

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

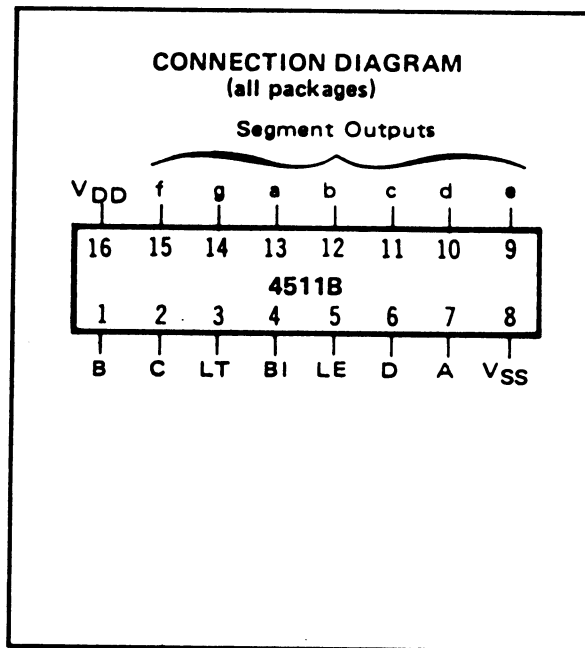
FEATURES

- ◆ 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.



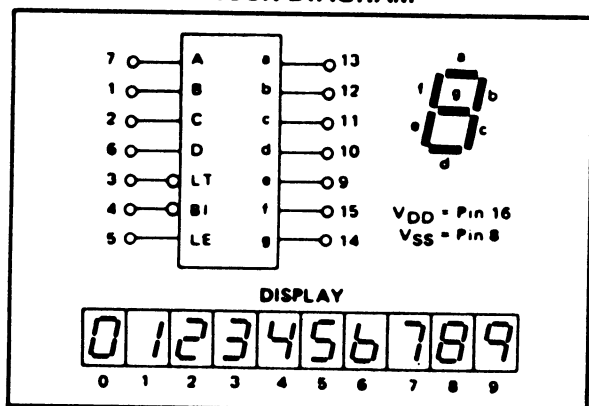
TRUTH TABLE

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	0	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	1	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	1	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
0	1	1	1	1	1	1	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

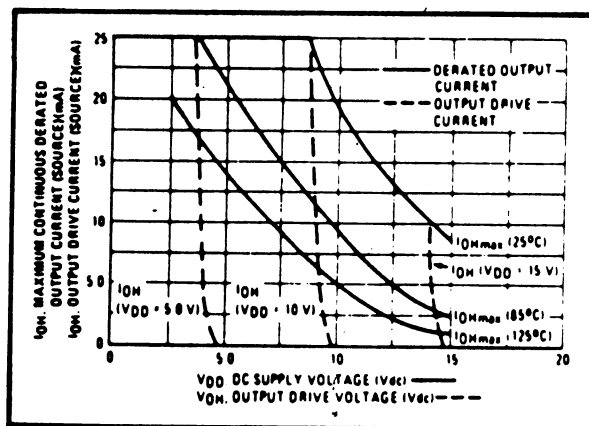
For maximum reliability:

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



Typical P-Channel
Source Current Characteristics

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} ²		+25°C			T _{HIGH} ²		Units		
			Min.	Max.	Min.	Typ.	Max.	Min.	Max.			
QUIESCENT DEVICE CURRENT I _{DD}	5	V _{IN} = V _{SS} or V _{DD} All valid input combinations	-	5	-	0.05	5	-	150	μA _{dc}		
	10		-	10	-	0.1	10	-	300			
	15		-	20	-	0.2	20	-	600			
OUTPUT DRIVE VOLTAGE V _{OUT}	5		I _{OH} = 0 mAdc	4.99	-	4.99	5.0	-	4.95		-	Vdc
			-5	-	-	4.25	-	-	-			
			-10	-	-	3.9	4.13	-	-			
	10		I _{OH} = 0 mAdc	9.99	-	9.99	10	-	9.95		-	
			-5	-	-	9.25	-	-	-			
			-10	-	-	9.0	9.15	-	-			
	15	I _{OH} = 0 mAdc	14.99	-	14.99	15	-	14.96	-			
		-5	-	-	14.25	-	-	-				
		-10	-	-	14.0	14.18	-	-				
OUTPUT LOW (SINK) CURRENT I _{OL}	5	V _{OL} = 0.4V	1.2	-	0.9	1.5	-	0.7	-	mA _{dc}		
		V _{OL} = 0.5V	1.9	-	1.7	4.0	-	1.4	-			
		V _{OL} = 1.5V	10.0	-	9.0	11.0	-	7.5	-			
	10	V _{IN} = V _{SS} or V _{DD}	-	-	-	-	-	-	-			
		-5	-	-	13.6	13.95	-	-				
		-10	-	-	13.80	-	-	-				
	15	V _{IN} = V _{SS} or V _{DD}	-	-	-	-	-	-	-			
		-5	-	-	-	-	-	-				
		-10	-	-	-	-	-	-				

NOTES: ¹ Remaining Static Electrical Characteristics are listed under "40006 Series Family Specifications".
² 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	
	t _{PHL}	5	660	1320	ns
		10	260	520	
		15	180	360	
From Blanking Input	t _{PLH}	5	300	600	ns
		10	125	250	
		15	100	200	
	t _{PHL}	5	500	1000	ns
		10	200	400	
		15	160	320	
From Lamp Test Input	t _{PLH}	5	300	600	ns
		10	120	240	
		15	90	180	
	t _{PHL}	5	325	650	ns
		10	130	260	
		15	95	190	
OUTPUT TRANSITION TIME	t _{TLH}	5	170	250	ns
		10	120	200	
		15	100	180	
	t _{THL}	5	400	900	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	65	130		

LOGIC DIAGRAM

