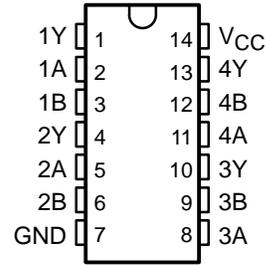


CD54ACT02, CD74ACT02 QUADRUPLE 2-INPUT POSITIVE-NOR GATES

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- Inputs Are TTL-Voltage Compatible
- Speed of Bipolar F, AS, and S, With Significantly Reduced Power Consumption
- Balanced Propagation Delays
- ± 24 -mA Output Drive Current
– Fanout to 15 F Devices
- SCR-Latchup-Resistant CMOS Process and Circuit Design
- Exceeds 2-kV ESD Protection Per MIL-STD-883, Method 3015

CD54ACT02 . . . F PACKAGE
CD74ACT02 . . . E OR M PACKAGE
(TOP VIEW)



description

The 'ACT02 devices contain four independent 2-input NOR gates that perform the Boolean function $Y = \overline{A} \cdot \overline{B}$ or $Y = \overline{A + B}$ in positive logic.

ORDERING INFORMATION

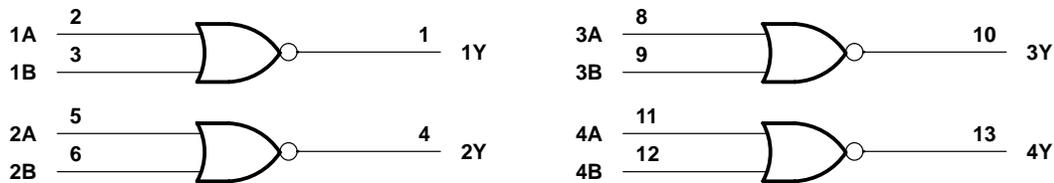
| T _A | PACKAGE† | | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|----------------|----------|---------------|-----------------------|------------------|
| –55°C to 125°C | PDIP – E | Tube | CD74ACT02E | CD74ACT02E |
| | SOIC – M | Tube | CD74ACT02M | ACT02M |
| | | Tape and reel | CD74ACT02M96 | |
| | CDIP – F | Tube | CD54ACT02F3A | CD54ACT02F3A |

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

FUNCTION TABLE (each gate)

| INPUTS | | OUTPUT |
|--------|---|--------|
| A | B | Y |
| H | X | L |
| X | H | L |
| L | L | H |

logic diagram (positive logic)



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

 **TEXAS
INSTRUMENTS**

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On products compliant to MIL-PRF-38535, all parameters are tested unless otherwise noted. On all other products, production processing does not necessarily include testing of all parameters.

CD54ACT02, CD74ACT02 QUADRUPLE 2-INPUT POSITIVE-NOR GATES

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absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

| | |
|---|----------------|
| Supply voltage range, V_{CC} | -0.5 V to 6 V |
| Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$) (see Note 1) | ± 20 mA |
| Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$) (see Note 1) | ± 50 mA |
| Continuous output current, I_O ($V_O = 0$ to V_{CC}) | ± 50 mA |
| Continuous current through V_{CC} or GND | ± 100 mA |
| Package thermal impedance, θ_{JA} (see Note 2): E package | 80°C/W |
| M package | 86°C/W |
| Storage temperature range, T_{stg} | -65°C to 150°C |

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions (see Note 3)

| | | $T_A = 25^\circ\text{C}$ | | $-40^\circ\text{C TO } 85^\circ\text{C}$ | | $-55^\circ\text{C TO } 125^\circ\text{C}$ | | UNIT |
|---------------------|------------------------------------|--------------------------|----------|--|----------|---|----------|------|
| | | MIN | MAX | MIN | MAX | MIN | MAX | |
| V_{CC} | Supply voltage | 4.5 | 5.5 | 4.5 | 5.5 | 4.5 | 5.5 | V |
| V_{IH} | High-level input voltage | 2 | | 2 | | 2 | | V |
| V_{IL} | Low-level input voltage | | 0.8 | | 0.8 | | 0.8 | V |
| V_I | Input voltage | 0 | V_{CC} | 0 | V_{CC} | 0 | V_{CC} | V |
| V_O | Output voltage | 0 | V_{CC} | 0 | V_{CC} | 0 | V_{CC} | V |
| I_{OH} | High-level output current | | -24 | | -24 | | -24 | mA |
| I_{OL} | Low-level output current | | 24 | | 24 | | 24 | mA |
| $\Delta t/\Delta v$ | Input transition rise or fall rate | | 10 | | 10 | | 10 | ns/V |

NOTE 3: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER | TEST CONDITIONS | V_{CC} | $T_A = 25^\circ\text{C}$ | | $-40^\circ\text{C TO } 85^\circ\text{C}$ | | $-55^\circ\text{C TO } 125^\circ\text{C}$ | | UNIT |
|-----------------|----------------------------------|------------------------------------|--------------------------|---------|--|---------------|---|-----|------|
| | | | MIN | MAX | MIN | MAX | MIN | MAX | |
| V_{OH} | $V_I = V_{IH}$ or V_{IL} | $I_{OH} = -50 \mu\text{A}$ | 4.5 V | 4.4 | 4.4 | 4.4 | | | V |
| | | $I_{OH} = -24 \text{ mA}$ | 4.5 V | 3.94 | 3.8 | 3.7 | | | |
| | | $I_{OH} = -50 \text{ mA}^\ddagger$ | 5.5 V | | | 3.85 | | | |
| | | $I_{OH} = -75 \text{ mA}^\ddagger$ | 5.5 V | | 3.85 | | | | |
| V_{OL} | $V_I = V_{IH}$ or V_{IL} | $I_{OL} = 50 \mu\text{A}$ | 4.5 V | 0.1 | 0.1 | 0.1 | | V | |
| | | $I_{OL} = 24 \text{ mA}$ | 4.5 V | 0.36 | 0.44 | 0.5 | | | |
| | | $I_{OL} = 50 \text{ mA}^\ddagger$ | 5.5 V | | | 1.65 | | | |
| | | $I_{OL} = 75 \text{ mA}^\ddagger$ | 5.5 V | | 1.65 | | | | |
| I_I | $V_I = V_{CC}$ or GND | 5.5 V | ± 0.1 | ± 1 | ± 1 | ± 1 | μA | | |
| I_{CC} | $V_I = V_{CC}$ or GND, $I_O = 0$ | 5.5 V | 4 | 40 | 80 | μA | | | |
| ΔI_{CC} | $V_I = V_{CC} - 2.1 \text{ V}$ | 4.5 V to 5.5 V | 2.4 | 2.8 | 3 | mA | | | |
| C_i | | | 10 | 10 | 10 | pF | | | |

‡ Test one output at a time, not exceeding 1-second duration. Measurement is made by forcing indicated current and measuring voltage to minimize power dissipation. Test verifies a minimum 50- Ω transmission-line drive capability at 85°C and 75- Ω transmission-line drive capability at 125°C.



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ACT INPUT LOAD TABLE

| INPUT | UNIT LOAD |
|--------|-----------|
| A or B | 0.32 |

Unit load is ΔI_{CC} limit specified in electrical characteristics table (e.g., 2.4 mA at 25°C).

switching characteristics over recommended operating free-air temperature range, $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$, $C_L = 50\text{ pF}$ (unless otherwise noted) (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | –40°C TO 85°C | | –55°C TO 125°C | | UNIT |
|-----------|-----------------|----------------|------------------|------|-------------------|------|------|
| | | | MIN | MAX | MIN | MAX | |
| t_{PLH} | A or B | Y | 3.1 | 11.1 | 3.1 | 12.2 | ns |
| t_{PHL} | | | 3.1 | 11.1 | 3.1 | 12.2 | |

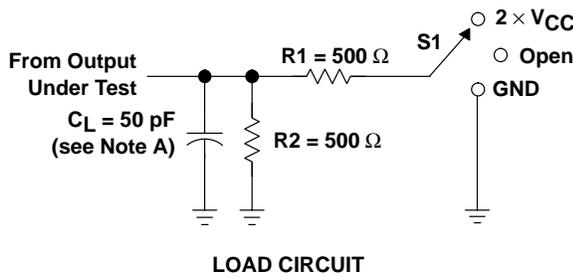
operating characteristics, $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$

| PARAMETER | TYP | UNIT |
|--|-----|------|
| C_{pd} Power dissipation capacitance | 55 | pF |

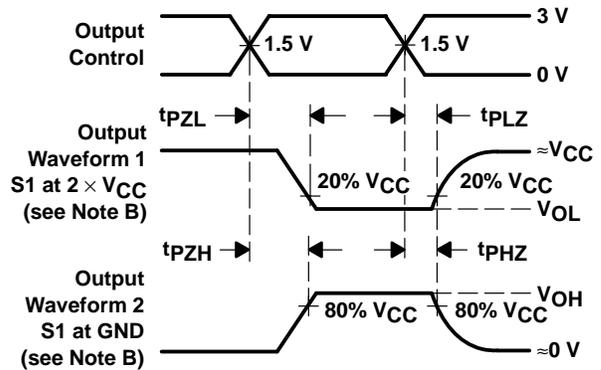
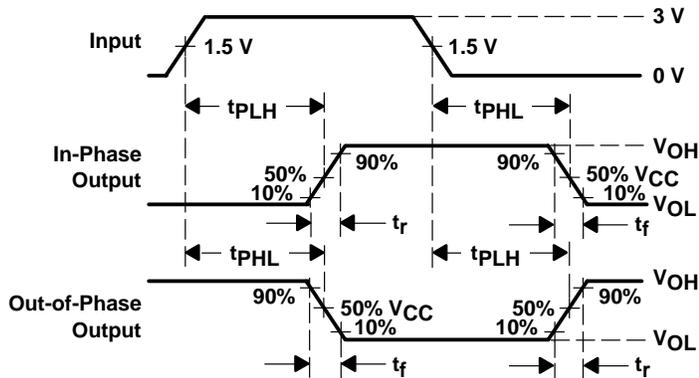
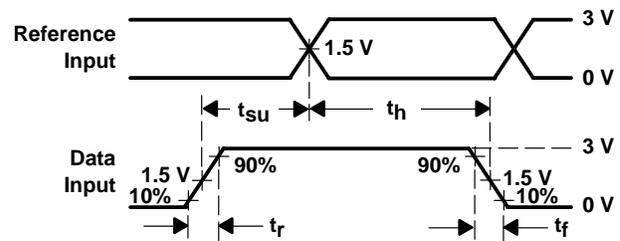
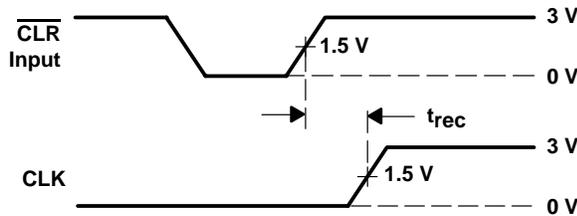
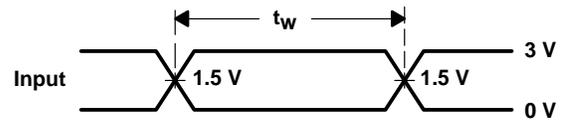
CD54ACT02, CD74ACT02 QUADRUPLE 2-INPUT POSITIVE-NOR GATES

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PARAMETER MEASUREMENT INFORMATION



| TEST | S1 |
|-------------------|-------------------|
| t_{PLH}/t_{PHL} | Open |
| t_{PLZ}/t_{PZL} | $2 \times V_{CC}$ |
| t_{PHZ}/t_{PZH} | GND |



- NOTES:
- C_L includes probe and test-fixture capacitance.
 - Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
 - All input pulses are supplied by generators having the following characteristics: $PRR \leq 1 \text{ MHz}$, $Z_O = 50 \Omega$, $t_r = 3 \text{ ns}$, $t_f = 3 \text{ ns}$. Phase relationships between waveforms are arbitrary.
 - For clock inputs, f_{max} is measured with the input duty cycle at 50%.
 - The outputs are measured one at a time with one input transition per measurement.
 - t_{PLH} and t_{PHL} are the same as t_{pd} .
 - t_{PZL} and t_{PZH} are the same as t_{en} .
 - t_{PLZ} and t_{PHZ} are the same as t_{dis} .

Figure 1. Load Circuit and Voltage Waveforms

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