

CD4503BM/CD4503BC Hex Non-Inverting TRI-STATE® Buffer

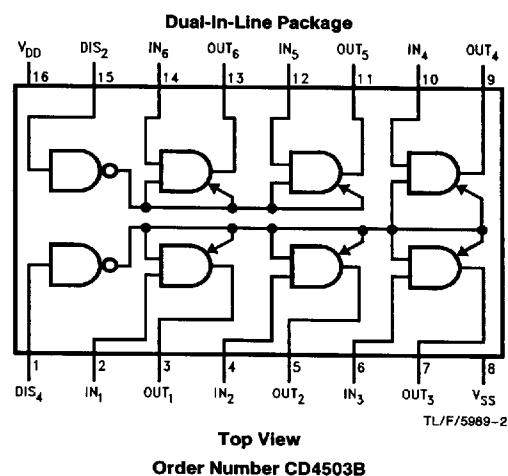
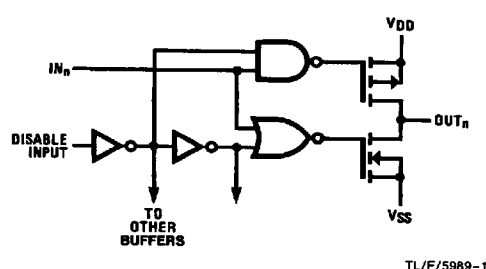
General Description

The CD4503B is a hex non-inverting TRI-STATE buffer with high output current sink and source capability. TRI-STATE outputs make it useful in bus-oriented applications. Two separate disable inputs are provided. Buffers 1 through 4 are controlled by the disable 4 input. Buffers 5 and 6 are controlled by the disable 2 input. A high level on either disable input will cause those gates on its control line to go into a high impedance state.

Features

- Wide supply voltage range 3.0 V_{DC} to 18 V_{DC}
- TRI-STATE outputs
- Symmetrical turn on/turn off delays
- Symmetrical output rise and fall times
- Pin-for-pin replacement for MM80C97 and MC14503

Schematic and Connection Diagrams



Truth Table

In	Disable Input	Out
0	0	0
1	0	1
X	1	TRI-STATE

X = Don't Care

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Absolute Maximum Ratings (Notes 1 and 2)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage (V_{DD})	–0.5V to +18V
Input Voltage (V_{IN})	–0.5V to +0.5V
Storage Temperature Range (T_S)	–65°C to +150°C
Power Dissipation (P_D)	
Dual-In-Line	700 mW
Small Outline	500 mW
Lead Temperature (T_L)	
(Soldering, 10 seconds)	260°C

Recommended Operating Conditions (Note 2)

Supply Voltage (V_{DD})	+3V to +15V
Operating Temperature Range (T_A)	
CD4503BM	–55°C to +125°C
CD4503BC	–40°C to +85°C

DC Electrical Characteristics CD4503BM (Note 2)

Symbol	Parameter	Conditions	–55°C		+25°			+125°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
I_{DD}	Quiescent Device Current	$V_{DD} = 5V$, $V_{IN} = V_{DD}$ or V_{SS}		1			1		30	μA
		$V_{DD} = 10V$, $V_{IN} = V_{DD}$ or V_{SS}		2			2		60	μA
		$V_{DD} = 15V$, $V_{IN} = V_{DD}$ or V_{SS}		4			4		120	μA
V_{OL}	Low Level Output Voltage	$V_{IN} = V_{DD}$ or 0								
		$V_{DD} = 5V$		0.05		0	0.05		0.05	V
		$V_{DD} = 10V$		0.05		0	0.05		0.05	V
V_{OH}	High Level Output Voltage	$V_{IN} = V_{DD}$ or 0								
		$V_{DD} = 5V$	4.95		4.95	5		4.95		V
		$V_{DD} = 10V$	9.95		9.95	10		9.95		V
V_{IL}	Low Level Input Voltage	$V_{DD} = 5V$, $V_O = 4.5V$ or 0.5V		1.5		2.25	1.5		1.5	V
		$V_{DD} = 10V$, $V_O = 9.0V$ or 1.0V		3.0		4.50	3.0		3.0	V
		$V_{DD} = 15V$, $V_O = 13.5V$ or 1.5V		4.0		6.75	4.0		4.0	V
V_{IH}	High Level Input Voltage	$V_{DD} = 5V$, $V_O = 0.5V$ or 4.5V	3.5		3.5	2.75		3.5		V
		$V_{DD} = 10V$, $V_O = 1.0V$ or 9.0V	7.0		7.0	5.5		7.0		V
		$V_{DD} = 15V$, $V_O = 1.5V$ or 13.5V	11.0		11.0	8.25		11.0		V
I_{OL}	Low Level Output Current (Note 3)	$V_{DD} = 4.5V$, $V_{OL} = 0.4V$	2.80		2.30	2.55		1.60		mA
		$V_{DD} = 5.0V$, $V_{OL} = 0.4V$	3.00		2.40	2.75		1.75		mA
		$V_{DD} = 10V$, $V_{OL} = 0.5V$	7.85		6.35	7.00		4.45		mA
		$V_{DD} = 15V$, $V_{OL} = 1.5V$	19.95		16.10	25.00		11.30		mA
I_{OH}	High Level Output Current (Note 3)	$V_{DD} = 5V$, $V_{OH} = 4.6V$	–1.28		–1.02	–1.76		–0.72		mA
		$V_{DD} = 10V$, $V_{OH} = 9.5V$	–3.20		–2.60	–4.5		–1.8		mA
		$V_{DD} = 15V$, $V_{OH} = 13.5V$	–8.20		–6.80	–17.6		–4.8		mA
I_{OZ}	TRI-STATE Leakage Current	$V_{DD} = 15V$		± 0.1		$\pm 10^{-4}$	± 0.1		± 1.0	μA
I_{IN}	Input Current	$V_{DD} = 15V$		± 0.1		$\pm 10^{-4}$	± 0.1		± 1.0	μA

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. They are not meant to imply that the devices should be operated at these limits. The tables of "Recommended Operating Conditions" and "Electrical Characteristics" provide conditions for actual device operation.

Note 2: $V_{SS} = 0V$ unless otherwise specified.

Note 3: I_{OH} and I_{OL} are tested one output at a time.

DC Electrical Characteristics CD4503BC (Note 2)

Symbol	Parameter	Conditions	- 40°C		+ 25°C			+ 85°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
I _{DD}	Quiescent Device Current	V _{DD} = 5V, V _{IN} = V _{DD} or V _{SS}		4			4		30	μA
		V _{DD} = 10V, V _{IN} = V _{DD} or V _{SS}		8			8		60	μA
		V _{DD} = 15V, V _{IN} = V _{DD} or V _{SS}		16			16		120	μA
V _{OL}	Low Level Output Voltage	V _{IN} = V _{DD} or 0								
		V _{DD} = 5V		0.05		0	0.05		0.05	V
		V _{DD} = 10V		0.05		0	0.05		0.05	V
V _{OH}	High Level Output Voltage	V _{IN} = V _{DD} or 0								
		V _{DD} = 5V	4.95		4.95			4.95		V
		V _{DD} = 10V	9.95		9.95			9.95		V
V _{IL}	Low Level Input Voltage	V _{DD} = 5V, V _O = 4.5V or 0.5V		1.5		2.25	1.5		1.5	V
		V _{DD} = 10V, V _O = 9.0V or 1.0V		3.0		4.50	3.0		3.0	V
		V _{DD} = 15V, V _O = 13.5V or 1.5V		4.0		6.75	4.0		4.0	V
V _{IH}	High Level Input Voltage	V _{DD} = 5V, V _O = 0.5V or 4.5V	3.5		3.5	2.75		3.5		V
		V _{DD} = 10V, V _O = 1.0V or 9.0V	7.0		7.0	5.5		7.0		V
		V _{DD} = 15V, V _O = 1.5V or 13.5V	11.0		11.0	8.25		11.0		V
I _{OL}	Low Level Output Current (Note 3)	V _{DD} = 4.5V, V _{OL} = 0.4V	2.30		1.95	2.65		1.60		mA
		V _{DD} = 5.0V, V _{OL} = 0.4V	2.5		2.10	2.75		1.75		mA
		V _{DD} = 10V, V _{OL} = 0.5V	6.5		5.45	7.0		4.45		mA
		V _{DD} = 15V, V _{OL} = 1.5V	16.50		13.80	25.00		11.30		mA
I _{OH}	High Level Output Current (Note 3)	V _{DD} = 5V, V _{OH} = 4.6V	-1.04		-0.88	-1.76		-0.7		mA
		V _{DD} = 10V, V _{OH} = 9.5V	-2.60		-2.2	-4.50		-1.8		mA
		V _{DD} = 15V, V _{OH} = 13.5V	-7.2		-6.0	-17.6		-4.8		mA
I _{TL}	TRI-STATE Leakage Current	V _{DD} = 15V		±0.3		±10 ⁻⁴	±0.3		±1.0	μA
I _{IN}	Input Current	V _{DD} = 15V		±0.3		±10 ⁻⁵	±0.3		±1.0	μA

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. They are not meant to imply that the devices should be operated at these limits. The tables of "Recommended Operating Conditions" and "Electrical Characteristics" provide conditions for actual device operation.

Note 2: V_{SS} = 0V unless otherwise specified.

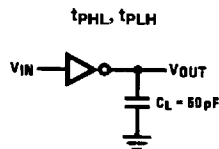
AC Electrical Characteristics* CD4503B

T_A = 25°C, C_L = 50 pF, R_L = 200 kΩ, Input t_r = t_f = 20 ns, unless otherwise specified

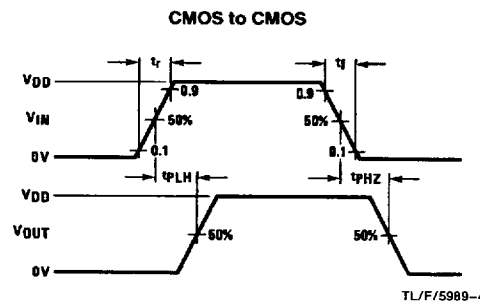
Symbol	Parameter	Conditions	Min	Typ	Max	Units
t _{PHL} , t _{PLH}	Propagation Delay Time	V _{DD} = 5V V _{DD} = 10V V _{DD} = 15V		75 35 25	100 40 30	ns
t _{PLZ} , t _{PHZ}	Propagation Delay Time, Logical Level to High Impedance State	V _{DD} = 5V V _{DD} = 10V V _{DD} = 15V		80 40 35	125 90 70	ns
t _{PZL} , t _{PZH}	Propagation Delay Time, High Impedance State to Logical Level	V _{DD} = 5V V _{DD} = 10V V _{DD} = 15V		95 40 35	175 80 70	ns
t _{TLH}	Output Rise Time	V _{DD} = 5V V _{DD} = 10V V _{DD} = 15V		45 23 18	80 40 35	ns
t _{THL}	Output Fall Time	V _{DD} = 5V V _{DD} = 10V V _{DD} = 15V		45 23 18	80 40 35	ns

*AC Parameters are guaranteed by DC correlated testing.

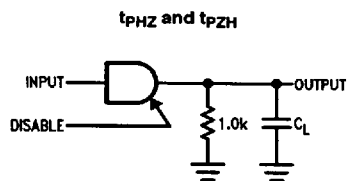
AC Test Circuits and Switching Time Waveforms



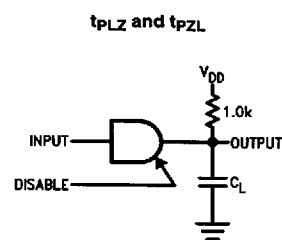
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TL/F/5989-4

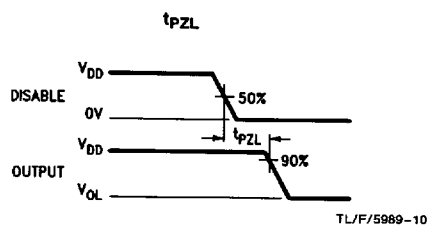
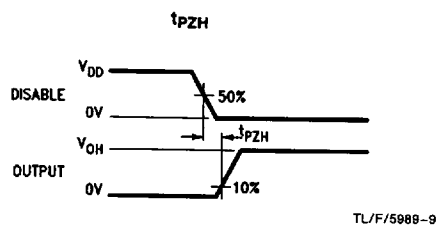
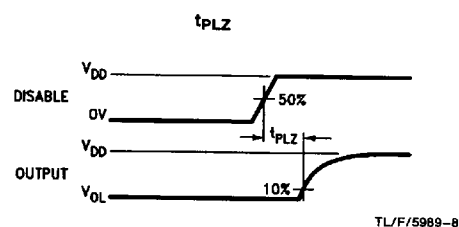
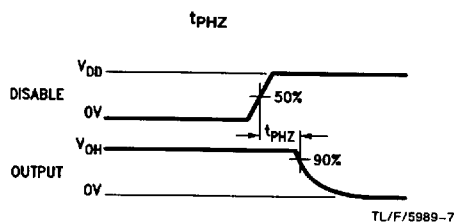


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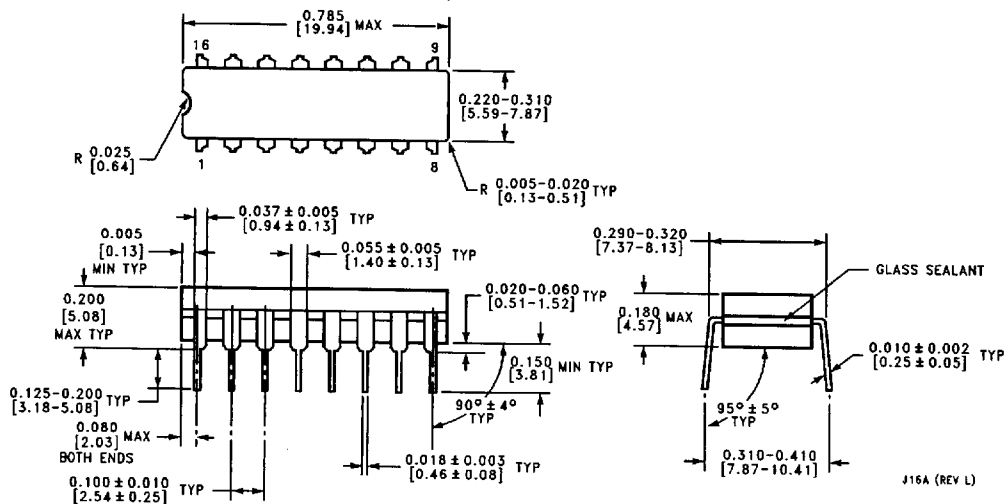
TL/F/5989-6

AC Test Circuits and Switching Time Waveforms (Continued)



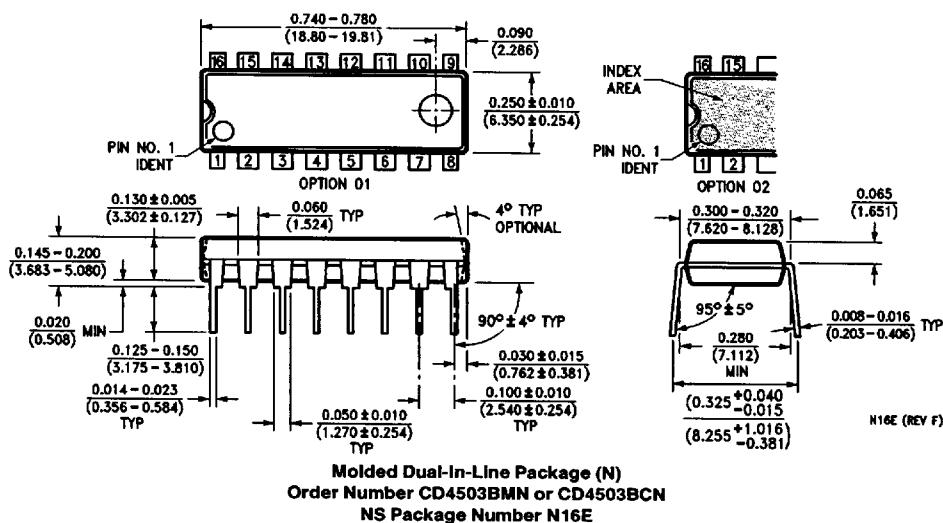
Note: Delays measured with input t_r ≤ 20 ns.

Physical Dimensions inches (millimeters)



Ceramic Dual-In-Line Package (J)
Order Number CD4503BMJ or CD4503BCJ
NS Package Number J16A

Physical Dimensions inches (millimeters) (Continued)



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