

## CMOS QUAD 3-STATE R-S LATCHES

### FEATURES

- ◆ Separate Set and Reset Inputs for each Latch
- ◆ Active-High (4043 B) or Active-Low (4044 B) Inputs
- ◆ 3-State Outputs with Common Enable

### DESCRIPTION

4043B types are Quad cross-coupled 3-state CMOS NOR Latches, and the 4044 B types are Quad cross-coupled 3-state CMOS NAND Latches. Each latch has a separate Q output and individual Set and Reset inputs. The Q outputs are gated through transmission gates controlled by a common Enable input. A logic "1" or "high" on the Enable input connects the latch states to the Q outputs. A logic "0" or "low" on the Enable input disconnects the latch states from the Q outputs, resulting in an open circuit condition on the Q outputs. The open circuit feature allows common bussing of the outputs. The logic operation of the latches is summarized in the truth table below.

### TRUTH TABLES

#### 4043 B

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

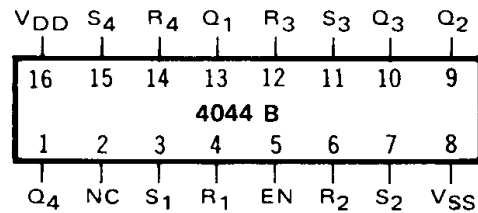
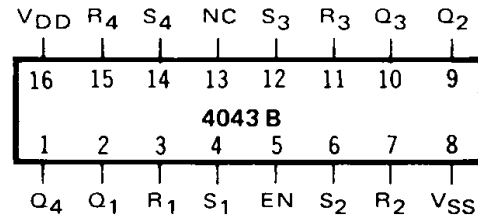
- \* OPEN CIRCUIT
- + NO CHANGE
- Δ DOMINATED BY S = 1 INPUT

#### 4044 B

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

- \* OPEN CIRCUIT
- + NO CHANGE
- ΔΔ DOMINATED BY R = 0 INPUT

### CONNECTION DIAGRAMS (all packages)



#### Add suffix for package:

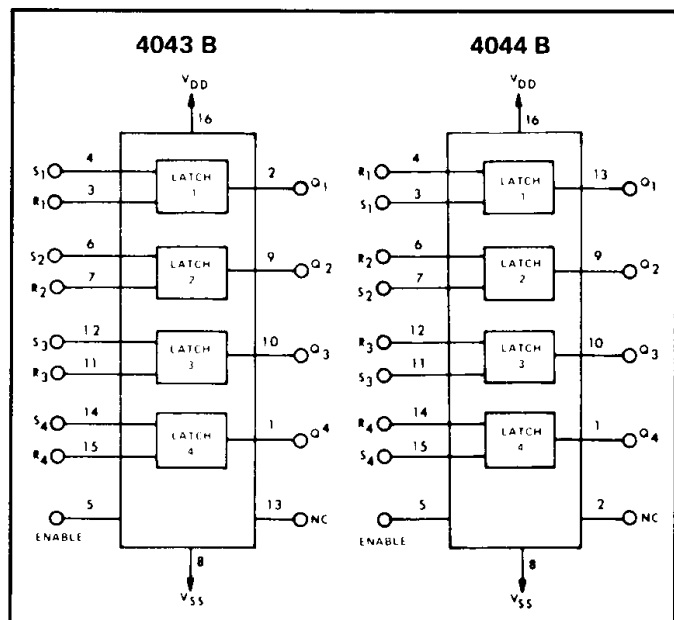
- C 16-pin Cerdip      F 16-pin Flat
- D 16-pin Ceramic    H Chip
- E 16-pin Epoxy

### RECOMMENDED OPERATING CONDITIONS

For maximum reliability:

- DC Supply Voltage  $V_{DD} - V_{SS}$  3 to 15 Vdc
- Operating Temperature  $T_A$
- C, D, F, H Device -55 to +125 °C
- E Device -40 to +85 °C

### BLOCK DIAGRAMS



## ELECTRICAL CHARACTERISTICS

### STATIC CHARACTERISTICS <sup>1</sup>

PARAMETER	V <sub>DD</sub> (Vdc)	CONDITIONS	T <sub>LOW</sub> <sup>2</sup>		+25°C			T <sub>HIGH</sub> <sup>2</sup>		Units
			Min.	Max.	Min.	Typ.	Max.	Min.	Max.	
QUIESCENT DEVICE CURRENT	I <sub>DD</sub>	V <sub>IN</sub> =V <sub>SS</sub> or V <sub>DD</sub> All valid input combinations	-	1.0	-	0.005	1.0	-	30	μA <sub>dc</sub>
			-	2.0	-	0.01	2.0	-	60	
			-	4.0	-	0.02	4.0	-	120	
3-STATE OUTPUT LEAKAGE CURRENT	I <sub>ZL</sub>	Enable = V <sub>SS</sub>	-	±0.1	-	±10 <sup>-4</sup>	±0.1	-	±1.0	μA <sub>dc</sub>

NOTES: <sup>1</sup> Remaining Static Electrical Characteristics are listed under "4000B Series Family Specifications".

<sup>2</sup> T<sub>LOW</sub> = -55°C for C, D, F, H device.

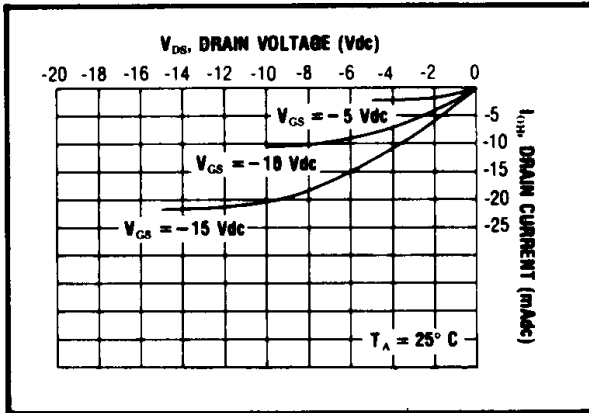
= -40°C for E device.

T<sub>HIGH</sub> = +125°C for C, D, F, H device.

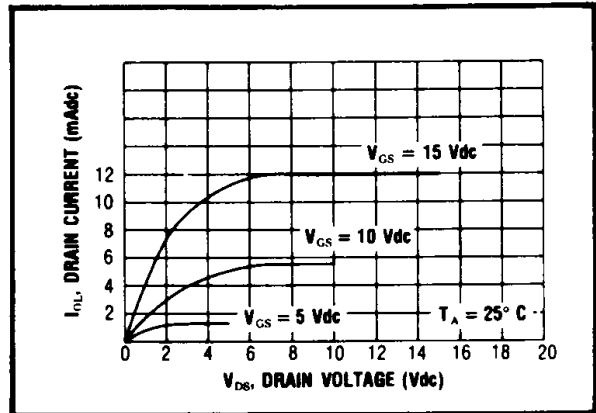
= + 85°C for E device.

### DYNAMIC CHARACTERISTICS (C<sub>L</sub> = 50pF, T<sub>A</sub> = 25°C)

PARAMETER	V <sub>DD</sub> (Vdc)	Min.	Typ.	Max.	Units	
PROPAGATION DELAY TIME From S or R Inputs	t <sub>PLH</sub> , t <sub>PHL</sub>	5	-	150	300	ns
		10	-	70	140	
		15	-	50	100	
From Enable Input	t <sub>PHZ</sub> , t <sub>PLZ</sub>	5	-	75	150	ns
	t <sub>PZH</sub> , t <sub>PZL</sub>	10	-	35	70	
		15	-	30	60	
OUTPUT TRANSITION TIME	t <sub>TLH</sub> , t <sub>THL</sub>	5	-	100	200	ns
MINIMUM SET OR RESET PULSE WIDTH	PW <sub>S</sub> , PW <sub>R</sub>	5	-	80	160	ns
		10	-	40	80	
		15	-	30	60	
SET OR RESET REMOVAL TIME	t <sub>rem</sub>	5	-	25	50	ns
		10	-	15	30	
		15	-	10	20	

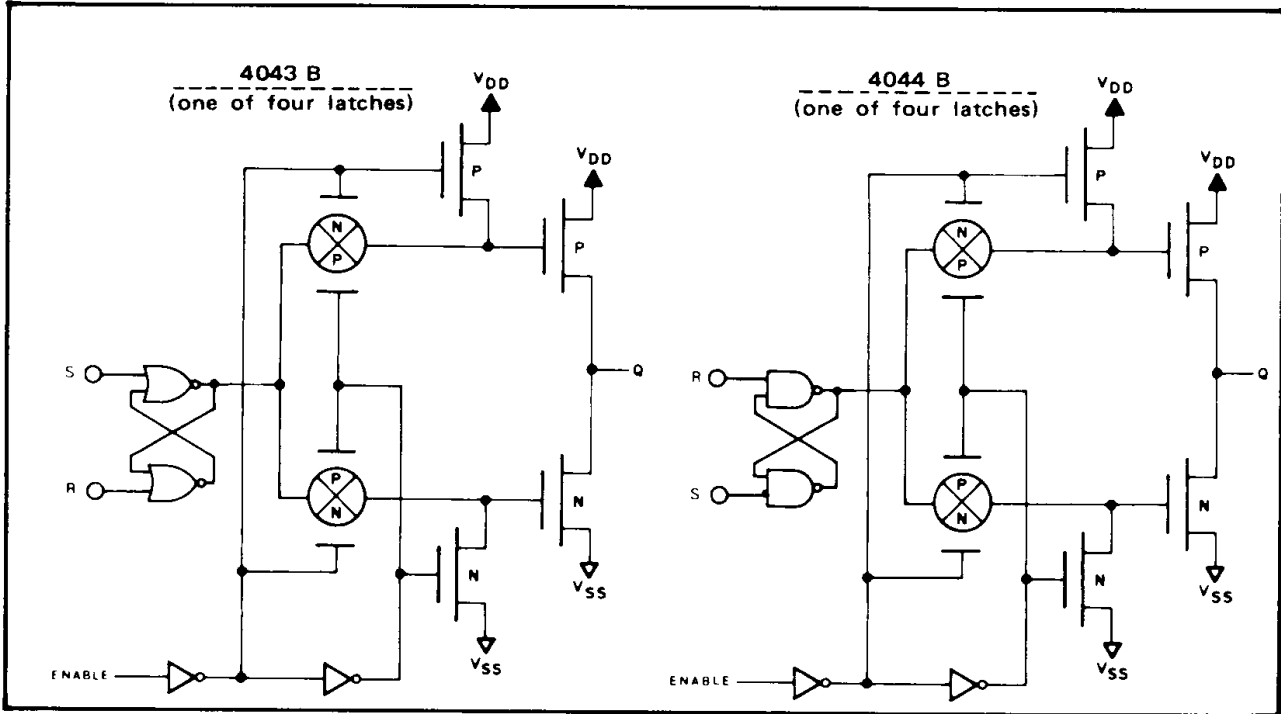


**Typical P-Channel  
Source Current Characteristics**



**Typical N-Channel  
Sink Current Characteristics**

LOGIC DIAGRAMS



APPLICATIONS INFORMATION

