

## CMOS EXPANDABLE GATES

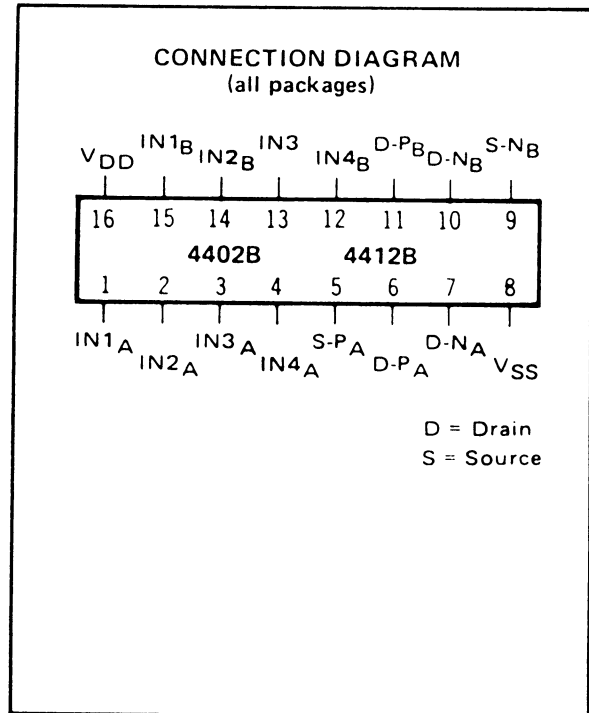
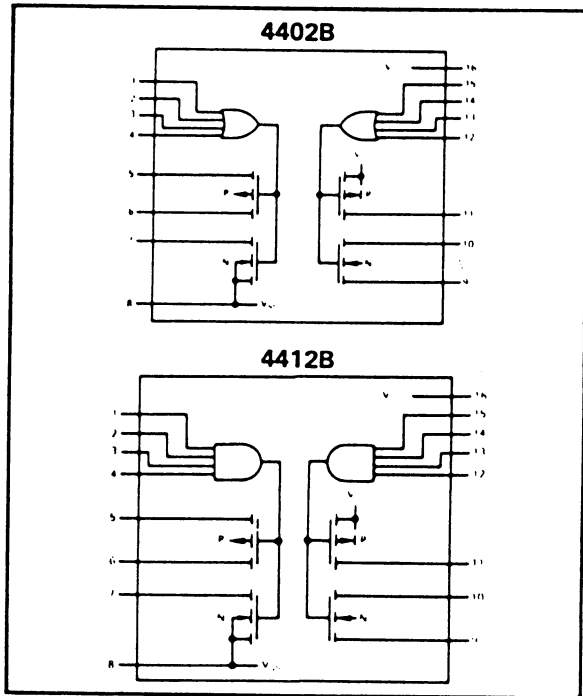
### FEATURES

- ◆ Dual 4-Input Gates with Uncommitted Output Transistors
- ◆ Simplifies Construction of Combinational Logic Functions
- ◆ CMOS-to-TTL Interface Capability
- ◆ All Inputs Diode-Protected

### DESCRIPTION

These devices are buffered Dual 4-input NOR Gates (4402B) and NAND Gates (4412B), with uncommitted output transistors. Gate expansion, complex combinational gating, and interface circuits can be constructed from these devices.

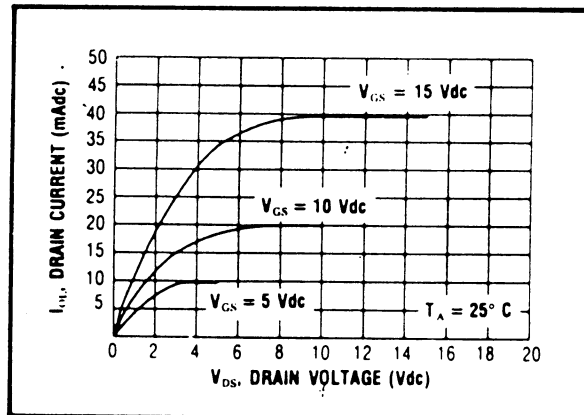
### LOGIC DIAGRAMS



### RECOMMENDED OPERATING CONDITIONS

For maximum reliability:

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



Typical N-Channel Sink Current Characteristics

## 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>	5	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>
	10		—	0.10	—	0.001	0.10	—	3.0	
	15		—	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

= -40°C for E

T<sub>HIGH</sub> = +125°C for C

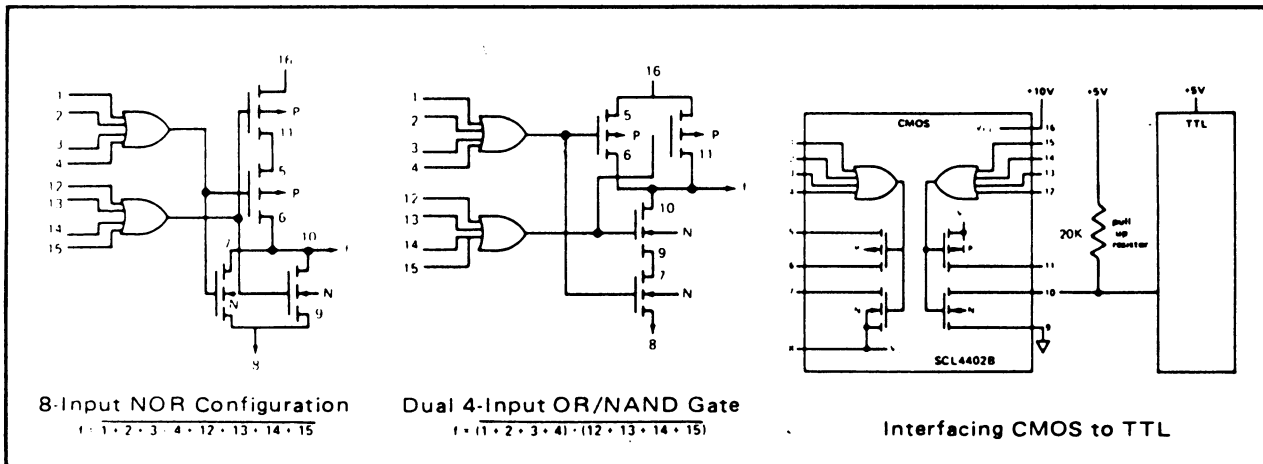
= +85°C for E

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

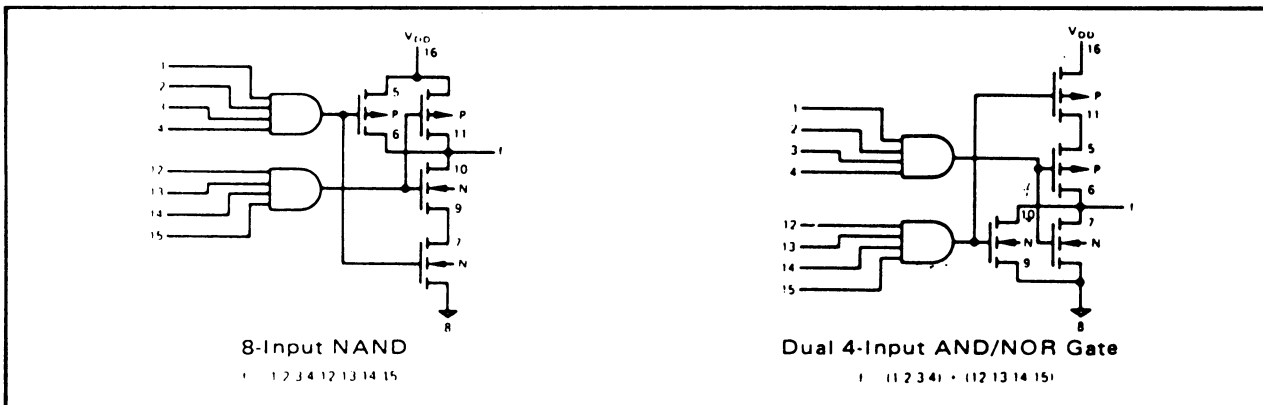
PARAMETER	V <sub>DD</sub> (Vdc)	Min.	Typ.	Max.	Units
PROPAGATION DELAY TIME Connected as Dual 4-Input Gates	t <sub>PLH</sub> , t <sub>PHL</sub>	—	125	250	ns
	5	—	60	120	
	10	—	45	90	
OUTPUT TRANSITION TIME	t <sub>TLH</sub> , t <sub>THL</sub>	—	100	200	ns
	5	—	50	100	
	10	—	40	80	

## APPLICATIONS INFORMATION

### 4402B



### 4412B



For additional information, see Application Note AN-102.