FAIRCHILD SEMICONDUCTOR™

October 1987
Revised August 2000

CD4023BC
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 V_{DD} and V_{SS}.

Features

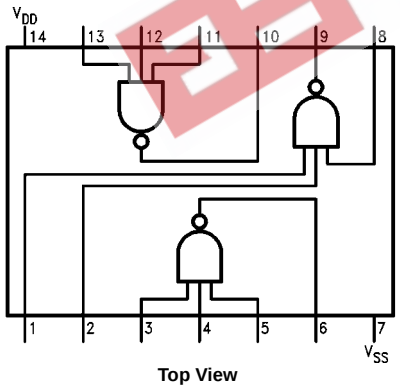
- Wide supply voltage range: 3.0V to 15V
- High noise immunity: 0.45 V_{DD} (typ)
- Low power TTL compatibility: fan out of 2 driving 74L or 1 driving 74LS
- 5V–10V–15V parametric ratings
- Symmetrical output characteristics
- Maximum input leakage 1 µA at 15V over full temperature range

Ordering Code:

Order Number	Package Number	Package Description
CD4023BCM	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150 Narrow
CD4023BCS	M14D	14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
CD4023BCN	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

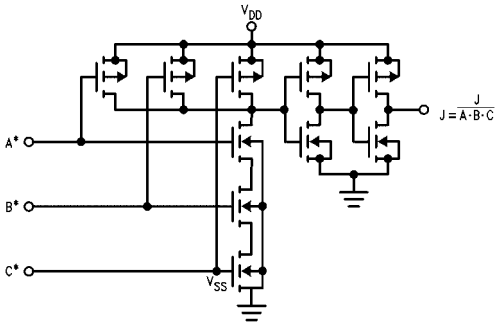
Devices also available in Tape and Reel. Specify by appending the suffix letter "X" tot he ordering code.

Connection Diagram



Top View

Block Diagram



1/3 Device Shown

*All Inputs Protected by Standard CMOS Input Protection Circuit.

Absolute Maximum Ratings(Note 1)

(Note 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 Temp. Range (T_S)	−65°C to +150°C
Power Dissipation (P_D)	
Dual-In-Line	700 mW
Small Outline	500 mW
Lead Temperature (T_L)	
(Soldering, 10 seconds)	260°C

Recommended Operating Conditions

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)	−40°C to +85°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: V_{SS} = 0V unless otherwise specified.

DC Electrical Characteristics (Note 3)

Symbol	Parameter	Conditions	−40°C		+25°C			+85°C		Units
			Min	Typ	Min	Typ	Max	Min	Max	
I_{DD}	Quiescent Device Current	V_{DD} = 5V		1.0		0.004	1.0		7.5	
		V_{DD} = 10V		2.0		0.005	2.0		15	µA
		V_{DD} = 15V		4.0		0.006	4.0		30	
V_{OL}	LOW Level Output Voltage	V_{DD} = 5V		0.05		0	0.05		0.05	
		V_{DD} = 10V		0.05		0	0.05		0.05	V
		V_{DD} = 15V		0.05		0	0.05		0.05	
V_{OH}	HIGH Level Output Voltage	V_{DD} = 5V	4.95		4.95	5		4.95		
		V_{DD} = 10V	9.95		9.95	10		9.95		V
		V_{DD} = 15V	14.95		14.95	15		14.95		
V_{IL}	LOW Level Input Voltage	V_{DD}=5V, V_O=4.5V		1.5		2	1.5		1.5	
		V_{DD}=10V, V_O=9.0V $\lvert I_O\rvert$<1µA		3.0		4	3.0		3.0	V
		V_{DD}=15V, V_O=13.5V		4.0		6	4.0		4.0	
V_{IH}	HIGH Level Input Voltage	V_{DD}=5V, V_O=0.5V	3.5		3.5	3		3.5		
		V_{DD}=10V, V_O=1.0V $\lvert I_O\rvert$<1µA	7.0		7.0	6		7.0		V
		V_{DD}=15V, V_O=1.5V	11.0		11.0	9		11.0		
I_{OL}	LOW Level Output Current	V_{DD}=5V, V_O = 0.4V	0.52		0.44	0.88		0.36		
	(Note 4)	V_{DD} = 10V, V_O = 0.5V	1.3		1.1	2.2		0.90		mA
		V_{DD} = 15V, V_O = 1.5V	3.6		3.0	8		2.4		
I_{OH}	HIGH Level Output Current	V_{DD} = 5V, V_O = 4.6V	−0.52		−0.44	−0.88		−0.36		
	(Note 4)	V_{DD} = 10V, V_O = 9.5V	−1.3		−1.1	−2.2		−0.90		mA
		V_{DD} = 15V, V_O = 13.5V	−3.6		−3.0	−8		−2.4		
I_{IN}	Input Current	V_{DD} = 15V, V_{IN} = 0V		−0.3		-10^{-5}	−0.3		−1.0	µA
		V_{DD} = 15V, V_{IN} = 15V		0.3		10^{-5}	0.3		1.0	

Note 3: V_{SS} = 0V unless otherwise specified.

Note 4: I_{OH} and I_{OL} are tested one output at a time.

AC Electrical Characteristics (Note 5)

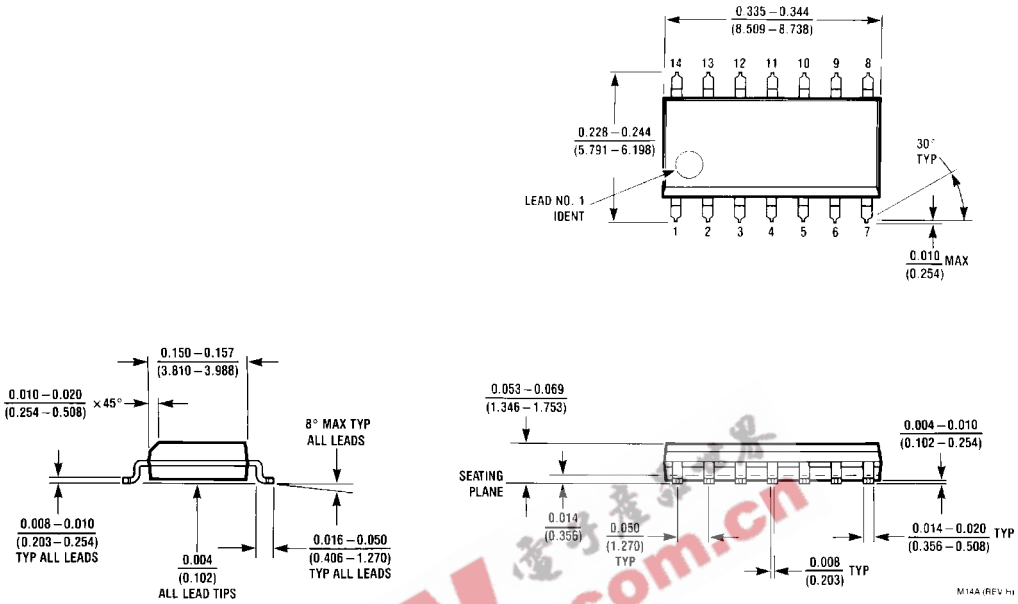
T_A = 25°C, C_L = 50 pF, R_L = 200k, unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_{PHL}	Propagation Delay, HIGH-to-LOW Level	V_{DD} = 5V		130	250	
		V_{DD} = 10V		60	100	ns
		V_{DD} = 15V		40	70	
t_{PLH}	Propagation Delay, LOW-to-HIGH Level	V_{DD} = 5V		110	250	
		V_{DD} = 10V		50	100	ns
		V_{DD} = 15V		35	70	
t_{THL}, t_{TLH}	Transition Time	V_{DD} = 5V		90	200	
		V_{DD} = 10V		50	100	ns
		V_{DD} = 15V		40	80	
C_{IN}	Average Input Capacitance	Any Input		5	7.5	pF
C_{PD}	Power Dissipation Capacity (Note 6)	Any Gate		17		pF

Note 5: AC Parameters are guaranteed by DC correlated testing.

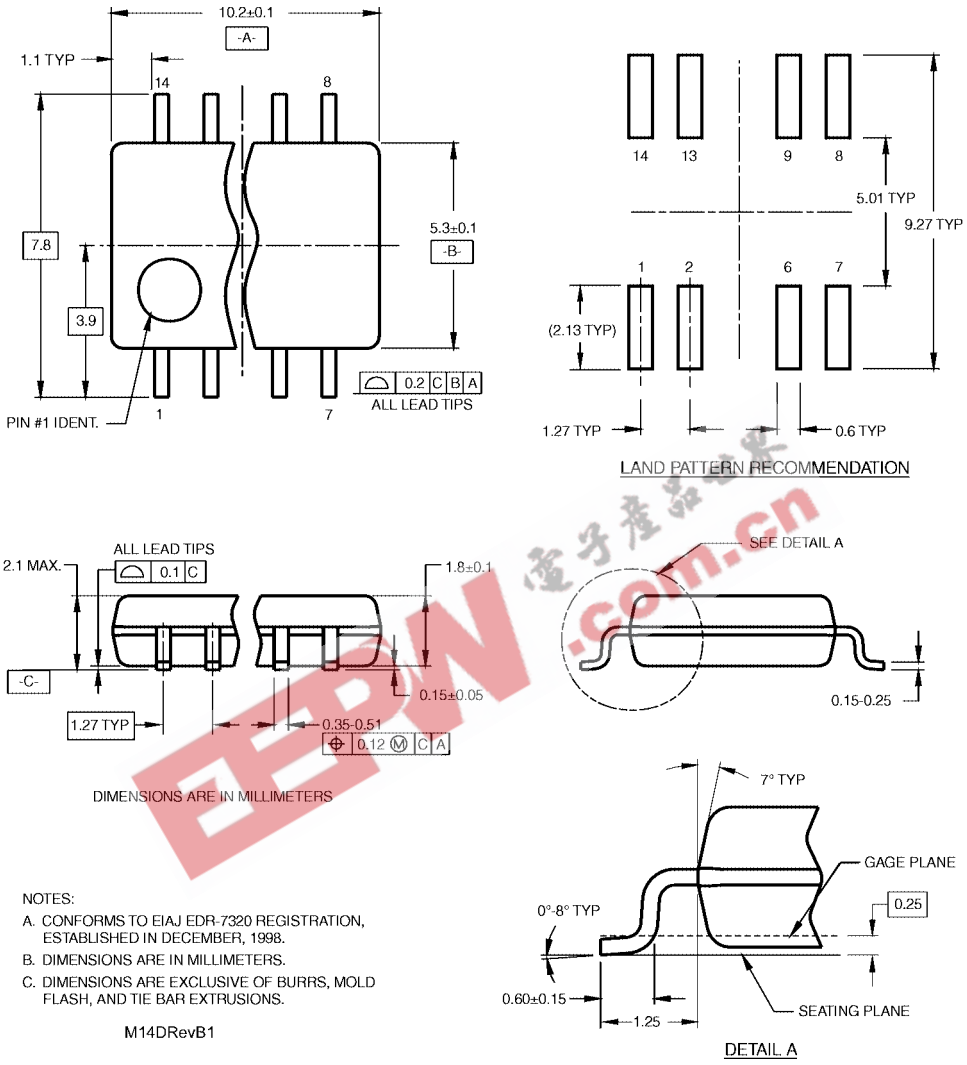
Note 6: C_{PD} determines the no load AC power consumption of any CMOS device. For complete explanation, see Family Characteristics Application Note AN-90.

Physical Dimensions inches (millimeters) unless otherwise noted



14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150 Narrow
Package Number M14A

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



NOTES:

A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.

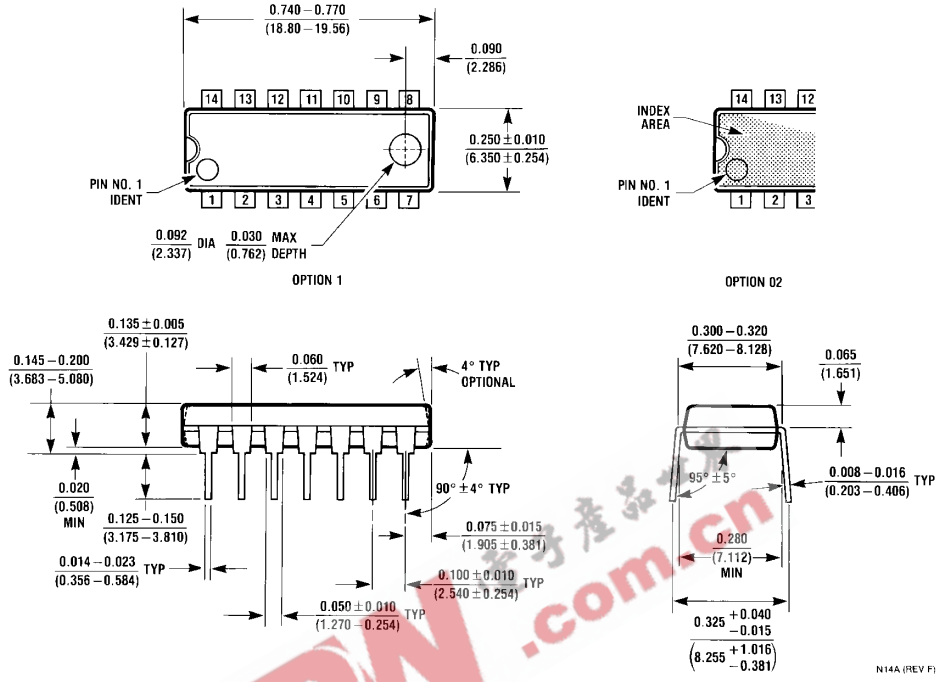
B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M14DRevB1

14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
Package Number M14D

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide
Package Number N14A

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

www.fairchildsemi.com