



AiP74LV21

Dual 4-input Positive-and Gate

Product Specification

Specification Revision History:

Version	Date	Description
2022-12-A1	2022-12	New



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1、General Description

The dual 4-input positive-AND gate is designed for 2V to 5.5V V_{CC} operation.

Features:

- Wide supply voltage range: 2.0V to 5.5V
- 5.5 V tolerant inputs/outputs
- Power-down mode
- Specified from -40°C to +125°C
- Packaging information: DIP14/SOP14/TSSOP14

Ordering Information:

Tube packing specifications:

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
AiP74LV21DA14.TB	DIP14	74LV21	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
AiP74LV21SA14.TB	SOP14	74LV21	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing: 1.27mm
AiP74LV21TA14.TB	TSSOP14	74LV21	96 PCS/tube	200 tube/box	19200 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm

Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP74LV21SA14.TR	SOP14	74LV21	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing: 1.27mm
AiP74LV21TA14.TR	TSSOP14	74LV21	5000 PCS/reel	10000 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm

Note: If the physical information is inconsistent with the ordering information, please refer to the actual product.



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2、Block Diagram And Pin Description

2.1、Block Diagram

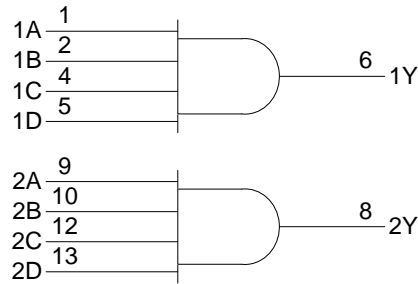
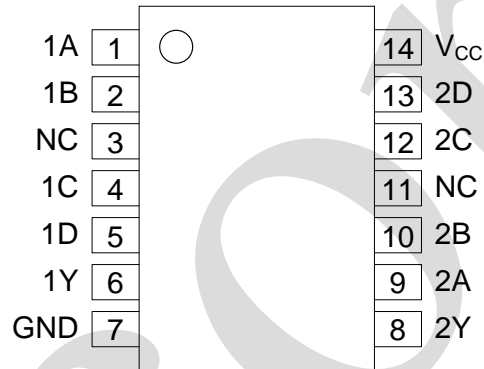


Figure 1. Logic diagram

2.2、Pin Configurations



2.3、Pin Description

Pin No.	Pin Name	Description
1	1A	data input
2	1B	data input
3	NC	no connection
4	1C	data input
5	1D	data input
6	1Y	data output
7	GND	ground (0V)
8	2Y	data output
9	2A	data input
10	2B	data input
11	NC	no connection
12	2C	data input
13	2D	data input
14	V _{CC}	positive supply voltage



2.4、Function Table

Inputs				Output
A	B	C	D	Y
H	H	H	H	H
L	X	X	X	L
X	L	X	X	L
X	X	L	X	L
X	X	X	L	L

Note: H=HIGH voltage level; L=LOW voltage level; X=don't care.

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
output voltage	V_O	high or low state	-0.5	$V_{CC}+05$	V
		power-off state	-0.5	+7.0	V
input clamping current	I_{IK}	$V_I < 0V$	-	-20	mA
output clamping current	I_{OK}	$V_O < 0V$	-	-50	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	$^{\circ}C$
soldering temperature	T_L	10s	DIP	245	$^{\circ}C$
			SOP/TSSOP	260	

3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V_{CC}	-	2.0	-	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	$^{\circ}C$



3.3、Electrical Characteristics

3.3.1、DC Characteristics

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	$V_{CC}=2.0\text{V}$	1.5	-	-	V
		$V_{CC}=2.3\text{V to }2.7\text{V}$	$0.7 \times V_{CC}$	-	-	V
		$V_{CC}=3.0\text{V to }3.6\text{V}$	$0.7 \times V_{CC}$	-	-	V
		$V_{CC}=4.5\text{V to }5.5\text{V}$	$0.7 \times V_{CC}$	-	-	V
LOW-level input voltage	V_{IL}	$V_{CC}=2.0\text{V}$	-	-	0.5	V
		$V_{CC}=2.3\text{V to }2.7\text{V}$	-	-	$0.3 \times V_{CC}$	V
		$V_{CC}=3.0\text{V to }3.6\text{V}$	-	-	$0.3 \times V_{CC}$	V
		$V_{CC}=4.5\text{V to }5.5\text{V}$	-	-	$0.3 \times V_{CC}$	V
HIGH-level output voltage	V_{OH}	$I_{OH}=-50\mu\text{A}; V_{CC}=2.0\text{V to }5.5\text{V}$	$V_{CC}-0.1$	-	-	V
		$I_{OH}=-2\text{mA}; V_{CC}=2.3\text{V}$	2.0	-	-	V
		$I_{OH}=-6\text{mA}; V_{CC}=3.0\text{V}$	2.48	-	-	V
		$I_{OH}=-12\text{mA}; V_{CC}=4.5\text{V}$	3.8	-	-	V
LOW-level output voltage	V_{OL}	$I_{OL}=50\mu\text{A}; V_{CC}=2.0\text{V to }5.5\text{V}$	-	-	0.1	V
		$I_{OL}=2\text{mA}; V_{CC}=2.3\text{V}$	-	-	0.4	V
		$I_{OL}=6\text{mA}; V_{CC}=3.0\text{V}$	-	-	0.44	V
		$I_{OL}=12\text{mA}; V_{CC}=4.5\text{V}$	-	-	0.55	V
HIGH-level output current	I_{OH}	$V_{CC}=2.0\text{V}$	-	-	-50	μA
		$V_{CC}=2.3\text{V to }2.7\text{V}$	-	-	-2	mA
		$V_{CC}=3.0\text{V to }3.6\text{V}$	-	-	-6	mA
		$V_{CC}=4.5\text{V to }5.5\text{V}$	-	-	-12	mA
LOW-level output current	I_{OL}	$V_{CC}=2.0\text{V}$	-	-	50	μA
		$V_{CC}=2.3\text{V to }2.7\text{V}$	-	-	2	mA
		$V_{CC}=3.0\text{V to }3.6\text{V}$	-	-	6	mA
		$V_{CC}=4.5\text{V to }5.5\text{V}$	-	-	12	mA
input leakage current	I_I	$V_I=5.5\text{V or GND}; V_{CC}=0\text{V to }5.5\text{V}$	-	-	± 1.0	μA
supply current	I_{CC}	$V_I=V_{CC or GND}; I_O=0\text{A}; V_{CC}=5.5\text{V}$	-	-	20	μA
power-off leakage current	I_{OFF}	per input; V_I or $V_O=0\text{V to }5.5\text{V}; V_{CC}=0\text{V}$	-	-	5	μA



3.3.2、AC 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
A, B, C, D to Y; propagation delay	t_{PHL}/t_{PLH}	$V_{CC}=2.5\text{V}\pm 0.2\text{V}$	-	9.2	15.7	ns
		$V_{CC}=3.3\text{V}\pm 0.3\text{V}$	-	6.6	10.5	ns
		$V_{CC}=5.0\text{V}\pm 0.5\text{V}$	-	4.9	7	ns

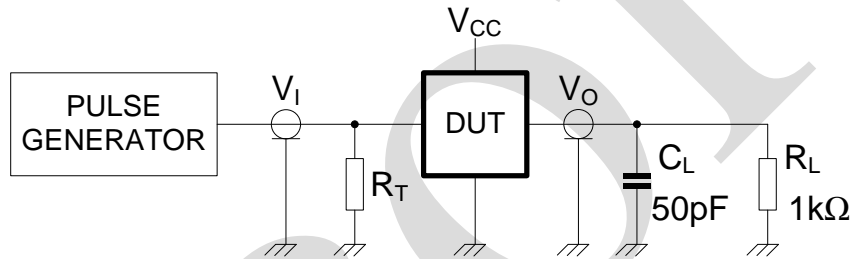
3.3.3、AC Characteristics 2

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
A, B, C, D to Y; propagation delay	t_{PHL}/t_{PLH}	$V_{CC}=2.5\text{V}\pm 0.2\text{V}$	-	-	19	ns
		$V_{CC}=3.3\text{V}\pm 0.3\text{V}$	-	-	12	ns
		$V_{CC}=5.0\text{V}\pm 0.5\text{V}$	-	-	8	ns

4、Testing Circuit

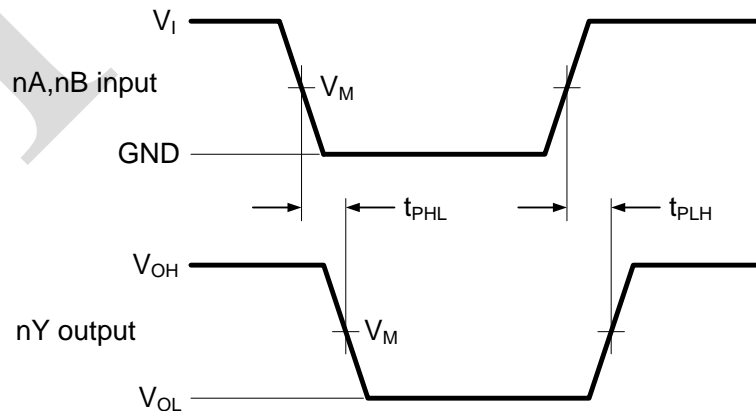
4.1、AC Testing Circuit



Note: C_L includes probe and jig capacitance.

Test	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{CC}
t_{PHZ}/t_{PZH}	GND
Open Drain	V_{CC}

4.2、AC Testing Waveforms





4.3、Measurement Points

Supply voltage	Input	Output
V_{CC}	V_M	V_M
$<2.7V$	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
$2.7V$ to $3.6V$	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
$\geq 4.5V$	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$

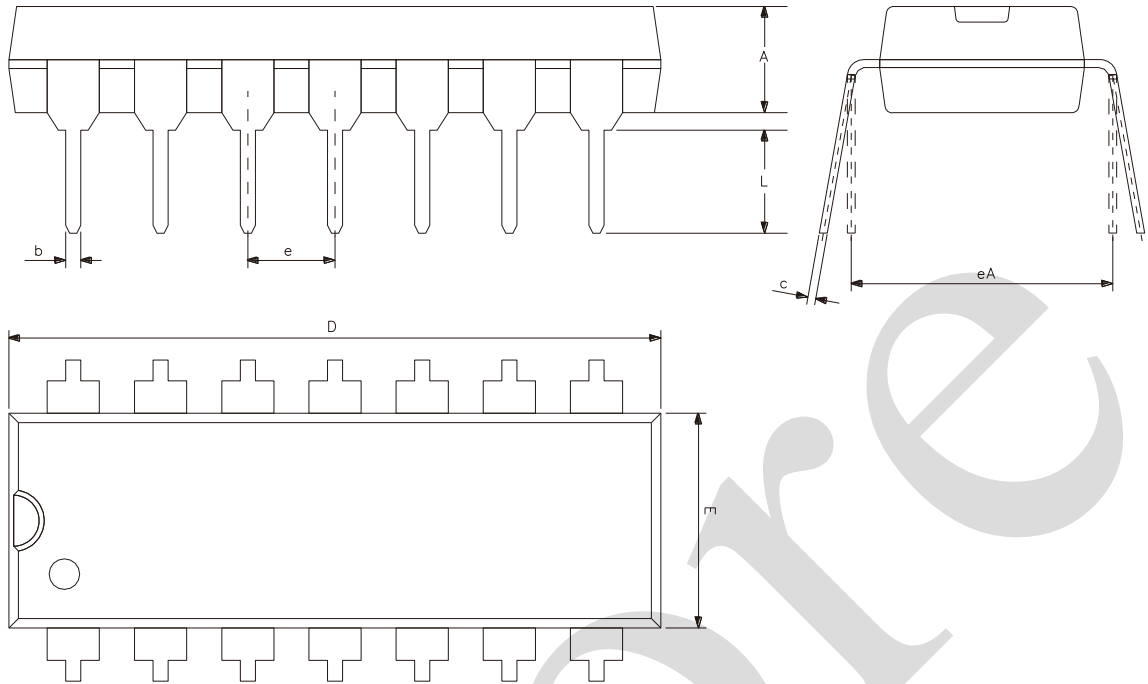
4.4、Test Data

Supply voltage	Input	
V_{CC}	V_I	t_r, t_f
$<2.7V$	V_{CC}	$\leq 3.0ns$
$2.7V$ to $3.6V$	V_{CC}	$\leq 3.0ns$
$\geq 4.5V$	V_{CC}	$\leq 3.0ns$



5、Package Information

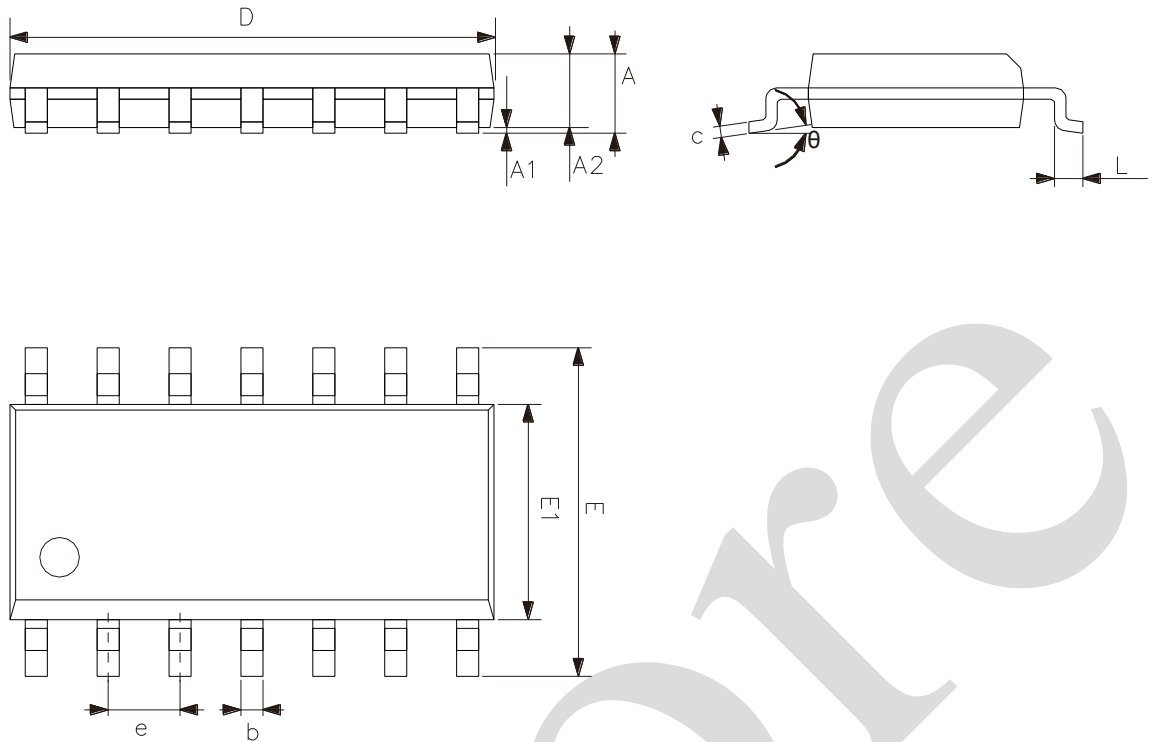
5.1、DIP14



Symbol	Dimensions (mm)	
	Min.	Max.
A	3.05	3.60
b	0.33	0.56
c	0.20	0.36
D	18.80	19.40
E	6.20	6.60
e	2.54	
eA	7.62	10.90
L	2.92	-



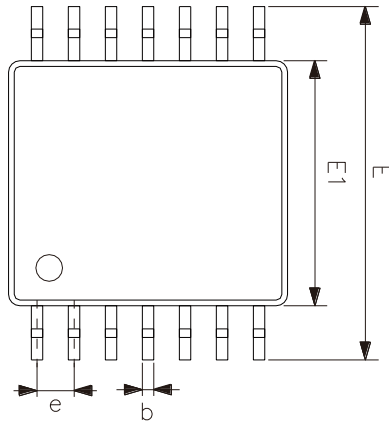
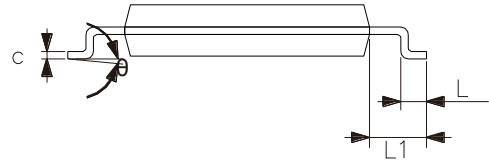
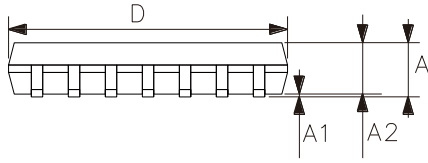
5.2、SOP14



Symbol	Dimensions (mm)	
	Min.	Max.
A	1.50	1.75
A1	0.05	0.25
A2	1.30	-
b	0.33	0.50
c	0.19	0.25
D	8.43	8.76
E	5.80	6.25
E1	3.75	4.00
e	1.27	
L	0.40	0.89
θ	0°	8°



5.3、TSSOP14



Symbol	Dimensions (mm)	
	Min.	Max.
A	-	1.20
A1	0.05	0.15
A2	0.80	1.05
b	0.19	0.30
c	0.09	0.20
D	4.90	5.10
E1	4.30	4.50
E	6.20	6.60
e	0.65	
L	0.45	0.75
L1	1.00	
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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