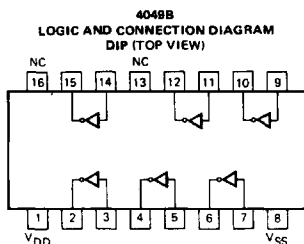


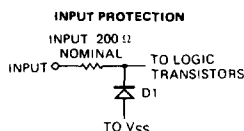
# GD4049B • GD4050B

## 4049B HEX INVERTING BUFFER • 4050B HEX NON-INVERTING BUFFER

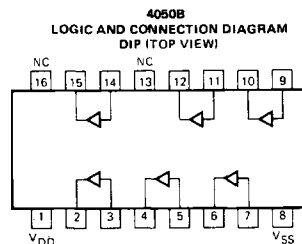
**DESCRIPTION** — These CMOS buffers provide high current output capability suitable for driving TTL or high capacitance loads. Since input voltages in excess of the buffers' supply voltage are permitted, these buffers may also be used to convert logic levels of up to 15 V to standard TTL levels. The 4049B provides six inverting buffers, the 4050B six non-inverting buffers. Their guaranteed fan out into common bipolar logic elements is shown in Table 1.



**NOTE:**  
The SO Package has the same pinouts (Connection Diagram) as the Dual In-line Package.



**NOTE:** Typical Breakdown Voltage of Diode D1 is 20 V



**TABLE 1**  
Guaranteed fan out of 4049B, 4050B into common logic families

| DRIVEN ELEMENT    | GUARANTEED FAN OUT |
|-------------------|--------------------|
| Standard TTL, DTL | 2                  |
| 9LS, 93L, 74LS    | 9                  |
| 74L               | 16                 |

Conditions:  $V_{DD} = V_{CC} = 5.0 \pm 0.25$  V  
 $V_{OL} = 0.5$  V,  $T_A = 0$  to  $75^\circ$  C

**DC CHARACTERISTICS:**  $V_{DD}$  as shown,  $V_{SS} = 0$  V, 4049BXM and 4050BXM (See Note 1)

| SYMBOL          | PARAMETER                               | LIMITS                |      |         |                        |      |         |                        |      |          | UNITS | TEMP             | TEST CONDITIONS                                                                                                                                                                                                    |                                                                                                                                                                                                                     |
|-----------------|-----------------------------------------|-----------------------|------|---------|------------------------|------|---------|------------------------|------|----------|-------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                                         | V <sub>DD</sub> = 5 V |      |         | V <sub>DD</sub> = 10 V |      |         | V <sub>DD</sub> = 15 V |      |          |       |                  |                                                                                                                                                                                                                    |                                                                                                                                                                                                                     |
|                 |                                         | MIN                   | TYP  | MAX     | MIN                    | TYP  | MAX     | MIN                    | TYP  | MAX      |       |                  |                                                                                                                                                                                                                    |                                                                                                                                                                                                                     |
| I <sub>OH</sub> | Output<br>HIGH<br>Current               | -1.85                 |      |         |                        |      |         |                        |      |          | mA    | MIN, 25°C<br>MAX | V <sub>OUT</sub> = 2.5 V for V <sub>DD</sub> = 5 V<br>Inputs at 0 or V <sub>DD</sub><br>per Function                                                                                                               |                                                                                                                                                                                                                     |
|                 |                                         | -1.25                 | -2.5 |         |                        |      |         |                        |      |          |       |                  |                                                                                                                                                                                                                    |                                                                                                                                                                                                                     |
|                 |                                         | -0.9                  |      |         |                        |      |         |                        |      |          |       | mA               | MIN, 25°C<br>MAX                                                                                                                                                                                                   | V <sub>OUT</sub> = 4.5 V for V <sub>DD</sub> = 5 V<br>V <sub>OUT</sub> = 9.5 V for V <sub>DD</sub> = 10 V<br>V <sub>OUT</sub> = 13.5 V for V <sub>DD</sub> = 15 V<br>Inputs at 0 or V <sub>DD</sub><br>per Function |
|                 |                                         | -0.62                 | -1   |         | -1.85                  | -2.5 |         | -5.5                   | -7.5 |          |       |                  |                                                                                                                                                                                                                    |                                                                                                                                                                                                                     |
|                 |                                         | -0.5                  |      |         | -1.25                  |      |         | -3.75                  |      |          |       |                  |                                                                                                                                                                                                                    |                                                                                                                                                                                                                     |
|                 |                                         | -0.35                 |      |         | -0.9                   |      |         | -2.7                   |      |          |       |                  |                                                                                                                                                                                                                    |                                                                                                                                                                                                                     |
| I <sub>OL</sub> | Output<br>LOW<br>Current                | 3.75                  |      |         | 10                     |      |         | 30                     |      |          | mA    | MIN, 25°C<br>MAX | V <sub>OUT</sub> = 0.4 V for V <sub>DD</sub> = 5 V<br>V <sub>OUT</sub> = 0.5 V for V <sub>DD</sub> = 10 V<br>V <sub>OUT</sub> = 1.5 V for V <sub>DD</sub> = 15 V<br>Inputs at 0 or V <sub>DD</sub><br>per Function |                                                                                                                                                                                                                     |
|                 |                                         | 3                     | 6    |         | 8                      | 16   |         | 24                     | 48   |          |       |                  |                                                                                                                                                                                                                    |                                                                                                                                                                                                                     |
|                 |                                         | 2.1                   |      |         | 5.6                    |      |         | 16.8                   |      |          |       | mA               | MIN, 25°C<br>MAX                                                                                                                                                                                                   | V <sub>OUT</sub> = 0.4 V for V <sub>DD</sub> = 4.5 V<br>Inputs at 0 V or V <sub>DD</sub><br>per Function                                                                                                            |
|                 |                                         | 3.3                   | 5.2  |         |                        |      |         |                        |      |          |       |                  |                                                                                                                                                                                                                    |                                                                                                                                                                                                                     |
|                 |                                         | 2.6                   |      |         |                        |      |         |                        |      |          |       |                  |                                                                                                                                                                                                                    |                                                                                                                                                                                                                     |
|                 |                                         | 1.8                   |      |         |                        |      |         |                        |      |          |       |                  |                                                                                                                                                                                                                    |                                                                                                                                                                                                                     |
| I <sub>DD</sub> | Quiescent<br>Power<br>Supply<br>Current |                       |      | 1<br>30 |                        |      | 2<br>60 |                        |      | 4<br>120 | μA    | MIN, 25°C<br>MAX | All Inputs at 0 V or V <sub>DD</sub>                                                                                                                                                                               |                                                                                                                                                                                                                     |

Notes on the following page.

**DC CHARACTERISTICS:**  $V_{DD}$  as shown,  $V_{SS} = 0$  V, 4049BXC and 4050BXC (Cont'd) (See Note 1)

| SYMBOL          | PARAM-<br>ETER                          | LIMITS                |      |         |                        |      |         |                        |      |           | UNITS          | TEMP               | TEST CONDITIONS                                                                                                                                                                                                     |
|-----------------|-----------------------------------------|-----------------------|------|---------|------------------------|------|---------|------------------------|------|-----------|----------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                                         | V <sub>DD</sub> = 5 V |      |         | V <sub>DD</sub> = 10 V |      |         | V <sub>DD</sub> = 15 V |      |           |                |                    |                                                                                                                                                                                                                     |
|                 |                                         | MIN                   | TYP  | MAX     | MIN                    | TYP  | MAX     | MIN                    | TYP  | MAX       |                |                    |                                                                                                                                                                                                                     |
| I <sub>OH</sub> | Output<br>HIGH<br>Current               | -1.5<br>-1.25<br>-1.0 | -2.5 |         |                        |      |         |                        |      |           | mA<br>mA<br>mA | MIN<br>25°C<br>MAX | V <sub>OUT</sub> = 2.5 V for V <sub>DD</sub> = 5 V<br>Inputs at 0 or V <sub>DD</sub><br>per Function                                                                                                                |
|                 |                                         | -0.6<br>-0.5<br>-0.4  | -1   |         | -1.5<br>-1.25<br>-1.0  | -2.5 |         | -4.5<br>-3.75<br>-3    | -7.5 |           | mA<br>mA<br>mA | MIN<br>25°C<br>MAX | V <sub>OUT</sub> = 4.5 V for V <sub>DD</sub> = 5 V<br>V <sub>OUT</sub> = 9.5 V for V <sub>DD</sub> = 10 V<br>V <sub>OUT</sub> = 13.5 V for V <sub>DD</sub> = 15 V<br>Inputs at 0 or V <sub>DD</sub><br>per Function |
| I <sub>OL</sub> | Output<br>LOW<br>Current                | 3.6<br>3.0<br>2.5     | 6    |         | 9.6<br>8<br>6.6        | 16   |         | 28<br>24<br>19         | 48   |           | mA<br>mA<br>mA | MIN<br>25°C<br>MAX | V <sub>OUT</sub> = 0.4 V for V <sub>DD</sub> = 5 V<br>V <sub>OUT</sub> = 0.5 V for V <sub>DD</sub> = 10 V<br>V <sub>OUT</sub> = 1.5 V for V <sub>DD</sub> = 15 V<br>Inputs at 0 or V <sub>DD</sub><br>per Function  |
|                 |                                         | 3.1<br>2.6<br>2.1     | 5.2  |         |                        |      |         |                        |      |           | mA<br>mA<br>mA | MIN<br>25°C<br>MAX | V <sub>OUT</sub> = 0.4 V for V <sub>DD</sub> = 4.5 V<br>Inputs at 0 V or V <sub>DD</sub><br>per Function                                                                                                            |
| I <sub>DD</sub> | Quiescent<br>Power<br>Supply<br>Current |                       |      | 4<br>30 |                        |      | 8<br>60 |                        |      | 16<br>120 | μA             | MIN, 25°C<br>MAX   | All inputs at<br>0 V or V <sub>DD</sub>                                                                                                                                                                             |

**AC CHARACTERISTICS AND SET-UP REQUIREMENTS:**  $V_{DD}$  as shown,  $V_{SS} = 0$  V,  $T_A = 25^\circ\text{C}$ , 4049B only (See Note 2)

| SYMBOL           | PARAMETER              | LIMITS                |     |     |                        |     |     |                        |     |     | UNITS | TEST CONDITIONS                                                                         |
|------------------|------------------------|-----------------------|-----|-----|------------------------|-----|-----|------------------------|-----|-----|-------|-----------------------------------------------------------------------------------------|
|                  |                        | V <sub>DD</sub> = 5 V |     |     | V <sub>DD</sub> = 10 V |     |     | V <sub>DD</sub> = 15 V |     |     |       |                                                                                         |
|                  |                        | MIN                   | TYP | MAX | MIN                    | TYP | MAX | MIN                    | TYP | MAX |       |                                                                                         |
| t <sub>PLH</sub> | Propagation Delay      |                       | 65  | 130 |                        | 30  | 65  |                        | 29  | 52  | ns    | C <sub>L</sub> = 50 pF,<br>R <sub>L</sub> = 200 kΩ<br>Input Transition<br>Times < 20 ns |
| t <sub>PHL</sub> |                        |                       | 50  | 105 |                        | 25  | 50  |                        | 17  | 40  | ns    |                                                                                         |
| t <sub>TLH</sub> | Output Transition Time |                       | 73  | 145 |                        | 40  | 80  |                        | 30  | 60  | ns    |                                                                                         |
| t <sub>THL</sub> |                        |                       | 33  | 65  |                        | 13  | 25  |                        | 9   | 20  | ns    |                                                                                         |

**NOTES:**

- Additional DC Characteristics are listed in this section under 4000B Series CMOS Family Characteristics.
- Propagation Delays and Output Transition Times are graphically described in this section under 4000B Series CMOS Family Characteristics.

AC CHARACTERISTICS AND SET-UP REQUIREMENTS:  $V_{DD}$  as shown,  $V_{SS} = 0$  V,  $T_A = 25^\circ\text{C}$ , 4050B only (See Note 2)

| SYMBOL                               | PARAMETER              | LIMITS                |     |     |                        |     |     |                        |     |     | UNITS | TEST CONDITIONS                                    |
|--------------------------------------|------------------------|-----------------------|-----|-----|------------------------|-----|-----|------------------------|-----|-----|-------|----------------------------------------------------|
|                                      |                        | V <sub>DD</sub> = 5 V |     |     | V <sub>DD</sub> = 10 V |     |     | V <sub>DD</sub> = 15 V |     |     |       |                                                    |
|                                      |                        | MIN                   | TYP | MAX | MIN                    | TYP | MAX | MIN                    | TYP | MAX |       |                                                    |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propegation Delay      |                       | 65  | 130 |                        | 30  | 65  |                        | 24  | 52  | ns    | C <sub>L</sub> = 50 pF,<br>R <sub>L</sub> = 200 kΩ |
| t <sub>TLH</sub><br>t <sub>THL</sub> | Output Transition Time |                       | 73  | 145 |                        | 90  | 80  |                        | 30  | 60  | ns    | Input Transition<br>Times < 20 ns                  |
|                                      |                        |                       | 33  | 65  |                        | 13  | 25  |                        | 9   | 20  |       |                                                    |

Notes on preceding page.

### TYPICAL ELECTRICAL CHARACTERISTICS

