FAIRCHILD SEMICONDUCTOR™

October 1987
Revised March 2002

CD4043BC • CD4044BC
Quad 3-STATE NOR R/S Latches • Quad 3-STATE NAND R/S Latches

General Description

The CD4043BC are quad cross-couple 3-STATE CMOS NOR latches, and the CD4044BC are quad cross-couple 3-STATE CMOS NAND latches. Each latch has a separate Q output and individual SET and RESET inputs. There is a common 3-STATE ENABLE input for all four latches. A logic "1" on the ENABLE input connects the latch states to the Q outputs. A logic "0" on the ENABLE input disconnects the latch states from the Q outputs resulting in an open circuit condition on the Q output. The 3-STATE feature allows common bussing of the outputs.

Features

- Wide supply voltage range: 3V to 15V
- Low power: 100 nW (typ.)
- High noise immunity: 0.45 V_{DD} (typ.)
- Separate SET and RESET inputs for each latch
- NOR and NAND configuration
- 3-STATE output with common output enable

Applications

- Multiple bus storage
- Strobed register
- Four bits of independent storage with output enable
- General digital logic

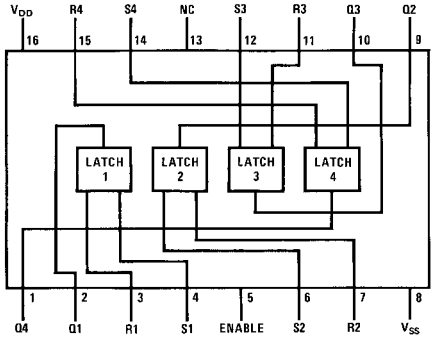
Ordering Code:

Order Number	Package Number	Package Description
CD4043BCM	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
CD4043BCN	N16E	16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide
CD4044BCM	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
CD4044BCSJ	M16D	16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
CD4044BCN	N16E	16-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" to the ordering code.

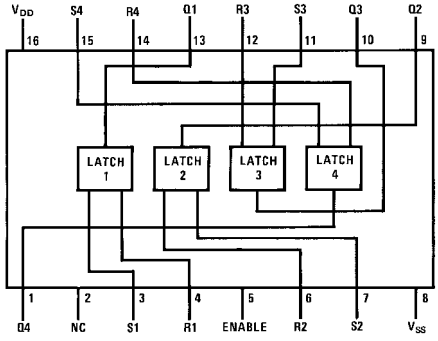
Connection Diagrams

Pin Assignments for DIP, SOIC and SOP
CD4043BC



Top View

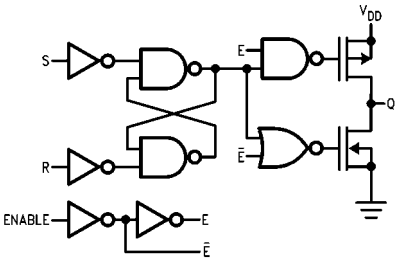
Pin Assignments for DIP and SOIC
CD4044BC



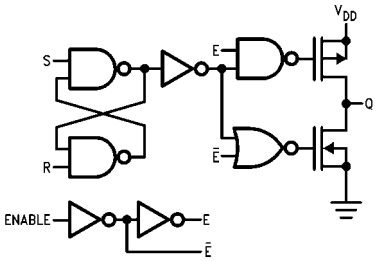
Top View

Block Diagrams

CD4043BC



CD4044BC



Truth Tables

CD4043BC

S	R	E	Q
X	X	0	OC
0	0	1	NC
1	0	1	1
0	1	1	0
1	1	1	Δ

OC = 3-STATE
NC = No change
X = Don't care
Δ = Dominated by S = 1 input
ΔΔ = Dominated by R = 0 input

CD4044BC

S	R	E	Q
X	X	0	OC
1	1	1	NC
0	1	1	1
1	0	1	0
0	0	1	ΔΔ

Absolute Maximum Ratings(Note 1)

(Note 2)

Supply Voltage (V_{DD})	−0.5V to +18V
Input Voltage (V_{IN})	−0.5V to V_{DD} +0.5V
Storage Temperature 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

(Note 2)

Supply Voltage (V_{DD})	3.0V to 15V
Input Voltage (V_{IN})	0 to V_{DD} V
Operating Temperature Range (T_A)	
CD4043BC, CD4044BC	−55°C to +125°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 tables of "Recommended Operating Conditions" and "Electrical Characteristics" provide conditions for actual device operation.

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

DC Electrical Characteristics (Note 2)

Symbol	Parameter	Conditions	−55°C		+25°C			+125°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
I_{DD}	Quiescent	V_{DD} = 5V, V_{IN} = V_{DD} or V_{SS}		5		0.01	5		150	
	Device Current	V_{DD} = 10V, V_{IN} = V_{DD} or V_{SS}		10		0.01	10		300	µA
		V_{DD} = 15V, V_{IN} = V_{DD} or V_{SS}		20		0.02	20		600	
V_{OL}	LOW Level	$\|I_O\| \leq 1$ µA, V_{IL} = 0V, V_{IH} = V_{DD}								
	Output Voltage	V_{DD} = 5.0V		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	$\|I_O\| \leq 1$ µA, V_{IL} = 0V, V_{IH} = V_{DD}								
	Output Voltage	V_{DD} = 5.0V	4.95		4.95	5.0		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	$\|I_O\| \leq 1$ µA								
	Input Voltage	V_{DD} = 5.0V, V_O = 0.5V or 4.5V		1.5		2.25	1.5		1.5	
		V_{DD} = 10V, V_O = 1.0V or 9.0V		3.0		4.5	3.0		3.0	V
		V_{DD} = 15V, V_O = 1.5V or 13.5V		4.0		6.75	4.0		4.0	
V_{IH}	HIGH Level	$\|I_O\| \leq 1$ µA								
	Input Voltage	V_{DD} = 5.0V, V_O = 0.5V or 4.5V	3.5		3.5	2.75		3.5		
		V_{DD} = 5.0V, V_O = 1.0V or 9.0V	7.0		7.0	5.5		7.0		V
		V_{DD} = 15V, V_O = 1.5V or 13.5V	11		11	8.25		11		
I_{OL}	LOW Level	V_{IL} = 0V, V_{IH} = V_{DD}								
	Output Current	V_{DD} = 5.0V, V_O = 0.4V	0.64		0.51	1.0		0.36		
	(Note 3)	V_{DD} = 10V, V_O = 0.5V	1.6		1.3	2.6		0.9		mA
		V_{DD} = 15V, V_O = 1.5V	4.2		3.4	6.8		2.4		
I_{OH}	HIGH Level	V_{IL} = 0V, V_{IH} = V_{DD}								
	Output Current	V_{DD} = 5.0V, V_O = 4.6V	−0.64		−0.51	−0.4		−0.36		
	(Note 3)	V_{DD} = 10V, V_O = 9.5V	−1.6		−1.3	−1.0		−0.9		mA
		V_{DD} = 15V, V_O = 13.5V	−4.2		−3.4	−3.0		−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 3: I_{OH} and I_{OL} are tested one output at a time.

AC Electrical Characteristics (Note 4)

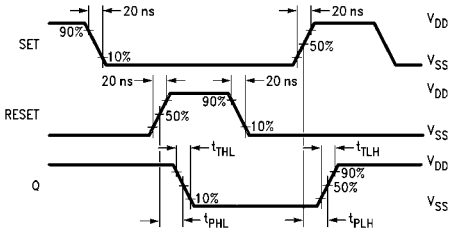
$T_A = 25°C$, $C_L = 50$ pF, $R_L = 200$k, input $t_r = t_f = 20$ ns, unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_{PLH}, t_{PHL}	Propagation Delay S or R to Q	$V_{DD} = 5.0V$		175	350	
		$V_{DD} = 10V$		75	175	ns
		$V_{DD} = 15V$		60	120	
t_{PZH}, t_{PHZ}	Propagation Delay Enable to Q (HIGH)	$V_{DD} = 5.0V$		115	230	
		$V_{DD} = 10V$		55	110	ns
		$V_{DD} = 15V$		40	80	
t_{PZL}, t_{PLZ}	Propagation Delay Enable to Q (LOW)	$V_{DD} = 5.0V$		100	200	
		$V_{DD} = 10V$		50	100	ns
		$V_{DD} = 15V$		40	80	
t_{THL}, t_{TLH}	Transition Time	$V_{DD} = 5.0V$		100	200	
		$V_{DD} = 10V$		50	100	ns
		$V_{DD} = 15V$		40	80	
t_{WO}	Minimum SET or RESET Pulse Width	$V_{DD} = 5.0V$		80	160	
		$V_{DD} = 10V$		40	80	ns
		$V_{DD} = 15V$		20	40	
C_{IN}	Input Capacitance			5.0	7.5	pF

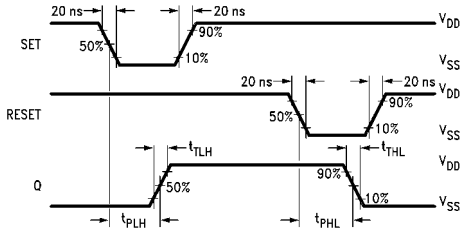
Note 4: AC Parameters are guaranteed by DC correlated testing.

Timing Waveforms

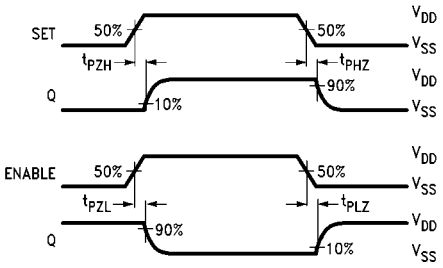
CD4043B



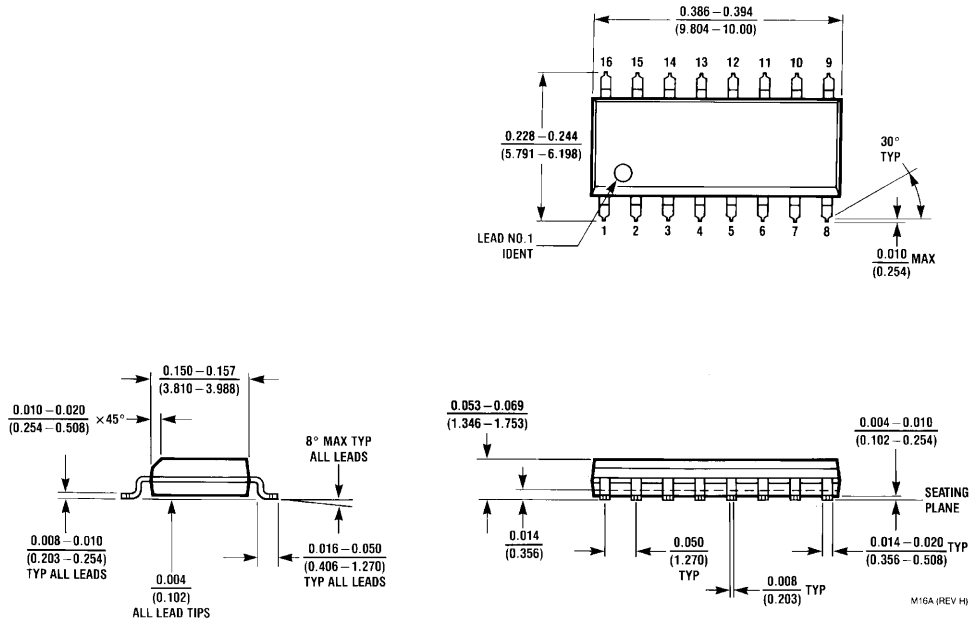
CD4044B



Enable Timing

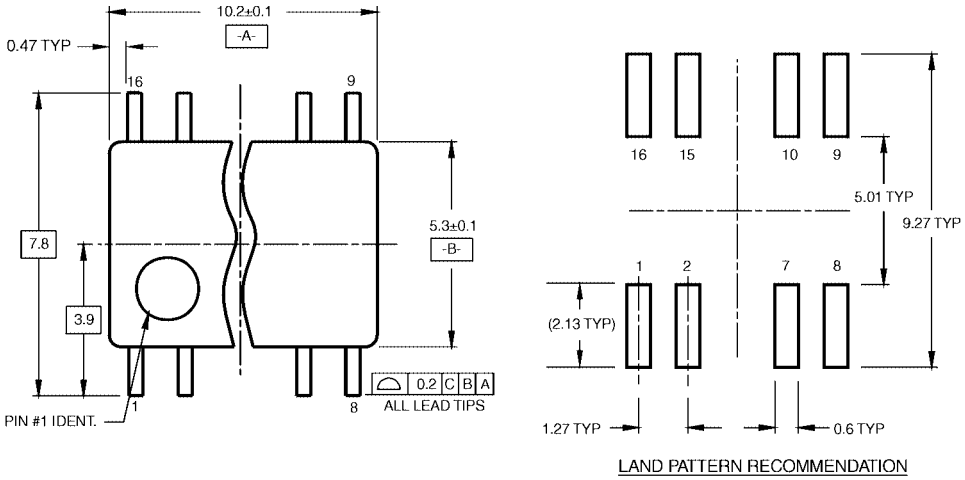


Physical Dimensions inches (millimeters) unless otherwise noted



16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
Package Number M16A

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



NOTES:

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

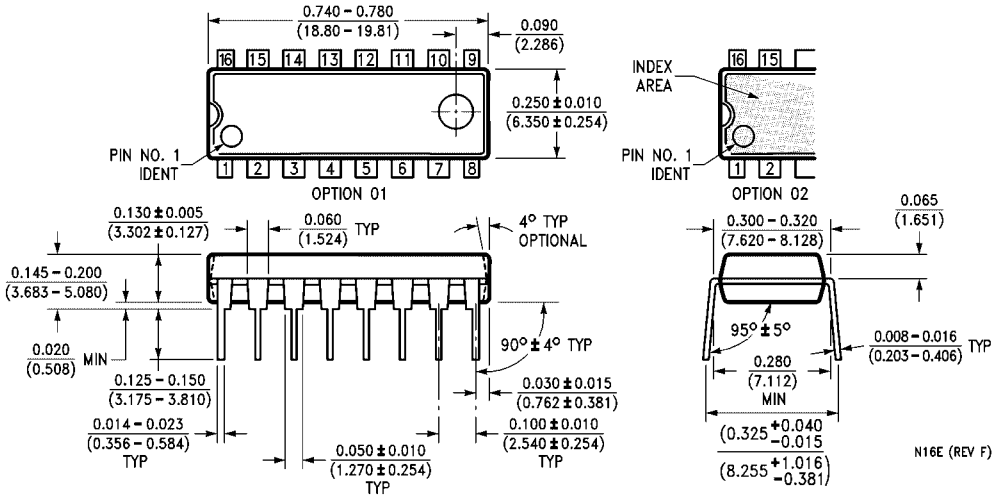
B. DIMENSIONS ARE IN MILLIMETERS.

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

M16DRevB1

16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
Package Number M16D

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



16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide
Package Number N16E