



AiP74AHC/AHCT1G00

Single 2-input NAND Gate

Product Specification

Specification Revision History:

Version	Date	Description
2018-03-A1	2018-03	New
2023-04-B1	2023-04	Update the template



Contents

1、General Description.....	3
2、Block Diagram And Pin Description	4
2.1、Block Diagram	4
2.2、Pin Configurations.....	4
2.3、Pin Description.....	4
2.4、Function Table.....	5
3、Electrical Parameter	5
3.1、Absolute Maximum Ratings.....	5
3.2、Recommended Operating Conditions	5
3.3、Electrical Characteristics.....	6
3.3.1、DC Characteristics 1	6
3.3.2、DC Characteristics 2	7
3.3.3、DC Characteristics 3.....	8
3.3.4、AC Characteristics 1	9
3.3.5、AC Characteristics 2.....	10
3.3.6、AC Characteristics 3.....	10
4、Testing Circuit	11
4.1、AC Testing Circuit	11
4.2、AC Testing Waveforms.....	11
4.3、Measurement Points	11
5、Package Information	12
5.1、SOT23-5.....	12
5.2、SOT353.....	13
6、Statements And Notes	14
6.1、The name and content of Hazardous substances or Elements in the product.....	14
6.2、Notes	14



1、General Description

AiP74AHC1G00 and AiP74AHCT1G00 are high-speed Si-gate CMOS devices. They provide a 2-input NAND function.

The AHC device has CMOS input switching levels and supply voltage range 2V to 5.5V.

The AHCT device has TTL input switching levels and supply voltage range 4.5V to 5.5V.

Features:

- Symmetrical output impedance
- Low power dissipation
- Balanced propagation delays
- Specified from -40°C to +125°C
- Packaging information: SOT23-5/SOT353

Ordering Information:

Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP74AHC1G00GB235.TR	SOT23-5	CKXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing:0.95mm
AiP74AHC1G00GC353.TR	SOT353	CKXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.1mm×1.3mm Pin spacing:0.65mm
AiP74AHCT1G00GB235.TR	SOT23-5	BYXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing:0.95mm
AiP74AHCT1G00GC353.TR	SOT353	BYXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.1mm×1.3mm Pin spacing:0.65mm

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

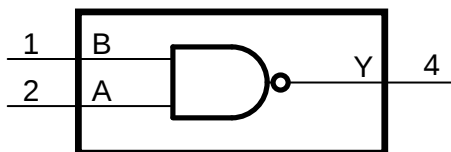


Figure 1. Logic symbol

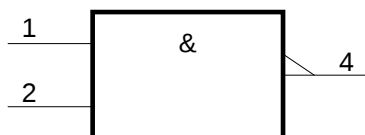


Figure 2. IEC logic symbol

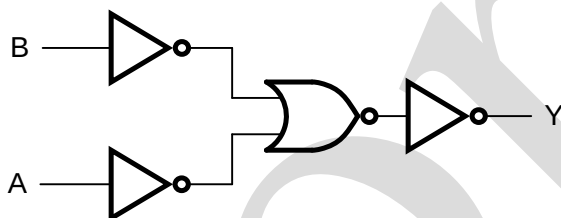
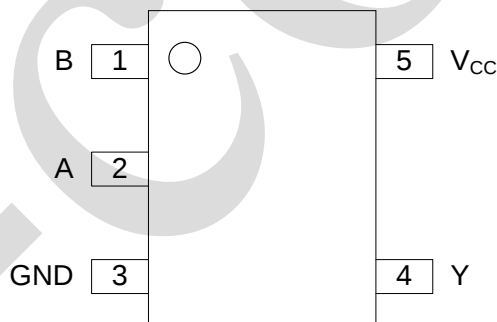


Figure 3. Logic diagram

2.2、Pin Configurations



2.3、Pin Description

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



2.4、Function Table

Input		Output
A	B	Y
L	L	H
L	H	H
H	L	H
H	H	L

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

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 voltage	V_I	-	-0.5	+7.0	V
input clamping current	I_{IK}	$V_I < -0.5V$	-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	°C
total power dissipation	P_{tot}	-	-	250	mW
Soldering temperature	T_L	10s	260		°C

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

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
AiP74AHC1G00						
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	°C
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
AiP74AHCT1G00						
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	°C
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

($T_{amb}=25^{\circ}\text{C}$, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
AiP74AHC1G00							
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 =-50μA; V _{CC} =2.0V	1.9	2.0	-	V
			I _O =-50μA; V _{CC} =3.0V	2.9	3.0	-	V
			I _O =-50μA; 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 =50μA; V _{CC} =2.0V	-	0	0.1	V
			I _O =50μA; V _{CC} =3.0V	-	0	0.1	V
			I _O =50μA; 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	μA
supply current	I _{CC}	V _I =V _{CC} or GND; I _O =0A; V _{CC} = 5.5V		-	-	1.0	μA
input capacitance	C _I	-		-	1.5	10	pF
AiP74AHCT1G00							
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 =-50μA; 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 =50μA; 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	μA
supply current	I _{CC}	V _I =V _{CC} or GND; I _O =0A; V _{CC} = 5.5V		-	-	1.0	μA
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
AiP74AHC1G00							
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 =-50μA; V _{CC} =2.0V	1.9	-	-	V
			I _O =-50μA; V _{CC} =3.0V	2.9	-	-	V
			I _O =-50μA; 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 =50μA; V _{CC} =2.0V	-	-	0.1	V
			I _O =50μA; V _{CC} =3.0V	-	-	0.1	V
			I _O =50μA; 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	μA
supply current	I _{CC}	V _I =V _{CC} or GND; I _O =0A; V _{CC} = 5.5V		-	-	10	μA
input capacitance	C _I	-		-	-	10	pF
AiP74AHCT1G00							
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 =-50μA; 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 =50μA; 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	μA
supply current	I _{CC}	V _I =V _{CC} or GND; I _O =0A; V _{CC} = 5.5V		-	-	10	μA
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

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

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
AiP74AHC1G00							
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 =-50μA; V _{CC} =2.0V	1.9	-	-	V
			I _O =-50μA; V _{CC} =3.0V	2.9	-	-	V
			I _O =-50μA; 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 =50μA; V _{CC} =2.0V	-	-	0.1	V
			I _O =50μA; V _{CC} =3.0V	-	-	0.1	V
			I _O =50μA; 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	μA
supply current	I _{CC}	V _I =V _{CC} or GND; I _O =0A; V _{CC} = 5.5V		-	-	40	μA
input capacitance	C _I	-		-	-	10	pF
AiP74AHCT1G00							
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 =-50μA; 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 =50μA; 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	μA
supply current	I _{CC}	V _I =V _{CC} or GND; I _O =0A; V _{CC} = 5.5V		-	-	40	μA
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

($T_{amb}=25^{\circ}\text{C}$, $\text{GND}=0\text{V}$, $t_r=t_f\leq 3.0\text{ns}$, unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
AiP74AHC1G00							
propagation delay	t _{pd}	A and B to Y; see Figure 5 ^[1]	V _{CC} =3.0V to 3.6V ^[2]				
			C _L =15pF	-	4.5	7.9	ns
			C _L =50pF	-	6.5	11.4	ns
			V _{CC} =4.5V to 5.5V ^[3]				
			C _L =15pF	-	3.5	5.5	ns
		C _L =50pF	-	4.9	7.5	ns	
Power dissipation capacitance	C _{PD}	per buffer; C _L =50pF; f=1MHz; V _I = GND to V _{CC} ^[4]	-	17	-	pF	
AiP74AHCT1G00							
propagation delay	t _{pd}	A and B to Y; see Figure 5 ^[1]	V _{CC} =4.5V to 5.5V ^[3]				
			C _L =15pF	-	3.6	6.2	ns
			C _L =50pF	-	5.0	7.9	ns
Power dissipation capacitance	C _{PD}	per buffer; V _I = GND to V _{CC} ^[4]	-	18	-	pF	

Note:

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

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

[3] Typical values are measured at $V_{CC}=5\text{V}$.

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

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



3.3.5、AC Characteristics 2

($T_{amb} = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $GND=0V$, $t_r=t_f \leq 3.0\text{ns}$, unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
AiP74AHC1G00							
propagation delay	t _{pd}	A and B to Y; see Figure 5 ^[1]	V _{CC} =3.0V to 3.6V ^[2]				
			C _L =15pF	1.0	-	9.5	ns
			C _L =50pF	1.0	-	13.0	ns
			V _{CC} =4.5V to 5.5V ^[3]				
			C _L =15pF	1.0	-	6.5	ns
			C _L =50pF	1.0	-	8.5	ns
AiP74AHCT1G00							
propagation delay	t _{pd}	A and B to Y; 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 $V_{CC}=5V$.

3.3.6、AC Characteristics 3

($T_{amb} = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, $GND=0V$, $t_r=t_f \leq 3.0\text{ns}$, unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
AiP74AHC1G00							
propagation delay	t _{pd}	A and B to Y; 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	-	14.5	ns
			V _{CC} =4.5V to 5.5V ^[3]				
			C _L =15pF	1.0	-	7.0	ns
			C _L =50pF	1.0	-	9.5	ns
AiP74AHCT1G00							
propagation delay	t _{pd}	A and B to Y; 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	-	10.0	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 $V_{CC}=5V$.



4、Testing Circuit

4.1、AC Testing Circuit

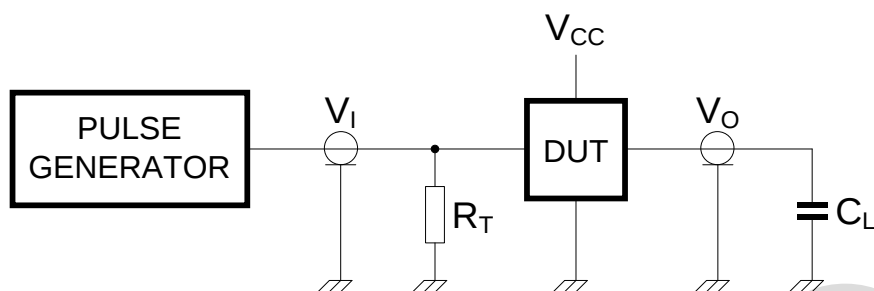


Figure 4. Test circuit for measuring switching times

Definitions for test circuit:

C_L =Load capacitance including jig and probe capacitance.

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

4.2、AC Testing Waveforms

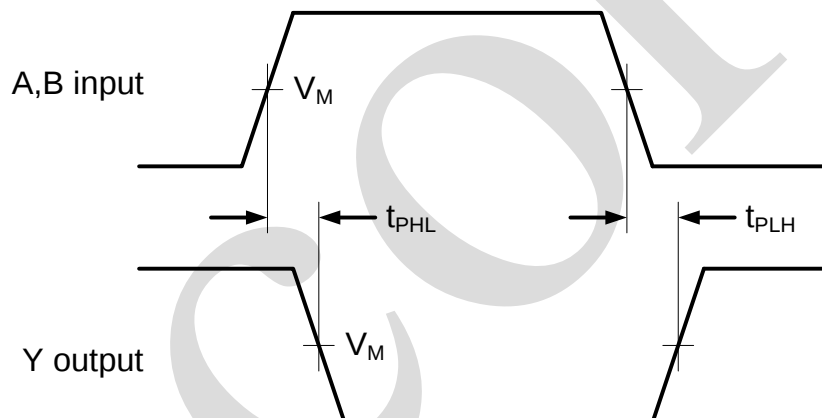


Figure 5. The inputs (A and B) to output (Y) propagation delays

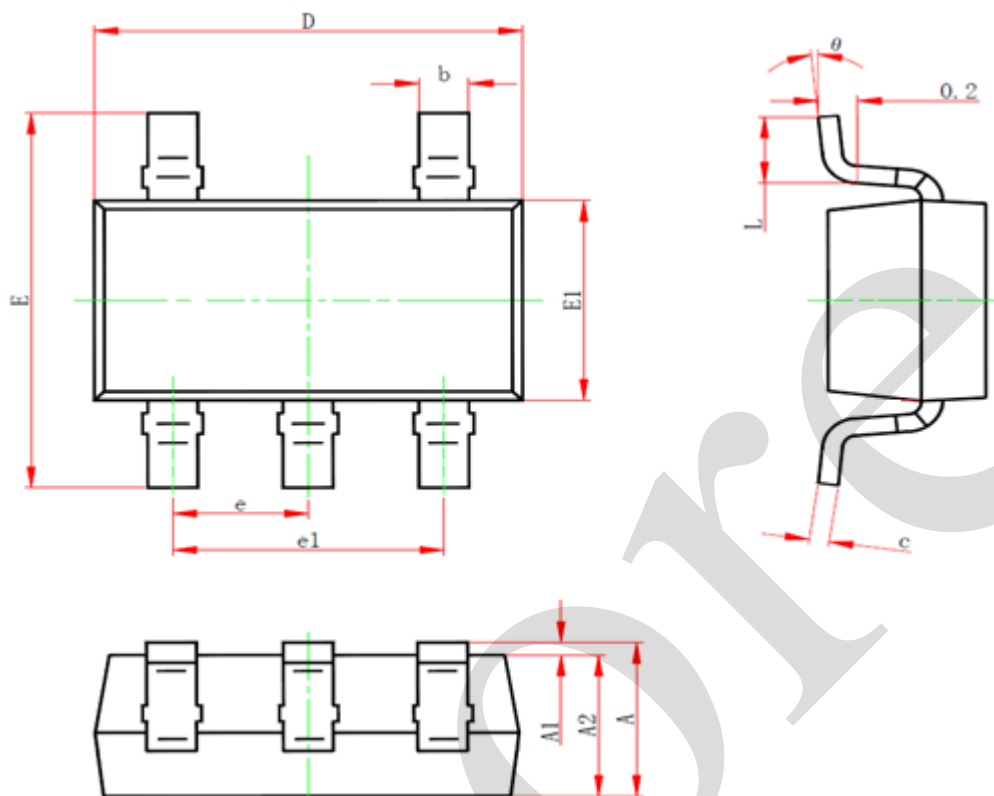
4.3、Measurement Points

Type	Input		Output
	V_I	V_M	V_M
AiP74AHC1G00	GND to V_{CC}	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
AiP74AHCT1G00	GND to 3.0V	1.5V	$0.5 \times V_{CC}$



5、Package Information

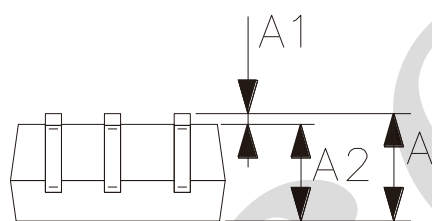
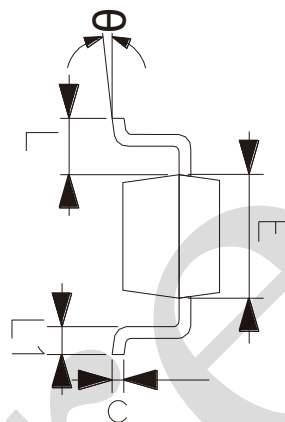
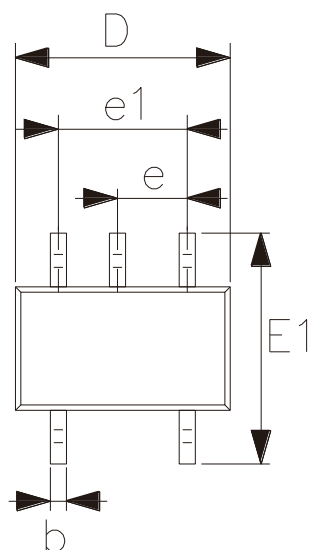
5.1、SOT23-5



Symbol	Dimensions (mm)	
	Min.	Max.
A	-	1.26
A1	0.00	0.12
A2	1.00	1.20
b	0.30	0.50
c	0.10	0.20
D	2.82	3.02
E	2.60	3.00
E1	1.50	1.70
e	0.95	
e1	1.80	2.00
L	0.30	0.60
θ	0°	8°



5.2、SOT353



Symbol	Dimensions (mm)	
	Min.	Max.
A	0.90	1.10
A1	0.00	0.10
A2	0.90	1.00
b	0.15	0.35
c	0.11	0.175
D	2.00	2.20
E	1.15	1.35
E1	2.15	2.45
e	0.65	
e1	1.20	1.40
L	0.525	
L1	0.26	0.46
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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