Input) | TO (Output) |
|------------------------|------------------|-----------|-----|-----|------------------|------|------|------------------------|--------------|-------------|
| | | Min | Typ | Max | Min | Max | | | | |
| 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 | | C _L = 50 pF | | |

Operating Characteristics

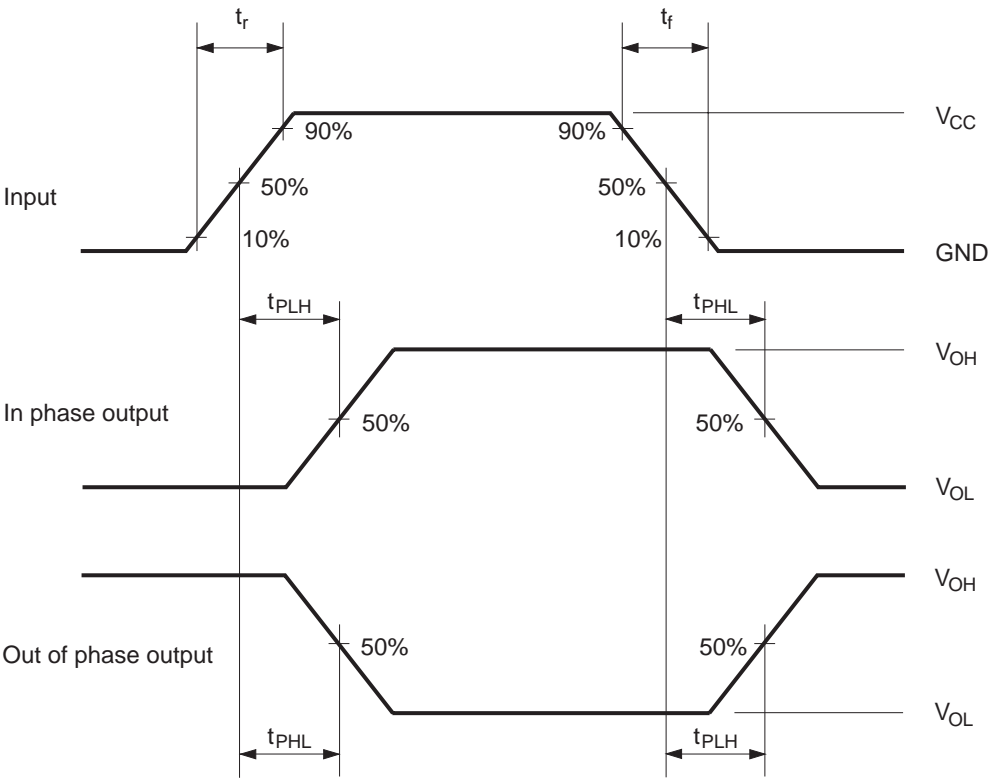
- C_L = 50 pF

| 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



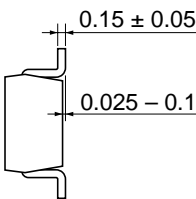
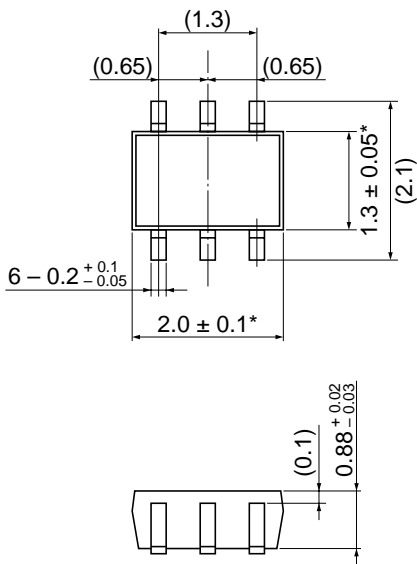
• Waveforms



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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