

# **CD4073BM/CD4073BC** **Double Buffered Triple 3-Input AND Gate** **CD4075BM/CD4075BC** **Double Buffered Triple 3-Input OR Gate**

## **General Description**

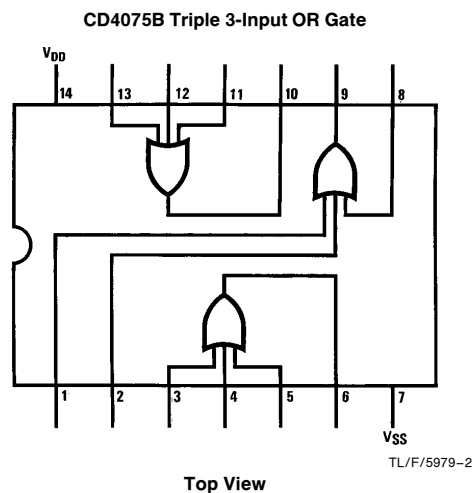
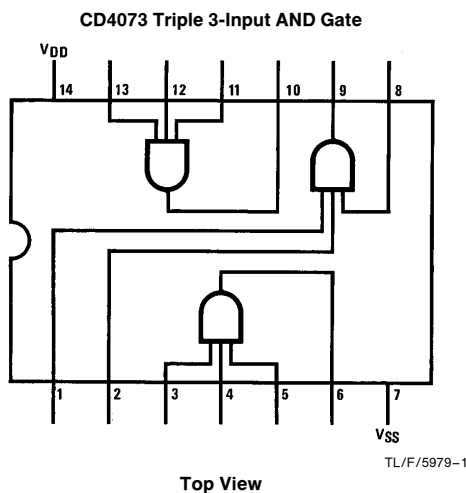
These triple gates are monolithic complementary MOS (CMOS) integrated circuits constructed with N- and P-channel enhancement mode transistors. They have equal source and sink current capabilities and conform to standard B series output drive. The devices also have buffered outputs which improve transfer characteristics by providing very high gain. All inputs are protected against static discharge with diodes to  $V_{DD}$  and  $V_{SS}$ .

## **Features**

- Wide supply voltage range 3.0V to 15V
- High noise immunity 0.45  $V_{DD}$  (typ.)
- Low power TTL compatibility Fan out of 2 driving 74L or 1 driving 74LS
- 5V–10V–15V parametric ratings
- Symmetrical output characteristics
- Maximum input leakage 1  $\mu A$  at 15V over full temperature range

## **Connection Diagrams**

### **Dual-In-Line Packages**



Order Number CD4073B or CD4075B

**CD4073BM/CD4073BC Double Buffered Triple 3-Input AND Gate**  
**CD4075BM/CD4075BC Double Buffered Triple 3-Input OR Gate**

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

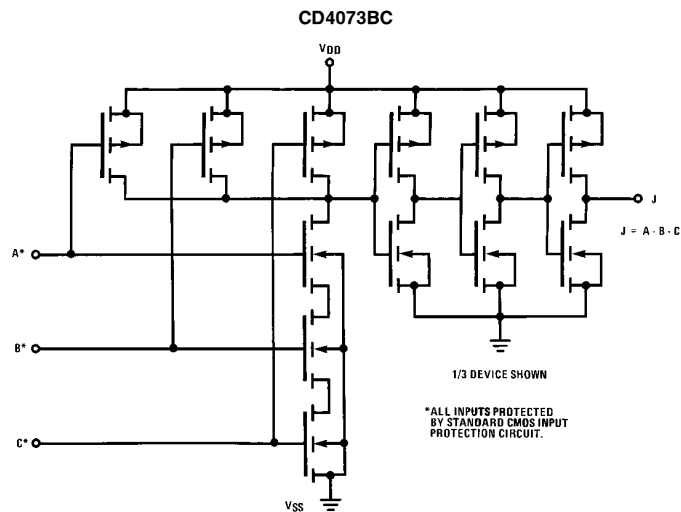
|                                     |                                                 |
|-------------------------------------|-------------------------------------------------|
| DC Supply Voltage ( $V_{DD}$ )      | $-0.5 V_{DC}$ to $+18 V_{DC}$                   |
| Input Voltage ( $V_{IN}$ )  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

**Operation Conditions** (Note 2)

|                                       |                                                 |
|---------------------------------------|-------------------------------------------------|
| DC Supply Voltage ( $V_{DD}$ )        | $+5 V_{DC}$ to $+15 V_{DC}$                     |
| Input Voltage ( $V_{IN}$ )            | $0 V_{DC}$ to $V_{DD} V_{DC}$                   |
| Operating Temperature Range ( $T_A$ ) |                                                 |
| CD4073BM/CD4075BM                     | $-55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ |
| CD4073BC/CD4075BC                     | $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$  |

**DC Electrical Characteristics** CD4073BM/CD4075BM (Note 2)

| Symbol   | Parameter                          | Conditions                                         | $-55^{\circ}\text{C}$ |       | $+25^{\circ}\text{C}$ |            |       | $+125^{\circ}\text{C}$ |      | Units         |
|----------|------------------------------------|----------------------------------------------------|-----------------------|-------|-----------------------|------------|-------|------------------------|------|---------------|
|          |                                    |                                                    | Min                   | Max   | Min                   | Typ        | Max   | Min                    | Max  |               |
| $I_{DD}$ | Quiescent Device Current           | $V_{DD} = 5\text{V}, V_{IN} = V_{DD}$ or $V_{SS}$  |                       | 0.25  |                       | 0.004      | 0.25  |                        | 7.5  | $\mu\text{A}$ |
|          |                                    | $V_{DD} = 10\text{V}, V_{IN} = V_{DD}$ or $V_{SS}$ |                       | 0.5   |                       | 0.005      | 0.5   |                        | 15   | $\mu\text{A}$ |
|          |                                    | $V_{DD} = 15\text{V}, V_{IN} = V_{DD}$ or $V_{SS}$ |                       | 1.0   |                       | 0.006      | 1.0   |                        | 30   | $\mu\text{A}$ |
| $V_{OL}$ | Low Level Output Voltage           | $V_{DD} = 5\text{V}$                               |                       | 0.05  |                       | 0          | 0.05  |                        | 0.05 | V             |
|          |                                    | $V_{DD} = 10\text{V}$                              |                       | 0.05  |                       | 0          | 0.05  |                        | 0.05 | V             |
|          |                                    | $V_{DD} = 15\text{V}$                              |                       | 0.05  |                       | 0          | 0.05  |                        | 0.05 | V             |
| $V_{OH}$ | High Level Output Voltage          | $V_{DD} = 5\text{V}$                               | 4.95                  |       | 4.95                  | 5          |       | 4.95                   |      | V             |
|          |                                    | $V_{DD} = 10\text{V}$                              | 9.95                  |       | 9.95                  | 10         |       | 9.95                   |      | V             |
|          |                                    | $V_{DD} = 15\text{V}$                              | 14.95                 |       | 14.95                 | 15         |       | 14.95                  |      | V             |
| $V_{IL}$ | Low Level Input Voltage            | $V_{DD} = 5\text{V}, V_O = 0.5\text{V}$            |                       | 1.5   |                       | 2          | 1.5   |                        | 1.5  | V             |
|          |                                    | $V_{DD} = 10\text{V}, V_O = 1.0\text{V}$           |                       | 3.0   |                       | 4          | 3.0   |                        | 3.0  | V             |
|          |                                    | $V_{DD} = 15\text{V}, V_O = 1.5\text{V}$           |                       | 4.0   |                       | 6          | 4.0   |                        | 4.0  | V             |
| $V_{IH}$ | High Level Input Voltage           | $V_{DD} = 5\text{V}, V_O = 4.5\text{V}$            | 3.5                   |       | 3.5                   | 3          |       | 3.5                    |      | V             |
|          |                                    | $V_{DD} = 10\text{V}, V_O = 9.0\text{V}$           | 7.0                   |       | 7.0                   | 6          |       | 7.0                    |      | V             |
|          |                                    | $V_{DD} = 15\text{V}, V_O = 13.5\text{V}$          | 11.0                  |       | 11.0                  | 9          |       | 11.0                   |      | V             |
| $I_{OL}$ | Low Level Output Current (Note 3)  | $V_{DD} = 5\text{V}, V_O = 0.4\text{V}$            | 0.64                  |       | 0.51                  | 0.88       |       | 0.36                   |      | mA            |
|          |                                    | $V_{DD} = 10\text{V}, V_O = 0.5\text{V}$           | 1.6                   |       | 1.3                   | 2.2        |       | 0.9                    |      | mA            |
|          |                                    | $V_{DD} = 15\text{V}, V_O = 1.5\text{V}$           | 4.2                   |       | 3.4                   | 8          |       | 2.4                    |      | mA            |
| $I_{OH}$ | High Level Output Current (Note 3) | $V_{DD} = 5\text{V}, V_O = 4.6\text{V}$            | -0.64                 |       | -0.51                 | -0.88      |       | -0.36                  |      | mA            |
|          |                                    | $V_{DD} = 10\text{V}, V_O = 9.5\text{V}$           | -1.6                  |       | -1.3                  | -2.2       |       | -0.9                   |      | mA            |
|          |                                    | $V_{DD} = 15\text{V}, V_O = 13.5\text{V}$          | -4.2                  |       | -3.4                  | -8         |       | -2.4                   |      | mA            |
| $I_{IN}$ | Input Current                      | $V_{DD} = 15\text{V}, V_{IN} = 0\text{V}$          |                       | -0.10 |                       | $-10^{-5}$ | -0.10 |                        | -1.0 | $\mu\text{A}$ |
|          |                                    | $V_{DD} = 15\text{V}, V_{IN} = 15\text{V}$         |                       | 0.10  |                       | $10^{-5}$  | 0.10  |                        | 1.0  | $\mu\text{A}$ |

**Schematic Diagram**

TL/F/5979-3

## DC Electrical Characteristics CD4073BC/CD4075BC (Note 2)

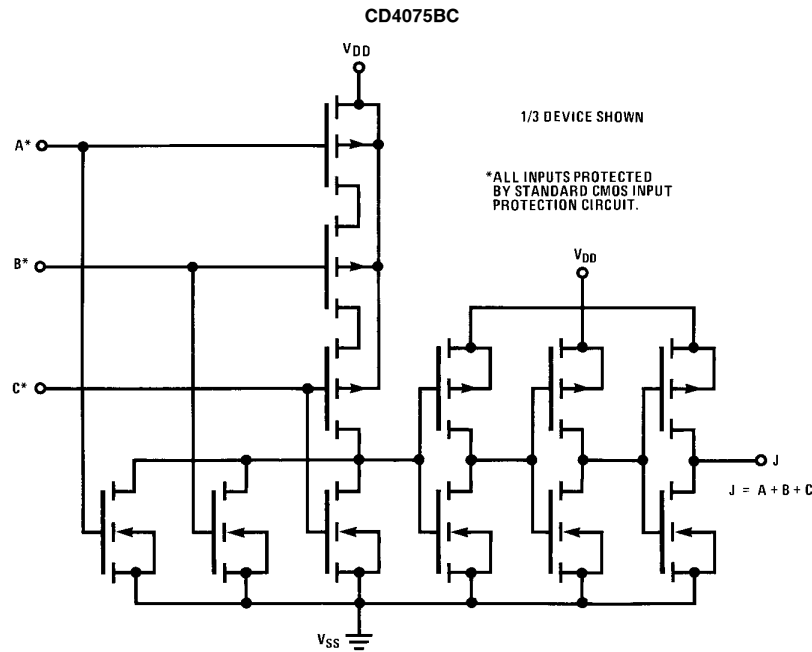
| Symbol   | Parameter                          | Conditions                                                                                                                                                    | -40°C                 |                      | +25°C                 |                         |                      | +85°C                 |                      | Units                         |
|----------|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------|-----------------------|-------------------------|----------------------|-----------------------|----------------------|-------------------------------|
|          |                                    |                                                                                                                                                               | Min                   | Max                  | Min                   | Typ                     | Max                  | Min                   | Max                  |                               |
| $I_{DD}$ | Quiescent Device Current           | $V_{DD} = 5V, V_{IN} = V_{DD} \text{ or } V_{SS}$<br>$V_{DD} = 10V, V_{IN} = V_{DD} \text{ or } V_{SS}$<br>$V_{DD} = 15V, V_{IN} = V_{DD} \text{ or } V_{SS}$ |                       | 1<br>2<br>4          |                       | 0.004<br>0.005<br>0.006 | 1<br>2<br>4          |                       | 7.5<br>15<br>30      | $\mu A$<br>$\mu A$<br>$\mu A$ |
| $V_{OL}$ | Low Level Output Voltage           | $V_{DD} = 5V$<br>$V_{DD} = 10V$<br>$V_{DD} = 15V$ } $ I_O  < 1 \mu A$                                                                                         |                       | 0.05<br>0.05<br>0.05 |                       | 0<br>0<br>0             | 0.05<br>0.05<br>0.05 |                       | 0.05<br>0.05<br>0.05 | V<br>V<br>V                   |
| $V_{OH}$ | High Level Output Voltage          | $V_{DD} = 5V$<br>$V_{DD} = 10V$<br>$V_{DD} = 15V$ } $ I_O  < 1 \mu A$                                                                                         | 4.95<br>9.95<br>14.95 |                      | 4.95<br>9.95<br>14.95 | 5<br>10<br>15           |                      | 4.95<br>9.95<br>14.95 |                      | V<br>V<br>V                   |
| $V_{IL}$ | Low Level Input Voltage            | $V_{DD} = 5V, V_O = 0.5V$<br>$V_{DD} = 10V, V_O = 1.0V$<br>$V_{DD} = 15V, V_O = 1.5V$ } $ I_O  < 1 \mu A$                                                     |                       | 1.5<br>3.0<br>4.0    |                       | 2<br>4<br>6             | 1.5<br>3.0<br>4.0    |                       | 1.5<br>3.0<br>4.0    | V<br>V<br>V                   |
| $V_{IH}$ | High Level Input Voltage           | $V_{DD} = 5V, V_O = 4.5V$<br>$V_{DD} = 10V, V_O = 9.0V$<br>$V_{DD} = 15V, V_O = 13.5V$ } $ I_O  < 1 \mu A$                                                    | 3.5<br>7.0<br>11.0    |                      | 3.5<br>7.0<br>11.0    | 3<br>6<br>9             |                      | 3.5<br>7.0<br>11.0    |                      | V<br>V<br>V                   |
| $I_{OL}$ | Low Level Output Current (Note 3)  | $V_{DD} = 5V, V_O = 0.4V$<br>$V_{DD} = 10V, V_O = 0.5V$<br>$V_{DD} = 15V, V_O = 1.5V$                                                                         | 0.52<br>1.3<br>3.6    |                      | 0.44<br>1.1<br>3.0    | 0.88<br>2.2<br>8        |                      | 0.36<br>0.9<br>2.4    |                      | mA<br>mA<br>mA                |
| $I_{OH}$ | High Level Output Current (Note 3) | $V_{DD} = 5V, V_O = 4.6V$<br>$V_{DD} = 10V, V_O = 9.5V$<br>$V_{DD} = 15V, V_O = 13.5V$                                                                        | -0.52<br>-1.3<br>-3.6 |                      | -0.44<br>-1.1<br>-3.0 | -0.88<br>-2.2<br>-8     |                      | -0.36<br>-0.9<br>-2.4 |                      | mA<br>mA<br>mA                |
| $I_{IN}$ | Input Current                      | $V_{DD} = 15V, V_{IN} = 0V$<br>$V_{DD} = 15V, V_{IN} = 15V$                                                                                                   |                       | -0.30<br>0.30        |                       | $-10^{-5}$<br>$10^{-5}$ | -0.30<br>0.30        |                       | -1.0<br>1.0          | $\mu A$<br>$\mu A$            |

**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 table of "Recommended Operating Conditions" and "Electrical Characteristics" provides 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.

## Schematic Diagram



TL/F/5979-4

**AC Electrical Characteristics\*** CD4073BM/CD4073BC/CD4075BM/CD4075BC  
 $T_A = 25^\circ\text{C}$ ,  $C_L = 50\text{ pF}$ ,  $R_L = 200\text{ k}$  unless otherwise specified

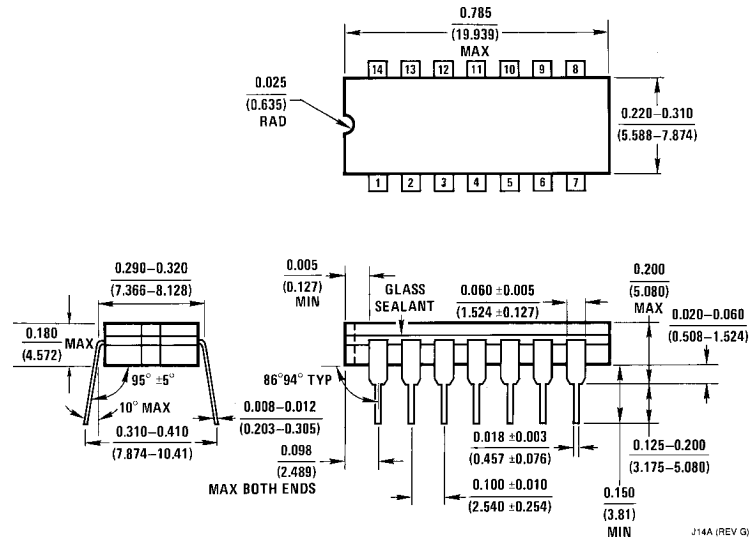
| Symbol                 | Parameter                               | Conditions            | CD4073BC<br>CD4073BM |     |     | CD4075BC<br>CD4075BM |     |     | Units |
|------------------------|-----------------------------------------|-----------------------|----------------------|-----|-----|----------------------|-----|-----|-------|
|                        |                                         |                       | Min                  | Typ | Max | Min                  | Typ | Max |       |
| $t_{PHL}$              | Propagation Delay,<br>High to Low Level | $V_{DD} = 5\text{V}$  |                      | 130 | 250 |                      | 140 | 250 | ns    |
|                        |                                         | $V_{DD} = 10\text{V}$ |                      | 60  | 100 |                      | 70  | 100 | ns    |
|                        |                                         | $V_{DD} = 15\text{V}$ |                      | 40  | 70  |                      | 50  | 70  | ns    |
| $t_{PLH}$              | Propagation Delay,<br>Low to High Level | $V_{DD} = 5\text{V}$  |                      | 140 | 250 |                      | 130 | 250 | ns    |
|                        |                                         | $V_{DD} = 10\text{V}$ |                      | 70  | 100 |                      | 50  | 100 | ns    |
|                        |                                         | $V_{DD} = 15\text{V}$ |                      | 50  | 70  |                      | 40  | 70  | ns    |
| $t_{THL}$<br>$t_{TLH}$ | Transition Time                         | $V_{DD} = 5\text{V}$  |                      | 90  | 200 |                      | 90  | 200 | ns    |
|                        |                                         | $V_{DD} = 10\text{V}$ |                      | 50  | 100 |                      | 50  | 100 | ns    |
|                        |                                         | $V_{DD} = 15\text{V}$ |                      | 40  | 80  |                      | 40  | 80  | ns    |
| $C_{IN}$               | Average Input<br>Capacitance (Note 4)   | Any Input             |                      | 5   | 7.5 |                      | 5   | 7.5 | pF    |
| $C_{PD}$               | Power Dissipation<br>Capacity (Note 5)  | Any Gate              |                      | 17  |     |                      | 17  |     | pF    |

\*AC Parameters are guaranteed by DC correlated testing.

**Note 4:** Capacitance is guaranteed by periodic testing.

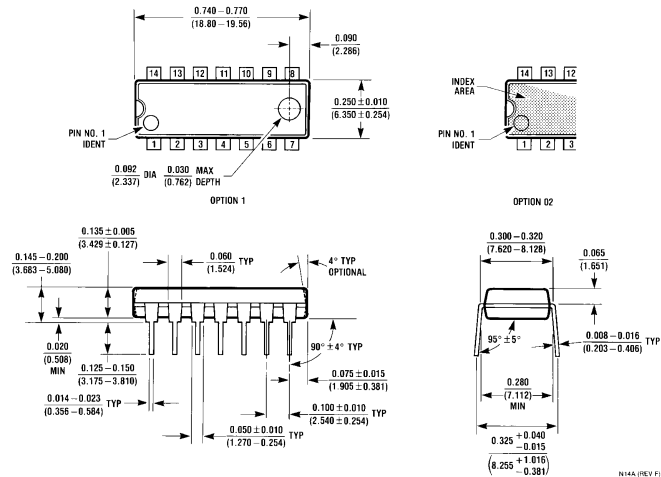
**Note 5:**  $C_{PD}$  determines the no load AC power consumption of any CMOS device. For complete explanation see 54C/74C Family characteristics Application Note AN-90.

## Physical Dimensions inches (millimeters)



**Ceramic Dual-In-Line Package (J)**  
**Order Number CD4073BMJ, CD4073BCJ, CD4075BMJ or CD4075BCJ**  
**NS Package Number J14A**

Physical Dimensions inches (millimeters) (Continued)



Molded Dual-In-Line Package (N)  
Order Number CD4073BMN, CD4073BCN, CD4075BMN or CD4075BCN  
NS Package Number N14A

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