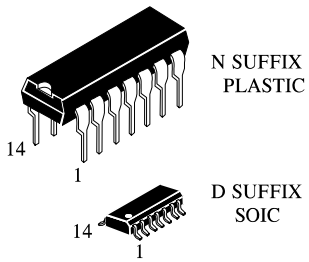
# IN74LV02

## QUAD 2-INPUT NOR GATE

The IN74LV02 is a low-voltage Si-gate CMOS device that is pin and function compatible with 74HC/HCT02A, 74ALS02

**Features:**

- Wide Operating Voltage: 1.0÷5.5 V
- Input voltage levels are compatible with standard C-MOS levels
- Accepts TTL input levels between $V_{CC}$ =2.7 V and $V_{CC}$ =3.6 V
- Output voltage levels are compatible with input levels C-MOS, N-MOS and TTL microcircuits.
- Maximum input current: 1.0 mkA; 0.1 mkA at T = 25 °C.
- Consumption current 8 mA.




**ORDERING INFORMATION**

| | |
|---|---|
| IN74LV02N | Plastic |
| IN74LV02D | SOIC |
| IZ74LV02 | Chip |

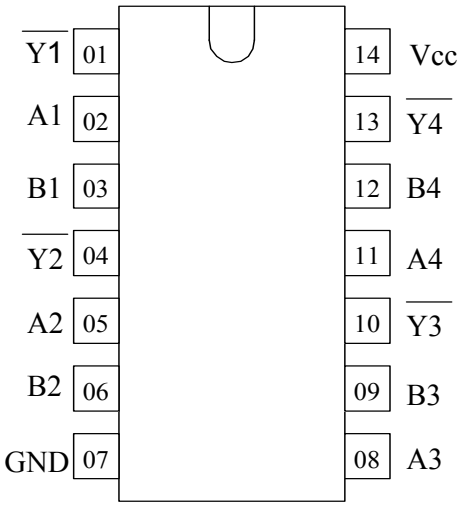
$T_A$ = -40° ÷ 125° C for all packages

***IN74LV02 truth table***

| Input | | Output |
|---|---|---|
| A | B | $Y= \overline{A+B}$ |
| L | L | H |
| L | H | L |
| H | L | L |
| H | H | L |

**Note –**
H - high voltage level;
L - low voltage level;

***Pinout***




**Pins description in IN74LV02D**

| Pin No. | Symbol | Pin description |
|---|---|---|
| 01 | $\overline{Y1}$ | Output |
| 02 | A1 | Input |
| 03 | B1 | Input |
| 04 | $\overline{Y2}$ | Output |
| 05 | A2 | Input |
| 06 | B2 | Input |
| 07 | GND | Common output |
| 08 | A3 | Input |
| 09 | B3 | Input |
| 10 | $\overline{Y3}$ | Output |
| 11 | A4 | Input |
| 12 | B4 | Input |
| 13 | $\overline{Y4}$ | Output |
| 14 | $V_{CC}$ | Supply output from voltage source |



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## Absolute maximum ratings*

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CC}$ | Supply voltage | from -0.5 to +5.0 | V |
| $I_{IK}$ *1 | Input diode current | ±20 | mA |
| $I_{OK}$ *2 | Output diode current | ±50 | mA |
| $I_O$ *3 | Output current source-drain | ±25 | mA |
| $I_{CC}$ | Supply output current | ±50 | mA |
| $I_{GND}$ | Common output current | ±50 | mA |
| $P_D$ | Dissipation power at free air change, Plastic DIP *4<br>SOIC *4 | <br>750<br>500 | mW |
| Tstg | Storage temperature | from -65 to +150 | °C |
| $T_L$ | | 260 | °C |

* Under absolute maximum conditions operation of microcircuits is not guaranteed. Operation under maximum conditions is guaranteed.

*1 If $V_I < -0.5V$ or $V_I > V_{CC} + 0.5$ V.

*2 If $V_O < -0.5V$ or $V_O > V_{CC} + 0.5$ V.

*3 If $-0.5V < V_O < V_{CC} + 0.5$ V.

*4 Under operation in the temperature range from 65°C to 125°C value of dissipation power drops down - to 12 mW/°C for Plastic DIP

- to 8 mW/°C for SOIC

## Maximum conditions

| Symbol | Parameter | | Min | Max | Unit |
|---|---|---|---|---|---|
| $V_{CC}$ | Supply voltage | | 1.2 | 5.5 | V |
| $V_{IN}$ | Input voltage | | 0 | $V_{CC}$ | V |
| $V_{OUT}$ | Output voltage | | 0 | $V_{CC}$ | V |
| $T_A$ | Operation temperature. For all packages | | -40 | 125 | °C |
| $t_{LH}$, $t_{HL}$ | Period of signal rise and fall edges (Figure 1) | $1.0 \le V_{CC} < 1.2$ B | 0 | 500 | ns |
| | | $2.0 \le V_{CC} < 2.7$ B | | 200 | |
| | | $2.7 \le V_{CC} < 3.6$ B | | 100 | |
| | | $3.6 \le V_{CC} \le 5.5$ B | | 50 | |

## DC electrical characteristics

| Symbol | Parameter | Test conditions | $V_{CC}$, V | Value | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 25°C | | -40°C to 85°C | | -40°C to 125°C | | |
| | | | | min | max | min | max | min | max | |
| $V_{IH}$ | High level input voltage | $V_O$ = $V_{CC}$-0.1 V | 1.2 | 0.9 | - | 0.9 | - | 0.9 | - | V |
| | | | 2.0 | 1.4 | - | 1.4 | - | 1.4 | - | |
| | | | 2.7 | 2.0 | - | 2.0 | - | 2.0 | - | |
| | | | 3.0 | 2.0 | - | 2.0 | - | 2.0 | - | |
| | | | 3.6 | 2.0 | - | 2.0 | - | 2.0 | - | |
| | | | 4.5 | 3.15 | - | 3.15 | - | 3.15 | - | |
| | | | 5.5 | 3.85 | - | 3.85 | - | 3.85 | - | |
| $V_{IL}$ | Low level input voltage | $V_O$ =0.1 B | 1.2 | - | 0.3 | - | 0.3 | - | 0.3 | V |
| | | | 2.0 | - | 0.6 | - | 0.6 | - | 0.6 | |
| | | | 2.7 | - | 0.8 | - | 0.8 | - | 0.8 | |
| | | | 3.0 | - | 0.8 | - | 0.8 | - | 0.8 | |
| | | | 3.6 | - | 0.8 | - | 0.8 | - | 0.8 | |
| | | | 4.5 | - | 4.35 | - | 4.35 | - | 4.35 | |
| | | | 5.5 | - | 5.35 | - | 5.35 | - | 5.35 | |
| $V_{OH}$ | High level output voltage | $V_I$ = $V_{IH}$ or $V_{IL}$ $I_O$ = -100 uA | 1.2 | 1.05 | - | 1.0 | - | 1.0 | - | V |
| | | | 2.0 | 1.85 | - | 1.8 | - | 1.8 | - | |
| | | | 2.7 | 2.55 | - | 2.5 | - | 2.5 | - | |
| | | | 3.0 | 2.85 | - | 2.8 | - | 2.8 | - | |
| | | | 3.6 | 3.45 | - | 3.4 | - | 3.4 | - | |
| | | | 4.5 | 4.35 | - | 4.3 | - | 4.3 | - | |
| | | | 5.5 | 5.35 | - | 5.3 | - | 5.3 | - | |
| | | $V_I$ = $V_{IH}$ or $V_{IL}$; $I_O$ = -6 mA | 3.0 | 2.48 | - | 2.40 | - | 2.20 | - | V |
| | | $V_I$ = $V_{IH}$ or $V_{IL}$; $I_O$ = -12 mA | 4.5 | 3.70 | - | 3.60 | - | 3.50 | - | V |
| $V_{OL}$ | Low level output voltage | $V_I$ = $V_{IH}$ or $V_{IL}$ $I_O$ = 100 uA | 1.2 | - | 0.15 | - | 0.2 | - | 0.2 | V |
| | | | 2.0 | - | 0.15 | - | 0.2 | - | 0.2 | |
| | | | 2.7 | - | 0.15 | - | 0.2 | - | 0.2 | |
| | | | 3.0 | - | 0.15 | - | 0.2 | - | 0.2 | |
| | | | 3.6 | - | 0.15 | - | 0.2 | - | 0.2 | |
| | | | 4.5 | - | 0.15 | - | 0.2 | - | 0.2 | |
| | | | 5.5 | - | 0.15 | - | 0.2 | - | 0.2 | |
| | | $V_I$ = $V_{IH}$ or $V_{IL}$; $I_O$ = 6 mA | 3.0 | - | 0.33 | - | 0.4 | - | 0.5 | V |
| | | $V_I$ = $V_{IH}$ or $V_{IL}$; $I_O$ = 12 mA | 4.5 | - | 0.40 | - | 0.55 | - | 0.65 | V |
| $I_I$ | Input current | $V_I$ = $V_{CC}$ or 0 V | 5.5 | - | ±0.1 | - | ±1.0 | - | ±1.0 | uA |
| $I_{CC}$ | Consumption current | $V_I$ =$V_{CC}$ or 0 V $I_O$ = 0 uA | 5.5 | - | 8.0 | - | 80 | - | 160 | uA |
| $I_{CC1}$ | Additional input consumption current | $V_I$ =$V_{CC}$ –0.6 V; $I_O$ = 0 uA | 5.5 | - | 8.0 | - | 80 | - | 160 | uA |

**AC electrical characteristics** ($t_{LH}$ = $t_{HL}$ = 2.5 ns, $C_L$=50 pF, $R_L$ = 1 KOhm ,)

| Symbol | Parameter | Test conditions | $V_{CC}$, V | Value | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 25 °C | | –40 to 85 °C | | –40 to 125 °C | | |
| | | | | min | max | min | max | min | max | |
| $t_{PHL}$, $t_{PLH}$ | Propagation delay time when switching "on", "off" | Fig.1 | 1.2 | - | 80 | - | 85 | - | 95 | ns |
| | | | 2.0 | - | 17 | - | 21 | - | 26 | |
| | | | 2.7 | - | 12 | - | 15 | - | 19 | |
| | | | 3.0 | - | 10 | - | 12 | - | 15 | |
| | | | 4.5 | - | 8 | - | 10 | - | 13 | |
| $C_I$ | Input capacity | - | 3.0 | - | 7 | - | - | - | - | pF |
| $C_{PD}$ | Dynamic capacity | $V_I$ = 0 V or $V_{CC}$ | 3.0 | - | 44 | - | - | - | - | |

***- Time diagram of input and output pulses***

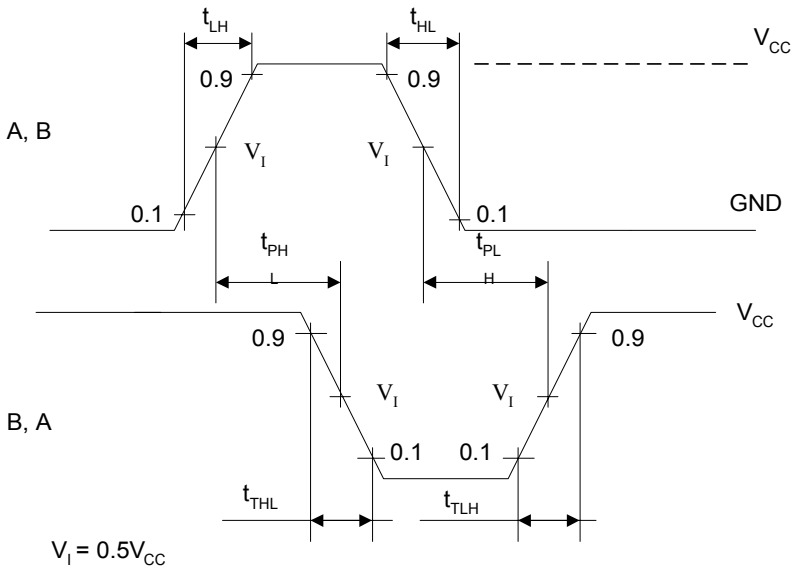


**Fig.1**



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