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XINBOLE

Product Specification

XBLW SN74LS365

Hex Buffer/Line Driver; 3-state

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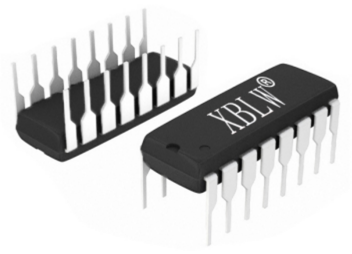
RoHS

Description

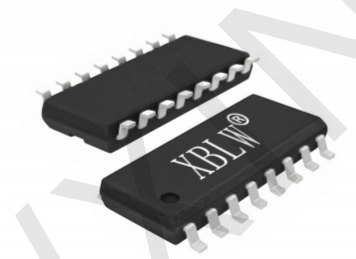
The SN74LS365 is a hex buffer/line driver with 3-state outputs controlled by the output enable inputs ($\overline{OE}n$). A HIGH on $\overline{OE}n$ causes the outputs to assume a high impedance OFF-state. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of V_{CC}.

Features

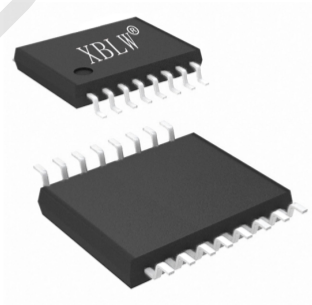
- 3-state outputs
- Specified from -20°C to +85°C
- Packaging information: DIP-16/SOP-16/TSSOP-16



DIP-16



SOP-16



TSSOP-16

Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW SN74LS365N	DIP-16	74LS365N	Tube	1000Pcs/Box
XBLW SN74LS365DTR	SOP-16	74LS365	Tape	2500Pcs/Reel
XBLW SN74LS365TDTR	TSSOP-16	74LS365	Tape	3000Pcs/Reel

Block Diagram

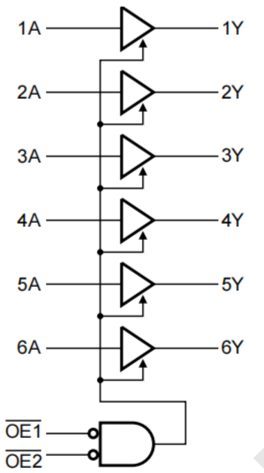


Figure 1. Logic symbol

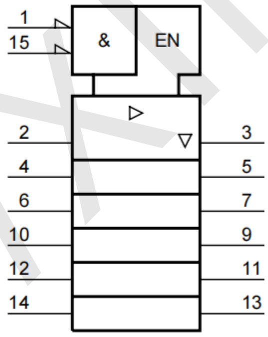


Figure 2. IEC logic symbol

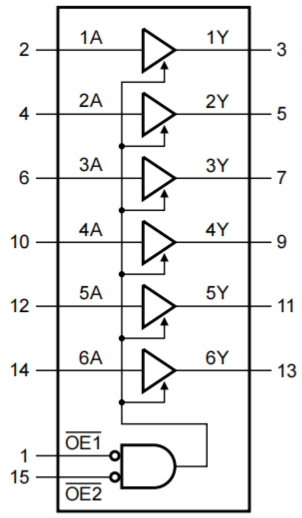


Figure 3. Functional diagram

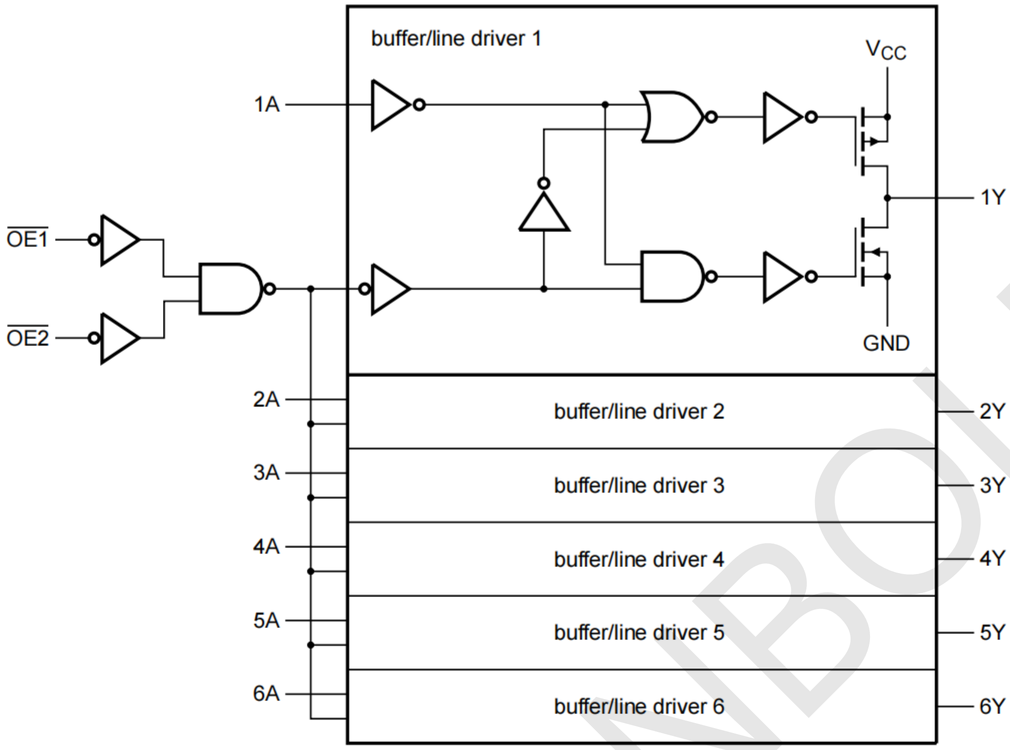
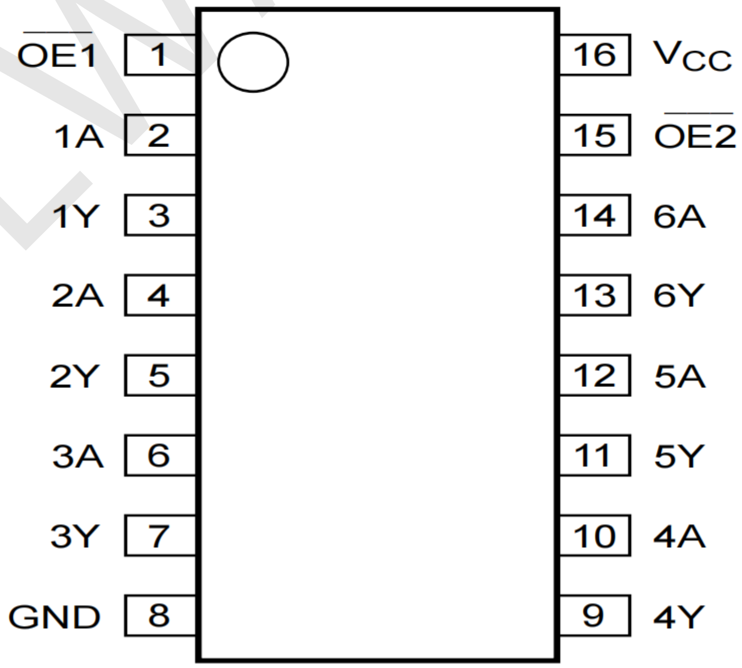


Figure 4. Logic diagram

Pin Configurations



Pin DescriptionFunction Table

Pin No.	Pin Name	Description
1	$\overline{OE}1$	output enable input 1 (active LOW)
2	1A	data input 1
3	1Y	data output 1
4	2A	data input 2
5	2Y	data output 2
6	3A	data input 3
7	3Y	data output 3
8	GND	ground (0V)
9	4Y	data output 4
10	4A	data input 4
11	5Y	data output 5
12	5A	data input 5
13	6Y	data output 6
14	6A	data input 6
15	$\overline{OE}2$	output enable input 2 (active LOW)
16	V_{CC}	supply voltage

Function Table

Input			Output
$\overline{OE}1$	**$\overline{OE}2$**	**nA**	**nY**
L	L	L	L
L	L	H	H
X	H	X	Z
H	X	X	Z

Note： H=HIGH voltage level; L=LOW voltage level; X=don’tcare; Z=high-impedance OFF-state.

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	-0.5V < V_O < V_{CC}+0.5V	-	±35	mA
supply current	I_{CC}	-	-	70	mA
ground current	I_{GND}	-	-70	-	mA
storage temperature	T_{stg}	-	-65	+150	°C
total power dissipation	P_{tot}	-	-	500	mW
Soldering temperatur e	T_L	10s DIP	245		°C
		10s SOP/TSSOP	260		

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	Δt/ΔV	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}	-	-20	-	+85	°C

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=-6.0mA; V_{CC}=4.5V	3.98	4.32	-	V
			I_O=-7.8mA; 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=6.0mA; V_{CC}=4.5V	-	0.15	0.26	V
			I_O=7.8mA; V_{CC}=6.0V	-	0.16	0.26	V
input leakage current	I_I	V_I=V_{CC} or GND; V_{CC}=6.0V		-	-	±0.1	uA
OFF-state output current	I_{OZ}	V_I=V_{IH} orV_{IL}; V_{CC}=6 .0V; V_O=V_{CC} or GND		-	-	±0.5	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}=6.0V		-	-	8.0	uA
input capacitance	C_I	-		-	3.5	-	pF

DC Characteristics 2

(T_{amb}=-20℃ 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=-6.0mA; V_{CC}=4.5V	3.84	-	-	V
			I_O=-7.8mA; 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=6.0mA; V_{CC}=4.5V	-	-	0.33	V
			I_O=7.8mA; V_{CC}=6.0V	-	-	0.33	V
input leakage current	I_I	V_I=V_{CC} or GND; V_{CC}=6.0V		-	-	±1.0	uA
OFF-state output current	I_{OZ}	V_I=V_{IH} orV_{IL}; V_{CC}=6 .0V; V_O=V_{CC} or GND		-	-	±5.0	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}=6.0V		-	-	80	uA

AC Characteristics 1

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

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
nA tonY propagation delay	t_{pd}	see Figure 6	V_{CC}=2.0V	-	30	95	ns
			V_{CC}=4.5V	-	11	19	ns
			V_{CC}=5.0V; C_L= 15pF	-	9	-	ns
			V_{CC}=6.0V	-	9	16	ns
$\overline{OE}$n to nY enable time	t_{en}	see Figure 7	V_{CC}=2.0V	-	47	150	ns
			V_{CC}=4.5V	-	17	30	ns
			V_{CC}=6.0V	-	14	26	ns
$\overline{OE}$n to nY disable time	t_{dis}	see Figure 7	V_{CC}=2.0V	-	61	150	ns
			V_{CC}=4.5V	-	22	30	ns
			V_{CC}=6.0V	-	18	26	ns
transition time	t_t	see Figure 6	V_{CC}=2.0V	-	14	60	ns
			V_{CC}=4.5V	-	5	12	ns
			V_{CC}=6.0V	-	4	10	ns
power dissipation capacitanc e	C_{PD}	per buffer; V_I=GND to V_{CC}		-	40	-	pF

Note:

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

[2] t_{en} is the same as t_{PZL} and t_{PZH}.

[3] t_{dis} is the same as t_{PLZ} and t_{PHZ}.

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

[5] C_{PD} isused 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}=-20℃ to +85℃, GND=0V, C_L=50pF, unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
nA tonY propagation delay	t_{pd}	see Figure 6	V_{CC}=2.0V	-	-	120	ns
			V_{CC}=4.5V	-	-	24	ns
			V_{CC}=6.0V	-	-	20	ns
$\overline{OE}$n to nY enable time	t_{en}	see Figure 7	V_{CC}=2.0V	-	-	190	ns
			V_{CC}=4.5V	-	-	38	ns
			V_{CC}=6.0V	-	-	33	ns
$\overline{OE}$n to nY disable time	t_{dis}	see Figure 7	V_{CC}=2.0V	-	-	190	ns
			V_{CC}=4.5V	-	-	38	ns
			V_{CC}=6.0V	-	-	33	ns
transition time	t_t	see Figure 6	V_{CC}=2.0V	-	-	75	ns
			V_{CC}=4.5V	-	-	15	ns
			V_{CC}=6.0V	-	-	13	ns

Note:

[1] t_{pd} is the same as t_{PLH} and t_{PHL}.
[2] t_{en} is the same as t_{PZL} and t_{PZH}.
[3] t_{dis} is the same as t_{PLZ} and t_{PHZ}.
[4] t_t is the same as t_{THL} and t_{TLH}.

Testing Circuit

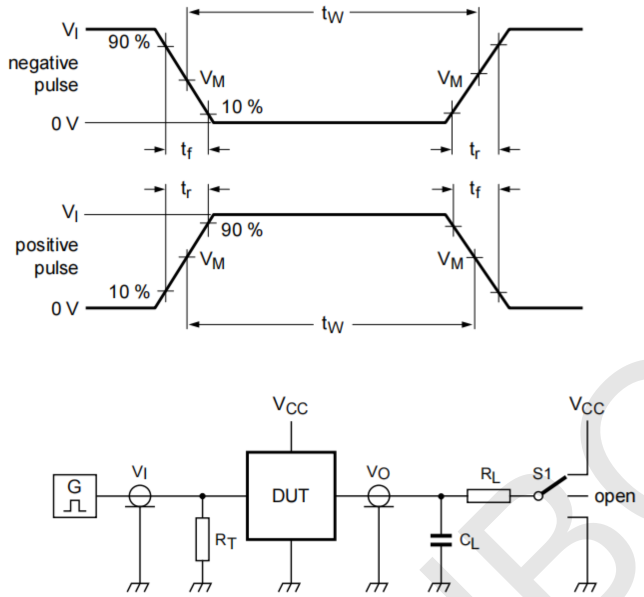


Figure 5. Test circuit for measuring switching times

Definitions for test circuit: R_L=Load resistance.
C_L=Load capacitance includingjig and probe capacitance.
R_T=Termination resistance should be equal to the output impedance Z_o ofthe pulse generator.
S1=Test selection switch.

AC Testing Waveforms

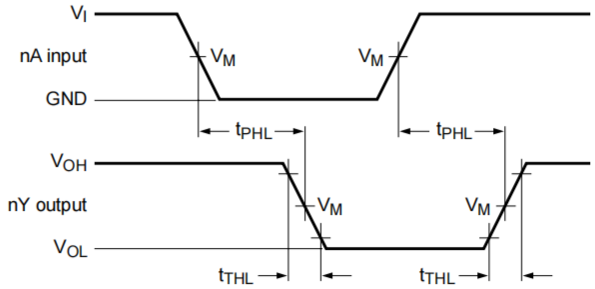


Figure 6. Input (nA) to output (nY) propagation delays and output transition times

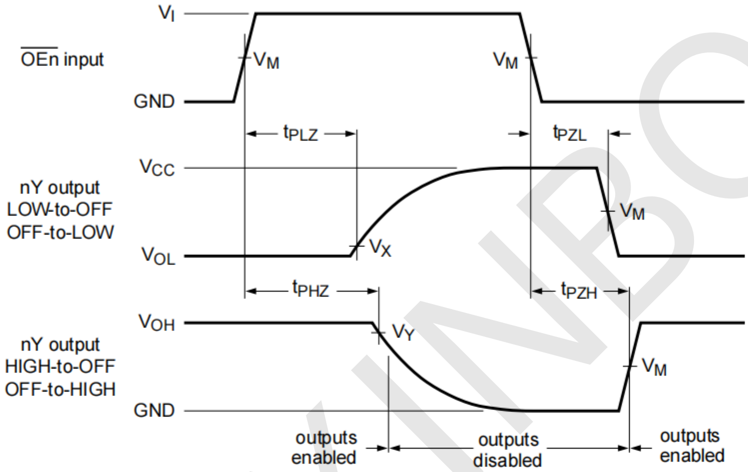


Figure 7. 3-state enable and disable times

Measurement Points

Type	Input	Output		
	V_M	V_M	V_X	V_Y
SN74LS365	0.5 ×V_{CC}	0.5 ×V_{CC}	0.1 ×V_{CC}	0.9 ×V_{CC}

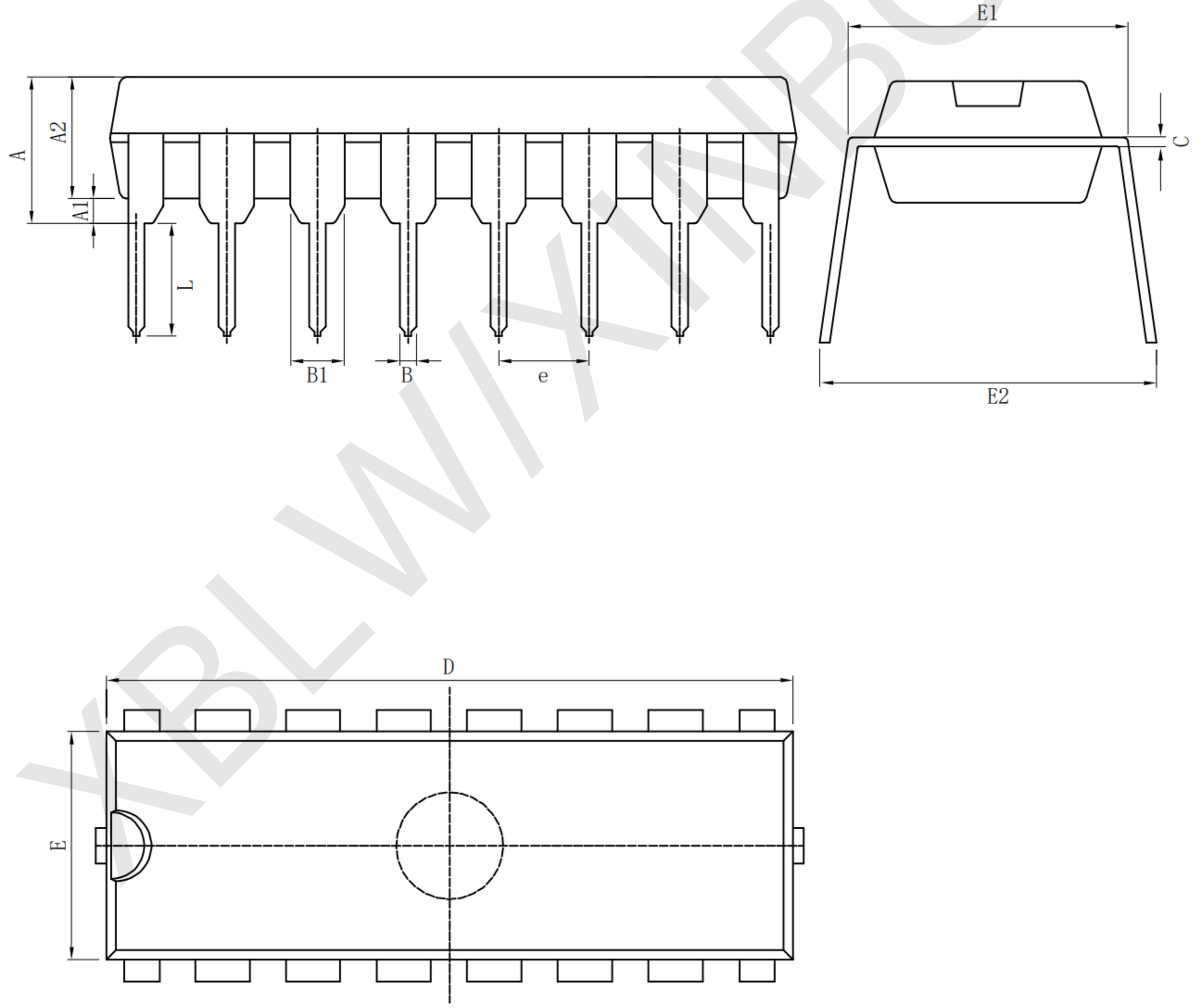
Test Data

Type	Input		Load		S1 position		
	V_I	t_r ,t_f	C_L	R_L	t_{PHL}, t_{PLH}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
SN74LS365	V_{CC}	6ns	15pF, 50pF	1kΩ	open	GND	V_{CC}

Package Information

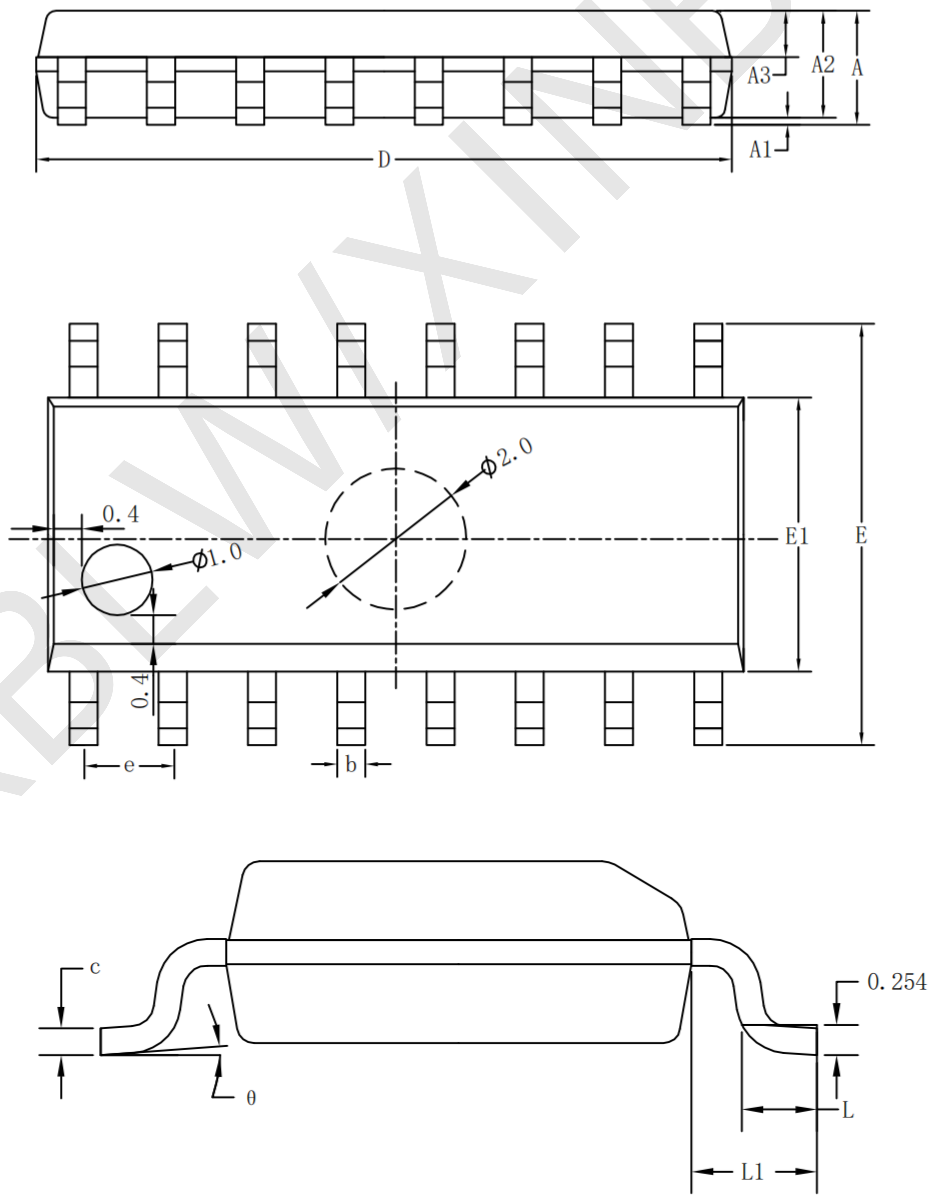
· DIP-16

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



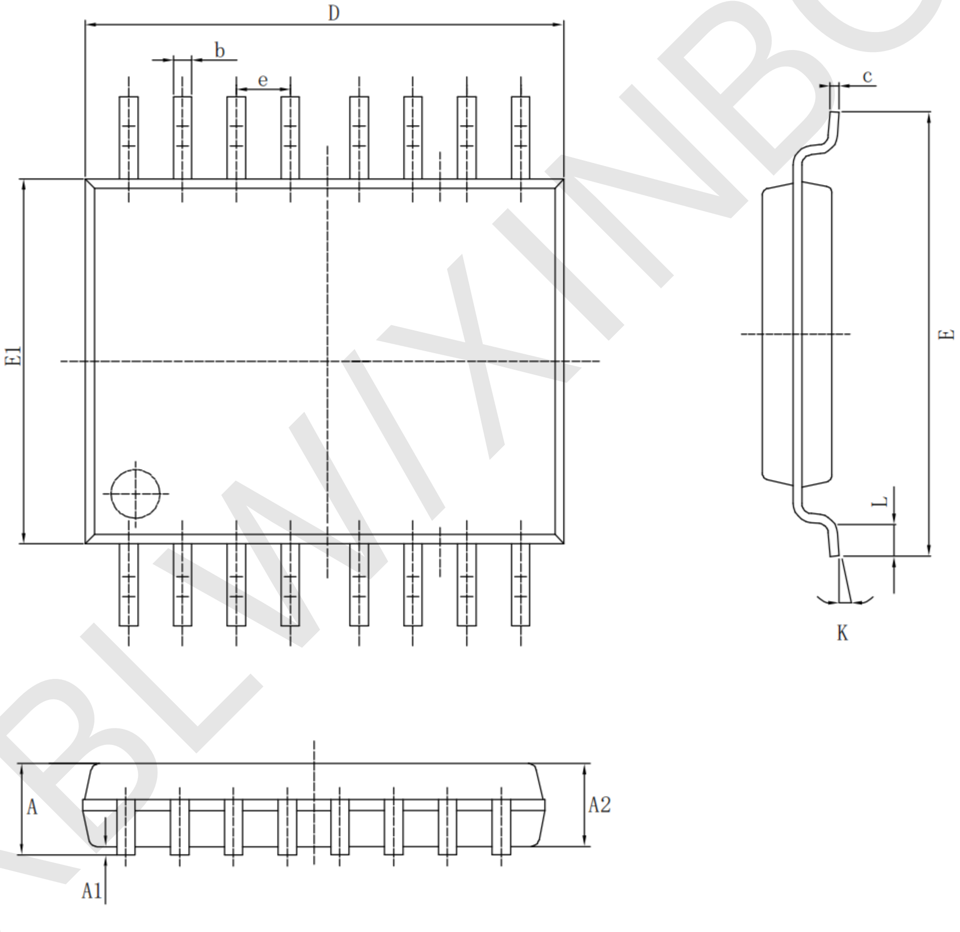
· SOP-16

Symbol \ Size	Dimensions In Millimeters			Symbol \ Size	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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