

74AC10 • 74ACT10 Triple 3-Input NAND Gate

General Description

The AC/ACT10 contains three, 3-input NAND gates.

Features

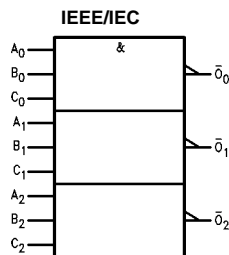
- I_{CC} reduced by 50% on 74AC only
- Outputs source/sink 24 mA

Ordering Code:

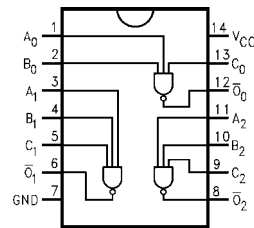
| Order Number | Package Number | Package Description |
|--------------|----------------|---|
| 74AC10SC | M14A | 14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150" Narrow Body |
| 74AC10SJ | M14D | 14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide |
| 74AC10MTC | MTC14 | 14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide |
| 74AC10PC | N14A | 14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide |
| 74ACT10SC | M14A | 14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150" Narrow Body |
| 74ACT10PC | N14A | 14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide |

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

Logic Symbol



Connection Diagram



Pin Descriptions

| Pin Names | Description |
|-----------------|-------------|
| A_n, B_n, C_n | Inputs |
| \bar{O}_n | Outputs |

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 |
| Junction Temperature (T_J) | |
| PDIP | 140°C |

Recommended Operating Conditions

| | |
|---|----------------|
| Supply Voltage (V_{CC}) | |
| AC | 2.0V to 6.0V |
| ACT | 4.5V to 5.5V |
| 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 ($\Delta V/\Delta t$) | |
| AC Devices | |
| V_{IN} from 30% to 70% of V_{CC} | |
| V_{CC} @ 3.3V, 4.5V, 5.5V | 125 mV/ns |
| Minimum Input Edge Rate ($\Delta V/\Delta t$) | |
| ACT Devices | |
| V_{IN} from 0.8V to 2.0V | |
| V_{CC} @ 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, with-
out 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 circuits outside databook specifications.

DC Electrical Characteristics for AC

| Symbol | Parameter | V_{CC} (V) | $T_A = +25^\circ\text{C}$ | | $T_A = -40^\circ\text{C to } +85^\circ\text{C}$ | | Units | Conditions |
|----------------------|--------------------------------------|-----------------|---------------------------|-------------------|---|---------------|--|---|
| | | | Typ | Guaranteed Limits | | | | |
| 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_{OH} | Minimum HIGH Level Output Voltage | 3.0 | 2.99 | 2.9 | 2.9 | V | $I_{OUT} = -50 \mu\text{A}$ | |
| | | 4.5 | 4.49 | 4.4 | 4.4 | | | |
| | | 5.5 | 5.49 | 5.4 | 5.4 | | | |
| | | | 3.0 | | 2.56 | 2.46 | V | $V_{IN} = V_{IL}$ or V_{IH} $I_{OH} = -12 \text{ mA}$ $I_{OH} = -24 \text{ mA}$ $I_{OH} = -24 \text{ mA}$ (Note 2) |
| | | | 4.5 | | 3.86 | 3.76 | | |
| | | | 5.5 | | 4.86 | 4.76 | | |
| V_{OL} | Maximum LOW Level Output Voltage | 3.0 | 0.002 | 0.1 | 0.1 | V | $I_{OUT} = 50 \mu\text{A}$ | |
| | | 4.5 | 0.001 | 0.1 | 0.1 | | | |
| | | 5.5 | 0.001 | 0.1 | 0.1 | | | |
| | | | 3.0 | | 0.36 | 0.44 | V | $V_{IN} = V_{IL}$ or V_{IH} $I_{OL} = 12 \text{ mA}$ $I_{OL} = 24 \text{ mA}$ $I_{OL} = 24 \text{ mA}$ (Note 2) |
| | | | 4.5 | | 0.36 | 0.44 | | |
| | | | 5.5 | | 0.36 | 0.44 | | |
| I_{IN} (Note 4) | Maximum Input Leakage Current | 5.5 | | ± 0.1 | ± 1.0 | μA | $V_I = V_{CC}$ or GND | |
| I_{OLD} | Minimum Dynamic | 5.5 | | | 75 | mA | $V_{OLD} = 1.65V$ Max | |
| I_{OHD} | Output Current (Note 3) | 5.5 | | | -75 | mA | $V_{OHD} = 3.85V$ Min | |
| I_{CC} (Note 4) | Maximum Quiescent Supply Current | 5.5 | | 2.0 | 20.0 | μA | $V_{IN} = V_{CC}$ or GND | |

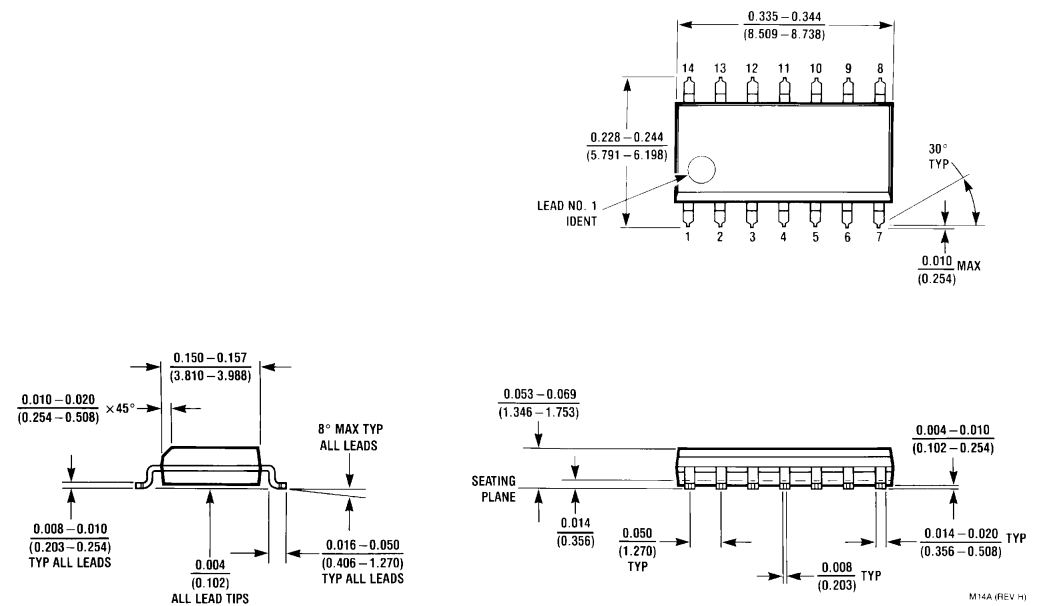
Note 2: All outputs loaded; thresholds on input associated with output under test.

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} .

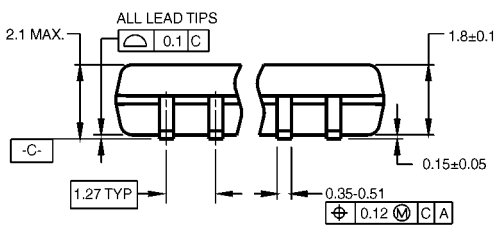
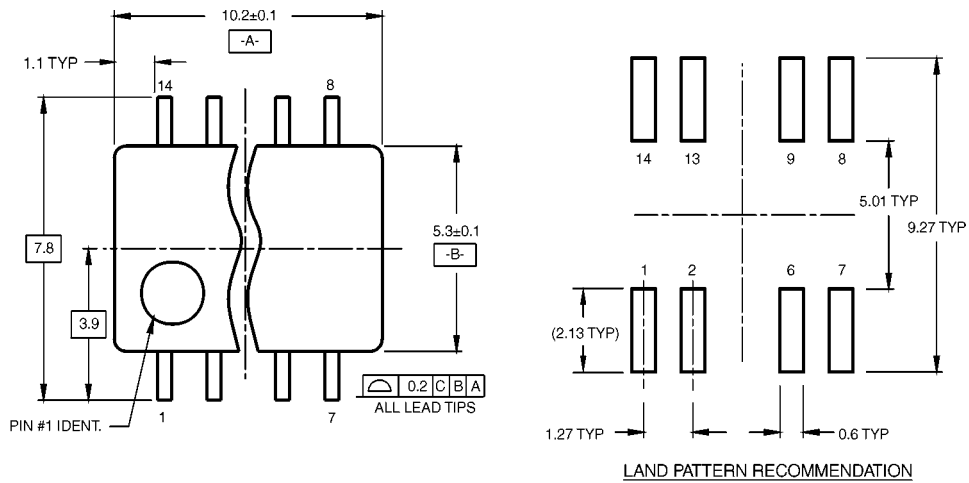
| DC Electrical Characteristics for ACT | | | | | | | | |
|--|--|------------------------------------|--|------------------------|---------------------------------|---|--|------------|
| Symbol | Parameter | V _{CC} (V) | T _A = +25°C | | T _A = -40°C to +85°C | | Units | Conditions |
| | | | Typ | Guaranteed Limits | | | | |
| V _{IH} | Minimum HIGH Level Input Voltage | 4.5 | 1.5 | 2.0 | 2.0 | V | V _{OUT} = 0.1V or V _{CC} - 0.1V | |
| | | 5.5 | 1.5 | 2.0 | 2.0 | | | |
| V _{IL} | Maximum LOW Level Input Voltage | 4.5 | 1.5 | 0.8 | 0.8 | V | V _{OUT} = 0.1V or V _{CC} - 0.1V | |
| | | 5.5 | 1.5 | 0.8 | 0.8 | | | |
| V _{OH} | Minimum HIGH Level Output Voltage | 4.5 | 4.49 | 4.4 | 4.4 | V | I _{OUT} = -50 μA | |
| | | 5.5 | 5.49 | 5.4 | 5.4 | | | |
| | | 4.5 | | 3.86 | 3.76 | V | V _{IN} = V _{IL} or V _{IH} I _{OH} = -24 mA | |
| V _{OL} | Maximum LOW Level Output Voltage | 4.5 | 0.001 | 0.1 | 0.1 | V | I _{OUT} = 50 μA | |
| | | 5.5 | 0.001 | 0.1 | 0.1 | | | |
| | | 4.5 | | 0.36 | 0.44 | V | V _{IN} = V _{IL} or V _{IH} I _{OL} = 24 mA | |
| I _{IN} | Maximum Input Leakage Current | 5.5 | | ±0.1 | ±1.0 | μA | V _I = V _{CC} , GND | |
| | | | | | | | | |
| I _{CC1} | Maximum I _{CC} /Input | 5.5 | 0.6 | | 1.5 | mA | V _I = V _{CC} - 2.1V | |
| I _{OLD} | Minimum Dynamic Output Current (Note 6) | 5.5 | | | 75 | mA | V _{OLD} = 1.65V Max | |
| I _{OHD} | | 5.5 | | | -75 | mA | V _{OHD} = 3.85V Min | |
| I _{CC} | Maximum Quiescent Supply Current | 5.5 | | 4.0 | 40.0 | μA | V _{IN} = V _{CC} or GND | |
| Note 5: All outputs loaded; thresholds on input associated with output under test. Note 6: Maximum test duration 2.0 ms, one output loaded at a time. | | | | | | | | |
| AC Electrical Characteristics for AC | | | | | | | | |
| Symbol | Parameter | V _{CC} (V) (Note 7) | T _A = +25°C C _L = 50 pF | | | T _A = -40°C to +85°C C _L = 50 pF | | Units |
| | | | Min | Typ | Max | Min | Max | |
| t _{PLH} | Propagation Delay | 3.3 5.0 | 1.5 1.5 | 6.0 4.5 | 9.5 7.0 | 1.0 1.0 | 10.5 8.0 | ns |
| t _{PHL} | Propagation Delay | 3.3 5.0 | 1.5 1.5 | 5.5 4.0 | 8.5 6.0 | 1.0 1.0 | 10.0 6.5 | ns |
| Note 7: Voltage Range 3.3 is 3.3V ± 0.3V Voltage Range 5.0 is 5.0V ± 0.5V | | | | | | | | |
| AC Electrical Characteristics for ACT | | | | | | | | |
| Symbol | Parameter | V _{CC} (V) (Note 8) | T _A = +25°C C _L = 50 pF | | | T _A = -40°C to +85°C C _L = 50 pF | | Units |
| | | | Min | Typ | Max | Min | Max | |
| t _{PLH} | Propagation Delay | 5.0 | 1.0 | 6.5 | 9.0 | 1.0 | 10.0 | ns |
| t _{PHL} | Propagation Delay | 5.0 | 1.0 | 6.5 | 9.0 | 1.0 | 9.5 | ns |
| Note 8: Voltage Range 5.0 is 5.0V ± 0.5V | | | | | | | | |
| Capacitance | | | | | | | | |
| Symbol | Parameter | Typ | Units | Conditions | | | | |
| C _{IN} | Input Capacitance | 4.5 | pF | V _{CC} = OPEN | | | | |
| C _{PD} | Power Dissipation Capacitance | 25.0 | pF | V _{CC} = 5.0V | | | | |

Physical Dimensions inches (millimeters) unless otherwise noted

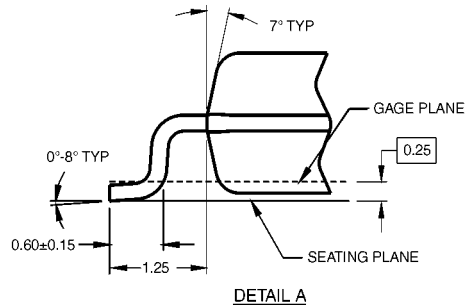
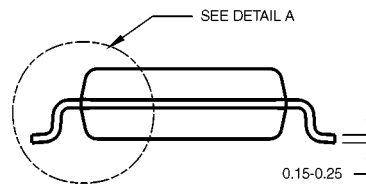


**14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150" Narrow Body
Package Number M14A**

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



DIMENSIONS ARE IN MILLIMETERS



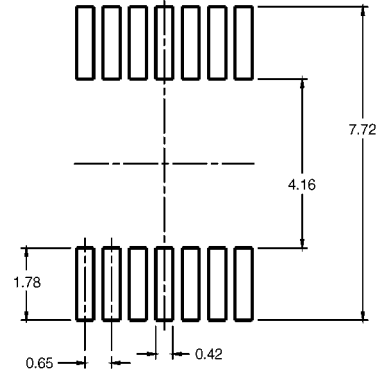
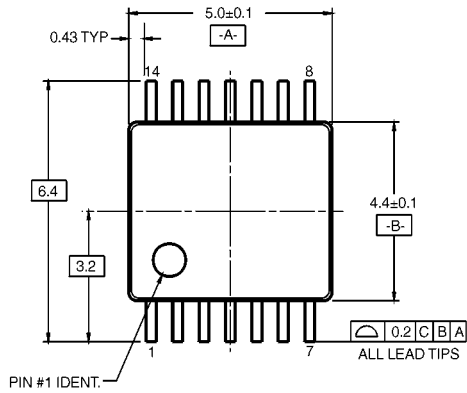
NOTES:

- A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

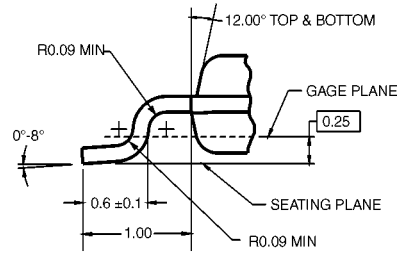
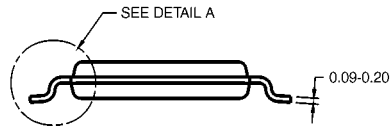
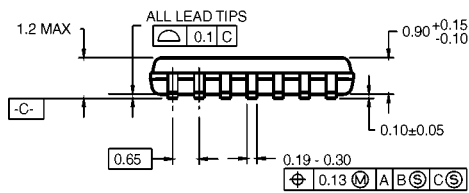
M14DRevB1

**14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
Package Number M14D**

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



LAND PATTERN RECOMMENDATION



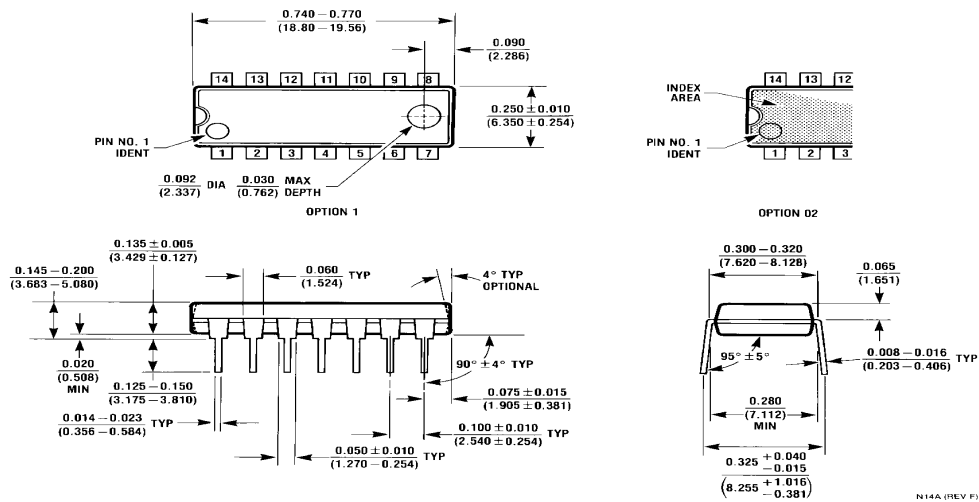
DETAIL A

- NOTES:
 A. CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AB, REF NOTE 6, DATE 7/93.
 B. DIMENSIONS ARE IN MILLIMETERS.
 C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
 D. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1982.

MTC14RevC3

**14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
 Package Number MTC14**

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



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