

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

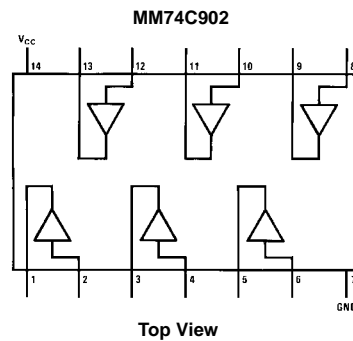
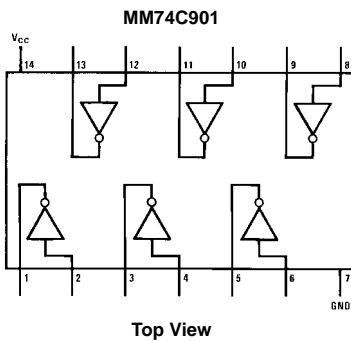
Ordering Code:

| 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.

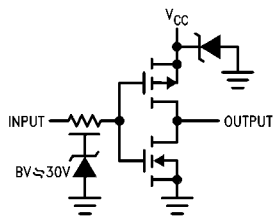
Connection Diagrams

Pin Assignments for DIP and SOIC

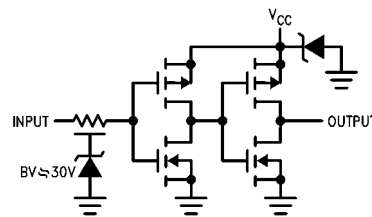


Logic Diagrams

MM74C901
CMOS to TTL Inverting Buffer



MM74C902
CMOS to TTL Buffer



| Absolute Maximum Ratings (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) | 260°C |
| MM74C901 | -0.3V to +15V | (Soldering, 10 seconds) | |
| 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 |
|---|-----------------------------------|--|------------------------|----------------|------------|---------|
| CMOS TO CMOS | | | | | | |
| $V_{IN(1)}$ | Logical "1" Input Voltage | $V_{CC} = 5.0V$ $V_{CC} = 10V$ | 3.5 8.0 | | | V |
| $V_{IN(0)}$ | Logical "0" Input Voltage | $V_{CC} = 5.0V$ $V_{CC} = 10V$ | | | 1.5 2.0 | V |
| $V_{OUT(1)}$ | Logical "1" Output Voltage | $V_{CC} = 5.0V, I_O = -10 \mu A$ $V_{CC} = 10V, I_O = -10 \mu A$ | 4.5 9.0 | | | V |
| $V_{OUT(0)}$ | Logical "0" Output Voltage | $V_{CC} = 5.0V$ $V_{CC} = 10V$ | | | 0.5 1.0 | V |
| $I_{IN(1)}$ | Logical "1" Input Current | $V_{CC} = 15V, V_{IN} = 15V$ | | 0.005 | 1.0 | μA |
| $I_{IN(0)}$ | Logical "0" Input Current | $V_{CC} = 15V, V_{IN} = 0V$ | -1.0 | -0.005 | | μA |
| I_{CC} | Supply Current | $V_{CC} = 15V$ | | 0.05 | 15 | μA |
| TTL TO CMOS | | | | | | |
| $V_{IN(1)}$ | 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 |
| CMOS TO TTL | | | | | | |
| $V_{IN(1)}$ | Logical "1" Input Voltage | MM74C901 $V_{CC} = 4.75V$ MM74C902 $V_{CC} = 4.75V$ | 4.25 $V_{CC} - 1.5$ | | | V |
| $V_{IN(0)}$ | Logical "0" Input Voltage | MM74C901 $V_{CC} = 4.75V$ MM74C902 $V_{CC} = 4.75V$ | | | 1.0 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 $V_{CC} = 4.75V, I_O = 2.6 mA$ MM74C902 $V_{CC} = 4.75V, I_O = 3.2 mA$ | | | 0.4 0.4 | V |
| OUTPUT DRIVE (See Family Characteristics Data Sheet) (Short Circuit Current) | | | | | | |
| (MM74C901) | | | | | | |
| I_{SOURCE} | Output Source Current (P-Channel) | $V_{CC} = 5.0V, V_{OUT} = 0V$ $T_A = 25^\circ C, V_{IN} = 0V$ | -5.0 | | | mA |
| I_{SOURCE} | Output Source Current (P-Channel) | $V_{CC} = 10V, V_{OUT} = 0V$ $T_A = 25^\circ C, V_{IN} = 0V$ | -20 | | | mA |
| I_{SINK} | Output Sink Current (N-Channel) | $V_{CC} = 5.0V, V_{OUT} = V_{CC}$ $T_A = 25^\circ C, V_{IN} = V_{CC}$ | 9.0 | | | mA |
| I_{SINK} | Output Sink Current (N-Channel) | $V_{CC} = 5.0V, V_{OUT} = 0.4V$ $T_A = 25^\circ C, V_{IN} = V_{CC}$ | 3.8 | | | mA |
| (MM74C902) | | | | | | |

DC Electrical Characteristics (Continued)

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

AC Electrical Characteristics (Note 2)

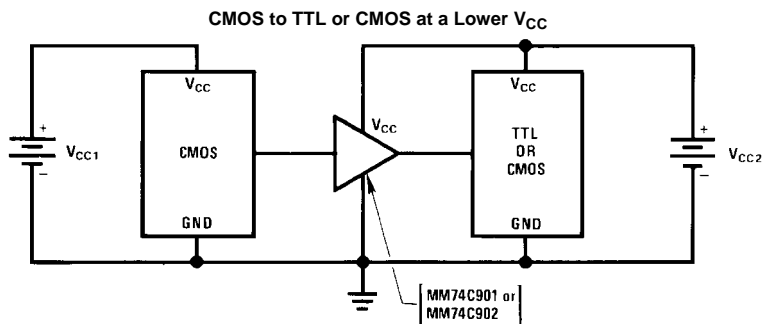
$T_A = 25^\circ C, C_L = 50$ pF, unless otherwise noted

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

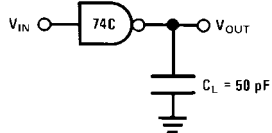
Note 3: Capacitance is guaranteed by periodic testing.

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.

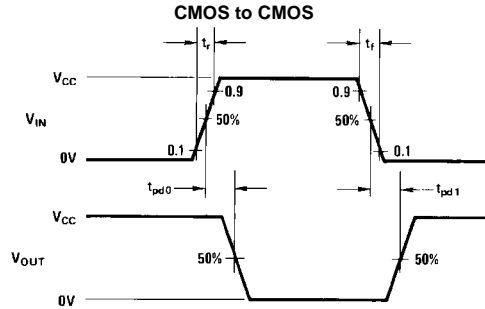
Typical Application

Note: $V_{CC1} = V_{CC2}$

AC Test Circuit and Switching Time Waveforms

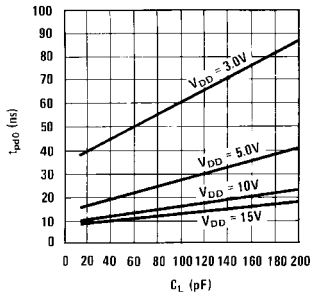


Note: Delays measured with input $t_r, t_f = 20 \text{ ns}$.

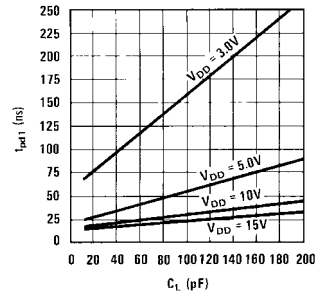


Typical Performance Characteristics

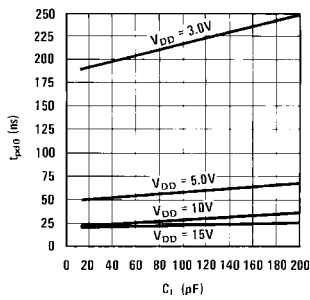
Typical Propagation Delay to a Logical "0" for the MM74C901



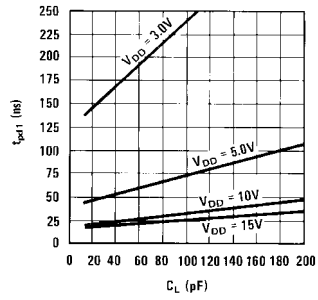
Typical Propagation Delay to a Logical "1" for the MM74C901



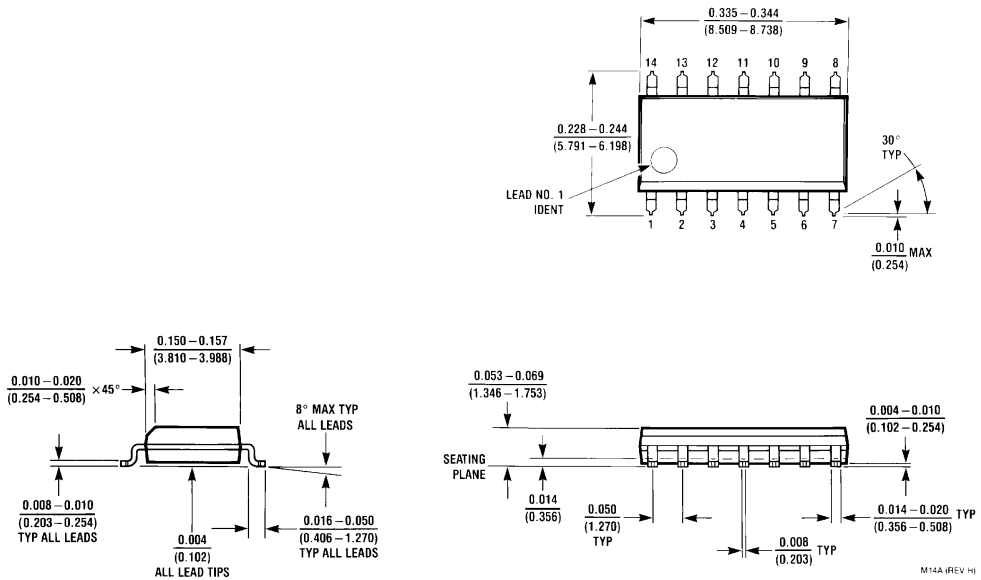
Typical Propagation Delay to a Logical "0" for the MM74C902



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

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