



AiP74LV1T34

Single Supply Translating Buffer

Product Specification

Specification Revision History:

Version	Date	Description
2017-12-A1	2017-12	New
2023-04-B1	2023-04	Update the template



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1、General Description

The AiP74LV1T34 is a single, level translating buffer. The low threshold inputs support 1.8V input logic at $V_{CC}=3.3V$ and can be used in 1.8V to 3.3V level up translation. In addition, the 5V tolerant input pins enable level down translation (3.3V to 2.5V output at $V_{CC}=2.5V$). The output level is referenced to the supply voltage and supports 1.8V, 2.5V, 3.3V and 5.0V CMOS levels. The wide V_{CC} range permits the generation of output levels to connect to controllers or processors.

Features:

- Single supply voltage translator at 1.8V, 2.5V, 3.3V and 5.0V
- Up translation
 - 1.2V to 1.8V at $V_{CC}=1.8V$
 - 1.5V to 2.5V at $V_{CC}=2.5V$
 - 1.8V to 3.3V at $V_{CC}=3.3V$
 - 3.3V to 5.0V at $V_{CC}=5.0V$
- Down translation
 - 3.3V to 1.8V at $V_{CC}=1.8V$
 - 3.3V to 2.5V at $V_{CC}=2.5V$
 - 5.0V to 3.3V at $V_{CC}=3.3V$
- 5V tolerant inputs
- Specified from $-40^{\circ}C$ to $+125^{\circ}C$
- Packaging information: SOT23-5/SOT353

Ordering Information:

Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP74LV1T34GB235.TR	SOT23-5	CWXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing:0.95mm
AiP74LV1T34GC353.TR	SOT353	CWXX	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

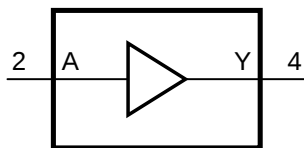


Figure 1. Logic symbol



Figure 2. IEC logic symbol

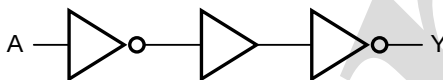
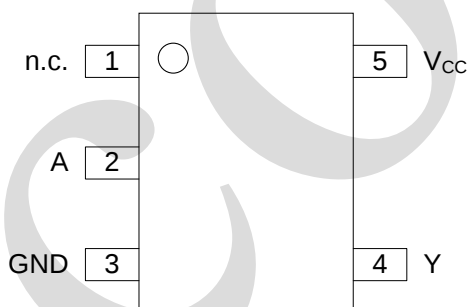


Figure 3. Logic diagram

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	L
H	H

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



3、Electrical Parameter

3.1、Absolute Maximum Ratings

(Voltage 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	^[1]	-0.5	+7.0	V
output voltage	V_O	output HIGH or LOW state ^{[2][3]}	-0.5	$V_{CC}+0.5$	V
		output in power-off state ^[2]	-0.5	+4.6	V
input clamping current	I_{IK}	$V_I < 0V$	-20	-	mA
output clamping current	I_{OK}	$V_O < 0V$ or $V_O > V_{CC}$	-	± 20	mA
output current	I_O	$V_O = 0V$ to V_{CC}	-	± 25	mA
supply current	I_{CC}	-	-	50	mA
ground current	I_{GND}	-	-50	-	mA
storage temperature	T_{stg}	-	-65	+150	°C
total power dissipation	P_{tot}	-	-	250	mW
soldering temperature	T_L	10s	260		°C

Note:

[1] If the input current ratings are observed, the minimum input voltage ratings may be exceeded.

[2] If the output current ratings are observed, the output voltage ratings may be exceeded.

[3] This value is limited to 7V maximum.

3.2、Recommended Operating Conditions

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V_{CC}	-	1.6	5.0	5.5	V
input voltage	V_I	-	0	-	5.5	V
output voltage	V_O	output HIGH or LOW state	0	-	V_{CC}	V
ambient temperature	T_{amb}	-	-40	-	+125	°C
input transition rise and fall rate	$\Delta t/\Delta V$	$V_{CC}=1.8V$ to $5.0V$	-	-	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
HIGH-level input voltage	V _{IH}	V _{CC} =1.65V to 1.8V		0.94	-	-	V
		V _{CC} =2.0V		0.99	-	-	V
		V _{CC} =2.25V to 2.5V		1.135	-	-	V
		V _{CC} =2.75V		1.21	-	-	V
		V _{CC} =3.0V to 3.3V		1.35	-	-	V
		V _{CC} =3.6V		1.47	-	-	V
		V _{CC} =4.5V to 5.0V		2.02	-	-	V
		V _{CC} =5.5V		2.10	-	-	V
LOW-level input voltage	V _{IL}	V _{CC} =1.65V to 2.0V		-	-	0.58	V
		V _{CC} =2.25V to 2.75V		-	-	0.75	V
		V _{CC} =3.0V to 3.6V		-	-	0.80	V
		V _{CC} =4.5V to 5.5V		-	-	0.80	V
HIGH-level output voltage	V _{OH}	V _I =V _{IH} or V _{IL}	V _{CC} =1.65V to 5.5V; I _O =-20uA	V _{CC} -0.1	-	-	V
			V _{CC} =1.65V; I _O =-2mA	1.28	-	-	V
			V _{CC} =1.8V; I _O =-2mA	1.5	-	-	V
			V _{CC} =2.3V; I _O =-2.3mA	2.0	-	-	V
			V _{CC} =2.3V; I _O =-3mA	2.0	-	-	V
			V _{CC} =2.5V; I _O =-3mA	2.25	-	-	V
			V _{CC} =3.0V; I _O =-3mA	2.78	-	-	V
			V _{CC} =3.0V; I _O =-5.5mA	2.6	-	-	V
			V _{CC} =3.3V; I _O =-5.5mA	2.9	-	-	V
			V _{CC} =4.5V; I _O =-4mA	4.2	-	-	V
			V _{CC} =4.5V; I _O =-8mA	4.1	-	-	V
V _{CC} =5.0V; I _O =-8mA	4.6	-	-	V			
LOW-level output voltage	V _{OL}	V _I =V _{IH} or V _{IL}	V _{CC} =1.65V to 5.5V; I _O =20uA	-	-	0.1	V
			V _{CC} =1.65V; I _O =2mA	-	-	0.2	V
			V _{CC} =2.3V; I _O =2.3mA	-	-	0.1	V
			V _{CC} =2.3V; I _O =3mA	-	-	0.15	V
			V _{CC} =3.0V; I _O =3mA	-	-	0.1	V
			V _{CC} =3.0V; I _O =5.5mA	-	-	0.2	V
			V _{CC} =4.5V; I _O =4mA	-	-	0.15	V
			V _{CC} =4.5V; I _O =8mA	-	-	0.3	V
input leakage current	I _I	V _I =V _{CC} or GND; V _{CC} =0V to 5.5V		-	-	±1	uA
supply current	I _{CC}	V _I =V _{CC} or GND; I _O =0A; V _{CC} =1.8V, 2.5V, 3.3V, 5.0V		-	-	1	uA
additional supply current	ΔI _{CC}	per input pin; V _{CC} =1.8V; V _I =0.3V or 1.1V; I _O =0A; other pins at V _{CC} or GND		-	-	10	uA



		per input pin; $V_{CC}=5.5V$; $V_I=0.3V$ or $3.4V$; $I_O=0A$; other pins at V_{CC} or GND	-	-	1.35	mA
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3.3.2、DC Characteristics 2

($T_{amb}=-40^{\circ}C$ to $+85^{\circ}C$, voltages are referenced to GND (ground=0V), unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	$V_{CC}=1.65V$ to $1.8V$	1.0	-	-	V
		$V_{CC}=2.0V$	1.03	-	-	V
		$V_{CC}=2.25V$ to $2.5V$	1.18	-	-	V
		$V_{CC}=2.75V$	1.23	-	-	V
		$V_{CC}=3.0V$ to $3.3V$	1.37	-	-	V
		$V_{CC}=3.6V$	1.48	-	-	V
		$V_{CC}=4.5V$ to $5.0V$	2.03	-	-	V
		$V_{CC}=5.5V$	2.11	-	-	V
LOW-level input voltage	V_{IL}	$V_{CC}=1.65V$ to $2.0V$	-	-	0.55	V
		$V_{CC}=2.25V$ to $2.75V$	-	-	0.71	V
		$V_{CC}=3.0V$ to $3.6V$	-	-	0.65	V
		$V_{CC}=4.5V$ to $5.5V$	-	-	0.80	V
HIGH-level output voltage	V_{OH}	$V_I=V_{IH}$ or V_{IL} $V_{CC}=1.65V$ to $5.5V$; $I_O=-20\mu A$	$V_{CC}-0.1$	-	-	V
		$V_{CC}=1.65V$; $I_O=-2mA$	1.21	-	-	V
		$V_{CC}=1.8V$; $I_O=-2mA$	1.45	-	-	V
		$V_{CC}=2.3V$; $I_O=-2.3mA$	2.0	-	-	V
		$V_{CC}=2.3V$; $I_O=-3mA$	1.93	-	-	V
		$V_{CC}=2.5V$; $I_O=-3mA$	2.15	-	-	V
		$V_{CC}=3.0V$; $I_O=-3mA$	2.7	-	-	V
		$V_{CC}=3.0V$; $I_O=-5.5mA$	2.49	-	-	V
		$V_{CC}=3.3V$; $I_O=-5.5mA$	2.8	-	-	V
		$V_{CC}=4.5V$; $I_O=-4mA$	4.1	-	-	V
		$V_{CC}=4.5V$; $I_O=-8mA$	3.95	-	-	V
		$V_{CC}=5.0V$; $I_O=-8mA$	4.5	-	-	V
LOW-level output voltage	V_{OL}	$V_I=V_{IH}$ or V_{IL} $V_{CC}=1.65V$ to $5.5V$; $I_O=20\mu A$	-	-	0.1	V
		$V_{CC}=1.65V$; $I_O=2mA$	-	-	0.25	V
		$V_{CC}=2.3V$; $I_O=2.3mA$	-	-	0.15	V
		$V_{CC}=2.3V$; $I_O=3mA$	-	-	0.2	V
		$V_{CC}=3.0V$; $I_O=3mA$	-	-	0.15	V
		$V_{CC}=3.0V$; $I_O=5.5mA$	-	-	0.252	V
		$V_{CC}=4.5V$; $I_O=4mA$	-	-	0.2	V
		$V_{CC}=4.5V$; $I_O=8mA$	-	-	0.35	V
input leakage current	I_I	$V_I=V_{CC}$ or GND; $V_{CC}=0V$ to $5.5V$	-	-	± 1	μA
supply current	I_{CC}	$V_I=V_{CC}$ or GND; $I_O=0A$; $V_{CC}=1.8V, 2.5V, 3.3V, 5.0V$	-	-	10	μA



additional supply current	ΔI_{CC}	per input pin; $V_{CC}=1.8V$; $V_I=0.3V$ or $1.1V$; $I_O=0A$; other pins at V_{CC} or GND	-	-	10	μA
		per input pin; $V_{CC}=5.5V$; $V_I=0.3V$ or $3.4V$; $I_O=0A$; other pins at V_{CC} or GND	-	-	1.5	mA

3.3.3、DC Characteristics 3

($T_{amb}=-40^{\circ}C$ to $+125^{\circ}C$, 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} =1.65V to 1.8V		1.0	-	-	V
		V _{CC} =2.0V		1.03	-	-	V
		V _{CC} =2.25V to 2.5V		1.18	-	-	V
		V _{CC} =2.75V		1.23	-	-	V
		V _{CC} =3.0V to 3.3V		1.37	-	-	V
		V _{CC} =3.6V		1.48	-	-	V
		V _{CC} =4.5V to 5.0V		2.03	-	-	V
		V _{CC} =5.5V		2.11	-	-	V
LOW-level input voltage	V _{IL}	V _{CC} =1.65V to 2.0V		-	-	0.55	V
		V _{CC} =2.25V to 2.75V		-	-	0.71	V
		V _{CC} =3.0V to 3.6V		-	-	0.65	V
		V _{CC} =4.5V to 5.5V		-	-	0.80	V
HIGH-level output voltage	V _{OH}	V _I =V _{IH} or V _{IL}	V _{CC} =1.65V to 5.5V; I _O =-20uA	V _{CC} -0.1	-	-	V
			V _{CC} =1.65V; I _O =-2mA	1.21	-	-	V
			V _{CC} =1.8V; I _O =-2mA	1.45	-	-	V
			V _{CC} =2.3V; I _O =-2.3mA	2.0	-	-	V
			V _{CC} =2.3V; I _O =-3mA	1.93	-	-	V
			V _{CC} =2.5V; I _O =-3mA	2.15	-	-	V
			V _{CC} =3.0V; I _O =-3mA	2.7	-	-	V
			V _{CC} =3.0V; I _O =-5.5mA	2.49	-	-	V
			V _{CC} =3.3V; I _O =-5.5mA	2.8	-	-	V
			V _{CC} =4.5V; I _O =-4mA	4.1	-	-	V
			V _{CC} =4.5V; I _O =-8mA	3.95	-	-	V
V _{CC} =5.0V; I _O =-8mA	4.5	-	-	V			
LOW-level output voltage	V _{OL}	V _I =V _{IH} or V _{IL}	V _{CC} =1.65V to 5.5V; I _O =20uA	-	-	0.1	V
			V _{CC} =1.65V; I _O =2mA	-	-	0.25	V
			V _{CC} =2.3V; I _O =2.3mA	-	-	0.15	V
			V _{CC} =2.3V; I _O =3mA	-	-	0.2	V
			V _{CC} =3.0V; I _O =3mA	-	-	0.15	V
			V _{CC} =3.0V; I _O =5.5mA	-	-	0.252	V
			V _{CC} =4.5V; I _O =4mA	-	-	0.2	V
			V _{CC} =4.5V; I _O =8mA	-	-	0.35	V
input leakage current	I _I	V _I =V _{CC} or GND; V _{CC} =0V to 5.5V	-	-	±1	uA	



supply current	I_{CC}	$V_I=V_{CC}$ or GND; $I_O=0A$; $V_{CC}=1.8V, 2.5V, 3.3V, 5.0V$	-	-	10	μA
additional supply current	ΔI_{CC}	per input pin; $V_{CC}=1.8V$; $V_I=0.3V$ or $1.1V$; $I_O=0A$; other pins at V_{CC} or GND	-	-	10	μA
		per input pin; $V_{CC}=5.5V$; $V_I=0.3V$ or $3.4V$; $I_O=0A$; other pins at V_{CC} or GND	-	-	1.5	mA

3.3.4、AC Characteristics 1

($T_{amb}=25^{\circ}C$, GND=0V, unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
propagation delay	t_{pd}	A, B to Y; see Figure 5 ^[1]	$V_{CC}=1.8V$; $C_L=15pF$	-	12.6	18.8	ns
			$V_{CC}=1.8V$; $C_L=30pF$	-	14.8	21	ns
			$V_{CC}=2.5V$; $C_L=15pF$	-	9	12.8	ns
			$V_{CC}=2.5V$; $C_L=30pF$	-	10.6	14.4	ns
			$V_{CC}=3.3V$; $C_L=15pF$	-	7.4	10.4	ns
			$V_{CC}=3.3V$; $C_L=30pF$	-	8.6	11.8	ns
			$V_{CC}=5.0V$; $C_L=15pF$	-	6.2	7.8	ns
			$V_{CC}=5.0V$; $C_L=30pF$	-	7.2	9	ns
input capacitance	C_I	$V_I=V_{CC}$ or GND; $V_{CC}=3.3V$		-	1.5	10	pF
output capacitance	C_O	$V_O=V_{CC}$ or GND; $V_{CC}=3.3V$		-	2.5	-	pF
power dissipation capacitance	C_{PD}	per buffer; $V_I=GND$ to V_{CC} ; $C_L=30pF$; $f=10MHz$ ^[2]	$V_{CC}=1.8V$	-	4.2	-	pF
			$V_{CC}=2.5V$	-	5.5	-	pF
			$V_{CC}=3.3V$	-	7.4	-	pF
			$V_{CC}=5.0V$	-	11.5	-	pF

Note:

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

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

$$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum (C_L \times V_{CC}^2 \times f_o) \text{ where:}$$

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;

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

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

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
propagation delay	t_{pd}	A, B to Y; see Figure 5 ^[1]	$V_{CC}=1.8V; C_L=15pF$	-	-	21.2	ns
			$V_{CC}=1.8V; C_L=30pF$	-	-	24	ns
			$V_{CC}=2.5V; C_L=15pF$	-	-	14.4	ns
			$V_{CC}=2.5V; C_L=30pF$	-	-	16.4	ns
			$V_{CC}=3.3V; C_L=15pF$	-	-	11.8	ns
			$V_{CC}=3.3V; C_L=30pF$	-	-	13.6	ns
			$V_{CC}=5.0V; C_L=15pF$	-	-	8.6	ns
			$V_{CC}=5.0V; C_L=30pF$	-	-	9.8	ns
input capacitance	C_I	$V_I=V_{CC}$ or GND; $V_{CC}=3.3V$		-	-	10	pF

Note:

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

3.3.6、AC Characteristics 3

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

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
propagation delay	t_{pd}	A, B to Y; see Figure 5 ^[1]	$V_{CC}=1.8V; C_L=15pF$	-	-	22.8	ns
			$V_{CC}=1.8V; C_L=30pF$	-	-	25.6	ns
			$V_{CC}=2.5V; C_L=15pF$	-	-	15.6	ns
			$V_{CC}=2.5V; C_L=30pF$	-	-	17.8	ns
			$V_{CC}=3.3V; C_L=15pF$	-	-	12.6	ns
			$V_{CC}=3.3V; C_L=30pF$	-	-	14.2	ns
			$V_{CC}=5.0V; C_L=15pF$	-	-	9	ns
			$V_{CC}=5.0V; C_L=30pF$	-	-	10.4	ns
input capacitance	C_I	$V_I=V_{CC}$ or GND; $V_{CC}=3.3V$		-	-	10	pF

Note:

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



4、Testing Circuit

4.1、AC Testing Circuit

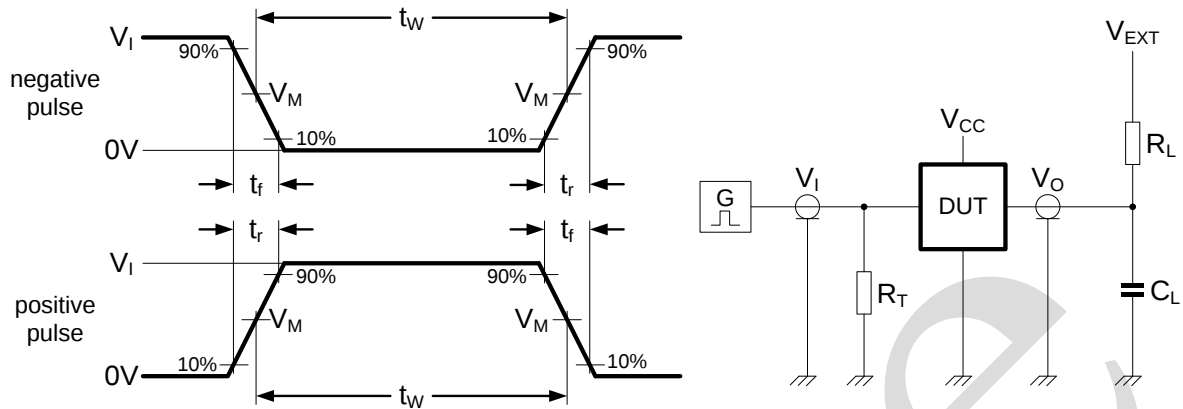


Figure 4. Test circuit for measuring switching time

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

V_{EXT} =External voltage for measuring switching times

4.2、AC Testing Waveforms

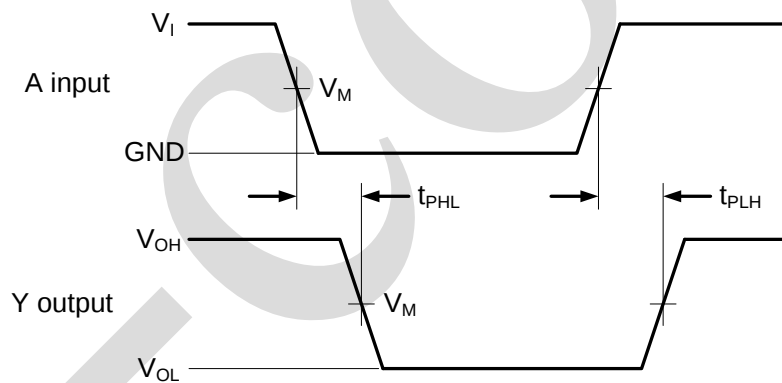


Figure 5. The input A to output Y propagation delays



4.3、Measurement Points

Input	Output
V_M	V_M
$0.5V_I$	$0.5V_{CC}$

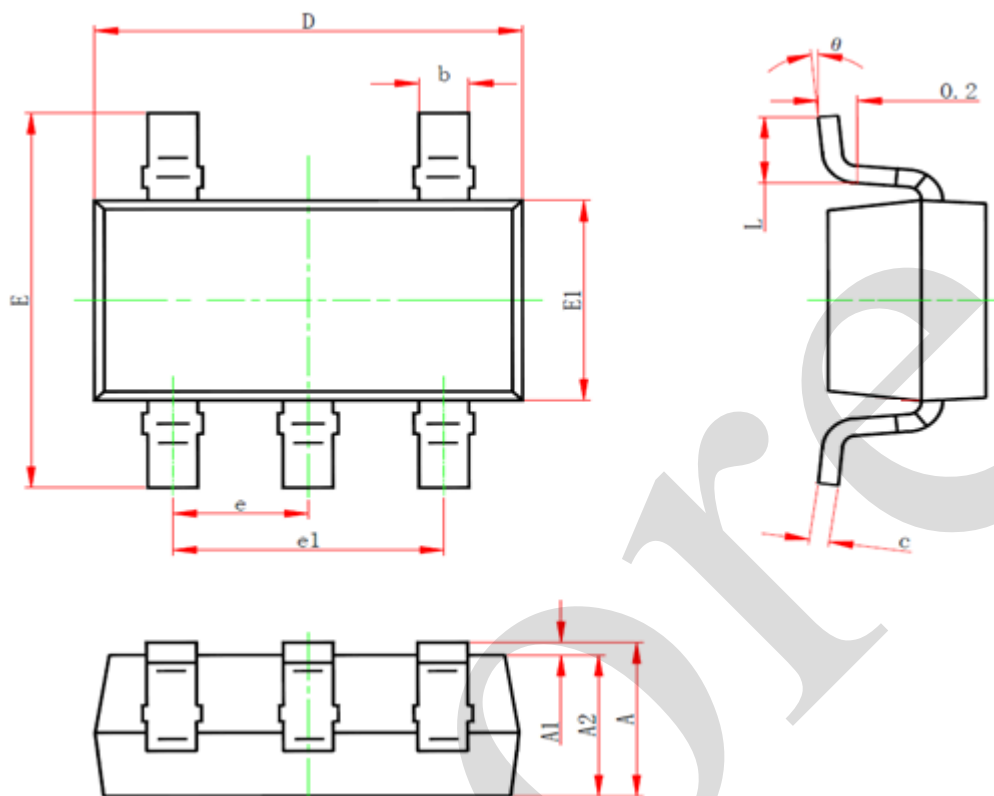
4.4、Test Data

Supply voltage	Input			Load		V_{EXT}		
V_{CC}	V_I	$\Delta t/\Delta V^{[1]}$	f_{max}	C_L	R_L	t_{PLH}, t_{PHL}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
1.8V	V_{CC}	$\leq 1.0ns/V$	15MHz	15pF, 30pF	1M Ω	GND	GND	V_{CC}
2.5V	V_{CC}	$\leq 1.0ns/V$	25MHz	15pF, 30pF	1M Ω	GND	GND	V_{CC}
3.3V	3V	$\leq 1.0ns/V$	50MHz	15pF, 30pF	1M Ω	GND	GND	V_{CC}
5.0V	3V	$\leq 1.0ns/V$	50MHz	15pF, 30pF	1M Ω	GND	GND	V_{CC}



5、Package Information

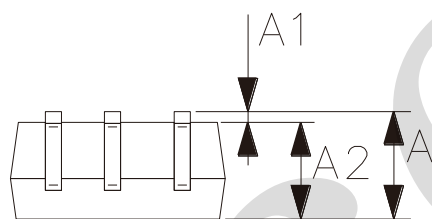
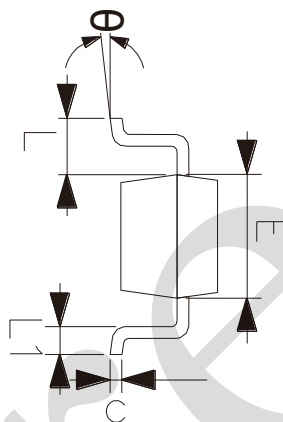
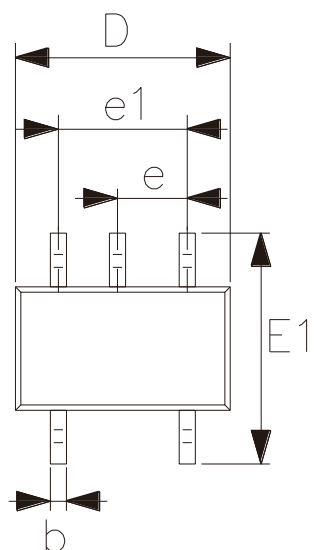
5.1、SOT23-5



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

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