



# AiP74LV1T08

## 2-input Single Supply Translating And Gate

### Product Specification

#### Specification Revision History:

| Version    | Date    | Description                   |
|------------|---------|-------------------------------|
| 2017-03-A1 | 2017-03 | New                           |
| 2023-04-B1 | 2023-04 | Update the template           |
| 2024-02-B2 | 2024-02 | Modify the parameters         |
| 2024-07-B3 | 2024-07 | Add the package form          |
| 2024-09-B4 | 2024-09 | Package XSON5 instead of DFN4 |



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## 1、General Description

The AiP74LV1T08 is a single, level translating 2-input AND gate. 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  $+125^{\circ}C$
- Package type:SOT23-5/SOT353/DFN4



## Ordering Information:

### Reel packing specifications:

| Part number         | Packaging form | Marking code | Reel quantity  | Boxed reel quantity | Notes                                                               |
|---------------------|----------------|--------------|----------------|---------------------|---------------------------------------------------------------------|
| AiP74LV1T08GB235.TR | SOT23-5        | CDXX         | 3000 PCS/reel  | 30000 PCS/box       | Dimensions of plastic enclosure: 2.9mm×1.6mm<br>Pin spacing: 0.95mm |
| AiP74LV1T08GC353.TR | SOT353         | CDXX         | 3000 PCS/reel  | 30000 PCS/box       | Dimensions of plastic enclosure: 2.1mm×1.3mm<br>Pin spacing: 0.65mm |
| AiP74LV1T08XD4.TR   | DFN4           | CDX          | 12000 PCS/reel | 120000 PCS/box      | Dimensions of plastic enclosure: 0.8mm×0.8mm<br>Pin spacing: 0.5mm  |

Note 1: “XX” refers to variable content, meaning year and package batch serial number; “X” refers to variable content, meaning 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

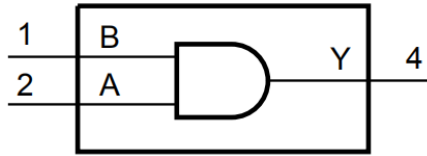


Figure 1. Logic symbol

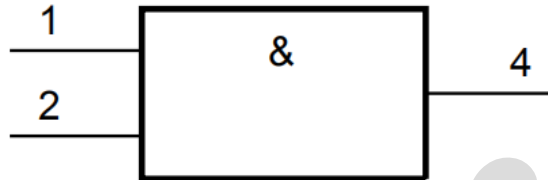


Figure 2. Logic symbol

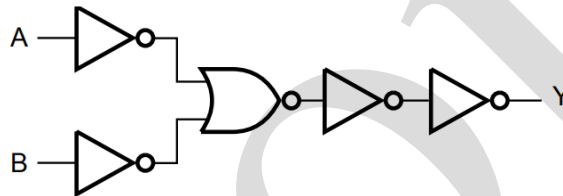
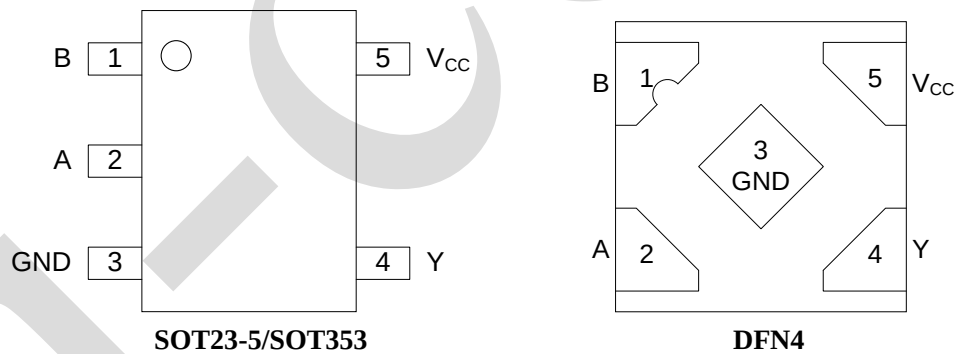


Figure 3. Logic diagram

### 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 <sub>CC</sub> | supply voltage |



## 2.4、Function table

H=HIGH voltage level;L=LOW voltage level

| Input |   | Output |
|-------|---|--------|
| A     | B | Y      |
| L     | L | L      |
| L     | H | L      |
| H     | L | L      |
| H     | H | H      |

## 3、Electrical Parameter

### 3.1、Absolute Maximum Ratings

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

| Characteristic          | Symbol    | Conditions                                              | Min. | Max.         | Unit               |
|-------------------------|-----------|---------------------------------------------------------|------|--------------|--------------------|
| Supply Voltage          | $V_{CC}$  | -                                                       | -0.5 | +7.0         | V                  |
| Input Voltage           | $V_I$     | - <sup>[1]</sup>                                        | -0.5 | +7.0         | V                  |
| output voltage          | $V_O$     | output HIGH or LOW state <sup>[2][3]</sup>              | -0.5 | $V_{CC}+0.5$ | V                  |
|                         |           | output in power-off state <sup>[2]</sup>                | -0.5 | +4.6         | V                  |
| input clamping current  | $I_{IK}$  | $V_I<0\text{V}$                                         | -20  | -            | mA                 |
| output clamping current | $I_{OK}$  | $V_O<0\text{V}$ or $V_O>V_{CC}$                         | -    | $\pm 20$     | mA                 |
| output current          | $I_O$     | $V_O=0\text{V}$ to $V_{CC}$                             | -    | $\pm 25$     | mA                 |
| supply current          | $I_{CC}$  | -                                                       | -    | 100          | mA                 |
| ground current          | $I_{GND}$ | -                                                       | -50  | -            | mA                 |
| Storage Temperature     | $T_{stg}$ | -                                                       | -65  | +150         | $^{\circ}\text{C}$ |
| total power dissipation | $P_{tot}$ | $T_{amb}=-40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ | -    | 250          | mW                 |
| Soldering Temperature   | $T_L$     | 10s                                                     | 260  |              | $^{\circ}\text{C}$ |

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

| 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     | $^{\circ}\text{C}$ |
| input transition rise and fall rate | $\Delta t/\Delta V$ | $V_{CC}=1.8\text{V}$ to $5.0\text{V}$ | -    | -    | 20       | ns/V               |



## 3.3、Electrical Characteristics

### 3.3.1、DC Characteristics 1

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

| Parameter                                  | Symbol           | Conditions                                                                                                                       |                                                          | Min.                 | Max. | Unit |
|--------------------------------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------|------|------|
| HIGH-level input voltage                   | V <sub>IH</sub>  | V <sub>CC</sub> =1.65V to 1.8V                                                                                                   |                                                          | 0.94                 | -    | V    |
|                                            |                  | V <sub>CC</sub> =2.0V                                                                                                            |                                                          | 0.99                 | -    | V    |
|                                            |                  | V <sub>CC</sub> =2.25V to 2.5V                                                                                                   |                                                          | 1.25                 | -    | V    |
|                                            |                  | V <sub>CC</sub> =2.75V                                                                                                           |                                                          | 1.33                 | -    | V    |
|                                            |                  | V <sub>CC</sub> =3.0V to 3.3V                                                                                                    |                                                          | 1.49                 | -    | V    |
|                                            |                  | V <sub>CC</sub> =3.6V                                                                                                            |                                                          | 1.62                 | -    | V    |
|                                            |                  | V <sub>CC</sub> =4.5V to 5.0V                                                                                                    |                                                          | 2.40                 | -    | V    |
|                                            |                  | V <sub>CC</sub> =5.5V                                                                                                            |                                                          | 3.00                 | -    | V    |
| LOW-level input voltage                    | V <sub>IL</sub>  | V <sub>CC</sub> =1.65V to 2.0V                                                                                                   |                                                          | -                    | 0.58 | V    |
|                                            |                  | V <sub>CC</sub> =2.25V to 2.75V                                                                                                  |                                                          | -                    | 0.75 | V    |
|                                            |                  | V <sub>CC</sub> =3.0V to 3.6V                                                                                                    |                                                          | -                    | 0.80 | V    |
|                                            |                  | V <sub>CC</sub> =4.5V to 5.5V                                                                                                    |                                                          | -                    | 0.80 | V    |
| HIGH-level output voltage                  | V <sub>OH</sub>  | V <sub>I</sub> =V <sub>IH</sub> or V <sub>IL</sub>                                                                               | V <sub>CC</sub> =1.65V to 5.5V;<br>I <sub>O</sub> =-20uA | V <sub>CC</sub> -0.1 | -    | V    |
|                                            |                  |                                                                                                                                  | V <sub>CC</sub> =1.65V;I <sub>O</sub> =-2mA              | 1.25                 | -    | V    |
|                                            |                  |                                                                                                                                  | V <sub>CC</sub> =1.8V;I <sub>O</sub> =-2mA               | 1.5                  | -    | V    |
|                                            |                  |                                                                                                                                  | V <sub>CC</sub> =2.3V;I <sub>O</sub> =-2.3mA             | 2.0                  | -    | V    |
|                                            |                  |                                                                                                                                  | V <sub>CC</sub> =2.3V;I <sub>O</sub> =-3mA               | 2.0                  | -    | V    |
|                                            |                  |                                                                                                                                  | V <sub>CC</sub> =2.5V;I <sub>O</sub> =-3mA               | 2.25                 | -    | V    |
|                                            |                  |                                                                                                                                  | V <sub>CC</sub> =3.0V;I <sub>O</sub> =-3mA               | 2.78                 | -    | V    |
|                                            |                  |                                                                                                                                  | V <sub>CC</sub> =3.0V;I <sub>O</sub> =-5.5mA             | 2.6                  | -    | V    |
|                                            |                  |                                                                                                                                  | V <sub>CC</sub> =3.3V;I <sub>O</sub> =-5.5mA             | 2.9                  | -    | V    |
|                                            |                  |                                                                                                                                  | V <sub>CC</sub> =4.5V;I <sub>O</sub> =-4mA               | 4.2                  | -    | V    |
|                                            |                  |                                                                                                                                  | V <sub>CC</sub> =4.5V;I <sub>O</sub> =-8mA               | 4.1                  | -    | V    |
| V <sub>CC</sub> =5.0V;I <sub>O</sub> =-8mA | 4.6              | -                                                                                                                                | V                                                        |                      |      |      |
| LOW-level output voltage                   | V <sub>OL</sub>  | V <sub>I</sub> =V <sub>IH</sub> or V <sub>IL</sub>                                                                               | V <sub>CC</sub> =1.65V to 5.5V;<br>I <sub>O</sub> =20uA  | -                    | 0.1  | V    |
|                                            |                  |                                                                                                                                  | V <sub>CC</sub> =1.65V;I <sub>O</sub> =2mA               | -                    | 0.2  | V    |
|                                            |                  |                                                                                                                                  | V <sub>CC</sub> =2.3V;I <sub>O</sub> =2.3mA              | -                    | 0.1  | V    |
|                                            |                  |                                                                                                                                  | V <sub>CC</sub> =2.3V;I <sub>O</sub> =3mA                | -                    | 0.15 | V    |
|                                            |                  |                                                                                                                                  | V <sub>CC</sub> =3.0V;I <sub>O</sub> =3mA                | -                    | 0.1  | V    |
|                                            |                  |                                                                                                                                  | V <sub>CC</sub> =3.0V;I <sub>O</sub> =5.5mA              | -                    | 0.2  | V    |
|                                            |                  |                                                                                                                                  | V <sub>CC</sub> =4.5V;I <sub>O</sub> =4mA                | -                    | 0.15 | V    |
|                                            |                  |                                                                                                                                  | V <sub>CC</sub> =4.5V;I <sub>O</sub> =8mA                | -                    | 0.3  | V    |
| input leakage current                      | I <sub>I</sub>   | V <sub>I</sub> =V <sub>CC</sub> or GND;<br>V <sub>CC</sub> =0V to 5.5V                                                           |                                                          | -                    | ±0.1 | uA   |
| supply current                             | I <sub>CC</sub>  | V <sub>I</sub> =V <sub>CC</sub> or GND;I <sub>O</sub> =0A;<br>V <sub>CC</sub> =1.8V,2.5V,3.3V,5.0V                               |                                                          | -                    | 1    | uA   |
| Additional supply current                  | ΔI <sub>CC</sub> | per input pin;V <sub>CC</sub> =1.8V;<br>V <sub>I</sub> =0.3V or 1.1V;I <sub>O</sub> =0A;<br>other pins at V <sub>CC</sub> or GND |                                                          | -                    | 10   | uA   |



|  |  |                                                                                                      |   |      |    |
|--|--|------------------------------------------------------------------------------------------------------|---|------|----|
|  |  | per input pin; $V_{CC}=5.5V$ ;<br>$V_I=0.3V$ or $3.4V$ ; $I_O=0A$ ;<br>other pins at $V_{CC}$ or GND | - | 1.35 | mA |
|--|--|------------------------------------------------------------------------------------------------------|---|------|----|

### 3.3.2、DC Characteristics 2

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

| Parameter                 | Symbol          | Conditions                                                                                         |                                                          | Min.                 | Max.  | Unit |
|---------------------------|-----------------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------|-------|------|
| HIGH-level input voltage  | V <sub>IH</sub> | V <sub>CC</sub> =1.65V to 1.8V                                                                     |                                                          | 1.00                 | -     | V    |
|                           |                 | V <sub>CC</sub> =2.0V                                                                              |                                                          | 1.04                 | -     | V    |
|                           |                 | V <sub>CC</sub> =2.25V to 2.5V                                                                     |                                                          | 1.30                 | -     | V    |
|                           |                 | V <sub>CC</sub> =2.75V                                                                             |                                                          | 1.38                 | -     | V    |
|                           |                 | V <sub>CC</sub> =3.0V to 3.3V                                                                      |                                                          | 1.54                 | -     | V    |
|                           |                 | V <sub>CC</sub> =3.6V                                                                              |                                                          | 1.67                 | -     | V    |
|                           |                 | V <sub>CC</sub> =4.5V to 5.0V                                                                      |                                                          | 2.45                 | -     | V    |
|                           |                 | V <sub>CC</sub> =5.5V                                                                              |                                                          | 3.05                 | -     | V    |
| LOW-level input voltage   | V <sub>IL</sub> | V <sub>CC</sub> =1.65V to 2.0V                                                                     |                                                          | -                    | 0.55  | V    |
|                           |                 | V <sub>CC</sub> =2.25V to 2.75V                                                                    |                                                          | -                    | 0.71  | V    |
|                           |                 | V <sub>CC</sub> =3.0V to 3.6V                                                                      |                                                          | -                    | 0.65  | V    |
|                           |                 | V <sub>CC</sub> =4.5V to 5.5V                                                                      |                                                          | -                    | 0.80  | V    |
| HIGH-level output voltage | V <sub>OH</sub> | V <sub>I</sub> =V <sub>IH</sub> or V <sub>IL</sub>                                                 | V <sub>CC</sub> =1.65V to 5.5V;<br>I <sub>O</sub> =-20uA | V <sub>CC</sub> -0.1 | -     | V    |
|                           |                 |                                                                                                    | V <sub>CC</sub> =1.65V;I <sub>O</sub> =-2mA              | 1.21                 | -     | V    |
|                           |                 |                                                                                                    | V <sub>CC</sub> =1.8V;I <sub>O</sub> =-2mA               | 1.45                 | -     | V    |
|                           |                 |                                                                                                    | V <sub>CC</sub> =2.3V;I <sub>O</sub> =-2.3mA             | 2.0                  | -     | V    |
|                           |                 |                                                                                                    | V <sub>CC</sub> =2.3V;I <sub>O</sub> =-3mA               | 1.93                 | -     | V    |
|                           |                 |                                                                                                    | V <sub>CC</sub> =2.5V;I <sub>O</sub> =-3mA               | 2.15                 | -     | V    |
|                           |                 |                                                                                                    | V <sub>CC</sub> =3.0V;I <sub>O</sub> =-3mA               | 2.7                  | -     | V    |
|                           |                 |                                                                                                    | V <sub>CC</sub> =3.0V;I <sub>O</sub> =-5.5mA             | 2.49                 | -     | V    |
|                           |                 |                                                                                                    | V <sub>CC</sub> =3.3V;I <sub>O</sub> =-5.5mA             | 2.8                  | -     | V    |
|                           |                 |                                                                                                    | V <sub>CC</sub> =4.5V;I <sub>O</sub> =-4mA               | 4.1                  | -     | V    |
|                           |                 |                                                                                                    | V <sub>CC</sub> =4.5V;I <sub>O</sub> =-8mA               | 3.95                 | -     | V    |
|                           |                 |                                                                                                    | V <sub>CC</sub> =5.0V;I <sub>O</sub> =-8mA               | 4.5                  | -     | V    |
| LOW-level output voltage  | V <sub>OL</sub> | V <sub>I</sub> =V <sub>IH</sub> or V <sub>IL</sub>                                                 | V <sub>CC</sub> =1.65V to 5.5V;<br>I <sub>O</sub> =20uA  | -                    | 0.1   | V    |
|                           |                 |                                                                                                    | V <sub>CC</sub> =1.65V;I <sub>O</sub> =2mA               | -                    | 0.25  | V    |
|                           |                 |                                                                                                    | V <sub>CC</sub> =2.3V;I <sub>O</sub> =2.3mA              | -                    | 0.15  | V    |
|                           |                 |                                                                                                    | V <sub>CC</sub> =2.3V;I <sub>O</sub> =3mA                | -                    | 0.2   | V    |
|                           |                 |                                                                                                    | V <sub>CC</sub> =3.0V;I <sub>O</sub> =3mA                | -                    | 0.15  | V    |
|                           |                 |                                                                                                    | V <sub>CC</sub> =3.0V;I <sub>O</sub> =5.5mA              | -                    | 0.252 | V    |
|                           |                 |                                                                                                    | V <sub>CC</sub> =4.5V;I <sub>O</sub> =4mA                | -                    | 0.2   | V    |
|                           |                 |                                                                                                    | V <sub>CC</sub> =4.5V;I <sub>O</sub> =8mA                | -                    | 0.35  | V    |
| input leakage current     | I <sub>I</sub>  | V <sub>I</sub> =V <sub>CC</sub> or GND;<br>V <sub>CC</sub> =0V to 5.5V                             | -                                                        | ±1                   | uA    |      |
| supply current            | I <sub>CC</sub> | V <sub>I</sub> =V <sub>CC</sub> or GND;I <sub>O</sub> =0A;<br>V <sub>CC</sub> =1.8V,2.5V,3.3V,5.0V | -                                                        | 10                   | uA    |      |



|                           |                 |                                                                                                      |   |     |         |
|---------------------------|-----------------|------------------------------------------------------------------------------------------------------|---|-----|---------|
| Additional supply current | $\Delta I_{CC}$ | per input pin; $V_{CC}=1.8V$ ;<br>$V_I=0.3V$ or $1.1V$ ; $I_O=0A$ ;<br>other pins at $V_{CC}$ or GND | - | 10  | $\mu A$ |
|                           |                 | per input pin; $V_{CC}=5.5V$ ;<br>$V_I=0.3V$ or $3.4V$ ; $I_O=0A$ ;<br>other pins at $V_{CC}$ or GND | - | 1.5 | mA      |

### 3.3.3、DC Characteristics 3

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

| Parameter                 | Symbol   | Conditions                                    |                                              | Min.         | Max.    | Unit    |
|---------------------------|----------|-----------------------------------------------|----------------------------------------------|--------------|---------|---------|
| HIGH-level input voltage  | $V_{IH}$ | $V_{CC}=1.65V$ to $1.8V$                      |                                              | 1.00         | -       | V       |
|                           |          | $V_{CC}=2.0V$                                 |                                              | 1.04         | -       | V       |
|                           |          | $V_{CC}=2.25V$ to $2.5V$                      |                                              | 1.30         | -       | V       |
|                           |          | $V_{CC}=2.75V$                                |                                              | 1.38         | -       | V       |
|                           |          | $V_{CC}=3.0V$ to $3.3V$                       |                                              | 1.54         | -       | V       |
|                           |          | $V_{CC}=3.6V$                                 |                                              | 1.67         | -       | V       |
|                           |          | $V_{CC}=4.5V$ to $5.0V$                       |                                              | 2.45         | -       | V       |
|                           |          | $V_{CC}=5.5V$                                 |                                              | 3.05         | -       | 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 $5.5V$ ;<br>$I_O=-20\mu A$ | $V_{CC}-0.1$ | -       | 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       |
| LOW-level output voltage  | $V_{OL}$ | $V_I=V_{IH}$ or $V_{IL}$                      | $V_{CC}=1.65V$ to $5.5V$ ;<br>$I_O=20\mu A$  | -            | 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;<br>$V_{CC}=0V$ to $5.5V$ |                                              | -            | $\pm 1$ | $\mu A$ |



|                           |                 |                                                                                                      |   |     |         |
|---------------------------|-----------------|------------------------------------------------------------------------------------------------------|---|-----|---------|
| supply current            | $I_{CC}$        | $V_I=V_{CC}$ or GND; $I_O=0A$ ;<br>$V_{CC}=1.8V, 2.5V, 3.3V, 5.0V$                                   | - | 10  | $\mu A$ |
| Additional supply current | $\Delta I_{CC}$ | per input pin; $V_{CC}=1.8V$ ;<br>$V_I=0.3V$ or $1.1V$ ; $I_O=0A$ ;<br>other pins at $V_{CC}$ or GND | - | 10  | $\mu A$ |
|                           |                 | per input pin; $V_{CC}=5.5V$ ;<br>$V_I=0.3V$ or $3.4V$ ; $I_O=0A$ ;<br>other pins at $V_{CC}$ or GND | - | 1.5 | mA      |

### 3.3.4、AC Characteristics

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

| Parameter                     | Symbol   | Conditions                                                                         |                         | -40°C to +125°C |              |              |              |               | Unit |
|-------------------------------|----------|------------------------------------------------------------------------------------|-------------------------|-----------------|--------------|--------------|--------------|---------------|------|
|                               |          |                                                                                    |                         | Min.            | Typ.<br>25°C | Max.<br>25°C | Max.<br>85°C | Max.<br>125°C |      |
| propagation delay             | $t_{pd}$ | A, B to Y; see Figure 4 <sup>[1]</sup>                                             | $V_{CC}=1.8V; C_L=15pF$ | -               | 13           | 19.4         | 21.8         | 23.4          | ns   |
|                               |          |                                                                                    | $V_{CC}=1.8V; C_L=30pF$ | -               | 15.2         | 21.8         | 24.8         | 26.8          | ns   |
|                               |          |                                                                                    | $V_{CC}=2.5V; C_L=15pF$ | -               | 9.2          | 13.2         | 15.2         | 16.4          | ns   |
|                               |          |                                                                                    | $V_{CC}=2.5V; C_L=30pF$ | -               | 10.6         | 15           | 17.2         | 18.4          | ns   |
|                               |          |                                                                                    | $V_{CC}=3.3V; C_L=15pF$ | -               | 7.6          | 10.8         | 12.2         | 13            | ns   |
|                               |          |                                                                                    | $V_{CC}=3.3V; C_L=30pF$ | -               | 8.8          | 12.2         | 13.6         | 14.6          | ns   |
|                               |          |                                                                                    | $V_{CC}=5.0V; C_L=15pF$ | -               | 6.4          | 8.2          | 9            | 9.4           | ns   |
|                               |          |                                                                                    | $V_{CC}=5.0V; C_L=30pF$ | -               | 7.2          | 9.2          | 10.2         | 10.8          | ns   |
| input capacitance             | $C_I$    | $V_I=V_{CC}$ or GND; $V_{CC}=3.3V$                                                 |                         | -               | 1.5          | 10           | 10           | 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;<br>$V_I=GND$ to $V_{CC}$ ;<br>$C_L=30pF$ ;<br>$f=10MHz$ <sup>[2]</sup> | $V_{CC}=1.8V$           | -               | 4.2          | -            | -            | -             | pF   |
|                               |          |                                                                                    | $V_{CC}=2.5V$           | -               | 5.3          | -            | -            | -             | pF   |
|                               |          |                                                                                    | $V_{CC}=3.3V$           | -               | 7.2          | -            | -            | -             | pF   |
|                               |          |                                                                                    | $V_{CC}=5.0V$           | -               | 11.1         | -            | -            | -             | 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  $\mu W$ ).

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

$f_i$ =input frequency in MHz;

$f_o$ =output frequency in MHz;

$C_L$ =output load capacitance in pF;

$V_{CC}$ =supply voltage in V;

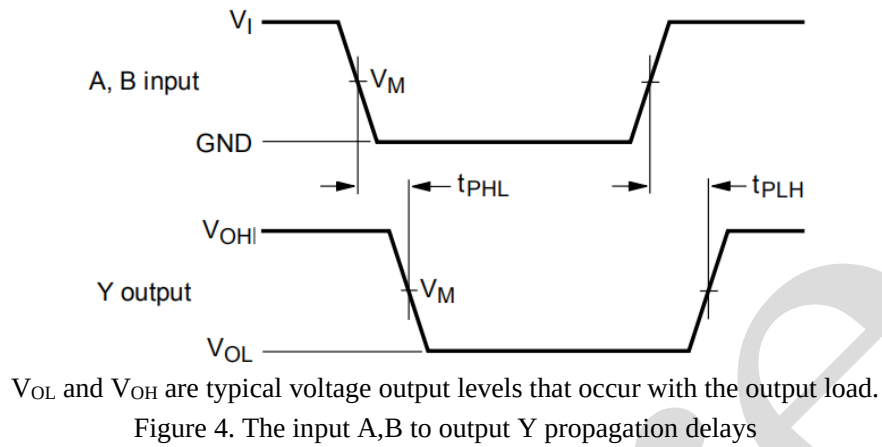
$N$ =number of inputs switching;

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



## 4、Testing Circuit

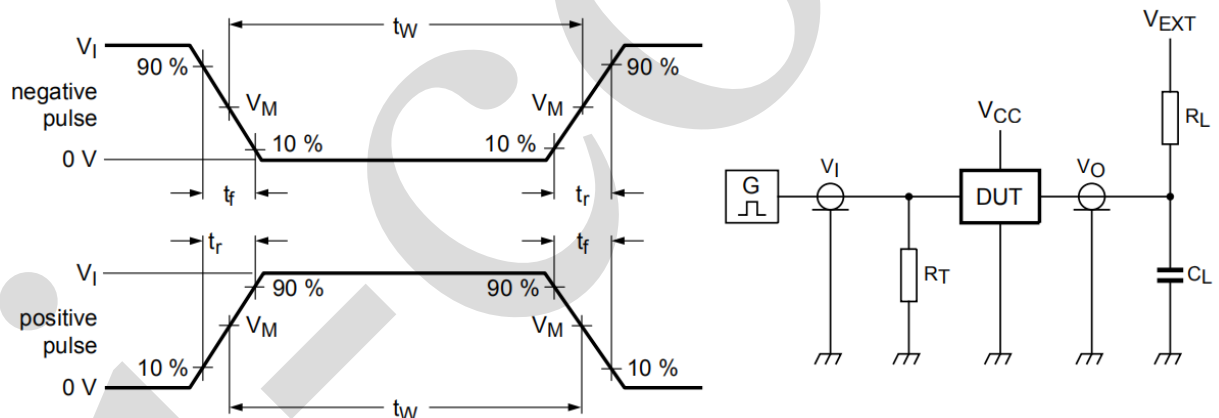
### 4.1、AC Testing Waveforms



### 4.2、Measurement Points

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

### 4.3、AC Testing Circuit



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

Figure 5. Test circuit for measuring switching times



## 4.4、Test Data

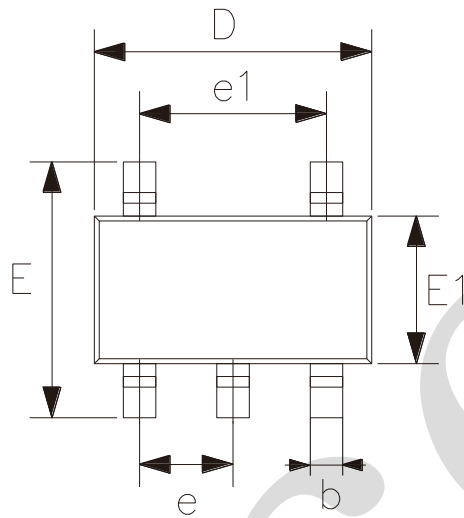
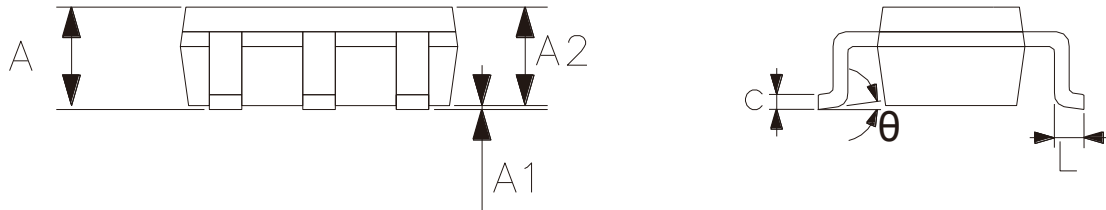
| Supply voltage  | Input           |                           |                  | Load           |                | V <sub>EXT</sub>                   |                                    |                                    |
|-----------------|-----------------|---------------------------|------------------|----------------|----------------|------------------------------------|------------------------------------|------------------------------------|
| V <sub>CC</sub> | V <sub>I</sub>  | $\Delta t/\Delta V^{[1]}$ | f <sub>max</sub> | C <sub>L</sub> | R <sub>L</sub> | t <sub>PLH</sub> ,t <sub>PHL</sub> | t <sub>PZH</sub> ,t <sub>PHZ</sub> | t <sub>PZL</sub> ,t <sub>PLZ</sub> |
| 1.8V            | V <sub>CC</sub> | ≤1.0ns/V                  | 15MHz            | 15pF,30pF      | 1MΩ            | GND                                | GND                                | V <sub>CC</sub>                    |
| 2.5V            | V <sub>CC</sub> | ≤1.0ns/V                  | 25MHz            | 15pF,30pF      | 1MΩ            | GND                                | GND                                | V <sub>CC</sub>                    |
| 3.3V            | 3V              | ≤1.0ns/V                  | 50MHz            | 15pF,30pF      | 1MΩ            | GND                                | GND                                | V <sub>CC</sub>                    |
| 5.0V            | 3V              | ≤1.0ns/V                  | 50MHz            | 15pF,30pF      | 1MΩ            | GND                                | GND                                | V <sub>CC</sub>                    |

Note: [1] dV/dt ≥1.0V/ns



## 5、Package Information

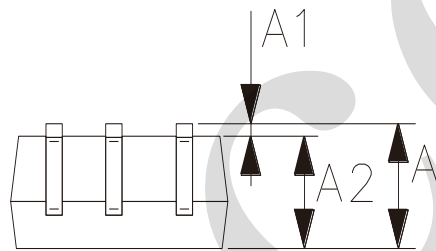
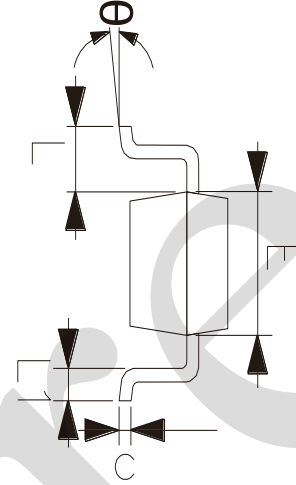
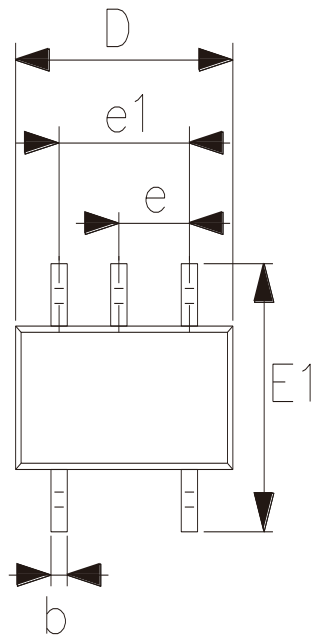
### 5.1、SOT23-5



| 2023/12/A | Dimensions In Millimeters |      |
|-----------|---------------------------|------|
| Symbol    | 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°   |



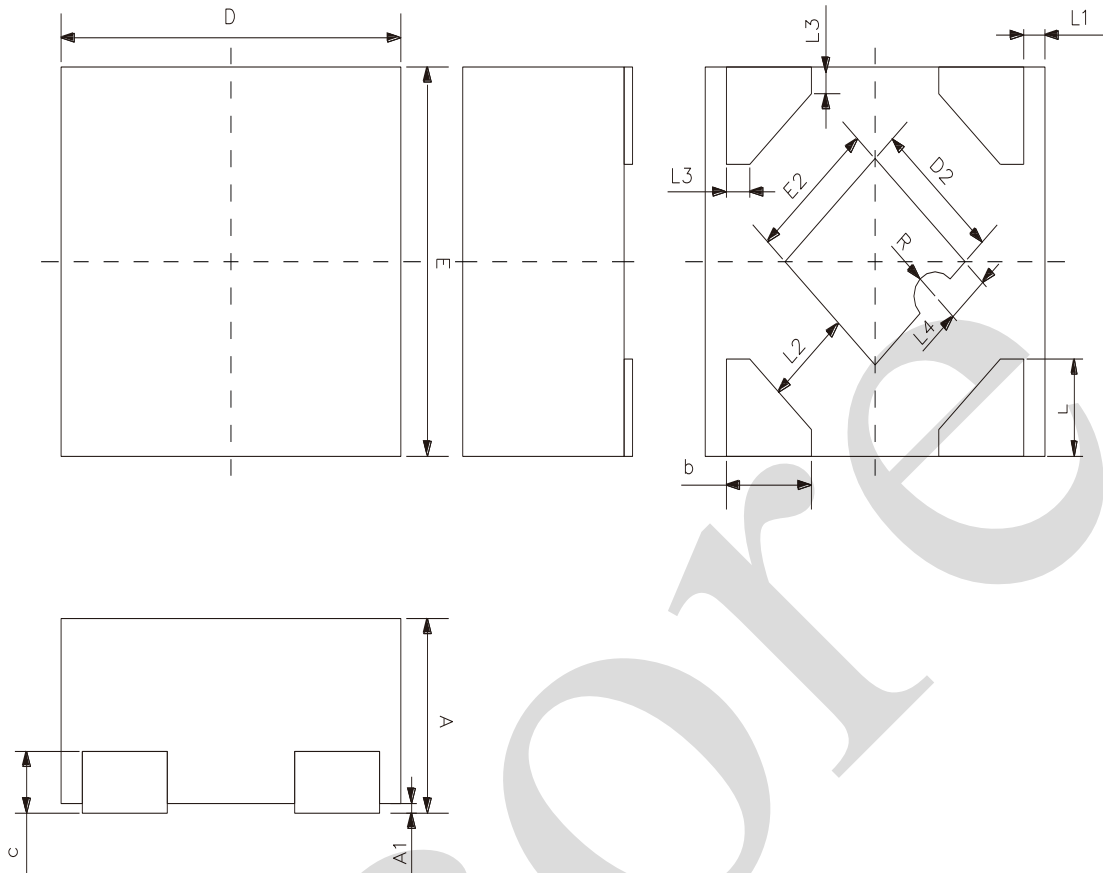
## 5.2、SOT353



| 2023/12/A | Dimensions In Millimeters |       |
|-----------|---------------------------|-------|
| Symbol    | 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°    |



## 5.3、DFN4



| 2023/12/A | Dimensions In Millimeters |      |
|-----------|---------------------------|------|
| Symbol    | Min                       | Max  |
| A         | 0.37                      | 0.43 |
| A1        | 0.00                      | 0.05 |
| b         | 0.15                      | 0.25 |
| c         | 0.127                     |      |
| D         | 0.75                      | 0.85 |
| D2        | 0.20                      | 0.40 |
| E         | 0.75                      | 0.85 |
| E2        | 0.20                      | 0.40 |
| e         | 0.50                      |      |
| L         | 0.15                      | 0.25 |
| L1        | 0.05                      |      |
| L2        | 0.20                      |      |
| L3        | 0.055                     |      |
| L4        | 0.10                      |      |
| R         | 0.05                      |      |



## 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             | <p>○: Indicates that the content of hazardous substances or elements in the detection limit of the following the SJ/T11363-2006 standard.</p> <p>×: Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements.</p> |                               |                               |                               |                          |                                |                   |                       |                           |                      |

### 6.2、Notes

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