

## 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

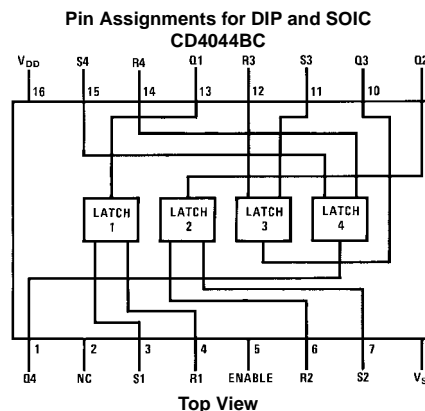
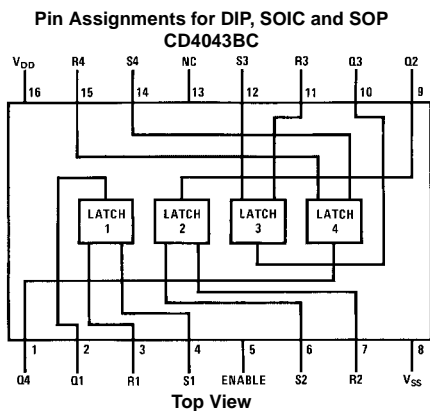
- Multiple bus storage
- Strobed register
- Four bits of independent storage with output enable
- General digital logic

#### Ordering Code:

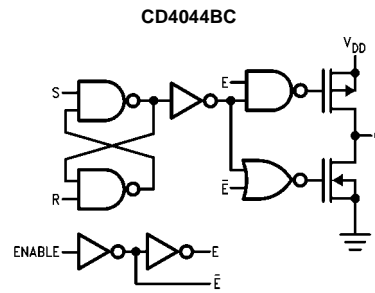
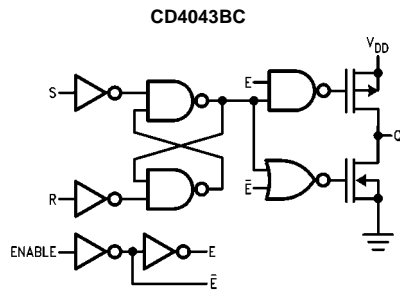
Order Number	Package Number	Package Description
CD4043BCM	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow Body
CD4043BCN	N16E	16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide
CD4044BCM	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC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

**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

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

### 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	-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 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	-40°C		+25°C			+85°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
$I_{DD}$	Quiescent Device Current	$V_{DD} = 5V, V_{IN} = V_{DD}$ or $V_{SS}$		20		0.01	20		150	$\mu A$
		$V_{DD} = 10V, V_{IN} = V_{DD}$ or $V_{SS}$		40		0.01	40		300	$\mu A$
		$V_{DD} = 15V, V_{IN} = V_{DD}$ or $V_{SS}$		80		0.02	80		600	$\mu A$
$V_{OL}$	LOW Level Output Voltage	$ I_O  \leq 1 \mu A, V_{IL} = 0V, V_{IH} = V_{DD}$		0.05		0	0.05		0.05	V
		$V_{DD} = 5.0V$		0.05		0	0.05		0.05	V
		$V_{DD} = 10V$		0.05		0	0.05		0.05	V
$V_{OH}$	HIGH Level Output Voltage	$ I_O  \leq 1 \mu A, V_{IL} = 0V, V_{IH} = V_{DD}$								V
		$V_{DD} = 5.0V$	4.95		4.95	5.0		4.95		V
		$V_{DD} = 10V$	9.95		9.95	10		9.95		V
$V_{IL}$	LOW Level Input Voltage	$ I_O  \leq 1 \mu A$								V
		$V_{DD} = 5.0V, V_O = 0.5V$ or $4.5V$		1.5		2.25	1.5		1.5	V
		$V_{DD} = 10V, V_O = 1.0V$ or $9.0V$		3.0		4.5	3.0		3.0	V
$V_{IH}$	HIGH Level Input Voltage	$ I_O  \leq 1 \mu A$								V
		$V_{DD} = 5.0V, V_O = 1.0V$ or $9.0V$		7.0		7.0			7.0	V
		$V_{DD} = 15V, V_O = 1.5V$ or $13.5V$		11		11			11	V
$I_{OL}$	LOW Level Output Current <small>(Note 3)</small>	$V_{IL} = 0V, V_{IH} = V_{DD}$								mA
		$V_{DD} = 5.0V, V_O = 0.4V$	0.52		0.44	0.88		0.36		mA
		$V_{DD} = 10V, V_O = 0.5V$	1.3		1.1	2.2		0.9		mA
$I_{OH}$	HIGH Level Output Current <small>(Note 3)</small>	$V_{IL} = 0V, V_{IH} = V_{DD}$								mA
		$V_{DD} = 5.0V, V_O = 4.6V$	-0.52		-0.44	-0.32		-0.36		mA
		$V_{DD} = 10V, V_O = 9.5V$	-1.3		-1.1	-0.8		-0.9		mA
$I_{IN}$	Input Current	$V_{DD} = 15V, V_{IN} = 0V$	-0.3			-0.3			-1.0	$\mu A$
		$V_{DD} = 15V, V_{IN} = 15V$	0.3			0.3			1.0	$\mu A$

**Note 3:**  $I_{OH}$  and  $I_{OL}$  are tested one output at a time.

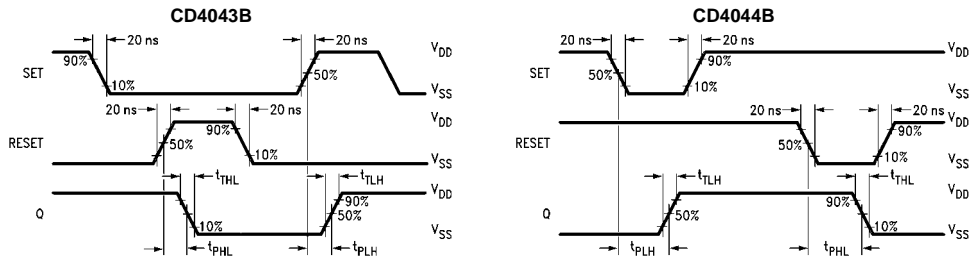
## AC Electrical Characteristics (Note 4)

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

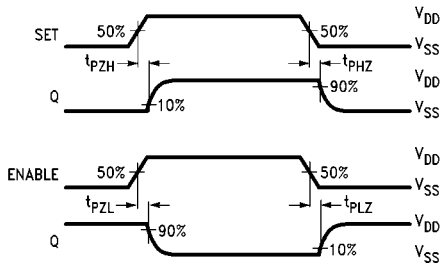
Symbol	Parameter	Conditions	Min	Typ	Max	Units
$t_{PLH}$ , $t_{PHL}$	Propagation Delay S or R to Q	$V_{DD} = 5.0\text{V}$		175	350	ns
		$V_{DD} = 10\text{V}$		75	175	ns
		$V_{DD} = 15\text{V}$		60	120	ns
$t_{PZH}$ , $t_{PHZ}$	Propagation Delay Enable to Q (HIGH)	$V_{DD} = 5.0\text{V}$		115	230	ns
		$V_{DD}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

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

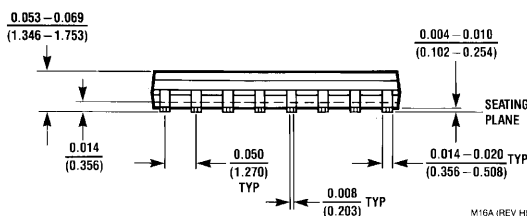
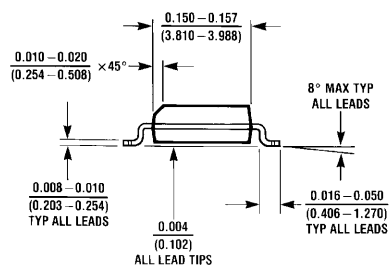
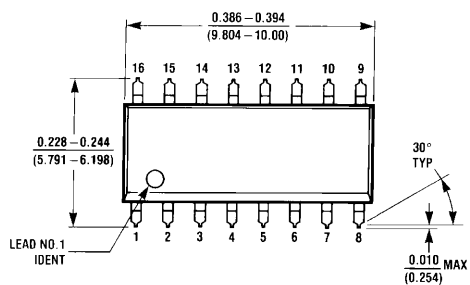
## Timing Waveforms



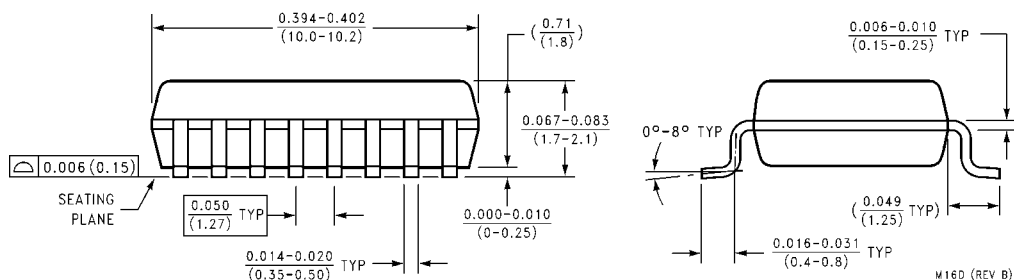
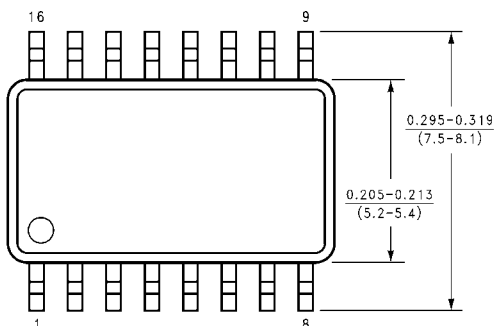
### Enable Timing



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

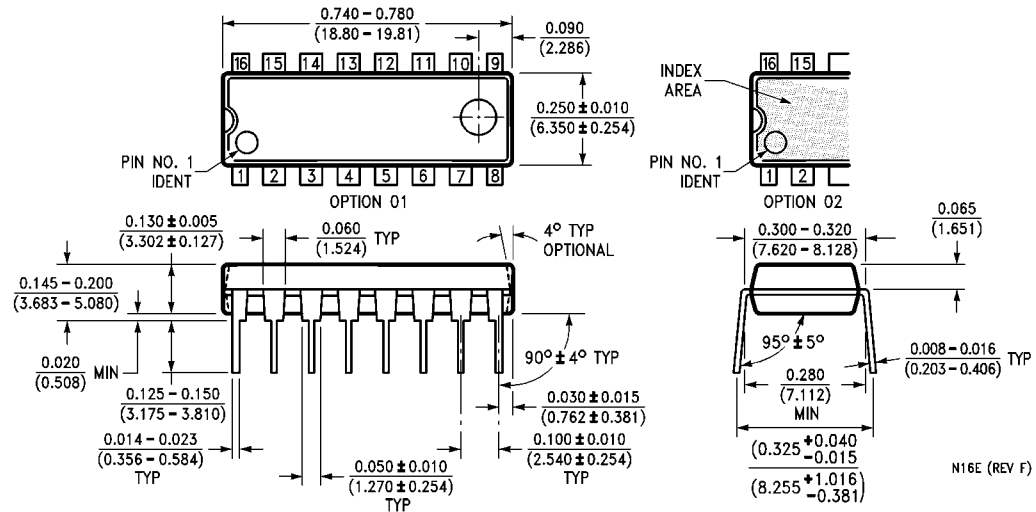


**16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow Body  
Package Number M16A**



**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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