AiP74AUP3GU04
Low Power Triple Unbuffered Inverter

Product Specification

Specification Revision History:

Version	Date	Description
2025-07-A0	2025-07	New
2025-11-A1	2025-11	Modify the parameters

Contents

1、General Description

The AiP74AUP3GU04 provides three unbuffered inverting gates.

This device ensures a very low static and dynamic power consumption across the entire V_{CC} range from 0.8V to 3.6V.

Features:

- Wide supply voltage range from 0.8V to 3.6V
- Low static power consumption; I_{CC}=1uA (maximum)
- Inputs accept voltages up to 3.6V
- Specified from -40℃ to +125℃
- Packaging information: XSON8/TSSOP8/VSSOP8

Ordering Information:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP74AUP3GU04 TA8.TR	TSSOP8	AiPJA 3GU04	3000 PCS/reel	3000 PCS/box	Dimensions of plastic enclosure: 3.0mm×3.0mm Pin spacing: 0.65mm
AiP74AUP3GU04 YA8.TR	VSSOP8	AiP JAXX	3000 PCS/reel	3000 PCS/box	Dimensions of plastic enclosure: 2.0mm×2.3mm Pin spacing: 0.50mm
AiP74AUP3GU04 EB8.TR	XSON8	JA 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 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

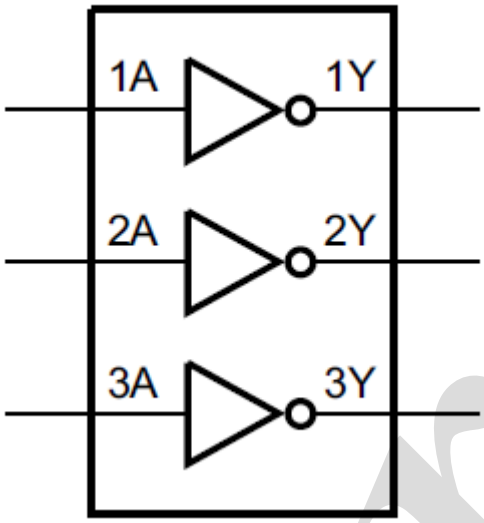


Figure 1. Logic symbol

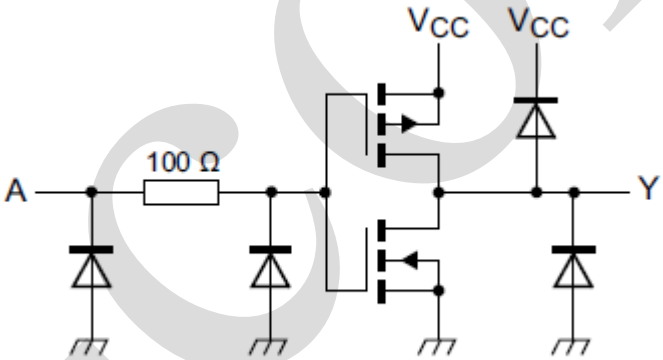
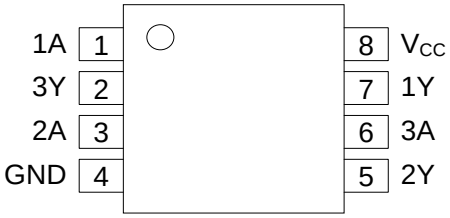
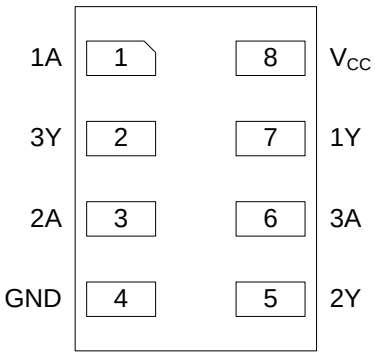


Figure 2. Logic diagram (one gate)

2.2、Pin Configurations



TSSOP8/VSSOP8



XSON8

2.3、Pin Description

Pin No.	Pin Name	Description
1, 3, 6	1A, 2A, 3A	data input
4	GND	ground (0V)
7, 5, 2	1Y, 2Y, 3Y	data output
8	V_{CC}	supply voltage

2.4、Function Table

Input	Output
nA	**nY**
L	H
H	L

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_{amb}=25℃, all voltage referenced to GND (ground=0V), unless otherwise specified)

Characteristic	Symbol	Conditions	Min.	Max.	Unit
supply voltage	V_{CC}	-	-0.5	+4.6	V
input clamping current	I_{IK}	V_I<0V	-50	-	mA
input voltage	V_I	-[1]	-0.5	+4.6	V
output clamping current	I_{OK}	V_O<0V	-50	-	mA
output voltage	V_O	Active mode[1]	-0.5	V_{CC}+0.5	V
		Power-down mode[1]	-0.5	+4.6	V
output current	I_O	V_O=0V to V_{CC}	-	±20	mA
supply current	I_{CC}	-	-	+50	mA
ground current	I_{GND}	-	-50	-	mA
storage temperature	T_{stg}	-	-65	+150	℃
total power dissipation	P_{tot}	-	-	250	mW
soldering temperature	T_L	10s	260		℃
Electrostatic discharge	ESD	HBM	8000		V

Note:

[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V_{CC}	-	0.8	-	3.6	V
input voltage	V_I	-	0	-	3.6	V
output voltage	V_O	Active mode	0	-	V_{CC}	V
		Power-down mode; V_{CC}=0V	0	-	3.6	V
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}=0.8V to 3.6V		0.75×V_{CC}	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=0.8V to 3.6V		-	-	0.25×V_{CC}	V
HIGH-level output voltage	V_{OH}	V_I= V_{CC} or GND	I_O=-20uA; V_{CC}=0.8V to 3.6V	V_{CC}-0.1	-	-	V
			I_O=-1.1mA; V_{CC}=1.1V	0.75×V_{CC}	-	-	V
			I_O=-1.7mA; V_{CC}=1.4V	1.11	-	-	V
			I_O=-1.9mA; V_{CC}=1.65V	1.32	-	-	V
			I_O=-2.3mA; V_{CC}=2.3V	2.05	-	-	V
			I_O=-3.1mA; V_{CC}=2.3V	1.9	-	-	V
			I_O=-2.7mA; V_{CC}=3.0V	2.72	-	-	V
			I_O=-4.0mA; V_{CC}=3.0V	2.6	-	-	V
LOW-level output voltage	V_{OL}	V_I= V_{CC} or GND	I_O=20uA; V_{CC}=0.8V to 3.6V	-	-	0.1	V
			I_O=1.1mA; V_{CC}=1.1V	-	-	0.3×V_{CC}	V
			I_O=1.7mA; V_{CC}=1.4V	-	-	0.31	V
			I_O=1.9mA; V_{CC}=1.65V	-	-	0.31	V
			I_O=2.3mA; V_{CC}=2.3V	-	-	0.31	V
			I_O=3.1mA; V_{CC}=2.3V	-	-	0.44	V
			I_O=2.7mA; V_{CC}=3.0V	-	-	0.31	V
			I_O=4.0mA; V_{CC}=3.0V	-	-	0.44	V
input leakage current	I_I	V_I=GND to 3.6V; V_{CC}=0V to 3.6V		-	-	±1	uA
supply current	I_{CC}	V_I=GND or V_{CC}; I_O=0A; V_{CC}=0.8V to 3.6V		-	-	1	uA

3.3.2、DC Characteristics 2

(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}=0.8V to 3.6V		0.75×V_{CC}	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=0.8V to 3.6V		-	-	0.25×V_{CC}	V
HIGH-level output voltage	V_{OH}	V_I= V_{CC} or GND	I_O=-20uA; V_{CC}=0.8V to 3.6V	V_{CC}-0.1	-	-	V
			I_O=-1.1mA; V_{CC}=1.1V	0.7×V_{CC}	-	-	V
			I_O=-1.7mA; V_{CC}=1.4V	1.03	-	-	V
			I_O=-1.9mA; V_{CC}=1.65V	1.30	-	-	V
			I_O=-2.3mA; V_{CC}=2.3V	1.97	-	-	V
			I_O=-3.1mA; V_{CC}=2.3V	1.85	-	-	V
			I_O=-2.7mA; V_{CC}=3.0V	2.67	-	-	V
			I_O=-4.0mA; V_{CC}=3.0V	2.55	-	-	V
LOW-level output voltage	V_{OL}	V_I= V_{CC} or GND	I_O=20uA; V_{CC}=0.8V to 3.6V	-	-	0.1	V
			I_O=1.1mA; V_{CC}=1.1V	-	-	0.3×V_{CC}	V
			I_O=1.7mA; V_{CC}=1.4V	-	-	0.37	V
			I_O=1.9mA; V_{CC}=1.65V	-	-	0.35	V
			I_O=2.3mA; V_{CC}=2.3V	-	-	0.33	V
			I_O=3.1mA; V_{CC}=2.3V	-	-	0.45	V
			I_O=2.7mA; V_{CC}=3.0V	-	-	0.33	V
			I_O=4.0mA; V_{CC}=3.0V	-	-	0.45	V
input leakage current	I_I	V_I=GND to 3.6V; V_{CC}=0V to 3.6V		-	-	±2	uA
supply current	I_{CC}	V_I=GND or V_{CC}; I_O=0A; V_{CC}=0.8V to 3.6V		-	-	2	uA

3.3.3、DC Characteristics 3

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

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Uni
HIGH-level input voltage	V_{IH}	V_{CC}=0.8V to 3.6V		0.75×V_{CC}	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=0.8V to 3.6V		-	-	0.25×V_{CC}	V
HIGH-level output voltage	V_{OH}	V_I=V_{IH} or V_{IL}	I_O=-20uA; V_{CC}=0.8V to 3.6V	V_{CC}-0.11	-	-	V
			I_O=-1.1mA;	0.6×V_{CC}	-	-	V
			I_O=-1.7mA;	0.93	-	-	V
			I_O=-1.9mA;	1.17	-	-	V
			I_O=-2.3mA;	1.77	-	-	V
			I_O=-3.1mA;	1.67	-	-	V
			I_O=-2.7mA;	2.40	-	-	V
			I_O=-4.0mA;	2.30	-	-	V
LOW-level output voltage	V_{OL}	V_I=V_{IH} or V_{IL}	I_O=20uA; V_{CC}=0.8V to 3.6V	-	-	0.11	V
			I_O=1.1mA; V_{CC}=1.1V	-	-	0.33×V_{CC}	V
			I_O=1.7mA; V_{CC}=1.4V	-	-	0.41	V
			I_O=1.9mA;	-	-	0.39	V
			I_O=2.3mA; V_{CC}=2.3V	-	-	0.36	V
			I_O=3.1mA; V_{CC}=2.3V	-	-	0.50	V
			I_O=2.7mA; V_{CC}=3.0V	-	-	0.36	V
			I_O=4.0mA; V_{CC}=3.0V	-	-	0.50	V
input leakage current	I_I	V_I=GND to 3.6V; V_{CC}=0V to 3.6V		-	-	±4	uA
supply current	I_{CC}	V_I=GND or V_{CC}; I_O=0A; V_{CC}=0.8V to 3.6V		-	-	4	uA

3.3.4、AC Characteristics 1

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

Parameter	Symbol	Conditions		Min.	Typ.[1]	Max.	Unit
propagation delay	t_{PLH}, t_{PHL}	nA to nY; see Figure 5	C_L=5pF				
			V_{CC}=0.8V	-	6.2	-	ns
			V_{CC}=1.1V to 1.3V	0.9	2.3	4.4	ns
			V_{CC}=1.4V to 1.6V	0.7	1.7	3.1	ns
			V_{CC}=1.65V to 1.95V	0.5	1.4	2.6	ns
			V_{CC}=2.3V to 2.7V	0.4	1.1	2	ns
			V_{CC}=3.0V to 3.6V	0.3	1	1.8	ns
			C_L=10pF				
			V_{CC}=0.8V	-	9.6	-	ns
			V_{CC}=1.1V to 1.3V	1.2	3.1	6.1	ns
			V_{CC}=1.4V to 1.6V	1	2.3	4	ns
			V_{CC}=1.65V to 1.95V	0.8	1.9	3.3	ns
			V_{CC}=2.3V to 2.7V	0.6	1.5	2.7	ns
			V_{CC}=3.0V to 3.6V	0.5	1.3	2.4	ns
			C_L=15pF				
			V_{CC}=0.8V	-	13	-	ns
			V_{CC}=1.1V to 1.3V	1.6	3.8	7.9	ns
			V_{CC}=1.4V to 1.6V	1.3	2.8	4.9	ns
			V_{CC}=1.65V to 1.95V	1	2.3	4	ns
			V_{CC}=2.3V to 2.7V	0.8	1.9	3.2	ns
			V_{CC}=3.0V to 3.6V	0.7	1.6	2.9	ns
			C_L=30pF				
			V_{CC}=0.8V	-	23.2	-	ns
			V_{CC}=1.1V to 1.3V	2.4	6	13.1	ns
			V_{CC}=1.4V to 1.6V	2	4.2	7.6	ns
			V_{CC}=1.65V to 1.95V	1.7	3.6	6.1	ns
			V_{CC}=2.3V to 2.7V	1.4	2.9	4.8	ns
			V_{CC}=3.0V to 3.6V	1.2	2.5	4.3	ns

Note:

[1] All typical values are measured at nominal V_{CC}.

3.3.5、AC Characteristics 2

(T_{amb}=-40℃ to +85℃, voltages are referenced to GND (ground=0V), unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
propagation delay	t_{PLH}, t_{PHL}	nA to nY; see Figure 5	C_L=5pF				
			V_{CC}=0.8V	-	-	-	ns
			V_{CC}=1.1V to 1.3V	0.9	-	4.8	ns
			V_{CC}=1.4V to 1.6V	0.6	-	3.4	ns
			V_{CC}=1.65V to 1.95V	0.5	-	2.9	ns
			V_{CC}=2.3V to 2.7V	0.4	-	2.3	ns
			V_{CC}=3.0V to 3.6V	0.3	-	2.1	ns
			C_L=10pF				
			V_{CC}=0.8V	-	-	-	ns
			V_{CC}=1.1V to 1.3V	1.2	-	6.8	ns
			V_{CC}=1.4V to 1.6V	0.9	-	4.6	ns
			V_{CC}=1.65V to 1.95V	0.7	-	3.8	ns
			V_{CC}=2.3V to 2.7V	0.6	-	3.1	ns
			V_{CC}=3.0V to 3.6V	0.5	-	2.7	ns
			C_L=15pF				
			V_{CC}=0.8V	-	-	-	ns
			V_{CC}=1.1V to 1.3V	1.4	-	8.8	ns
			V_{CC}=1.4V to 1.6V	1.1	-	5.7	ns
			V_{CC}=1.65V to 1.95V	0.9	-	4.7	ns
			V_{CC}=2.3V to 2.7V	0.8	-	3.7	ns
			V_{CC}=3.0V to 3.6V	0.7	-	3.3	ns
			C_L=30pF				
			V_{CC}=0.8V	-	-	-	ns
			V_{CC}=1.1V to 1.3V	2.2	-	14.8	ns
			V_{CC}=1.4V to 1.6V	1.8	-	9.0	ns
			V_{CC}=1.65V to 1.95V	1.5	-	7.2	ns
			V_{CC}=2.3V to 2.7V	1.3	-	5.7	ns
			V_{CC}=3.0V to 3.6V	1.1	-	5.1	ns

3.3.6、AC Characteristics 3

(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_{PLH}, t_{PHL}	nA to nY; see Figure 5	C_L=5pF				
			V_{CC}=0.8V	-	-	-	ns
			V_{CC}=1.1V to 1.3V	-	-	5.3	ns
			V_{CC}=1.4V to 1.6V	-	-	3.8	ns
			V_{CC}=1.65V to 1.95V	-	-	3.2	ns
			V_{CC}=2.3V to 2.7V	-	-	26	ns
			V_{CC}=3.0V to 3.6V	-	-	2.4	ns
			C_L=10pF				
			V_{CC}=0.8V	-	-	-	ns
			V_{CC}=1.1V to 1.3V	-	-	7.5	ns
			V_{CC}=1.4V to 1.6V	-	-	5.1	ns
			V_{CC}=1.65V to 1.95V	-	-	4.2	ns
			V_{CC}=2.3V to 2.7V	-	-	3.5	ns
			V_{CC}=3.0V to 3.6V	-	-	3.0	ns
			C_L=15pF				
			V_{CC}=0.8V	-	-	-	ns
			V_{CC}=1.1V to 1.3V	-	-	9.7	ns
			V_{CC}=1.4V to 1.6V	-	-	6.3	ns
			V_{CC}=1.65V to 1.95V	-	-	5.2	ns
			V_{CC}=2.3V to 2.7V	-	-	4.1	ns
			V_{CC}=3.0V to 3.6V	-	-	3.7	ns
			C_L=30pF				
			V_{CC}=0.8V	-	-	-	ns
			V_{CC}=1.1V to 1.3V	-	-	16.3	ns
			V_{CC}=1.4V to 1.6V	-	-	9.9	ns
			V_{CC}=1.65V to 1.95V	-	-	8.0	ns
			V_{CC}=2.3V to 2.7V	-	-	6.3	ns
			V_{CC}=3.0V to 3.6V	-	-	5.7	ns

4、Testing Circuit

4.1、AC Testing Circuit

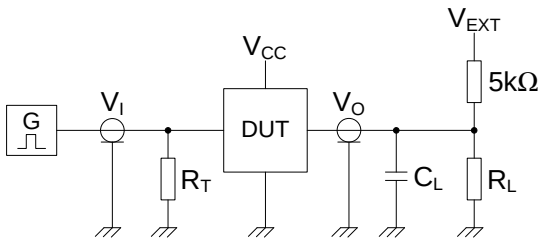


Figure 4. Test circuit for measuring switching times

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.

V_{EXT}=External voltage for measuring switching times.

4.2、AC Testing Waveforms

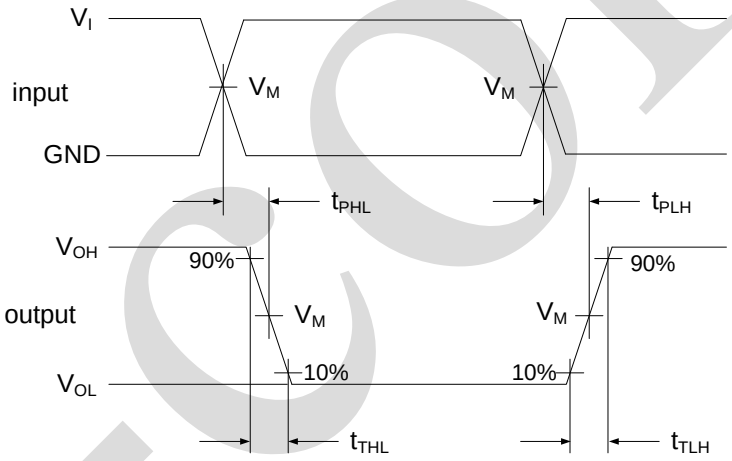


Figure 5. The data input (nA) to output (nY) propagation delays

4.3、Measurement Points

Supply voltage	Input			Output
V_{CC}	V_M	V_I	$t_r=t_f$	V_M
0.8V to 3.6V	0.5×V_{CC}	V_{CC}	≤3.0ns	0.5×V_{CC}

4.4、Test Data

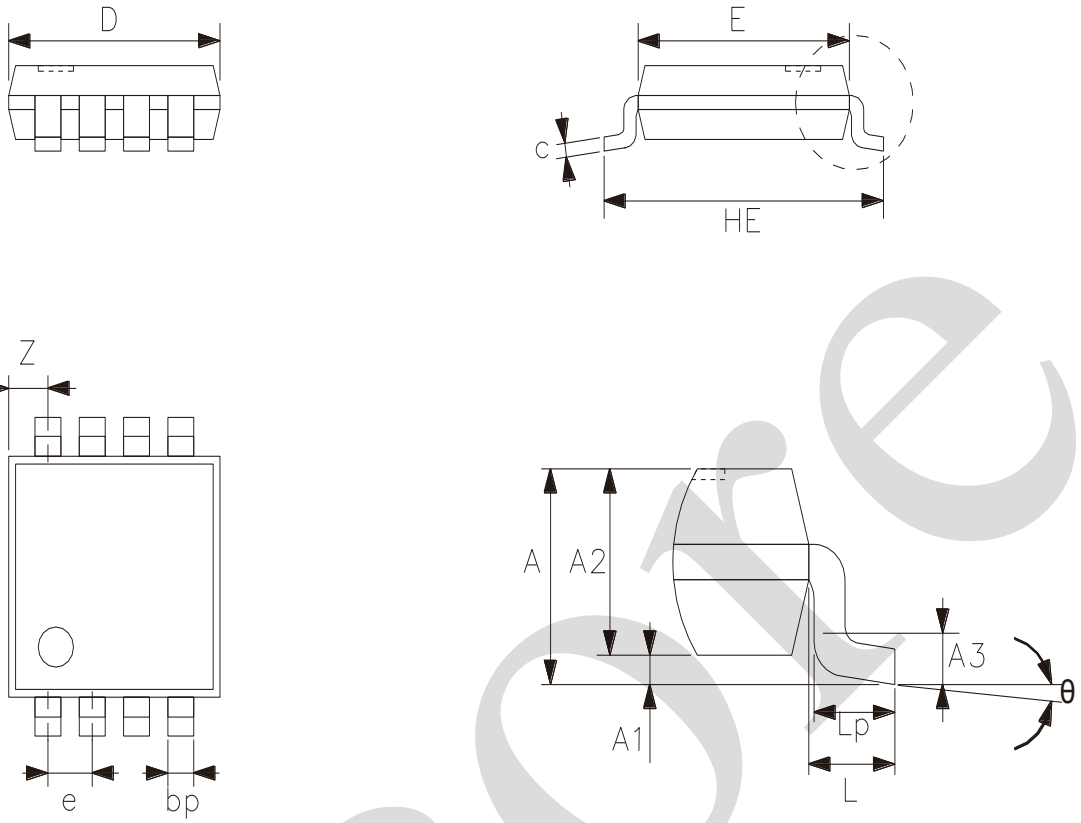
Supply voltage	Load		V_{EXT}		
V_{CC}	C_L	R_L[1]	t_{PLH}, t_{PHL}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
0.8V to 3.6V	5pF, 10pF, 15pF and 30pF	5kΩ or 1MΩ	open	GND	2×V_{CC}

Note:

[1] For measuring enable and disable times R_L=5kΩ, for measuring propagation delays, setup and hold times and pulse width R_L=1MΩ.

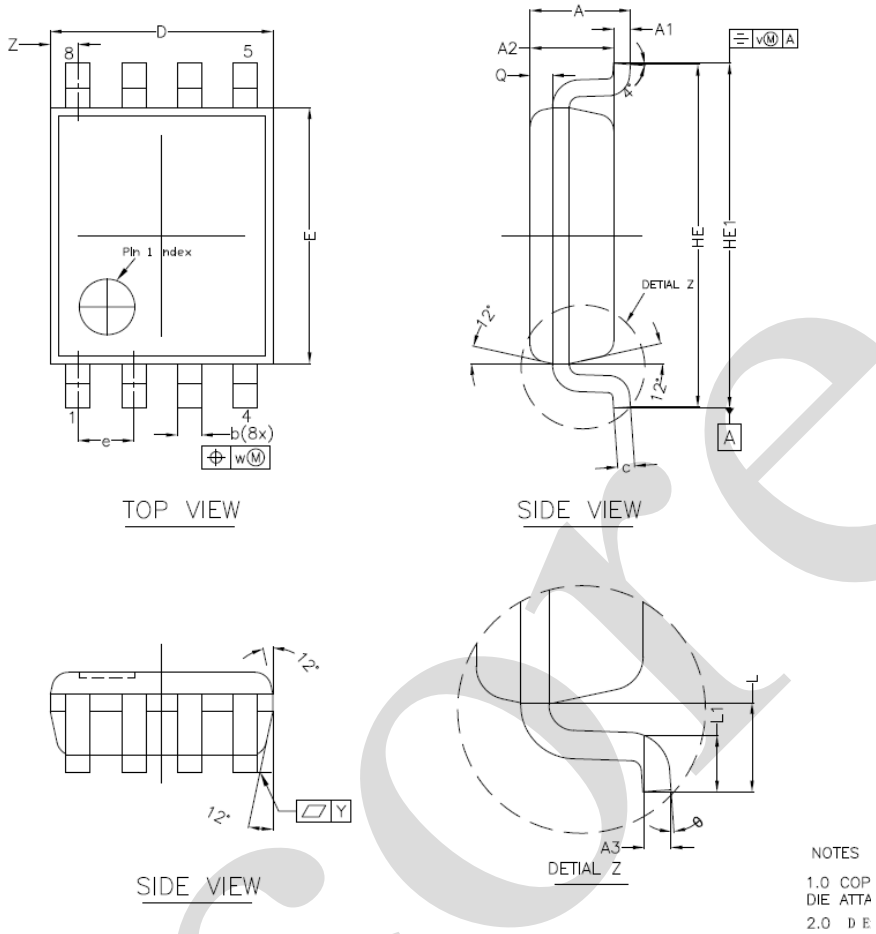
5、Package Information

5.1、TSSOP8



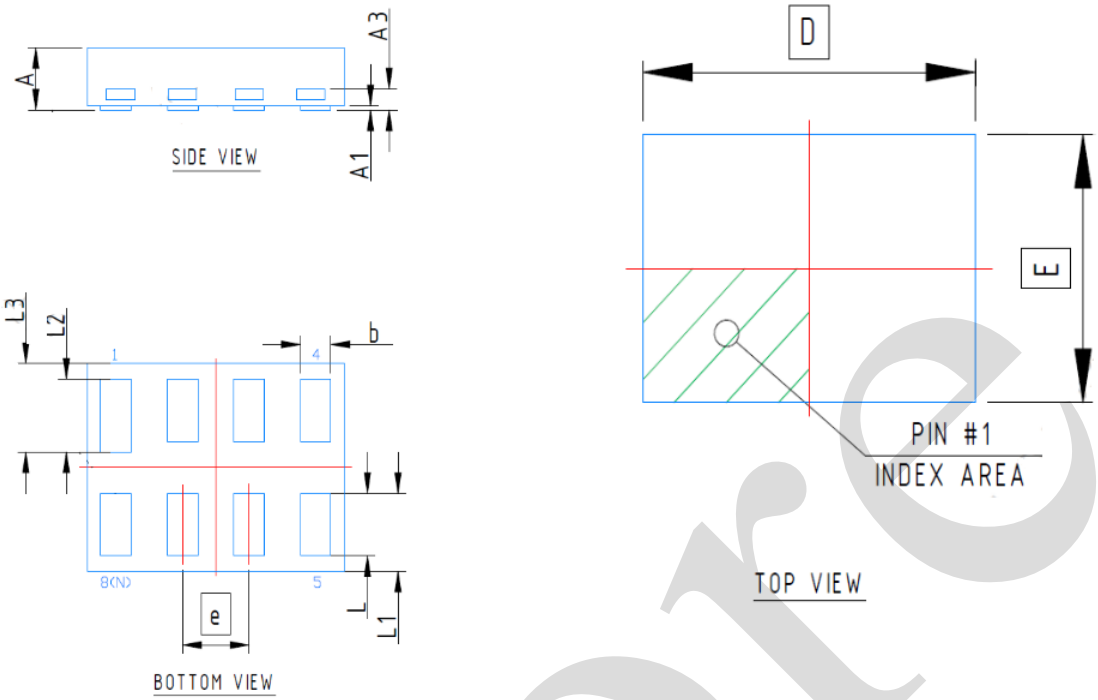
2023/12/A	Dimensions In Millimeters	
Symbol	**Min**	**Max**
A	—	1.10
A1	0	0.15
A2	0.75	0.95
A3	0.25	
bp	0.22	0.38
c	0.08	0.18
D	2.90	3.10
E	2.90	3.10
HE	3.90	4.10
L	0.50	
Lp	0.33	0.47
e	0.65	
Z	0.35	0.70
θ	0°	8°

5.2、VSSOP8



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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