BCD-to-Decimal Decoder / Driver

1. Description

The SN74LS145 is a BCD-to-Decimal Decoder / Driver, with open drain output structure (with 15 V outputs). It consists of eight inverters and ten four-input NAND gates.

2. Features

- BCD-to-Decimal Decoder / Driver.
- Open drain output structure (with 15 V outputs).
- Fully compatible with TTL input and output logic level
- Package: DIP16, SOP16

3. Applications

- Signal decoding processing.
- Industrial control applications
- Other application areas Battery-powered equipment

4. Ordering Information

| Type Number	Package Type	Packing	Notes
SN74LS145N	DIP-16	Tube	
SN74LS145D	SOP-16	Tape & Reel	

Note: If the physical information is inconsistent with the ordering information, please refer to the actual product.

5. Pin Assignment

SOP16 or DIP16			
Pin NO	Pin Definition	Pin NO	Pin Definition
1	Output 0Y	16	Supply V$_{CC}$
2	Output 1Y	15	Input A
3	Output 2Y	14	Input B
4	Output 3Y	13	Input C
5	Output 4Y	12	Input D
6	Output 5Y	11	Output 9Y
7	Output 6Y	10	Output 8Y
8	Supply GND	9	Output 7Y
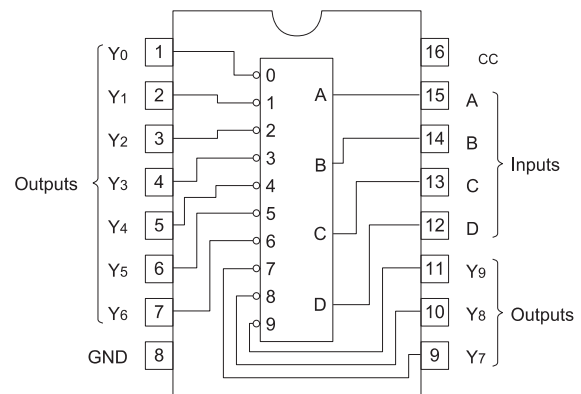
6. Block Diagram
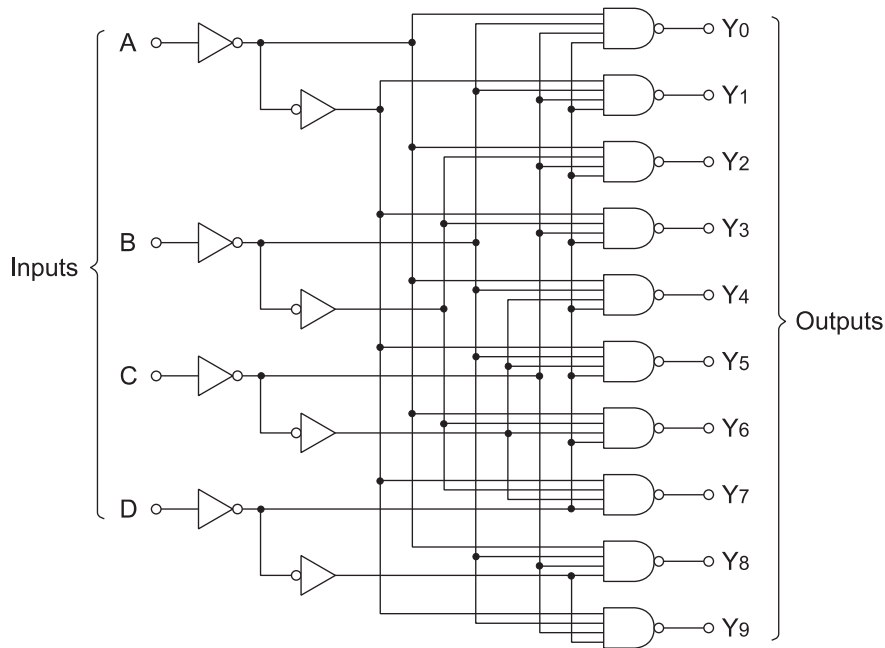
7. Function Table

No.	Inputs				Outputs									
	D	C	B	A	0	1	2	3	4	5	6	7	8	9
0	L	L	L	L	L	H	H	H	H	H	H	H	H	H
1	L	L	L	H	H	L	H	H	H	H	H	H	H	H
2	L	L	H	L	H	H	L	H	H	H	H	H	H	H
3	L	L	H	H	H	H	H	L	H	H	H	H	H	H
4	L	H	L	L	H	H	H	H	L	H	H	H	H	H
5	L	H	L	H	H	H	H	H	H	L	H	H	H	H
6	L	H	H	L	H	H	H	H	H	H	L	H	H	H
7	L	H	H	H	H	H	H	H	H	H	H	L	H	H
8	H	L	L	L	H	H	H	H	H	H	H	H	L	H
9	H	L	L	H	H	H	H	H	H	H	H	H	H	L
Invalid	H	L	H	L	H	H	H	H	H	H	H	H	H	H
	H	L	H	H	H	H	H	H	H	H	H	H	H	H
	H	H	L	L	H	H	H	H	H	H	H	H	H	H
	H	H	L	H	H	H	H	H	H	H	H	H	H	H
	H	H	H	L	H	H	H	H	H	H	H	H	H	H
	H	H	H	H	H	H	H	H	H	H	H	H	H	H

8. Recommended Operating Conditions

Item	Symbol	Min	Tpy	Max	Unit
Supply voltage	V_{CC}	4.75	5	5.25	V
Input voltage	V_{IH}	2	—	—	V
	V_{IL}	—	—	0.8	V
Output current	I_{OH}	—	—	-400	uA
	I_{OL}	—	—	8	mA
Operating temperature	T_A	0	—	60	°C

9. Absolute Maximum Ratings

Item	Symbol	Maximum Ratings	Unit
Supply voltage	V_{CC}	7	V
Input voltage	V_I	7	V
Power dissipation	P_D	500	mW
Operating temperature	T_A	0-70	°C
Storage temperature	T_S	-65-150	°C
welding temperature	T_W	260	°C, 10s

Note: the limit parameter is the limit value that cannot be exceeded under any condition. Once this limit is exceeded, it may cause physical damage such as deterioration of the product. At the same time, the chip can not be guaranteed to work properly when it is close to the limit parameters.

10. Electrical Characteristics

(T_A=25°C, Unless specified)

Item	Symbol	Min	Tpy	Max	Unit	Conditions	
Output current	$I_{O(OFF)}$	0	0.01	250	uA	V_{OFF}=15V	V_{CC}=4.75V, V_{IL}=0.8V, V_{IH}=2V
Output voltage	$V_{OL(ON)}$	—	0.25	0.4	V	I_{OL}=12mA	V_{CC}=4.75V，V_{IL}=0.8V, V_{IH}=2V
		—	0.45	0.5		I_{OL}=24mA	
		—	2.9	3.3		I_{OL}=80mA	
Input current	I_I	—	0.1	100	uA	V_{CC}=5.25V, V_I=7V	
	I_{IH}	—	0.1	20	uA	V_{CC}=5.25V, V_I=2.7V	
	I_{IL}	—	0.23	0.4	mA	V_{CC}=5.25V, V_I=0.4V	
Supply current	I_{CC}	—	7	13	mA	V_{CC}=5.25V，all inputs=GND, outputs open	
Input clamp voltage	V_{IK}	—	0.9	-1.5	V	V_{CC}=4.75V, I_I=-18mA	

11. Switching Characteristics

(T_A=25°C, Unless specified)

Item	Symbol	Min	Tpy	Max	Unit	Conditions
Propagation delay time	t_{PHL}	—	25	—	ns	V_{CC}=5V，C_L=45pF, R_L=665Ω
A、B、C、D to Outputs (0 to 9)	t_{PLH}	—	20	—	ns	

## 12. Testing Method

Test Circuit
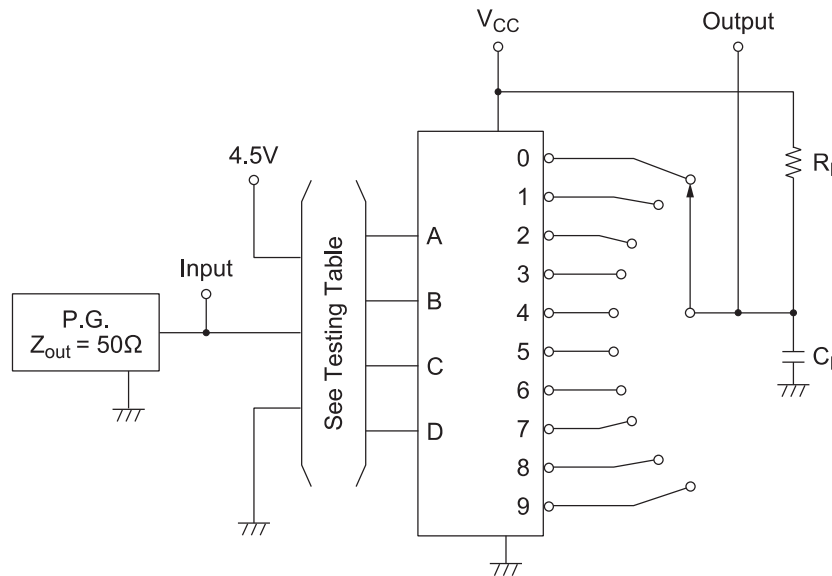
Waveform
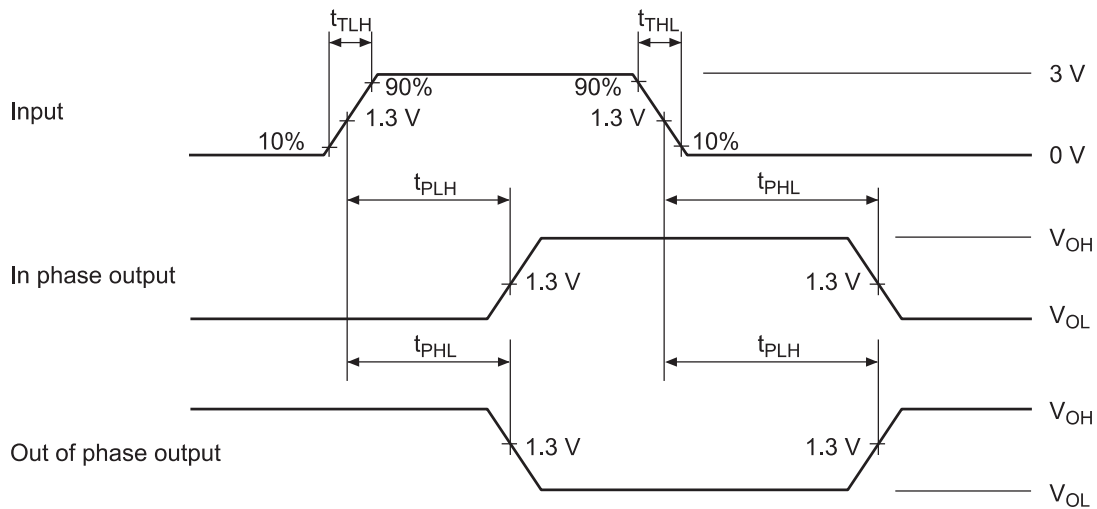
Note:

1. See Testing Table refers to the corresponding test items in the switch characteristic table.

2. the CL capacitor is an external patch capacitor (0603), which is connected to the output pin and the capacitor is near the chip GND.

3. Input: port input level, f=1MHz, D=50%, tr=tf or less 20ns;

4. Output: Y output test port (Out of Phase Output, In Phase Output)

13. Package Outlines

DIP-16
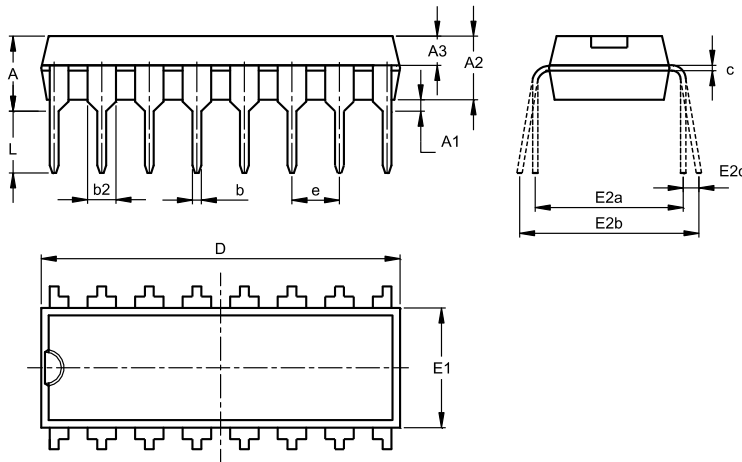
PDIP-16			
Dim	Min	Max	Nom
A	3.60	4.00	3.80
A1	0.51	-	
A2	3.20	3.40	3.30
A3	1.47	1.57	1.52
b	0.44	0.53	--
b2	1.52BSC		
c	0.25	0.31	--
D	18.90	19.30	19.10
E1	6.15	6.55	6.35
E2a	7.62 BSC		
E2b	7.62	9.30	--
E2c	0.00	0.84	--
e	2.54BSC		
L	3.00	--	
All Dimensions in mm			

SOP-16
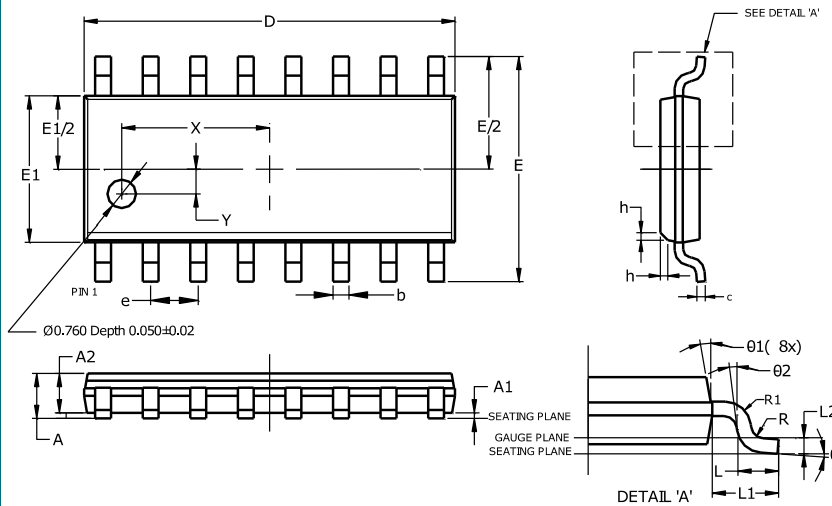
SOP-16			
Dim	Min	Max	Typ
A	--	1.260	--
A1	0.10	0.23	--
A2	1.02	--	--
b	0.31	0.51	--
c	0.10	0.25	--
D	9.80	10.00	--
E	5.90	6.10	--
E1	3.80	4.00	--
e	1.27 BSC		
h	0.15	0.25	0.20
L	0.40	1.27	--
L1	1.04 REF		
L2	0.25 BSC		
R	0.07	--	--
R1	0.07	--	--
X	3.945 REF		
Y	0.661 REF		
θ	0°	8°	--
θ1	5°	15°	--
θ2	0°	--	--
All Dimensions in mm			

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