AiP74LV4T125
Quad Translating Buffer/Line Driver; 3-state

Product Specification

Specification Revision History：

Version	Date	Description
2022-12-A1	2022-12	New
2025-01-A2	2025-01	Modify the content

Contents

1、General Description

The AiP74LV4T125 is Quad translating buffer/line driver with 3-state output.

The input is designed with a lower threshold circuit to match 1.8V input logic at V_{CC}=3.3V and can be used in 1.8V to 3.3V level-up translation. In addition, the 5V tolerant input pins enable down translation (for example, 3.3V to 2.5V output at V_{CC}=2.5V). The wide VCC range of 1.8V to 5.5V allows the generation of desired output levels to connect to controllers or processors.

Features:

- Supply voltage:1.6V to 5.5V
- Up translation
  1.2V to 1.8V at V_{CC}=1.8V
  1.5V to 2.5V at V_{CC}=2.5V
  1.8V to 3.3V at V_{CC}=3.3V
  3.3V to 5.0V at V_{CC}=5.0V
- Down translation
  3.3V to 1.8V at V_{CC}=1.8V
  3.3V to 2.5V at V_{CC}=2.5V
  5.0V to 3.3V at V_{CC}=3.3V
- Inputs accept voltages to 5.5V
- Temperature range:-40℃ to +125℃
- Packaging information: SOP14/TSSOP14

Ordering Information:

Tube packing specifications:

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
AiP74LV4T125SA14.TB	SOP14	74LV4T125	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing: 1.27mm
AiP74LV4T125TA14.TB	TSSOP14	74LV4T125	96 PCS/tube	200 tube/box	19200 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm

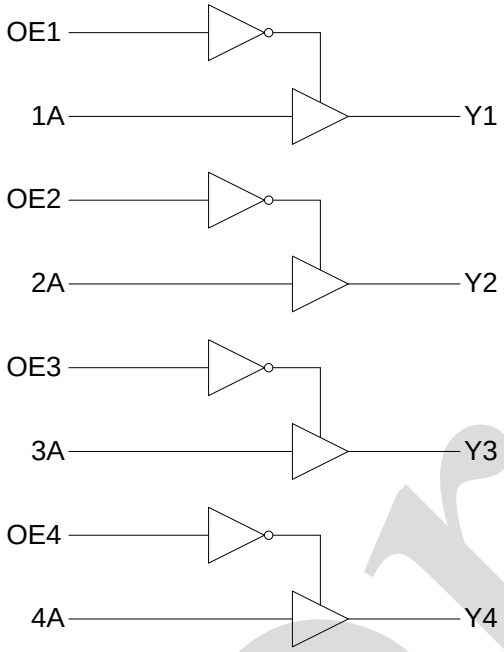
Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP74LV4T125SA14.TR	SOP14	74LV4T125	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing: 1.27mm
AiP74LV4T125TA14.TR	TSSOP14	74LV4T125	5000 PCS/reel	10000 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm

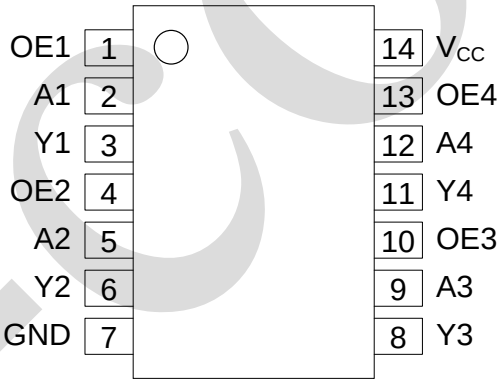
Note: If the physical information is inconsistent with the ordering information, please refer to the actual product.

2、Block Diagram And Pin Description

2.1、Block Diagram



2.2、Pin Configurations



2.3、Pin Description

Pin No.	Pin Name	Description
1	OE1	output enable input (active LOW)
2	A1	data input
3	Y1	data output
4	OE2	output enable input (active LOW)
5	A2	data input
6	Y2	data output
7	GND	ground (0V)
8	Y3	data output
9	A3	data input
10	OE3	output enable input (active LOW)
11	Y4	data output
12	A4	data input
13	OE4	output enable input (active LOW)
14	V_{CC}	supply voltage

2.4、Function Table

Inputs		Output
OEn	**An**	**Yn**
L	H	H
L	L	L
H	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

Parameter	Symbol	Conditions	Min.	Max.	Unit
supply voltage	V_{CC}	-	-0.5	+7.0	V
input voltage	V_I	-	-0.5	+7.0	V
output voltage	V_O	high-impedance or power-off state	-0.5	+4.6	V
		HIGH or LOW state	-0.5	V_{CC}+0.5	V
input clamping current	I_{IK}	V_I<0	-	-20	mA
output clamping current	I_{OK}	V_O<0 or V_O>V_{CC}	-	±50	mA
output current	I_O	-	-	±35	mA
supply current	I_{CC}	-	-	+70	mA
ground current	I_{GND}	-	-70	-	mA
storage temperature	T_{stg}	-	-65	+150	℃
soldering temperature	T_L	10s	260		℃

3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V_{CC}	-	1.6	-	5.5	V
input voltage	V_I	-	0	-	5.5	V
output voltage	V_O	-	0	-	V_{CC}	V
High-level output current	I_{OH}	V_{CC}=1.8V	-	-	-3	mA
		V_{CC}=2.5V	-	-	-5	
		V_{CC}=3.3V	-	-	-8	
		V_{CC}=5.0V	-	-	-16	
Low-level output current	I_{OL}	V_{CC}=1.8V	-	-	3	
		V_{CC}=2.5V	-	-	5	
		V_{CC}=3.3V	-	-	8	
		V_{CC}=5.0V	-	-	16	
ambient temperature	T_{amb}	-	-40	-	+125	℃

3.3、Electrical Characteristics

3.3.1、DC Characteristics 1

(T_{amb}=25℃, 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}=1.65V to 1.8V		0.94	-	-	V
		V_{CC}=2.0V		0.99	-	-	V
		V_{CC}=2.25V to 2.5V		1.135	-	-	V
		V_{CC}=2.75V		1.21	-	-	V
		V_{CC}=3.0V to 3.3V		1.35	-	-	V
		V_{CC}=3.6V		1.47	-	-	V
		V_{CC}=4.5V to 5.0V		2.02	-	-	V
		V_{CC}=5.5V		2.10	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=1.65V to 2.0V		-	-	0.58	V
		V_{CC}=2.25V to 2.75V		-	-	0.75	V
		V_{CC}=3.0V to 3.6V		-	-	0.80	V
		V_{CC}=4.5V to 5.5V		-	-	0.80	V
HIGH-level output voltage	V_{OH}	V_I=V_{IH} or V_{IL}	V_{CC}=1.65V to 5.5V; I_O=-20uA	V_{CC}-0.1	-	-	V
			V_{CC}=1.65V; I_O=-2mA	1.28	-	-	V
			V_{CC}=1.8V; I_O=-2mA	1.5	-	-	V
			V_{CC}=2.3V; I_O=-2.3mA	2.0	-	-	V
			V_{CC}=2.3V; I_O=-3mA	2.0	-	-	V
			V_{CC}=2.5V; I_O=-3mA	2.25	-	-	V
			V_{CC}=3.0V; I_O=-3mA	2.78	-	-	V
			V_{CC}=3.0V; I_O=-5.5mA	2.6	-	-	V
			V_{CC}=3.3V; I_O=-5.5mA	2.9	-	-	V
			V_{CC}=4.5V; I_O=-4mA	4.2	-	-	V
			V_{CC}=4.5V; I_O=-8mA	4.1	-	-	V
			V_{CC}=5.0V; I_O=-8mA	4.6	-	-	V
			V_{CC}=4.5V; I_O=-16mA	3.8	-	-	V

			V_{CC}=5.0V; I_O=-16mA	4.4	-	-	V
LOW-level output voltage	V_{OL}	V_I=V_{IH} or V_{IL}	V_{CC}=1.65V to 5.5V; I_O=20uA	-	-	0.1	V
			V_{CC}=1.65V; I_O=2mA	-	-	0.2	V
			V_{CC}=2.3V; I_O=2.3mA	-	-	0.1	V
			V_{CC}=2.3V; I_O=3mA	-	-	0.15	V
			V_{CC}=3.0V; I_O=3mA	-	-	0.1	V
			V_{CC}=3.0V; I_O=5.5mA	-	-	0.2	V
			V_{CC}=4.5V; I_O=4mA	-	-	0.15	V
			V_{CC}=4.5V; I_O=8mA	-	-	0.3	V
			V_{CC}=4.5V; I_O=16mA	-	-	0.55	V
			V_{CC}=5.0V; I_O=16mA	-	-	0.55	V
input leakage current	I_I	V_I=V_{CC} or GND; V_{CC}=0V to 5.5V		-	-	±1	uA
OFF-state output current	I_{OZ}	-		-	-	±1	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}=1.8V, 2.5V, 3.3V, 5.0V		-	-	1	uA
Additional supply current	ΔI_{CC}	per input pin; V_{CC}=1.8V; V_I=0.3V or 1.1V; I_O=0A; other pins at V_{CC} or GND		-	-	10	uA
		per input pin; V_{CC}=5.5V; V_I=0.3V or 3.4V; I_O=0A; other pins at V_{CC} or GND		-	-	1.35	mA

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}=1.65V to 1.8V		1.0	-	-	V
		V_{CC}=2.0V		1.03	-	-	V
		V_{CC}=2.25V to 2.5V		1.18	-	-	V
		V_{CC}=2.75V		1.23	-	-	V
		V_{CC}=3.0V to 3.3V		1.37	-	-	V
		V_{CC}=3.6V		1.48	-	-	V
		V_{CC}=4.5V to 5.0V		2.03	-	-	V
		V_{CC}=5.5V		2.11	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=1.65V to 2.0V		-	-	0.55	V
		V_{CC}=2.25V to 2.75V		-	-	0.71	V
		V_{CC}=3.0V to 3.6V		-	-	0.65	V
		V_{CC}=4.5V to 5.5V		-	-	0.80	V
HIGH-level output voltage	V_{OH}	V_I=V_{IH} or V_{IL}	V_{CC}=1.65V to 5.5V; I_O=-20uA	V_{CC}-0.1	-	-	V
			V_{CC}=1.65V; I_O=-2mA	1.21	-	-	V
			V_{CC}=1.8V; I_O=-2mA	1.45	-	-	V
			V_{CC}=2.3V; I_O=-2.3mA	2.0	-	-	V

			V_{CC}=2.3V; I_O=-3mA	1.93	-	-	V
			V_{CC}=2.5V; I_O=-3mA	2.15	-	-	V
			V_{CC}=3.0V; I_O=-3mA	2.7	-	-	V
			V_{CC}=3.0V; I_O=-5.5mA	2.49	-	-	V
			V_{CC}=3.3V; I_O=-5.5mA	2.8	-	-	V
			V_{CC}=4.5V; I_O=-4mA	4.1	-	-	V
			V_{CC}=4.5V; I_O=-8mA	3.95	-	-	V
			V_{CC}=5.0V; I_O=-8mA	4.5	-	-	V
			V_{CC}=4.5V; I_O=-16mA	3.7	-	-	V
			V_{CC}=5.0V; I_O=-16mA	4.3	-	-	V
LOW-level output voltage	V_{OL}	V_I=V_{IH} or V_{IL}	V_{CC}=1.65V to 5.5V; I_O=20uA	-	-	0.1	V
			V_{CC}=1.65V; I_O=2mA	-	-	0.25	V
			V_{CC}=2.3V; I_O=2.3mA	-	-	0.15	V
			V_{CC}=2.3V; I_O=3mA	-	-	0.2	V
			V_{CC}=3.0V; I_O=3mA	-	-	0.15	V
			V_{CC}=3.0V; I_O=5.5mA	-	-	0.252	V
			V_{CC}=4.5V; I_O=4mA	-	-	0.2	V
			V_{CC}=4.5V; I_O=8mA	-	-	0.35	V
			V_{CC}=4.5V; I_O=16mA	-	-	0.55	V
			V_{CC}=5.0V; I_O=16mA	-	-	0.55	V
input leakage current	I_I	V_I=V_{CC} or GND; V_{CC}=0V to 5.5V		-	-	±4	uA
OFF-state output current	I_{OZ}	-		-	-	±4	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}=1.8V, 2.5V, 3.3V, 5.0V		-	-	4	uA
Additional supply current	ΔI_{CC}	per input pin; V_{CC}=1.8V; V_I=0.3V or 1.1V; I_O=0A; other pins at V_{CC} or GND		-	-	10	uA
		per input pin; V_{CC}=5.5V; V_I=0.3V or 3.4V; I_O=0A; other pins at V_{CC} or GND		-	-	1.5	mA

3.3.3、AC Characteristics 1

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

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
propagation delay	t_{pd}	An to Yn; see Figure 5[1]	V_{CC}=1.8V; C_L=15pF	-	6.5	9.6	ns
			V_{CC}=1.8V; C_L=30pF	-	7.6	10.8	ns
			V_{CC}=2.5V; C_L=15pF	-	4.6	6.6	ns
			V_{CC}=2.5V; C_L=30pF	-	5.3	7.4	ns
			V_{CC}=3.3V; C_L=15pF	-	3.8	5.4	ns
			V_{CC}=3.3V; C_L=30pF	-	4.4	6.0	ns
			V_{CC}=5.0V; C_L=15pF	-	3.2	4.1	ns
			V_{CC}=5.0V; C_L=30pF	-	3.6	4.6	ns
enable time	t_{en}	$\overline{OE}$n to Yn; see Figure 6[1]	V_{CC}=1.8V; C_L=15pF	-	7.8	10.7	ns
			V_{CC}=1.8V; C_L=30pF	-	9.0	12.6	ns
			V_{CC}=2.5V; C_L=15pF	-	5.5	7.1	ns
			V_{CC}=2.5V; C_L=30pF	-	6.3	8.3	ns
			V_{CC}=3.3V; C_L=15pF	-	4.5	5.6	ns
			V_{CC}=3.3V; C_L=30pF	-	5.1	6.4	ns
			V_{CC}=5.0V; C_L=15pF	-	3.2	4.1	ns
			V_{CC}=5.0V; C_L=30pF	-	3.7	4.7	ns
disable time	t_{dis}	$\overline{OE}$n to Yn; see Figure 6[1]	V_{CC}=1.8V; C_L=15pF	-	7.6	9.7	ns
			V_{CC}=1.8V; C_L=30pF	-	10.5	12.9	ns
			V_{CC}=2.5V; C_L=15pF	-	5.5	7.0	ns
			V_{CC}=2.5V; C_L=30pF	-	7.4	9.0	ns
			V_{CC}=3.3V; C_L=15pF	-	4.5	5.8	ns
			V_{CC}=3.3V; C_L=30pF	-	5.9	7.5	ns
			V_{CC}=5.0V; C_L=15pF	-	4.0	5.5	ns
			V_{CC}=5.0V; C_L=30pF	-	5.0	6.5	ns

Note:

[1] t_{pd} is the same as t_{PLH} and t_{PHL}, t_{en} is the same as t_{PZL} and t_{PZH}, t_{dis} is the same as t_{PLZ} and t_{PHZ}.

3.3.4、AC Characteristics 2

(T_{amb}=-40℃ to +125℃, voltages are referenced to GND (ground=0V), unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
propagation delay	t_{pd}	An to Yn; see Figure 5[1]	V_{CC}=1.8V; C_L=15pF	-	-	11.6	ns
			V_{CC}=1.8V; C_L=30pF	-	-	13.1	ns
			V_{CC}=2.5V; C_L=15pF	-	-	7.0	ns
			V_{CC}=2.5V; C_L=30pF	-	-	9.1	ns
			V_{CC}=3.3V; C_L=15pF	-	-	6.4	ns
			V_{CC}=3.3V; C_L=30pF	-	-	7.3	ns
			V_{CC}=5.0V; C_L=15pF	-	-	4.7	ns
			V_{CC}=5.0V; C_L=30pF	-	-	5.4	ns
enable time	t_{en}	$\overline{OE}$n to Yn; see Figure 6[1]	V_{CC}=1.8V; C_L=15pF	-	-	12.9	ns
			V_{CC}=1.8V; C_L=30pF	-	-	15.3	ns
			V_{CC}=2.5V; C_L=15pF	-	-	8.6	ns
			V_{CC}=2.5V; C_L=30pF	-	-	10.0	ns
			V_{CC}=3.3V; C_L=15pF	-	-	6.8	ns
			V_{CC}=3.3V; C_L=30pF	-	-	7.7	ns
			V_{CC}=5.0V; C_L=15pF	-	-	4.8	ns
			V_{CC}=5.0V; C_L=30pF	-	-	5.5	ns
disable time	t_{dis}	$\overline{OE}$n to Yn; see Figure 6[1]	V_{CC}=1.8V; C_L=15pF	-	-	11.3	ns
			V_{CC}=1.8V; C_L=30pF	-	-	14.7	ns
			V_{CC}=2.5V; C_L=15pF	-	-	8.1	ns
			V_{CC}=2.5V; C_L=30pF	-	-	10.3	ns
			V_{CC}=3.3V; C_L=15pF	-	-	6.7	ns
			V_{CC}=3.3V; C_L=30pF	-	-	8.6	ns
			V_{CC}=5.0V; C_L=15pF	-	-	6.2	ns
			V_{CC}=5.0V; C_L=30pF	-	-	7.3	ns

Note:

[1] t_{pd} is the same as t_{PLH} and t_{PHL}, t_{en} is the same as t_{PZL} and t_{PZH}, t_{dis} is the same as t_{PLZ} and t_{PHZ}.

4、Testing Circuit

4.1、AC Testing Circuit

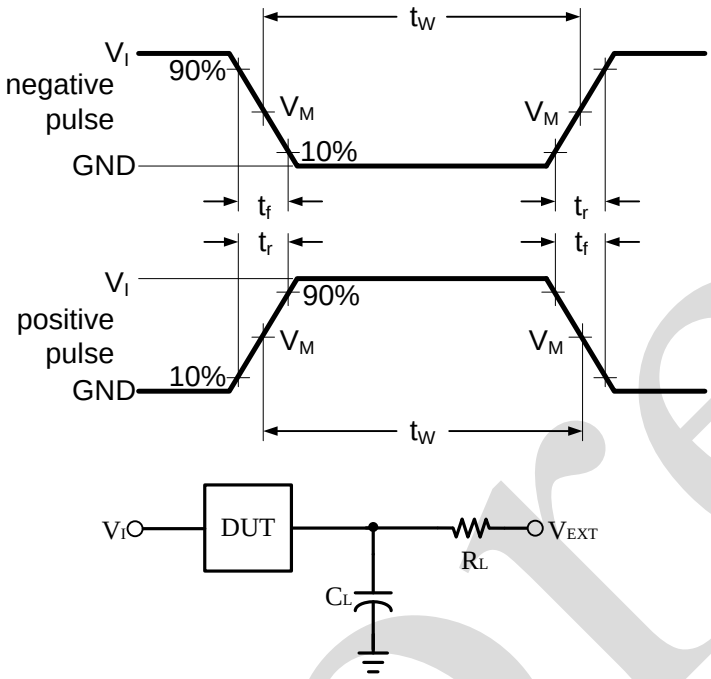


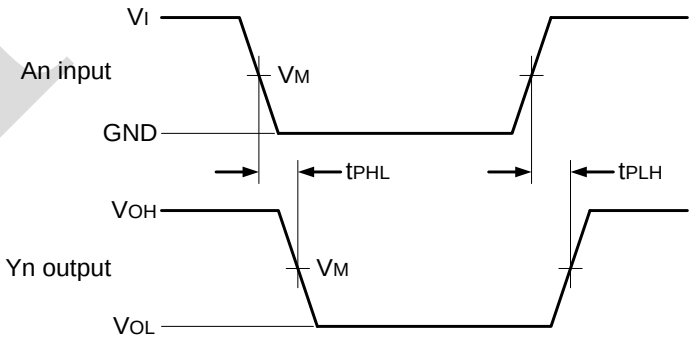
Figure 4. Test circuit for measuring switching time

C_L includes probe and jig capacitance.

4.2、Test Data

Supply voltage	Input		Load		V_{EXT}		
V_{CC}	V_I	$t_r = t_f$	C_L	R_L	t_{PLH}, t_{PHL}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
1.8V	V_{CC}	3.0ns	15pF, 30pF	1KΩ	Open	GND	V_{CC}
2.5V	V_{CC}	3.0ns	15pF, 30pF	1KΩ	Open	GND	V_{CC}
3.3V	3V	3.0ns	15pF, 30pF	1KΩ	Open	GND	V_{CC}
5.0V	3V	3.0ns	15pF, 30pF	1KΩ	Open	GND	V_{CC}

4.3、AC Testing Waveforms



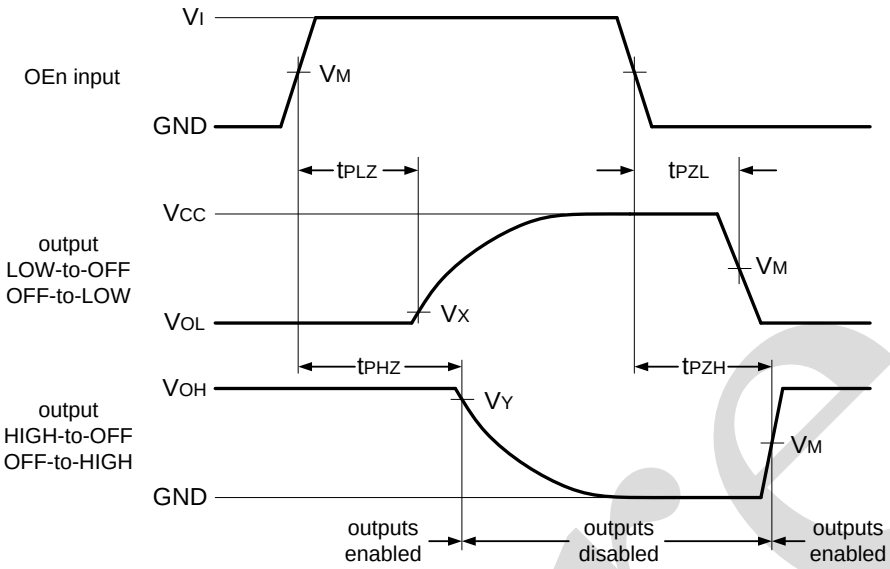


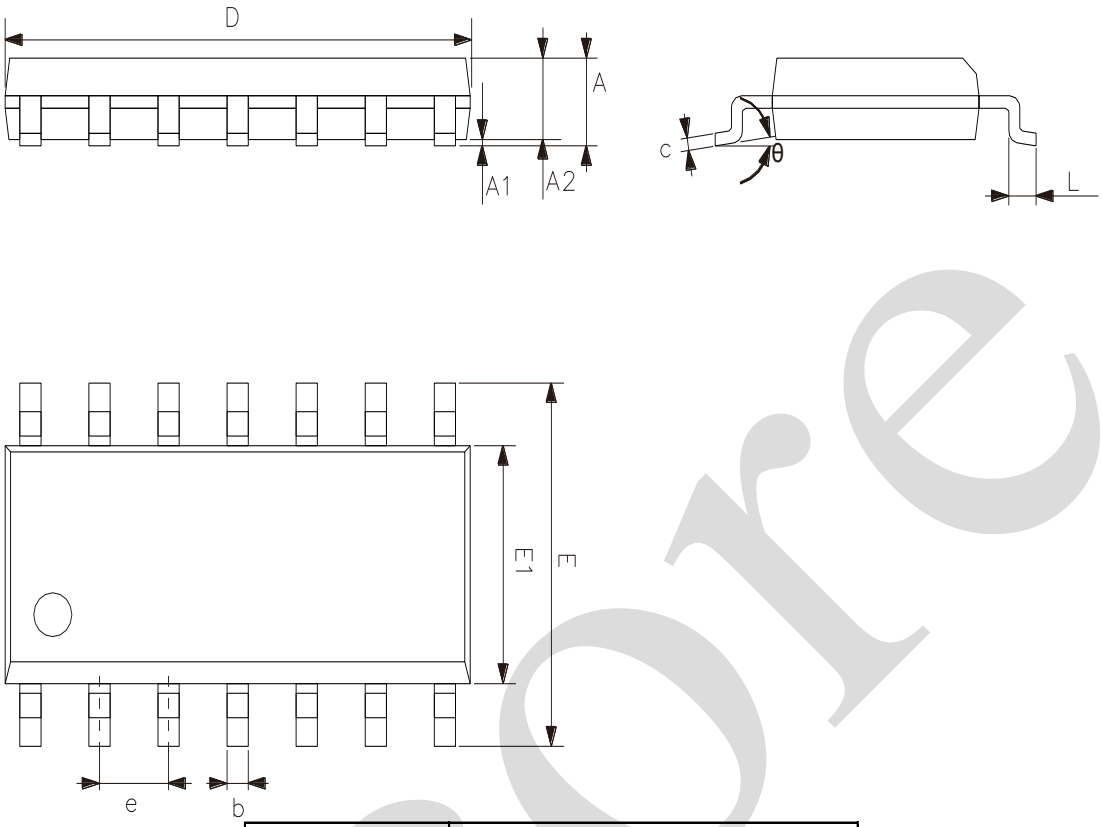
Figure 5. 3-state enable and disable times

4.4、Measurement Points

Input	Output		
V_M	V_M	V_X	V_Y
$0.5V_I$	$0.5\times V_{CC}$	$V_{OL}+0.3V$	$V_{OH}-0.3V$

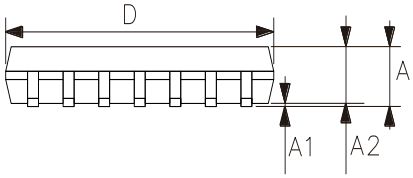
5、Package Information

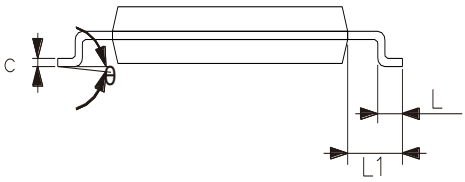
5.1、SOP14

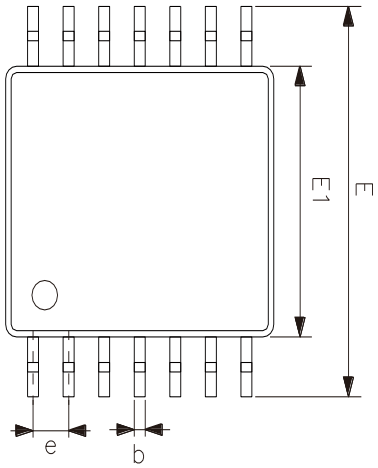


2023/12/A	Dimensions In Millimeters	
Symbol	Min.	Max.
A	1.50	1.75
A1	0.05	0.25
A2	1.30	—
b	0.33	0.50
c	0.19	0.25
D	8.43	8.76
E	5.80	6.25
E1	3.75	4.00
e	1.27	
L	0.40	0.89
θ	0°	8°

5.2、TSSOP14







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
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

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

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