

## MM74C901 • MM74C902

### Hex Inverting TTL Buffer • Hex Non-Inverting TTL Buffer

#### General Description

The MM74C901 and MM74C902 hex buffers employ complementary MOS to achieve wide supply operating range, low power consumption, and high noise immunity. These buffers provide direct interface from PMOS into CMOS or TTL and direct interface from CMOS to TTL or CMOS operating at a reduced  $V_{CC}$  supply.

#### Features

- Wide supply voltage range: 3.0V to 15V
- Guaranteed noise margin: 1.0V
- High noise immunity:  $0.45 V_{CC}$  (typ.)
- TTL compatibility: Fan out of 2 driving standard TTL

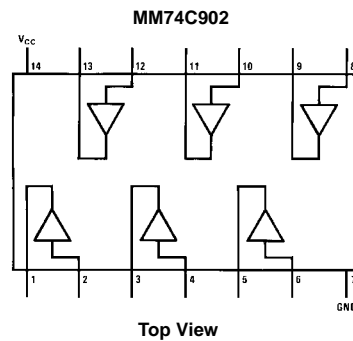
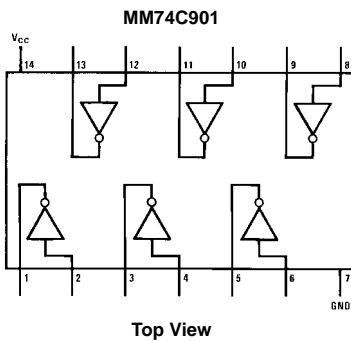
#### Ordering Code:

| Order Number | Package Number | Package Description  |
|--------------|----------------|--|
| MM74C901M    | M14A           | 14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150" Narrow |
| MM74C901N    | N14A           | 14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-011, 0.300" Wide       |
| MM74C902M    | M14A           | 14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150" Narrow |
| MM74C902N    | N14A           | 14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-011, 0.300" Wide       |

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

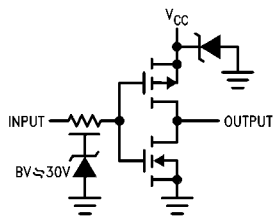
#### Connection Diagrams

Pin Assignments for DIP and SOIC

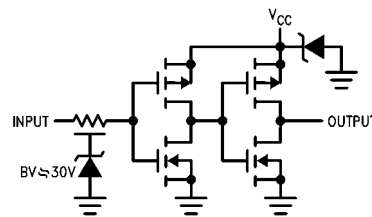


#### Logic Diagrams

**MM74C901**  
CMOS to TTL Inverting Buffer



**MM74C902**  
CMOS to TTL Buffer



| <b>Absolute Maximum Ratings</b> (Note 1) |                          | Operating $V_{CC}$ Range   | 3.0V to 15V |
|--|--------------------------|----------------------------|-------------|
| Voltage at Any Pin                       | -0.3V to $V_{CC} + 0.3V$ | Absolute Maximum $V_{CC}$  | 18V         |
| Voltage at Any Input Pin                 |                          | Lead Temperature ( $T_L$ ) |             |
| MM74C901                                 | -0.3V to +15V            | (Soldering, 10 seconds)    | 260°C       |
| MM74C902                                 | -0.3V to +15V            |                            |             |
| Storage Temperature Range ( $T_S$ )      | -65°C to +150°C          |                            |             |
| Power Dissipation ( $P_D$ )              |                          |                            |             |
| Dual-In-Line                             | 700 mW                   |                            |             |
| Small Outline                            | 500 mW                   |                            |             |
| Operating Temperature Range ( $T_A$ )    |                          |                            |             |
| MM74C901, MM74C902,                      | -40°C to +85°C           |                            |             |

**Note 1:** "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. Except for "Operating Temperature Range" they are not meant to imply that the devices should be operated at these limits. The table of "Electrical Characteristics" provides conditions for actual device operation.

## DC Electrical Characteristics

Min/Max limits apply across temperature range unless otherwise noted

| Symbol  | Parameter                         | Conditions   | Min            | Typ            | Max        | Units   |
|---|-----------------------------------|--|----------------|----------------|------------|---------|
| <b>CMOS TO CMOS</b>   |                                   |  |                |                |            |         |
| $V_{IN(1)}$   | Logical "1" Input Voltage         | $V_{CC} = 5.0V$<br>$V_{CC} = 10V$  | 3.5<br>8.0     |                |            | V<br>V  |
| $V_{IN(0)}$   | Logical "0" Input Voltage         | $V_{CC} = 5.0V$<br>$V_{CC} = 10V$  |                |                | 1.5<br>2.0 | V<br>V  |
| $V_{OUT(1)}$  | Logical "1" Output Voltage        | $V_{CC} = 5.0V, I_O = -10 \mu A$<br>$V_{CC} = 10V, I_O = -10 \mu A$      | 4.5<br>9.0     |                |            | V<br>V  |
| $V_{OUT(0)}$  | Logical "0" Output Voltage        | $V_{CC} = 5.0V$<br>$V_{CC} = 10V$  |                |                | 0.5<br>1.0 | V<br>V  |
| $I_{IN(1)}$   | Logical "1" Input Current         | $V_{CC} = 15V, V_{IN} = 15V$   |                | 0.005          | 1.0        | $\mu A$ |
| $I_{IN(0)}$   | Logical "0" Input Current         | $V_{CC} = 15V, V_{IN} = 0V$  | -1.0           | -0.005         |            | $\mu A$ |
| $I_{CC}$  | Supply Current                    | $V_{CC} = 15V$   |                | 0.05           | 15         | $\mu A$ |
| <b>TTL TO CMOS</b>  |                                   |  |                |                |            |         |
| $V_{IN(1)}$   | Logical "1" Input Voltage         | $V_{CC} = 4.75V$   |                | $V_{CC} - 1.5$ |            | V       |
| $V_{IN(0)}$   | Logical "0" Input Voltage         | $V_{CC} = 4.75V$   |                |                | 0.8        | V       |
| <b>CMOS TO TTL</b>  |                                   |  |                |                |            |         |
| $V_{IN(1)}$   | Logical "1" Input Voltage         |  |                |                |            |         |
|   | MM74C901                          | $V_{CC} = 4.75V$   | 4.25           |                |            | V       |
|   | MM74C902                          | $V_{CC} = 4.75V$   | $V_{CC} - 1.5$ |                |            | V       |
| $V_{IN(0)}$   | Logical "0" Input Voltage         |  |                |                |            |         |
|   | MM74C901                          | $V_{CC} = 4.75V$   |                |                | 1.0        | V       |
|   | MM74C902                          | $V_{CC} = 4.75V$   |                |                | 1.5        | V       |
| $V_{OUT(1)}$  | Logical "1" Output Voltage        | $V_{CC} = 4.75V, I_O = -800 \mu A$                                       | 2.4            |                |            | V       |
| $V_{OUT(0)}$  | Logical "0" Output Voltage        |  |                |                |            |         |
|   | MM74C901                          | $V_{CC} = 4.75V, I_O = 2.6 mA$   |                |                | 0.4        | V       |
|   | MM74C902                          | $V_{CC} = 4.75V, I_O = 3.2 mA$   |                |                | 0.4        | V       |
| <b>OUTPUT DRIVE (See Family Characteristics Data Sheet) (Short Circuit Current)</b> |                                   |  |                |                |            |         |
| <b>(MM74C901)</b>   |                                   |  |                |                |            |         |
| $I_{SOURCE}$  | Output Source Current (P-Channel) | $V_{CC} = 5.0V, V_{OUT} = 0V$<br>$T_A = 25^\circ C, V_{IN} = 0V$         | -5.0           |                |            | mA      |
| $I_{SOURCE}$  | Output Source Current (P-Channel) | $V_{CC} = 10V, V_{OUT} = 0V$<br>$T_A = 25^\circ C, V_{IN} = 0V$          | -20            |                |            | mA      |
| $I_{SINK}$  | Output Sink Current (N-Channel)   | $V_{CC} = 5.0V, V_{OUT} = V_{CC}$<br>$T_A = 25^\circ C, V_{IN} = V_{CC}$ | 9.0            |                |            | mA      |
| $I_{SINK}$  | Output Sink Current (N-Channel)   | $V_{CC} = 5.0V, V_{OUT} = 0.4V$<br>$T_A = 25^\circ C, V_{IN} = V_{CC}$   | 3.8            |                |            | mA      |
| <b>(MM74C902)</b>   |                                   |  |                |                |            |         |

**DC Electrical Characteristics** (Continued)

| Symbol       | Parameter                            | Conditions   | Min  | Typ | Max | Units |
|--------------|--------------------------------------|--|------|-----|-----|-------|
| $I_{SOURCE}$ | Output Source Current<br>(P-Channel) | $V_{CC} = 5.0V, V_{OUT} = 0V$<br>$T_A = 25^\circ C, V_{IN} = V_{CC}$ | -5.0 |     |     | mA    |
| $I_{SOURCE}$ | Output Source Current<br>(P-Channel) | $V_{CC} = 10V, V_{OUT} = 0V$<br>$T_A = 25^\circ C, V_{IN} = V_{CC}$  | -20  |     |     | mA    |
| $I_{SINK}$   | Output Sink Current<br>(N-Channel)   | $V_{CC} = 5.0V, V_{OUT} = V_{CC}$<br>$T_A = 25^\circ C, V_{IN} = 0V$ | 9.0  |     |     | mA    |
| $I_{SINK}$   | Output Sink Current<br>(N-Channel)   | $V_{CC} = 5.0V, V_{OUT} = 0.4V$<br>$T_A = 25^\circ C, V_{IN} = 0V$   | 3.8  |     |     | mA    |

**AC Electrical Characteristics** (Note 2)

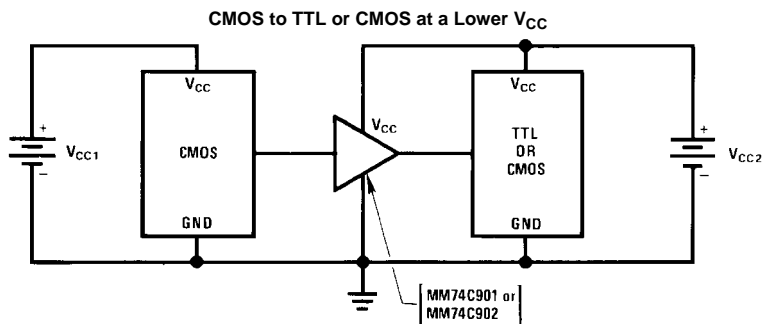
$T_A = 25^\circ C, C_L = 50$  pF, unless otherwise noted

| Symbol          | Parameter                                  | Conditions                        | Min | Typ      | Max      | Units |
|-----------------|--|-----------------------------------|-----|----------|----------|-------|
| <b>MM74C901</b> |  |                                   |     |          |          |       |
| $t_{pd1}$       | Propagation Delay Time<br>to a Logical "1" | $V_{CC} = 5.0V$<br>$V_{CC} = 10V$ |     | 38<br>22 | 70<br>30 | ns    |
| $t_{pd0}$       | Propagation Delay Time<br>to a Logical "0" | $V_{CC} = 5.0V$<br>$V_{CC} = 10V$ |     | 21<br>13 | 35<br>20 | ns    |
| $C_{IN}$        | Input Capacitance                          | Any Input (Note 3)                |     | 14       |          | pF    |
| $C_{PD}$        | Power Dissipation Capacity                 | Per Buffer (Note 4)               |     | 30       |          | pF    |
| <b>MM74C902</b> |  |                                   |     |          |          |       |
| $t_{pd1}$       | Propagation Delay Time<br>to a Logical "1" | $V_{CC} = 5.0V$<br>$V_{CC} = 10V$ |     | 57<br>27 | 90<br>40 | ns    |
| $t_{pd0}$       | Propagation Delay Time<br>to a Logical "0" | $V_{CC} = 5.0V$<br>$V_{CC} = 10V$ |     | 54<br>25 | 90<br>40 | ns    |
| $C_{IN}$        | Input Capacitance                          | Any Input (Note 3)                |     | 5.0      |          | pF    |
| $C_{PD}$        | Power Dissipation Capacity                 | Per Buffer (Note 4)               |     | 50       |          | pF    |

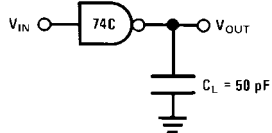
**Note 2:** AC Parameters are guaranteed by DC correlated testing.

**Note 3:** Capacitance is guaranteed by periodic testing.

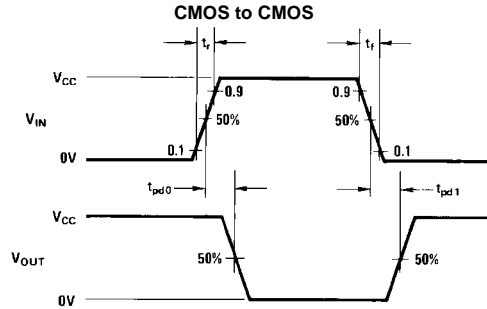
**Note 4:**  $C_{PD}$  determines the no load AC power consumption of any CMOS device. For complete explanation see Family Characteristics application note AN-90.

**Typical Application**

### AC Test Circuit and Switching Time Waveforms

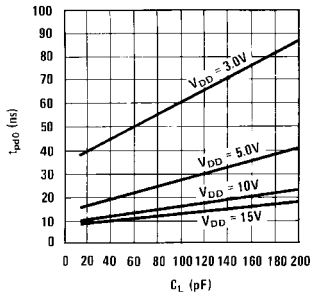


Note: Delays measured with input  $t_r, t_f = 20 \text{ ns}$ .

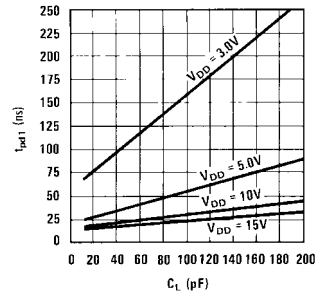


### Typical Performance Characteristics

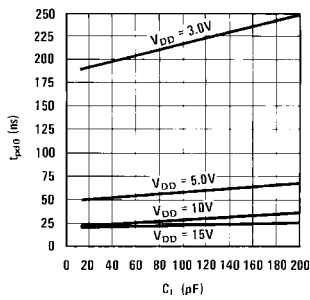
Typical Propagation Delay to a Logical "0" for the MM74C901



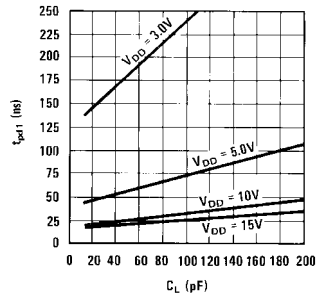
Typical Propagation Delay to a Logical "1" for the MM74C901



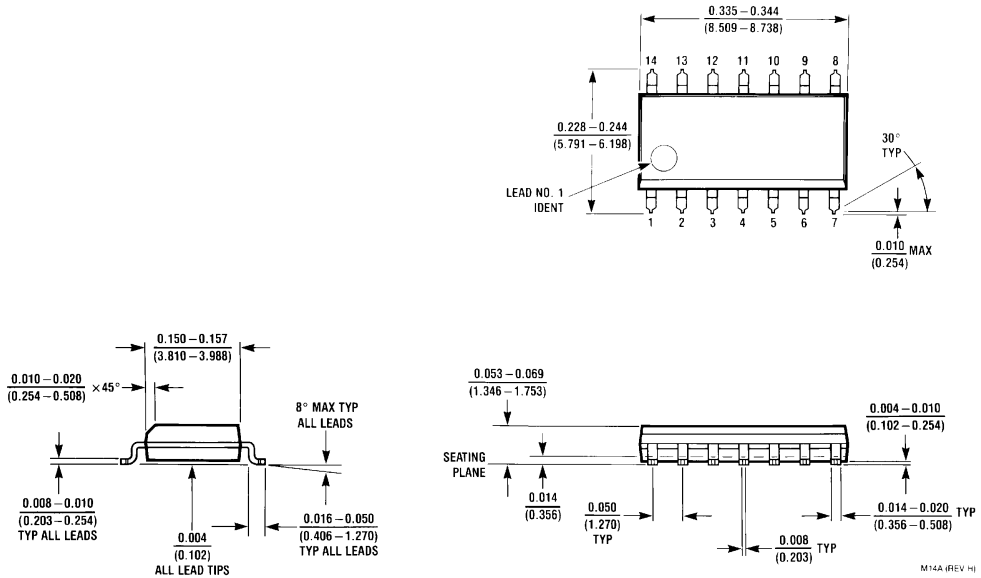
Typical Propagation Delay to a Logical "0" for the MM74C902



Typical Propagation Delay to a Logical "1" for the MM74C902



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



**14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-120, 0.150" Narrow  
Package Number M14A**

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



14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide Package Number N14A

**LIFE SUPPORT POLICY**

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

[www.fairchildsemi.com](http://www.fairchildsemi.com)