AiP74LV126
Quad Buffer/Line Driver; 3-state

Product Specification

Specification Revision History:

Version	Date	Description
2017-05-A1	2017-05	New
2023-04-B1	2023-04	Update the template

Contents

1、General Description

The AiP74LV126 is a low-voltage Si-gate CMOS device that is pin and function compatible with AiP74HC/HCT126.

The AiP74LV126 consists of four non-inverting buffers/line drivers with 3-state outputs. The 3-state outputs (nY) are controlled by the output enable input (nOE). A LOW at nOE causes the outputs to assume a high impedance OFF-state.

Features:

- Operating voltage: 1.0V to 5.5V
- 5.5V tolerant inputs/outputs
- Power-down mode
- Specified from -40℃ to +125℃
- Packaging information: DIP14/SOP14/TSSOP14

Ordering Information:

Tube packing specifications:

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
AiP74LV126DA14.TB	DIP14	74LV126	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
AiP74LV126SA14.TB	SOP14	74LV126	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing: 1.27mm
AiP74LV126TA14.TB	TSSOP14	74LV126	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
AiP74LV126SA14.TR	SOP14	74LV126	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing: 1.27mm
AiP74LV126TA14.TR	TSSOP14	74LV126	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

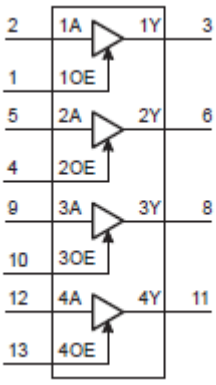


Figure 1. Logic symbol

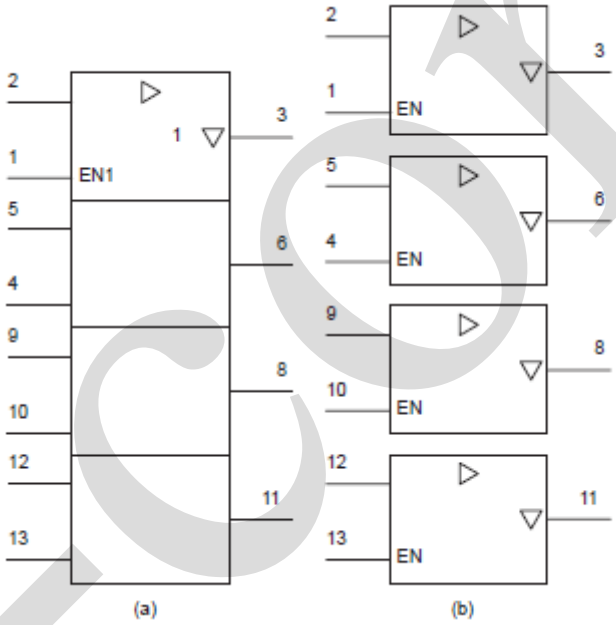


Figure 2. IEC logic symbol

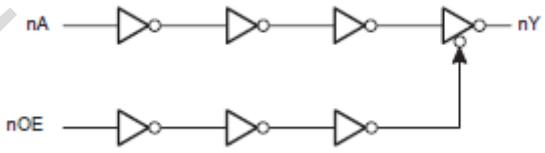
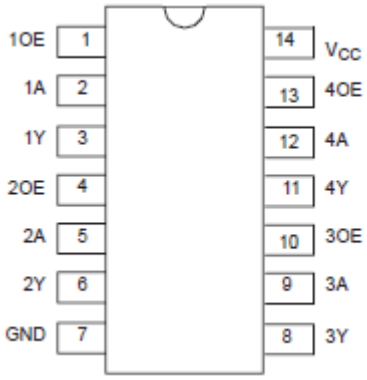


Figure 3. Logic diagram (one gate)

2.2、Pin Configurations



2.3、Pin Description

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

2.4、Function Table

Control	Input	Output
nOE	**nA**	**nY**
H	L	L
H	H	H
L	X	Z

Note: H=HIGH voltage level; L=LOW voltage level; X=don't care; Z=high-impedance OFF-state.

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	+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 $V_O > V_{CC}+0.5V$		-	±50	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	℃
total power dissipation	P_{tot}	-		-	500	mW
Soldering temperature	T_L	10s	DIP	245		℃
			SOP/TSSOP	260		

Note:

[1] Stresses beyond those listed may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V_{CC}	-	1.0	3.3	5.5	V
input voltage	V_I	-	0	-	V_{CC}	V
output voltage	V_O	-	0	-	V_{CC}	V
ambient temperature	T_{amb}	-	-40	-	+125	℃
input transition rise and fall rate	$\Delta t/\Delta V$	V_{CC}=1.0V to 2.0V	-	-	500	ns/V
		V_{CC}=2.0V to 2.7V	-	-	200	ns/V
		V_{CC}=2.7V to 3.6V	-	-	100	ns/V
		V_{CC}=3.6V to 5.5V	-	-	50	ns/V

Note: The LV is guaranteed to function down to V_{CC}=1.0V (input levels GND or V_{CC}); DC characteristics are guaranteed from V_{CC}=1.2V to V_{CC}=5.5V.

3.3、Electrical Characteristics

3.3.1、DC Characteristics 1

(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}=1.2V		0.9	-	-	V
		V_{CC}=2.0V		1.4	-	-	V
		V_{CC}=2.7V to 3.6V		2.0	-	-	V
		V_{CC}=4.5V to 5.5V		0.7×V_{CC}	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=1.2V		-	-	0.3	V
		V_{CC}=2.0V		-	-	0.6	V
		V_{CC}=2.7V to 3.6V		-	-	0.8	V
		V_{CC}=4.5V to 5.5V		-	-	0.3×V_{CC}	V
HIGH-level output voltage	V_{OH}	V_I = V_{IH} or V_{IL}	I_O=-100uA; V_{CC}=1.2V	-	1.2	-	V
			I_O=-100uA; V_{CC}=2.0V	1.8	2.0	-	V
			I_O=-100uA; V_{CC}=2.7V	2.5	2.7	-	V
			I_O=-100uA; V_{CC}=3.0V	2.8	3.0	-	V
			I_O=-100uA; V_{CC}=4.5V	4.3	4.5	-	V
			I_O=-8mA; V_{CC}=3.0V	2.4	2.82		V
			I_O=-16mA; V_{CC}=4.5V	3.6	4.2	-	V
LOW-level output voltage	V_{OL}	V_I = V_{IH} or V_{IL}	I_O=100uA; V_{CC}=1.2V	-	0	-	V
			I_O=100uA; V_{CC}=2.0V	-	0	0.2	V
			I_O=100uA; V_{CC}=2.7V	-	0	0.2	V
			I_O=100uA; V_{CC}=3.0V	-	0	0.2	V
			I_O=100uA; V_{CC}=4.5V	-	0	0.2	V
			I_O=8mA; V_{CC}=3.0V	-	0.20	0.40	V
			I_O=16mA; V_{CC}=4.5V	-	0.35	0.55	V
input leakage current	I_I	V_I=V_{CC} or GND; V_{CC}=5.5V		-	-	1.0	uA
OFF-state output current	I_{OZ}	V_I=V_{IH} or V_{IL}; V_O=V_{CC} or GND; V_{CC}=5.5V		-	-	5	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}=5.5V		-	-	20	uA
additional supply current	ΔI_{CC}	V_I=V_{CC}-0.6V; V_{CC}=2.7V to 3.6V		-	-	500	uA
input capacitance	C_I	-		-	3.5	-	pF

Note: All typical values are measured at T_{amb}=25℃

3.3.2、DC Characteristics 2

(T_{amb}=-40℃ to +125℃, 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		0.9	-	-	V
		V_{CC}=2.0V		1.4	-	-	V
		V_{CC}=2.7V to 3.6V		2.0	-	-	V
		V_{CC}=4.5V to 5.5V		0.7×V_{CC}	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=1.2V		-	-	0.3	V
		V_{CC}=2.0V		-	-	0.6	V
		V_{CC}=2.7V to 3.6V		-	-	0.8	V
		V_{CC}=4.5V to 5.5V		-	-	0.3×V_{CC}	V
HIGH-level output voltage	V_{OH}	V_I = V_{IH} or V_{IL}	I_O=-100uA; V_{CC}=2.0V	1.8	-	-	V
			I_O=-100uA; V_{CC}=2.7V	2.5	-	-	V
			I_O=-100uA; V_{CC}=3.0V	2.8	-	-	V
			I_O=-100uA; V_{CC}=4.5V	4.3	-	-	V
			I_O=-8mA; V_{CC}=3.0V	2.2	-	-	V
			I_O=-16mA; V_{CC}=4.5V	3.5	-	-	V
LOW-level output voltage	V_{OL}	V_I = V_{IH} or V_{IL}	I_O=100uA; V_{CC}=2.0V	-	-	0.2	V
			I_O=100uA; V_{CC}=2.7V	-	-	0.2	V
			I_O=100uA; V_{CC}=3.0V	-	-	0.2	V
			I_O=100uA; V_{CC}=4.5V	-	-	0.2	V
			I_O=8mA; V_{CC}=3.0V	-	-	0.50	V
			I_O=16mA; V_{CC}=4.5V	-	-	0.65	V
input leakage current	I_I	V_I=V_{CC} or GND; V_{CC}=5.5V		-	-	1.0	uA
OFF-state output current	I_{OZ}	V_I=V_{IH} or $V_{IL;}$ V_O=V_{CC} or GND; V_{CC}=5.5V		-	-	10	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}=5.5V		-	-	160	uA
additional supply current	ΔI_{CC}	V_I=V_{CC}-0.6V; V_{CC}=2.7V to 3.6V		-	-	850	uA

Note: All typical values are measured at T_{amb}=25℃

3.3.3、AC Characteristics 1

(T_{amb}=-40℃ to +85℃, GND=0V; t_r= t_f≤2.5ns; C_L=50pF; R_L=500Ω, unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
nA to nY; propagation delay	t_{PHL}/t_{PLH}	see Figure 5,6	V_{CC}=1.2V	-	55	-	ns
			V_{CC}=2.0V	-	19	24	ns
			V_{CC}=2.7V	-	14	18	ns
			V_{CC}=3.0V to 3.6V	-	10	14	ns
			V_{CC}=4.5V to 5.5V	-	-	12	ns
			V_{CC}=3.3V; C_L=15pF	-	9	-	ns
nOE to nY; 3-state output enable time	t_{PZH}/t_{PZL}	see Figure 5,6	V_{CC}=1.2V	-	75	-	ns
			V_{CC}=2.0V	-	26	31	ns
			V_{CC}=2.7V	-	19	23	ns
			V_{CC}=3.0V to 3.6V	-	14	18	ns
			V_{CC}=4.5V to 5.5V	-	-	15	ns
nOE to nY; 3-state output disable time	t_{PHZ}/t_{PLZ}	see Figure 5,6	V_{CC}=1.2V	-	65	-	ns
			V_{CC}=2.0V	-	24	32	ns
			V_{CC}=2.7V	-	18	24	ns
			V_{CC}=3.0V to 3.6V	-	14	20	ns
			V_{CC}=4.5V to 5.5V	-	-	17	ns
Power dissipation capacitance	C_{PD}	V_I=GND to $V_{CC;}$ V_{CC}=3.3V		-	23	-	pF

Note:

[1] Unless otherwise stated, all typical values are measured at T_{amb}=25℃.

[2] Typical values are measured at V_{CC}=3.3V.

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

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

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

3.3.4、AC Characteristics 2

(T_{amb}=-40℃ to +125℃, GND=0V; t_r= t_f≤2.5ns; C_L=50pF; R_L=500Ω, unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
nA to nY; propagation delay	t_{PHL}/t_{PLH}	see Figure 5,6	V_{CC}=2.0V	-	-	31	ns
			V_{CC}=2.7V	-	-	23	ns
			V_{CC}=3.0V to 3.6V	-	-	18	ns
			V_{CC}=4.5V to 5.5V	-	-	15	ns
nOE to nY; 3-state output enable time	t_{PZH}/t_{PZL}	see Figure 5,6	V_{CC}=2.0V	-	-	39	ns
			V_{CC}=2.7V	-	-	29	ns
			V_{CC}=3.0V to 3.6V	-	-	23	ns
			V_{CC}=4.5V to 5.5V	-	-	19	ns
nOE to nY; 3-state output disable time	t_{PHZ}/t_{PLZ}	see Figure 5,6	V_{CC}=2.0V	-	-	39	ns
			V_{CC}=2.7V	-	-	29	ns
			V_{CC}=3.0V to 3.6V	-	-	24	ns
			V_{CC}=4.5V to 5.5V	-	-	21	ns

Note:

[1] Unless otherwise stated, all typical values are measured at T_{amb}=25℃.

[2] Typical values are measured at V_{CC}=3.3V.

4、Testing Circuit

4.1、AC Testing Circuit

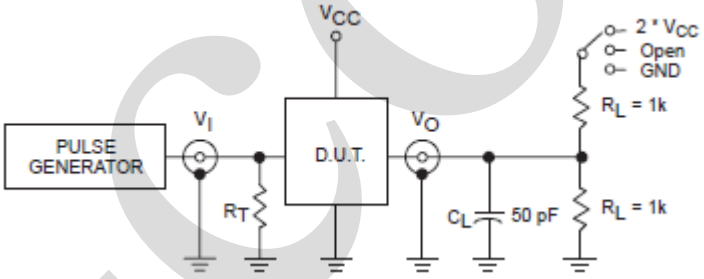


Figure 4. Load circuit for switching times

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

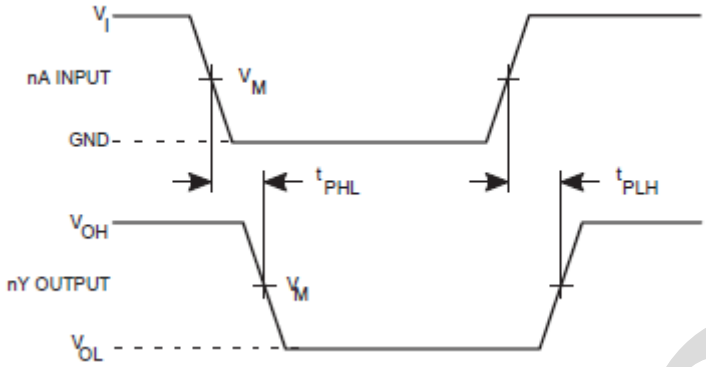


Figure 5. The input (nA) to output (nY) propagation delays

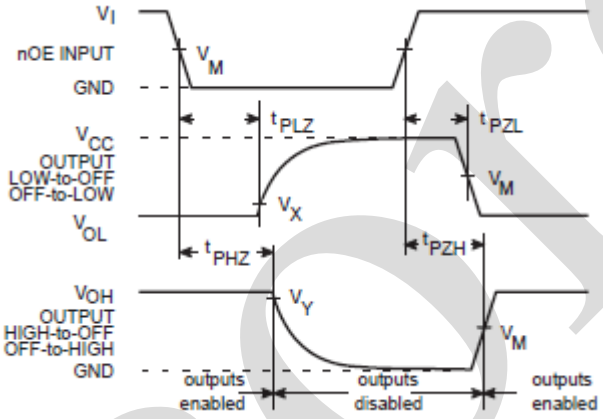


Figure 6. Enable and disable times

4.3、Measurement Points

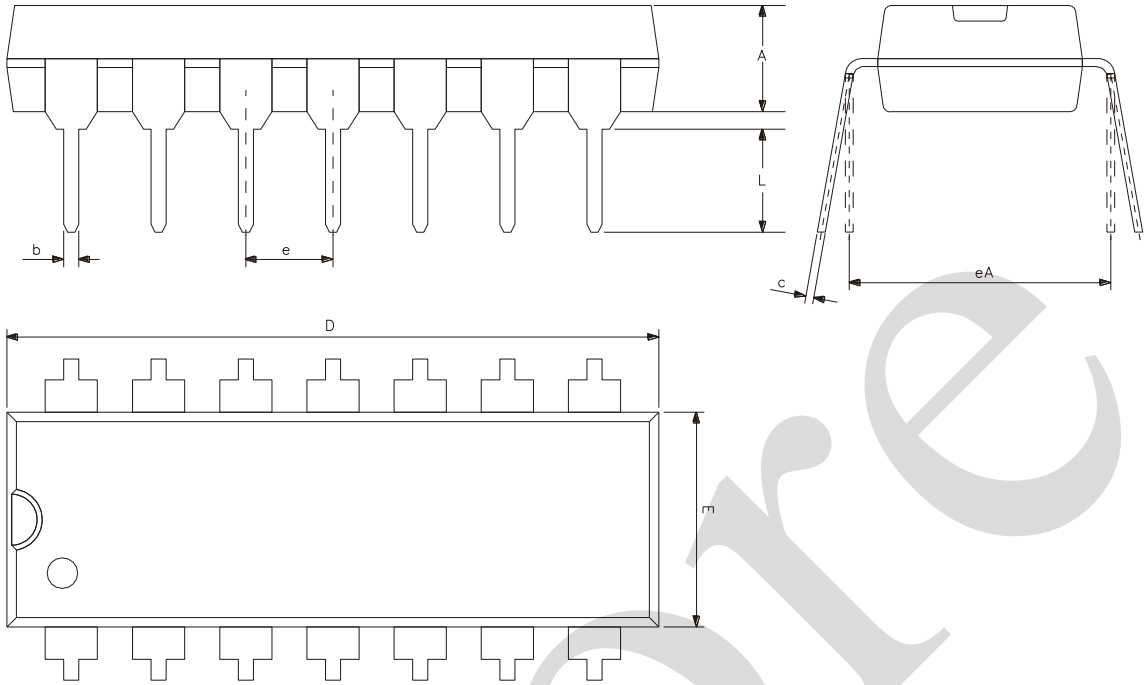
Supply voltage	Input	Output		
V_{CC}	V_M	V_M	V_X	V_Y
<2.7V	$0.5\times V_{CC}$	$0.5\times V_{CC}$	$V_{OL}+0.1\times V_{CC}$	$V_{OH}-0.1\times V_{CC}$
2.7V to 3.6V	1.5V	1.5V	V_{OL}+0.3V	V_{OH}-0.3V
≥4.5V	$0.5\times V_{CC}$	$0.5\times V_{CC}$	$V_{OL}+0.1\times V_{CC}$	$V_{OH}-0.1\times V_{CC}$

4.4、Test Data

Supply voltage	Input		Load		S1 position		
V_{CC}	V_I	t_r , t_f	C_L	R_L	t_{PHL}, t_{PLH}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
<2.7V	V_{CC}	≤2.5ns	50pF	1kΩ	open	GND	$2\times V_{CC}$
2.7V to 3.6V	2.7V	≤2.5ns	15pF, 50pF	1kΩ	open	GND	$2\times V_{CC}$
≥4.5V	V_{CC}	≤2.5ns	50pF	1kΩ	open	GND	$2\times V_{CC}$

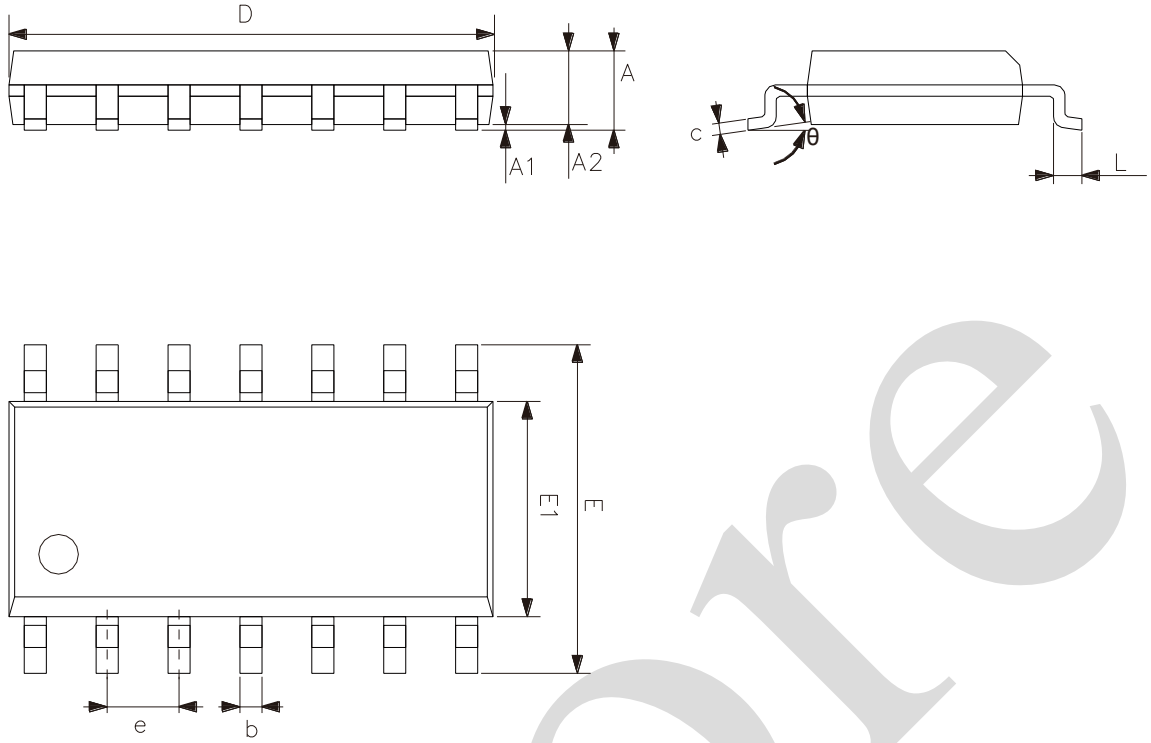
5、Package Information

5.1、DIP14



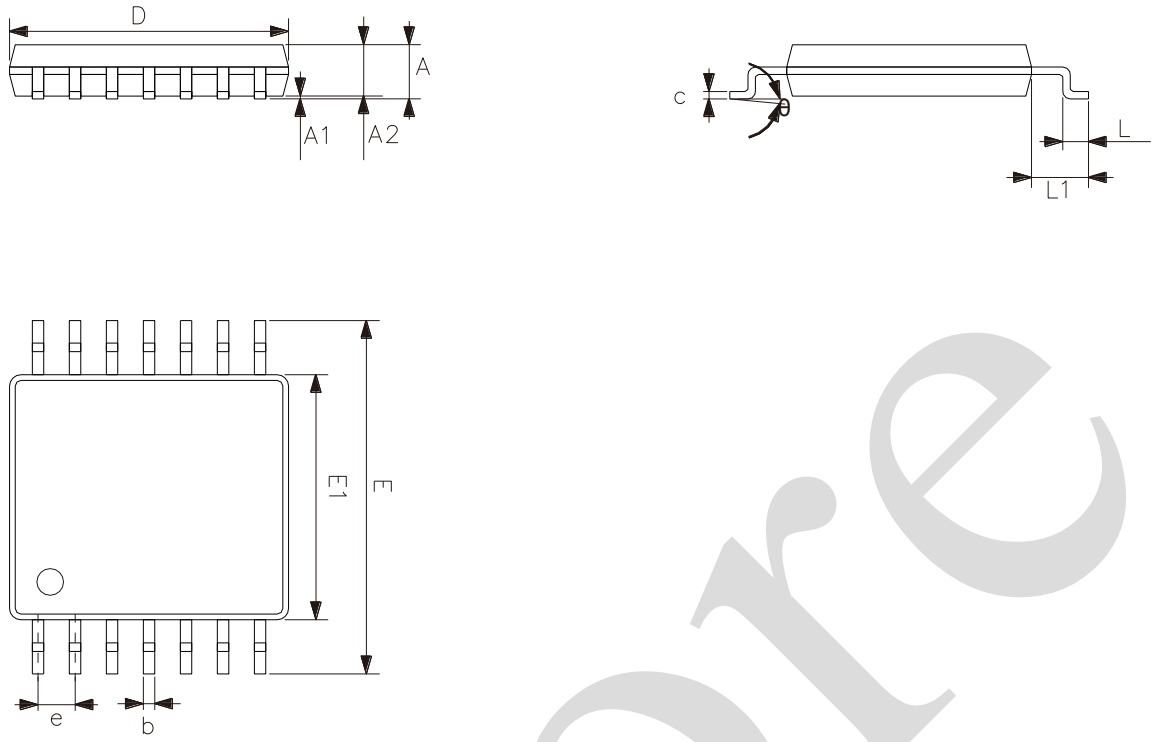
Symbol	Dimensions (mm)	
	Min.	Max.
A	3.05	3.60
b	0.33	0.56
c	0.20	0.36
D	18.80	19.40
E	6.20	6.60
e	2.54	
eA	7.62	10.90
L	2.92	-

5.2、SOP14



Symbol	Dimensions (mm)	
	Min.	Max.
A	1.50	1.75
A1	0.05	0.25
A2	1.30	-
b	0.33	0.50
c	0.19	0.25
D	8.43	8.76
E	5.80	6.25
E1	3.75	4.00
e	1.27	
L	0.40	0.89
θ	0 °	8 °

5.3、TSSOP14



Symbol	Dimensions (mm)	
	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
L1	1.00	
θ	0°	8°

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

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