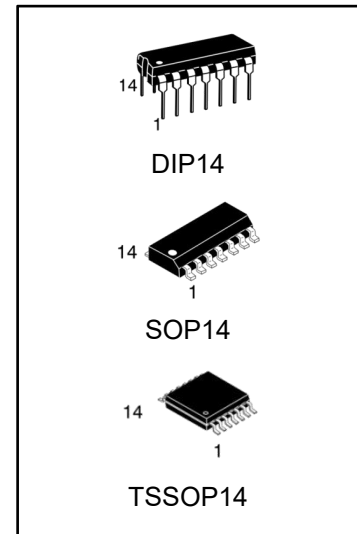


Features:

- 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

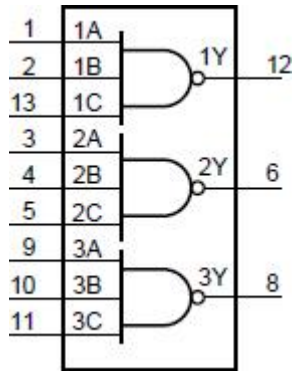


Figure 1. Functional diagram

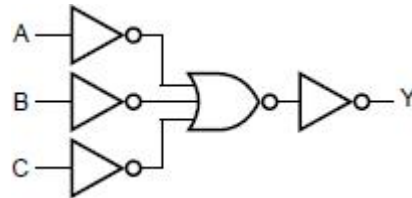
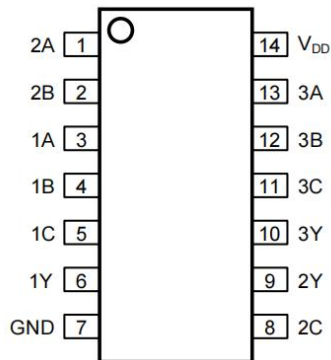


Figure 2 Logic diagram (one gate)

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 _D	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

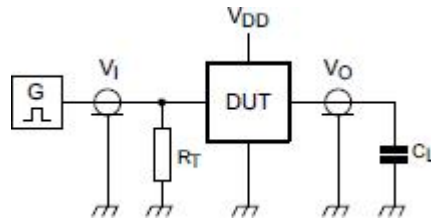


Figure 3. Test circuit for switching times

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

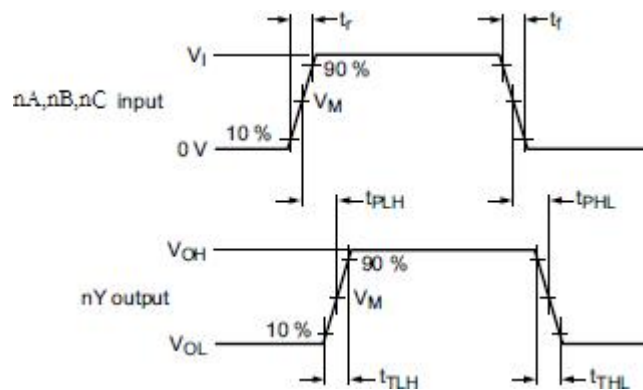


Figure 4. Propagation delay, output transition time

Measurement Points

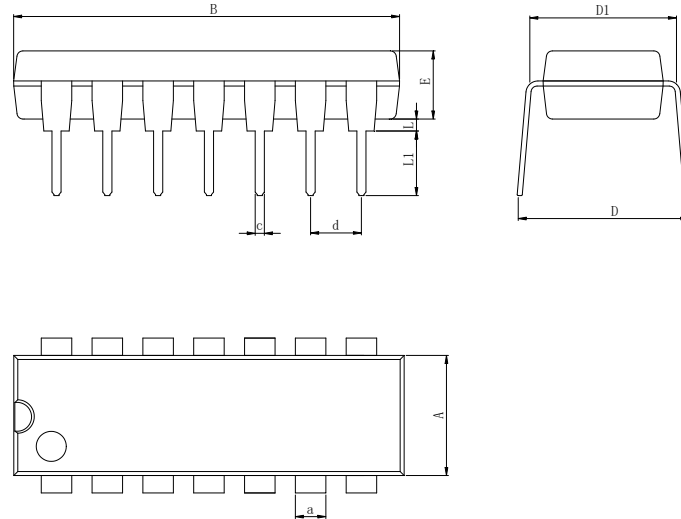
Supply voltage	Input	Output
VDD	VM	VM
5V to 15V	$0.5 \times V_{DD}$	$0.5 \times V_{DD}$

Test Data

Supply voltage	Input		Load
VDD	VI	t_r, t_f	CL
5V to 15V	GND or VDD	$\leq 20\text{ns}$	50pF

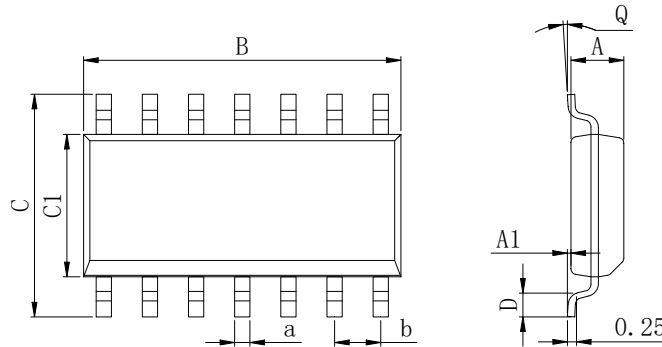
Physical Dimensions

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	

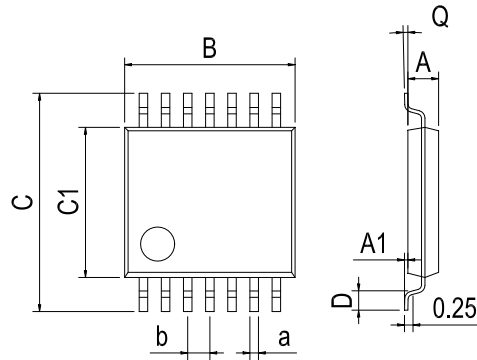
SOP14



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	