

MM54C901/MM74C901 Hex Inverting TTL Buffer **MM54C902/MM74C902 Hex Non-Inverting TTL Buffer** **MM54C903/MM74C903 Hex Inverting CMOS Buffer** **MM54C904/MM74C904 Hex Non-Inverting CMOS Buffer**

General Description

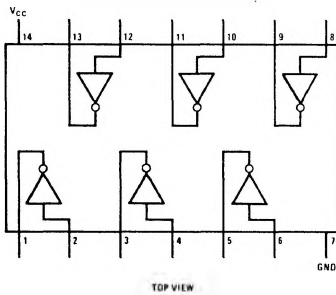
These hex buffers employ complementary MOS to achieve wide supply operating range, low power consumption, and high noise immunity. These buffers provide direct interface from PMOS into CMOS or TTL and direct interface from CMOS to TTL or CMOS operating at a reduced V_{CC} supply. For specific applications see MOS Brief 18 in the back of this catalog.

Features

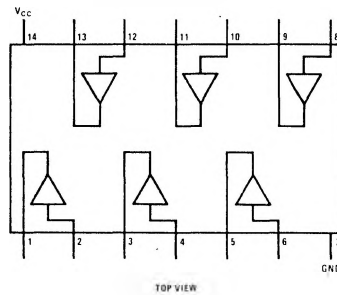
- Wide supply voltage range 3.0V to 15V
- Guaranteed noise margin 1.0V
- High noise immunity 0.45 V_{CC} (typ.)
- TTL compatibility fan out of 2
driving standard TTL

Connection and Logic Diagrams

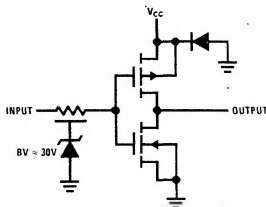
MM54C901/MM74C901
MM54C903/MM74C903



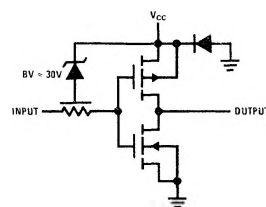
MM54C902/MM74C902
MM54C904/MM74C904



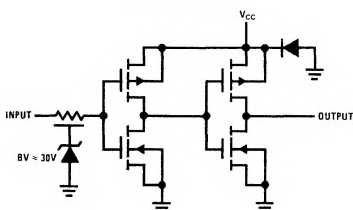
MM54C901/MM74C901
CMOS to TTL Inverting Buffer



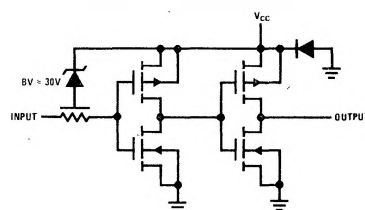
MM54C903/MM74C903
PMOS to TTL or CMOS Inverting Buffer



MM54C902/MM74C902
CMOS to TTL Buffer



MM54C904/MM74C904
PMOS to TTL or CMOS Buffer



Absolute Maximum Ratings (Note 1)

Voltage at Any Pin	-0.3V to $V_{CC} + 0.3V$
Voltage at any Input Pin	
MM54C901/MM74C901	-0.3V to +15V
MM54C902/MM74C902	-0.3V to +15V
MM54C903/MM74C903	$V_{CC} - 17V$ to $V_{CC} + 0.3V$
MM54C904/MM74C904	$V_{CC} - 17V$ to $V_{CC} + 0.3V$
Storage Temperature Range	-65°C to +150°C
Package Dissipation	500mW

Operating Temperature Range	
MM54C901, MM54C902,	
MM54C903, MM54C904	-55°C to +125°C
MM74C901, MM74C902,	
MM74C903, MM74C904	-40°C to +85°C
Operating V_{CC} Range	3.0V to 15V
Absolute Maximum V_{CC}	18V
Lead Temperature (Soldering, 10 sec.)	300°C

DC Electrical Characteristics Max./min. limits apply across temperature range, unless otherwise noted.

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	54C $V_{CC} = 4.5V$ 74C $V_{CC} = 4.75V$	$V_{CC} - 1.5$ $V_{CC} - 1.5$			V V
$V_{IN(0)}$ Logical "0" Input Voltage	54C $V_{CC} = 4.5V$ 74C $V_{CC} = 4.75V$			0.8 0.8	V V
CMOS to TTL					
$V_{IN(1)}$ Logical "1" Input Voltage	MM54C901, MM54C903 MM54C902, MM54C904 MM74C901, MM74C903 MM74C902, MM74C904	$V_{CC} = 4.5V$ $V_{CC} = 4.5V$ $V_{CC} = 4.75V$ $V_{CC} = 4.75V$	4.0 $V_{CC} - 1.5$ 4.25 $V_{CC} - 1.5$		V V V V
$V_{IN(0)}$ Logical "0" Input Voltage	MM54C901, MM54C903 MM54C902, MM54C904 MM74C901, MM74C903 MM74C902, MM74C904	$V_{CC} = 4.5V$ $V_{CC} = 4.5V$ $V_{CC} = 4.75V$ $V_{CC} = 4.75V$		1.0 1.5 1.0 1.5	V V V V
$V_{OUT(1)}$ Logical "1" Output Voltage	54C $V_{CC} = 4.5V, I_O = -800\mu A$ 74C $V_{CC} = 4.75V, I_O = -800\mu A$	2.4 2.4			V V
$V_{OUT(0)}$ Logical "0" Output Voltage	MM54C901, MM54C903 MM54C902, MM54C904 MM74C901, MM74C903 MM74C902, MM74C904	$V_{CC} = 4.5V, I_O = 2.6mA$ $V_{CC} = 4.5V, I_O = 3.2mA$ $V_{CC} = 4.75V, I_O = 2.6mA$ $V_{CC} = 4.75V, I_O = 3.2mA$		0.4 0.4 0.4 0.4	V V V V
Output Drive (See 54C/74C Family Characteristics Data Sheet) (Short Circuit Current) (MM54C901/MM74C901, MM54C903/MM74C903)					
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

DC Electrical Characteristics (cont'd)

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Drive (See 54C/74C Family Characteristics Data Sheet) (Short Circuit Current) (MM54C902/MM74C902, MM54C903/MM74C903)					
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 $T_A = 25^\circ C, C_L = 50pF$, unless otherwise noted.

Parameter	Conditions	Min.	Typ.	Max.	Units
MM54C901/MM74C901, MM54C903/MM74C903					
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 2)		14		pF
C_{PD} Power Dissipation Capacity	(Note 3) Per Buffer		30		pF
MM54C902/MM74C902, MM54C904/MM74C904					
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 2)		5.0		pF
C_{PD} Power Dissipation Capacity	(Note 3) Per Buffer		50		pF

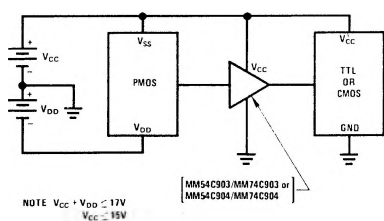
Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. Except for "Operating Temperature Range" they are not meant to imply that the devices should be operated at these limits. The table of "Electrical Characteristics" provides conditions for actual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

Note 2: Capacitance is guaranteed by periodic testing.

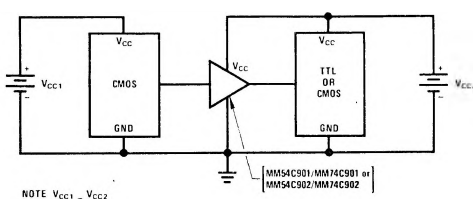
Note 3: C_{PD} determines the no load AC power consumption of any CMOS device. For complete explanation see 54C/74C Family Characteristics application note AN-90.

Typical Applications

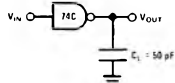
PMOS to CMOS or TTL Interface



CMOS to TTL or CMOS at a Lower V_{CC}

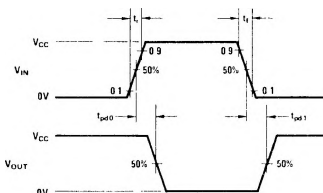


AC Test Circuit and Switching Time Waveform



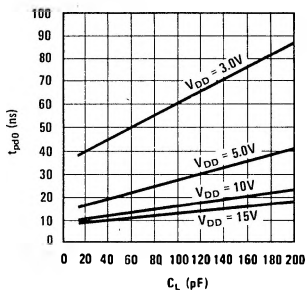
Note: Delays measured with input $t_1, t_2 = 20$ ns.

CMOS to CMOS

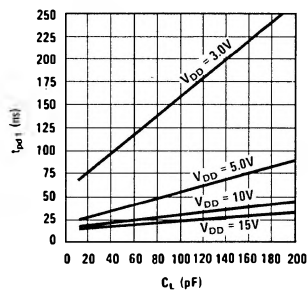


Typical Performance Characteristics

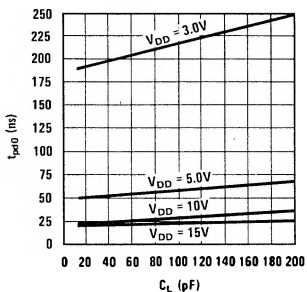
Typical Propagation Delay to a Logical "0" for the MM54C901/MM74C901 and MM54C903/MM74C903



Typical Propagation Delay to a Logical "1" for the MM54C901/MM74C901 and MM54C903/MM74C903



Typical Propagation Delay to a Logical "0" for the MM54C902/MM74C902 and MM54C904/MM74C904



Typical Propagation Delay to a Logical "1" for the MM54C902/MM74C902 and MM54C904/MM74C904

