



AiP74LVC157

Quad 2-input Multiplexer

Product Specification

Specification Revision History:

Version	Date	Description
2017-07-A1	2017-07	New
2021-08-A2	2021-08	Modify Supply Current Parameter
2021-12-A3	2021-12	Modify Ordering Information
2022-02-A4	2022-02	Modify ambient temperature to -40°C~+105°C and add electrical characteristics of -40°C~+105°C



1、 General Description

The AiP74LVC157 is a quad 2-input multiplexer which select four bits of data from two sources under the control of a common select input (S). The four outputs present the selected data in the true (non-inverted) form. The enable input (\bar{E}) is active LOW. When pin \bar{E} is HIGH, all of the outputs (1Y to 4Y) are forced LOW regardless of all the other input conditions. Moving the data from two groups of registers to four common output buses is a common use of the AiP74LVC157. The state of the common data select input (S) determines the particular register from which the data comes. It can also be used as function generator. It is useful for implementing highly irregular logic by generating any 4 of the 16 different functions of two variables with one variable common.

The device is the logic implementation of a 4-pole, 2-position switch, where the position of the switch is determined by the logic levels applied to pin S.

Inputs can be driven from either 3.3V or 5V devices. This feature allows the use of these devices as translators in mixed 3.3V and 5V applications.

Features:

- Wide supply voltage range from 1.2V to 3.6V
- 5V tolerant inputs for interfacing with 5V logic
- CMOS low power consumption
- Direct interface with TTL levels
- Specified from -40°C to +105°C
- Packaging information: DIP16/SOP16/TSSOP16

**Ordering Information:****Tube packing specifications:**

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
AiP74LVC157DA16.TB	DIP16	74LVC157	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
AiP74LVC157SA16.TB	SOP16	74LVC157	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
AiP74LVC157TA16.TB	TSSOP16	74LVC157	96 PCS/tube	200 tube/box	19200 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm

Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP74LVC157SA16.TR	SOP16	74LVC157	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing:1.27mm
AiP74LVC157TA16.TR	TSSOP16	74LVC157	5000 PCS/reel	10000 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing:0.65mm

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



2、 Block Diagram And Pin Description

2.1、 Block Diagram

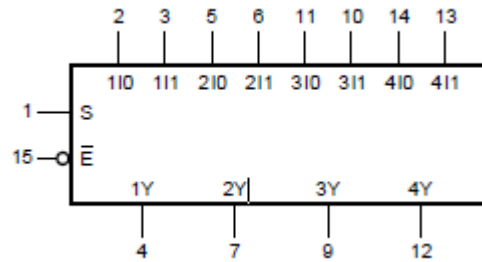


Figure 1. Logic symbol

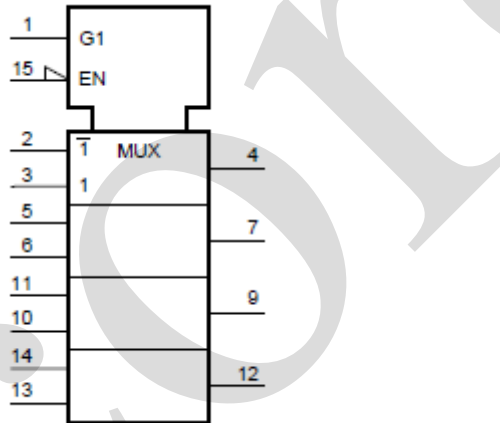


Figure 2. IEC logic symbol

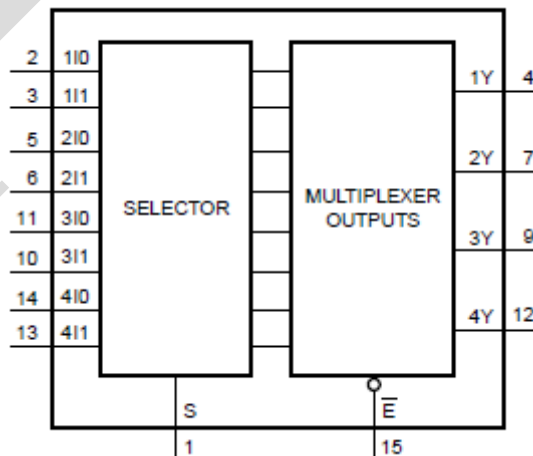


Figure 3. Functional diagram

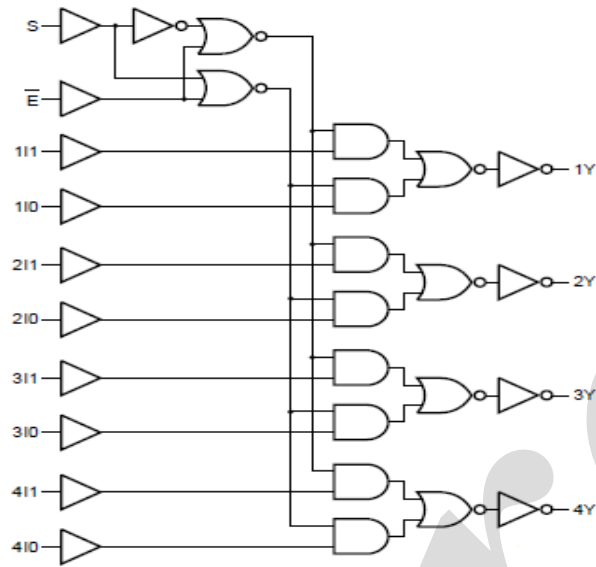
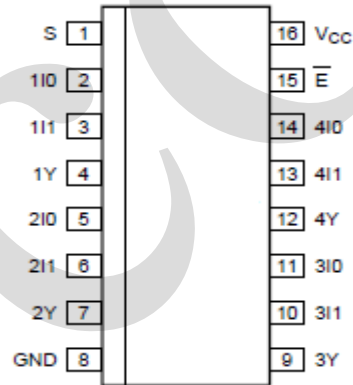


Figure 4. Logic diagram

2.2、 Pin Configurations



2.3、 Pin Description

Pin No.	Pin Name	Description
1	S	common data select input
2	1I0	data input from source 0
3	1I1	data input from source 1
4	1Y	multiplexer output
5	2I0	data input from source 0
6	2I1	data input from source 1
7	2Y	multiplexer output
8	GND	ground (0V)
9	3Y	multiplexer output



10	3I1	data input from source 1
11	3I0	data input from source 0
12	4Y	multiplexer output
13	4I1	data input from source 1
14	4I0	data input from source 0
15	\bar{E}	enable input (active LOW)
16	V _{CC}	supply voltage

2.4、Function Table

Input				Output
\bar{E}	S	nI0	nI1	nY
H	X	X	X	L
L	L	L	X	L
L	L	H	X	H
L	H	X	L	L
L	H	X	H	H

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

3、Electrical Parameter

3.1、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	+6.5	V
input clamping current	I _{IK}	V _I < 0V	-50	-	mA
input voltage	V _I	-	-0.5	+6.5	V
output clamping current	I _{OK}	V _O > V _{CC} or V _O < 0V	-	±50	mA
output voltage	V _O	-	-0.5	V _{CC} +0.5	V
output current	I _O	V _O =0V to V _{CC}	-	±50	mA
supply current	I _{CC}	-	-	100	mA
ground current	I _{GND}	-	-100	-	mA
total power dissipation	P _{tot}	-	-	500	mW
storage temperature	T _{stg}	-	-65	+150	°C
Soldering temperature	T _L	10s	DIP	245	°C
			SOP	250	°C

Note:

- [1] For DIP16 packages: above 70°C the value of P_{tot} derates linearly with 12mW/K.
- [2] For SOP16 packages: above 70°C the value of P_{tot} derates linearly with 8mW/K.
- [3] For (T)SSOP16 packages: above 60°C the value of P_{tot} derates linearly with 5.5mW/K.



3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V_{CC}	-	1.65	-	3.6	V
		functional	1.2	-	-	V
input voltage	V_I	-	0	-	5.5	V
output voltage	V_O	-	0	-	V_{CC}	V
ambient temperature	T_{amb}	-	-40	-	+105	°C
input transition rise and fall rate	$\Delta t/\Delta V$	$V_{CC}=1.65V$ to $2.7V$	0	-	20	ns/V
		$V_{CC}=2.7V$ to $3.6V$	0	-	10	ns/V

3.3、Electrical Characteristics

3.3.1、DC Characteristics 1

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
HIGH-level input voltage	V_{IH}	$V_{CC}=1.2V$	1.08	-	-	V	
		$V_{CC}=1.65V$ to $1.95V$	$0.65 \times V_{CC}$	-	-	V	
		$V_{CC}=2.3V$ to $2.7V$	1.7	-	-	V	
		$V_{CC}=2.7V$ to $3.6V$	2.0	-	-	V	
LOW-level input voltage	V_{IL}	$V_{CC}=1.2V$	-	-	0.12	V	
		$V_{CC}=1.65V$ to $1.95V$	-	-	$0.35 \times V_{CC}$	V	
		$V_{CC}=2.3V$ to $2.7V$	-	-	0.7	V	
		$V_{CC}=2.7V$ to $3.6V$	-	-	0.8	V	
HIGH-level output voltage	V_{OH}	$V_I = V_{IH}$ or V_{IL}	$I_O=-100\mu A$; $V_{CC}=1.65V$ to $3.6V$	$V_{CC}-0.2$	-	-	V
			$I_O=-4mA$; $V_{CC}=1.65V$	1.2	-	-	V
			$I_O=-8mA$; $V_{CC}=2.3V$	1.8	-	-	V
			$I_O=-12mA$; $V_{CC}=2.7V$	2.2	-	-	V
			$I_O=-18mA$; $V_{CC}=3.0V$	2.4	-	-	V
			$I_O=-24mA$; $V_{CC}=3.0V$	2.2	-	-	V
LOW-level output voltage	V_{OL}	$V_I = V_{IH}$ or V_{IL}	$I_O=100\mu A$; $V_{CC}=1.65V$ to $3.6V$	-	-	0.2	V
			$I_O=4mA$; $V_{CC}=1.65V$	-	-	0.45	V
			$I_O=8mA$; $V_{CC}=2.3V$	-	-	0.6	V
			$I_O=12mA$; $V_{CC}=2.7V$	-	-	0.4	V
			$I_O=24mA$; $V_{CC}=3.0V$	-	-	0.55	V
input leakage current	I_I	$V_I=5.5V$ or GND; $V_{CC}=3.6V$	-	± 0.1	± 5	μA	
supply current	I_{CC}	$V_I=V_{CC}$ or GND; $I_O=0A$; $V_{CC}=3.6V$	-	1.5	15	μA	
additional supply current	ΔI_{CC}	per input pin; $V_I=V_{CC}-0.6V$; $I_O=0A$; $V_{CC}=2.7V$ to $3.6V$	-	5	500	μA	
input capacitance	C_I	$V_{CC}=0V$ to $3.6V$; $V_I=$ GND to V_{CC}	-	5.0	-	pF	

Note: All typical values are measured at $V_{CC}=3.3V$ (unless stated otherwise) and $T_{amb}=25^{\circ}C$.



3.3.2、DC Characteristics 2

($T_{amb} = -40^{\circ}\text{C}$ to $+105^{\circ}\text{C}$, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
HIGH-level input voltage	V_{IH}	$V_{CC}=1.2\text{V}$	1.08	-	-	V	
		$V_{CC}=1.65\text{V}$ to 1.95V	$0.65 \times V_{CC}$	-	-	V	
		$V_{CC}=2.3\text{V}$ to 2.7V	1.7	-	-	V	
		$V_{CC}=2.7\text{V}$ to 3.6V	2.0	-	-	V	
LOW-level input voltage	V_{IL}	$V_{CC}=1.2\text{V}$	-	-	0.12	V	
		$V_{CC}=1.65\text{V}$ to 1.95V	-	-	$0.35 \times V_{CC}$	V	
		$V_{CC}=2.3\text{V}$ to 2.7V	-	-	0.7	V	
		$V_{CC}=2.7\text{V}$ to 3.6V	-	-	0.8	V	
HIGH-level output voltage	V_{OH}	$V_I = V_{IH}$ or V_{IL}	$I_O = -100\mu\text{A}; V_{CC}=1.65\text{V}$ to 3.6V	$V_{CC} - 0.3$	-	-	V
			$I_O = -4\text{mA}; V_{CC}=1.65\text{V}$	1.05	-	-	V
			$I_O = -8\text{mA}; V_{CC}=2.3\text{V}$	1.65	-	-	V
			$I_O = -12\text{mA}; V_{CC}=2.7\text{V}$	2.05	-	-	V
			$I_O = -18\text{mA}; V_{CC}=3.0\text{V}$	2.25	-	-	V
			$I_O = -24\text{mA}; V_{CC}=3.0\text{V}$	2.0	-	-	V
LOW-level output voltage	V_{OL}	$V_I = V_{IH}$ or V_{IL}	$I_O = 100\mu\text{A}; V_{CC}=1.65\text{V}$ to 3.6V	-	-	0.3	V
			$I_O = 4\text{mA}; V_{CC}=1.65\text{V}$	-	-	0.65	V
			$I_O = 8\text{mA}; V_{CC}=2.3\text{V}$	-	-	0.8	V
			$I_O = 12\text{mA}; V_{CC}=2.7\text{V}$	-	-	0.6	V
			$I_O = 24\text{mA}; V_{CC}=3.0\text{V}$	-	-	0.8	V
input leakage current	I_I	$V_I = 5.5\text{V}$ or GND; $V_{CC} = 3.6\text{V}$	-	-	± 20	μA	
supply current	I_{CC}	$V_I = V_{CC}$ or GND; $I_O = 0\text{A}; V_{CC} = 3.6\text{V}$	-	-	40	μA	
additional supply current	ΔI_{CC}	per input pin; $V_I = V_{CC} - 0.6\text{V}; I_O = 0\text{A}; V_{CC} = 2.7\text{V}$ to 3.6V	-	-	5000	μA	

Note: All typical values are measured at $V_{CC} = 3.3\text{V}$ (unless stated otherwise) and $T_{amb} = 25^{\circ}\text{C}$.



3.3.3. AC Characteristics 1

($T_{amb} = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
propagation delay	t_{pd}	nI0, nI1 to nY; see Figure 6	$V_{CC}=1.2\text{V}$	-	16	-	ns
			$V_{CC}=1.65\text{V to }1.95\text{V}$	1.0	4.8	10.2	ns
			$V_{CC}=2.3\text{V to }2.7\text{V}$	1.5	2.8	5.8	ns
			$V_{CC}=2.7\text{V}$	1.0	2.9	5.9	ns
			$V_{CC}=3.0\text{V to }3.6\text{V}$	1.0	2.5	5.2	ns
		\bar{E} to nY; see Figure 7	$V_{CC}=1.2\text{V}$	-	17	-	ns
			$V_{CC}=1.65\text{V to }1.95\text{V}$	0.5	4.8	12.8	ns
			$V_{CC}=2.3\text{V to }2.7\text{V}$	1.5	2.8	7.2	ns
			$V_{CC}=2.7\text{V}$	1.0	2.9	7.8	ns
			$V_{CC}=3.0\text{V to }3.6\text{V}$	1.0	2.6	6.5	ns
		S to nY; see Figure 6	$V_{CC}=1.2\text{V}$	-	16	-	ns
			$V_{CC}=1.65\text{V to }1.95\text{V}$	1.0	5.1	12.4	ns
			$V_{CC}=2.3\text{V to }2.7\text{V}$	1.5	3.0	7.0	ns
			$V_{CC}=2.7\text{V}$	1.0	3.1	7.3	ns
			$V_{CC}=3.0\text{V to }3.6\text{V}$	1.0	2.7	6.3	ns
output skew time	$t_{sk(o)}$	$V_{CC}=3.0\text{V to }3.6\text{V}$	-	-	1.0	ns	
power dissipation capacitance	C_{PD}	per input; $V_I=GND$ to V_{CC}	$V_{CC}=1.65\text{V to }1.95\text{V}$	-	9.4	-	pF
			$V_{CC}=2.3\text{V to }2.7\text{V}$	-	12.8	-	pF
			$V_{CC}=3.0\text{V to }3.6\text{V}$	-	15.9	-	pF

Note:

[1] Typical values are measured at $T_{amb}=25^{\circ}\text{C}$ and $V_{CC}=1.8\text{V}, 2.5\text{V}, 2.7\text{V}$ and 3.3V respectively.

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

[3] Skew between any two outputs of the same package switching in the same direction. This parameter is guaranteed by design.

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

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

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;

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



3.3.4、 AC Characteristics 2

($T_{amb}=-40^{\circ}\text{C}$ to $+105^{\circ}\text{C}$, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
propagation delay	t_{pd}	nI0, nI1 to nY; see Figure 6	$V_{CC}=1.65\text{V}$ to 1.95V	1.0	-	11.8	ns
			$V_{CC}=2.3\text{V}$ to 2.7V	1.5	-	6.7	ns
			$V_{CC}=2.7\text{V}$	1.0	-	7.5	ns
			$V_{CC}=3.0\text{V}$ to 3.6V	1.0	-	6.5	ns
		\bar{E} to nY; see Figure 7	$V_{CC}=1.65\text{V}$ to 1.95V	0.5	-	14.7	ns
			$V_{CC}=2.3\text{V}$ to 2.7V	1.5	-	8.3	ns
			$V_{CC}=2.7\text{V}$	1.0	-	10.0	ns
			$V_{CC}=3.0\text{V}$ to 3.6V	1.0	-	8.5	ns
		S to nY; see Figure 6	$V_{CC}=1.65\text{V}$ to 1.95V	1.0	-	14.3	ns
			$V_{CC}=2.3\text{V}$ to 2.7V	1.5	-	8.1	ns
			$V_{CC}=2.7\text{V}$	1.0	-	9.5	ns
			$V_{CC}=3.0\text{V}$ to 3.6V	1.0	-	8.0	ns
output skew time	$t_{sk(o)}$	$V_{CC}=3.0\text{V}$ to 3.6V	-	-	1.5	ns	

Note:

[1] Typical values are measured at $T_{amb}=25^{\circ}\text{C}$ and $V_{CC}=1.8\text{V}$, 2.5V , 2.7V and 3.3V respectively.

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

[3] Skew between any two outputs of the same package switching in the same direction. This parameter is guaranteed by design.

4、 Testing Circuit

4.1、 AC Testing Circuit

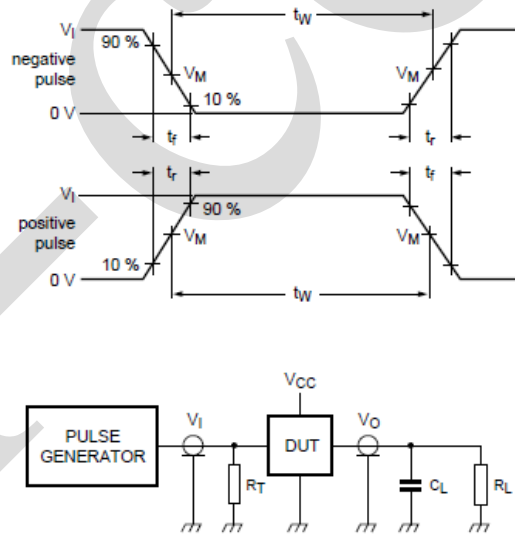


Figure 5. Test circuit for measuring switching times

Definitions for test circuit:

R_L =Load resistance.

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.



4.2、 AC Testing Waveforms

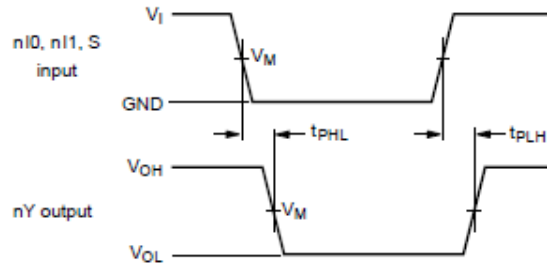


Figure 6. Data inputs (nI0, nI1) and common data select input (S) to output (nY) propagation delays

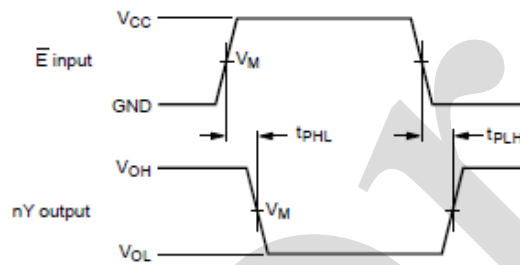


Figure 7. Enable input (\bar{E}) to output (nY) propagation delays

4.3、 Measurement Points

Supply voltage	Input	Output
V_{CC}	V_M	V_M
$< 2.7V$	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
$\geq 2.7V$	1.5V	1.5V

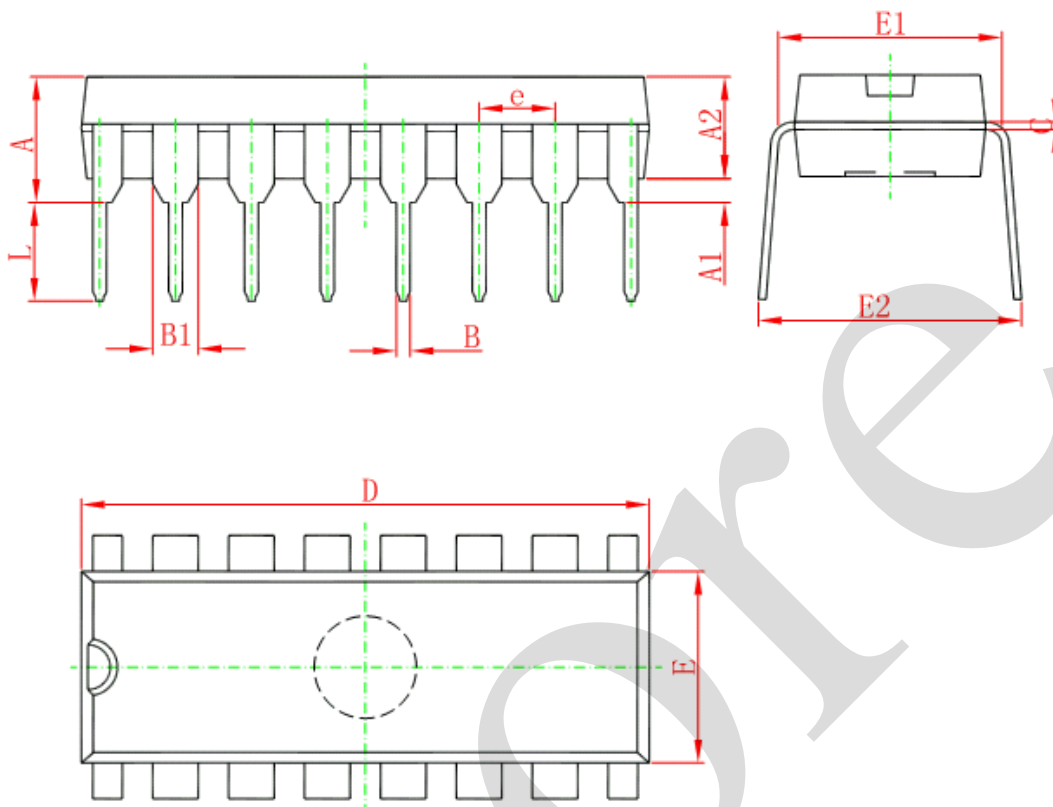
4.4、 Test Data

Supply voltage	Input		Load	
V_{CC}	V_I	t_r, t_f	C_L	R_L
1.2V	V_{CC}	$\leq 2.0ns$	30pF	1k Ω
1.65V to 1.95V	V_{CC}	$\leq 2.0ns$	30pF	1k Ω
2.3V to 2.7V	V_{CC}	$\leq 2.0ns$	30pF	500 Ω
2.7V	2.7V	$\leq 2.5ns$	50pF	500 Ω
3.0V to 3.6V	2.7V	$\leq 2.5ns$	50pF	500 Ω



5、Package Information

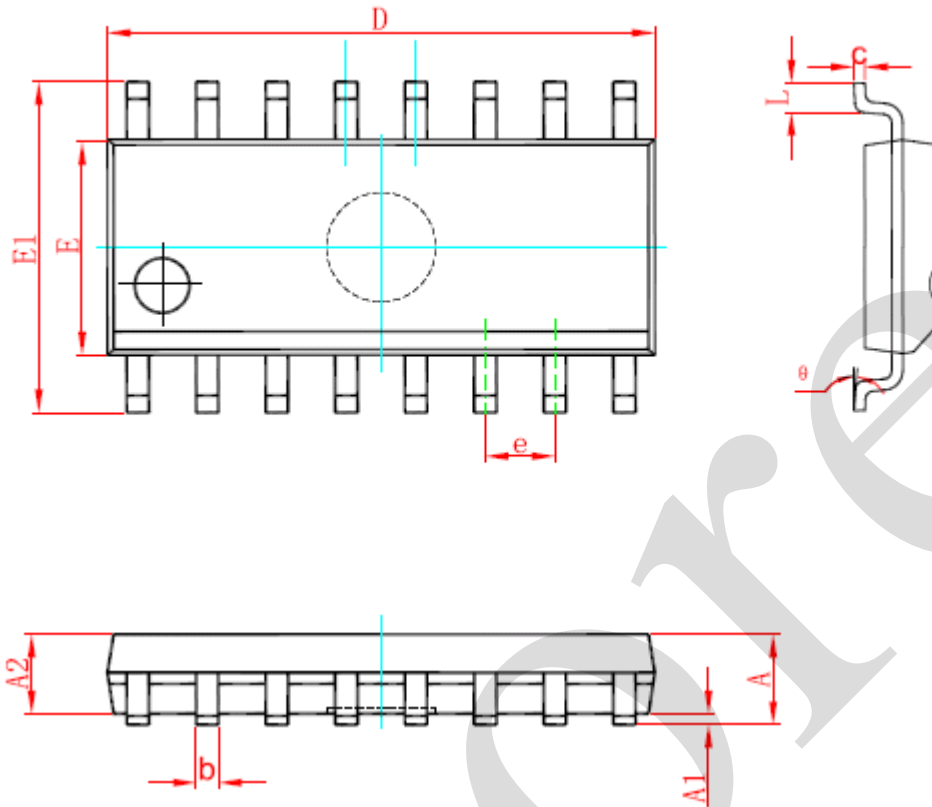
5.1、DIP16



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.710	4.310	0.146	0.170
A1	0.510		0.020	
A2	3.200	3.600	0.126	0.142
B	0.380	0.570	0.015	0.022
B1	1.524 (BSC)		0.060 (BSC)	
C	0.204	0.360	0.008	0.014
D	18.800	19.200	0.740	0.756
E	6.200	6.600	0.244	0.260
E1	7.320	7.920	0.288	0.312
e	2.540 (BSC)		0.100 (BSC)	
L	3.000	3.600	0.118	0.142
E2	8.400	9.000	0.331	0.354



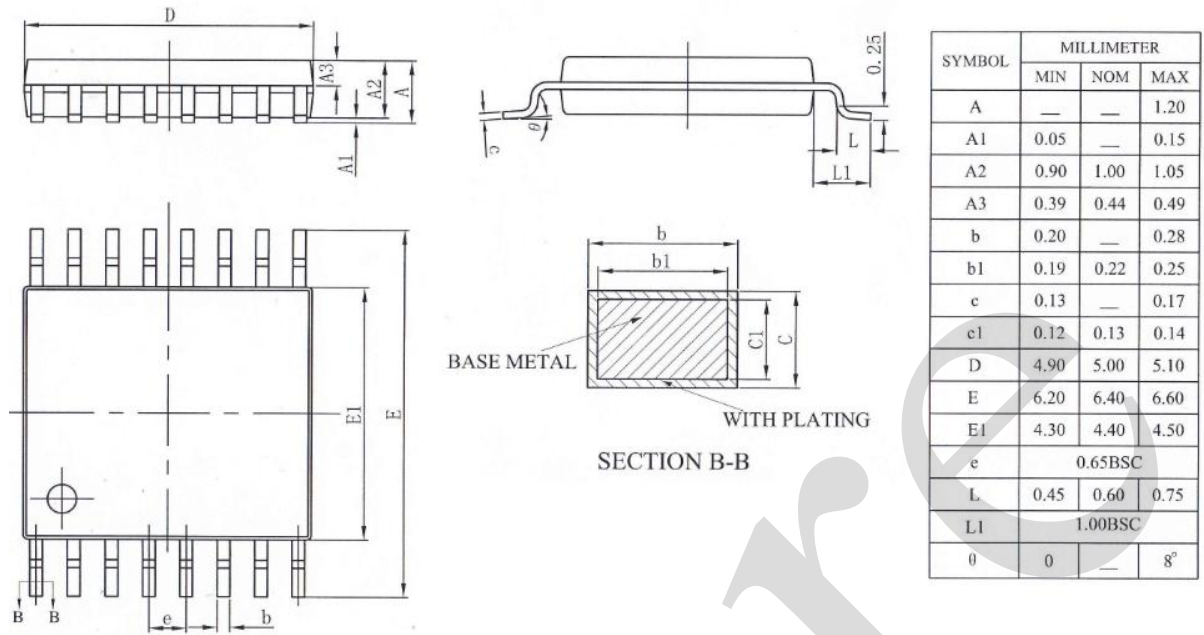
5.2、SOP16



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	9.800	10.200	0.386	0.402
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



5.3、TSSOP16





6、 Statements And Notes

6.1、 The name and content of Hazardous substances or Elements in the product

Part name	Hazardous substances or Elements									
	Lead and lead compounds	Mercury and mercury compounds	Cadmium and cadmium compounds	Hexavalent chromium compounds	Polybrominated biphenyls	Polybrominated biphenyl ethers	Dibutyl phthalate	Butylbenzyl phthalate	Di-2-ethylhexyl phthalate	Diisobutyl phthalate
Lead frame	○	○	○	○	○	○	○	○	○	○
Plastic resin	○	○	○	○	○	○	○	○	○	○
Chip	○	○	○	○	○	○	○	○	○	○
The lead	○	○	○	○	○	○	○	○	○	○
Plastic sheet installed	○	○	○	○	○	○	○	○	○	○
explanation	○: Indicates that the content of hazardous substances or elements in the detection limit of the following the SJ/T11363-2006 standard. ×: Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements.									

6.2、 Notion

Recommended carefully reading this information before the use of this product;

The information in this document are subject to change without notice;

This information is using to the reference only, the company is not responsible for any loss;

The company is not responsible for the any infringement of the third party patents or other rights of the responsibility.