

RD74LVC02B

Quad. 2-input NOR Gates

REJ03D0223-0100Z

Rev.1.00

May 11, 2004

Description

The RD74LVC02B has four 2-input NOR gates in a 14 pin package. Low voltage and high speed operation is suitable at the battery drive product (note type personal computer) and low power consumption extends the life of a battery for long time operation.

Features

- $V_{CC} = 1.65 \text{ V to } 5.5 \text{ V}$
- All inputs $V_{IH} (\text{Max.}) = 5.5 \text{ V} (@V_{CC} = 0 \text{ V to } 5.5 \text{ V})$
- Typical V_{OL} ground bounce $< 0.8 \text{ V} (@V_{CC} = 3.3 \text{ V}, T_a = 25^\circ\text{C})$
- Typical V_{OH} undershoot $> 2.0 \text{ V} (@V_{CC} = 3.3 \text{ V}, T_a = 25^\circ\text{C})$
- High output current
 - $\pm 4 \text{ mA} (@V_{CC} = 1.65 \text{ V})$
 - $\pm 8 \text{ mA} (@V_{CC} = 2.3 \text{ V})$
 - $\pm 12 \text{ mA} (@V_{CC} = 2.7 \text{ V})$
 - $\pm 24 \text{ mA} (@V_{CC} = 3.0 \text{ V to } 5.5 \text{ V})$
- Ordering Information

| Part Name | Package Type | Package Code | Package Abbreviation | Taping Abbreviation (Quantity) |
|----------------|--------------------|--------------|----------------------|--------------------------------|
| RD74LVC02BFPEL | SOP-14 pin (JEITA) | FP-14DAV | FP | EL (2,000 pcs/reel) |
| RD74LVC02BTELL | TSSOP-14 pin | TTP-14DV | T | ELL (2,000 pcs/reel) |

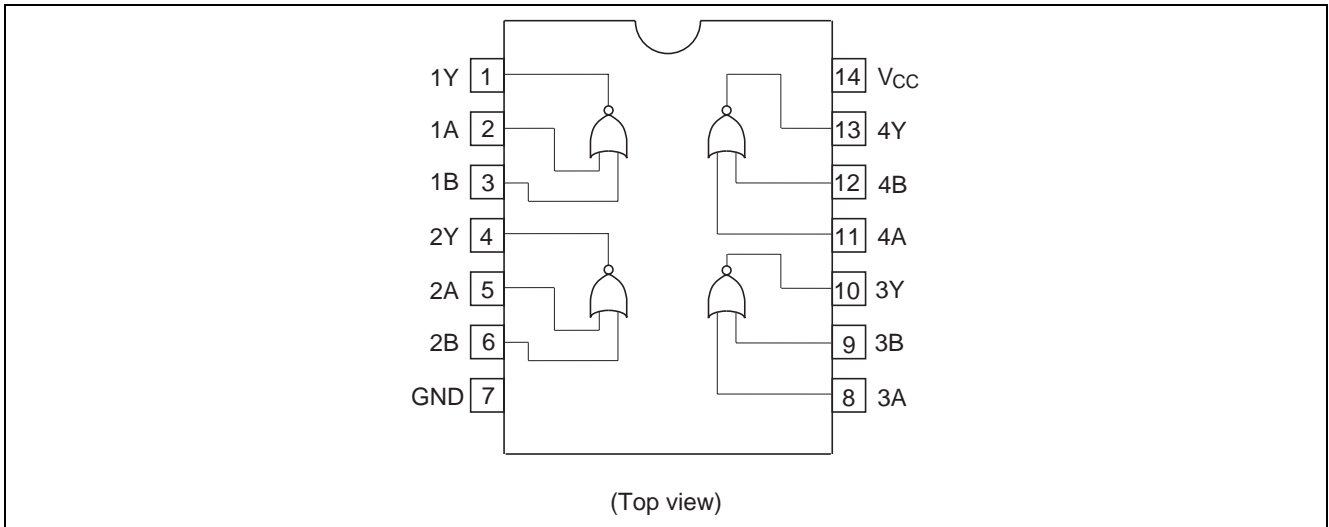
Function Table

| Inputs | | Output Y |
|--------|---|----------|
| A | B | |
| L | L | H |
| L | H | L |
| H | L | L |
| H | H | L |

H : High level

L : Low level

Pin Arrangement



Absolute Maximum Ratings

| Item | Symbol | Ratings | Unit | Conditions |
|------------------------------|-----------------------|------------------------|--------------|------------------------|
| Supply voltage | V_{CC} | -0.5 to 7.0 | V | |
| Input diode current | I_{IK} | -50 | mA | $V_I = -0.5$ V |
| Input voltage | V_I | -0.5 to 7.0 | V | |
| Output diode current | I_{OK} | -50 | mA | $V_O = -0.5$ V |
| | | 50 | mA | $V_O = V_{CC} + 0.5$ V |
| Output voltage | V_O | -0.5 to $V_{CC} + 0.5$ | V | |
| Output current | I_O | ± 50 | mA | |
| V_{CC} , GND current / pin | I_{CC} or I_{GND} | 100 | mA | |
| Storage temperature | T_{stg} | -65 to +150 | $^{\circ}$ C | |

Note: 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.

Recommended Operating Conditions

| Item | Symbol | Ratings | Unit | Conditions |
|--------------------------------------|------------|---------------|------|--|
| Supply voltage | V_{CC} | 1.5 to 5.5 | V | Data hold |
| | | 1.65 to 5.5 | | At operation |
| Input / Output voltage | V_I | 0 to 5.5 | V | A, B |
| | V_O | 0 to V_{CC} | | Y |
| Operating temperature | T_a | -40 to 85 | °C | |
| Output current | I_{OH} | -4 | mA | $V_{CC} = 1.65\text{ V}$ |
| | | -8 | | $V_{CC} = 2.3\text{ V}$ |
| | | -12 | | $V_{CC} = 2.7\text{ V}$ |
| | | -24 | | $V_{CC} = 3.0\text{ V to }5.5\text{ V}$ |
| | I_{OL} | 4 | | $V_{CC} = 1.65\text{ V}$ |
| | | 8 | | $V_{CC} = 2.3\text{ V}$ |
| | | 12 | | $V_{CC} = 2.7\text{ V}$ |
| | | 24 | | $V_{CC} = 3.0\text{ V to }5.5\text{ V}$ |
| Input rise / fall time ^{*1} | t_r, t_f | 20 | ns/V | $V_{CC} = 1.65\text{ V to }2.7\text{ V}$ |
| | | 10 | | $V_{CC} = 3.0\text{ V to }5.5\text{ V}$ |

Notes: 1. This item guarantees maximum limit when one input switches.

Waveform: Refer to test circuit of switching characteristics.

Electrical Characteristics

| Item | Symbol | V _{CC} (V) | Ta = -40 to 85°C | | Unit | Test Conditions |
|--------------------------|------------------|---------------------|-----------------------|-----------------------|------|---|
| | | | Min | Max | | |
| Input voltage | V _{IH} | 1.65 to 1.95 | V _{CC} ×0.65 | — | V | |
| | | 2.3 to 2.7 | 1.7 | — | | |
| | | 2.7 to 3.6 | 2.0 | — | | |
| | | 4.5 to 5.5 | V _{CC} ×0.7 | — | | |
| | V _{IL} | 1.65 to 1.95 | — | V _{CC} ×0.35 | | |
| | | 2.3 to 2.7 | — | 0.7 | | |
| | | 2.7 to 3.6 | — | 0.8 | | |
| | | 4.5 to 5.5 | — | V _{CC} ×0.3 | | |
| Output voltage | V _{OH} | 1.65 to 5.5 | V _{CC} -0.2 | — | V | I _{OH} = -100 μA |
| | | 1.65 | 1.2 | — | | I _{OH} = -4 mA |
| | | 2.3 | 1.7 | — | | I _{OH} = -8 mA |
| | | 2.7 | 2.2 | — | | I _{OH} = -12 mA |
| | | 3.0 | 2.4 | — | | |
| | | 3.0 | 2.2 | — | | I _{OH} = -24 mA |
| | | 4.5 | 3.8 | — | | |
| | V _{OL} | 1.65 to 5.5 | — | 0.2 | | I _{OL} = 100 μA |
| | | 1.65 | — | 0.45 | | I _{OL} = 4 mA |
| | | 2.3 | — | 0.7 | | I _{OL} = 8 mA |
| | | 2.7 | — | 0.4 | | I _{OL} = 12 mA |
| | | 3.0 | — | 0.55 | | I _{OL} = 24 mA |
| | | 4.5 | — | 0.55 | | |
| | | | | | | |
| Input current | I _{IN} | 0 to 5.5 | — | ±5.0 | μA | V _{IN} = 5.5 V or GND |
| Quiescent supply current | I _{CC} | 2.7 to 3.6 | — | ±5.0 | μA | V _{IN} = 3.6 V to 5.5 V |
| | | 2.7 to 5.5 | — | 5.0 | | V _{IN} = V _{CC} or GND |
| | ΔI _{CC} | 2.7 to 3.6 | — | 500 | | V _{IN} = one input at (V _{CC} -0.6)V, other inputs at V _{CC} or GND |

Switching Characteristics

| Item | Symbol | V _{CC} (V) | Ta = -40 to 85°C | | | Unit | From (Input) | To (Output) |
|----------------------------|-------------------|---------------------|------------------|-----|-----|------|--------------|-------------|
| | | | Min | Typ | Max | | | |
| Propagation delay time | t _{PLH} | 1.8±0.15 | 1.0 | — | 8.9 | ns | A or B | Y |
| | t _{PHL} | 2.5±0.2 | 1.0 | — | 7.4 | | | |
| | | 2.7 | 1.0 | — | 5.4 | | | |
| | | 3.3±0.3 | 1.0 | — | 4.4 | | | |
| | | 5.0±0.5 | 1.0 | — | 3.9 | | | |
| Between output pins skew*1 | t _{OSLH} | 1.8±0.15 | — | — | — | ns | | |
| | t _{OSSL} | 2.5±0.2 | — | — | — | | | |
| | | 2.7 | — | — | — | | | |
| | | 3.3±0.3 | — | — | 1.0 | | | |
| | | 5.0±0.5 | — | — | 1.0 | | | |
| Input capacitance | C _{IN} | 3.3 | — | 5.0 | — | pF | | |

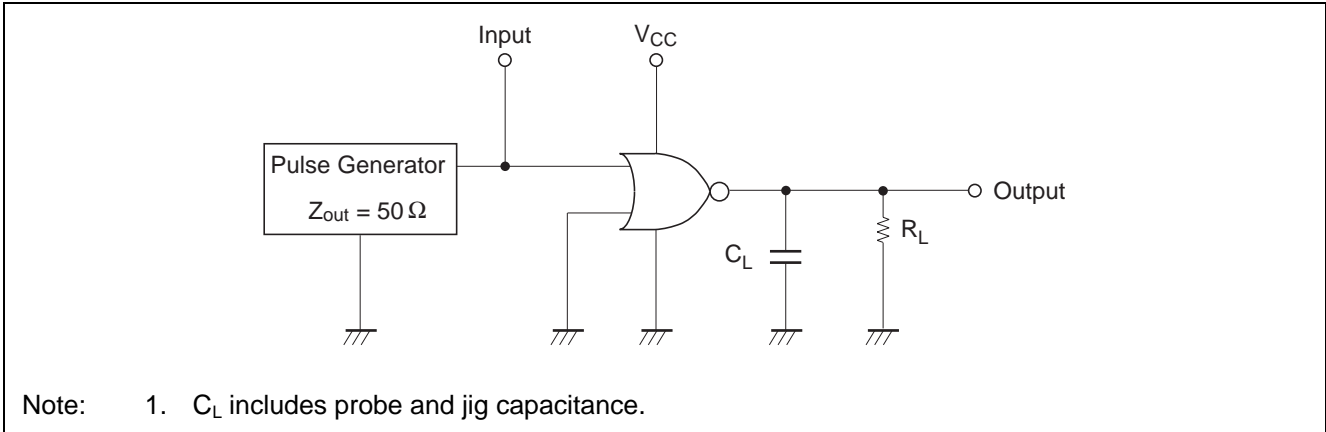
Note: 1. This parameter is characterized but not tested.

$$t_{OSLH} = |t_{PLHm} - t_{PLHn}|, t_{OSSL} = |t_{PHLm} - t_{PHLn}|$$

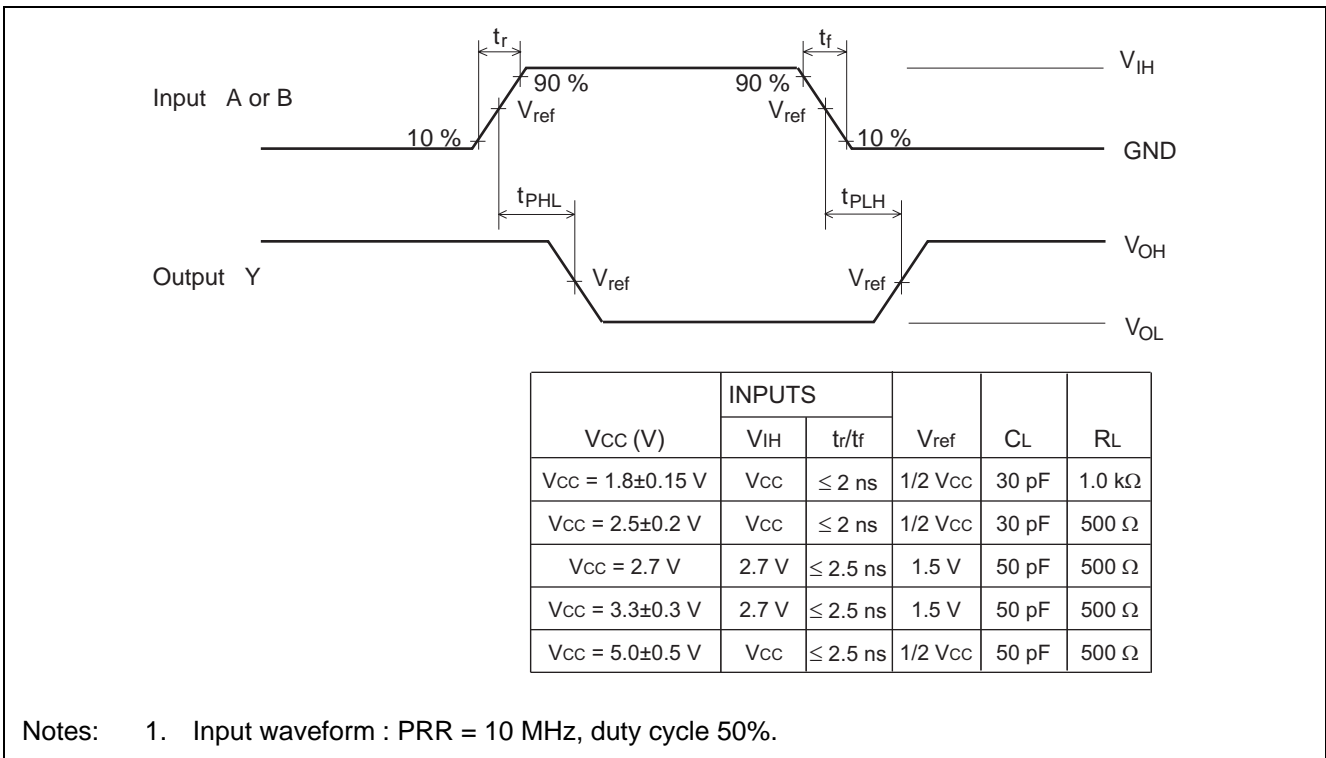
Operating Characteristics

| Item | Symbol | V _{CC} (V) | Ta = 25°C | | | Unit | Test conditions |
|-------------------------------|-----------------|---------------------|-----------|-----|-----|------|-----------------|
| | | | Min | Typ | Max | | |
| Power dissipation Capacitance | C _{PD} | 1.8 | — | 10 | — | pF | f = 10 MHz |
| | | 2.5 | — | 12 | — | | |
| | | 3.3 | — | 12 | — | | |
| | | 5.0 | — | 15 | — | | |

Test Circuit

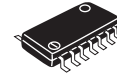
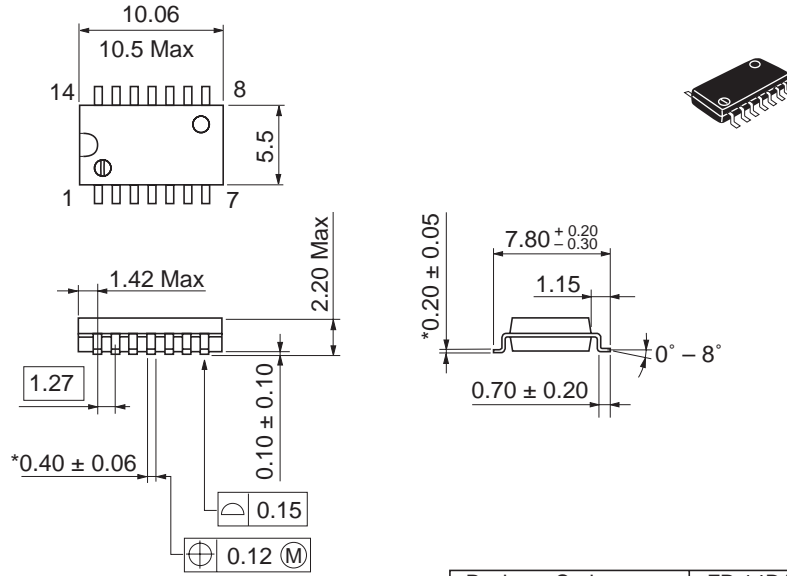


Waveforms



Package Dimensions

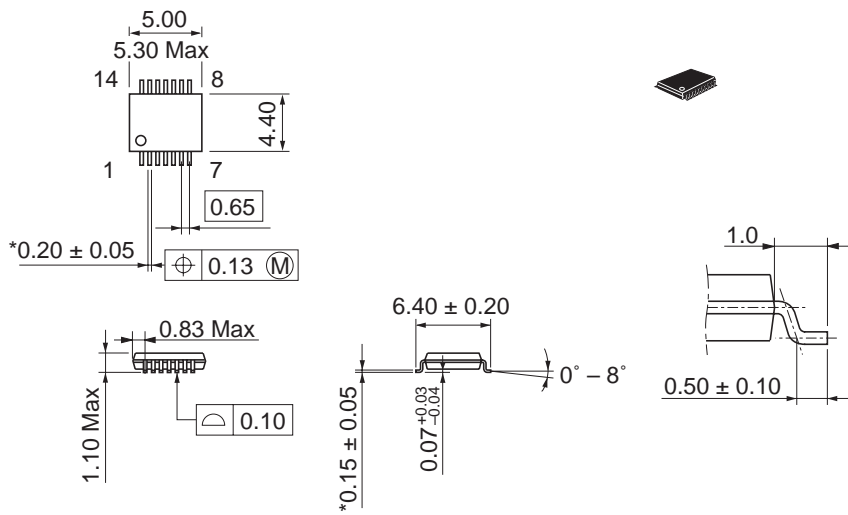
As of January, 2003
Unit: mm



*Ni/Pd/Au plating

| | |
|------------------------|----------|
| Package Code | FP-14DAV |
| JEDEC | — |
| JEITA | Conforms |
| Mass (reference value) | 0.23 g |

As of January, 2003
Unit: mm



*Ni/Pd/Au plating

| | |
|------------------------|----------|
| Package Code | TTP-14DV |
| JEDEC | — |
| JEITA | — |
| Mass (reference value) | 0.05 g |

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