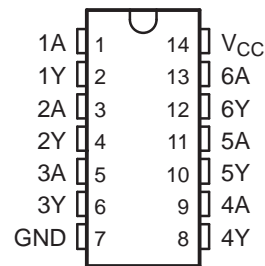


FEATURES

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

CD54ACT05 . . . F PACKAGE
CD74ACT05 . . . E OR M PACKAGE
(TOP VIEW)



DESCRIPTION/ORDERING INFORMATION

The 'ACT05 devices contain six independent inverters. These devices perform the Boolean function $Y = \bar{A}$. The open-drain outputs require pullup resistors to perform correctly, and can be connected to other open-drain outputs to implement active-low wired-OR or active-high wired-AND functions.

ORDERING INFORMATION

| T _A | PACKAGE ⁽¹⁾ | | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|----------------|------------------------|--------------|-----------------------|------------------|
| -55°C to 125°C | PDIP – E | Tube of 25 | CD74ACT05E | CD74ACT05E |
| | SOIC – M | Tube of 50 | CD74ACT05M | ACT05M |
| | | Reel of 2500 | CD74ACT05M96 | |
| | CDIP – F | Reel of 1000 | CD54ACT05F3A | CD54ACT05F3A |

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

FUNCTION TABLE (EACH INVERTER)

| INPUT A | OUTPUT Y |
|------------|-------------|
| H | L |
| L | Z |



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.

CD54ACT05, CD74ACT05 HEX INVERTERS WITH OPEN-DRAIN OUTPUTS

SCHS311C—JANUARY 2001—REVISED JANUARY 2007

Absolute Maximum Ratings⁽¹⁾

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

| | | MIN | MAX | UNIT |
|------------------|--|--|-----|-----------|
| V _{CC} | Supply voltage range | -0.5 | 6 | V |
| I _{IK} | Input clamp current ⁽²⁾ | V _I < 0 or V _I > V _{CC} | | ±20 mA |
| I _{OK} | Output clamp current ⁽²⁾ | V _O < 0 | | -50 mA |
| I _O | Continuous current | | | ±50 mA |
| θ _{JA} | Package thermal impedance ⁽³⁾ | E package | | 80 |
| | | M package | | 86 |
| T _{stg} | Storage temperature range | -65 | 150 | °C |

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

Recommended Operating Conditions⁽¹⁾

| | | T _A = 25°C | | -40°C TO 85°C | | -55°C TO 125°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 | 5.5 | 0 | 5.5 | 0 | 5.5 | V |
| I _{OL} | Low-level output current | 24 | | 24 | | 24 | | mA |
| Δt/Δv | Input transition rise or fall rate | 10 | | 10 | | 10 | | ns/V |

- (1) 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°C | | -40°C TO 85°C | | -55°C TO 125°C | | UNIT |
|------------------|---|--|-----------------------|-----|---------------|-----|----------------|-----|------|
| | | | MIN | MAX | MIN | MAX | MIN | MAX | |
| V _{OL} | V _I = V _{IH} or V _{IL} | I _{OL} = 50 mA | 4.5 V | | 0.1 | | 0.1 | | V |
| | | I _{OL} = 24 mA | 4.5 V | | 0.36 | | 0.44 | | |
| | | I _{OL} = 50 mA ⁽¹⁾ | 5.5 V | | | | 1.65 | | |
| | | I _{OL} = 75 mA ⁽¹⁾ | 5.5 V | | | | 1.65 | | |
| I _I | V _I = V _{CC} or GND | 5.5 V | ±0.1 | | ±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 V | 4.5 V to 5.5 V | 2.4 | | 2.8 | | 3 | | mA |
| C _i | | | 10 | | 10 | | 10 | | pF |

- (1) 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.

ACT INPUT LOAD TABLE⁽¹⁾

| Input | Unit Load |
|-------|-----------|
| A | 0.18 |

(1) 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)

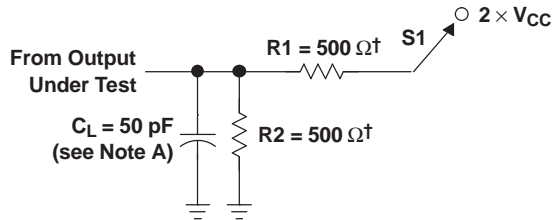
| PARAMETER | FROM (INPUT) | TO (OUTPUT) | -40°C TO 85°C | | -55°C TO 125°C | | UNIT |
|-----------|--------------|-------------|---------------|-----|----------------|------|------|
| | | | MIN | MAX | MIN | MAX | |
| t_{PZL} | A or B | Y | 2.4 | 8.5 | 2.3 | 9.3 | ns |
| t_{PLZ} | | | 2.8 | 9.8 | 2.7 | 10.8 | |

Operating Characteristics

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

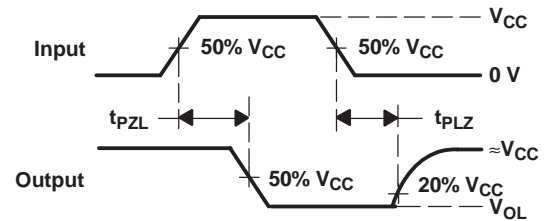
| PARAMETER | TYP | UNIT |
|--|-----|------|
| C_{pd} Power dissipation capacitance | 105 | pF |

PARAMETER MEASUREMENT INFORMATION



[†] When $V_{CC} = 1.5\text{ V}$, $R1 = R2 = 1\text{ k}\Omega$

LOAD CIRCUIT



**VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES**

- NOTES: A. C_L includes probe and jig capacitance.
 B. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r \leq 3\text{ ns}$, $t_f \leq 3\text{ ns}$.
 C. The outputs are measured one at a time, with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

PACKAGING INFORMATION

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead finish/ Ball material (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|------------------|---------------|--------------|-----------------|------|-------------|------------------|--------------------------------------|----------------------|--------------|-------------------------------------|-------------------------|
| 5962-9068601QCA | ACTIVE | CDIP | J | 14 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-9068601QC A CD54ACT05F3A | Samples |
| CD54ACT05F3A | ACTIVE | CDIP | J | 14 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-9068601QC A CD54ACT05F3A | Samples |
| CD74ACT05E | ACTIVE | PDIP | N | 14 | 25 | RoHS & Green | NIPDAU | N / A for Pkg Type | -55 to 125 | CD74ACT05E | Samples |
| CD74ACT05EE4 | ACTIVE | PDIP | N | 14 | 25 | RoHS & Green | NIPDAU | N / A for Pkg Type | -55 to 125 | CD74ACT05E | Samples |
| CD74ACT05M | ACTIVE | SOIC | D | 14 | 50 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -55 to 125 | ACT05M | Samples |
| CD74ACT05M96 | ACTIVE | SOIC | D | 14 | 2500 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -55 to 125 | ACT05M | Samples |

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

⁽⁶⁾ Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

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OTHER QUALIFIED VERSIONS OF CD54ACT05, CD74ACT05 :

- Catalog : [CD74ACT05](#)
- Military : [CD54ACT05](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

TAPE AND REEL INFORMATION

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE


*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|--------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| CD74ACT05M96 | SOIC | D | 14 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|--------------|--------------|-----------------|------|------|-------------|------------|-------------|
| CD74ACT05M96 | SOIC | D | 14 | 2500 | 356.0 | 356.0 | 35.0 |

TUBE


*All dimensions are nominal

| Device | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|--------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| CD74ACT05E | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| CD74ACT05E | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| CD74ACT05EE4 | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| CD74ACT05EE4 | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| CD74ACT05M | D | SOIC | 14 | 50 | 506.6 | 8 | 3940 | 4.32 |

J 14

GENERIC PACKAGE VIEW
CDIP - 5.08 mm max height
CERAMIC DUAL IN LINE PACKAGE



Images above are just a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.

4040083-5/G

J0014A



PACKAGE OUTLINE

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



4214771/A 05/2017

NOTES:

1. All controlling linear dimensions are in inches. Dimensions in brackets are in millimeters. Any dimension in brackets or parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This package is hermetically sealed with a ceramic lid using glass frit.
4. Index point is provided on cap for terminal identification only and on press ceramic glass frit seal only.
5. Falls within MIL-STD-1835 and GDIP1-T14.

EXAMPLE BOARD LAYOUT

J0014A

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



LAND PATTERN EXAMPLE
NON-SOLDER MASK DEFINED
SCALE: 5X



4214771/A 05/2017

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
 - Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
 - E. Reference JEDEC MS-012 variation AB.

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Publication IPC-7351 is recommended for alternate designs.
 - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
 - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 - The 20 pin end lead shoulder width is a vendor option, either half or full width.

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