

CMOS BCD-TO-SEVEN SEGMENT LATCH/DECODER/DRIVER

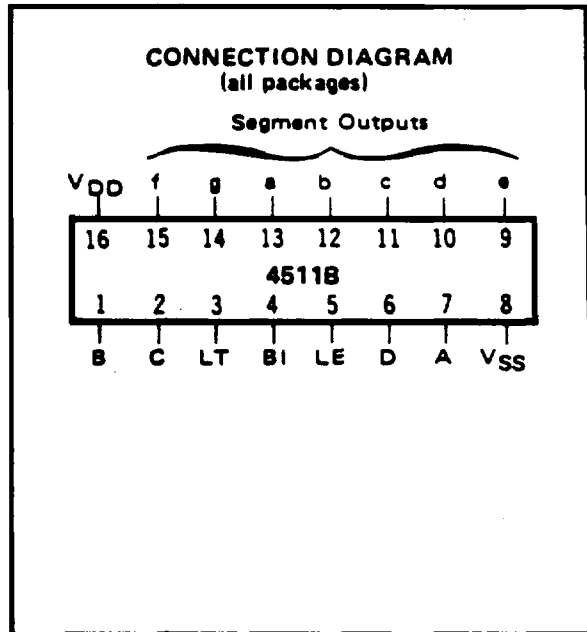
FEATURES

- ◆ High-Current Sourcing Bipolar Outputs (Up to 25 mA)
- ◆ Latched Storage of Input Code
- ◆ Blanking Input for Display Intensity Modulation
- ◆ Lamp Test Provision
- ◆ Readout Blanking for Illegal Input Combinations

DESCRIPTION

The 4511B provides the functions of a 4-bit storage latch, an 8421 BCD-to-seven segment decoder, and an output drive capability to source up to 25 mA of current. Lamp Test, Blanking, and Latch Enable inputs are used to test the display, turn off the display, and store a BCD code, respectively. It can be used with LED, incandescent, fluorescent, gas discharge, or liquid crystal readouts either directly or indirectly.

Applications include counter display drivers, seven-segment decimal display, and various clock, watch, and timer uses.



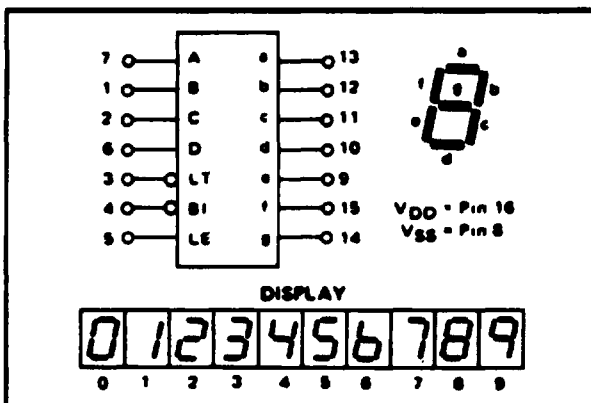
TRUTH TABLE

LE	BI	LT	D	C	B	A	a	b	c	d	e	f	g	DISPLAY
X	X	0	X	X	X	X	1	1	1	1	1	1	1	8
X	0	1	X	X	X	X	0	0	0	0	0	0	0	Blank
0	1	1	0	0	0	0	1	1	1	1	1	1	0	0
0	1	1	0	0	0	1	0	1	1	0	0	0	0	1
0	1	1	0	0	1	0	1	1	0	1	1	0	1	2
0	1	1	0	0	1	1	1	1	1	0	0	1	0	3
0	1	1	0	1	0	0	0	1	1	0	0	1	1	4
0	1	1	0	1	0	1	1	0	1	1	0	1	1	5
0	1	1	0	1	1	0	0	0	1	1	1	1	1	6
0	1	1	0	1	1	1	1	1	0	0	0	0	0	7
0	1	1	1	0	0	0	1	1	1	1	1	1	1	8
0	1	1	1	0	0	1	1	1	1	0	0	1	1	9
0	1	1	1	0	1	0	0	0	0	0	0	0	0	Blank
0	1	1	1	0	1	1	0	0	0	0	0	0	0	Blank
0	1	1	1	1	0	0	0	0	0	0	0	0	0	Blank
0	1	1	1	1	1	0	0	0	0	0	0	0	0	Blank
1	1	1	X	X	X	X	*	*	*	*	*	*	*	*

X = Don't care

* Depends upon the BCD code applied during the 0 to 1 transition of LE.

BLOCK DIAGRAM



RECOMMENDED OPERATING CONDITIONS

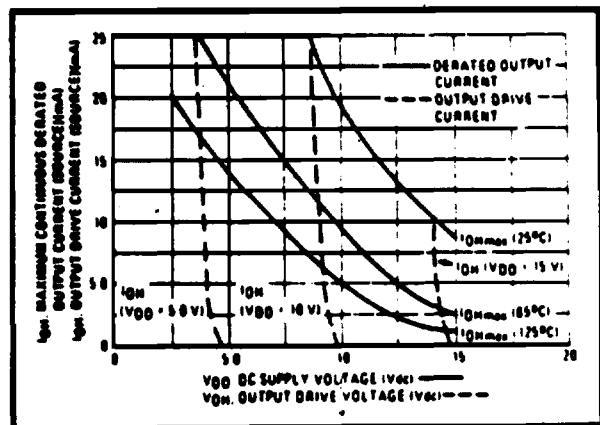
For maximum reliability:

DC Supply Voltage $V_{DD} - V_{SS}$ 3 to 15 Vdc

Operating Temperature T_A

C -55 to +125 °C

E -40 to +85 °C



The maximum continuous (worst case) derated output drive current applies to a single output with all other outputs sourcing an equal amount of current. Operation above the derating curve at a given temperature is not recommended.

STATIC CHARACTERISTICS¹

PARAMETER	V _{DD} (Vdc)	CONDITIONS	T _{LOW} ¹		+25°C			T _{HIGH} ¹		Units	
			Min.	Max.	Min.	Typ.	Max.	Min.	Max.		
QUIESCENT DEVICE CURRENT	I _{DD}	V _{IN} = V _{SS} or V _{DD} All valid input combinations	-	5	-	0.05	5	-	150	μA/dc	
			-	10	-	0.1	10	-	300		
			-	20	-	0.2	20	-	600		
OUTPUT DRIVE VOLTAGE	V _{OUT}	I _{OH} = 0 mA/dc - 5 - 10 - 15 - 20 - 25	4.99	-	4.99	5.0	-	4.95	-	Vdc	
			-	-	-	4.25	-	-	-		
			-	-	3.9	4.13	-	-	-		
			-	-	3.4	3.75	-	-	-		
			-	-	3.5	-	-	-	-		
			9.99	-	9.99	10	-	9.95	-		Vdc
			-	-	-	9.25	-	-	-		
			-	-	9.0	9.15	-	-	-		
			-	-	8.6	8.90	-	-	-		
			-	-	8.75	-	-	-	-		
			14.99	-	14.99	15	-	14.98	-		Vdc
			-	-	-	14.25	-	-	-		
-	-	14.0	14.18	-	-	-					
-	-	13.6	13.95	-	-	-					
-	-	13.80	-	-	-	-					
OUTPUT LOW (SINK) CURRENT	I _{OL}	V _{OL} = 0.4V V _{OL} = 0.5V V _{OL} = 1.5V V _{IN} = V _{SS} or V _{DD}	1.2	-	0.9	1.5	-	0.7	-	mA/dc	
			1.9	-	1.7	4.0	-	1.4	-		
			10.0	-	9.0	11.0	-	7.5	-		
			-	-	-	-	-	-	-		

NOTES: ¹ Remaining Static Electrical Characteristics are listed under "4000B Series Family Specifications".
 T_{LOW} = -55°C for C
 = -40°C for E
 T_{HIGH} = +125°C for C
 = +85°C for E

DYNAMIC CHARACTERISTICS (C_L = 50pF, T_A = 25°C)

PARAMETER	V _{DD} (Vdc)	Min.	Typ.	Max.	Units		
PROPAGATION DELAY TIME From Data Inputs	t _{PLH}	5	-	520	1040	ns	
		10	-	210	420		
		15	-	150	300		
	From Blanking Input	t _{PHL}	5	-	980	1320	ns
			10	-	280	520	
			15	-	180	360	
From Lamp Test Input	t _{PLH}	5	-	300	600	ns	
		10	-	125	250		
		15	-	100	200		
	From Lamp Test Input	t _{PHL}	5	-	500	1000	ns
			10	-	200	400	
			15	-	160	320	
OUTPUT TRANSITION TIME	t _{PLH}	5	-	170	250	ns	
		10	-	120	200		
		15	-	100	180		
	From Lamp Test Input	t _{PHL}	5	-	400	800	ns
			10	-	225	450	
			15	-	200	400	
MINIMUM DATA INPUT SETUP TIME	t _{setup}	5	-	90	180	ns	
		10	-	40	80		
		15	-	20	40		
MINIMUM DATA INPUT HOLD TIME	t _{hold}	5	-	90	0	ns	
		10	-	40	0		
		15	-	20	0		
MINIMUM LATCH ENABLE PULSE WIDTH	PW _{LE}	5	-	260	520	ns	
		10	-	110	220		
		15	-	85	170		

LOGIC DIAGRAM

