FAIRCHILD SEMICONDUCTOR™

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# 74AC05
# Hex Inverter with Open Drain Outputs

## General Description

The AC05 contains six inverters.

## Features

- Outputs sink 24 mA
- Open drain for wired NOR function
- Radiation tolerant FACT™ process

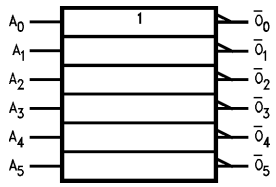
## Ordering Code:

| Order Number | Package Number | Package Description |
|---|---|---|
| 74AC05SC | M14A | 14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow Body |

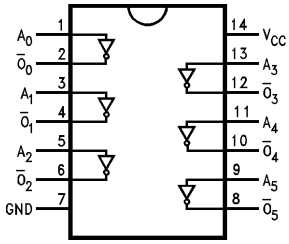
Device also available in Tape and Reel. Specify by appending suffix letter "X" to the ordering code.

## Logic Symbol

IEEE/IEC




## Connection Diagram




## Pin Descriptions

| Pin Names | Description |
|---|---|
| $A_n$ | Inputs |
| $\overline{O}_n$ | Outputs |

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## Absolute Maximum Ratings(Note 1)

| | |
|---|---|
| Supply Voltage ($V_{CC}$) | −0.5V to +7.0V |
| DC Input Diode Current ($I_{IK}$) | |
| $V_I$ = −0.5V | −20 mA |
| $V_I$ = $V_{CC}$ + 0.5V | +20 mA |
| DC Input Voltage ($V_I$) | −0.5V to $V_{CC}$ + 0.5V |
| DC Output Diode Current ($I_{OK}$) | |
| $V_O$ = −0.5V | −20 mA |
| $V_O$ = $V_{CC}$ + 0.5V | +20 mA |
| DC Output Voltage ($V_O$) | −0.5V to $V_{CC}$ + 0.5V |
| DC Output Source | |
| or Sink Current ($I_O$) | ± 50 mA |
| DC $V_{CC}$ or Ground Current | |
| per Output Pin ($I_{CC}$ or $I_{GND}$) | ± 50 mA |
| Storage Temperature ($T_{STG}$) | −65°C to +150°C |

## Recommended Operating Conditions

| | |
|---|---|
| Supply Voltage ($V_{CC}$) | 2.0V to 6.0V |
| Input Voltage ($V_I$) | 0V to $V_{CC}$ |
| Output Voltage ($V_O$) | 0V to $V_{CC}$ |
| Operating Temperature ($T_A$) | −40°C to +85°C |
| Minimum Input Edge Rate (ΔV/Δt) | |
| $V_{IN}$ from 30% to 70% of $V_{CC}$ | |
| $V_{CC}$ @ 3.3V, 4.5V, 5.5V | 125 mV/ns |

**Note 1:** Absolute maximum ratings are those values beyond which damage to the device may occur. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. Fairchild does not recommend operation of FACT™ circuits outside databook specifications.

## DC Electrical Characteristics

| Symbol | Parameter | $V_{CC}$ (V) | $T_A$ = +25°C Typ | $T_A$ = −40°C to +85°C Guaranteed Limits | | Units | Conditions |
|---|---|---|---|---|---|---|---|
| $V_{IH}$ | Minimum HIGH Level Input Voltage | 3.0 | 1.5 | 2.1 | 2.1 | V | $V_{OUT}$ = 0.1V or $V_{CC}$ − 0.1V |
| | | 4.5 | 2.25 | 3.15 | 3.15 | | |
| | | 5.5 | 2.75 | 3.85 | 3.85 | | |
| $V_{IL}$ | Maximum LOW Level Input Voltage | 3.0 | 1.5 | 0.9 | 0.9 | V | $V_{OUT}$ = 0.1V or $V_{CC}$ − 0.1V |
| | | 4.5 | 2.25 | 1.35 | 1.35 | | |
| | | 5.5 | 2.75 | 1.65 | 1.65 | | |
| $V_{OL}$ | Maximum LOW Level Output Voltage | 3.0 | 0.002 | 0.1 | 0.1 | V | $I_{OUT}$ = 50 μA |
| | | 4.5 | 0.001 | 0.1 | 0.1 | | |
| | | 5.5 | 0.001 | 0.1 | 0.1 | | |
| | | | | | | | $V_{IN}$ = $V_{IL}$ or $V_{IH}$ |
| | | 3.0 | | 0.32 | 0.44 | | $I_{OL}$ = 12 mA |
| | | 4.5 | | 0.36 | 0.44 | V | $I_{OL}$ = 24 mA |
| | | 5.5 | | 0.36 | 0.44 | | $I_{OL}$ = 24 mA (Note 2) |
| $I_{IN}$ (Note 4) | Maximum Input Leakage Current | 5.5 | | ±0.1 | ±1.0 | μA | $V_I$ = $V_{CC}$, GND |
| $I_{OHD}$ | Off-State Current | 5.5 | | +0.5 | +10.0 | μA | $V_{IN}$ = $V_{CC}$ |
| $I_{OLD}$ | Minimum Dynamic Output Current (Note 3) | 5.5 | | 50 | 75 | mA | $V_{OLD}$ = 1.65V Max |
| $I_{CC}$ (Note 4) | Maximum Quiescent Supply Current | 5.5 | | 4.0 | 20.0 | μA | $V_{IN}$ = $V_{CC}$ or GND |

**Note 2:** All outputs loaded; thresholds on input associated with output under test.

**Note 3:** Maximum test duration 2.0 ms, one output loaded at a time.

**Note 4:** $I_{IN}$ and $I_{CC}$ @ 3.0V are guaranteed to be less than or equal to the respective limit @ 5.5V $V_{CC}$.

## AC Electrical Characteristics

| Symbol | Parameter | $V_{CC}$ (V) (Note 5) | $T_A = +25°C$, $C_L = 50$ pF | | $T_A = -40°C$ to $+85°C$ | | Units |
|---|---|---|---|---|---|---|---|
| | | | Min | Max | Min | Min | |
| $t_{PLZ}$ | Propagation Delay | 3.3 | 2.0 | 14.5 | 2.0 | 14.5 | ns |
| | (Note 6) | 5.0 | 2.0 | 14.0 | 2.0 | 14.0 | |
| $t_{PZL}$ | Propagation Delay | 3.3 | 2.0 | 6.5 | 2.0 | 6.5 | ns |
| | | 5.0 | 2.0 | 5.0 | 2.0 | 5.0 | |

**Note 5:** Voltage Range 3.3 is 3.3V ± 0.3V

Voltage Range 5.0 is 5.0V ± 0.5V

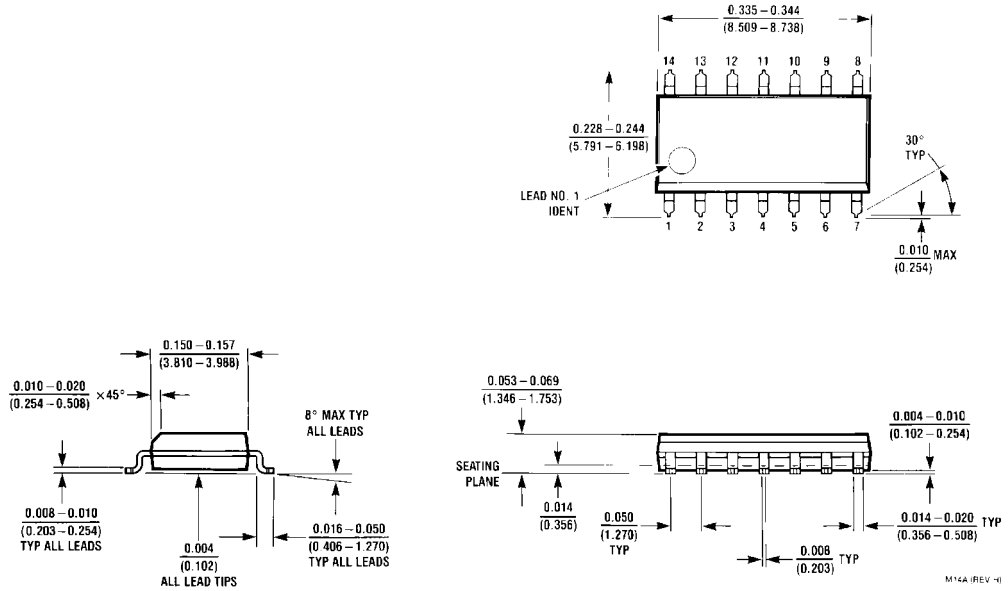
**Note 6:** AC Load is $V_{CC}$ x 2, $R_L = 1\ k\Omega$

$C_L = 50$ pF

## Capacitance

| Symbol | Parameter | Typ | Units | Conditions |
|---|---|---|---|---|
| $C_{IN}$ | Input Capacitance | 4.5 | pF | $V_{CC} = 5.0V$ |
| $C_{PD}$ | Power Dissipation Capacitance | 30.0 | pF | $V_{CC} = 5.0V$ |

## Physical Dimensions inches (millimeters) unless otherwise noted




**14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow Body**
**Package Number M14A**



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