

## 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.

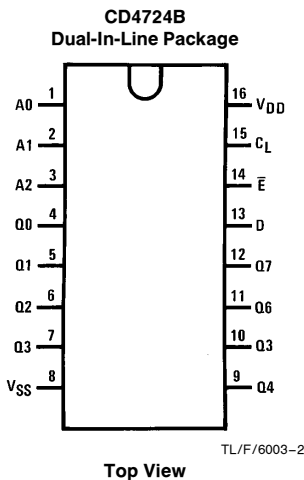
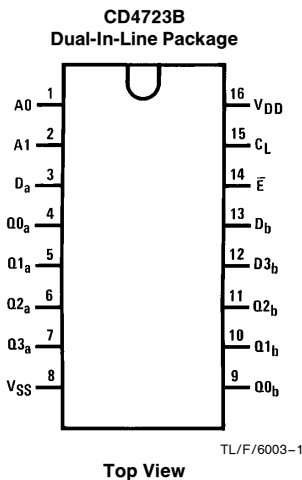
When clear (CL) and enable ( $\bar{E}$ ) are high, all outputs are low. When clear (CL) is high and enable ( $\bar{E}$ ) is low, the channel demultiplexing occurs. The bit that is addressed has an active output which follows the data input while all unaddressed bits are held low. When operating in the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

able latch mode ( $\bar{E} = \text{CL} = \text{low}$ ), 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 ( $\bar{E} = \text{high}$ ,  $\text{CL} = \text{low}$ ).

### 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

### Truth Table

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

**Absolute Maximum Ratings** (Notes 1 & 2)

If Military/Aerospace specified devices are required, please 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  | $\mu A$ |
|          |                                    | $V_{DD} = 10V$                        |       | 10   |       | 0.02              | 10   |        | 300  | $\mu A$ |
|          |                                    | $V_{DD} = 15V$                        |       | 20   |       | 0.02              | 20   |        | 600  | $\mu A$ |
| $V_{OL}$ | 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       |
| $V_{OH}$ | 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       |
| $V_{IL}$ | Low Level Input Voltage            | $V_{DD} = 15V$                        | 14.95 |      | 14.95 | 15                |      | 14.95  |      | V       |
|          |                                    | $V_{DD} = 5V, V_O = 0.5V$ 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       |
| $V_{IH}$ | High Level Input Voltage           | $V_{DD} = 15V, V_O = 1.5V$ or $13.5V$ |       | 4.0  |       | 6.75              | 4.0  |        | 4.0  | V       |
|          |                                    | $V_{DD} = 5V, V_O = 0.5V$ 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       |
| $I_{OL}$ | Low Level Output Current (Note 3)  | $V_{DD} = 15V, V_O = 1.5V$            | 11.0  |      | 11.0  | 8.25              |      | 11.0   |      | V       |
|          |                                    | $V_{DD} = 5V, V_O = 0.4V$             | 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      |
| $I_{OH}$ | High Level Output Current (Note 3) | $V_{DD} = 15V, V_O = 13.5V$           | 4.2   |      | 3.4   | 8.8               |      | 2.4    |      | mA      |
|          |                                    | $V_{DD} = 5V, V_O = 4.6V$             | −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      |
| $I_{IN}$ | Input Current                      | $V_{DD} = 15V, V_{IN} = 0V$           |       | −0.1 |       | −10 <sup>−5</sup> | −0.1 |        | −1.0 | $\mu A$ |
|          |                                    | $V_{DD} = 15V, V_{IN} = 15V$          |       | 0.1  |       | 10 <sup>−5</sup>  | 0.1  |        | 1.0  | $\mu A$ |

**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 <sub>DD</sub> | Quiescent Device Current           | V <sub>DD</sub> = 5V<br>V <sub>DD</sub> = 10V<br>V <sub>DD</sub> = 15V |        | 20<br>40<br>80 |        | 0.02<br>0.02<br>0.02 | 20<br>40<br>80 |        | 150<br>300<br>600 | μA<br>μA<br>μA |
| V <sub>OL</sub> | Low Level Output Voltage           | I <sub>O</sub>   ≤ 1 μA                                                |        |                |        |                      |                |        |                   |                |
|                 |                                    | V <sub>DD</sub> = 5V                                                   |        | 0.05           |        | 0                    | 0.05           |        | 0.05              | V              |
|                 |                                    | V <sub>DD</sub> = 10V                                                  |        | 0.05           |        | 0                    | 0.05           |        | 0.05              | V              |
|                 |                                    | V <sub>DD</sub> = 15V                                                  |        | 0.05           |        | 0                    | 0.05           |        | 0.05              | V              |
| V <sub>OH</sub> | High Level Output Voltage          | I <sub>O</sub>   ≤ 1 μA                                                |        |                |        |                      |                |        |                   |                |
|                 |                                    | V <sub>DD</sub> = 5V                                                   | 4.95   |                | 4.95   | 5.0                  |                | 4.95   |                   | V              |
|                 |                                    | V <sub>DD</sub> = 10V                                                  | 9.95   |                | 9.95   | 10                   |                | 9.95   |                   | V              |
|                 |                                    | V <sub>DD</sub> = 15V                                                  | 14.95  |                | 14.95  | 15                   |                | 14.95  |                   | V              |
| V <sub>IL</sub> | Low Level Input Voltage            | V <sub>DD</sub> = 5V, V <sub>O</sub> = 0.5V or 4.5V                    |        | 1.5            |        | 2.25                 | 1.5            |        | 1.5               | V              |
|                 |                                    | V <sub>DD</sub> = 10V, V <sub>O</sub> = 1V or 9V                       |        | 3.0            |        | 4.5                  | 3.0            |        | 3.0               | V              |
|                 |                                    | V <sub>DD</sub> = 15V, V <sub>O</sub> = 1.5V or 13.5V                  |        | 4.0            |        | 6.75                 | 4.0            |        | 4.0               | V              |
|                 |                                    |                                                                        |        |                |        |                      |                |        |                   |                |
| V <sub>IH</sub> | High Level Input Voltage           | V <sub>DD</sub> = 5V, V <sub>O</sub> = 0.5V or 4.5V                    | 3.5    |                | 3.5    | 2.75                 |                | 3.5    |                   | V              |
|                 |                                    | V <sub>DD</sub> = 10V, V <sub>O</sub> = 1V or 9V                       | 7.0    |                | 7.0    | 5.5                  |                | 7.0    |                   | V              |
|                 |                                    | V <sub>DD</sub> = 15V, V <sub>O</sub> = 1.5V or 13.5V                  | 11.0   |                | 11.0   | 8.25                 |                | 11.0   |                   | V              |
|                 |                                    |                                                                        |        |                |        |                      |                |        |                   |                |
| I <sub>OL</sub> | Low Level Output Current (Note 3)  | V <sub>DD</sub> = 5V, V <sub>O</sub> = 0.4V                            | 0.52   |                | 0.44   | 0.88                 |                | 0.36   |                   | mA             |
|                 |                                    | V <sub>DD</sub> = 10V, V <sub>O</sub> = 0.5V                           | 1.3    |                | 1.1    | 2.25                 |                | 0.9    |                   | mA             |
|                 |                                    | V <sub>DD</sub> = 15V, V <sub>O</sub> = 1.5V                           | 3.6    |                | 3.0    | 8.8                  |                | 2.4    |                   | mA             |
|                 |                                    |                                                                        |        |                |        |                      |                |        |                   |                |
| I <sub>OH</sub> | High Level Output Current (Note 3) | V <sub>DD</sub> = 5V, V <sub>O</sub> = 4.6V                            | −0.52  |                | −0.44  | −0.88                |                | −0.36  |                   | mA             |
|                 |                                    | V <sub>DD</sub> = 10V, V <sub>O</sub> = 9.5V                           | −1.3   |                | −1.1   | −2.25                |                | −0.9   |                   | mA             |
|                 |                                    | V <sub>DD</sub> = 15V, V <sub>O</sub> = 13.5V                          | −3.6   |                | −3.0   | −8.8                 |                | −2.4   |                   | mA             |
|                 |                                    |                                                                        |        |                |        |                      |                |        |                   |                |
| I <sub>IN</sub> | Input Current                      | V <sub>DD</sub> = 15V, V <sub>IN</sub> = 0V                            |        | −0.30          |        | −10 <sup>−5</sup>    | −0.30          |        | −1.0              | μA             |
|                 |                                    | V <sub>DD</sub> = 15V, V <sub>IN</sub> = 15V                           |        | 0.30           |        | 10 <sup>−5</sup>     | 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<sub>SS</sub> = 0V unless otherwise specified.

**Note 3:** I<sub>OL</sub> and I<sub>OH</sub> are tested one output at a time.

## AC Electrical Characteristics\*

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

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

\*AC Parameters are guaranteed by DC correlated testing.

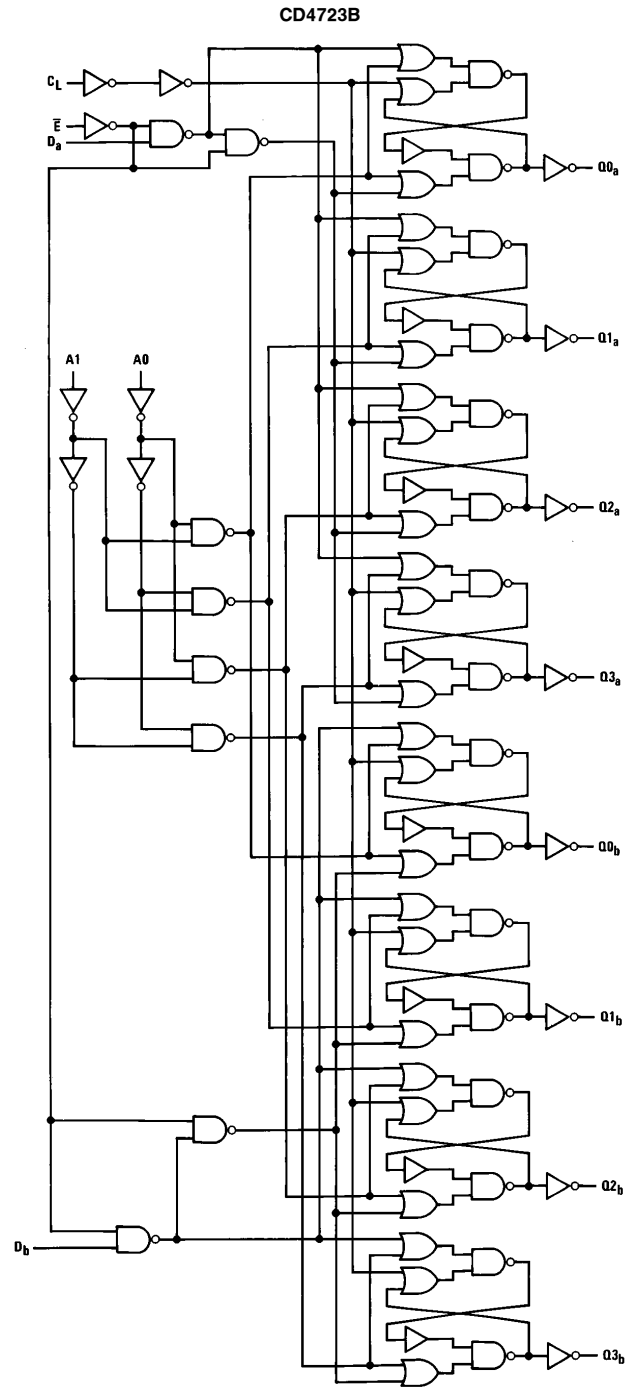
**Note 1:** "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed; they are not meant to imply that the devices should be operated at these limits. The tables of "Recommended Operating Conditions" and "Electrical Characteristics" provide conditions for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

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

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

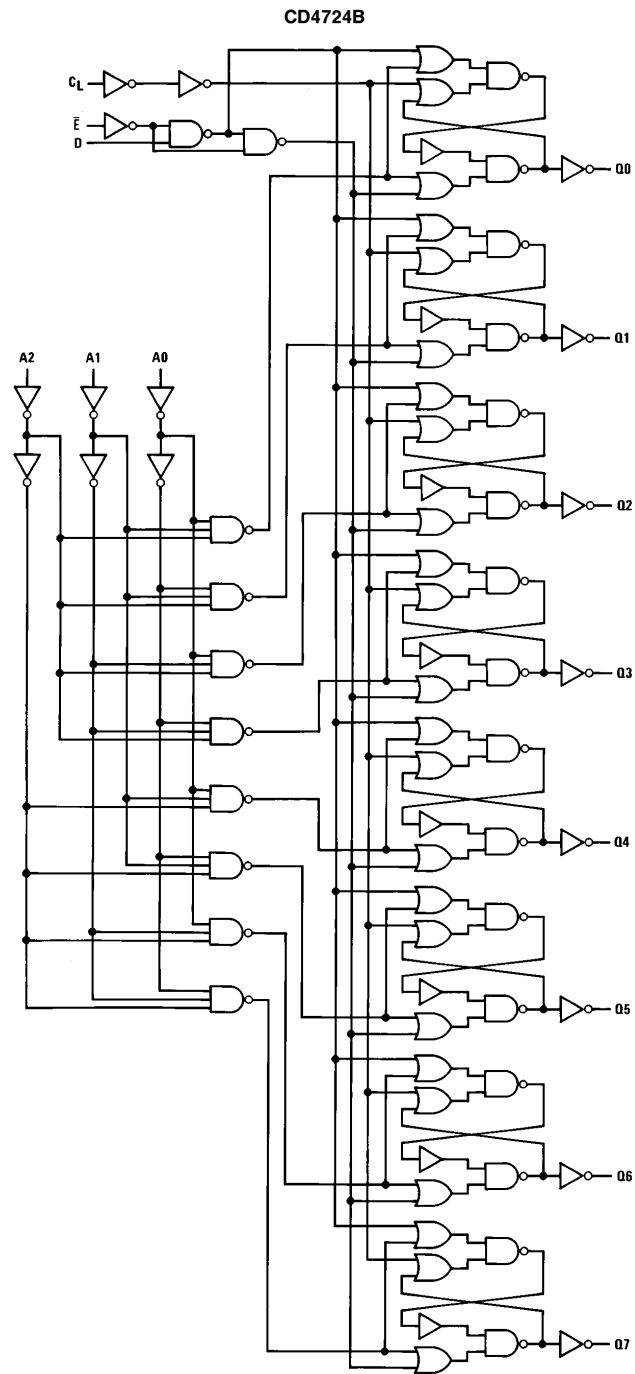
**Note 4:** Dynamic power dissipation ( $P_D$ ) is given by:  $P_D = (C_{PD} + C_L) V_{CC}^2 f + P_Q$ , where  $C_L$  = load capacitance;  $f$  = frequency of operation; for further details, see Application Note AN-90, "54C/74C Family Characteristics".

## Logic Diagrams



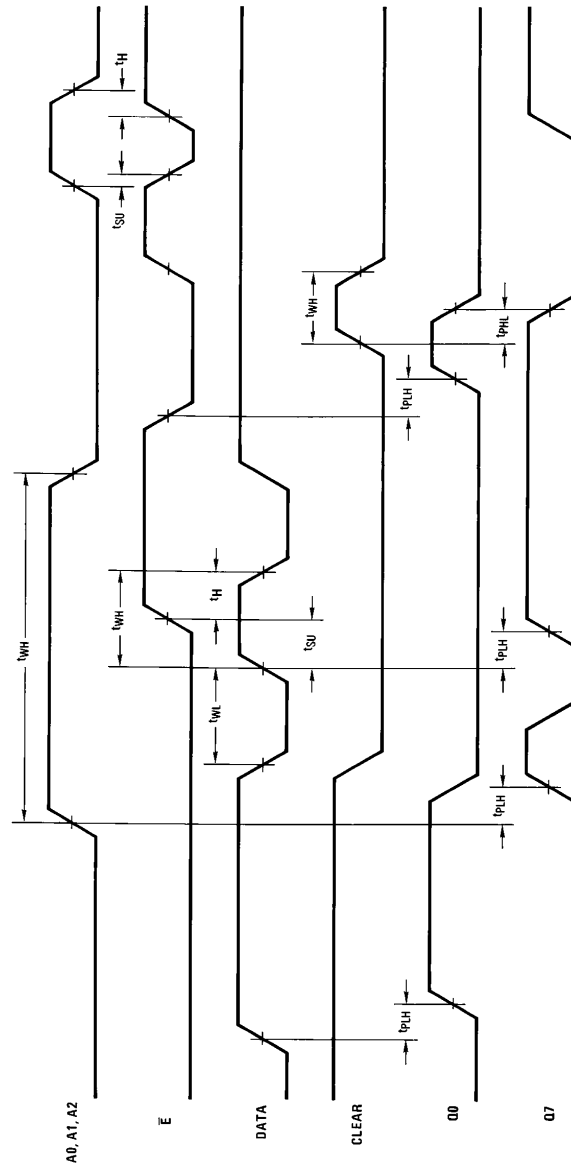
TL/F/6003-3

Logic Diagrams (Continued)



TL/F/6003-4

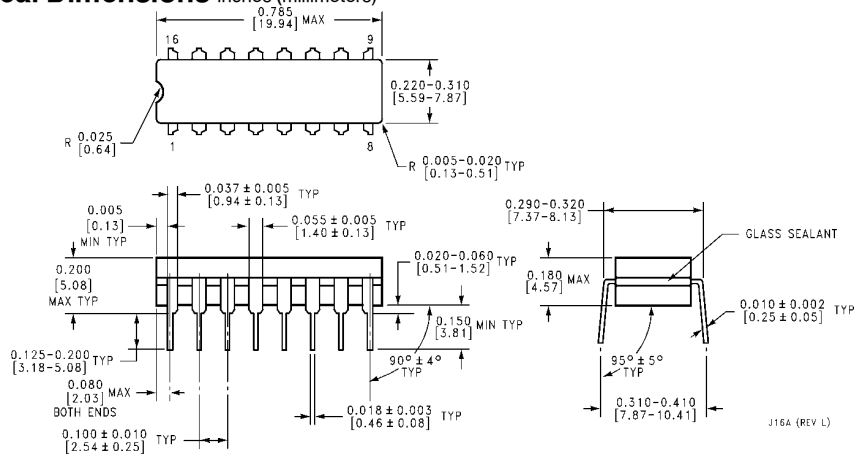
## Switching Time Waveforms



TL/F/6003-5

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

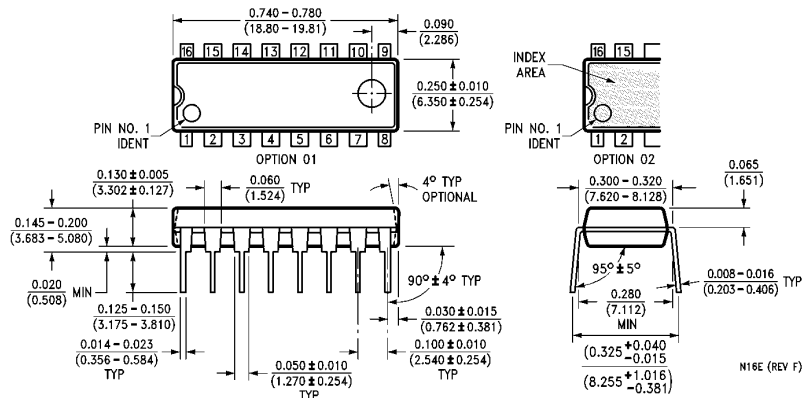
## Physical Dimensions inches (millimeters)



### Ceramic Dual-In-Line Package (J)

Order Number CD4723BMJ, CD4723BCJ, CD4724BMJ or CD4724BCJ

NS Package Number J16A



### Molded Dual-In-Line Package (N)

Order Number CD4723BMN, CD4723BCN, CD4724BMN or CD4724BCN

NS Package Number N16E

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