AiP74AHC/AHCT2G08
Dual 2-input And Gate

Product Specification

Specification Revision History:

Version	Date	Description
2018-09-A1	2018-09	New
2023-04-B1	2023-04	Update the template

Contents

1、General Description

The AiP74AHC2G08; AiP74AHCT2G08 is a high-speed Si-gate CMOS device.

The AiP74AHC2G08; AiP74AHCT2G08 provides two 2-input AND gates.

Features:

- Symmetrical output impedance
- Low power dissipation
- Balanced propagation delays
- Specified from -40℃ to +125℃
- Packaging information: TSSOP8/VSSOP8

Ordering Information:

Tube packing specifications:

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
AiP74AHC2G08TA8.TB	TSSOP8	CPXX	100 PCS/tube	200 tube/box	20000 PCS/box	Dimensions of plastic enclosure: 3.0mm×3.0mm Pin spacing: 0.65mm
AiP74AHCT2G08TA8.TB	TSSOP8	CQXX	100 PCS/tube	200 tube/box	20000 PCS/box	Dimensions of plastic enclosure: 3.0mm×3.0mm Pin spacing: 0.65mm

Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP74AHC2G08 TA8.TR	TSSOP8	CPXX	3000 PCS/reel	3000 PCS/box	Dimensions of plastic enclosure: 3.0mm×3.0mm Pin spacing:0.65mm
AiP74AHCT2G08 TA8.TR	TSSOP8	CQXX	3000 PCS/reel	3000 PCS/box	Dimensions of plastic enclosure: 3.0mm×3.0mm Pin spacing:0.65mm
AiP74AHC2G08 YA8.TR	VSSOP8	CPXX	3000 PCS/reel	3000 PCS/box	Dimensions of plastic enclosure: 2.0mm×2.3mm Pin spacing:0.50mm
AiP74AHCT2G08 YA8.TR	VSSOP8	CQXX	3000 PCS/reel	3000 PCS/box	Dimensions of plastic enclosure: 2.0mm×2.3mm Pin spacing:0.50mm

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

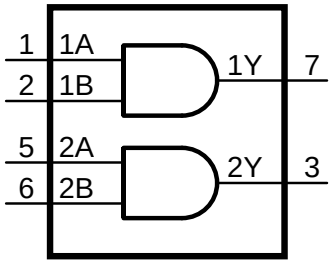


Figure 1. Logic symbol

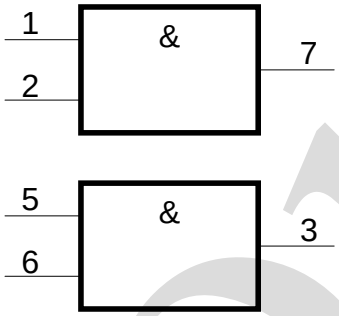


Figure 2. IEC logic symbol

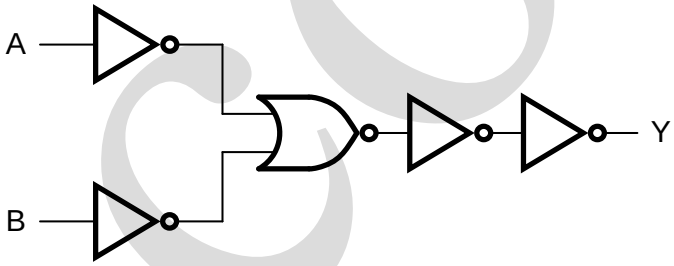
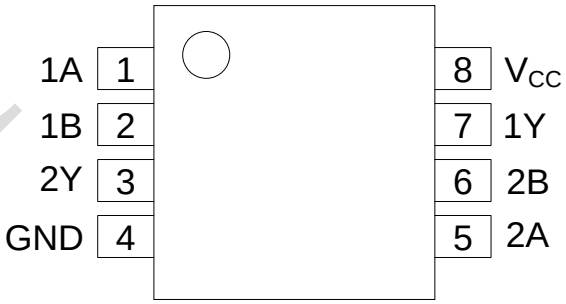


Figure 3. Logic diagram (one gate)

2.2、Pin Configurations



2.3、Pin Description

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

2.4、Function table

Input		Output
nA	nB	nY
L	L	L
L	H	L
H	L	L
H	H	H

Note: H=HIGH voltage level; L=LOW voltage level.

3、Electrical Parameter

3.1、Absolute Maximum Ratings

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

Characteristic	Symbol	Conditions	Min.	Max.	Unit
supply voltage	V_{CC}	-	-0.5	+7.0	V
input voltage	V_I	-	-0.5	+7.0	V
input clamping current	I_{IK}	V_I<-0.5V[1]	-20	-	mA
output clamping current	I_{OK}	V_O<-0.5V or V_O>V_{CC}+0.5V[1]	-	±20	mA
output current	I_O	-0.5V<V_O<V_{CC}+0.5V	-	±25	mA
supply current	I_{CC}	-	-	75	mA
ground current	I_{GND}	-	-75	-	mA
storage temperature	T_{stg}	-	-65	150	℃
total power dissipation	P_{tot}	T_{amb}=-40℃ to +125℃	-	250	mW
soldering temperature	T_L	10s	260		℃

3.2、Recommended Operating Conditions

(Voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
AiP74AHC2G08						
supply voltage	V_{CC}	-	2.0	5.0	5.5	V
input voltage	V_I	-	0	-	5.5	V
output voltage	V_O	-	0	-	V_{CC}	V
ambient temperature	T_{amb}	-	-40	-	+125	℃
input transition rise and fall rate	Δt/ΔV	V_{CC}=3.3V ±0.3V	-	-	100	ns/V
		V_{CC}=5.0V ±0.5V	-	-	20	ns/V
AiP74AHCT2G08						
supply voltage	V_{CC}	-	4.5	5.0	5.5	V
input voltage	V_I	-	0	-	5.5	V
output voltage	V_O	-	0	-	V_{CC}	V
ambient temperature	T_{amb}	-	-40	-	+125	℃
input transition rise and fall rate	Δt/ΔV	V_{CC}=3.3V ±0.3V	-	-	-	ns/V
		V_{CC}=5.0V ±0.5V	-	-	20	ns/V

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
AiP74AHC2G08							
HIGH-level input voltage	V_{IH}	V_{CC}=2.0V		1.5	-	-	V
		V_{CC}=3.0V		2.1	-	-	V
		V_{CC}=5.5V		3.85	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=2.0V		-	-	0.5	V
		V_{CC}=3.0V		-	-	0.9	V
		V_{CC}=5.5V		-	-	1.65	V
HIGH-level output voltage	V_{OH}	V_I=V_{IH} or V_{IL}	I_O=-50uA; V_{CC}=2.0V	1.9	2.0	-	V
			I_O=-50uA; V_{CC}=3.0V	2.9	3.0	-	V
			I_O=-50uA; V_{CC}=4.5V	4.4	4.5	-	V
			I_O=-4mA; V_{CC}=3.0V	2.58	-	-	V
			I_O=-8mA; V_{CC}=4.5V	3.94	-	-	V
LOW-level output voltage	V_{OL}	V_I=V_{IH} or V_{IL}	I_O=50uA; V_{CC}=2.0V	-	0	0.1	V
			I_O=50uA; V_{CC}=3.0V	-	0	0.1	V
			I_O=50uA; V_{CC}=4.5V	-	0	0.1	V
			I_O=4mA; V_{CC}=3.0V	-	-	0.36	V
			I_O=8mA; V_{CC}=4.5V	-	-	0.36	V
input leakage current	I_I	V_I=5.5V or GND; V_{CC}=0V to 5.5V		-	-	1.0	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}= 5.5V		-	-	1.0	uA
input capacitance	C_I	-		-	1.5	10	pF

AiP74AHCT2G08							
HIGH-level input voltage	V_{IH}	V_{CC}=4.5V to 5.5V		2.0	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=4.5V to 5.5V		-	-	0.8	V
HIGH-level output voltage	V_{OH}	V_I=V_{IH} or V_{IL}	I_O=-50uA; V_{CC}=4.5V	4.4	4.5	-	V
			I_O=-8mA; V_{CC}=4.5V	3.94	-	-	V
LOW-level output voltage	V_{OL}	V_I=V_{IH} or V_{IL}	I_O=50uA; V_{CC}=4.5V	-	0	0.1	V
			I_O=8mA; V_{CC}=4.5V	-	-	0.36	V
input leakage current	I_I	V_I=5.5V or GND; V_{CC}=0V to 5.5V		-	-	1.0	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}= 5.5V		-	-	1.0	uA
additional supply current	ΔI_{CC}	per input pin; V_I=3.4V; other inputs at V_{CC} or GND; I_O=0A; V_{CC}=5.5V		-	-	1.35	mA
input capacitance	C_I	-		-	1.5	10	pF

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
AiP74AHC2G08							
HIGH-level input voltage	V_{IH}	V_{CC}=2.0V		1.5	-	-	V
		V_{CC}=3.0V		2.1	-	-	V
		V_{CC}=5.5V		3.85	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=2.0V		-	-	0.5	V
		V_{CC}=3.0V		-	-	0.9	V
		V_{CC}=5.5V		-	-	1.65	V
HIGH-level output voltage	V_{OH}	V_I=V_{IH} or V_{IL}	I_O=-50uA; V_{CC}=2.0V	1.9	-	-	V
			I_O=-50uA; V_{CC}=3.0V	2.9	-	-	V
			I_O=-50uA; V_{CC}=4.5V	4.4	-	-	V
			I_O=-4mA; V_{CC}=3.0V	2.48	-	-	V
			I_O=-8mA; V_{CC}=4.5V	3.8	-	-	V
LOW-level output voltage	V_{OL}	V_I=V_{IH} or V_{IL}	I_O=50uA; V_{CC}=2.0V	-	-	0.1	V
			I_O=50uA; V_{CC}=3.0V	-	-	0.1	V
			I_O=50uA; V_{CC}=4.5V	-	-	0.1	V
			I_O=4mA; V_{CC}=3.0V	-	-	0.44	V
			I_O=8mA; V_{CC}=4.5V	-	-	0.44	V
input leakage current	I_I	V_I=5.5V or GND; V_{CC}=0V to 5.5V		-	-	1.0	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}= 5.5V		-	-	10	uA
input capacitance	C_I	-		-	-	10	pF

AiP74AHCT2G08							
HIGH-level input voltage	V_{IH}	V_{CC}=4.5V to 5.5V		2.0	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=4.5V to 5.5V		-	-	0.8	V
HIGH-level output voltage	V_{OH}	V_I=V_{IH} or V_{IL}	I_O=-50uA; V_{CC}=4.5V	4.4	-	-	V
			I_O=-8mA; V_{CC}=4.5V	3.8	-	-	V
LOW-level output voltage	V_{OL}	V_I=V_{IH} or V_{IL}	I_O=50uA; V_{CC}=4.5V	-	-	0.1	V
			I_O=8mA; V_{CC}=4.5V	-	-	0.44	V
input leakage current	I_I	V_I=5.5V or GND; V_{CC}=0V to 5.5V		-	-	1.0	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}= 5.5V		-	-	10	uA
additional supply current	ΔI_{CC}	per input pin; V_I=3.4V; other inputs at V_{CC} or GND; I_O=0A; V_{CC}=5.5V		-	-	1.5	mA
input capacitance	C_I	-		-	-	10	pF

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.	Unit
AiP74AHC2G08							
HIGH-level input voltage	V_{IH}	V_{CC}=2.0V		1.5	-	-	V
		V_{CC}=3.0V		2.1	-	-	V
		V_{CC}=5.5V		3.85	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=2.0V		-	-	0.5	V
		V_{CC}=3.0V		-	-	0.9	V
		V_{CC}=5.5V		-	-	1.65	V
HIGH-level output voltage	V_{OH}	V_I=V_{IH} or V_{IL}	I_O=-50uA; V_{CC}=2.0V	1.9	-	-	V
			I_O=-50uA; V_{CC}=3.0V	2.9	-	-	V
			I_O=-50uA; V_{CC}=4.5V	4.4	-	-	V
			I_O=-4mA; V_{CC}=3.0V	2.4	-	-	V
			I_O=-8mA; V_{CC}=4.5V	3.7	-	-	V
LOW-level output voltage	V_{OL}	V_I=V_{IH} or V_{IL}	I_O=50uA; V_{CC}=2.0V	-	-	0.1	V
			I_O=50uA; V_{CC}=3.0V	-	-	0.1	V
			I_O=50uA; V_{CC}=4.5V	-	-	0.1	V
			I_O=4mA; V_{CC}=3.0V	-	-	0.55	V
			I_O=8mA; V_{CC}=4.5V	-	-	0.55	V
input leakage current	I_I	V_I=5.5V or GND; V_{CC}=0V to 5.5V		-	-	2.0	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}= 5.5V		-	-	40	uA
input capacitance	C_I	-		-	-	10	pF

AiP74AHCT2G08							
HIGH-level input voltage	V_{IH}	V_{CC}=4.5V to 5.5V		2.0	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=4.5V to 5.5V		-	-	0.8	V
HIGH-level output voltage	V_{OH}	V_I=V_{IH} or V_{IL}	I_O=-50uA; V_{CC}=4.5V	4.4	-	-	V
			I_O=-8mA; V_{CC}=4.5V	3.7	-	-	V
LOW-level output voltage	V_{OL}	V_I=V_{IH} or V_{IL}	I_O=50uA; V_{CC}=4.5V	-	-	0.1	V
			I_O=8mA; V_{CC}=4.5V	-	-	0.55	V
input leakage current	I_I	V_I=5.5V or GND; V_{CC}=0V to 5.5V		-	-	2.0	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}= 5.5V		-	-	40	uA
additional supply current	ΔI_{CC}	per input pin; V_I=3.4V; other inputs at V_{CC} or GND; I_O=0A; V_{CC}=5.5V		-	-	1.5	mA
input capacitance	C_I	-		-	-	10	pF

3.3.4、AC Characteristics 1

(T_{amb}=25℃, GND=0V, unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
AiP74AHC2G08							
propagation delay	t_{pd}	nA, nB to nY; see Figure 5 [1]	V_{CC}=3.0V to 3.6V[2]				
			C_L=15pF	-	4.6	8.8	ns
			C_L=50pF	-	6.5	12.3	ns
			V_{CC}=4.5V to 5.5V[3]				
			C_L=15pF	-	3.2	5.9	ns
			C_L=50pF	-	4.6	7.9	ns
Power dissipation capacitance	C_{PD}	per buffer; C_L=50pF; f_i=1MHz; V_I=GND to V_{CC} [4]		-	17	-	pF
AiP74AHCT2G08							
propagation delay	t_{pd}	nA, nB to nY; see Figure 5 [1]	V_{CC}=4.5V to 5.5V[3]				
			C_L=15pF	-	3.6	6.2	ns
			C_L=50pF	-	5.1	7.9	ns
Power dissipation capacitance	C_{PD}	per buffer; C_L=50pF; f_i=1MHz; V_I=GND to V_{CC} [4]		-	19	-	pF

Note:

[1] t_{pd} is the same as t_{PLH} and t_{PHL}.

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

[3] Typical values are measured at V_{CC}=5.0V.

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

P_D=C_{PD} ×V_{CC}^2 ×f_i ×N+∑(C_L ×V_{CC}^2 ×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 Volts.

N=number of inputs switching;

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

3.3.5、AC Characteristics 2

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

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
AiP74AHC2G08							
propagation delay	t_{pd}	nA, nB to nY; see Figure 5 [1]	V_{CC}=3.0V to 3.6V[2]				
			C_L=15pF	1.0	-	10.5	ns
			C_L=50pF	1.0	-	14.0	ns
			V_{CC}=4.5V to 5.5V[3]				
			C_L=15pF	1.0	-	7.0	ns
			C_L=50pF	1.0	-	9.0	ns
AiP74AHCT2G08							
propagation delay	t_{pd}	nA, nB to nY; see Figure 5 [1]	V_{CC}=4.5V to 5.5V[3]				
			C_L=15pF	1.0	-	7.1	ns
			C_L=50pF	1.0	-	9.0	ns

Note:

[1] t_{pd} is the same as t_{PLH} and t_{PHL}.

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

[3] Typical values are measured at V_{CC}=5.0V.

3.3.6、AC Characteristics 3

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

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
AiP74AHC2G08							
propagation delay	t_{pd}	nA, nB to nY; see Figure 5 [1]	V_{CC}=3.0V to 3.6V[2]				
			C_L=15pF	1.0	-	12.0	ns
			C_L=50pF	1.0	-	16.0	ns
			V_{CC}=4.5V to 5.5V[3]				
			C_L=15pF	1.0	-	8.0	ns
			C_L=50pF	1.0	-	10.5	ns
AiP74AHCT2G08							
propagation delay	t_{pd}	nA, nB to nY; see Figure 5 [1]	V_{CC}=4.5V to 5.5V[3]				
			C_L=15pF	1.0	-	8.0	ns
			C_L=50pF	1.0	-	10.5	ns

Note:

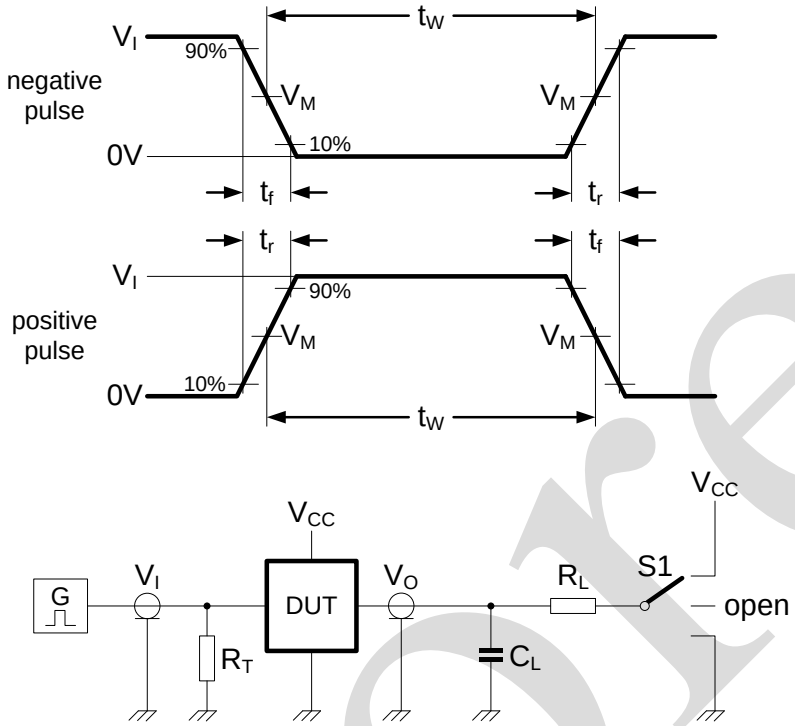
[1] t_{pd} is the same as t_{PLH} and t_{PHL}.

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

[3] Typical values are measured at V_{CC}=5.0V.

4、Testing Circuit

4.1、AC Testing Circuit



Definitions test circuit:

R_T=Termination resistance should be equal to output impedance Z_o of the pulse generator.

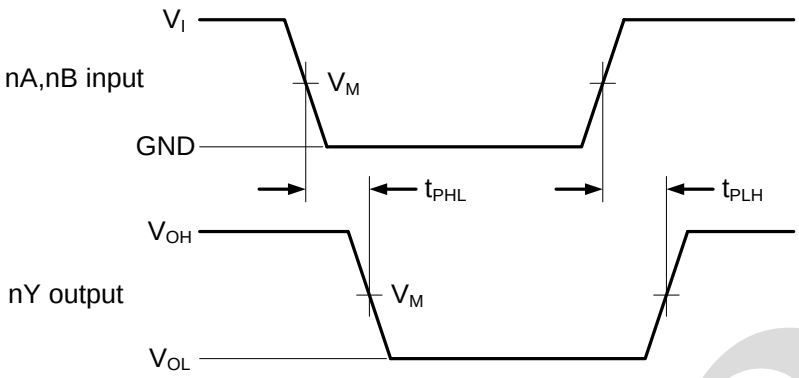
C_L=Load capacitance including jig and probe capacitance.

R_L=Load resistance.

S1=Test selection switch.

Figure 4. Test circuit for measuring switching times

4.2、AC Testing Waveforms



Logic levels: V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

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

4.3、Measurement Points

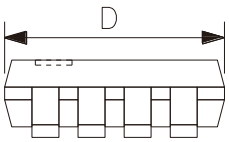
Type	Input	Output
	V_M	V_M
AiP74AHC2G08	$0.5\times V_{CC}$	$0.5\times V_{CC}$
AiP74AHCT2G08	1.5V	$0.5\times V_{CC}$

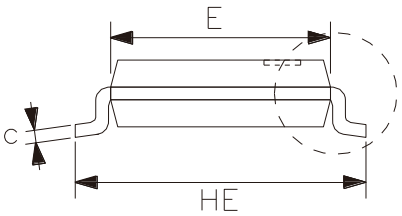
4.4、Test Data

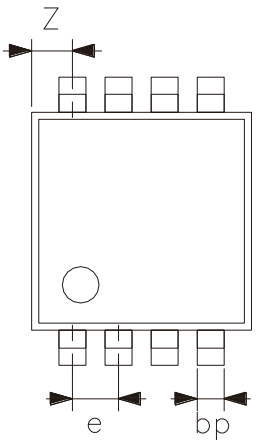
Type	Input		Load		S1 position		
	V_I	t_r, t_f	C_L	R_L	t_{PHL}, t_{PLH}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
AiP74AHC2G08	V_{CC}	≤3ns	15pF, 50pF	1kΩ	open	GND	V_{CC}
AiP74AHCT2G08	3V	≤3ns	15pF, 50pF	1kΩ	open	GND	V_{CC}

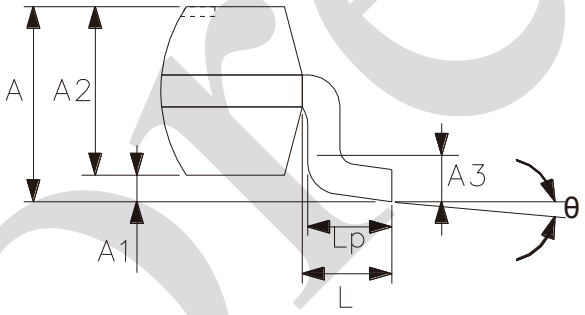
5、Package Information

5.1、TSSOP8



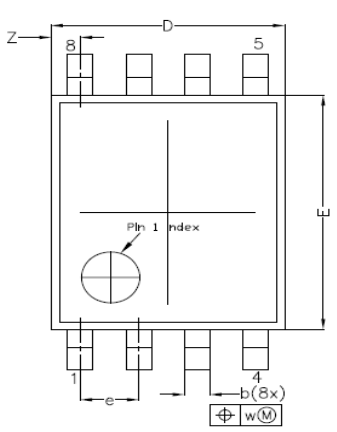




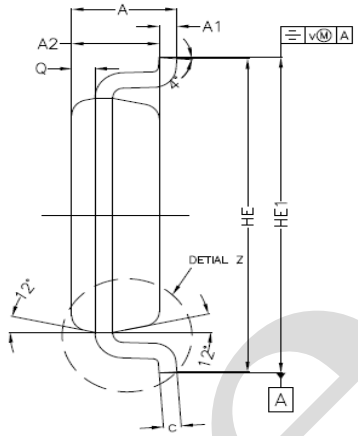


Symbol	Dimensions (mm)	
	Min.	Max.
A	-	1.10
A1	0	0.15
A2	0.75	0.95
A3	0.25	
bp	0.22	0.38
c	0.08	0.18
D	2.90	3.10
E	2.90	3.10
HE	3.90	4.10
L	0.50	
Lp	0.33	0.47
e	0.65	
Z	0.35	0.70
θ	0°	8°

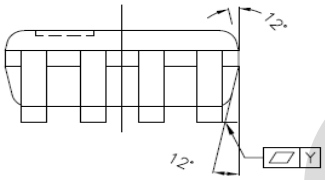
5.2、VSSOP8



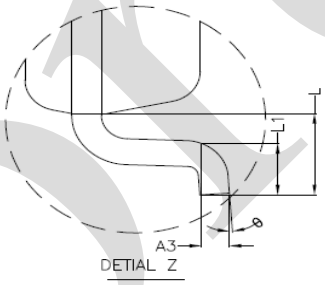
TOP VIEW



SIDE VIEW



SIDE VIEW



Symbol	Dimensions (mm)	
	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°

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.

The information in this chapter is provided for reference only and i-Core disclaims any express or implied warranties, including but not limited to applicability, special application or non-infringement of third party rights.

This product is not suitable for critical equipment such as life-saving, life-sustaining or safety equipment. It is also not suitable for applications that may result in personal injury, death, or serious property or environmental damage due to product malfunction or failure. I-Core will not be liable for any damages incurred by the customers at their own risk for such applications.

The customer is responsible for conducting all necessary tests i-Core's application to avoid failure in the application or the application of the customer' s third party users. I-Core does not accept any liability.

The Company reserves the right to change or improve the information published in this chapter at any time. The information in this chapter are subject to change without notice. We recommend the customer to consult our sales staff before purchasing.

Please obtain related materials form i-Core's regular channels and we are not responsible for its content if it is provided by sources other than our company.

In case of any conflict between the Chinese and English version, the version is subject to the Chinese one.