

## CMOS NAND GATES

- 4011B – Quad 2-Input NAND
- 4012B – Dual 4-Input NAND
- 4023B – Triple 3-Input NAND
- 4068B – 8-Input NAND

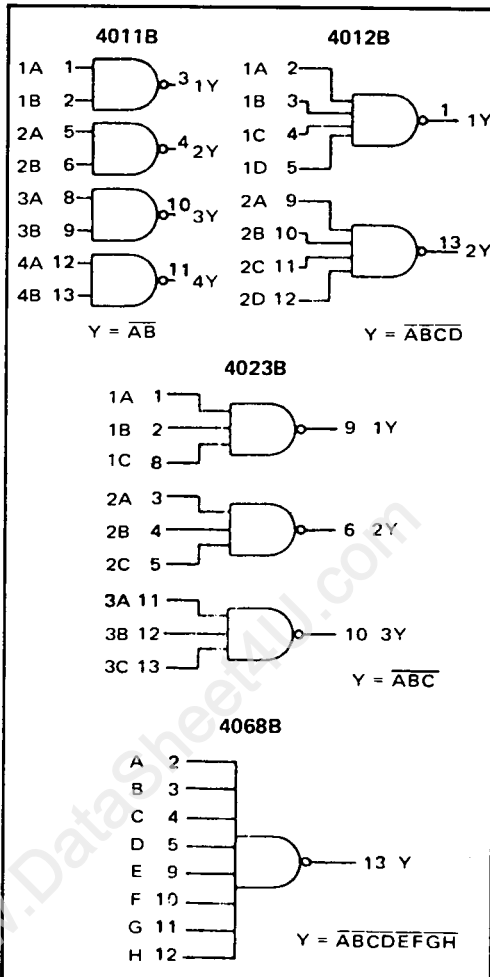
### FEATURES

- ◆ Buffered Outputs
- ◆ Diode Protection on all Inputs
- ◆ Fully "B"-Series Compatible

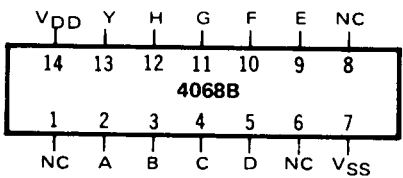
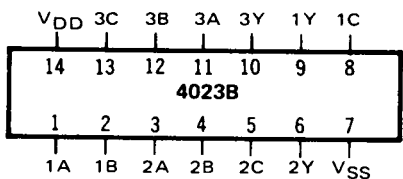
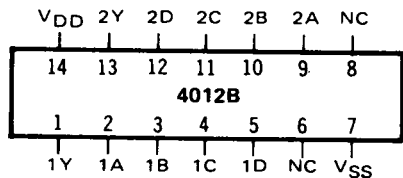
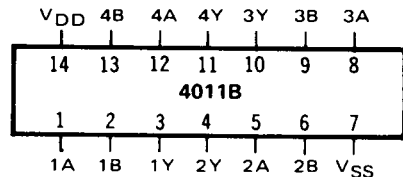
### TRUTH TABLE

Inputs	Output
1 1 ... 1	0
All other combinations	1

### FUNCTION DIAGRAMS



### CONNECTION DIAGRAMS (all packages)



### RECOMMENDED OPERATING CONDITIONS

For maximum reliability:

DC Supply Voltage	V <sub>DD</sub> - V <sub>SS</sub>	3 to 15	V <sub>dc</sub>
Operating Temperature	T <sub>A</sub>		
C, D, F, H Device		-55 to +125	°C
E Device		-40 to +85	°C

## 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	-	0.05	-	0.0005	0.05	-	1.5	μA <sub>dc</sub>
	5		-	0.10	-	0.001	0.10	-	3.0	
	10		-	0.20	-	0.002	0.20	-	6.0	

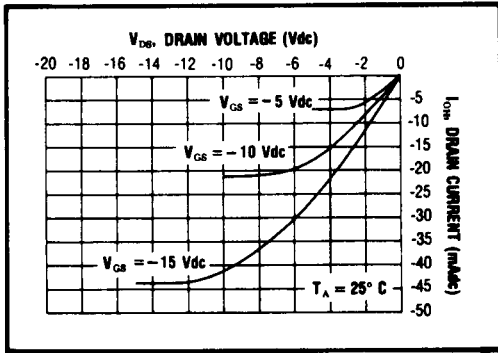
NOTES: <sup>1</sup> Remaining Static Electrical Characteristics are listed under "4000B Series Family Specifications."

<sup>2</sup> T<sub>LOW</sub> = -55°C for C, D, F, H device.  
= -40°C for E device.

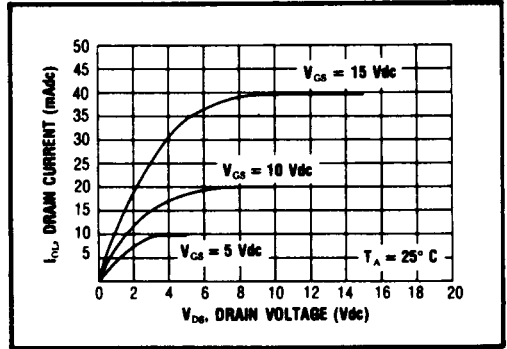
T<sub>HIGH</sub> = +125°C for C, D, F, H device.  
= +85°C for E device.

### 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	t <sub>PLH</sub> , t <sub>PHL</sub>	5	-	125	250	ns
		10	-	60	120	
		15	-	45	90	
OUTPUT TRANSITION TIME	t <sub>TLH</sub> , t <sub>THL</sub>	5	-	100	200	ns
		10	-	50	100	
		15	-	40	80	

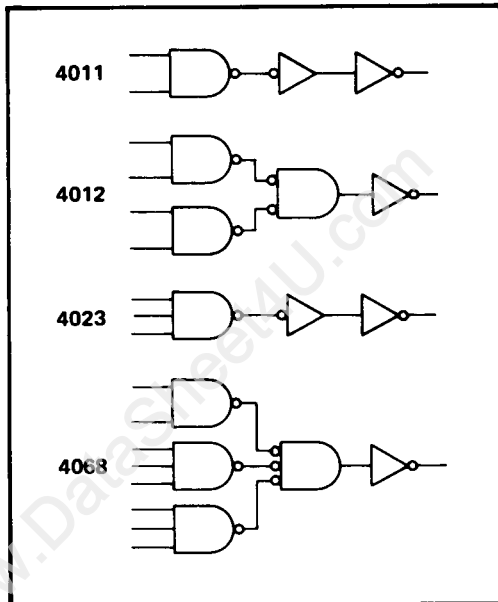


**Typical P-Channel  
Source Current Characteristics**



**Typical N-Channel  
Sink Current Characteristics**

### LOGIC DIAGRAMS



### SCHEMATIC DIAGRAM 4012B (1 of 2 gates)

