AiP74AHC1GU04
Single Unbuffered Inverter

Product Specification

Specification Revision History:

Version	Date	Description
2018-10-A1	2018-10	New
2023-04-B1	2023-04	Update the template

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1、General Description

The AiP74AHC1GU04 is a high-speed Si-gate CMOS device. It provides an inverting single stage function.

Features:

- Wide supply voltage range from 2V to 5.5V
- Low power consumption
- Specified from -40℃ to +125℃
- Packaging information: SOT-23-5/SOT-353

Ordering Information:

Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP74AHC1GU04GB235.TR	SOT-23-5	CAXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing:0.95mm
AiP74AHC1GU04GC353.TR	SOT-353	CAXX	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

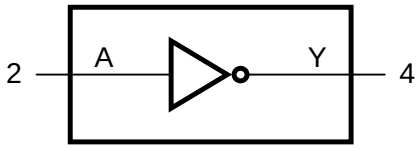


Figure 1. Logic symbol

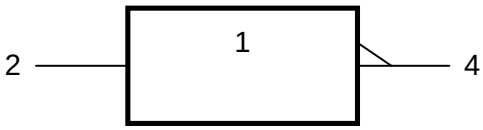


Figure 2. IEC logic symbol

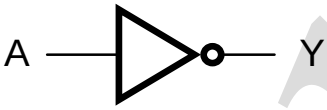
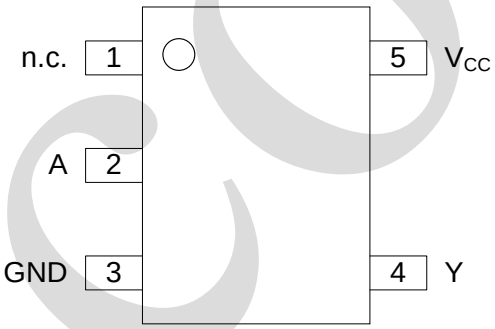


Figure 3. Logic diagram

2.2、Pin Configurations



2.3、Pin Description

Pin No.	Pin Name	Description
1	n.c.	not connected
2	A	data input
3	GND	ground (0V)
4	Y	data output
5	V_{CC}	supply voltage

2.4、Function Table

Input	Output
A	**Y**
L	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	-	±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}	-	-	250	mW
Soldering temperature	T_L	10s	260		℃

3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
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}=3.0V to 3.6V	-	-	100	ns/V
		V_{CC}=4.5V to 5.5V	-	-	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
HIGH-level input voltage	V_{IH}	V_{CC}=2.0V		1.7	-	-	V
		V_{CC}=3.0V		2.4	-	-	V
		V_{CC}=5.5V		4.4	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=2.0V		-	-	0.3	V
		V_{CC}=3.0V		-	-	0.6	V
		V_{CC}=5.5V		-	-	1.1	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

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}=2.0V		1.7	-	-	V
		V_{CC}=3.0V		2.4	-	-	V
		V_{CC}=5.5V		4.4	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=2.0V		-	-	0.3	V
		V_{CC}=3.0V		-	-	0.6	V
		V_{CC}=5.5V		-	-	1.1	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

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
HIGH-level input voltage	V_{IH}	V_{CC}=2.0V		1.7	-	-	V
		V_{CC}=3.0V		2.4	-	-	V
		V_{CC}=5.5V		4.4	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=2.0V		-	-	0.3	V
		V_{CC}=3.0V		-	-	0.6	V
		V_{CC}=5.5V		-	-	1.1	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

3.3.4、AC Characteristics 1

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

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
A to Y propagation delay	t_{pd}	see Figure 5	V_{CC}=3.0V to 3.6V				
			C_L=15pF	-	3.4	7.1	ns
			C_L=50pF	-	4.9	10.6	ns
			V_{CC}=4.5V to 5.5V				
			C_L=15pF	-	2.6	5.5	ns
			C_L=50pF	-	3.6	7.0	ns
Power dissipation capacitance	C_{PD}	C_L=50pF; f_i=1MHz; V_I= GND to V_{CC}		-	14	-	pF

Note:

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

[2] Typical values are measured at V_{CC}=3.3V or 5V.

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

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

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
A to Y propagation delay	t_{pd}	see Figure 5	V_{CC}=3.0V to 3.6V				
			C_L=15pF	1.0	-	8.5	ns
			C_L=50pF	1.0	-	12.0	ns
			V_{CC}=4.5V to 5.5V				
			C_L=15pF	1.0	-	6.0	ns
			C_L=50pF	1.0	-	8.0	ns

Note:

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

[2] Typical values are measured at V_{CC}=3.3V or 5V.

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
A to Y propagation delay	t_{pd}	see Figure 5	V_{CC}=3.0V to 3.6V				
			C_L=15pF	1.0	-	10.0	ns
			C_L=50pF	1.0	-	13.5	ns
			V_{CC}=4.5V to 5.5V				
			C_L=15pF	1.0	-	7.0	ns
			C_L=50pF	1.0	-	9.0	ns

Note:

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

[2] Typical values are measured at V_{CC}=3.3V or 5V.

4、Testing Circuit

4.1、AC Testing Circuit

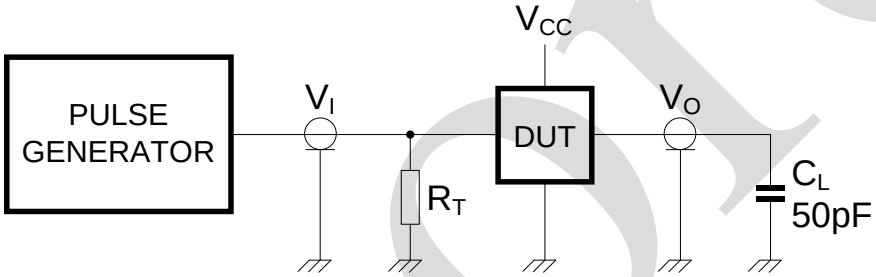


Figure 4. Load circuitry for switching times

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

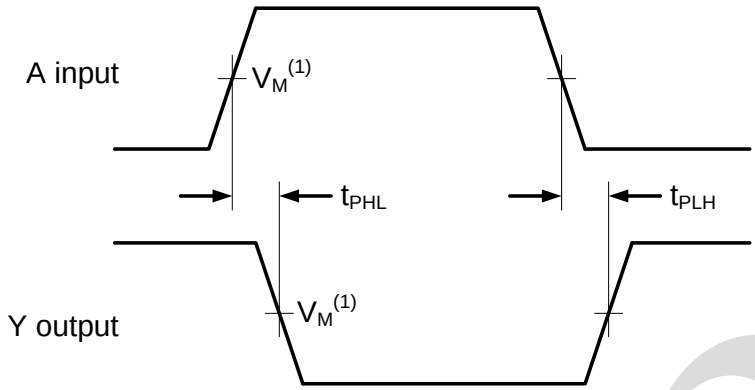


Figure 5. The input (A) to output (Y) propagation delay times

4.3、Measurement Points

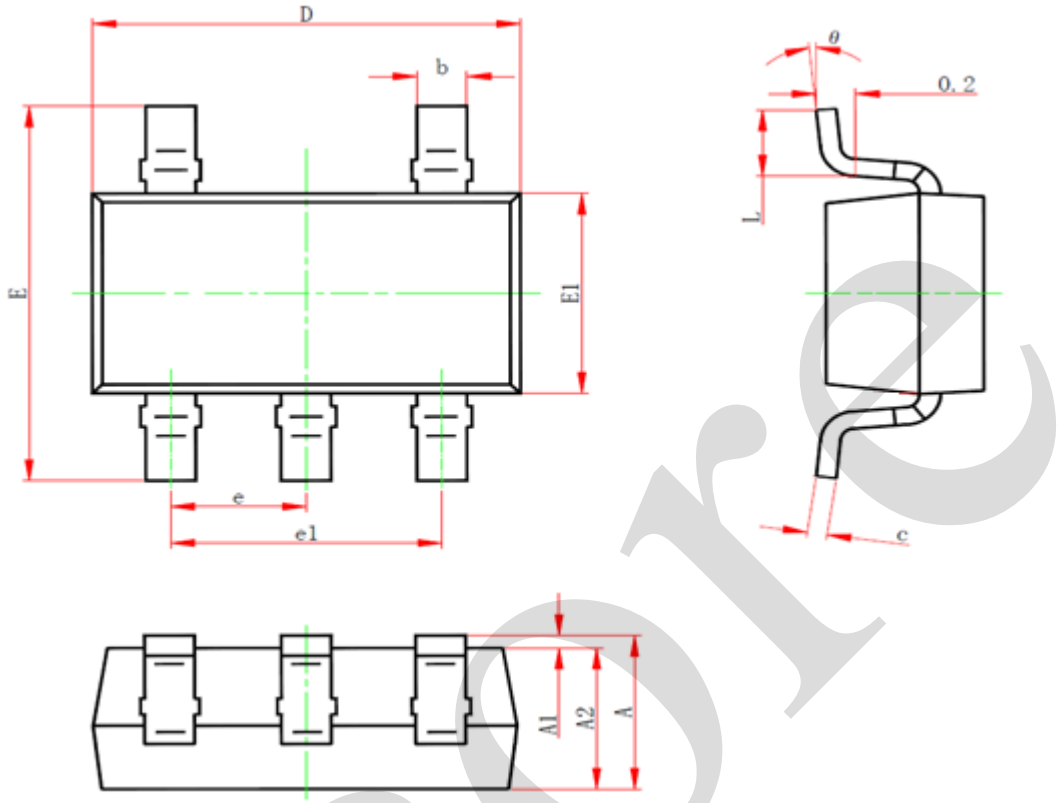
Input	Output
V_M	V_M
$0.5\times V_{CC}$	$0.5\times V_{CC}$

4.4、Test Data

Input		Load
V_I	t_r , t_f	C_L
GND to V_{CC}	≤ 3.0ns	15pF
GND to V_{CC}	≤ 3.0ns	50pF

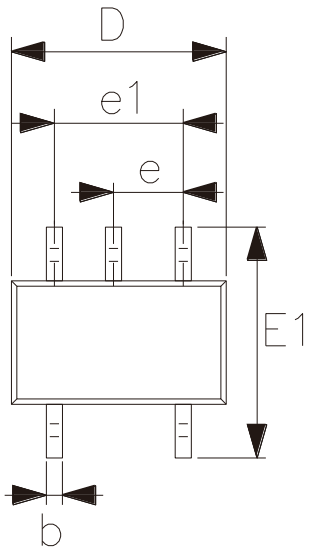
5、Package Information

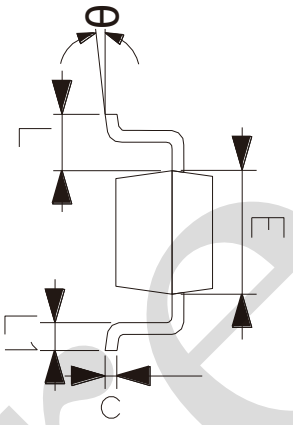
5.1、SOT23-5

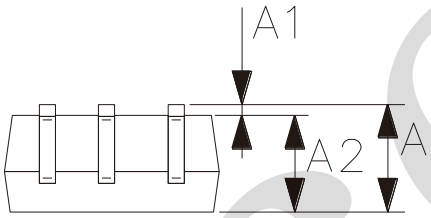


Symbol	Dimensions (mm)	
	Min.	Max.
A	-	1.26
A1	0.00	0.12
A2	1.00	1.20
b	0.30	0.50
c	0.10	0.20
D	2.82	3.02
E	2.60	3.00
E1	1.50	1.70
e	0.95	
e1	1.80	2.00
L	0.30	0.60
θ	0°	8°

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

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