

CD4043BM/CD4043BC Quad TRI-STATE® NOR R/S Latches **CD4044BM/CD4044BC Quad TRI-STATE® NAND R/S Latches**

General Description

CD4043BM/CD4043BC are quad cross-couple TRI-STATE CMOS NOR latches, and CD4044BM/CD4044BC are quad cross-couple TRI-STATE CMOS NAND latches. Each latch has a separate Q output and individual SET and RESET inputs. There is a common TRI-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 TRI-STATE feature allows common bussing of the outputs.

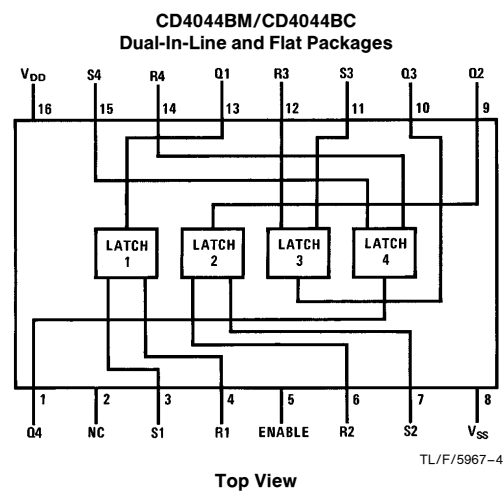
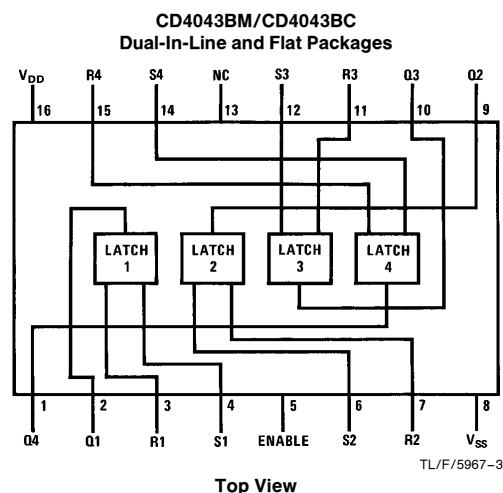
Features

- 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
- TRI-STATE output with common output enable

Applications

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

Connection Diagrams



Truth Table

CD4043BM/CD4043BC				CD4044BM/CD4044BC			
S	R	E	Q	S	R	E	Q
X	X	0	OC	X	X	0	OC
0	0	1	NC	1	1	1	NC
1	0	1	1	0	1	1	1
0	1	1	0	1	0	1	0
1	1	1	Δ	0	0	1	ΔΔ

Order Number CD4043B or CD4044B

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

CD4043BM/CD4043BC Quad TRI-STATE® NOR R/S Latches
CD4044BM/CD4044BC Quad TRI-STATE® NAND R/S Latches

Absolute Maximum Ratings (Notes 1 and 2)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

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)	
CD4043BM, CD4044BM	–55°C to +125°C
CD4043BC, CD4044BC	–40°C to +85°C

DC Electrical Characteristics CD4043BM/CD4044BM (Note 2)

Symbol	Parameter	Conditions	–55°C		+25°C			+125°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
I_{DD}	Quiescent Device Current	$V_{DD} = 5V, V_{IN} = V_{DD}$ or V_{SS} $V_{DD} = 10V, V_{IN} = V_{DD}$ or V_{SS} $V_{DD} = 15V, V_{IN} = V_{DD}$ or V_{SS}		5.0 10 20		0.01 0.01 0.02	5.0 10 20		150 300 600	μA μA μA
V_{OL}	Low Level Output Voltage	$ I_O \leq 1 \mu A, V_{IL} = 0V, V_{IH} = V_{DD}$ $V_{DD} = 5.0V$ $V_{DD} = 10V$ $V_{DD} = 15V$		0.05 0.05 0.05		0 0 0	0.05 0.05 0.05		0.05 0.05 0.05	V V V
V_{OH}	High Level Output Voltage	$ I_O \leq 1 \mu A, V_{IL} = 0V, V_{IH} = V_{DD}$ $V_{DD} = 5.0V$ $V_{DD} = 10V$ $V_{DD} = 15V$	4.95 9.95 14.95		4.95 9.95 14.95	5.0 10 15		4.95 9.95 14.95		V V V
V_{IL}	Low Level Input Voltage	$ I_O \leq 1 \mu A$ $V_{DD} = 5.0V, V_O = 0.5V$ or 4.5V $V_{DD} = 10V, V_O = 1.0V$ or 9.0V $V_{DD} = 15V, V_O = 1.5V$ or 13.5V		1.5 3.0 4.0		2.25 4.5 6.75	1.5 3.0 4.0		1.5 3.0 4.0	V V V
V_{IH}	High Level Input Voltage	$ I_O \leq 1 \mu A$ $V_{DD} = 5.0V, V_O = 0.5V$ or 4.5V $V_{DD} = 10V, V_O = 1.0V$ or 9.0V $V_{DD} = 15V, V_O = 1.5V$ or 13.5V	3.5 7.0 11		3.5 7.0 11	2.75 5.5 8.25		3.5 7.0 11		V V V
I_{OL}	Low Level Output Current	$V_{IL} = 0V, V_{IH} = V_{DD}$ $V_{DD} = 5.0V, V_O = 0.4V$ $V_{DD} = 10V, V_O = 0.5V$ $V_{DD} = 15V, V_O = 1.5V$	0.64 1.6 4.2		0.51 1.3 3.4	1.0 2.6 6.8		0.36 0.9 2.4		mA mA mA
I_{OH}	High Level Output Current	$V_{IL} = 0V, V_{IH} = V_{DD}$ $V_{DD} = 5.0V, V_O = 4.6V$ $V_{DD} = 10V, V_O = 9.5V$ $V_{DD} = 15V, V_O = 13.5V$	–0.64 –1.6 –4.2		–0.51 –1.3 –3.4	–0.4 –1.0 –3.0		–0.36 –0.9 –2.4		mA mA mA
I_{IN}	Input Current	$V_{DD} = 15V, V_{IN} = 0V$ $V_{DD} = 15V, V_{IN} = 15V$		–0.1 0.1		–10 ^{–5} 10 ^{–5}	–0.1 0.1		–1.0 1.0	μA μA

DC Electrical Characteristics CD4043BC/CD4044BC (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} $V_{DD} = 10V, V_{IN} = V_{DD}$ or V_{SS} $V_{DD} = 15V, V_{IN} = V_{DD}$ or V_{SS}		20 40 80		0.01 0.01 0.02	20 40 80		150 300 600	μA μA μA
V_{OL}	Low Level Output Voltage	$ I_O \leq 1 \mu A, V_{IL} = 0V, V_{IH} = V_{DD}$ $V_{DD} = 5.0V$ $V_{DD} = 10V$ $V_{DD} = 15V$		0.05 0.05 0.05		0 0 0	0.05 0.05 0.05		0.05 0.05 0.05	V V V
V_{OH}	High Level Output Voltage	$ I_O \leq 1 \mu A, V_{IL} = 0V, V_{IH} = V_{DD}$ $V_{DD} = 5.0V$ $V_{DD} = 10V$ $V_{DD} = 15V$	4.95 9.95 14.95		4.95 9.95 14.95	5.0 10 15		4.95 9.95 14.95		V V V

DC Electrical Characteristics CD4043BC/CD4044BC (Continued)

Symbol	Parameter	Conditions	−40°C		+25°C			+85°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
V _{IL}	Low Level Input Voltage	$ I_O \leq 1 \mu A$ V _{DD} = 5.0V, V _O = 0.5V or 4.5V V _{DD} = 10V, V _O = 1.0V or 9.0V V _{DD} = 15V, V _O = 1.5V or 13.5V		1.5 3.0 4.0		2.25 4.5 6.75	1.5 3.0 4.0		1.5 3.0 4.0	V V V
V _{IH}	High Level Input Voltage	$ I_O \leq 1 \mu A$ V _{DD} = 5.0V, V _O = 0.5V or 4.5V V _{DD} = 5.0V, V _O = 1.0V or 9.0V V _{DD} = 15V, V _O = 1.5V or 13.5V	3.5 7.0 11		3.5 7.0 11			3.5 7.0 11		V V V
I _{OL}	Low Level Output Current (Note 3)	V _{IL} = 0V, V _{IH} = V _{DD} V _{DD} = 5.0V, V _O = 0.4V V _{DD} = 10V, V _O = 0.5V V _{DD} = 15V, V _O = 1.5V	0.52 1.3 3.6		0.44 1.1 3.0	0.88 2.2 6.0		0.36 0.9 2.4		mA mA mA
I _{OH}	High Level Output Current (Note 3)	V _{IL} = 0V, V _{IH} = V _{DD} V _{DD} = 5.0V, V _O = 4.6V V _{DD} = 10V, V _O = 9.5V V _{DD} = 15V, V _O = 13.5V	−0.52 −1.3 −3.6		−0.44 −1.1 −3.0	−0.32 −0.8 −2.4		−0.36 −0.9 −2.4		mA mA mA
I _{IN}	Input Current	V _{DD} = 15V, V _{IN} = 0V V _{DD} = 15V, V _{IN} = 15V	−0.3 0.3			−0.3 0.3			−1.0 1.0	μA μA

AC Electrical Characteristics*

T_A = 25°C, C_L = 50 pF, R_L = 200k, 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 V _{DD} = 10V V _{DD} = 15V		175 75 60	350 175 120	ns ns ns
t _{PZH} , t _{PHZ}	Propagation Delay Enable to Q (High)	V _{DD} = 5.0V V _{DD} = 10V V _{DD} = 15V		115 55 40	230 110 80	ns ns ns
t _{PZL} , t _{PLZ}	Propagation Delay Enable to Q (Low)	V _{DD} = 5.0V V _{DD} = 10V V _{DD} = 15V		100 50 40	200 100 80	ns ns ns
t _{THL} , t _{TLH}	Transition Time	V _{DD} = 5.0V V _{DD} = 10V V _{DD} = 15V		100 50 40	200 100 80	ns ns ns
t _{WO}	Minimum SET or RESET Pulse Width	V _{DD} = 5.0V V _{DD} = 10V V _{DD} = 15V		80 40 20	160 80 40	ns ns ns
C _{IN}	Input Capacitance			5.0	7.5	pF

*AC Parameters are guaranteed by DC correlated testing.

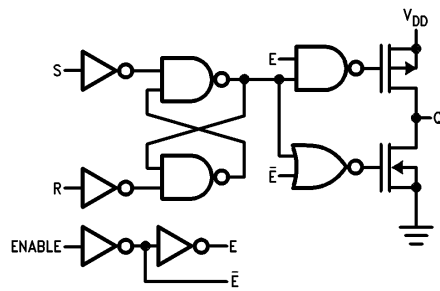
Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed; they are not meant to imply that the devices should be operated at these limits. The tables of "Recommended Operating Conditions" and "Electrical Characteristics" provide conditions for actual device operation.

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

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

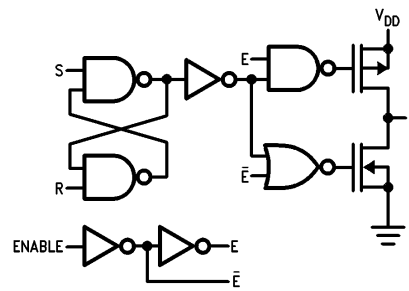
Schematic Diagrams

CD4043BM/CD4043BC



TL/F/5967-1

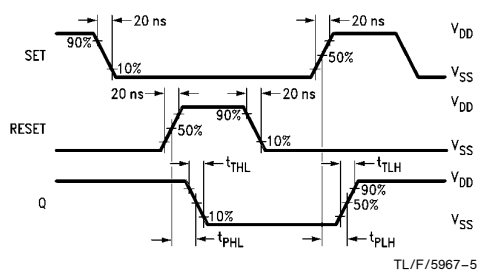
CD4044BM/CD4044BC



TL/F/5967-2

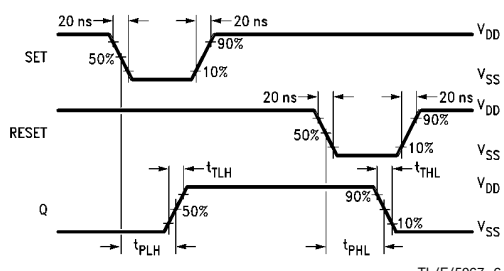
Timing Waveforms

CD4043B



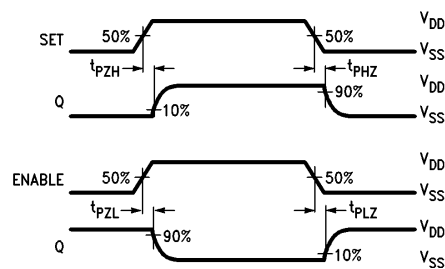
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CD4044B



TL/F/5967-6

Enable Timing



TL/F/5967-7

The drawing shows the mechanical specifications for the CD4043BMJ, CD4043BCJ, and CD4044BCJ packages. It includes a top view and a side view with the following dimensions:

- Top View Dimensions:**
 - Overall width: $0.785 [19.94]$ MAX
 - Pin 16 to Pin 9 distance: $0.220-0.310 [5.59-7.87]$
 - Pin 1 to Pin 8 distance: $0.005-0.020$ TYP $[0.13-0.51]$
 - Pin 16 to Pin 1 distance: $0.037 \pm 0.005 [0.94 \pm 0.13]$ TYP
 - Pin 9 to Pin 8 distance: 0.055 ± 0.005 TYP $[1.40 \pm 0.13]$
 - Pin 16 to Pin 15 distance: $0.005 [0.13]$ MIN TYP
 - Pin 1 to Pin 2 distance: $0.200 [5.08]$ MAX TYP
 - Pin 15 to Pin 14 distance: $0.125-0.200 [3.18-5.08]$ TYP
 - Pin 1 to Pin 2 distance (both ends): $0.080 [2.03]$ MAX
 - Pin 1 to Pin 2 distance: $0.100 \pm 0.010 [2.54 \pm 0.25]$ TYP
 - Pin 15 to Pin 14 distance: $0.020-0.060 [0.51-1.52]$ TYP
 - Pin 15 to Pin 14 distance: $0.150 [3.81]$ MIN TYP
 - Pin 15 to Pin 14 distance: $90^\circ \pm 4^\circ$ TYP
 - Pin 15 to Pin 14 distance: $0.018 \pm 0.003 [0.46 \pm 0.08]$ TYP
- Side View Dimensions:**
 - Overall height: $0.290-0.320 [7.37-8.13]$
 - Pin 15 to Pin 14 distance: $0.180 [4.57]$ MAX
 - Pin 15 to Pin 14 distance: $0.010 \pm 0.002 [0.25 \pm 0.05]$ TYP
 - Pin 15 to Pin 14 distance: $95^\circ \pm 5^\circ$ TYP
 - Pin 15 to Pin 14 distance: $0.310-0.410 [7.87-10.41]$

Ceramic Dual-In-Line Package (J)
Order Number CD4043BMJ, CD4043BCJ, CD4044BCJ
NS Package Number J16A

J16A (REV L)

