

## 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

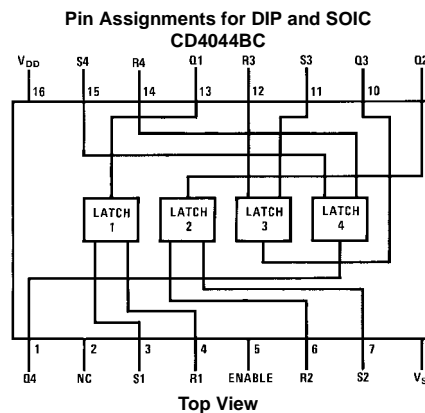
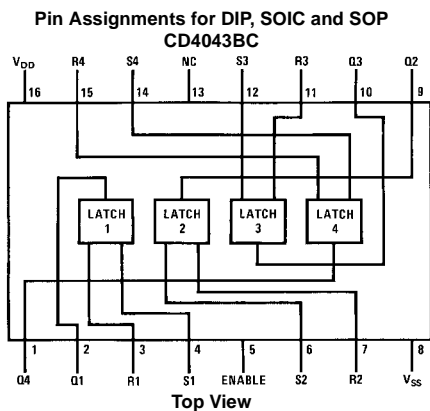
- Multiple bus storage
- Strobed register
- Four bits of independent storage with output enable
- General digital logic

#### Ordering Code:

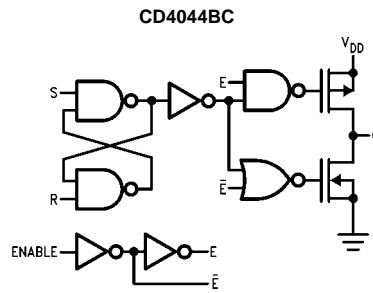
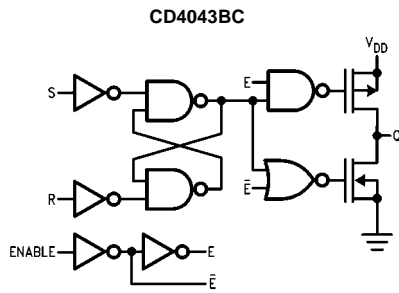
Order Number	Package Number	Package Description
CD4043BCM	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
CD4043BCN	N16E	16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide
CD4044BCM	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 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



**Block Diagrams**



**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	$\Delta$

CD4044BC

S	R	E	Q
X	X	0	OC
1	1	1	NC
0	1	1	1
1	0	1	0
0	0	1	$\Delta\Delta$

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

Absolute Maximum Ratings <sup>(Note 1)</sup>			Recommended Operating Conditions		
<sup>(Note 2)</sup>			<sup>(Note 2)</sup>		
Supply Voltage (V <sub>DD</sub> )		-0.5V to +18V	Supply Voltage (V <sub>DD</sub> )		3.0V to 15V
Input Voltage (V <sub>IN</sub> )		-0.5V to V <sub>DD</sub> +0.5V	Input Voltage (V <sub>IN</sub> )		0 to V <sub>DD</sub> V
Storage Temperature Range (T <sub>S</sub> )		-65°C to +150°C	Operating Temperature Range (T <sub>A</sub> )		CD4043BC, CD4044BC -55°C to +125°C
Power Dissipation (P <sub>D</sub> )					
Dual-In-Line		700 mW			
Small Outline		500 mW			
Lead Temperature (T <sub>L</sub> )					
(Soldering, 10 seconds)		260°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<sub>SS</sub> = 0V unless otherwise specified.

### DC Electrical Characteristics <sup>(Note 2)</sup>

Symbol	Parameter	Conditions	-55°C		+25°C			+125°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
I <sub>DD</sub>	Quiescent Device Current	V <sub>DD</sub> = 5V, V <sub>IN</sub> = V <sub>DD</sub> or V <sub>SS</sub>		5		0.01	5		150	μA
		V <sub>DD</sub> = 10V, V <sub>IN</sub> = V <sub>DD</sub> or V <sub>SS</sub>		10		0.01	10		300	
		V <sub>DD</sub> = 15V, V <sub>IN</sub> = V <sub>DD</sub> or V <sub>SS</sub>		20		0.02	20		600	
V <sub>OL</sub>	LOW Level Output Voltage	I <sub>O</sub>   ≤ 1 μA, V <sub>IL</sub> = 0V, V <sub>IH</sub> = V <sub>DD</sub>								V
		V <sub>DD</sub> = 5.0V		0.05		0	0.05		0.05	
		V <sub>DD</sub> = 10V		0.05		0	0.05		0.05	
V <sub>OH</sub>	HIGH Level Output Voltage	I <sub>O</sub>   ≤ 1 μA, V <sub>IL</sub> = 0V, V <sub>IH</sub> = V <sub>DD</sub>								V
		V <sub>DD</sub> = 5.0V	4.95		4.95	5.0		4.95		
		V <sub>DD</sub> = 10V	9.95		9.95	10		9.95		
V <sub>IL</sub>	LOW Level Input Voltage	I <sub>O</sub>   ≤ 1 μA								V
		V <sub>DD</sub> = 5.0V, V <sub>O</sub> = 0.5V or 4.5V		1.5		2.25	1.5		1.5	
		V <sub>DD</sub> = 10V, V <sub>O</sub> = 1.0V or 9.0V		3.0		4.5	3.0		3.0	
V <sub>IH</sub>	HIGH Level Input Voltage	I <sub>O</sub>   ≤ 1 μA								V
		V <sub>DD</sub> = 5.0V, V <sub>O</sub> = 0.5V or 4.5V	3.5		3.5	2.75		3.5		
		V <sub>DD</sub> = 5.0V, V <sub>O</sub> = 1.0V or 9.0V	7.0		7.0	5.5		7.0		
I <sub>OL</sub>	LOW Level Output Current (Note 3)	V <sub>IL</sub> = 0V, V <sub>IH</sub> = V <sub>DD</sub>								mA
		V <sub>DD</sub> = 5.0V, V <sub>O</sub> = 0.4V	0.64		0.51	1.0		0.36		
		V <sub>DD</sub> = 10V, V <sub>O</sub> = 0.5V	1.6		1.3	2.6		0.9		
I <sub>OH</sub>	HIGH Level Output Current (Note 3)	V <sub>IL</sub> = 0V, V <sub>IH</sub> = V <sub>DD</sub>								mA
		V <sub>DD</sub> = 5.0V, V <sub>O</sub> = 4.6V	-0.64		-0.51	-0.4		-0.36		
		V <sub>DD</sub> = 10V, V <sub>O</sub> = 9.5V	-1.6		-1.3	-1.0		-0.9		
I <sub>IN</sub>	Input Current	V <sub>DD</sub> = 15V, V <sub>IN</sub> = 0V		-0.1		-10.5	-0.1		-1.0	μA
		V <sub>DD</sub> = 15V, V <sub>IN</sub> = 15V		0.1		10.5	0.1		1.0	

**Note 3:** I<sub>OH</sub> and I<sub>OL</sub> are tested one output at a time.

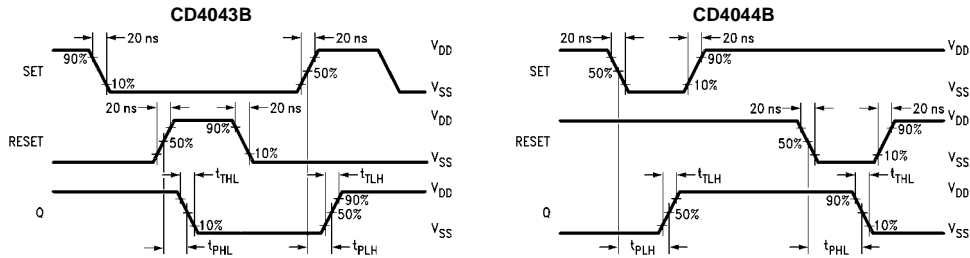
### AC Electrical Characteristics (Note 4)

$T_A = 25^\circ\text{C}$ ,  $C_L = 50\text{ pF}$ ,  $R_L = 200\text{ k}$ , input  $t_r = t_f = 20\text{ ns}$ , unless otherwise noted

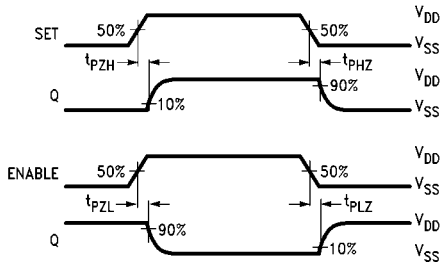
Symbol	Parameter	Conditions	Min	Typ	Max	Units
$t_{PLH}, t_{PHL}$	Propagation Delay S or R to Q	$V_{DD} = 5.0\text{V}$ $V_{DD} = 10\text{V}$ $V_{DD} = 15\text{V}$		175 75 60	350 175 120	ns
$t_{PZH}, t_{PHZ}$	Propagation Delay Enable to Q (HIGH)	$V_{DD} = 5.0\text{V}$ $V_{DD} = 10\text{V}$ $V_{DD} = 15\text{V}$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

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

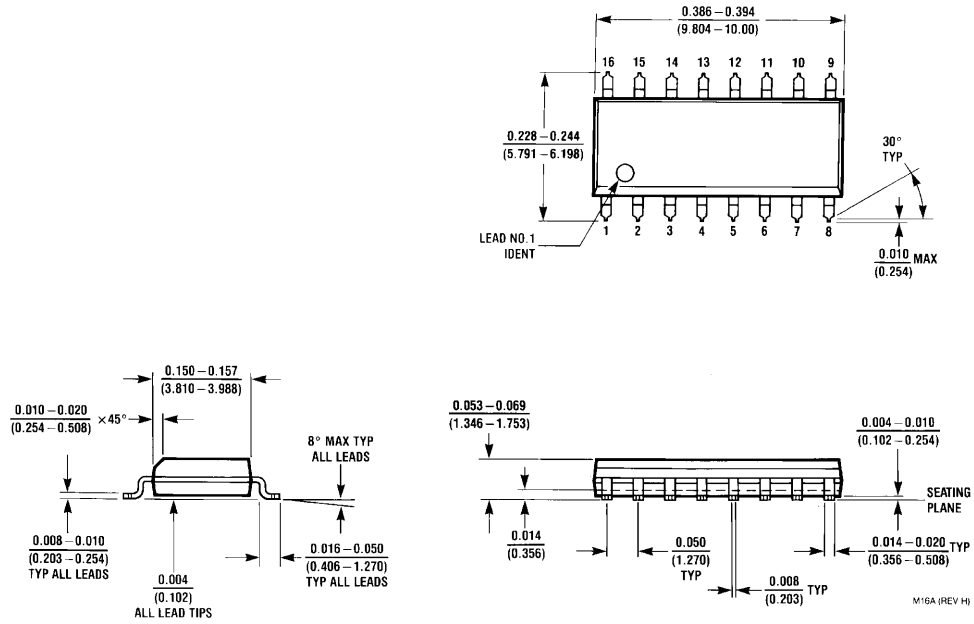
### Timing Waveforms



#### Enable Timing

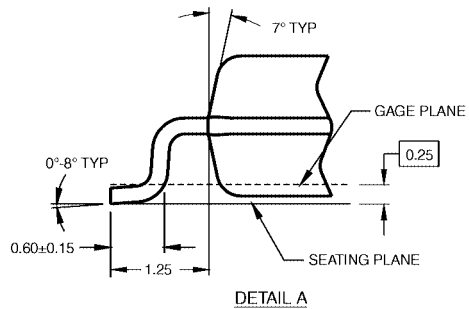
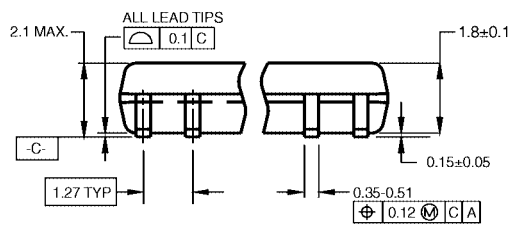
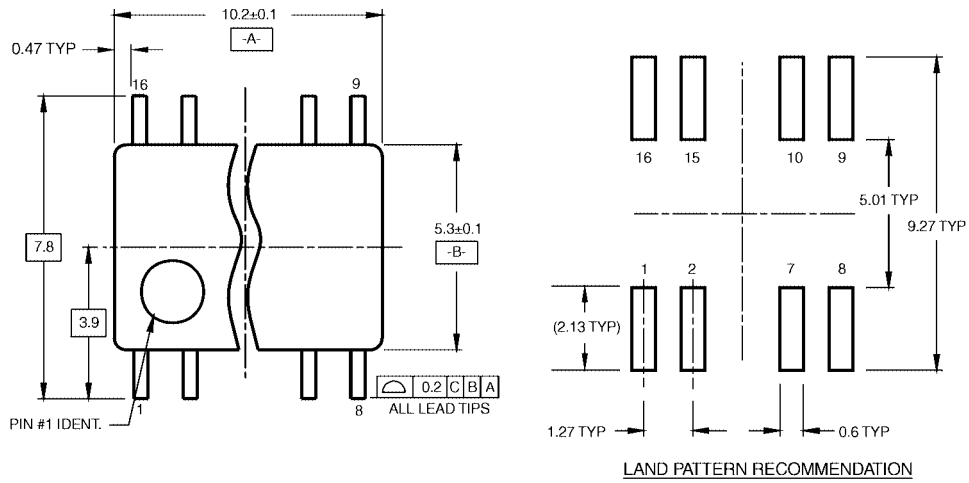


**Physical Dimensions** inches (millimeters) unless otherwise noted



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

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

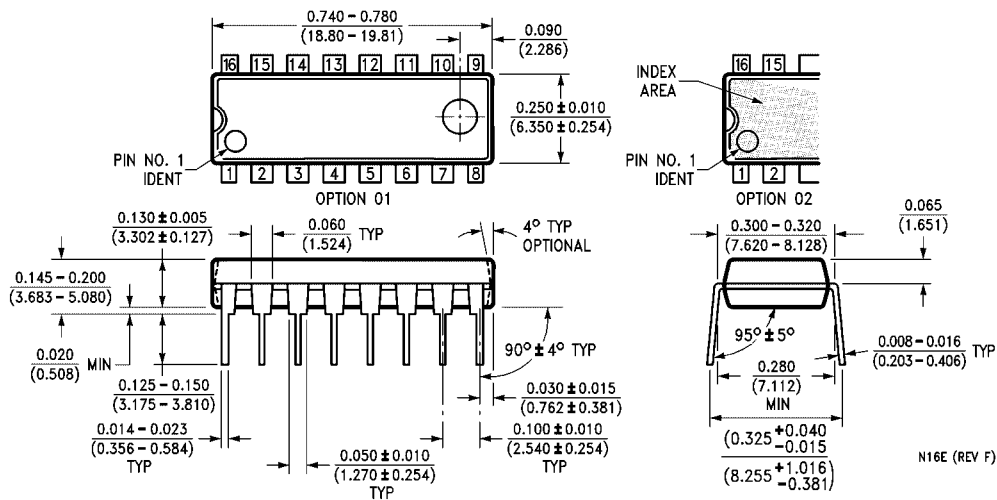


- NOTES:
- A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.
  - B. DIMENSIONS ARE IN MILLIMETERS.
  - C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

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**

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