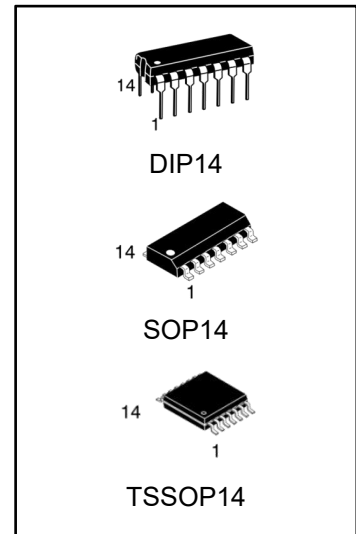


Features:

- Wide supply voltage range from 3V to 15V
- Fully static operation
- 5V, 10V, and 15V parametric ratings
- Standardized symmetrical output characteristics
- Inputs and outputs are protected against electrostatic effects
- Specified from -40°C to +105°C
- Packaging information: DIP14/SOP14/TSSOP14



Ordering Information

| DEVICE | Package Type | MARKING | Packing | Packing Qty |
|--------------|--------------|----------|---------|--------------|
| CD4023BE | DIP14 | CD4023BE | TUBE | 1000pcs/Box |
| CD4023BM/TR | SOP14 | CD4023B | REEL | 2500pcs/Reel |
| CD4023BMT/TR | TSSOP14 | CD4023B | REEL | 2500pcs/Reel |

General Description

The CD4023B provides the positive triple 3-input NAND function. The outputs are fully buffered for highest noise immunity and pattern insensitivity of output impedance.

It operates over a recommended V_{DD} power supply range of 3V to 15V referenced to GND (usually ground). Unused inputs must be connected to V_{DD} , GND, or another input.

Block Diagram

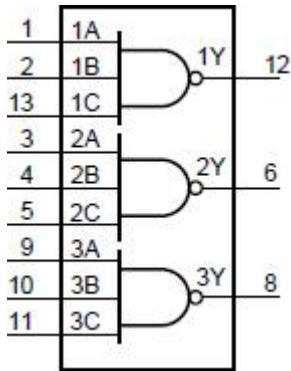


Figure 1. Functional diagram

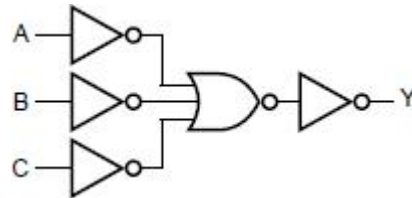
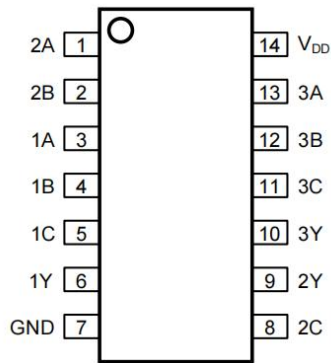


Figure 2 Logic diagram (one gate)

Pin Configurations



DIP14,SOP14,TSSOP14

Pin Description

| Pin No. | Pin Name | Description |
|---------|-----------------|----------------|
| 1 | 2A | data input |
| 2 | 2B | data input |
| 3 | 1A | data input |
| 4 | 1B | data input |
| 5 | 1C | data input |
| 6 | 1Y | data output |
| 7 | GND | ground (0V) |
| 8 | 2C | data input |
| 9 | 2Y | data output |
| 10 | 3Y | data output |
| 11 | 3C | data input |
| 12 | 3B | data input |
| 13 | 3A | data input |
| 14 | V _{DD} | supply voltage |

Function Table

| Input | | | Output |
|-------|----|----|--------|
| nA | nB | nC | nY |
| L | X | X | H |
| X | L | X | H |
| X | X | L | H |
| H | H | H | L |

Note: H=HIGH voltage level; L=LOW voltage level; X=don't care.

Electrical Parameter

Absolute Maximum Ratings

(Voltages are referenced to GND (ground=0V), unless otherwise specified.)

| Parameter | Symbol | Conditions | Min. | Max. | Unit |
|-------------------------|-----------|-----------------------|------|--------------|------|
| supply voltage | V_{DD} | - | -0.5 | +18 | V |
| DC input current | I_{IK} | any one input | - | ± 10 | mA |
| input voltage | V_I | all inputs | -0.5 | $V_{DD}+0.5$ | V |
| storage temperature | T_{stg} | - | -65 | +150 | °C |
| total power dissipation | P_{tot} | - | - | 500 | mW |
| device dissipation | P | per output transistor | - | 100 | mW |
| Soldering temperature | T_L | 10s | DIP | 245 | °C |
| | | | SOP | 250 | |

Note:

- (1) For DIP14 packages: above 70°C the value of P_{tot} derates linearly with 12mW/K.
- (2) For SOP14 packages: above 70°C the value of P_{tot} derates linearly with 8mW/K.
- (3) For (T)SSOP14 packages: above 60°C the value of P_{tot} derates linearly with 5.5mW/K.

Recommended Operating Conditions

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---------------------|-----------|-------------|------|------|------|------|
| supply voltage | V_{DD} | - | 3 | - | 15 | V |
| ambient temperature | T_{amb} | in free air | -40 | - | +105 | °C |

Electrical Characteristics
DC Characteristics 1

 (T_{amb}=25°C, voltages are referenced to GND (ground=0V), unless otherwise specified.)

| Parameter | Symbol | Conditions (V) | | | T _{amb} =25°C | | | Unit |
|---------------------------|-----------------|----------------|-----------------|-----------------|------------------------|-------------------|------|------|
| | | V _O | V _{IN} | V _{DD} | Min. | Typ. | Max. | |
| supply current | I _{DD} | - | 0, 5 | 5 | - | 0.01 | 0.25 | uA |
| | | - | 0, 10 | 10 | - | 0.01 | 0.5 | uA |
| | | - | 0, 15 | 15 | - | 0.01 | 1 | uA |
| LOW-level output current | I _{OL} | 0.4 | 0, 5 | 5 | 0.51 | 1 | - | mA |
| | | 0.5 | 0, 10 | 10 | 1.3 | 2.6 | - | mA |
| | | 1.5 | 0, 15 | 15 | 3.4 | 6.8 | - | mA |
| HIGH-level output current | I _{OH} | 4.6 | 0, 5 | 5 | -0.51 | -1 | - | mA |
| | | 2.5 | 0, 5 | 5 | -1.6 | -3.2 | - | mA |
| | | 9.5 | 0, 10 | 10 | -1.3 | -2.6 | - | mA |
| | | 13.5 | 0, 15 | 15 | -3.4 | -6.8 | - | mA |
| LOW-level output voltage | V _{OL} | - | 0, 5 | 5 | - | 0 | 0.05 | V |
| | | - | 0, 10 | 10 | - | 0 | 0.05 | V |
| | | - | 0, 15 | 15 | - | 0 | 0.05 | V |
| HIGH-level output voltage | V _{OH} | - | 0, 5 | 5 | 4.95 | 5 | - | V |
| | | - | 0, 10 | 10 | 9.95 | 10 | - | V |
| | | - | 0, 15 | 15 | 14.95 | 15 | - | V |
| LOW-level input voltage | V _{IL} | 0.5, 4.5 | - | 5 | - | - | 1.5 | V |
| | | 1, 9 | - | 10 | - | - | 3 | V |
| | | 1.5, 13.5 | - | 15 | - | - | 4 | V |
| HIGH-level input voltage | V _{IH} | 4.5 | - | 5 | 3.5 | - | - | V |
| | | 9 | - | 10 | 7 | - | - | V |
| | | 13.5 | - | 15 | 11 | - | - | V |
| input leakage current | I _I | - | 0, 15 | 15 | - | ±10 ⁻⁵ | ±0.1 | uA |

DC Characteristics 2

(Tamb=-40°C to +105°C, voltages are referenced to GND (ground=0V), unless otherwise specified.)

| Parameter | Symbol | Conditions (V) | | | Tamb=-40°C | | Tamb=+85°C | | Tamb=+105°C | | Unit |
|---------------------------|--------|----------------|-------|-----|------------|------|------------|------|-------------|------|------|
| | | VO | VIN | VDD | Min. | Max. | Min. | Max. | Min. | Max. | |
| supply current | IDD | - | 0, 5 | 5 | - | 0.25 | - | 7.5 | - | 7.5 | uA |
| | | - | 0, 10 | 10 | - | 0.5 | - | 15 | - | 15 | uA |
| | | - | 0, 15 | 15 | - | 1 | - | 30 | - | 30 | uA |
| LOW-level output current | IOL | 0.4 | 0, 5 | 5 | 0.61 | - | 0.42 | - | 0.36 | - | mA |
| | | 0.5 | 0, 10 | 10 | 1.5 | - | 1.1 | - | 0.9 | - | mA |
| | | 1.5 | 0, 15 | 15 | 4 | - | 2.8 | - | 2.4 | - | mA |
| HIGH-level output current | IOH | 4.6 | 0, 5 | 5 | -0.61 | - | -0.42 | - | -0.36 | - | mA |
| | | 2.5 | 0, 5 | 5 | -1.8 | - | -1.3 | - | -1.15 | - | mA |
| | | 9.5 | 0, 10 | 10 | -1.5 | - | -1.1 | - | -0.9 | - | mA |
| | | 13.5 | 0, 15 | 15 | -4 | - | -2.8 | - | -2.4 | - | mA |
| LOW-level output voltage | VOL | - | 0, 5 | 5 | - | 0.05 | - | 0.05 | - | 0.05 | V |
| | | - | 0, 10 | 10 | - | 0.05 | - | 0.05 | - | 0.05 | V |
| | | - | 0, 15 | 15 | - | 0.05 | - | 0.05 | - | 0.05 | V |
| HIGH-level output voltage | VOH | - | 0, 5 | 5 | 4.95 | - | 4.95 | - | 4.95 | - | V |
| | | - | 0, 10 | 10 | 9.95 | - | 9.95 | - | 9.95 | - | V |
| | | - | 0, 15 | 15 | 14.95 | - | 14.95 | - | 14.95 | - | V |
| LOW-level input voltage | VIL | 4.5 | - | 5 | - | 1.5 | - | 1.5 | - | 1.5 | V |
| | | 9 | - | 10 | - | 3 | - | 3 | - | 3 | V |
| | | 13.5 | - | 15 | - | 4 | - | 4 | - | 4 | V |
| HIGH-level input voltage | VIH | 0.5,4.5 | - | 5 | 3.5 | - | 3.5 | - | 3.5 | - | V |
| | | 1.9 | - | 10 | 7 | - | 7 | - | 7 | - | V |
| | | 1.5,13.5 | - | 15 | 11 | - | 11 | - | 11 | - | V |
| input leakage current | Ii | - | 0, 15 | 15 | - | ±0.1 | - | ±1 | - | ±1 | uA |

AC Characteristics

(Tamb=25°C, GND=0V, tr, tf=20ns, CL=50pF, RL=200kΩ, unless otherwise specified.)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit | |
|------------------------|------------|--------------|---------|------|------|------|----|
| propagation delay time | tPHL, tPLH | see Figure 4 | VDD=5V | - | 125 | 250 | ns |
| | | | VDD=10V | - | 60 | 120 | ns |
| | | | VDD=15V | - | 45 | 90 | ns |
| transition time | tTHL, tTLH | see Figure 4 | VDD=5V | - | 100 | 200 | ns |
| | | | VDD=10V | - | 50 | 100 | ns |
| | | | VDD=15V | - | 40 | 80 | ns |
| input capacitance | CI | any input | - | 5 | 7.5 | pF | |

AC Testing Circuit

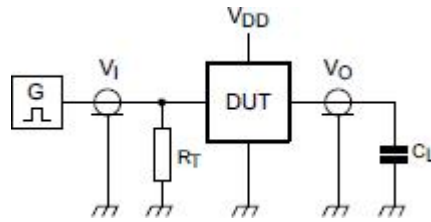


Figure 3. Test circuit for switching times

Definitions for test circuit:

DUT=Device Under Test.

C_L =Load capacitance including jig and probe capacitance.

R_T =Termination resistance should be equal to the output impedance Z_o of the pulse generator.

AC Testing Waveforms

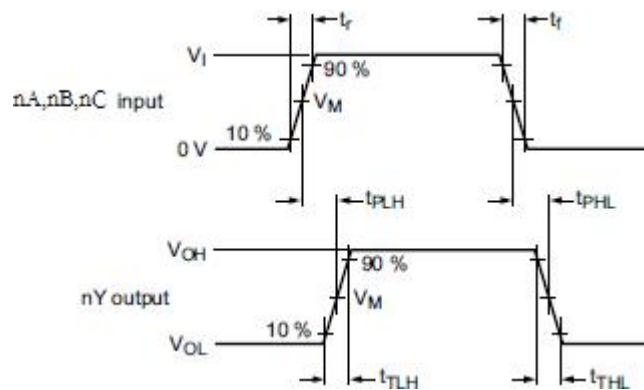


Figure 4. Propagation delay, output transition time

Measurement Points

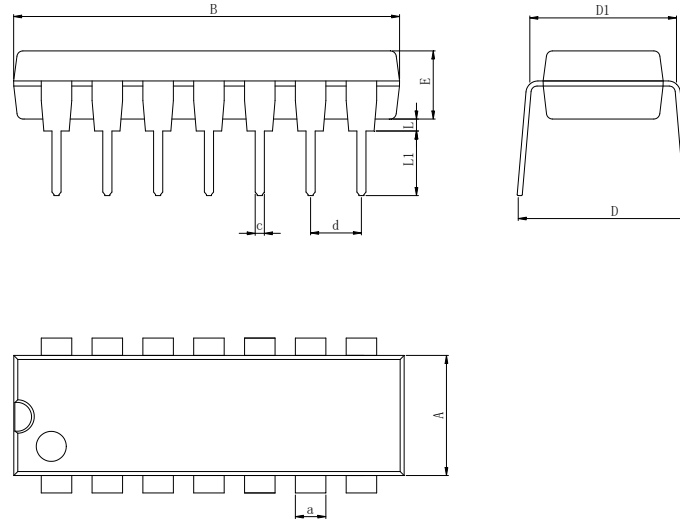
| Supply voltage | Input | Output |
|----------------|---------------------|---------------------|
| VDD | VM | VM |
| 5V to 15V | $0.5 \times V_{DD}$ | $0.5 \times V_{DD}$ |

Test Data

| Supply voltage | Input | Load |
|----------------|------------|--------------------|
| VDD | VI | CL |
| 5V to 15V | GND or VDD | $\leq 20\text{ns}$ |

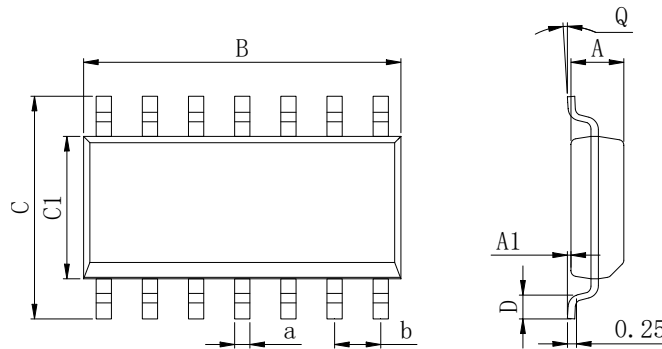
Physical Dimensions

DIP14



| Dimensions In Millimeters(DIP14) | | | | | | | | | | |
|----------------------------------|------|-------|------|------|------|------|------|------|------|----------|
| Symbol: | A | B | D | D1 | E | L | L1 | a | c | d |
| Min: | 6.10 | 18.94 | 8.40 | 7.42 | 3.10 | 0.50 | 3.00 | 1.50 | 0.40 | 2.54 BSC |
| Max: | 6.68 | 19.56 | 9.00 | 7.82 | 3.55 | 0.70 | 3.60 | 1.55 | 0.50 | |

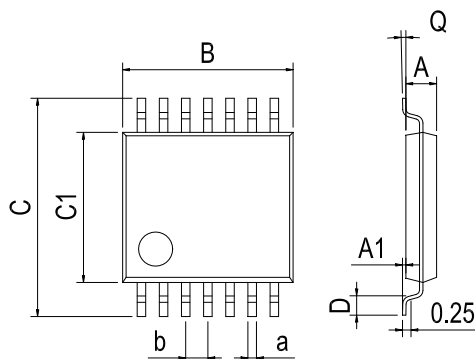
SOP14



| Dimensions In Millimeters(SOP14) | | | | | | | | | |
|----------------------------------|------|------|------|------|------|------|----|------|----------|
| Symbol: | A | A1 | B | C | C1 | D | Q | a | b |
| Min: | 1.35 | 0.05 | 8.55 | 5.80 | 3.80 | 0.40 | 0° | 0.35 | 1.27 BSC |
| Max: | 1.55 | 0.20 | 8.75 | 6.20 | 4.00 | 0.80 | 8° | 0.45 | |

Physical Dimensions

TSSOP14



| Dimensions In Millimeters(TSSOP14) | | | | | | | | | |
|------------------------------------|------|------|------|------|------|------|----|------|----------|
| Symbol: | A | A1 | B | C | C1 | D | Q | a | b |
| Min: | 0.85 | 0.05 | 4.90 | 6.20 | 4.30 | 0.40 | 0° | 0.20 | 0.65 BSC |
| Max: | 0.95 | 0.20 | 5.10 | 6.60 | 4.50 | 0.80 | 8° | 0.25 | |

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