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XINBOLE

Product Specification

XBLW SN74HC151

8-input Multiplexer

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RoHS

Description

The SN74HC151 are 8-bit multiplexer with eight binary inputs (I0 to I7), three select inputs (S0 to S2) and an enable input ($\bar{E}$). One of the eight binary inputs is selected by the select inputs and routed to the complementary outputs (Y and $\bar{Y}$). A HIGH on $\bar{E}$ forces the output Y LOW and output $\bar{Y}$ HIGH. Inputs also include clamp diodes that enable the use of current limiting resistors to interface inputs to voltages in excess of V_{CC}.

Features

- Low-power dissipation
- Non-inverting data path
- Specified from -40°C to +105°C
- Packaging information: DIP-16/SOP-16/TSSOP-16

ORDERING INFORMATION

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW SN74HC151N	DIP-16	74HC151N	Tube	1000Pcs/Box
XBLW SN74HC151DTR	SOP-16	74HC151	Tape	2500Pcs/Reel
XBLW SN74HC151TDTR	TSSOP-16	74HC151	Tape	3000Pcs/Reel

Block Diagram

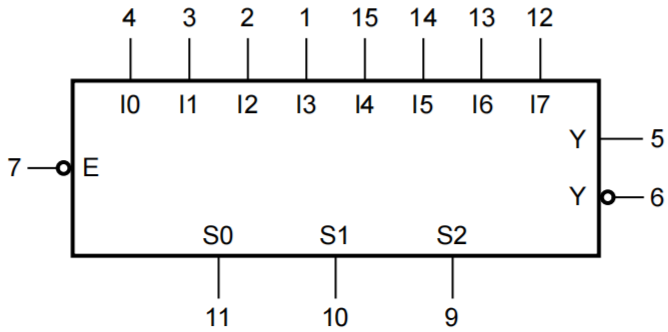


Figure 1. Logic symbol

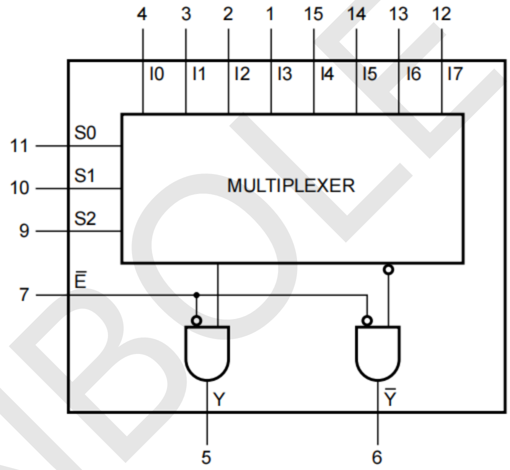


Figure 2. Functional diagram

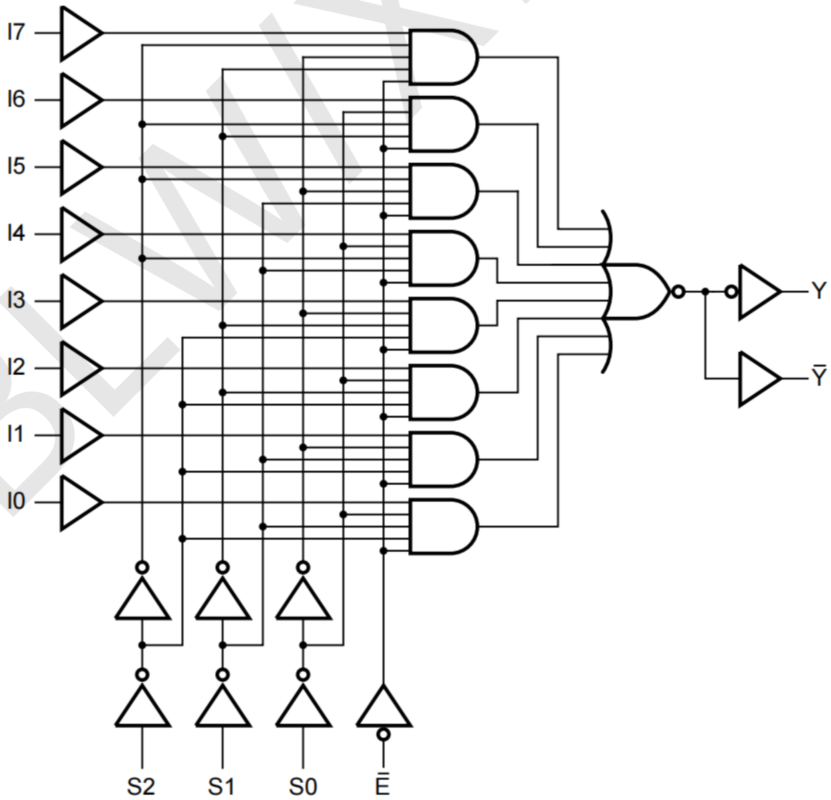
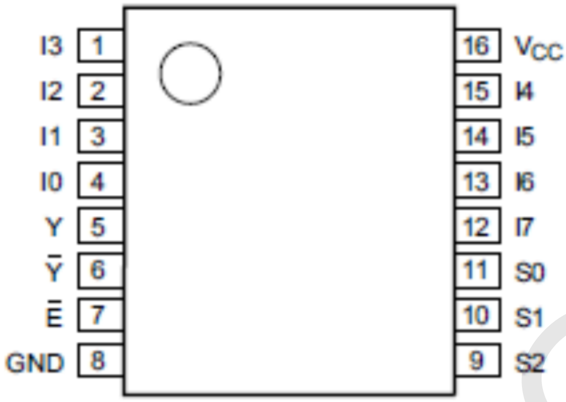


Figure 3. Logic diagram

Pin Configurations



Pin Description

Pin No.	Pin Name	Description
1	I3	data input
2	I2	data input
3	I1	data input
4	I0	data input
5	$\overline{Y}$	multiplexer output
6	$\overline{Y}$	complementary multiplexer output
7	$\overline{E}$	enable input(active LOW)
8	GND	ground(0V)
9	S2	common data select input
10	S1	common data select input
11	S0	common data select input
12	I7	data input
13	I6	data input
14	I5	data input
15	I4	data input
16	V_{CC}	supply voltage

Function Table

Input												Output	
$\overline{E}$	S2	S1	S0	I0	I1	I2	I3	I4	I5	I6	I7	Y	$\overline{Y}$
H	X	X	X	X	X	X	X	X	X	X	X	H	L
L	L	L	L	L	X	X	X	X	X	X	X	H	L
L	L	L	L	H	X	X	X	X	X	X	X	L	H
L	L	L	H	X	L	X	X	X	X	X	X	H	L
L	L	L	H	X	H	X	X	X	X	X	X	L	H
L	L	H	L	X	X	L	X	X	X	X	X	H	L
L	L	H	L	X	X	H	X	X	X	X	X	L	H
L	L	H	H	X	X	X	L	X	X	X	X	H	L
L	L	H	H	X	X	X	H	X	X	X	X	L	H
L	H	L	L	X	X	X	X	L	X	X	X	H	L
L	H	L	L	X	X	X	X	H	X	X	X	L	H
L	H	L	H	X	X	X	X	X	L	X	X	H	L
L	H	L	H	X	X	X	X	X	H	X	X	L	H
L	H	H	L	X	X	X	X	X	X	L	X	H	L
L	H	H	L	X	X	X	X	X	X	H	X	L	H
L	H	H	H	X	X	X	X	X	X	X	L	H	L
L	H	H	H	X	X	X	X	X	X	X	H	L	H

Note: H=HIGH voltage level; L=LOW voltage level; X=don’t care.

Electrical Parameter

Absolute Maximum Ratings

(Voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Max.	Unit
supply voltage	V_{CC}	-		-0.5	+7.0	V
input clamping current	I_{IK}	V_I < -0.5V or V_I > V_{CC}+0.5V		-	±20	mA
output clamping current	I_{OK}	V_O < -0.5V or V_O > V_{CC}+0.5V		-	±20	mA
output current	I_O	V_O = -0.5V to (V_{CC} +0.5V)		-	±25	mA
supply current	I_{CC}	-		-	50	mA
ground current	I_{GND}	-		-50	-	mA
storage temperature	T_{stg}	-		-65	+150	℃
total power dissipation	P_{tot}	-		-	500	mW
soldering temperature	T_L	10s	DIP	245		℃
			SOP	250		

Note:

[1] For DIP16 packages: above 70℃ the value of P_{tot} derates linearly with 12mW/K.

[2] For SOP16 packages: above 70℃ the value of P_{tot} derates linearly with 8mW/K.

[3] For (T)SSOP16 packages: above 60℃ the value of P_{tot} derates linearly with 5.5mW/K.

Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V_{CC}	-	2.0	5.0	6.0	V
input voltage	V_I	-	0	-	V_{CC}	V
output voltage	V_O	-	0	-	V_{CC}	V
input transition rise and fall rate	$\Delta t/\Delta V$	V_{CC}=2.0V	-	-	625	ns/V
		V_{CC}=4.5V	-	1.67	139	ns/V
		V_{CC}=6.0V	-	-	83	ns/V
ambient temperature	T_{amb}	-	-40	-	+105	℃

Electrical Characteristics

DC Characteristics 1

(T_{amb}=25°C, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	V_{CC}=2.0V		1.5	1.2	-	V
		V_{CC}=4.5V		3.15	2.4	-	V
		V_{CC}=6.0V		4.2	3.2	-	V
LOW-level input voltage	V_{IL}	V_{CC}=2.0V		-	0.8	0.5	V
		V_{CC}=4.5V		-	2. 1	1.35	V
		V_{CC}=6.0V		-	2.8	1.8	V
HIGH-level output voltage	V_{OH}	$V_I=V_{IH}$ or V_{IL}	I_O=-20uA;V_{CC}=2.0V	1.9	2.0	-	V
			I_O=-20uA;V_{CC}=4.5V	4.4	4.5	-	V
			I_O=-20uA;V_{CC}=6.0V	5.9	6.0	-	V
			I_O=-4.0mA;V_{CC}=4.5V	3.98	4.32	-	V
			I_O=-5.2mA;V_{CC}=6.0V	5.48	5.81	-	V
LOW-level output voltage	V_{OL}	$V_I=V_{IH}$ or V_{IL}	I_O=20uA;V_{CC}=2.0V	-	0	0. 1	V
			I_O=20uA;V_{CC}=4.5V	-	0	0. 1	V
			I_O=20uA;V_{CC}=6.0V	-	0	0. 1	V
			I_O=4.0mA;V_{CC}=4.5V	-	0.15	0.26	V
			I_O=5.2mA;V_{CC}=6.0V	-	0.16	0.26	V
input leakage current	I_I	V_I=Vcc or GND;V_{CC}=6.0V		-	-	±0. 1	μA
supply current	I_{CC}	$V_I=V_{CC}$ or GND;I_O=0A;V_{CC}=6.0V		-	-	8.0	μA
input apacitance	C_I	-		-	3.5	-	pF

DC Characteristics 2

(T_{amb}=-40℃to +85℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	V_{CC}=2.0V		1.5	-	-	V
		V_{CC}=4.5V		3.15	-	-	V
		V_{CC}=6.0V		4.2	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=2.0V		-	-	0.5	V
		V_{CC}=4.5V		-	-	1.35	V
		V_{CC}=6.0V		-	-	1.8	V
HIGH-level output voltage	V_{OH}	V_I=V_{IH} or V_{IL}	I_O=-20uA;V_{CC}=2.0V	1.9	-	-	V
			I_O=-20uA;V_{CC}=4.5V	4.4	-	-	V
			I_O=-20uA;V_{CC}=6.0V	5.9	-	-	V
			I_O=-4.0mA;V_{CC}=4.5V	3.84	-	-	V
			I_O=-5.2mA;V_{CC}=6.0V	5.34	-	-	V
LOW-level output voltage	V_{OL}	V_I=V_{IH} or V_{IL}	I_O=20uA;V_{CC}=2.0V	-	-	0. 1	V
			I_O=20uA;V_{CC}=4.5V	-	-	0. 1	V
			I_O=20uA;V_{CC}=6.0V	-	-	0. 1	V
			I_O=4.0mA;V_{CC}=4.5V	-	-	0.33	V
			I_O=5.2mA;V_{CC}=6.0V	-	-	0.33	V
input leakage current	I_I	Vi= V_{CC} or GND;V_{CC}=6.0V		-	-	±1.0	µA
supply current	I_{CC}	Vi=Vcc or GND;Io=0A;V_{CC}=6.0V		-	-	80	µA

DC Characteristics 3

(T_{amb}=-40℃to +105℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	V_{CC}=2.0V		1.5	-	-	V
		V_{CC}=4.5V		3.15	-	-	V
		V_{CC}=6.0V		4.2	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=2.0V		-	-	0.5	V
		V_{CC}=4.5V		-	-	1.35	V
		V_{CC}=6.0V		-	-	1.8	V
HIGH-level output voltage	V_{OH}	V_I= V_{IH} or V_{IL}	I_O=-20uA;V_{CC}=2.0V	1.9	-	-	V
			I_O=-20uA;V_{CC}=4.5V	4.4	-	-	V
			I_O=-20uA;V_{CC}=6.0V	5.9	-	-	V
			I_O=-4.0mA;V_{CC}=4.5V	3.7	-	-	V
			I_O=-5.2mA;V_{CC}=6.0V	5.2	-	-	V
LOW-level output voltage	V_{OL}	V_I= V_{IH} or V_{IL}	I_O=20uA;V_{CC}=2.0V	-	-	0. 1	V
			I_O=20uA;V_{CC}=4.5V	-	-	0. 1	V
			I_O=20uA;V_{CC}=6.0V	-	-	0. 1	V
			I_O=4.0mA;V_{CC}=4.5V	-	-	0.4	V
			I_O=5.2mA;V_{CC}=6.0V	-	-	0.4	V
input leakage current	I_I	V_I= Vcc or GND;V_{CC}=6.0V		-	-	±1.0	μA
supply current	I_{CC}	V_I=Vcc or GND;I_O=0A;V_{CC}=6.0V		-	-	160	μA

AC Characteristics 1

(T_{amb}=25℃, GND =0V, C_L=50pF,unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Propagation delay	t_{pd}	In to Y see Figure5[1]	V_{CC}=2.0V	-	52	170	ns
			V_{CC}=4.5V	-	19	34	ns
			VCC=5.0V;CL= 15pF	-	17	-	ns
			V_{CC}=6.0V	-	15	29	ns
		In to $\overline{Y}$ see Figure5[1]	V_{CC}=2.0V	-	58	185	ns
			V_{CC}=4.5V	-	21	37	ns
			VCC=5.0V;CL= 15pF	-	17	-	ns
			V_{CC}=6.0V	-	17	31	ns
		Sn to Y see Figure6[1]	V_{CC}=2.0V	-	61	185	ns
			V_{CC}=4.5V	-	22	37	ns
			VCC=5.0V;CL= 15pF	-	19	-	ns
			V_{CC}=6.0V	-	18	31	ns
		Sn to $\overline{Y}$ see Figure6[1]	V_{CC}=2.0V	-	61	205	ns
			V_{CC}=4.5V	-	22	41	ns
			VCC=5.0V;CL= 15pF	-	19	-	ns
			V_{CC}=6.0V	-	18	35	ns
		$\overline{E}$ to Y see Figure6	V_{CC}=2.0V	-	41	125	ns
			V_{CC}=4.5V	-	15	25	ns
			VCC=5.0V;CL= 15pF	-	12	-	ns
			V_{CC}=6.0V	-	12	21	ns
		$\overline{E}$ to $\overline{Y}$ see Figure6	V_{CC}=2.0V	-	47	145	ns
			V_{CC}=4.5V	-	17	29	ns
			VCC=5.0V;CL= 15pF	-	14	-	ns
			V_{CC}=6.0V	-	14	25	ns
transition time	t_t	Y,$\overline{Y}$ see Figure5[2]	V_{CC}=2.0V	-	19	75	ns
			V_{CC}=4.5V	-	7	15	ns
			V_{CC}=6.0V	-	6	13	ns
power dissipation capacitance	C_{PD}	C_L=50pF;f=1MHz;V_I=GND to V_{CC}[3]		-	40	-	pF

Note:

[1]t_{pd} is the same as t_{PLH} and t_{PHL}.

[2]t_t is the same as t_{THL} and t_{TLH}.

[3]C_{PD} is used to determine the dynamic power dissipation (P_D in uW).

$P_D=C_{PD}\times V_{CC}^2\times f_i\times N+\Sigma(C_L\times V_{CC}^2\times f_o)$ where:

f_i=input frequency in MHz;

f_o=output frequency in MHz;

C_L=output load capacitance in pF;

V_{CC}=supply voltage in V;

N=number of inputs switching;

$\Sigma(C_L\times V_{CC}^2\times f_o)$=sum of outputs.

AC Characteristics 2
(T_{amb}=-40°C to +85°C, GND=0V, C_L=50pF, unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Propagation delay	t_{pd}	In to Y see Figure5[1]	V_{CC}=2.0V	-	-	215	ns
			V_{CC}=4.5V	-	-	43	ns
			V_{CC}=6.0V	-	-	37	ns
		In to $\overline{Y}$ see Figure5[1]	V_{CC}=2.0V	-	-	230	ns
			V_{CC}=4.5V	-	-	46	ns
			V_{CC}=6.0V	-	-	39	ns
		Sn to Y see Figure6[1]	V_{CC}=2.0V	-	-	230	ns
			V_{CC}=4.5V	-	-	46	ns
			V_{CC}=6.0V	-	-	39	ns
		Sn to $\overline{Y}$ see Figure6[1]	V_{CC}=2.0V	-	-	255	ns
			V_{CC}=4.5V	-	-	51	ns
			V_{CC}=6.0V	-	-	43	ns
		$\overline{E}$ to Y see Figure6	V_{CC}=2.0V	-	-	155	ns
			V_{CC}=4.5V	-	-	31	ns
			V_{CC}=6.0V	-	-	26	ns
		$\overline{E}$ to $\overline{Y}$ see Figure6	V_{CC}=2.0V	-	-	180	ns
			V_{CC}=4.5V	-	-	36	ns
			V_{CC}=6.0V	-	-	31	ns
transition time	t_t	Y, $\overline{Y}$ see Figure5[2]	V_{CC}=2.0V	-	-	95	ns
			V_{CC}=4.5V	-	-	19	ns
			V_{CC}=6.0V	-	-	16	ns

Note:
[1] t_{pd} is the same as t_{PLH} and t_{PHL}.
[2] t_t is the same as t_{THL} and t_{TLH}.

AC Characteristics 3

(T_{amb}=-40°C to +105°C, GND=0V, C_L=50pF, unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Propagation delay	t_{pd}	In to Y see Figure5[1]	V_{CC}=2.0V	-	-	255	ns
			V_{CC}=4.5V	-	-	51	ns
			V_{CC}=6.0V	-	-	43	ns
		In to $\overline{Y}$ see Figure5[1]	V_{CC}=2.0V	-	-	280	ns
			V_{CC}=4.5V	-	-	56	ns
			V_{CC}=6.0V	-	-	48	ns
		Sn to Y see Figure6[1]	V_{CC}=2.0V	-	-	280	ns
			V_{CC}=4.5V	-	-	56	ns
			V_{CC}=6.0V	-	-	48	ns
		Sn to $\overline{Y}$ see Figure6[1]	V_{CC}=2.0V	-	-	310	ns
			V_{CC}=4.5V	-	-	62	ns
			V_{CC}=6.0V	-	-	53	ns
		$\overline{E}$ to Y see Figure6	V_{CC}=2.0V	-	-	190	ns
			V_{CC}=4.5V	-	-	38	ns
			V_{CC}=6.0V	-	-	32	ns
		$\overline{E}$ to $\overline{Y}$ see Figure6	V_{CC}=2.0V	-	-	220	ns
			V_{CC}=4.5V	-	-	44	ns
			V_{CC}=6.0V	-	-	38	ns
transition time	t_t	Y,$\overline{Y}$ see Figure5[2]	V_{CC}=2.0V	-	-	110	ns
			V_{CC}=4.5V	-	-	22	ns
			V_{CC}=6.0V	-	-	19	ns

Note:

[1] t_{pd} is the same as t_{PLH} and t_{PHL}.

[2] t_t is the same as t_{THL} and t_{TLH}.

Testing Circuit

AC Testing Circuit

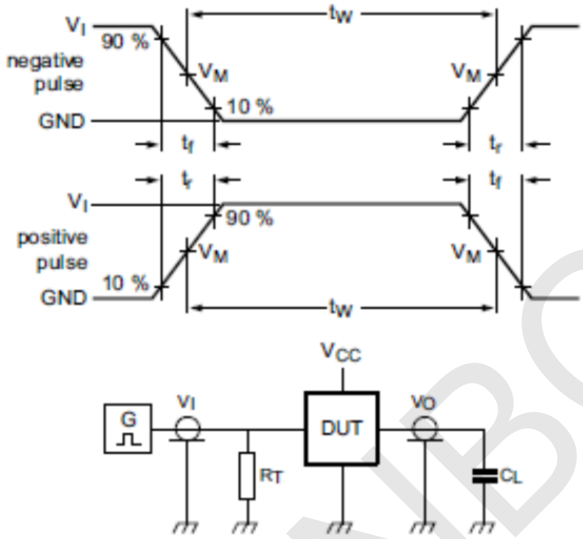


Figure 4. Test circuit for measuring switching times

Definitions for test circuit:

C_L=Load capacitance including jig and probe capacitance.

R_T=Termination resistance should be equal to the output impedance Z_o of the pulse generator.

AC Testing Waveforms

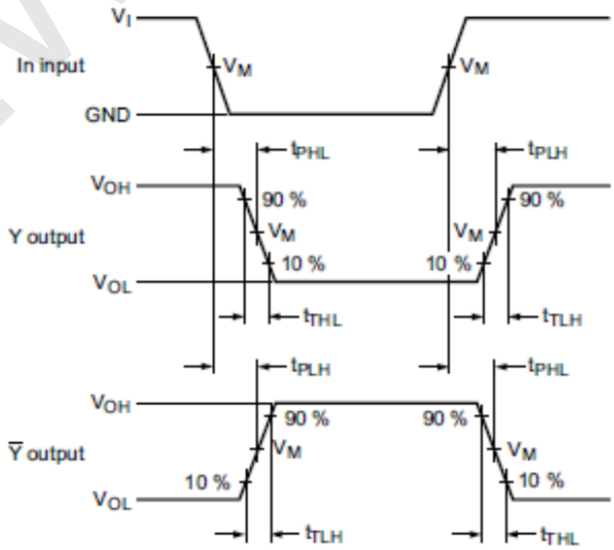


Figure 5. Propagation delay input (In) to output (Y,$\overline{Y}$) and the output (Y, $\overline{Y}$) transition time

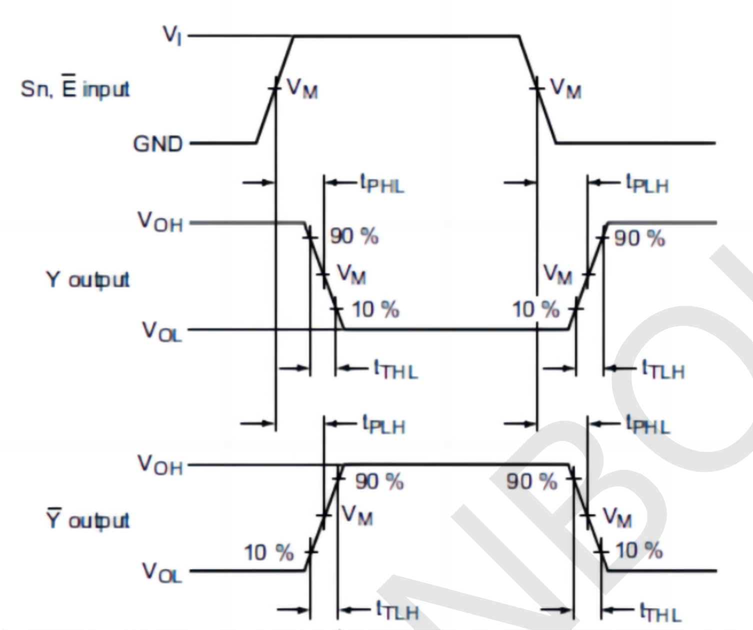


Figure 6. Propagation delay input (Sn, $\overline{E}$) to output (Y, $\overline{Y}$) and output (Y, $\overline{Y}$) transitions time

Measurement Points

Type	Input	Output
	V_M	V_M
SN74HC151	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$

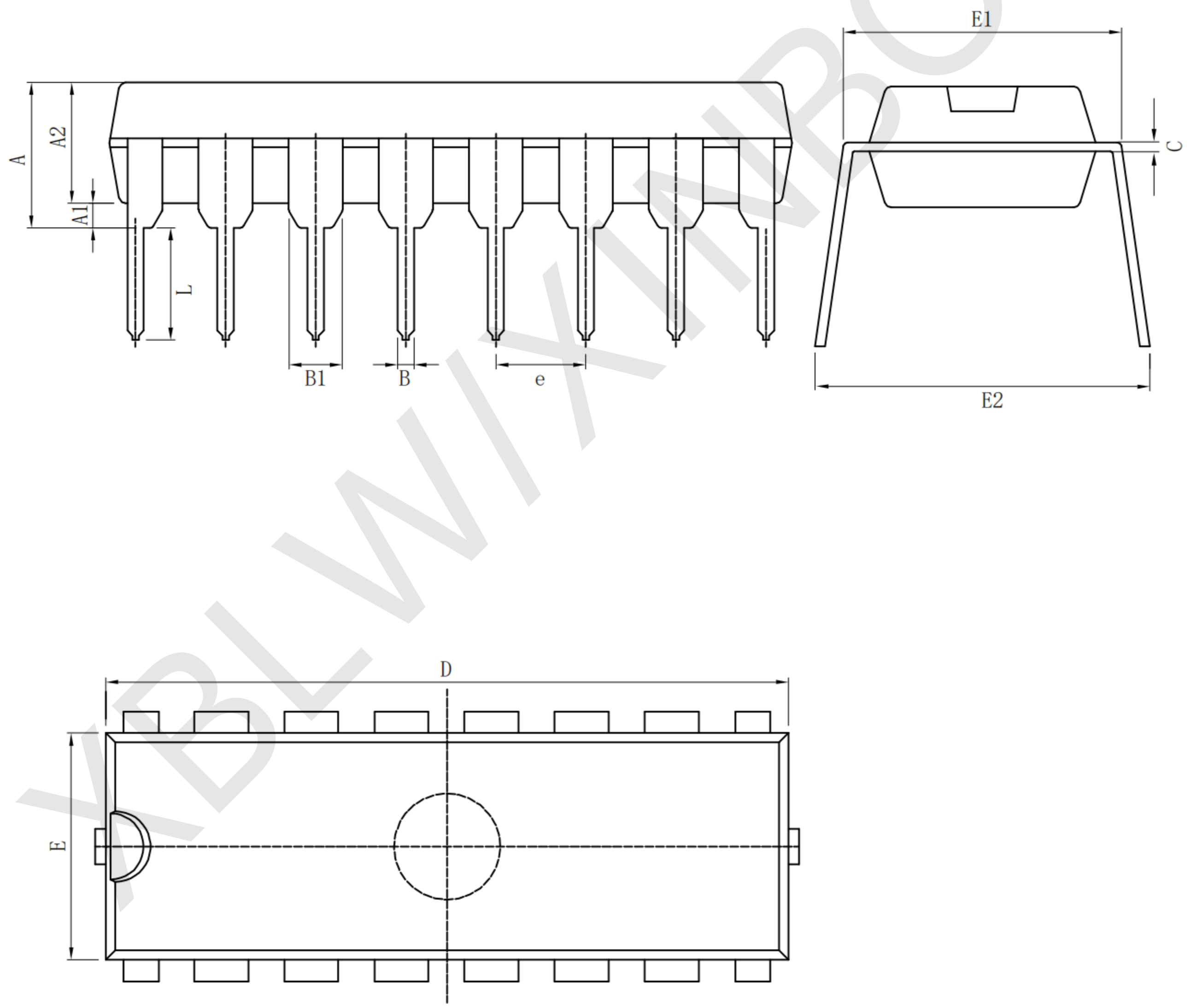
Test Data

Type	Input		Load	Test
	V_I	t_r, t_f	C_L	
SN74HC151	V_{CC}	6.0ns	15pF,50pF	t_{PHL}, t_{PLH}

Package Information

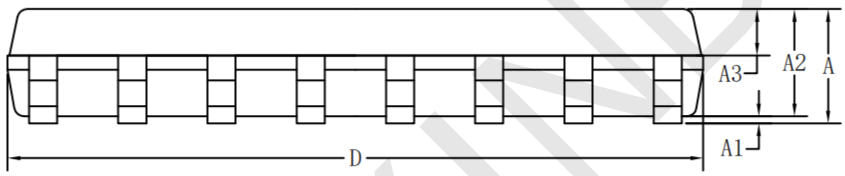
· DIP-16

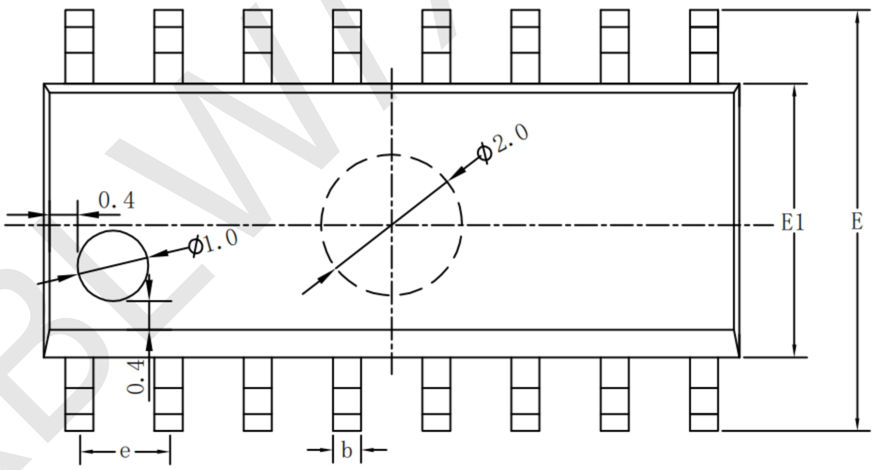
Size / Symbol	Dimensions In Millimeters		Size / Symbol	Dimensions In Inches	
	Min(mm)	Max(mm)		Min(in)	Max(in)
A	3.710	4.310	A	0.146	0.170
A1	0.510		A1	0.020	
A2	3.200	3.600	A2	0.126	0.142
B	0.380	0.570	B	0.015	0.022
B1	1.524(BSC)		B1	0.060(BSC)	
C	0.204	0.360	C	0.008	0.014
D	18.80	19.20	D	0.740	0.756
E	6.200	6.600	E	0.244	0.260
E1	7.320	7.920	E1	0.288	0.312
e	2.540(BSC)		e	0.100(BSC)	
L	3.000	3.600	L	0.118	0.142
E2	8.400	9.000	E2	0.331	0.354

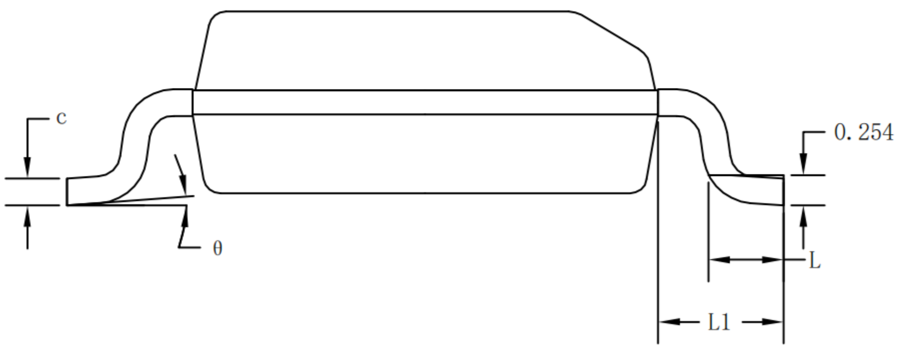


· SOP-16

Size / Symbol	Dimensions In Millimeters			Size / Symbol	Dimensions In Inches		
	Min(mm)	Nom(mm)	Max(mm)		Min(in)	Nom(in)	Max(in)
A	1.500	1.600	1.700	A	0.059	0.063	0.067
A1	0.100	0.150	0.250	A1	0.004	0.006	0.010
A2	1.400	1.450	1.500	A2	0.055	0.057	0.059
A3	0.600	0.650	0.700	A3	0.024	0.026	0.028
b	0.300	0.400	0.500	b	0.012	0.016	0.020
c	0.150	0.200	0.250	c	0.006	0.008	0.010
D	9.800	9.900	10.00	D	0.386	0.390	0.394
E	5.800	6.000	6.200	E	0.228	0.236	0.244
E1	3.850	3.900	3.950	E1	0.152	0.154	0.156
e	1.27(BSC)			e	0.050(BSC)		
L	0.500	0.600	0.700	L	0.020	0.024	0.028
L1	1.05(BSC)			L1	0.041(BSC)		
θ	0°	4°	8°	θ	0°	4°	8°

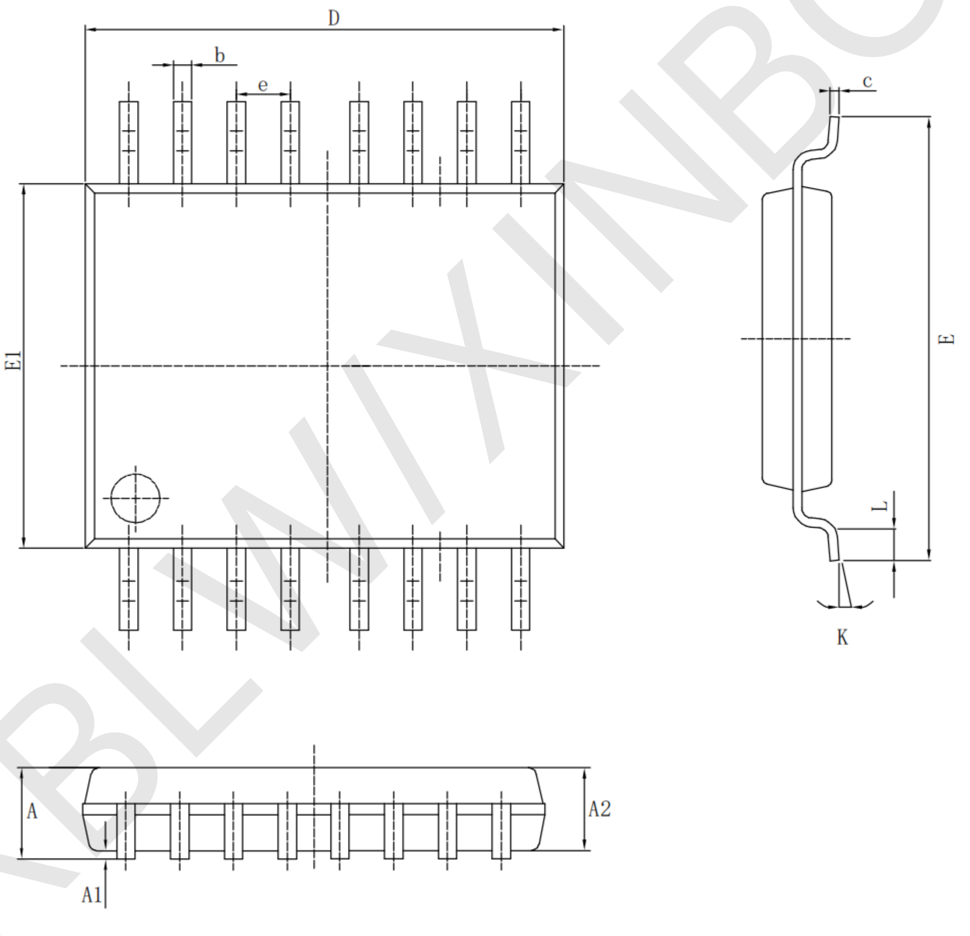






· TSSOP-16

Symbol \ Size	Dimensions In Millimeters		Symbol \ Size	Dimensions In Inches	
	Min(mm)	Max(mm)		Min(in)	Max(in)
A		1.200	A		0.047
A1	0.050	0.150	A1	0.002	0.006
A2	0.800	1.050	A2	0.031	0.041
b	0.190	0.300	b	0.007	0.012
c	0.090	0.200	c	0.004	0.0089
D	4.900	5.100	D	0.193	0.201
E	6.200	6.600	E	0.244	0.260
E1	4.300	4.480	E1	0.169	0.176
e	0.65(BSC)		e	0.0256(BSC)	
K	0°	8°	K	0°	8°
L	0.450	0.750	L	0.018	0.030



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