



AiP74LVC1G99

Ultra-Configurable Multiple Function Gate; 3-State

Product Specification

Specification Revision History:

Version	Date	Description
2024-11-A0	2024-11	New
2025-05-A1	2025-05	Modify the parameters



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1、General Description

The AiP74LVC1G99 provides a low voltage, ultra-configurable, multiple function gate with 3-state output.

The input can be driven from either 3.3V or 5V devices. This feature allows the use of this device in a mixed 3.3V and 5V environment.

Features:

- Wide supply voltage range from 1.65V to 5.5V
- Inputs accept voltages to 5.5V
- $\pm 24\text{mA}$ output drive at 3.0V
- High-impedance when $V_{CC}=0\text{V}$
- Temperature range: -40°C to $+125^{\circ}\text{C}$
- Packaging information: TSSOP8/VSSOP8/XSON8

Ordering Information:

Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP74LVC1G99TA8.TR	TSSOP8	AiPHM 1G99	3000 PCS/reel	3000 PCS/box	Dimensions of plastic enclosure: 3.0mm×3.0mm Pin spacing: 0.65mm
AiP74LVC1G99YA8.TR	VSSOP8	AiP HMXX	3000 PCS/reel	3000 PCS/box	Dimensions of plastic enclosure: 2.0mm×2.3mm Pin spacing: 0.50mm
AiP74LVC1G99EB8.TR	XSON8	HM XX	5000 PCS/reel	25000 PCS/box	Dimensions of plastic enclosure: 1.35mm×1.0mm Pin spacing: 0.35mm

Note 1: “XX” refers to variable content, meaning year and package batch serial number.

Note 2: 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

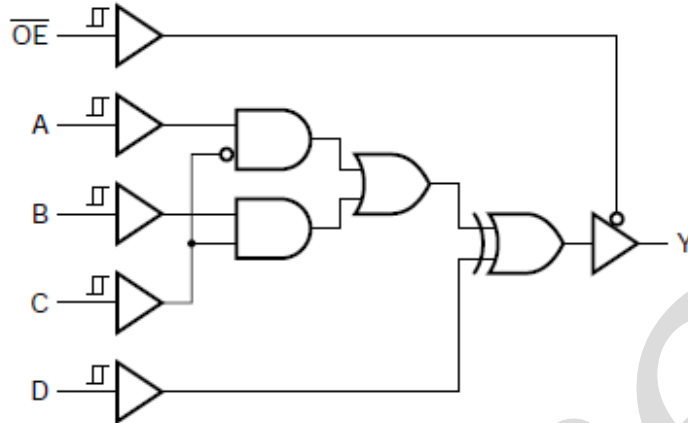


Figure 1. Logic symbol

2.2、Pin Configurations

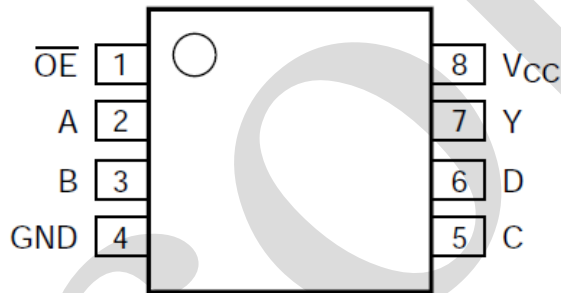


Figure 2. Pin configurations

2.3、Pin Description

Pin No.	Pin Name	Description
1	\overline{OE}	output enable input \overline{OE} (active LOW)
2	A	data input
3	B	data input
4	GND	ground (0 V)
5	C	data input
6	D	data input
7	Y	data output
8	V_{CC}	supply voltage



2.4、Function Table

Inputs					Output
$\overline{\text{OE}}$	D	C	B	A	Y
L	L	L	L	L	L
L	L	L	L	H	H
L	L	L	H	L	L
L	L	L	H	H	H
L	L	H	L	L	L
L	L	H	L	H	L
L	L	H	H	L	H
L	L	H	H	H	H
L	H	L	L	L	H
L	H	L	L	H	L
L	H	L	H	L	H
L	H	L	H	H	L
L	H	H	L	L	H
L	H	H	L	H	H
L	H	H	H	L	L
L	H	H	H	H	L
H	X	X	X	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

($T_{\text{amb}}=25^{\circ}\text{C}$, all voltage referenced to GND, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Max.	Unit
supply voltage	V_{CC}	-	-0.5	+6.5	V
input voltage	V_{I}	-	-0.5	+6.5	V
output voltage	V_{O}	Active mode	-0.5	$V_{\text{CC}}+0.5$	V
		Power-down mode; $V_{\text{CC}}=0\text{V}$	-0.5	+6.5	V
supply current	I_{CC}	-	-	100	mA
ground current	I_{GND}	-	-100	-	mA
input clamping current	I_{IK}	$V_{\text{I}}<0\text{V}$	-50	-	mA
output current	I_{O}	$V_{\text{O}}=0\text{V}$ to V_{CC}	-	± 50	mA
output clamping current	I_{OK}	$V_{\text{O}}>V_{\text{CC}}$ or $V_{\text{O}}<0\text{V}$	-	± 50	mA
storage temperature	T_{stg}	-	-65	+150	$^{\circ}\text{C}$
soldering temperature	T_{L}	10s	260		$^{\circ}\text{C}$



3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V_{CC}	-	1.65	-	5.5	V
input voltage	V_I	-	0	-	5.5	V
output voltage	V_O	Active mode	0	-	V_{CC}	V
		Power-down mode; $V_{CC}=0V$	0	-	5.5	V
ambient temperature	T_{amb}	-	-40	-	+125	°C

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	Vcc	Conditions	Min.	Typ.	Max.	Unit
positive-going threshold voltage	V_{T+}	1.8V	-	0.70	1.10	1.50	V
		2.3V	-	1.00	1.40	1.80	V
		3.0V	-	1.30	1.76	2.20	V
		4.5V	-	1.90	2.47	3.10	V
		5.5V	-	2.20	2.91	3.60	V
negative-going threshold voltage	V_{T-}	1.8V	-	0.25	0.61	0.75	V
		2.3V	-	0.40	0.80	0.90	V
		3.0V	-	0.60	1.04	1.50	V
		4.5V	-	1.00	1.55	2.00	V
		5.5V	-	1.20	1.86	2.30	V
hysteresis voltage	V_H	1.8V	-	0.15	0.49	1.00	V
		2.3V	-	0.25	0.60	1.10	V
		3.0V	-	0.40	0.73	1.50	V
		4.5V	-	0.60	0.92	2.00	V
		5.5V	-	0.70	1.02	2.30	V
HIGH-level output voltage	V_{OH}	1.65V to 5.5V	$I_O=-100\mu A$	$V_{CC} - 0.1$	-	-	V
		1.65V	$I_O=-4mA$	1.2	1.54	-	V
		2.3V	$I_O=-8mA$	1.9	2.15	-	V
		2.7V	$I_O=-12mA$	2.2	2.50	-	V
		3.0V	$I_O=-24mA$	2.3	2.62	-	V
		4.5V	$I_O=-32mA$	3.8	4.11	-	V
LOW-level output voltage	V_{OL}	1.65V to 5.5V	$I_O=100\mu A$	-	-	0.10	V
		1.65V	$I_O=4mA$	-	0.07	0.45	V
		2.3V	$I_O=8mA$	-	0.12	0.30	V
		2.7V	$I_O=12mA$	-	0.17	0.40	V
		3.0V	$I_O=24mA$	-	0.33	0.55	V
		4.5V	$I_O=32mA$	-	0.39	0.55	V
input leakage current	I_I	0V to 5.5V	5.5V or GND	-	-	± 1	μA
OFF-state output current	I_{OZ}	3.6V	V_I or $V_O=5.5V$	-	-	± 2	μA
power-off leakage current	I_{OFF}	0V	V_I or $V_O=5.5V$	-	-	± 2	μA



supply current	I_{CC}	1.65V to 5.5V	$V_I=5.5V$ or GND; $I_O=0A$	-	-	4	uA
additional supply current	ΔI_{CC}	2.3V to 5.5V	$V_I=V_{CC}-0.6V$; $I_O=0A$	-	-	500	uA

Note: Typical values are measured at $T_{amb}=25^{\circ}C$.

3.3.2、DC Characteristics 2

($T_{amb}=-40^{\circ}C$ to $+125^{\circ}C$, voltages are referenced to GND (ground = 0V), unless otherwise specified.)

Parameter	Symbol	Vcc	Conditions	Min.	Typ.	Max.	Unit
positive-going threshold voltage	V_{T+}	1.8V	-	0.70	-	1.70	V
		2.3V	-	1.00	-	2.00	V
		3.0V	-	1.30	-	2.40	V
		4.5V	-	1.90	-	3.30	V
		5.5V	-	2.20	-	3.80	V
negative-going threshold voltage	V_{T-}	1.8V	-	0.25	-	1.10	V
		2.3V	-	0.40	-	1.35	V
		3.0V	-	0.60	-	1.70	V
		4.5V	-	1.00	-	2.20	V
		5.5V	-	1.20	-	2.50	V
hysteresis voltage	V_H	1.8V	-	0.15	-	1.20	V
		2.3V	-	0.25	-	1.30	V
		3.0V	-	0.40	-	1.40	V
		4.5V	-	0.60	-	1.70	V
		5.5V	-	0.70	-	1.90	V
HIGH-level output voltage	V_{OH}	1.65V to 5.5V	$I_O=-100uA$	$V_{CC}-0.1$	-	-	V
		1.65V	$I_O=-4mA$	0.95	-	-	V
		2.3V	$I_O=-8mA$	1.7	-	-	V
		2.7V	$I_O=-12mA$	1.9	-	-	V
		3.0V	$I_O=-24mA$	2.0	-	-	V
		4.5V	$I_O=-32mA$	3.4	-	-	V
LOW-level output voltage	V_{OL}	1.65V to 5.5V	$I_O=100uA$	-	-	0.10	V
		1.65V	$I_O=4mA$	-	-	0.70	V
		2.3V	$I_O=8mA$	-	-	0.45	V
		2.7V	$I_O=12mA$	-	-	0.60	V
		3.0V	$I_O=24mA$	-	-	0.80	V
		4.5V	$I_O=32mA$	-	-	0.80	V
input leakage current	I_I	0V to 5.5V	5.5V or GND	-	-	± 1	uA
OFF-state output current	I_{OZ}	3.6V	V_I or $V_O=5.5V$	-	-	± 2	uA
power-off leakage current	I_{OFF}	0V	V_I or $V_O=5.5V$	-	-	± 2	uA
supply current	I_{CC}	1.65V to 5.5V	$V_I=5.5V$ or GND; $I_O=0A$	-	-	4	uA
additional supply current	ΔI_{CC}	2.3V to 5.5V	$V_I=V_{CC}-0.6V$; $I_O=0A$	-	-	500	uA



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	Vcc	Conditions	Min.	Typ.	Max.	Unit
A to Y propagation delay	t_{PLH}, t_{PHL}	1.65V to 1.95V	see Figure 4	2.8	7.5	30.8	ns
		2.3V to 2.7V		2.0	5.0	11.7	ns
		2.7V		2.0	5.4	9.0	ns
		3.0V to 3.6V		1.8	4.5	8.4	ns
		4.5V to 5.5V		1.8	3.8	5.5	ns
B to Y propagation delay		1.65V to 1.95V		2.8	7.5	28.9	ns
		2.3V to 2.7V		2.0	5.0	11.3	ns
		2.7V		2.0	5.4	9.0	ns
		3.0V to 3.6V		1.8	4.5	8.2	ns
		4.5V to 5.5V		1.8	3.8	5.4	ns
C to Y propagation delay		1.65V to 1.95V		3.2	7.8	29.8	ns
		2.3V to 2.7V		2.3	5.2	12.3	ns
		2.7V		2.3	5.3	9.6	ns
		3.0V to 3.6V		2.3	4.6	8.6	ns
		4.5V to 5.5V		1.8	3.8	5.7	ns
D to Y propagation delay	1.65V to 1.95V	2.8	7.0	25.7	ns		
	2.3V to 2.7V	2.0	4.6	10.7	ns		
	2.7V	2.0	4.8	9.2	ns		
	3.0V to 3.6V	1.8	4.1	7.6	ns		
	4.5V to 5.5V	1.6	3.4	5.2	ns		
$\overline{\text{OE}}$ to Y enable time	t_{PZH}, t_{PZL}	1.65V to 1.95V	see Figure 5	2.0	5.7	25.2	ns
		2.3V to 2.7V		1.4	3.8	11.3	ns
		2.7V		1.4	4.2	8.6	ns
		3.0V to 3.6V		1.4	3.5	7.0	ns
		4.5V to 5.5V		1.4	2.7	4.7	ns
$\overline{\text{OE}}$ to Y disable time		1.65V to 1.95V		3.0	5.7	15.0	ns
		2.3V to 2.7V		2.0	3.6	5.8	ns
		2.7V		2.0	4.5	6.6	ns
		3.0V to 3.6V		2.1	4.5	5.9	ns
		4.5V to 5.5V		1.0	3.4	4.5	ns

Note: Typical values are measured at $T_{amb}=25^{\circ}\text{C}$ and $V_{CC}=1.8\text{V}, 2.5\text{V}, 2.7\text{V}, 3.3\text{V}$ and 5.0V respectively.



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	Vcc	Conditions	Min.	Typ.	Max.	Unit
A to Y propagation delay	t_{PLH}, t_{PHL}	1.65V to 1.95V	see Figure 4	-	-	38.5	ns
		2.3V to 2.7V		-	-	14.6	ns
		2.7V		-	-	11.3	ns
		3.0V to 3.6V		-	-	10.5	ns
		4.5V to 5.5V		-	-	6.9	ns
B to Y propagation delay		1.65V to 1.95V		-	-	36.2	ns
		2.3V to 2.7V		-	-	14.2	ns
		2.7V		-	-	11.3	ns
		3.0V to 3.6V		-	-	10.3	ns
		4.5V to 5.5V		-	-	6.8	ns
C to Y propagation delay		1.65V to 1.95V		-	-	37.3	ns
		2.3V to 2.7V		-	-	15.4	ns
		2.7V		-	-	12.0	ns
		3.0V to 3.6V		-	-	10.8	ns
		4.5V to 5.5V		-	-	7.2	ns
D to Y propagation delay	1.65V to 1.95V	-	-	32.2	ns		
	2.3V to 2.7V	-	-	13.4	ns		
	2.7V	-	-	11.5	ns		
	3.0V to 3.6V	-	-	9.5	ns		
	4.5V to 5.5V	-	-	6.5	ns		
$\overline{\text{OE}}$ to Y enable time	t_{PZH}, t_{PZL}	1.65V to 1.95V	see Figure 5	-	-	32.0	ns
		2.3V to 2.7V		-	-	14.0	ns
		2.7V		-	-	11.0	ns
		3.0V to 3.6V		-	-	9.0	ns
		4.5V to 5.5V		-	-	6.0	ns
$\overline{\text{OE}}$ to Y disable time		1.65V to 1.95V		-	-	19.0	ns
		2.3V to 2.7V		-	-	7.3	ns
		2.7V		-	-	8.2	ns
		3.0V to 3.6V		-	-	7.4	ns
		4.5V to 5.5V		-	-	5.6	ns



4、Testing Circuit

4.1、AC Testing Circuit

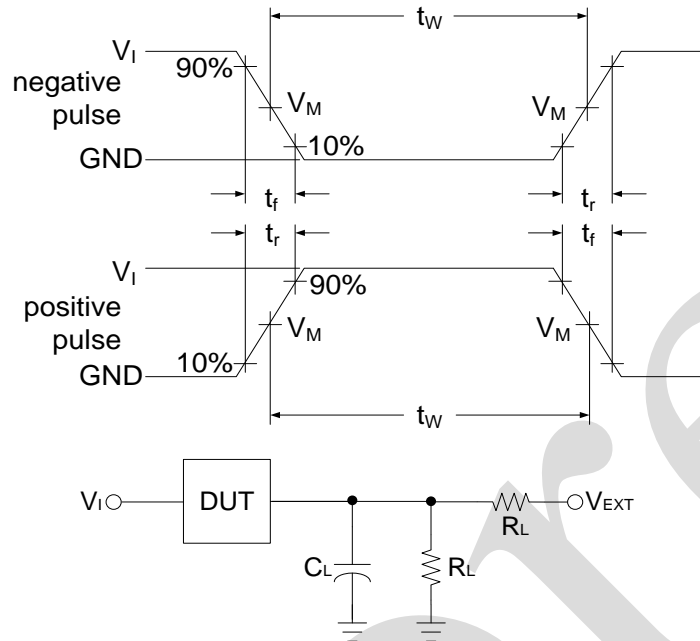


Figure 3. Load circuit

C_L includes probe and jig capacitance.

R_L =Load resistance.

4.2、Test Data

Supply voltage V_{CC}	Input		Load		V_{EXT}		
	V_I	$t_r = t_f$	C_L	R_L	t_{PLH}/t_{PHL}	t_{PLZ}/t_{PZL}	t_{PHZ}/t_{PZH}
1.65V to 1.95V	V_{CC}	$\leq 3ns$	30pF	1k Ω	Open	$2 \times V_{CC}$	GND
2.3V to 2.7V	V_{CC}	$\leq 3ns$	30pF	500 Ω	Open	$2 \times V_{CC}$	GND
2.7V	V_{CC}	$\leq 3ns$	50pF	500 Ω	Open	$2 \times V_{CC}$	GND
3.0V to 3.6V	V_{CC}	$\leq 3ns$	50pF	500 Ω	Open	$2 \times V_{CC}$	GND
4.5V to 5.5V	V_{CC}	$\leq 3ns$	50pF	500 Ω	Open	$2 \times V_{CC}$	GND



4.3、AC Testing Waveforms

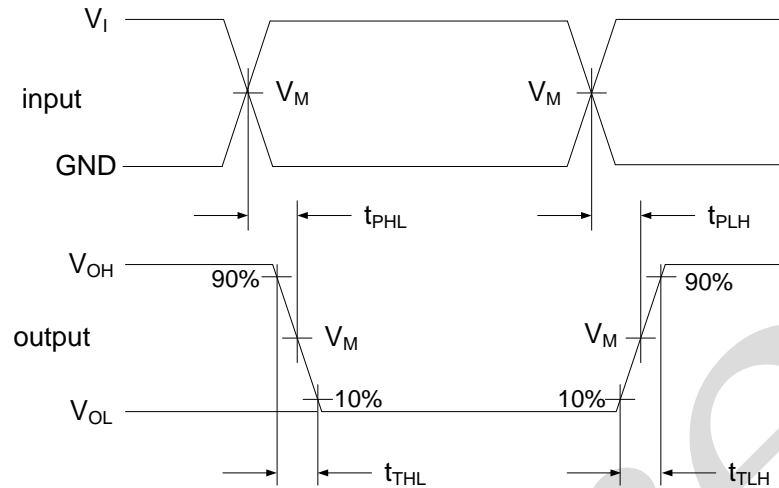


Figure 4. The data input (A、B、C、D) to output (Y) propagation delays

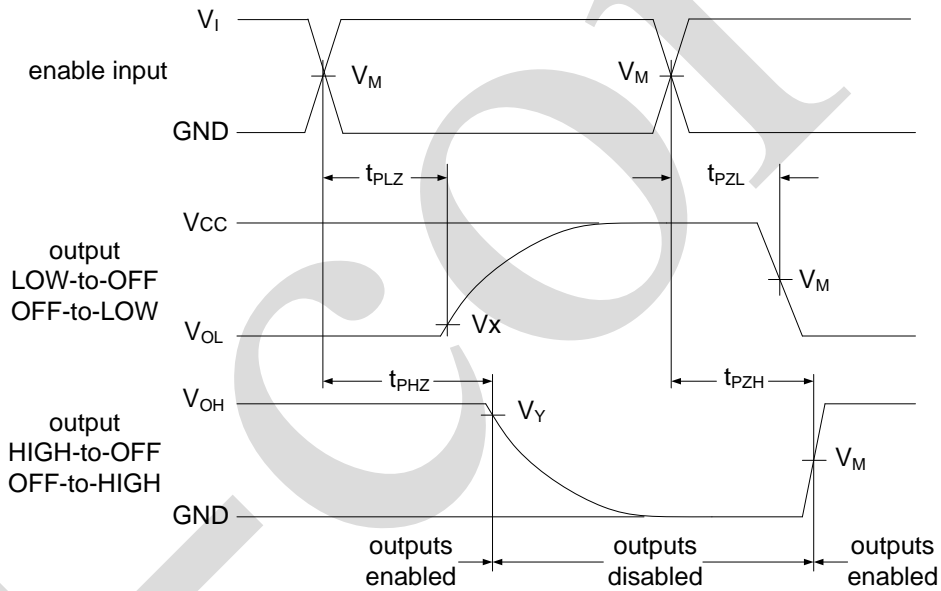


Figure 5. 3-state enable and disable times

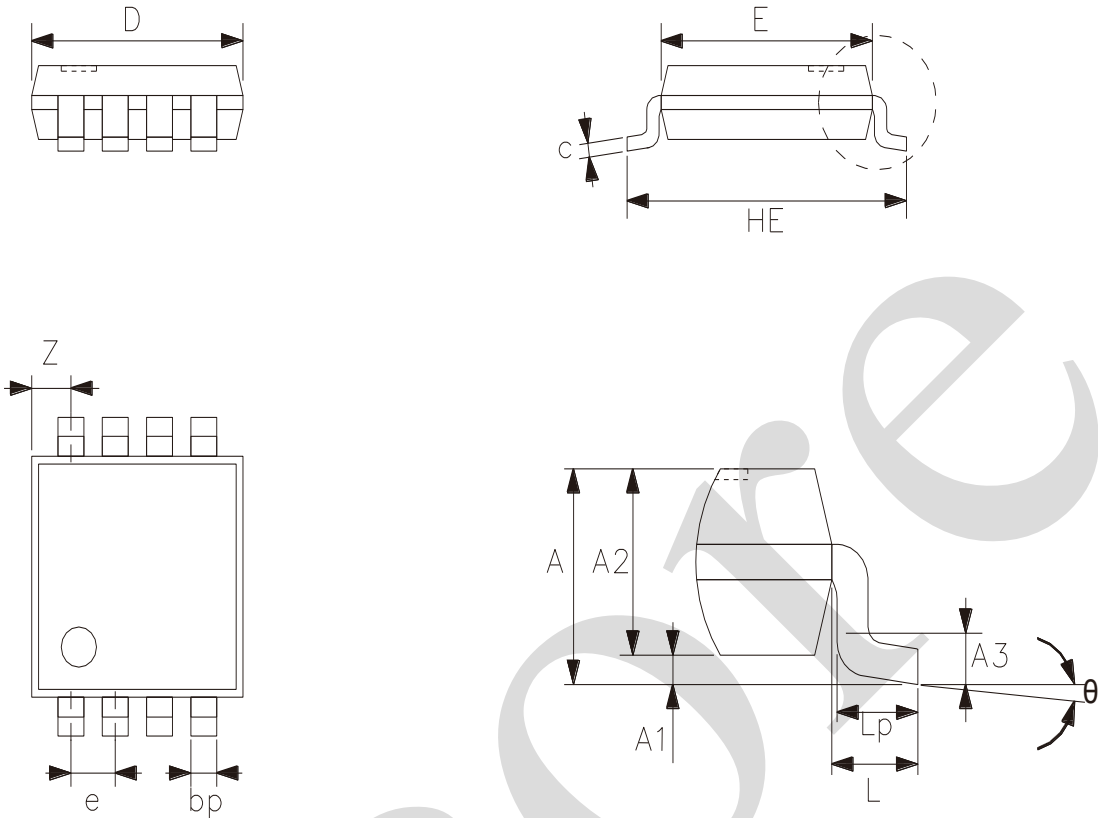
4.4、Measurement Points

Supply voltage	Input	Output		
V_{CC}	V_M	V_M	V_X	V_Y
1.65V to 1.95V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$V_{OL} + 0.15V$	$V_{OH} - 0.15V$
2.3V to 2.7V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$V_{OL} + 0.15V$	$V_{OH} - 0.15V$
2.7V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$V_{OL} + 0.3V$	$V_{OH} - 0.3V$
3.0V to 3.6V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$V_{OL} + 0.3V$	$V_{OH} - 0.3V$
4.5V to 5.5V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$V_{OL} + 0.3V$	$V_{OH} - 0.3V$



5、Package Information

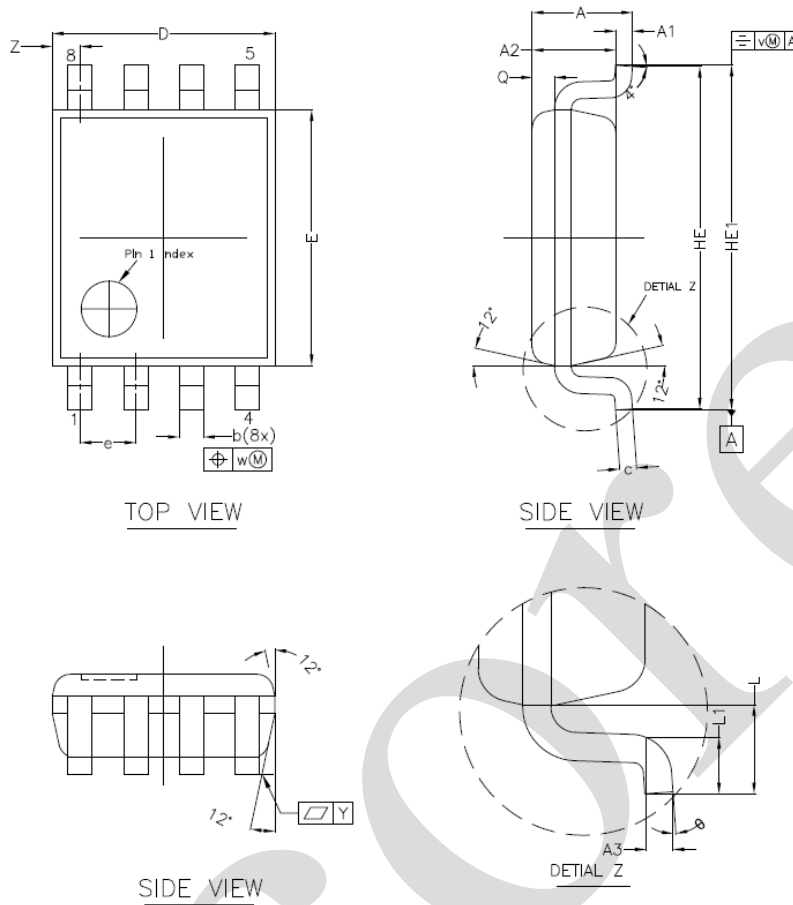
5.1、TSSOP8



2023/12/A	Dimensions In Millimeters	
Symbol	Min	Max
A	—	1.10
A1	0	0.15
A2	0.75	0.95
A3	0.25	
bp	0.22	0.38
c	0.08	0.18
D	2.90	3.10
E	2.90	3.10
HE	3.90	4.10
L	0.50	
Lp	0.33	0.47
e	0.65	
Z	0.35	0.70
θ	0°	8°



5.2、VSSOP8

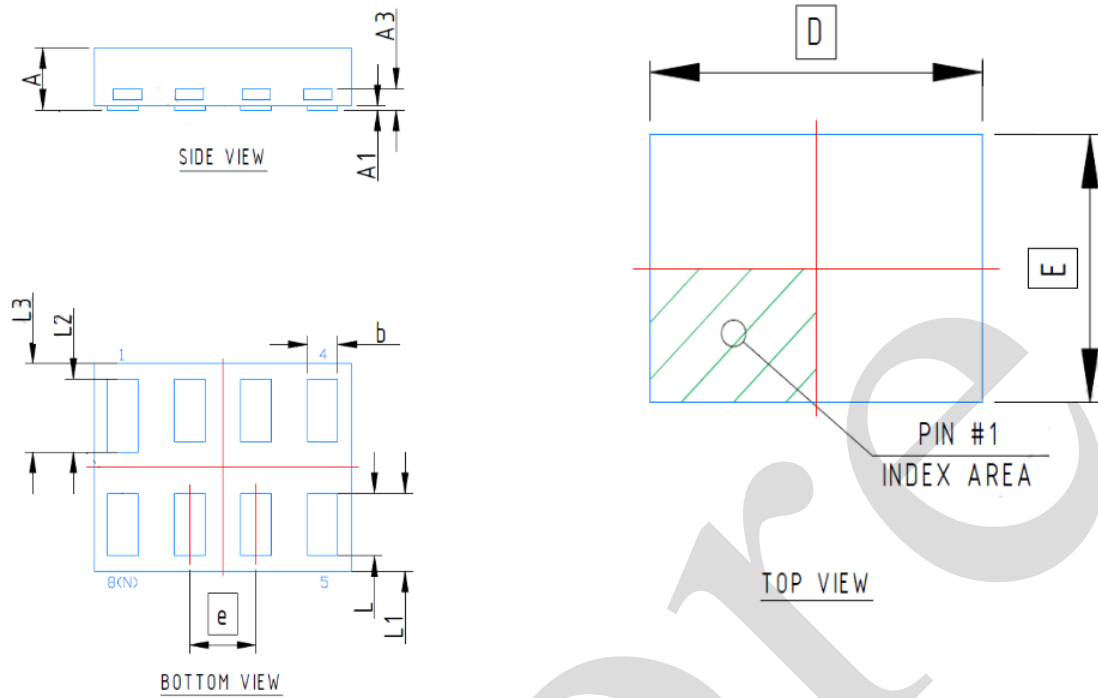


NOTES
 1.0 COP
 DIE ATTA
 2.0 D E

2023/12/A	Dimensions In Millimeters	
Symbol	Min	Max
A	—	1.00
A1	0.00	0.15
A2	0.60	0.85
A3	0.12	
Q	0.19	0.21
b	0.17	0.27
c	0.08	0.23
D	1.90	2.10
E	2.20	2.40
HE	3.00	3.20
HE1	3.00	3.40
e	0.50	
L	0.40	
L1	0.15	0.40
Y	0.10	
Z	0.10	0.40
θ	0°	8°



5.3、XSON8



2023/12/A		
Dimensions In Millimeters		
Symbol	Min	Max
A	0.28	0.32
A1	0.00	0.05
A3	0.10	
b	0.11	0.21
D	1.35	
E	1.00	
e	0.35	
L	0.25	0.35
L1	0.275	0.475
L2	0.30	0.40
L3	0.325	0.525



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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