

MM74C902 Hex Non-Inverting TTL Buffer

General Description

The MM74C902 hex buffer employs complementary MOS to achieve wide supply operating range, low power consumption, and high noise immunity. This buffer provides direct interface from PMOS into CMOS or TTL and direct interface from CMOS to TTL or CMOS operating at a reduced V_{CC} supply.

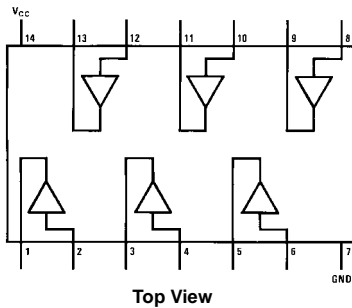
Features

- 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

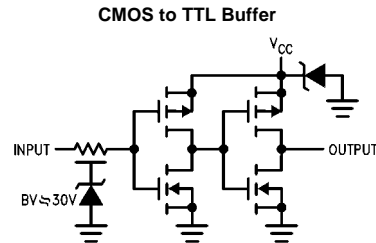
Ordering Code:

Order Number	Package Number	Package Description
MM74C902M	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
MM74C902N	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

Connection Diagram



Logic Diagram



Absolute Maximum Ratings(Note 1)

Voltage at Any Pin	-0.3V to $V_{CC} + 0.3V$
Voltage at Any Input Pin	-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)	-40°C to +85°C
Operating V_{CC} Range	3.0V to 15V
Absolute Maximum V_{CC}	18V
Lead Temperature (T_L)	
(Soldering, 10 seconds)	260°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
$V_{IN(0)}$	Logical "0" Input Voltage	$V_{CC} = 5.0V$ $V_{CC} = 10V$			1.5 2.0	V 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
$V_{OUT(0)}$	Logical "0" Output Voltage	$V_{CC} = 5.0V$ $V_{CC} = 10V$			0.5 1.0	V 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	$V_{CC} = 4.75V$	$V_{CC} - 1.5$		1.5	V
$V_{IN(0)}$	Logical "0" Input Voltage	$V_{CC} = 4.75V$				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	$V_{CC} = 4.75V, I_O = 3.2 mA$			0.4	V
OUTPUT DRIVE (See Family Characteristics Data Sheet) (Short Circuit Current)						
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)

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

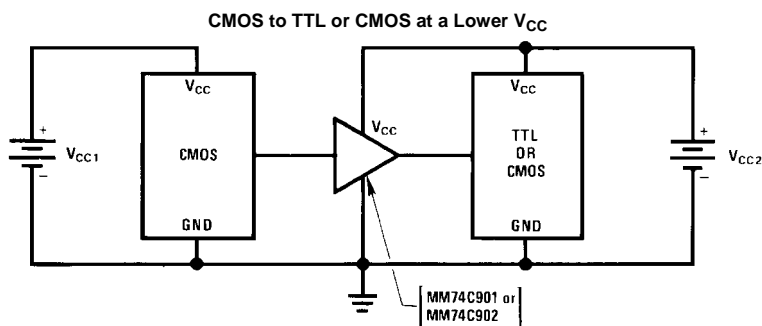
Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_{pd1}	Propagation Delay Time to a Logical "1"	$V_{CC} = 5.0\text{V}$		57	90	ns
		$V_{CC} = 10\text{V}$		27	40	ns
t_{pd0}	Propagation Delay Time to a Logical "0"	$V_{CC} = 5.0\text{V}$		54	90	ns
		$V_{CC} = 10\text{V}$		25	40	ns
C_{IN}	Input Capacitance	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.

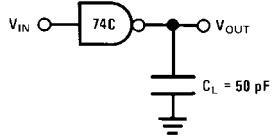
Note 4: C_{PD} determines the no load AC power consumption of any CMOS device. For complete explanation see Family Characteristics application note AN-90.

Typical Application

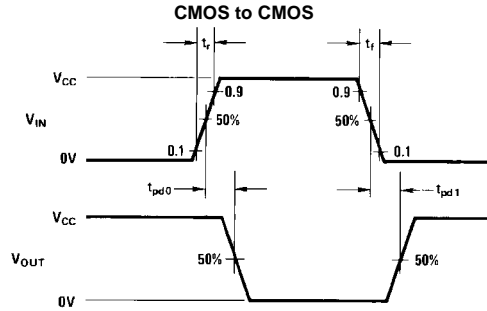


Note: $V_{CC1} = V_{CC2}$

AC Test Circuit and Switching Time Waveforms

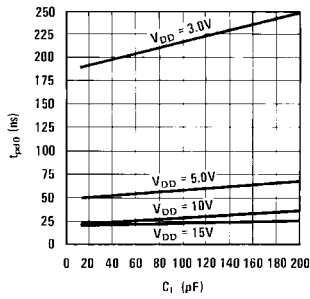


Note: Delays measured with input $t_r, t_f = 20 \text{ ns}$.

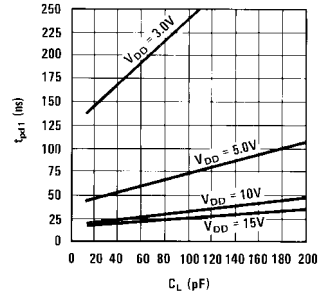


Typical Performance Characteristics

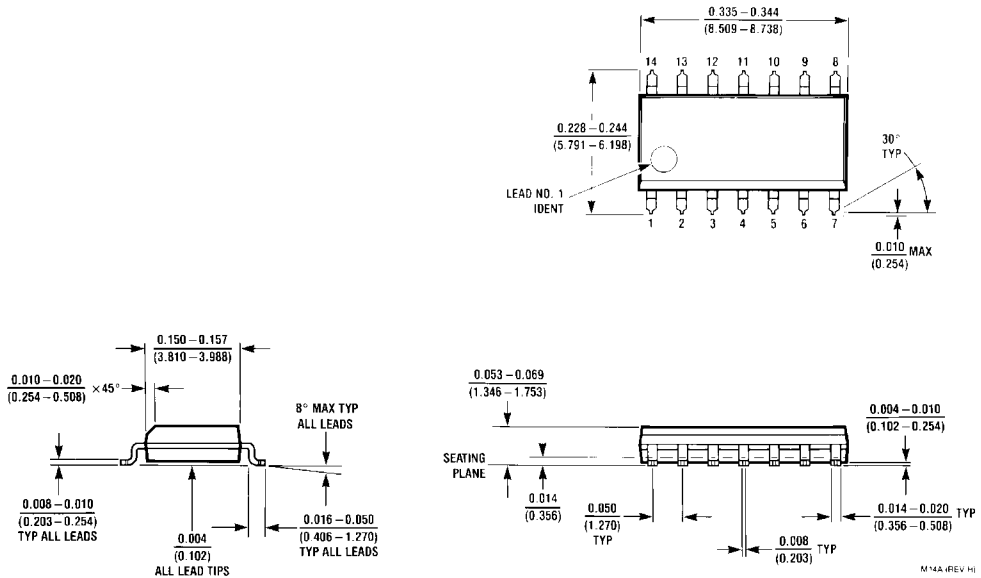
Typical Propagation Delay to a Logical "0"



Typical Propagation Delay to a Logical "1"

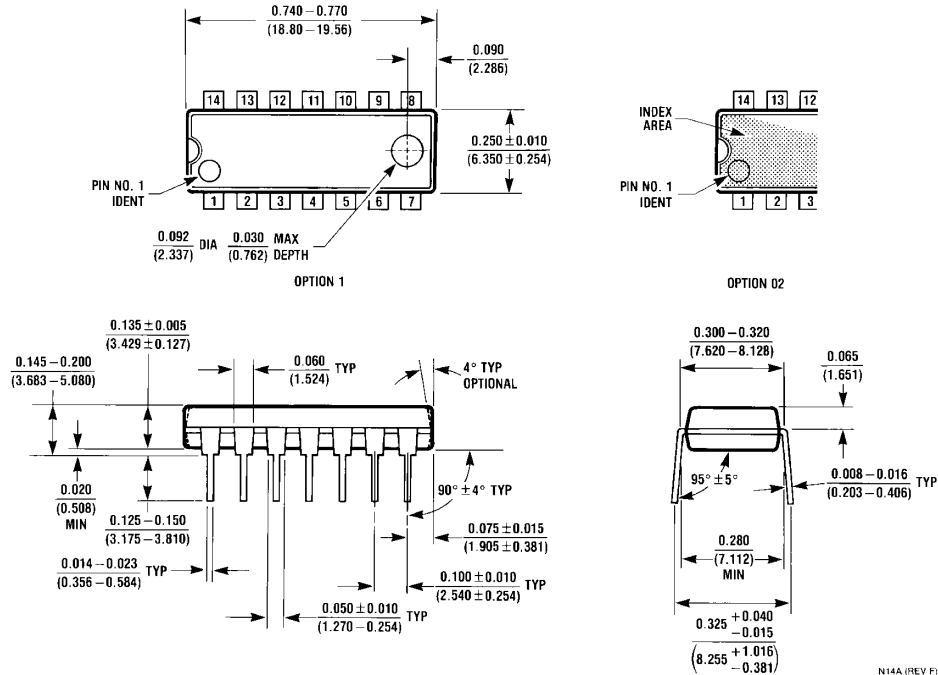


Physical Dimensions inches (millimeters) unless otherwise noted



**14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 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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