



**MICROCIRCUIT DATA SHEET**

**MNCD4023BM-X REV 1A0**

Original Creation Date: 10/10/95  
 Last Update Date: 07/08/98  
 Last Major Revision Date: 03/10/98

**BUFFERED TRIPLE 3-INPUT NAND 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 Vdd and Vss.

**Industry Part Number**

CD4023BM

**NS Part Numbers**

CD4023BMJ/883\*  
 CD4023BMW/883

**Prime Die**

CD4023BM

**Controlling Document**

79013

**Processing**

MIL-STD-883, Method 5004

**Quality Conformance Inspection**

MIL-STD-883, Method 5005

| Subgrp | Description         | Temp ( °C) |
|--------|---------------------|------------|
| 1      | Static tests at     | +25        |
| 2      | Static tests at     | +125       |
| 3      | Static tests at     | -55        |
| 4      | Dynamic tests at    | +25        |
| 5      | Dynamic tests at    | +125       |
| 6      | Dynamic tests at    | -55        |
| 7      | Functional tests at | +25        |
| 8A     | Functional tests at | +125       |
| 8B     | Functional tests at | -55        |
| 9      | Switching tests at  | +25        |
| 10     | Switching tests at  | +125       |
| 11     | Switching tests at  | -55        |

**Features**

- Wide supply voltage range 3.0V to 15V
- High noise immunity 0.45V<sub>dd</sub> (typ.)
- Low power TTL Fan out of 2 driving 74L  
compatibility or 1 driving 74LS
- Standard Military Drawing (SMD)
  - CD4023: 7901301CA\*
  
- 5V-10V-15V parametric ratings
- Symmetrical output characteristics
- Maximum input leakage 1uA at 15V over full temperature range

**(Absolute Maximum Ratings)**

(Note 1, 2)

|                                |                        |
|--------------------------------|------------------------|
| DC Supply Voltage (Vdd)        | -0.5Vdc to +18Vdc      |
| Input Voltage (Vin)            | -0.5Vdc to Vdd +0.5Vdc |
| Storage Temperature Range (Ts) | -65 C to +150 C        |
| Power Dissipation (Pd)         |                        |
| Dual-In-Line                   | 700mW                  |
| Small Outline                  | 500mW                  |
| Lead Temperature (Tl)          |                        |
| (Soldering, 10 seconds)        | 260 C                  |

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: Vss = 0V unless otherwise specified.

**Recommended Operating Conditions**

|                                  |                 |
|----------------------------------|-----------------|
| DC Supply Voltage (Vdd)          | 5Vdc to 15Vdc   |
| Input Voltage (Vin)              | 0Vdc to Vdd Vdc |
| Operating Temperature Range (TA) |                 |
| CD4023BM                         | -55 C to +125 C |

## Electrical Characteristics

### DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)  
DC:  $V_{ss} = 0V$

| SYMBOL | PARAMETER                  | CONDITIONS                                | NOTES | PIN-NAME | MIN   | MAX   | UNIT | SUB-GROUPS |
|--------|----------------------------|---|-------|----------|-------|-------|------|------------|
| Vol    | Logical "0" Output Voltage | Vdd = 5V, Iout = 1uA, All inputs at 5V    |       |          |       | 0.05  | V    | 1, 2, 3    |
|        |                            | Vdd = 10V, Iout = 1uA, All inputs at 10V  |       |          |       | 0.05  | V    | 1, 2, 3    |
|        |                            | Vdd = 15V, Iout = 1uA, All inputs at 15V  |       |          |       | 0.05  | V    | 1, 2, 3    |
| Voh    | Logical "1" Output Voltage | Vdd = 5V, Iout = 1uA, All inputs at 0V    |       |          | 4.95  |       | V    | 1, 2, 3    |
|        |                            | Vdd = 10V, Iout = 1uA, All inputs at 0V   |       |          | 9.95  |       | V    | 1, 2, 3    |
|        |                            | Vdd = 15V, Iout = 1uA, All inputs at 0V   |       |          | 14.95 |       | V    | 1, 2, 3    |
| Iih    | Logical "1" Input Current  | Vdd = 15V, Vin = 15V (inputs tied)        |       |          |       | 100   | nA   | 1, 3       |
|        |                            |   |       |          |       | 1000  | nA   | 2          |
| Iil    | Logical "0" Input Current  | Vdd = 15V, Vin = 0V (inputs tied)         |       |          |       | -100  | nA   | 1, 3       |
|        |                            |   |       |          |       | -1000 | nA   | 2          |
| Ioh    | Output Source Current      | Vdd = 5V, Vout = 4.6V, All inputs at 0V   |       |          | -0.51 |       | mA   | 1          |
|        |                            |   |       |          | -0.36 |       | mA   | 2          |
|        |                            |   |       |          | -0.64 |       | mA   | 3          |
|        |                            | Vdd = 5V, Vout = 0V, All inputs at 0V     |       |          | -2.06 |       | mA   | 1          |
|        |                            |   |       |          | -1.37 |       | mA   | 2          |
|        |                            |   |       |          | -2.55 |       | mA   | 3          |
|        |                            | Vdd = 10V, Vout = 9.5V, All inputs at 0V  |       |          | -1.3  |       | mA   | 1          |
|        |                            |   |       |          | -0.9  |       | mA   | 2          |
|        |                            |   |       |          | -1.6  |       | mA   | 3          |
|        |                            | Vdd = 15V, Vout = 13.5V, All inputs at 0V |       |          | -3.4  |       | mA   | 1          |
|        |                            |   |       |          | -2.4  |       | mA   | 2          |
|        |                            |   |       |          | -4.2  |       | mA   | 3          |

## Electrical Characteristics

### DC PARAMETERS (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)  
DC:  $V_{SS} = 0V$

| SYMBOL          | PARAMETER                 | CONDITIONS   | NOTES | PIN-NAME | MIN  | MAX  | UNIT | SUB-GROUPS |
|-----------------|---------------------------|--|-------|----------|------|------|------|------------|
| I <sub>ol</sub> | Output Sink Current       | V <sub>dd</sub> = 5V, V <sub>out</sub> = 0.4V, All inputs at 5V    |       |          | 0.51 |      | mA   | 1          |
|                 |                           |  |       |          | 0.36 |      | mA   | 2          |
|                 |                           |  |       |          | 0.64 |      | mA   | 3          |
|                 |                           | V <sub>dd</sub> = 5V, V <sub>out</sub> = 5V, All inputs at 5V      |       |          | 2.27 |      | mA   | 1          |
|                 |                           |  |       |          | 1.54 |      | mA   | 2          |
|                 |                           |  |       |          | 2.81 |      | mA   | 3          |
|                 |                           | V <sub>dd</sub> = 10V, V <sub>out</sub> = 0.5V, All inputs at 10V  |       |          | 1.3  |      | mA   | 1          |
|                 |                           |  |       |          | 0.9  |      | mA   | 2          |
|                 |                           |  |       |          | 1.6  |      | mA   | 3          |
|                 |                           | V <sub>dd</sub> = 15V, V <sub>out</sub> = 1.5V, All inputs at 15V  |       |          | 3.4  |      | mA   | 1          |
|                 |                           |  |       |          | 2.4  |      | mA   | 2          |
|                 |                           |  |       |          | 4.2  |      | mA   | 3          |
| I <sub>cc</sub> | Power Supply Current      | V <sub>dd</sub> = 5V, V <sub>ih</sub> = 5V, V <sub>il</sub> = 0V   |       |          |      | 0.25 | uA   | 1, 3       |
|                 |                           |  |       |          |      | 7.5  | uA   | 2          |
|                 |                           | V <sub>dd</sub> = 10V, V <sub>ih</sub> = 10V, V <sub>il</sub> = 0V |       |          |      | 0.5  | uA   | 1, 3       |
|                 |                           |  |       |          |      | 15   | uA   | 2          |
|                 |                           | V <sub>dd</sub> = 15V, V <sub>ih</sub> = 15V, V <sub>il</sub> = 0V |       |          |      | 1    | uA   | 1, 3       |
|                 |                           |  |       |          |      | 30   | uA   | 2          |
| V <sub>ih</sub> | Logical "1" Input Voltage | V <sub>dd</sub> = 5V, V <sub>out</sub> = 0.5V (max)                | 1     |          | 3.5  |      | V    | 1, 2, 3    |
|                 |                           | V <sub>dd</sub> = 10V, V <sub>out</sub> = 1V (max)                 | 1     |          | 7    |      | V    | 1, 2, 3    |
|                 |                           | V <sub>dd</sub> = 15V, V <sub>out</sub> = 1.5V (max)               | 1     |          | 11   |      | V    | 1, 2, 3    |
| V <sub>il</sub> | Logical "0" Input Voltage | V <sub>dd</sub> = 5V, V <sub>out</sub> = 4.5V (min)                | 1     |          |      | 1.5  | V    | 1, 2, 3    |
|                 |                           | V <sub>dd</sub> = 10V, V <sub>out</sub> = 9.0V (min)               | 1     |          |      | 3    | V    | 1, 2, 3    |
|                 |                           | V <sub>dd</sub> = 15V, V <sub>out</sub> = 13.5V (min)              | 1     |          |      | 4    | V    | 1, 2, 3    |

## Electrical Characteristics

### DC PARAMETERS: HIGH TEMP/VOLTAGE STRESS TEST

| SYMBOL | PARAMETER             | CONDITIONS           | NOTES | PIN-NAME | MIN | MAX   | UNIT | SUB-GROUPS |
|--------|-----------------------|----------------------|-------|----------|-----|-------|------|------------|
| Iih    | Input Leakage Current | Vdd = 15V, Vih = 15V |       |          |     | 1000  | nA   | 2          |
| Iil    | Input Leakage Current | Vdd = 15V, Vil = 0V  |       |          |     | -1000 | nA   | 2          |
| Icc    | Power Supply Current  | Vdd = 15V, Vih = 15V |       |          |     | 30    | uA   | 2          |

## Electrical Characteristics

### AC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)

AC:  $C_1 = 50\text{pF}$ ,  $R_1 = 200\text{K}$

| SYMBOL    | PARAMETER                                 | CONDITIONS | NOTES | PIN-NAME        | MIN      | MAX | UNIT | SUB-GROUPS |
|-----------|---|------------|-------|-----------------|----------|-----|------|------------|
| tPHL      | Propagation Delay Time: High to Low Level | Vdd = 5V   | 3     |                 |          | 250 | nS   | 9          |
|           |   |            | 3     |                 |          | 350 | nS   | 10         |
|           |   |            | 3     |                 |          | 200 | nS   | 11         |
|           |   | Vdd = 10V  | 2     |                 |          | 100 | nS   | 9          |
|           |   |            | 2     |                 |          | 140 | nS   | 10         |
|           |   |            | 2     |                 |          | 80  | nS   | 11         |
|           |   | Vdd = 15V  | 2     |                 |          | 70  | nS   | 9          |
|           |   |            | 2     |                 |          | 100 | nS   | 10         |
|           |   |            | 2     |                 |          | 55  | nS   | 11         |
| tPLH      | Propagation Delay Time: Low to High Level | Vdd = 5V   | 3     |                 |          | 250 | nS   | 9          |
|           |   |            | 3     |                 |          | 350 | nS   | 10, 11     |
|           |   |            | 2     |                 |          | 100 | nS   | 9          |
|           |   | Vdd = 10V  | 2     |                 |          | 140 | nS   | 10         |
|           |   |            | 2     |                 |          | 80  | nS   | 11         |
|           |   |            | 2     |                 |          | 70  | nS   | 9          |
|           |   | Vdd = 15V  | 2     |                 |          | 100 | nS   | 10         |
|           |   |            | 2     |                 |          | 55  | nS   | 11         |
|           |   |            | tTHL  | Transition Time | Vdd = 5V | 3   |      |            |
| 3         |   |            |       |                 |          | 300 | nS   | 10, 11     |
| Vdd = 10V | 2   |            |       |                 |          | 100 | nS   | 9          |
|           | 2   |            |       |                 |          | 150 | nS   | 10, 11     |
| Vdd = 15V | 2   |            |       |                 |          | 80  | nS   | 9          |
|           | 2   |            |       |                 |          | 120 | nS   | 10, 11     |
| tTLH      | Transition Time                           | Vdd = 5V   | 3     |                 |          | 200 | nS   | 9          |
|           |   |            | 3     |                 |          | 300 | nS   | 10, 11     |
|           |   | Vdd = 10V  | 2     |                 |          | 100 | nS   | 9          |
|           |   |            | 2     |                 |          | 150 | nS   | 10, 11     |
|           |   | Vdd = 15V  | 2     |                 |          | 80  | nS   | 9          |
|           |   |            | 2     |                 |          | 120 | nS   | 10, 11     |
| Cin       | Average Input Capacitance                 | Any Input  | 2     |                 |          | 7.5 | pF   | 9          |

Note 1: Parameter tested go-no-go only.

Note 2: Guaranteed parameter not tested.

Note 3: Tested at 25 C; guaranteed but not tested at +125 C and -55 C.



**Revision History**

| Rev | ECN #    | Rel Date | Originator    | Changes                           |
|-----|----------|----------|---------------|-----------------------------------|
| 1A0 | M0002792 | 07/08/98 | Linda Collins | New update: MNCD4023BM-X Rev. 1A0 |