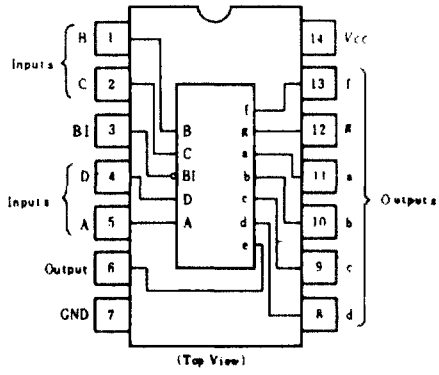
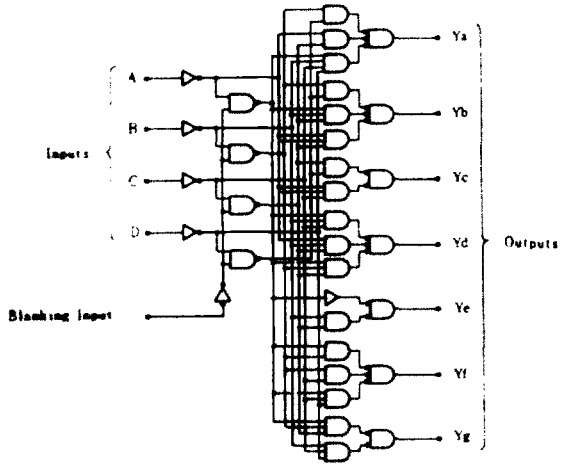
HD74LS49 ● BCD-to-Seven Segment Decoder/Driver (with Open collector outputs)

The HD74LS49 features active-high outputs for driving lamp buffer. This circuit incorporates a direct blanking input. Segment identification and resultant displays are shown below. Display patterns for BCD input counts above 9 are unique symbols to authenticate input conditions. It contains an over-riding blanking input (BI) which can be used to control the lamp intensity by pulsing or to inhibit the output. Inputs and outputs are entirely compatible for use with TTL or DTL logic outputs.

■PIN ARRANGEMENT



■BLOCK DIAGRAM



■ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Ratings	Unit
Supply voltage	V_{CC}	7.0	V
Input voltage	V_{AN}	7.0	V
Output current (off-state)	$I_{O(off)}$	1	mA
Operating temperature range	T_{opr}	−20 ~ +75	℃
Storage temperature range	T_{stg}	−65 ~ +150	℃

■FUNCTION TABLE

Decimal or Function	Inputs					Outputs							Note
	D	C	B	A	BI	a	b	c	d	e	f	g	
0	L	L	L	L	H	H	H	H	H	H	H	L	
1	L	L	L	H	H	L	H	H	L	L	L	L	
2	L	L	H	L	H	H	H	L	H	H	L	H	
3	L	L	H	H	H	H	H	H	H	L	L	H	
4	L	H	L	L	H	L	H	H	L	L	H	H	
5	L	H	L	H	H	H	L	H	H	L	H	H	
6	L	H	H	L	H	L	L	H	H	H	H	H	
7	L	H	H	H	H	H	H	H	L	L	L	L	
8	H	L	L	L	H	H	H	H	H	H	H	H	1
9	H	L	L	H	H	H	H	H	L	L	H	H	
10	H	L	H	L	H	L	L	L	H	H	L	H	
11	H	L	H	H	H	L	L	H	H	L	L	H	
12	H	H	L	L	H	L	H	L	L	L	H	H	
13	H	H	L	H	H	H	L	L	H	L	H	H	
14	H	H	H	L	H	L	L	L	H	H	H	H	
15	H	H	H	H	H	L	L	L	L	L	L	L	
BI	×	×	×	×	L	L	L	L	L	L	L	L	2

H; high level, L; low level, X; irrelevant

Notes: 1. The blanking input (BI) must be open or held at a high logic level when output functions 0 through 15 are desired.
2. When a low logic level is applied directly to the blanking input (BI), all segment outputs are low regardless of the level of any other input.

■ELECTRICAL CHARACTERISTICS (Ta = 20 ~ 75°C)

Item	Symbol	Test Conditions		min	typ*	max	Unit
Input voltage	V_{IH}			2.0			V
	V_{IL}					0.8	V
Output current	I_{OH}	V_{CC} = 4.75V, V_{IH} = 2V, V_{IL} = 0.8V, V_{OH} = 5.5V				250	μA
Output voltage	V_{OL}	V_{CC} = 4.75V, V_{IH} = 2V, V_{IL} = 0.8V	I_{OL} = 4mA			0.4	V
			I_{OL} = 8mA			0.5	
Input current	I_{IH}	V_{CC} = 5.25V, V_I = 2.7V				20	μA
	I_{IL}	V_{CC} = 5.25V, V_I = 0.4V				0.4	mA
	I_I	V_{CC} = 5.25V, V_I = 7V				0.1	mA
Supply current **	I_{CC}	V_{CC} = 5.25V			6	15	mA
Input clamp voltage	V_{IK}	V_{CC} = 4.75V, I_{IN} = −18mA				−1.5	V

* V_{CC}=5V, Ta=25°C

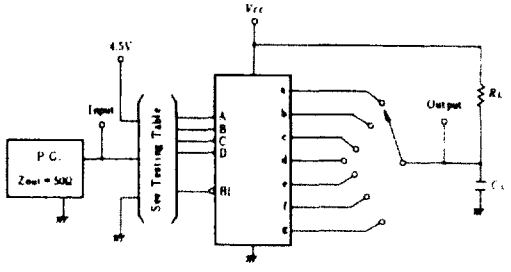
** I_{CC} is measured with all outputs open and all inputs at 4.5V.

■SWITCHING CHARACTERISTICS (V_{CC}=5V, Ta=25°C)

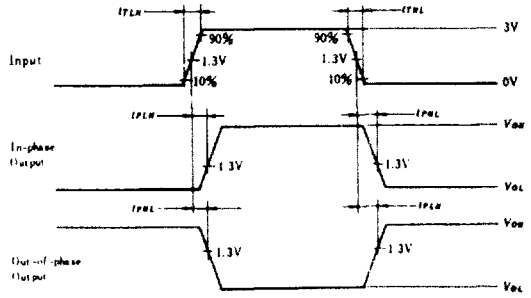
Item	Symbol	Input	Test Conditions	min	typ	max	Unit
Propagation delay time	t_{PHL}	A	C_L = 15pF, R_L = 2kΩ			100	ns
	t_{PLH}					100	
	t_{PHL}	BI	C_L = 15pF, R_L = 6kΩ			100	ns
	t_{PLH}					100	

■TESTING METHOD

1) Test Circuit



Waveform



2) Testing Table

Item	Inputs					Outputs						
	BI	D	C	B	A	a	b	c	d	e	f	g
	4.5V	GND	GND	GND	IN	OUT	–	–	OUT	OUT	OUT	–
t_{PLH}	4.5V	GND	GND	4.5V	IN	–	–	OUT	–	OUT	–	–
t_{PHL}	4.5V	GND	4.5V	4.5V	IN	OUT	OUT	–	OUT	OUT	OUT	OUT
	IN	GND	GND	GND	GND	OUT	OUT	OUT	OUT	OUT	OUT	–