



AiP74LVC157

Quad 2-input Multiplexer

Product Specification

Specification Revision History:

Version	Date	Description
2017-07-A1	2017-07	New
2023-04-B1	2023-04	Update the template
2024-04-B2	2024-04	Add DHVQFN16 package form



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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 +125°C
- Packaging information: DIP16/SOP16/TSSOP16/DHVQFN16

**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
AiP74LVC157QE16.TR	DHVQFN16	LVC157	3000 PCS/reel	3000 PCS/box	Dimensions of plastic enclosure: 3.5mm×2.5mm Pin spacing: 0.5mm

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

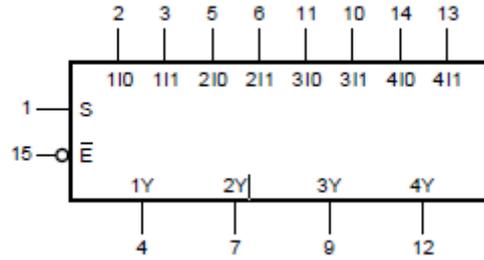


Figure 1. Logic symbol

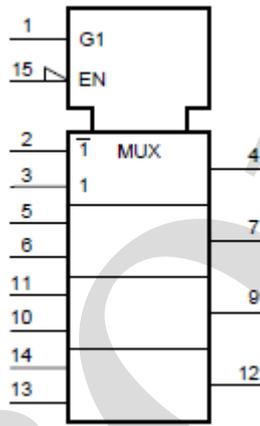


Figure 2. IEC logic symbol

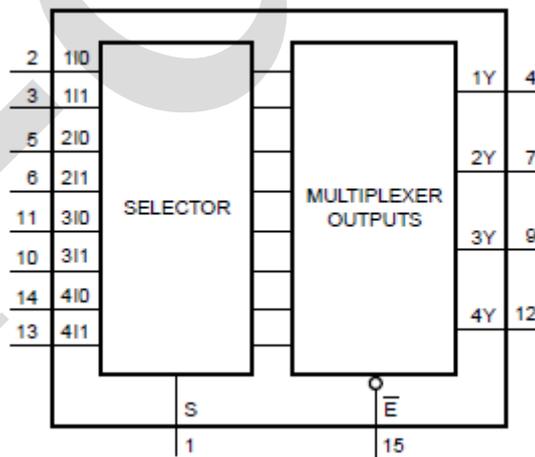


Figure 3. Functional diagram

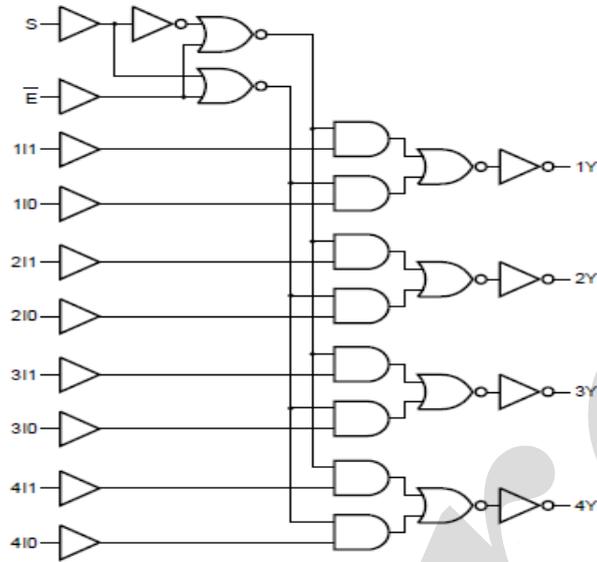
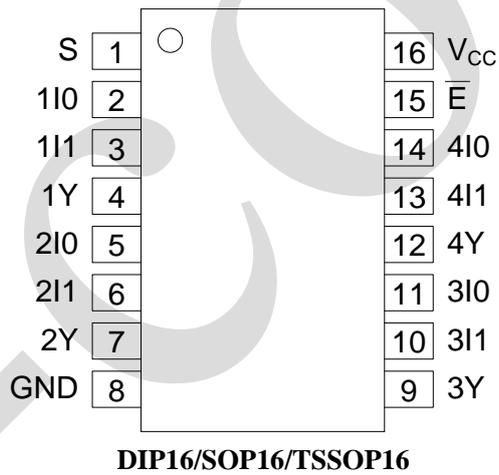
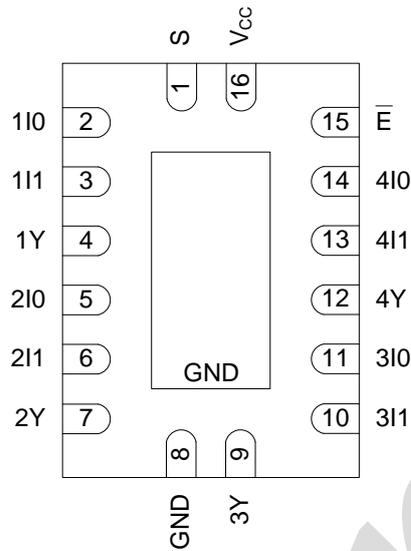


Figure 4. Logic diagram

2.2. Pin Configurations





DHVQFN16

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/TSSOP/DHVQFN		260	°C

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	-	+125	°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

($T_{amb} = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, 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	$V_{CC}-0.2$	-	-	V
			$I_O = -4\text{mA}$; $V_{CC}=1.65\text{V}$	1.2	-	-	V
			$I_O = -8\text{mA}$; $V_{CC}=2.3\text{V}$	1.8	-	-	V
			$I_O = -12\text{mA}$; $V_{CC}=2.7\text{V}$	2.2	-	-	V
			$I_O = -18\text{mA}$; $V_{CC}=3.0\text{V}$	2.4	-	-	V
			$I_O = -24\text{mA}$; $V_{CC}=3.0\text{V}$	2.2	-	-	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	-	-	0.2	V
			$I_O = 4\text{mA}$; $V_{CC}=1.65\text{V}$	-	-	0.45	V
			$I_O = 8\text{mA}$; $V_{CC}=2.3\text{V}$	-	-	0.6	V
			$I_O = 12\text{mA}$; $V_{CC}=2.7\text{V}$	-	-	0.4	V
			$I_O = 24\text{mA}$; $V_{CC}=3.0\text{V}$	-	-	0.55	V
input leakage current	I_I	$V_I = 5.5\text{V}$ or GND; $V_{CC} = 3.6\text{V}$	-	-	± 5	μA	
supply current	I_{CC}	$V_I = V_{CC}$ or GND; $I_O = 0\text{A}$; $V_{CC} = 3.6\text{V}$	-	-	15	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	-	-	500	μA	
input capacitance	C_I	$V_{CC} = 0\text{V}$ to 3.6V ; $V_I = \text{GND}$ to V_{CC}	-	5.0	-	pF	

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



3.3.2、DC Characteristics 2

($T_{amb}=-40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, 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; $I_O=0\text{A}; V_{CC}=3.6\text{V}$	-	-	200	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 1.95V	1.0	4.8	10.2	ns
			$V_{CC}=2.3\text{V}$ to 2.7V	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 3.6V	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 1.95V	0.5	4.8	12.8	ns
			$V_{CC}=2.3\text{V}$ to 2.7V	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 3.6V	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 1.95V	1.0	5.1	12.4	ns
			$V_{CC}=2.3\text{V}$ to 2.7V	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 3.6V	1.0	2.7	6.3	ns
output skew time	$t_{sk(o)}$	$V_{CC}=3.0\text{V}$ to 3.6V	-	-	1.0	ns	
power dissipation capacitance	C_{PD}	per input; $V_I=\text{GND}$ to V_{CC}	$V_{CC}=1.65\text{V}$ to 1.95V	-	9.4	-	pF
			$V_{CC}=2.3\text{V}$ to 2.7V	-	12.8	-	pF
			$V_{CC}=3.0\text{V}$ to 3.6V	-	15.9	-	pF

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

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

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 $+125^{\circ}\text{C}$, 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

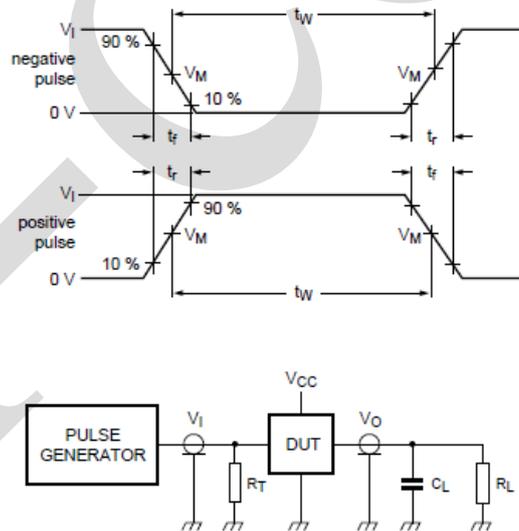


Figure 5. Test circuit for measuring switching times

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

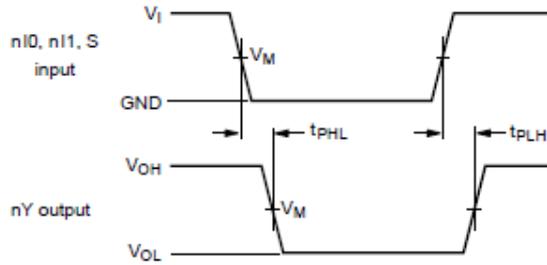


Figure 6. Data inputs (nI0, nI1) and common data select input (S) to output (nY) propagation delays

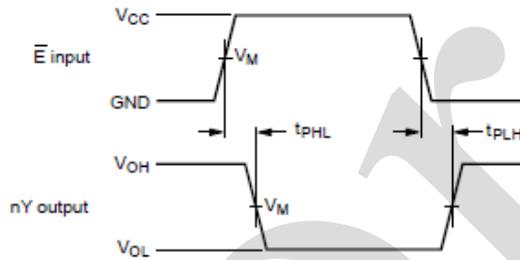


Figure 7. Enable input (\bar{E}) to output (nY) propagation delays

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

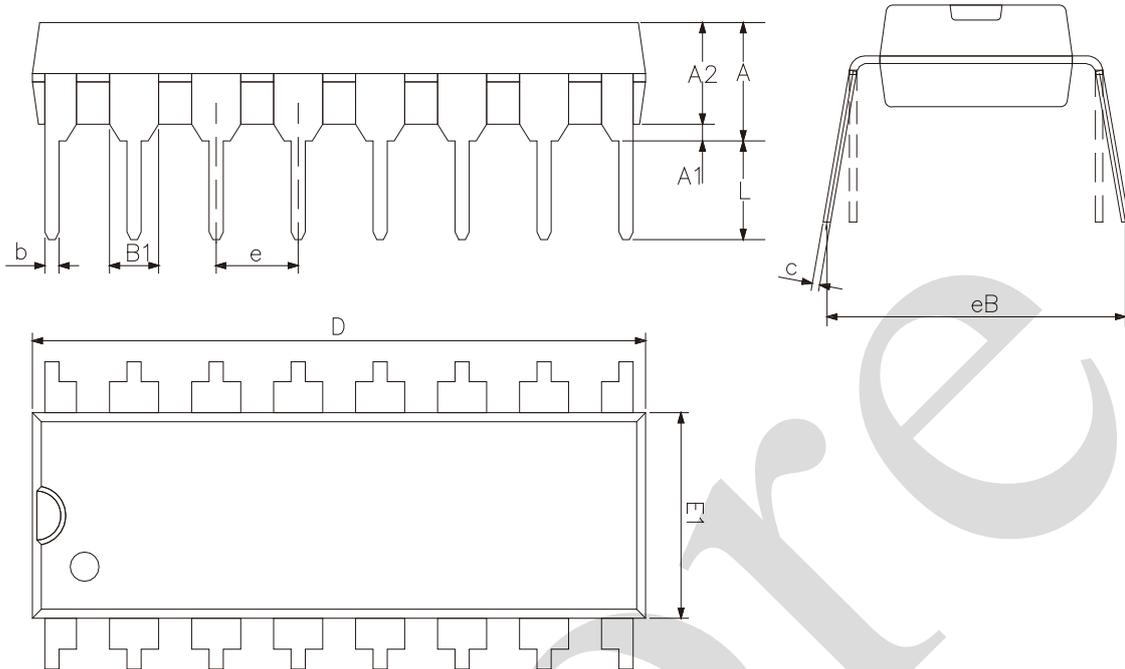
4.4、Test Data

Supply voltage	Input		Load	
	V_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

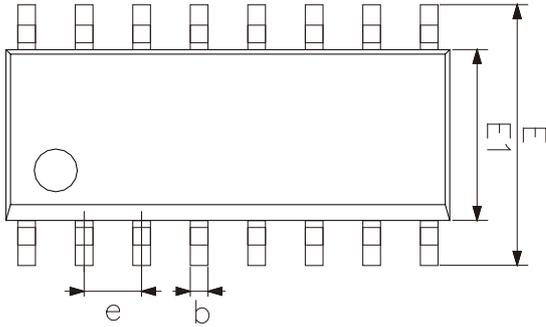
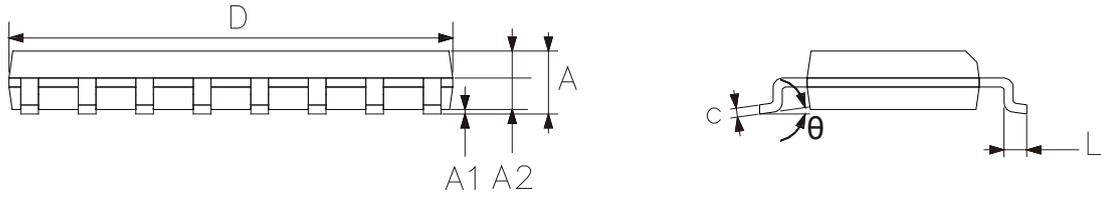
5.1、DIP16



2023/12/A	Dimensions In Millimeters	
Symbol	Min	Max
A2	3.00	3.60
A1	0.51	—
A	3.60	5.33
L	3.00	3.60
b	0.36	0.56
B1	1.52	
D	18.80	19.94
E1	6.20	6.60
e	2.54	
c	0.20	0.36
eB	7.62	9.30



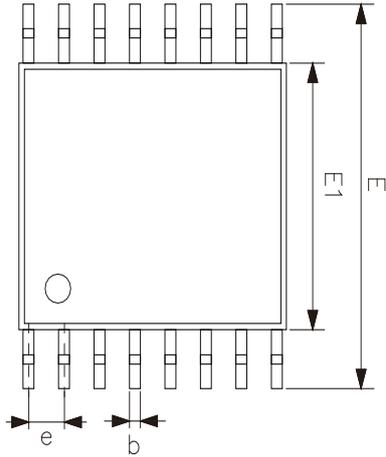
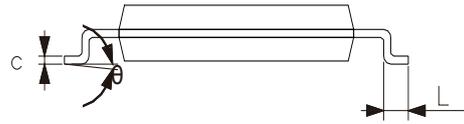
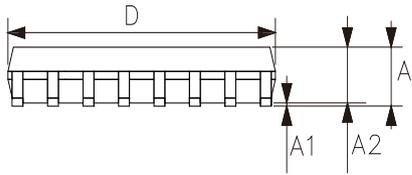
5.2、SOP16



2023/12/A	Dimensions In Millimeters	
Symbol	Min.	Max.
A	1.35	1.80
A1	0.10	0.25
A2	1.25	1.55
b	0.33	0.51
c	0.19	0.25
D	9.50	10.10
E	5.80	6.30
E1	3.70	4.10
e	1.27	
L	0.35	0.89
θ	0°	8°



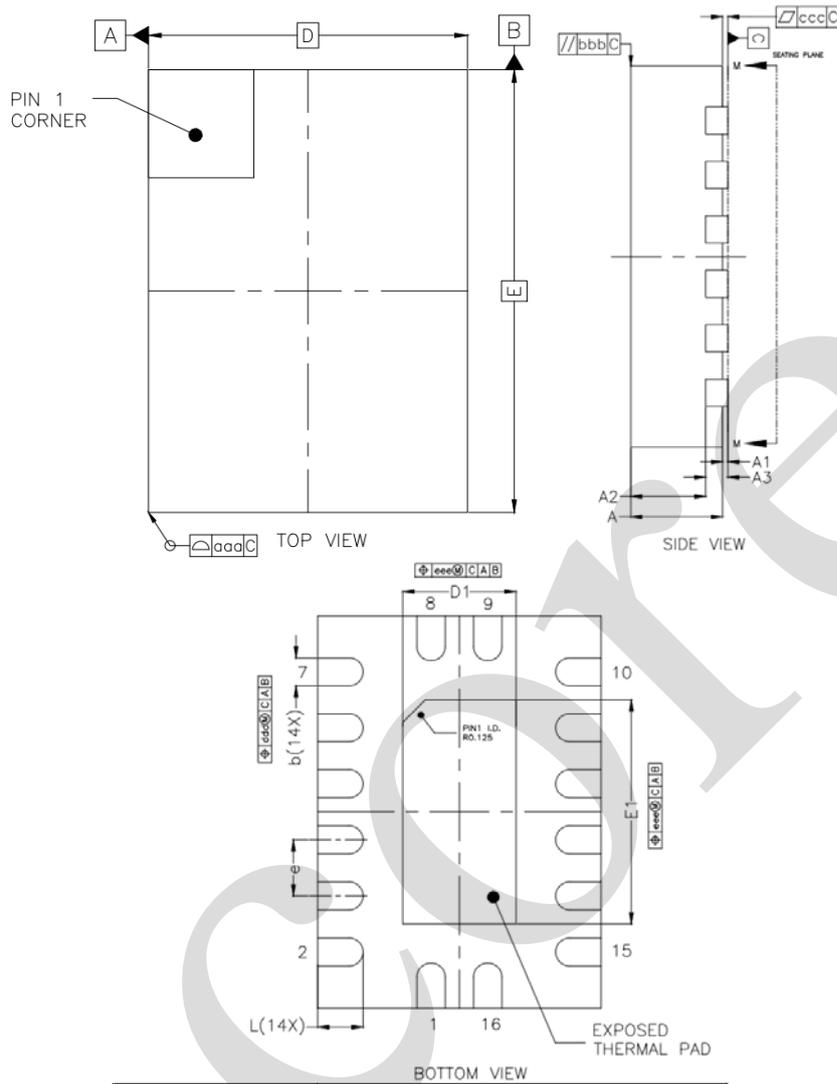
5.3、TSSOP16



2023/12/A	Dimensions In Millimeters	
Symbol	Min	Max
A	—	1.20
A1	0.05	0.15
A2	0.80	1.05
b	0.19	0.30
c	0.09	0.20
D	4.90	5.10
E1	4.30	4.50
E	6.20	6.60
e	0.65	
L	0.45	0.75
θ	0°	8°



5.4. DHVQFN16



2023/12/A	Dimensions In Millimeters	
Symbol	Min	Max
A	0.80	1.00
A1	0.00	0.05
A2	0.60	0.70
A3	0.20	
D	2.40	2.60
E	3.40	3.60
e	0.50	
b	0.18	0.30
L	0.30	0.50
D1	0.85	1.15
E1	1.85	2.15



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、 Notes

We recommend you to read this chapter carefully before using this product.

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