FAIRCHILD SEMICONDUCTOR™

October 1987
Revised January 2004

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

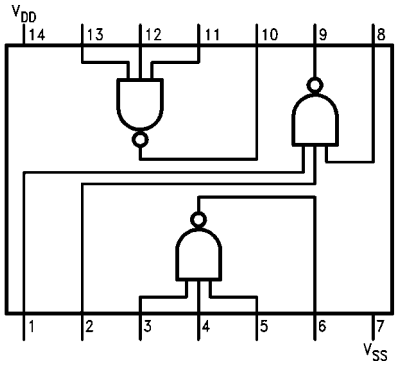
- Wide supply voltage range: 3.0V to 15V
- High noise immunity: 0.45 V_{DD} (typ)
- Low power TTL compatibility: fan out of 2 driving 74L or 1 driving 74LS
- 5V–10V–15V parametric ratings
- Symmetrical output characteristics
- Maximum input leakage 1 μA at 15V over full temperature range

Ordering Code:

Order Number	Package Number	Package Description
CD4023BCM (Note 1)	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
CD4023BCSJ	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

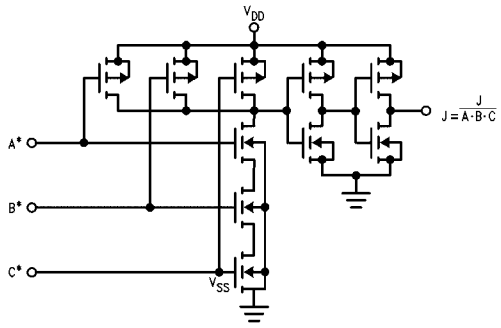
Note 1: Devices also available in Tape and Reel. Specify by appending the suffix letter "X" tot he ordering code.

Connection Diagram



Top View

Block Diagram



$^1/_3$ Device Shown

*All Inputs Protected by Standard CMOS Input Protection Circuit.

Absolute Maximum Ratings(Note 2)

(Note 3)

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)	−55°C to +125°C

Note 2: "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 3: V_{SS} = 0V unless otherwise specified.

DC Electrical Characteristics (Note 4)

Symbol	Parameter	Conditions	−55°C		+25°C			+125°C		Units
			Min	Typ	Min	Typ	Max	Min	Max	
I_{DD}	Quiescent Device Current	V_{DD} = 5V		0.25		0.004	0.25		7.5	
		V_{DD} = 10V		0.5		0.005	0.5		15	µA
		V_{DD} = 15V		1.0		0.006	1.0		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	0.64		0.51	0.88		0.36		
	(Note 5)	V_{DD} = 10V, V_O = 0.5V	1.6		1.3	2.2		0.90		mA
		V_{DD} = 15V, V_O = 1.5V	4.2		3.4	8		2.4		
I_{OH}	HIGH Level Output Current	V_{DD} = 5V, V_O = 4.6V	−0.64		−0.51	−0.88		−0.36		
	(Note 5)	V_{DD} = 10V, V_O = 9.5V	−1.6		−1.3	−2.2		−0.90		mA
		V_{DD} = 15V, V_O = 13.5V	−4.2		−3.4	−8		−2.4		
I_{IN}	Input Current	V_{DD} = 15V, V_{IN} = 0V		−0.1		-10^{-5}	−0.1		−1.0	µA
		V_{DD} = 15V, V_{IN} = 15V		0.1		10^{-5}	0.1		1.0	

Note 4: V_{SS} = 0V unless otherwise specified.

Note 5: I_{OH} and I_{OL} are tested one output at a time.

AC Electrical Characteristics (Note 6)

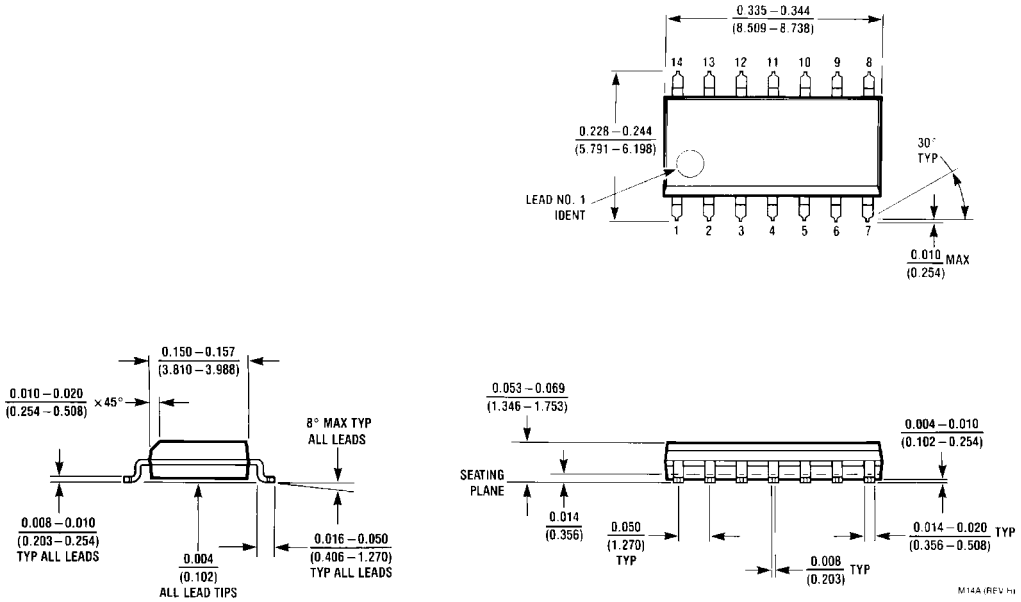
$T_A = 25°C$, $C_L = 50$ pF, $R_L = 200$k, unless otherwise specified

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},	Transition Time	$V_{DD} = 5V$		90	200	
t_{TLH}		$V_{DD} = 10V$		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 7)	Any Gate		17		pF

Note 6: AC Parameters are guaranteed by DC correlated testing.

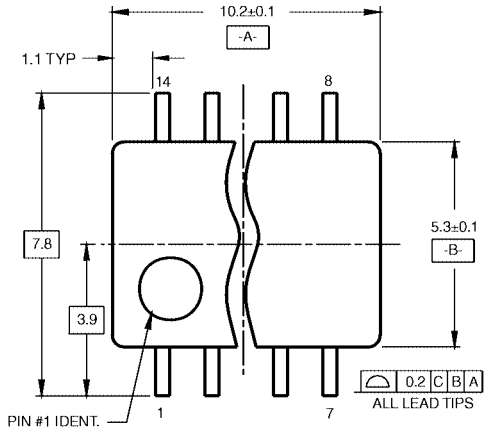
Note 7: C_{PD} determines the no load AC power consumption of any CMOS device. For complete explanation, see Family Characteristics Application Note AN-90.

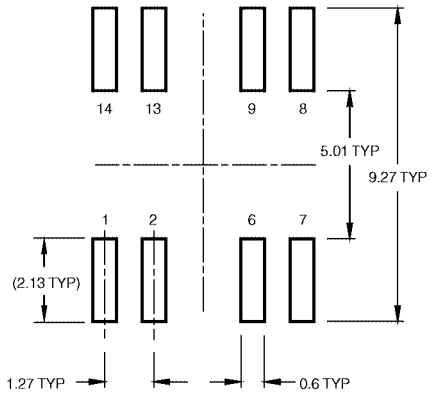
Physical Dimensions inches (millimeters) unless otherwise noted



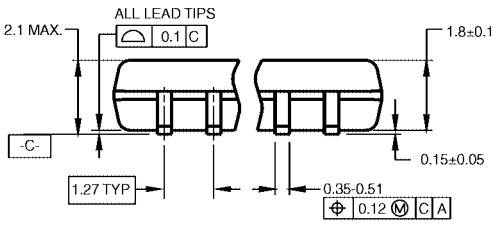
14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
Package Number M14A

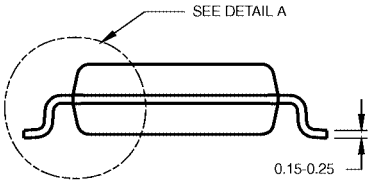
Physical Dimensions inches (millimeters) unless otherwise noted (Continued)





LAND PATTERN RECOMMENDATION





DIMENSIONS ARE IN MILLIMETERS

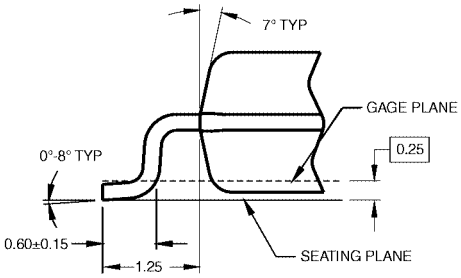
NOTES:

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.

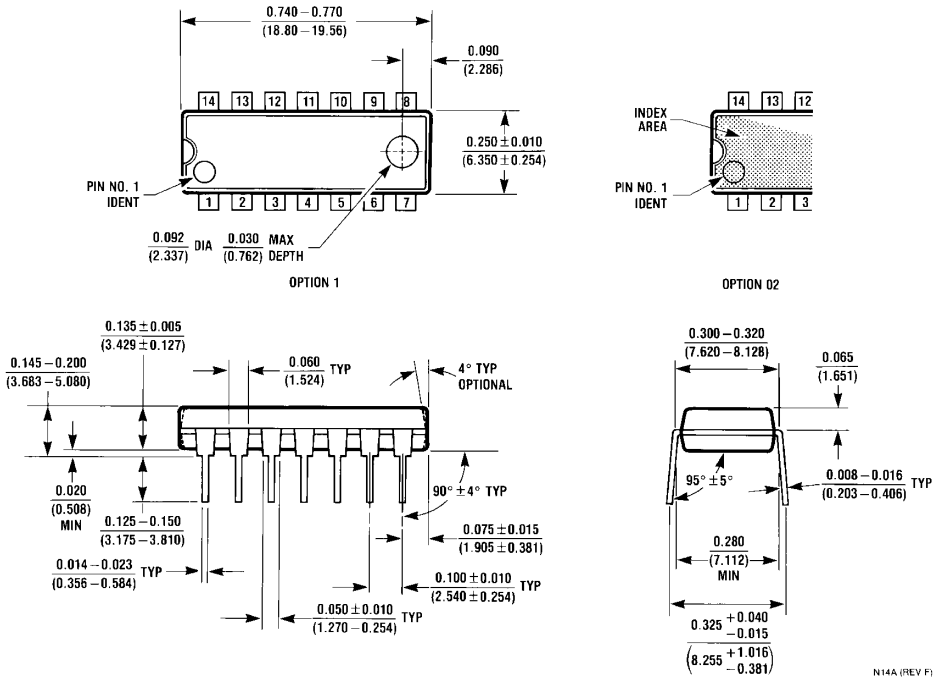
M14DRevB1



DETAIL A

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