

CD4723BM/CD4723BC Dual 4-Bit Addressable Latch CD4724BM/CD4724BC 8-Bit Addressable Latch

General Description

The CD4723B is a dual 4-bit addressable latch with common control inputs, including two address inputs (A0, A1), an active low enable input (\bar{E}), and an active high clear input (CL). Each latch has a data input (D) and four outputs (Q0-Q3). The CD4724B is an 8-bit addressable latch with three address inputs (A0-A2), an active low enable input (\bar{E}), active high clear input (CL), a data input (D) and eight outputs (Q0-Q7).

Data is entered into a particular bit in the latch when that is addressed by the address inputs and the enable (\bar{E}) is low. Data entry is inhibited when enable (\bar{E}) is high.

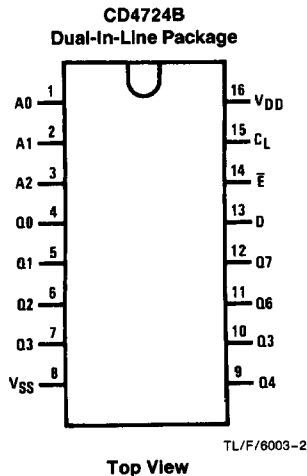
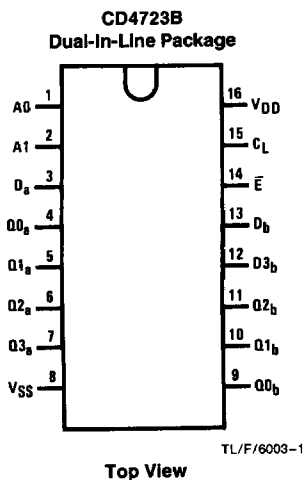
When clear (CL) and enable (\bar{E}) are high, all outputs are low. When clear (CL) is high and enable (\bar{E}) is low, the channel demultiplexing occurs. The bit that is addressed has an active output which follows the data input while all unaddressed bits are held low. When operating in the address-

able latch mode ($\bar{E} = CL = \text{low}$), changing more than one bit of the address could impose a transient wrong address. Therefore, this should only be done while in the memory mode ($\bar{E} = \text{high}, CL = \text{low}$).

Features

- Wide supply voltage range 3.0V to 15V
- High noise immunity 0.45 V_{DD} (typ.)
- Low power TTL fan out of 2 driving 74L compatibility or 1 driving 74LS
- Serial to parallel capability
- Storage register capability
- Random (addressable) data entry
- Active high demultiplexing capability
- Common active high clear

Connection Diagrams



**Order Number CD4723B* or
CD4724B***

*Please look into Section 8, Appendix D for availability of various package types.

Truth Table

Mode Selection				
\bar{E}	CL	Addressed Latch	Unaddressed Latch	Mode
L	L	Follows Data	Holds Previous Data	Addressable Latch Memory
H	L	Hold Previous Data	Holds Previous Data	
L	H	Follows Data	Reset to "0"	Demultiplexer
H	H	Reset to "0"	Reset to "0"	Clear

Absolute Maximum Ratings (Notes 1 & 2)

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

DC Supply Voltage (V_{DD})	-0.5V to +18 V _{DC}
Input Voltage (V_{IN})	-0.5V to V_{DD} + 0.5 V _{DC}
Storage Temperature (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)

DC Supply Voltage (V_{DD})	3.0V to 15 V _{DC}
Input Voltage (V_{IN})	0V to V_{DD} V _{DC}
Operating Temperature Range (T_A)	
CD4723BM/CD4724BM	-55°C to +125°C
CD4723BC/CD4724BC	-40°C to +85°C

DC Electrical Characteristics CD4723BM/CD4724BM (Note 2)

Symbol	Parameter	Conditions	-55°C		+25°C			+125°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
I_{DD}	Quiescent Device Current	$V_{DD} = 5V$		5.0		0.02	5.0		150	μA
		$V_{DD} = 10V$		10		0.02	10		300	μA
		$V_{DD} = 15V$		20		0.02	20		600	μA
V_{OL}	Low Level Output Voltage	$ I_O \leq 1 \mu A$								
		$V_{DD} = 5V$		0.05		0	0.05		0.05	V
		$V_{DD} = 10V$		0.05		0	0.05		0.05	V
		$V_{DD} = 15V$		0.05		0	0.05		0.05	V
V_{OH}	High Level Output Voltage	$ I_O \leq 1 \mu A$								
		$V_{DD} = 5V$	4.95		4.95	5.0		4.95		V
		$V_{DD} = 10V$	9.95		9.95	10		9.95		V
		$V_{DD} = 15V$	14.95		14.95	15		14.95		V
V_{IL}	Low Level Input Voltage	$V_{DD} = 5V, V_O = 0.5V$ or 4.5V		1.5		2.25	1.5		1.5	V
		$V_{DD} = 10V, V_O = 1V$ or 9V		3.0		4.5	3.0		3.0	V
		$V_{DD} = 15V, V_O = 1.5V$ or 13.5V		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
		$V_{DD} = 10V, V_O = 1V$ or 9V	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)	$V_{DD} = 5V, V_O = 0.4V$	0.64		0.51	0.88		0.36		mA
		$V_{DD} = 10V, V_O = 0.5V$	1.6		1.3	2.25		0.9		mA
		$V_{DD} = 15V, V_O = 1.5V$	4.2		3.4	8.8		2.4		mA
I_{OH}	High Level Output Current (Note 3)	$V_{DD} = 5V, V_O = 4.6V$	-0.64		-0.51	-0.88		-0.36		mA
		$V_{DD} = 10V, V_O = 9.5V$	-1.6		-1.3	-2.25		-0.9		mA
		$V_{DD} = 15V, V_O = 13.5V$	-4.2		-3.4	-8.8		-2.4		mA
I_{IN}	Input Current	$V_{DD} = 15V, V_{IN} = 0V$		-0.1		-10^{-5}	-0.1		-1.0	μA
		$V_{DD} = 15V, V_{IN} = 15V$		0.1		10^{-5}	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_{OL} and I_{OH} are tested one output at a time.

DC Electrical Characteristics CD4723BC/CD4724BC (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		20		0.02	20		150	μA
		V _{DD} = 10V		40		0.02	40		300	μA
		V _{DD} = 15V		80		0.02	80		600	μA
V _{OL}	Low Level Output Voltage	I _O ≤ 1 μA								
		V _{DD} = 5V		0.05		0	0.05		0.05	V
		V _{DD} = 10V		0.05		0	0.05		0.05	V
		V _{DD} = 15V		0.05		0	0.05		0.05	V
V _{OH}	High Level Output Voltage	I _O ≤ 1 μA								
		V _{DD} = 5V	4.95		4.95	5.0		4.95		V
		V _{DD} = 10V	9.95		9.95	10		9.95		V
		V _{DD} = 15V	14.95		14.95	15		14.95		V
V _{IL}	Low Level Input Voltage	V _{DD} = 5V, V _O = 0.5V or 4.5V		1.5		2.25	1.5		1.5	V
		V _{DD} = 10V, V _O = 1V or 9V		3.0		4.5	3.0		3.0	V
		V _{DD} = 15V, V _O = 1.5V or 13.5V		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 = 1V or 9V	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} = 5V, V _O = 0.4V	0.52		0.44	0.88		0.36		mA
		V _{DD} = 10V, V _O = 0.5V	1.3		1.1	2.25		0.9		mA
		V _{DD} = 15V, V _O = 1.5V	3.6		3.0	8.8		2.4		mA
I _{OH}	High Level Output Current (Note 3)	V _{DD} = 5V, V _O = 4.6V	-0.52		-0.44	-0.88		-0.36		mA
		V _{DD} = 10V, V _O = 9.5V	-1.3		-1.1	-2.25		-0.9		mA
		V _{DD} = 15V, V _O = 13.5V	-3.6		-3.0	-8.8		-2.4		mA
I _{IN}	Input Current	V _{DD} = 15V, V _{IN} = 0V		-0.30		-10 ⁻⁵	-0.30		-1.0	μA
		V _{DD} = 15V, V _{IN} = 15V		0.30		10 ⁻⁵	0.30		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_{OL} and I_{OH} are tested one output at a time.

AC Electrical Characteristics*
 $T_A = 25^\circ\text{C}$, $C_L = 50\text{ pF}$, $R_L = 200\text{ k}$, Input $t_r = t_f = 20\text{ ns}$, unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_{PHL} , t_{PLH}	Propagation Delay Data to Output	$V_{\text{DD}} = 5\text{V}$		200	400	ns
		$V_{\text{DD}} = 10\text{V}$		75	150	ns
		$V_{\text{DD}} = 15\text{V}$		50	100	ns
t_{PLH} , t_{PHL}	Propagation Delay Enable to Output	$V_{\text{DD}} = 5\text{V}$		200	400	ns
		$V_{\text{DD}} = 10\text{V}$		80	160	ns
		$V_{\text{DD}} = 15\text{V}$		60	120	ns
t_{PHL}	Propagation Delay Clear to Output	$V_{\text{DD}} = 5\text{V}$		175	350	ns
		$V_{\text{DD}} = 10\text{V}$		80	160	ns
		$V_{\text{DD}} = 15\text{V}$		65	130	ns
t_{PLH} , t_{PHL}	Propagation Delay Address to Output	$V_{\text{DD}} = 5\text{V}$		225	450	ns
		$V_{\text{DD}} = 10\text{V}$		100	200	ns
		$V_{\text{DD}} = 15\text{V}$		75	150	ns
t_{THL} , t_{TLH}	Transition Time (Any Output)	$V_{\text{DD}} = 5\text{V}$		100	200	ns
		$V_{\text{DD}} = 10\text{V}$		50	100	ns
		$V_{\text{DD}} = 15\text{V}$		40	80	ns
T_{WH} , T_{WL}	Minimum Data Pulse Width	$V_{\text{DD}} = 5\text{V}$		100	200	ns
		$V_{\text{DD}} = 10\text{V}$		50	100	ns
		$V_{\text{DD}} = 15\text{V}$		40	80	ns
t_{WH} , t_{WL}	Minimum Address Pulse Width	$V_{\text{DD}} = 5\text{V}$		200	400	ns
		$V_{\text{DD}} = 10\text{V}$		100	200	ns
		$V_{\text{DD}} = 15\text{V}$		65	125	ns
t_{WH}	Minimum Clear Pulse Width	$V_{\text{DD}} = 5\text{V}$		75	150	ns
		$V_{\text{DD}} = 10\text{V}$		40	75	ns
		$V_{\text{DD}} = 15\text{V}$		25	50	ns
t_{SU}	Minimum Setup Time Data to E	$V_{\text{DD}} = 5\text{V}$		40	80	ns
		$V_{\text{DD}} = 10\text{V}$		20	40	ns
		$V_{\text{DD}} = 15\text{V}$		15	30	ns
t_{H}	Minimum Hold Time Data to E	$V_{\text{DD}} = 5\text{V}$		60	120	ns
		$V_{\text{DD}} = 10\text{V}$		30	60	ns
		$V_{\text{DD}} = 15\text{V}$		25	50	ns
t_{SU}	Minimum Setup Time Address to E	$V_{\text{DD}} = 5\text{V}$		-15	50	ns
		$V_{\text{DD}} = 10\text{V}$		0	30	ns
		$V_{\text{DD}} = 15\text{V}$		0	20	ns
t_{H}	Minimum Hold Time Address to E	$V_{\text{DD}} = 5\text{V}$		-50	15	ns
		$V_{\text{DD}} = 10\text{V}$		-20	10	ns
		$V_{\text{DD}} = 15\text{V}$		-15	5	ns
C_{PD}	Power Dissipation Capacitance	Per Package (Note 4)		100		pF
C_{IN}	Input Capacitance	Any Input		5.0	7.5	pF

*AC Parameters are guaranteed by DC correlated testing.

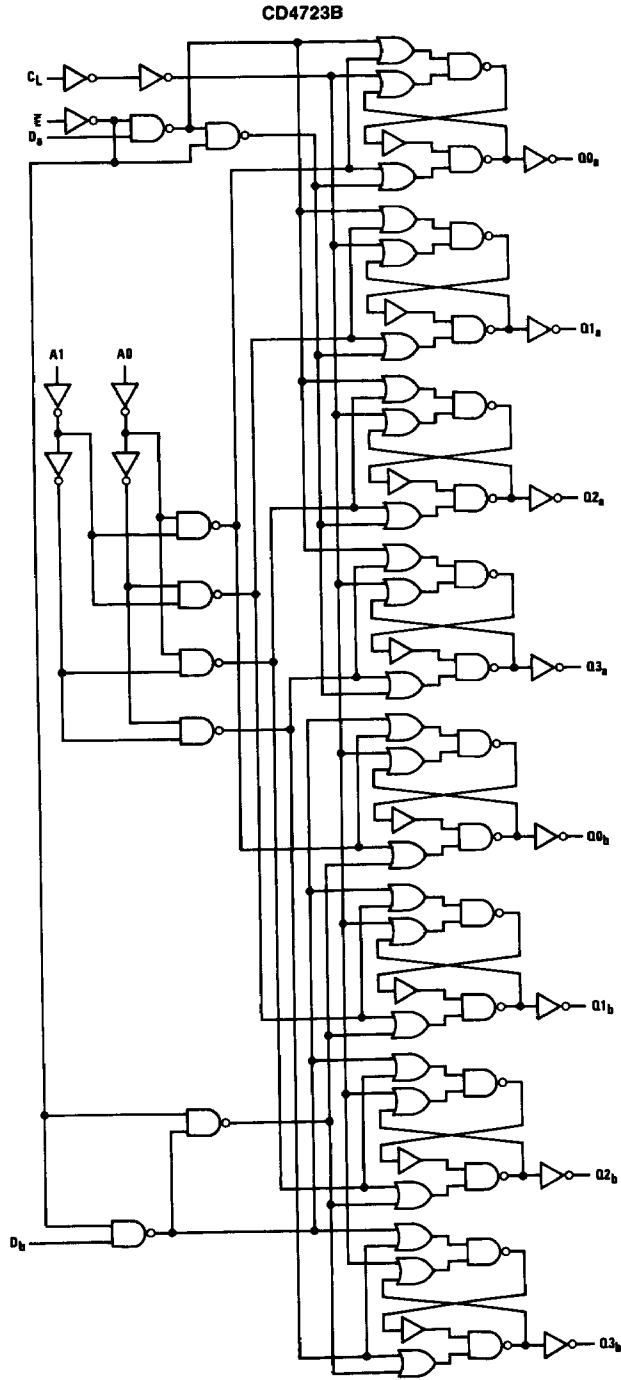
Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed; they are not meant to imply that the devices should be operated at these limits. The tables of "Recommended Operating Conditions" and "Electrical Characteristics" provide conditions for actual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

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

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

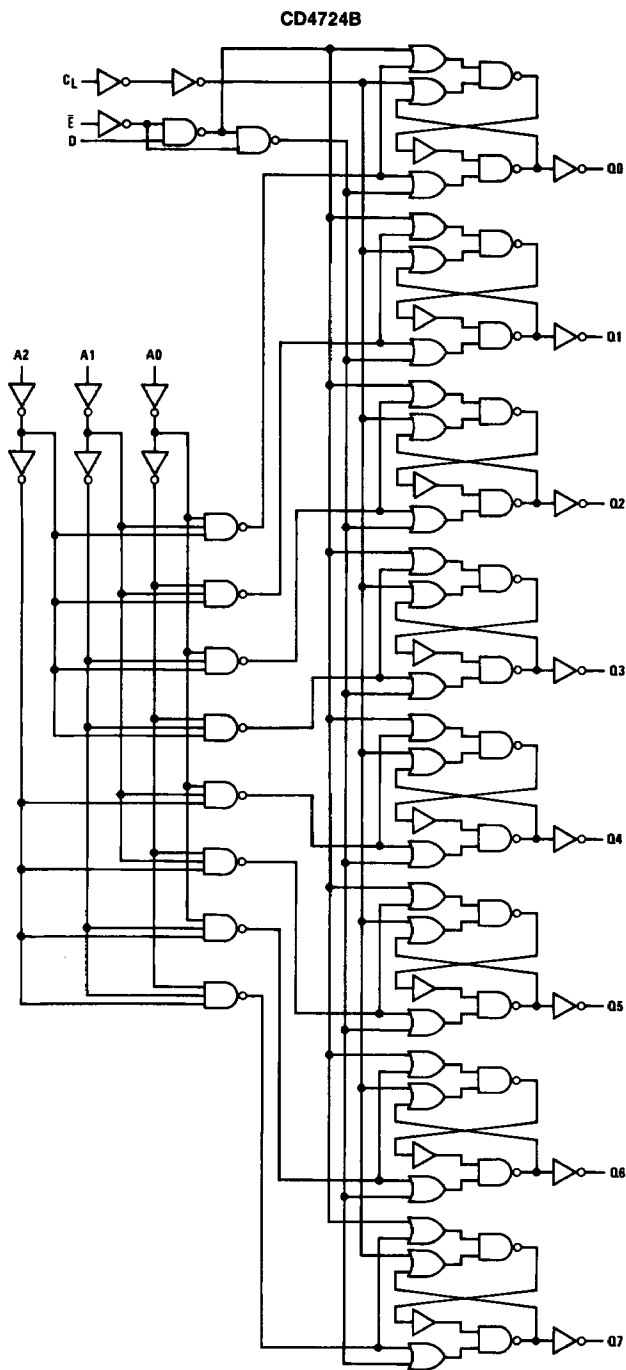
Note 4: Dynamic power dissipation (P_{D}) is given by: $P_{\text{D}} = (C_{\text{PD}} + C_{\text{I}}) V_{\text{CC}}^2 f + P_{\text{Q}}$; where C_{L} = load capacitance; f = frequency of operation; for further details, see Application Note AN-90, "54C/74C Family Characteristics".

Logic Diagrams



TL/F/6003-3

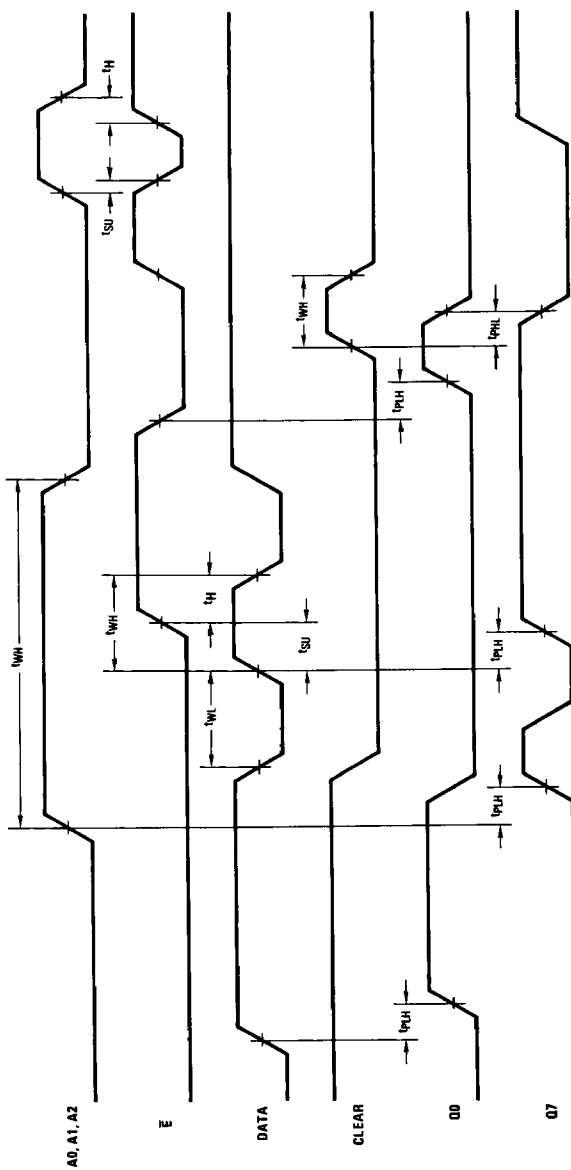
Logic Diagrams (Continued)



TL/F/6003-4

Switching Time Waveforms

5-6009/F/TL



CD4723BM/CD4723BC/CD4724BM/CD4724BC