AiP74AHC/AHCT1G04
Single Inverter

Product Specification

Specification Revision History:

Version	Date	Description
2018-10-A1	2018-10	New
2021-09-A2	2021-09	Modify ambient temperature to -40℃~+105℃ and add electrical characteristics of -40℃~+105℃
2021-10-A3	2021-10	Modify Ordering Information
2021-12-A4	2021-12	Modify Ordering Information
2022-03-A5	2022-03	Modify ordering information note 1

1、General Description

AiP74AHC1G04 and AiP74AHCT1G04 are high-speed Si-gate CMOS devices. They provide an inverting buffer.

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

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

Features:

- Low power consumption
- Specified from -40℃ to +105℃
- Packaging information: SOT-23-5/SOT-353

Ordering Information:

Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP74AHC1G04GB235.TR	SOT-23-5	CBXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing:0.95mm
AiP74AHC1G04GC353.TR	SOT-353	CBXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.1mm×1.3mm Pin spacing:0.65mm
AiP74AHCT1G04GB235.TR	SOT-23-5	CCXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing:0.95mm
AiP74AHCT1G04GC353.TR	SOT-353	CCXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.1mm×1.3mm Pin spacing:0.65mm

Note: “XX” refers to variable content, meaning year and month.

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

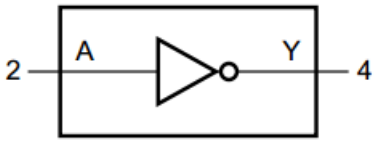


Figure 1. Logic symbol

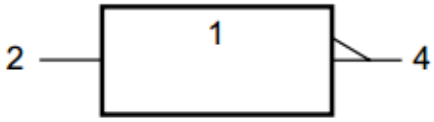
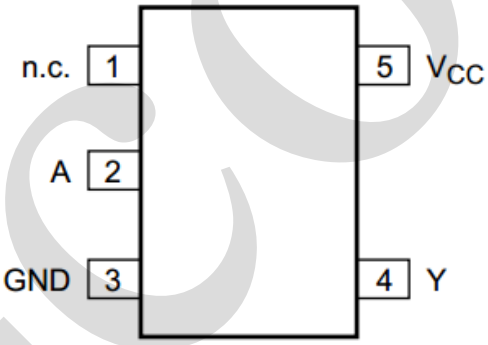


Figure 2. IEC logic symbol

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	250		℃

3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
AiP74AHC1G04						
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	-	+105	℃
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
AiP74AHCT1G04						
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	-	+105	℃
input transition rise and fall rate	Δt/ΔV	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
AiP74AHC1G04							
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		-	-	0.1	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
AiP74AHCT1G04							
HIGH-level input voltage	V_{IH}	V_{CC}=4.5V~5.5V		2.0	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=4.5V~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		-	-	0.1	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
AiP74AHC1G04							
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
AiP74AHCT1G04							
HIGH-level input voltage	V_{IH}	V_{CC}=4.5V~5.5V		2.0	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=4.5V~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 +105℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
AiP74AHC1G04							
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
AiP74AHCT1G04							
HIGH-level input voltage	V_{IH}	V_{CC}=4.5V~5.5V		2.0	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=4.5V~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℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
AiP74AHC1G04							
A to Y propagation delay	t_{pd}	see Figure 5	V_{CC}=3.0V to 3.6V				
			C_L=15pF	-	4.3	7.1	ns
			C_L=50pF	-	6.1	10.6	ns
			V_{CC}=4.5V to 5.5V				
			C_L=15pF	-	3.1	5.5	ns
			C_L=50pF	-	4.5	7.5	ns
Power dissipation capacitance	C_{PD}	C_L=50pF; f_i=1MHz; V_I= GND to V_{CC}		-	15	-	pF
AiP74AHCT1G04							
A to Y propagation delay	t_{pd}	see Figure 5	V_{CC}=4.5V to 5.5V				
			C_L=15pF	-	3.4	6.7	ns
			C_L=50pF	-	4.9	7.7	ns
Power dissipation capacitance	C_{PD}	C_L=50pF; f_i=1MHz; V_I= GND to V_{CC}		-	16	-	pF

Note:

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

[2] Typical values are measured at VCC=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;

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

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
AiP74AHC1G04							
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	ns
			V_{CC}=4.5V to 5.5V				
			C_L=15pF	1.0	-	6.5	ns
			C_L=50pF	1.0	-	8.5	ns
AiP74AHCT1G04							
A to Y propagation delay	t_{pd}	see Figure 5	V_{CC}=4.5V to 5.5V				
			C_L=15pF	1.0	-	7.5	ns
			C_L=50pF	1.0	-	8.5	ns

Note:

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

[2] Typical values are measured at VCC=3.3V or 5V.

3.3.6、AC Characteristics 3

(T_{amb}= -40℃ to +105℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
AiP74AHC1G04							
A to Y propagation delay	t_{pd}	see Figure 5	V_{CC}=3.0V to 3.6V				
			C_L=15pF	1.0	-	11	ns
			C_L=50pF	1.0	-	14.5	ns
			V_{CC}=4.5V to 5.5V				
			C_L=15pF	1.0	-	7.0	ns
			C_L=50pF	1.0	-	9.5	ns
AiP74AHCT1G04							
A to Y propagation delay	t_{pd}	see Figure 5	V_{CC}=4.5V to 5.5V				
			C_L=15pF	1.0	-	8.5	ns
			C_L=50pF	1.0	-	10.0	ns

Note:

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

[2] Typical values are measured at VCC=3.3V or 5V.

4、Testing Circuit

4.1、AC Testing Circuit

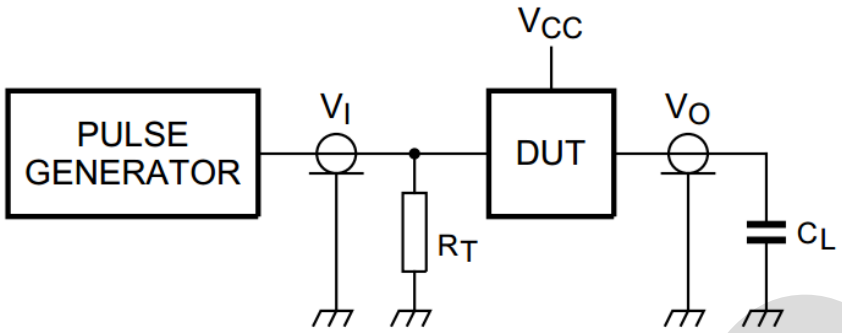


Figure 4. Load circuitry for switching times

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

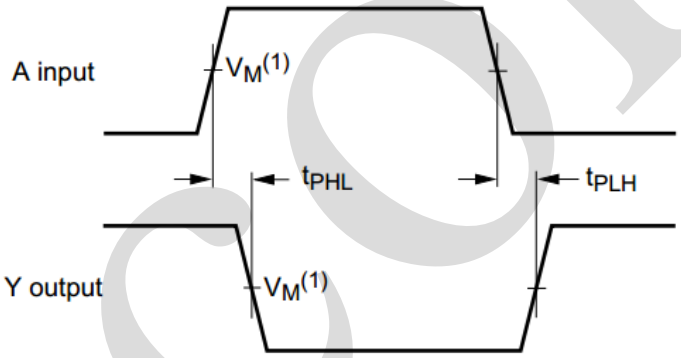


Figure 5. The input (A) to output (Y) propagation delay times

4.3、Measurement Points

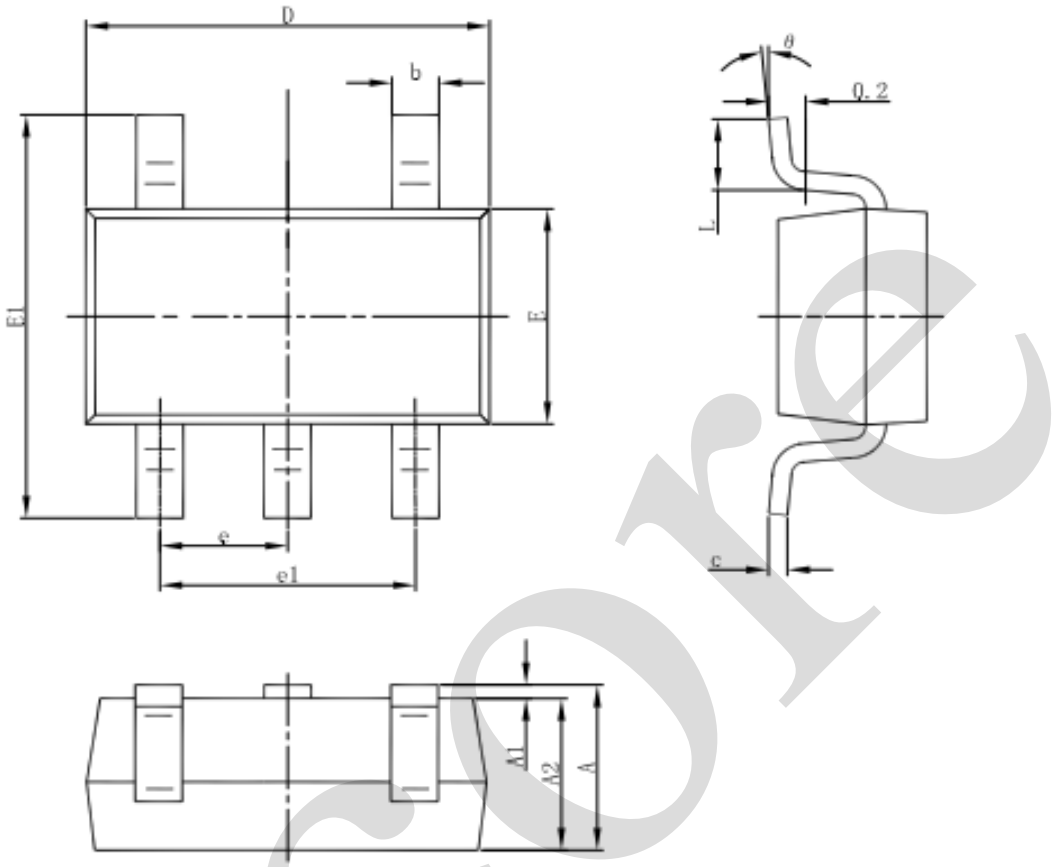
Type	Input		Output
	V_I	V_M	V_M
AiP74AHC1G04	GND to V_{CC}	0.5×V_{CC}	0.5×V_{CC}
AiP74AHCT1G04	GND to 3.0V	1.5V	0.5×V_{CC}

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

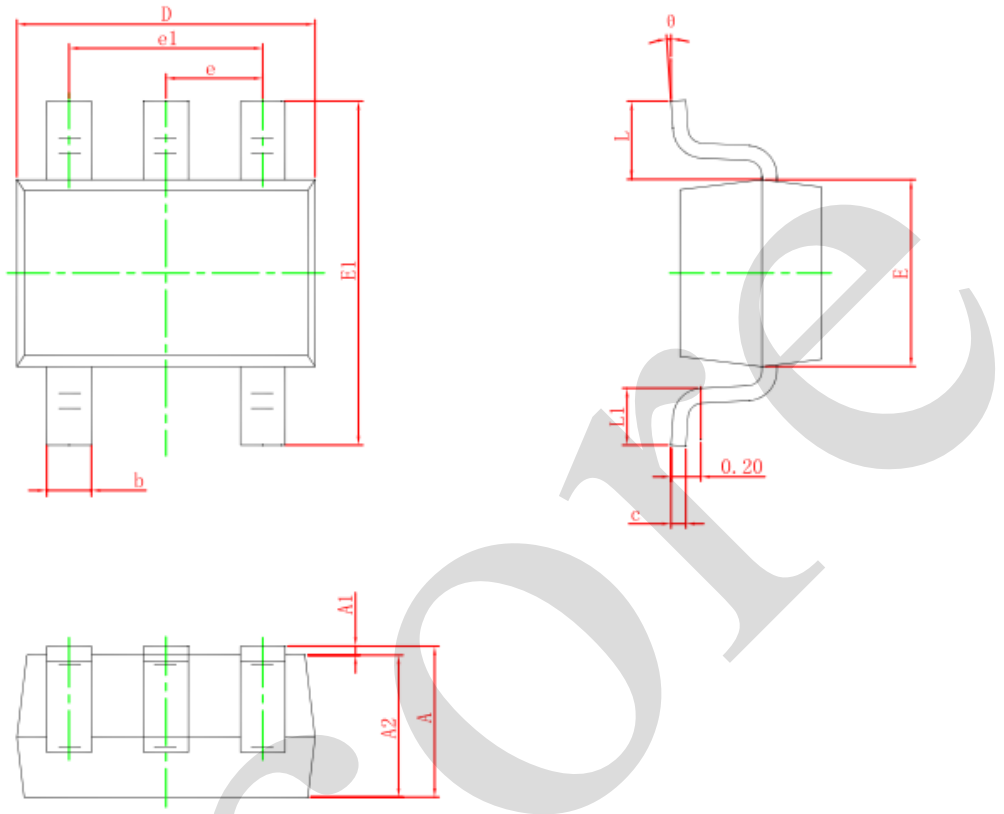
5、Package Information

5.1、SOT-23-5



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

5.2、SOT-353



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650 TYP.		0.026 TYP.	
e1	1.200	1.400	0.047	0.055
L	0.525 REF.		0.021 REF.	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	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、Notion

Recommended carefully reading this information before the use of this product;

The information in this document are subject to change without notice;

This information is using to the reference only, the company is not responsible for any loss;

The company is not responsible for the any infringement of the third party patents or other rights of the responsibility.