# AiP74LVC1G374
# Single D-Type Flip-Flop With 3-State Output

# Product Specification

**Specification Revision History：**

| Version | Date | Description |
|---|---|---|
| 2024-07-A0 | 2024-07 | New |
| 2024-09-A1 | 2024-09 | Modify the parameters |
| | | |
| | | |

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## 1、General Description

The AiP74LVC1G374 provides a D-type flip-flop with 3-state output.

The input can be driven from either 3.3V or 5V devices. This feature allows the use of this device in a mixed 3.3V and 5V environment.

**Features:**

- Supply voltage range: 1.65V to 5.5V
- Inputs accept voltages to 5.5 V
- ±24mA output drive at 3.0V
- High-impedance when $V_{CC}$=0V
- Temperature range:-40℃ to +125℃
- Packaging information: SOT23-6/SOT363/XSON6

**Ordering Information:**

**Reel packing specifications:**

| Part number | Packaging form | Marking code | Reel quantity | Boxed reel quantity | Notes |
|---|---|---|---|---|---|
| AiP74LVC1G374GB236.TR | SOT23-6 | GQXX | 3000 PCS/reel | 30000 PCS/box | Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm |
| AiP74LVC1G374GC363.TR | SOT363 | GQXX | 3000 PCS/reel | 30000 PCS/box | Dimensions of plastic enclosure: 2.1mm×1.3mm Pin spacing: 0.65mm |
| AiP74LVC1G374EA6.TR | XSON6 | GQXX | 5000 PCS/reel | 25000 PCS/box | Dimensions of plastic enclosure: 1.45mm×1.0mm Pin spacing: 0.5mm |
| AiP74LVC1G374ED6.TR | XSON6 | GQXX | 5000 PCS/reel | 25000 PCS/box | Dimensions of plastic enclosure: 1.0mm×1.0mm Pin spacing: 0.35mm |

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

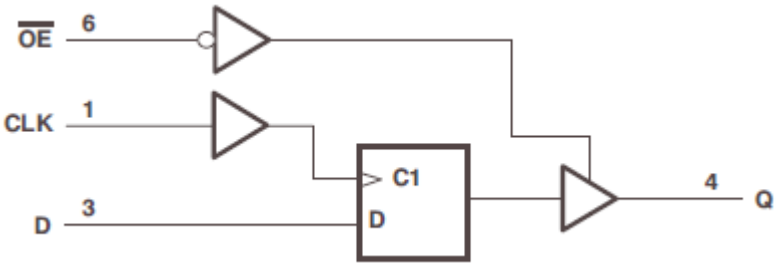
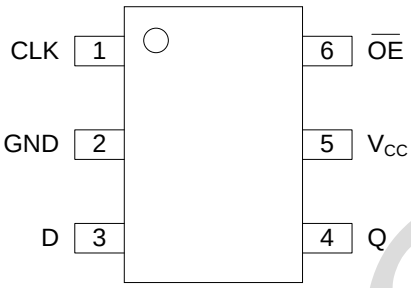
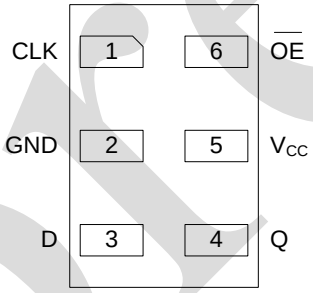



Figure 1. Block Diagram

### 2.2、Pin Configurations




SOT23-6/SOT363




XSON6

### 2.3、Pin Description

| Pin No. | Pin Name | Description |
|---|---|---|
| 1 | CLK | clock input (LOW-to-HIGH, edge-triggered) |
| 2 | GND | ground (0V) |
| 3 | D | data input |
| 4 | Q | data output |
| 5 | $V_{CC}$ | supply voltage |
| 6 | $\overline{OE}$ | active low output enable; Z output when high |

### 2.4、Function Table

| Input | | | Output |
|---|---|---|---|
| $\overline{OE}$ | CLK | D | Q |
| L | ↑ | L | L |
| L | ↑ | H | H |
| L | L or H | X | Q0 |
| H | X | X | Z |

Note: H=HIGH voltage level; L=LOW voltage level; Z=high-impedance OFF-state.

## 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 | +6.5 | V |
| input voltage | $V_I$ | - | -0.5 | +6.5 | V |
| output voltage | $V_O$ | Active mode | -0.5 | $V_{CC}$+0.5 | V |
| | | Power-down mode; $V_{CC}$=0V | -0.5 | +6.5 | V |
| | | output 3-state | -0.5 | +6.5 | V |
| supply current | $I_{CC}$ | - | - | 100 | mA |
| ground current | $I_{GND}$ | - | -100 | - | mA |
| input clamping current | $I_{IK}$ | $V_I$ < 0V | -50 | - | mA |
| output current | $I_O$ | $V_O$=0V to $V_{CC}$ | - | ±50 | mA |
| output clamping current | $I_{OK}$ | $V_O$ > $V_{CC}$ or $V_O$ < 0V | - | ±50 | mA |
| storage temperature | $T_{stg}$ | - | -65 | +150 | ℃ |
| soldering temperature | $T_L$ | 10s | 260 | | ℃ |

### 3.2、Recommended Operating Conditions

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| supply voltage | $V_{CC}$ | - | 1.65 | - | 5.5 | V |
| input voltage | $V_I$ | - | 0 | - | 5.5 | V |
| output voltage | $V_O$ | Active mode | 0 | - | $V_{CC}$ | V |
| | | Power-down mode; $V_{CC}$=0V | 0 | - | 5.5 | V |
| | | output 3-state | 0 | - | 5.5 | V |
| ambient temperature | $T_{amb}$ | - | -40 | - | +125 | ℃ |

### 3.3、Electrical Characteristics

#### 3.3.1、DC Characteristics 1

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

| Parameter | Sym | $V_{CC}$ | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| HIGH-level input voltage | $V_{IH}$ | 1.65V to 1.95V | - | 0.65×$V_{CC}$ | - | - | V |
| | | 2.3V to 2.7V | - | 1.7 | - | - | V |
| | | 3V to 3.6V | - | 2.0 | - | - | V |
| | | 4.5V to 5.5V | - | 0.7×$V_{CC}$ | - | - | V |
| LOW-level input voltage | $V_{IL}$ | 1.65V to 1.95V | - | - | - | 0.35×$V_{CC}$ | V |
| | | 2.3V to 2.7V | - | - | - | 0.7 | V |
| | | 3V to 3.6V | - | - | - | 0.8 | V |
| | | 4.5V to 5.5V | - | - | - | 0.3×$V_{CC}$ | V |
| HIGH-level output voltage | $V_{OH}$ | 1.65V to 5.5V | $I_O$=-100uA | $V_{CC}$ - 0.1 | - | - | V |
| | | 1.65V | $I_O$ =-4mA | 1.2 | - | - | V |
| | | 2.3V | $I_O$ =-8mA | 1.9 | - | - | V |
| | | 3.0V | $I_O$ =-16mA | 2.4 | - | - | V |
| | | 3.0V | $I_O$ =-24mA | 2.3 | - | - | V |
| | | 4.5V | $I_O$ =-32mA | 3.8 | - | - | V |
| LOW-level output voltage | $V_{OL}$ | 1.65V to 5.5V | $I_O$=100uA | - | - | 0.10 | V |
| | | 1.65V | $I_O$ =4mA | - | - | 0.45 | V |
| | | 2.3V | $I_O$ =8mA | - | - | 0.30 | V |
| | | 3.0V | $I_O$ =16mA | - | - | 0.40 | V |
| | | 3.0V | $I_O$ =24mA | - | - | 0.55 | V |
| | | 4.5V | $I_O$ =32mA | - | - | 0.55 | V |
| input leakage current | $I_I$ | 0V to 5.5V | $V_I$=5.5V or GND | - | - | ±1 | uA |
| OFF-state output current | $I_{OZ}$ | 3.6V | $V_I$=$V_{IH}$ or $V_{IL}$; $V_O$= 0V to 5.5V | - | - | ±5 | uA |
| power-off leakage current | $I_{OFF}$ | 0V | $V_I$ or $V_O$=5.5V | - | - | ±10 | uA |
| supply current | $I_{CC}$ | 1.65V to 5.5V | $V_I$=5.5V or GND; $I_O$=0A | - | - | 10 | uA |
| additional supply current | $\Delta I_{CC}$ | 2.3V to 5.5V | per input pin; $V_I$= $V_{CC}$-0.6V; $I_O$=0A | - | - | 500 | uA |

### 3.3.2、DC Characteristics 2

($T_{amb}$=-40℃ to +125℃, voltages are referenced to GND (ground = 0V), unless otherwise specified.)

| Parameter | Sym | $V_{CC}$ | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| HIGH-level input voltage | $V_{IH}$ | 1.65V to 1.95V | - | 0.65×$V_{CC}$ | - | - | V |
| | | 2.3V to 2.7V | - | 1.7 | - | - | V |
| | | 3V to 3.6V | - | 2.0 | - | - | V |
| | | 4.5V to 5.5V | - | 0.7×$V_{CC}$ | - | - | V |
| LOW-level input voltage | $V_{IL}$ | 1.65V to 1.95V | - | - | - | 0.35×$V_{CC}$ | V |
| | | 2.3V to 2.7V | - | - | - | 0.7 | V |
| | | 3V to 3.6V | - | - | - | 0.8 | V |
| | | 4.5V to 5.5V | - | - | - | 0.3×$V_{CC}$ | V |
| HIGH-level output voltage | $V_{OH}$ | 1.65V to 5.5V | $I_O$=-100uA | $V_{CC}$-0.1 | - | - | V |
| | | 1.65V | $I_O$ =-4mA | 1.2 | - | - | V |
| | | 2.3V | $I_O$ =-8mA | 1.9 | - | - | V |
| | | 3.0V | $I_O$ =-16mA | 2.4 | - | - | V |
| | | 3.0V | $I_O$ =-24mA | 2.3 | - | - | V |
| | | 4.5V | $I_O$ =-32mA | 3.8 | - | - | V |
| LOW-level output voltage | $V_{OL}$ | 1.65V to 5.5V | $I_O$=100uA | - | - | 0.10 | V |
| | | 1.65V | $I_O$ =4mA | - | - | 0.45 | V |
| | | 2.3V | $I_O$ =8mA | - | - | 0.30 | V |
| | | 3.0V | $I_O$ =16mA | - | - | 0.40 | V |
| | | 3.0V | $I_O$ =24mA | - | - | 0.65 | V |
| | | 4.5V | $I_O$ =32mA | - | - | 0.65 | V |
| input leakage current | $I_I$ | 0V to 5.5V | $V_I$=5.5V or GND | - | - | ±2 | uA |
| OFF-state output current | $I_{OZ}$ | 3.6V | $V_I$=$V_{IH}$ or $V_{IL}$; $V_O$= 0V to 5.5V | - | - | ±5 | uA |
| power-off leakage current | $I_{OFF}$ | 0V | $V_I$ or $V_O$=5.5V | - | - | ±10 | uA |
| supply current | $I_{CC}$ | 1.65V to 5.5V | $V_I$=5.5V or GND; $I_O$=0A | - | - | 10 | uA |
| additional supply current | $\Delta I_{CC}$ | 2.3V to 5.5V | per input pin; $V_I$= $V_{CC}$-0.6V; $I_O$=0A | - | - | 500 | uA |

### 3.3.3、AC Characteristics 1

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

| Parameter | Symbol | $V_{CC}$ | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| CLK to Q propagation delay | $t_{PLH}$, $t_{PHL}$ | 1.65V to 1.95V | see Figure 3 | - | - | 18.3 | ns |
| | | 2.3V to 2.7V | | - | - | 8.2 | ns |
| | | 3V to 3.6V | | - | - | 6 | ns |
| | | 4.5V to 5.5V | | - | - | 4 | ns |
| $n\overline{OE}$ to Q enable time | $t_{PZH}$, $t_{PZL}$ | 1.65V to 1.95V | see Figure 4 | - | - | 13 | ns |
| | | 2.3V to 2.7V | | - | - | 6.3 | ns |
| | | 3V to 3.6V | | - | - | 5 | ns |
| | | 4.5V to 5.5V | | - | - | 3.5 | ns |
| $n\overline{OE}$ to Q disable time | $t_{PLZ}$, $t_{PHZ}$ | 1.65V to 1.95V | see Figure 4 | - | - | 14 | ns |
| | | 2.3V to 2.7V | | - | - | 5.3 | ns |
| | | 3V to 3.6V | | - | - | 4.5 | ns |
| | | 4.5V to 5.5V | | - | - | 3.1 | ns |
| maximum frequency | $f_{max}$ | 1.65V to 1.95V | see Figure 4 | 100 | - | - | MHz |
| | | 2.3V to 2.7V | | 125 | - | - | MHz |
| | | 3V to 3.6V | | 150 | - | - | MHz |
| | | 4.5V to 5.5V | | 175 | - | - | MHz |
| pulse duration, CLK high or low | $t_w$ | 1.65V to 1.95V | see Figure 2 | 3.3 | - | - | ns |
| | | 2.3V to 2.7V | | 3 | - | - | ns |
| | | 3V to 3.6V | | 2.8 | - | - | ns |
| | | 4.5V to 5.5V | | 2.5 | - | - | ns |
| setup time | $t_{su}$ | 1.65V to 1.95V | see Figure 5 | 3.5 | - | - | ns |
| | | 2.3V to 2.7V | | 2.5 | - | - | ns |
| | | 3V to 3.6V | | 2 | - | - | ns |
| | | 4.5V to 5.5V | | 1.5 | - | - | ns |
| hold time | $t_h$ | 1.65V to 1.95V | see Figure 5 | 3.4 | - | - | ns |
| | | 2.3V to 2.7V | | 1.6 | - | - | ns |
| | | 3V to 3.6V | | 1.5 | - | - | ns |
| | | 4.5V to 5.5V | | 1.5 | - | - | ns |

Note:Typical values are measured at $T_{amb}$=25℃ and $V_{CC}$=1.8V, 2.5V, 2.7V, 3.3V and 5.0V respectively.

### 3.3.4、AC Characteristics 2

($T_{amb}$=-40℃ to +125℃, voltages are referenced to GND (ground = 0V), unless otherwise specified.)

| Parameter | Symbol | $V_{CC}$ | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| CLK to Q propagation delay | $t_{PLH}$, $t_{PHL}$ | 1.65V to 1.95V | see Figure 3 | - | - | 18.3 | ns |
| | | 2.3V to 2.7V | | - | - | 10.2 | ns |
| | | 3V to 3.6V | | - | - | 7 | ns |
| | | 4.5V to 5.5V | | - | - | 5 | ns |
| $n\overline{OE}$ to Q enable time | $t_{PZH}$, $t_{PZL}$ | 1.65V to 1.95V | see Figure 4 | - | - | 14 | ns |
| | | 2.3V to 2.7V | | - | - | 8.3 | ns |
| | | 3V to 3.6V | | - | - | 6.5 | ns |
| | | 4.5V to 5.5V | | - | - | 5.5 | ns |
| $n\overline{OE}$ to Q disable time | $t_{PLZ}$, $t_{PHZ}$ | 1.65V to 1.95V | see Figure 4 | - | - | 16 | ns |
| | | 2.3V to 2.7V | | - | - | 7.3 | ns |
| | | 3V to 3.6V | | - | - | 6 | ns |
| | | 4.5V to 5.5V | | - | - | 5.1 | ns |
| maximum frequency | $f_{max}$ | 1.65V to 1.95V | see Figure 4 | 100 | - | - | MHz |
| | | 2.3V to 2.7V | | 125 | - | - | MHz |
| | | 3V to 3.6V | | 150 | - | - | MHz |
| | | 4.5V to 5.5V | | 175 | - | - | MHz |
| pulse duration, CLK high or low | $t_w$ | 1.65V to 1.95V | see Figure 2 | 3.3 | - | - | ns |
| | | 2.3V to 2.7V | | 3 | - | - | ns |
| | | 3V to 3.6V | | 2.8 | - | - | ns |
| | | 4.5V to 5.5V | | 2.5 | - | - | ns |
| setup time | $t_{su}$ | 1.65V to 1.95V | see Figure 5 | 3.5 | - | - | ns |
| | | 2.3V to 2.7V | | 2.5 | - | - | ns |
| | | 3V to 3.6V | | 2 | - | - | ns |
| | | 4.5V to 5.5V | | 1.5 | - | - | ns |
| hold time | $t_h$ | 1.65V to 1.95V | see Figure 5 | 3.4 | - | - | ns |
| | | 2.3V to 2.7V | | 1.6 | - | - | ns |
| | | 3V to 3.6V | | 1.5 | - | - | ns |
| | | 4.5V to 5.5V | | 1.5 | - | - | ns |

## 4、Testing Circuit

### 4.1、AC Testing Circuit

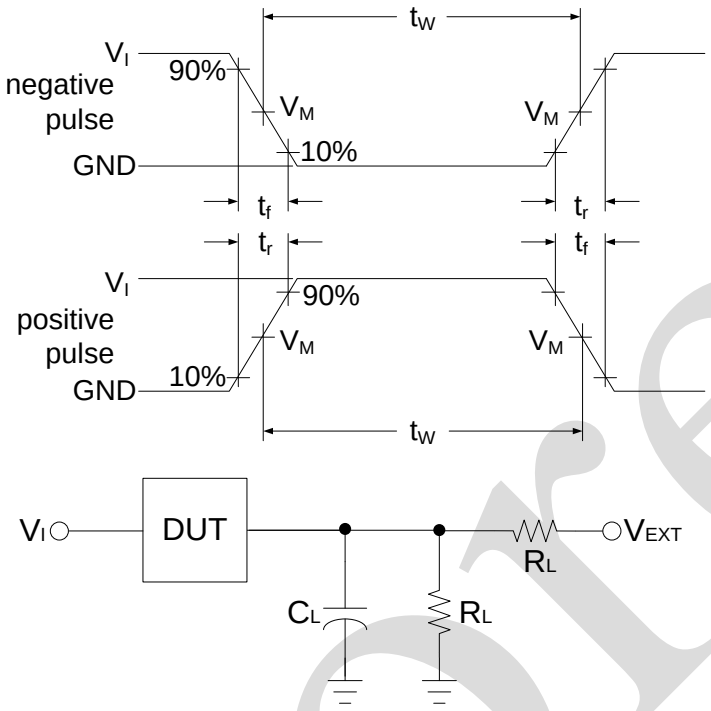



Figure 2. AC Testing Circuit

Definitions for test circuit:

$R_L$=Load resistance.

$C_L$=Load capacitance including jig and probe capacitance.

### 4.2、Test Data

| Supply voltage | Input | | Load | | $V_{EXT}$ | | |
|---|---|---|---|---|---|---|---|
| $V_{CC}$ | $V_I$ | $t_r = t_f$ | $C_L$ | $R_L$ | $t_{PLH}/t_{PHL}$ | $t_{PLZ}/t_{PZL}$ | $t_{PHZ}/t_{PZH}$ |
| 1.65V to 1.95V | $V_{CC}$ | ≤ 2ns | 30pF | 1kΩ | Open | 2×$V_{CC}$ | GND |
| 2.3V to 2.7V | $V_{CC}$ | ≤ 2ns | 30pF | 500Ω | Open | 2×$V_{CC}$ | GND |
| 3V to 3.6V | $V_{CC}$ | ≤ 2.5ns | 50pF | 500Ω | Open | 2×$V_{CC}$ | GND |
| 4.5V to 5.5V | $V_{CC}$ | ≤ 2.5ns | 50pF | 500Ω | Open | 2×$V_{CC}$ | GND |

### 4.3、AC Testing Waveforms

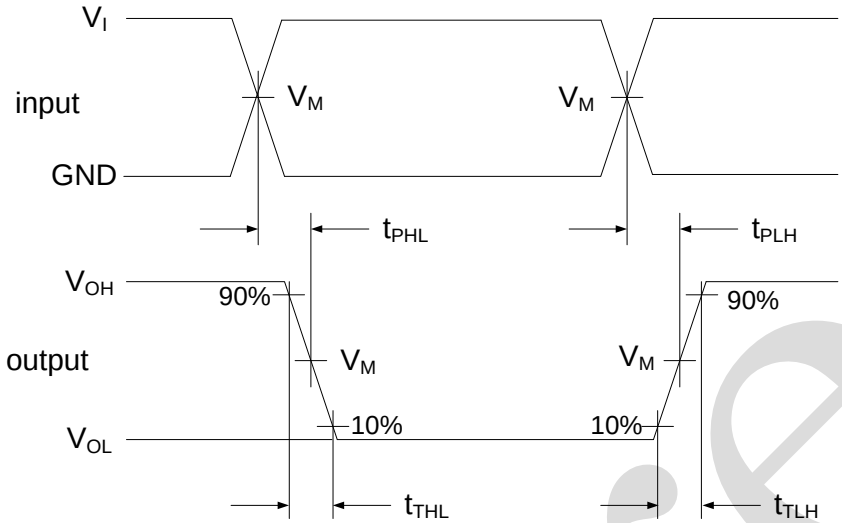



Figure 3. The data input (D) to output(Q) propagation delays

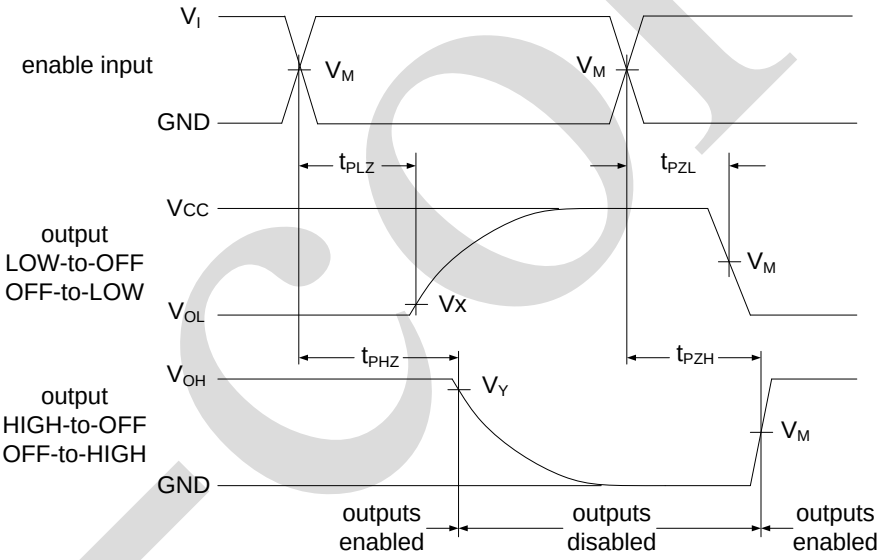



Figure 4. 3-state enable and disable times

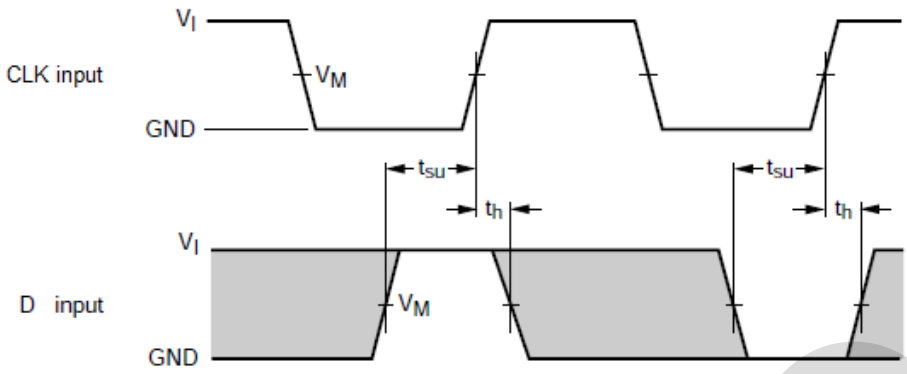


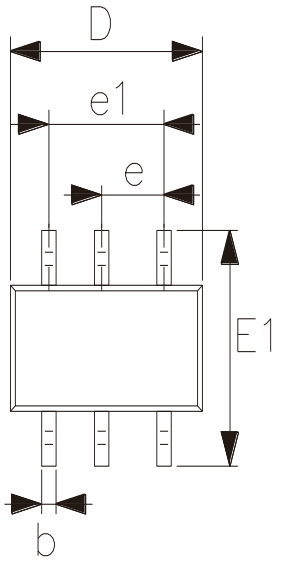

Figure 5. data setup and hold times for D input to the CLK

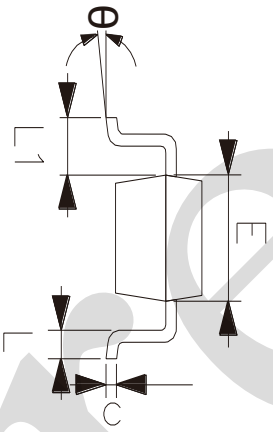
### 4.4、Measurement Points

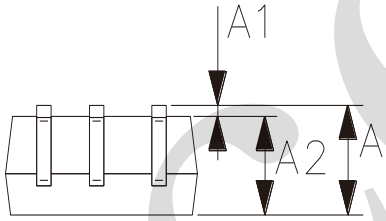
| Supply voltage | Input | Output | | |
|---|---|---|---|---|
| $V_{CC}$ | $V_M$ | $V_M$ | $V_X$ | $V_Y$ |
| 1.65V to 1.95V | 0.5×$V_{CC}$ | 0.5×$V_{CC}$ | $V_{OL}$+0.15V | $V_{OH}$-0.15V |
| 2.3V to 2.7V | 0.5×$V_{CC}$ | 0.5×$V_{CC}$ | $V_{OL}$+0.15V | $V_{OH}$-0.15V |
| 3V to 3.6V | 0.5×$V_{CC}$ | 0.5×$V_{CC}$ | $V_{OL}$+0.3V | $V_{OH}$-0.3V |
| 4.5V to 5.5V | 0.5×$V_{CC}$ | 0.5×$V_{CC}$ | $V_{OL}$+0.3V | $V_{OH}$-0.3V |

## 5、Package Information

### 5.1、SOT363

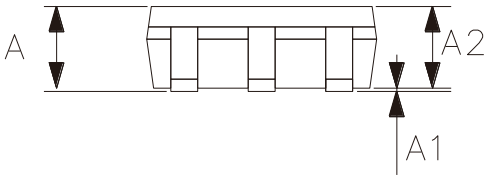


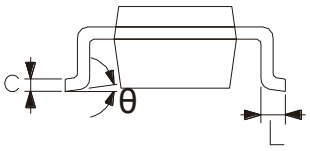



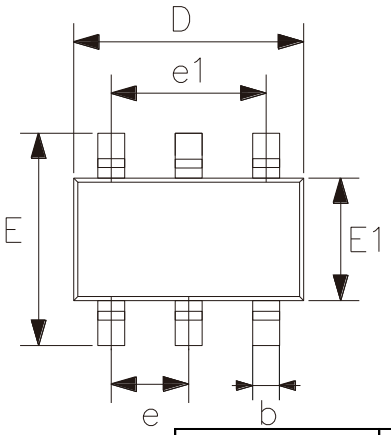




| 2023/12/A | Dimensions In Millimeters | |
|---|---|---|
| Symbol | Min. | Max. |
| A | 0.90 | 1.10 |
| A1 | 0.00 | 0.10 |
| A2 | 0.90 | 1.00 |
| b | 0.15 | 0.35 |
| c | 0.11 | 0.175 |
| D | 2.00 | 2.20 |
| E1 | 2.15 | 2.45 |
| E | 1.15 | 1.35 |
| e | 0.65 | |
| e1 | 1.20 | 1.40 |
| L | 0.26 | 0.46 |
| L1 | 0.525 | |
| θ | 0° | 8° |

**5.2、SOT23-6**

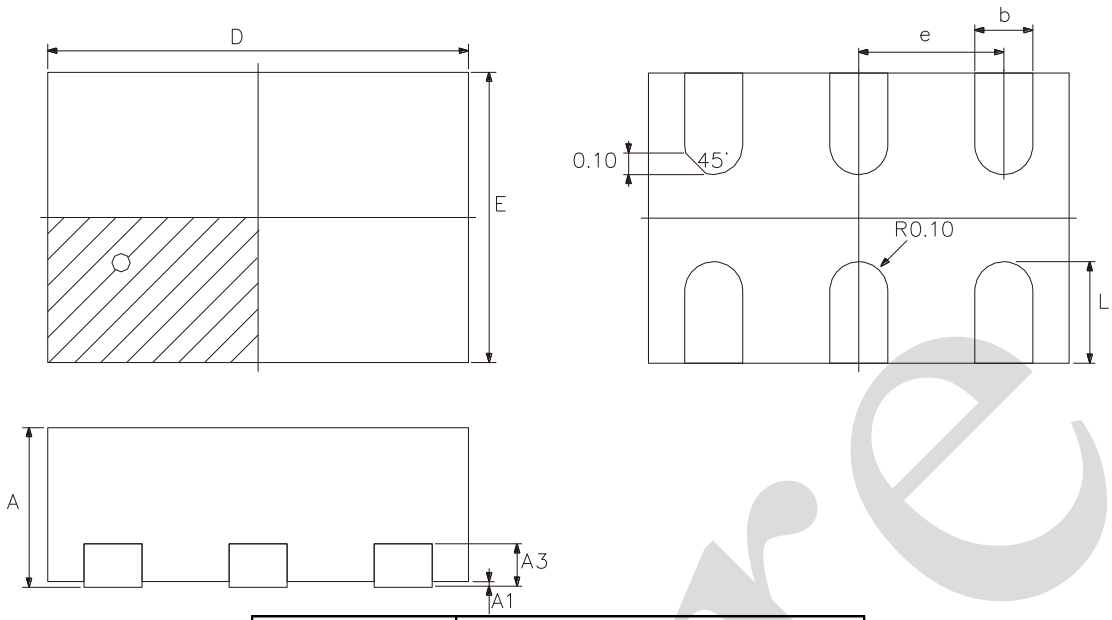


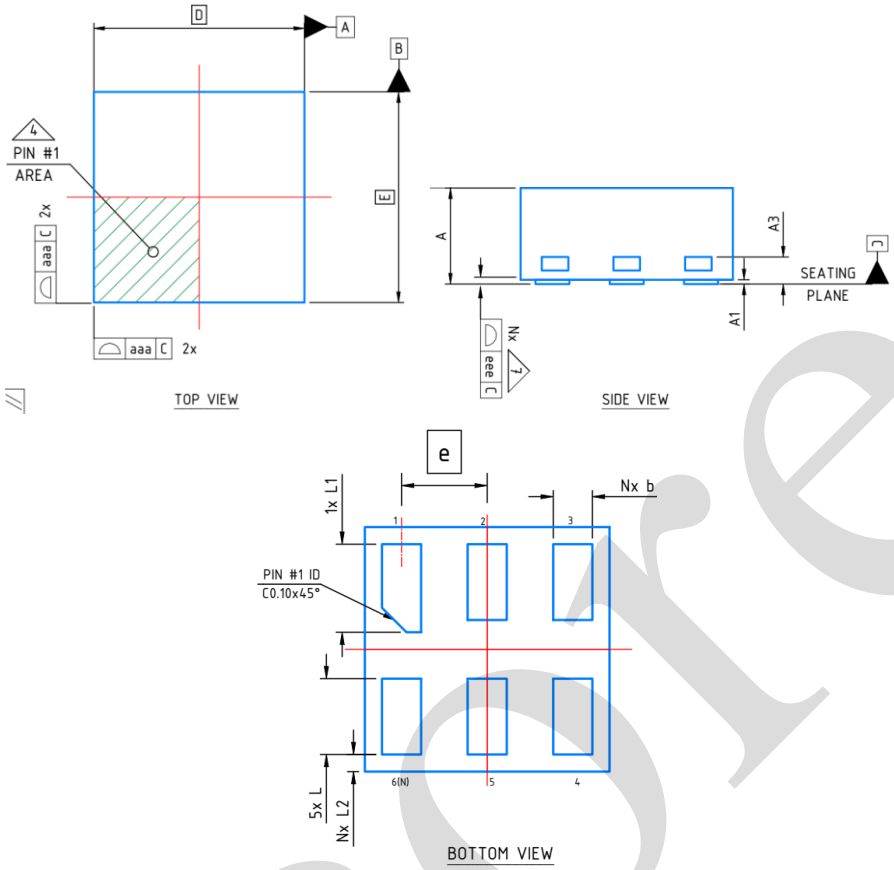

| 2023/12/A | Dimensions In Millimeters | |
|---|---|---|
| **Symbol** | **Min.** | **Max.** |
| A | — | 1.25 |
| A1 | 0.00 | 0.12 |
| A2 | 1.00 | 1.20 |
| b | 0.30 | 0.50 |
| c | 0.10 | 0.20 |
| D | 2.82 | 3.02 |
| E | 2.60 | 3.00 |
| E1 | 1.50 | 1.70 |
| e | 0.95 | |
| e1 | 1.80 | 2.00 |
| L | 0.30 | 0.60 |
| θ | 0° | 8° |

### 5.3、XSON6(1*1.45*0.55)-0.5




| 2023/12/A | Dimensions In Millimeters | |
|---|---|---|
| **Symbol** | **Min** | **Max** |
| A | 0.51 | 0.60 |
| A1 | 0.00 | 0.05 |
| A3 | 0.15 | |
| b | 0.15 | 0.25 |
| D | 1.45 | |
| E | 1.00 | |
| e | 0.50 | |
| L | 0.25 | 0.45 |

## 5.4、XSON6(1*1*0.45)-0.35




| 2023/12/A | Dimensions In Millimeters | |
|---|---|---|
| **Symbol** | **Min** | **Max** |
| A | 0.41 | 0.50 |
| A1 | 0.00 | 0.05 |
| A3 | 0.127 | |
| b | 0.11 | 0.21 |
| D | 1.00 | |
| E | 1.00 | |
| e | 0.35 | |
| L | 0.26 | 0.36 |
| L1 | 0.31 | 0.41 |
| L2 | 0.02 | 0.12 |

## 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.<br>×：Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements. | | | | | | | | | |

### 6.2、Notes

We recommend you to read this chapter carefully before using this product.

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