# AiP74LVT/LVTH16244
# 16-bit Buffer/Line Driver; 3-state

# Product Specification

**Specification Revision History:**

| Version | Date | Description |
|---|---|---|
| 2017-12-A1 | 2017-12 | New |
| 2023-04-B1 | 2023-04 | Update the template |
| 2023-06-B2 | 2023-06 | Revise the content |
| | | |

# Contents

## 1、General Description

The AiP74LVT16244; AiP74LVTH16244 is a 16-bit buffer and line driver featuring non-inverting 3-state bus outputs. The device can be used as four 4-bit buffers, two 8-bit buffers, or one 16-bit buffer.

**Features:**

- Wide supply voltage range from 2.7V to 5.5V
- Output capability: +64mA and -32mA
- Specified from -40℃ to +125℃
- Packaging information: TSSOP48

**Ordering Information:**
**Tube packing specifications:**

| Part number | Packaging form | Marking code | Tube quantity | Boxed tube quantity | Boxed quantity | Notes |
|---|---|---|---|---|---|---|
| AiP74LVT16244 TA48.TB | TSSOP48 | 74LVT16244 | 38 PCS/tube | 100 tube/box | 3800 PCS/box | Dimensions of plastic enclosure: 12.5mm×6.1mm Pin spacing: 0.5mm |
| AiP74LVTH16244 TA48.TB | TSSOP48 | 74LVTH16244 | 38 PCS/tube | 100 tube/box | 3800 PCS/box | Dimensions of plastic enclosure: 12.5mm×6.1mm Pin spacing: 0.5mm |

**Reel packing specifications:**

| Part number | Packaging form | Marking code | Reel quantity | Boxed reel quantity | Notes |
|---|---|---|---|---|---|
| AiP74LVT16244 TA48.TR | TSSOP48 | 74LVT16244 | 2000 PCS/reel | 2000 PCS/box | Dimensions of plastic enclosure: 12.5mm×6.1mm Pin spacing: 0.5mm |
| AiP74LVTH16244 TA48.TR | TSSOP48 | 74LVTH16244 | 2000 PCS/reel | 2000 PCS/box | Dimensions of plastic enclosure: 12.5mm×6.1mm Pin spacing: 0.5mm |

Note: 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

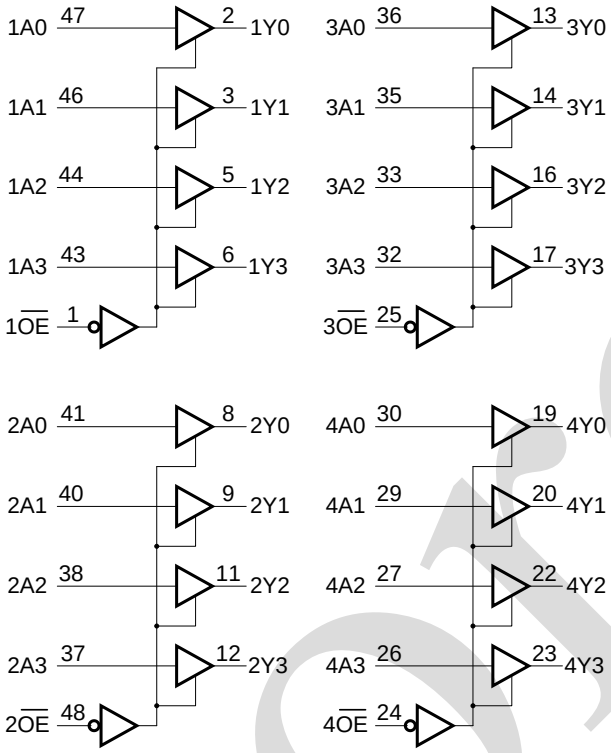



Figure 1. Logic symbol

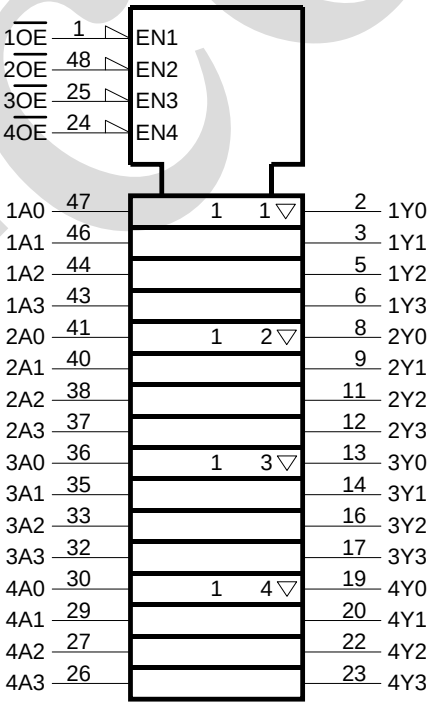
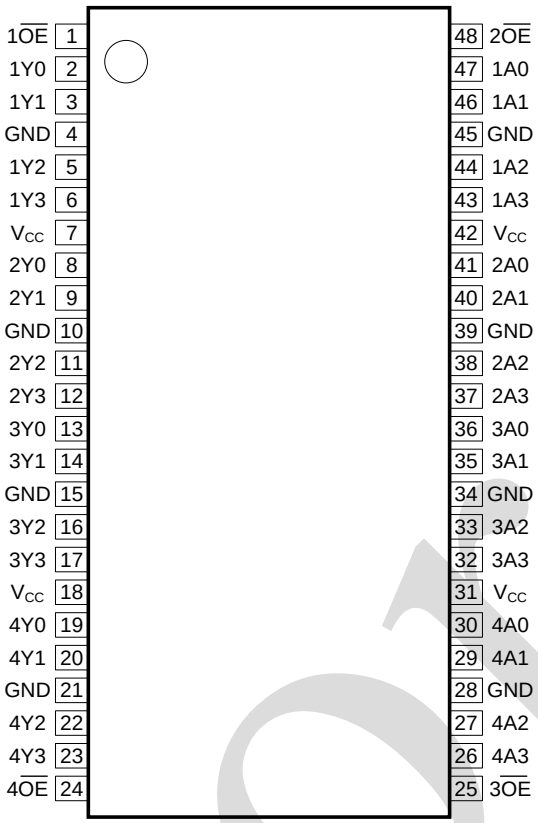



Figure 2. IEC logic symbol

## 2.2、Pin Configurations




## 2.3、Pin Description

| Pin No. | Pin Name | Description |
|---|---|---|
| 1,48,25,24 | $1\overline{OE}$ ,$2\overline{OE}$ ,$3\overline{OE}$ ,$4\overline{OE}$ | output enable input (active LOW) |
| 2,3,5,6 | 1Y0,1Y1,1Y2,1Y3 | data outputs |
| 8,9,11,12 | 2Y0,2Y1,2Y2,2Y3 | data outputs |
| 13,14,16,17 | 3Y0,3Y1,3Y2,3Y3 | data outputs |
| 19,20,22,23 | 4Y0,4Y1,4Y2,4Y3 | data outputs |
| 4,10,15,21,28,34,39,45 | GND | ground (0V) |
| 7,18,31,42 | $V_{CC}$ | supply voltage |
| 47,46,44,43 | 1A0,1A1,1A2,1A3 | data inputs |
| 41,40,38,37 | 2A0,2A1,2A2,2A3 | data inputs |
| 36,35,33,32 | 3A0,3A1,3A2,3A3 | data inputs |
| 30,29,27,26 | 4A0,4A1,4A2,4A3 | data inputs |

## 2.4、Function Table

| Control | Input | Output |
|---|---|---|
| **n$\overline{OE}$** | **nAn** | **nYn** |
| L | L | L |
| L | H | H |
| H | X | Z |

Note: H=HIGH voltage level; L=LOW voltage level; X=don't care ; 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 | +7.0 | V |
| input voltage | $V_I$ | - | -0.5 | +7.0 | V |
| output voltage | $V_O$ | output in OFF-state or HIGH-state | -0.5 | +7.0 | V |
| input clamping current | $I_{IK}$ | $V_I$<0V | -50 | - | mA |
| output clamping current | $I_{OK}$ | $V_O$<0V | -50 | - | mA |
| output current | $I_O$ | output in LOW-state | - | 128 | mA |
| | | output in HIGH-state | -64 | - | mA |
| storage temperature | $T_{stg}$ | - | -65 | +150 | ℃ |
| junction temperature | $T_j$ | - | - | 150 | ℃ |
| soldering temperature | $T_L$ | 10s | 260 | | ℃ |

### 3.2、Recommended Operating Conditions

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| supply voltage | $V_{CC}$ | - | 2.7 | - | 5.5 | V |
| input voltage | $V_I$ | - | 0 | - | 5.5 | V |
| ambient temperature | $T_{amb}$ | in free-air | -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 | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| input clamping voltage | $V_{IK}$ | $V_{CC}$=2.7V; $I_{IK}$=-18mA | | -1.2 | -0.85 | - | V |
| HIGH-level input voltage | $V_{IH}$ | $V_{CC}$=3.3V | | 2.0 | - | - | V |
| | | $V_{CC}$=5V | | 3.0 | - | - | V |
| LOW-level input voltage | $V_{IL}$ | $V_{CC}$=3.3V | | - | - | 0.8 | V |
| | | $V_{CC}$=5V | | - | - | 1.2 | V |
| HIGH-level output voltage | $V_{OH}$ | $I_{OH}$=-100uA; $V_{CC}$=2.7V to 3.6V | | $V_{CC}$-0.2 | $V_{CC}$ | - | V |
| | | $I_{OH}$=-8mA; $V_{CC}$=2.7V | | 2.4 | 2.5 | - | V |
| | | $I_{OH}$=-32mA; $V_{CC}$=3.0V | | 2.0 | 2.3 | - | V |
| | | $I_{OH}$=-32mA; $V_{CC}$=5.0V | | 4.0 | 4.6 | - | V |
| LOW-level output voltage | $V_{OL}$ | $V_{CC}$=2.7V | $I_{OL}$=100uA | - | 0.07 | 0.2 | V |
| | | | $I_{OL}$=24mA | - | 0.3 | 0.5 | V |
| | | $V_{CC}$=3.0V | $I_{OL}$=16mA | - | 0.25 | 0.4 | V |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | $I_{OL}$=32mA | - | 0.3 | 0.5 | V |
| | | | $I_{OL}$=64mA | - | 0.4 | 0.55 | V |
| | | $V_{CC}$=5.0V | $I_{OL}$=64mA | - | 0.2 | 0.4 | V |
| input leakage current | $I_I$ | all input pins; $V_{CC}$=0V or 3.6V; $V_I$=5.5V | | - | - | 10 | uA |
| | | control pins; $V_{CC}$=2.7~5.5V; $V_I$=$V_{CC}$ or GND | | - | - | ±1.0 | uA |
| | | data pins; $V_{CC}$=2.7V to 5.5V | $V_I$=$V_{CC}$ | - | - | 1 | uA |
| | | | $V_I$=0V | -5 | - | - | uA |
| power-off leakage current | $I_{OFF}$ | $V_{CC}$=0V; $V_I$ or $V_O$=0V to 4.5V | | - | - | ±100 | uA |
| bus hold LOW current | $I_{BHL}$ | $V_{CC}$=3V; $V_I$=0.8V | | 75 | 135 | - | uA |
| bus hold HIGH current | $I_{BHH}$ | $V_{CC}$=3V; $V_I$=2.0V | | - | -135 | -75 | uA |
| bus hold LOW overdrive current | $I_{BHLO}$ | nAn input; $V_{CC}$=0V to 3.6V; $V_I$=3.6V | | 500 | - | - | uA |
| bus hold HIGH overdrive current | $I_{BHHO}$ | nAn input; $V_{CC}$=0V to 3.6V; $V_I$=3.6V | | - | - | -500 | uA |
| output leakage current | $I_{LO}$ | output in HIGH-state when $V_O$>$V_{CC}$; $V_O$=5.5V; $V_{CC}$=3.0V | | - | - | 125 | uA |
| power-up/ power-down output current | $I_{O(pu/pd)}$ | $V_{CC}$≤1.2V; $V_O$=0.5V to $V_{CC}$; $V_I$=GND or $V_{CC}$; n$\overline{OE}$ = don't care | | - | - | ±100 | uA |
| OFF-state output current | $I_{OZ}$ | $V_{CC}$=3.6V to 5.5V; $V_I$=$V_{IH}$ or $V_{IL}$ | output HIGH: $V_O$=3.0V | - | - | 5 | uA |
| | | | output LOW: $V_O$=0.5V | -5 | - | - | uA |
| supply current | $I_{CC}$ | $V_{CC}$=3.6V; $V_I$=GND or $V_{CC}$; $I_O$=0A | output HIGH | - | - | 0.12 | mA |
| | | | output LOW | - | - | 0.12 | mA |
| | | | outputs disabled | - | - | 0.12 | mA |
| | | $V_{CC}$=5V; $V_I$=GND or $V_{CC}$; $I_O$=0A | output HIGH | - | - | 0.2 | mA |
| | | | output LOW | - | - | 0.2 | mA |
| | | | outputs disabled | - | - | 0.2 | mA |
| additional supply current | $\Delta I_{CC}$ | per input pin; $V_{CC}$=3.0V to 5.0V; one input at $V_{CC}$-0.6V, other inputs at $V_{CC}$ or GND | | - | - | 0.3 | mA |

### 3.3.2、DC Characteristics 2

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

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| input clamping voltage | $V_{IK}$ | $V_{CC}$=2.7V; $I_{IK}$=-18mA | | -1.2 | - | - | V |
| HIGH-level input voltage | $V_{IH}$ | $V_{CC}$=3.3V | | 2.0 | - | - | V |
| | | $V_{CC}$=5V | | 3.0 | - | - | V |
| LOW-level input voltage | $V_{IL}$ | $V_{CC}$=3.3V | | - | - | 0.8 | V |
| | | $V_{CC}$=5V | | - | - | 1.2 | V |
| HIGH-level output voltage | $V_{OH}$ | $I_{OH}$=-100uA; $V_{CC}$=2.7V to 3.6V | | $V_{CC}$-0.2 | - | - | V |
| | | $I_{OH}$=-8mA; $V_{CC}$=2.7V | | 2.4 | - | - | V |
| | | $I_{OH}$=-32mA; $V_{CC}$=3.0V | | 2.0 | - | - | V |
| | | $I_{OH}$=-32mA; $V_{CC}$=5.0V | | 4.0 | - | - | V |
| LOW-level output voltage | $V_{OL}$ | $V_{CC}$=2.7V | $I_{OL}$=100uA | - | - | 0.2 | V |
| | | | $I_{OL}$=24mA | - | - | 0.5 | V |
| | | $V_{CC}$=3.0V | $I_{OL}$=16mA | - | - | 0.4 | V |
| | | | $I_{OL}$=32mA | - | - | 0.5 | V |
| | | | $I_{OL}$=64mA | - | - | 0.55 | V |
| | | $V_{CC}$=5.0V | $I_{OL}$=64mA | - | - | 0.4 | V |
| input leakage current | $I_I$ | all input pins; $V_{CC}$=0V or 3.6V; $V_I$=5.5V | | - | - | 10 | uA |
| | | control pins; $V_{CC}$=2.7~5.5V; $V_I$=$V_{CC}$ or GND | | - | - | ±10 | uA |
| | | data pins; $V_{CC}$=2.7~5.5V | $V_I$=$V_{CC}$ | - | - | 10 | uA |
| | | | $V_I$=0V | -10 | - | - | uA |
| power-off leakage current | $I_{OFF}$ | $V_{CC}$=0V; $V_I$ or $V_O$=0V to 4.5V | | - | - | ±100 | uA |
| bus hold LOW current | $I_{BHL}$ | $V_{CC}$=3V; $V_I$=0.8V | | 75 | - | - | uA |
| bus hold HIGH current | $I_{BHH}$ | $V_{CC}$=3V; $V_I$=2.0V | | - | - | -75 | uA |
| bus hold LOW overdrive current | $I_{BHLO}$ | nAn input; $V_{CC}$=0V to 3.6V; $V_I$=3.6V | | 500 | - | - | uA |
| bus hold HIGH overdrive current | $I_{BHHO}$ | nAn input; $V_{CC}$=0V to 3.6V; $V_I$=3.6V | | - | - | -500 | uA |
| output leakage current | $I_{LO}$ | output in HIGH-state when $V_O$>$V_{CC}$; $V_O$=5.5V; $V_{CC}$=3.0V | | - | - | 125 | uA |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| power-up/ power-down output current | $I_{O(pu/pd)}$ | $V_{CC}$≤1.2V; $V_O$=0.5V to $V_{CC}$; $V_I$=GND or $V_{CC}$; $n\overline{OE}$ = don't care | | - | - | ±100 | uA |
| OFF-state output current | $I_{OZ}$ | $V_{CC}$=3.6~5.5V; $V_I$=$V_{IH}$ or $V_{IL}$ | output HIGH: $V_O$=3.0V | - | - | 10 | uA |
| | | | output LOW: $V_O$=0.5V | -10 | - | - | uA |
| supply current | $I_{CC}$ | $V_{CC}$=3.6V; $V_I$=GND or $V_{CC}$; $I_O$=0A | output HIGH | - | - | 0.25 | mA |
| | | | output LOW | - | - | 0.25 | mA |
| | | | outputs disabled | - | - | 0.25 | mA |
| | | $V_{CC}$=5V; $V_I$=GND or $V_{CC}$; $I_O$=0A | output HIGH | - | - | 0.4 | mA |
| | | | output LOW | - | - | 0.4 | mA |
| | | | outputs disabled | - | - | 0.4 | mA |
| additional supply current | $\Delta I_{CC}$ | per input pin; $V_{CC}$=3.0V to 5.0V; one input at $V_{CC}$-0.6V, other inputs at $V_{CC}$ or GND | | - | - | 0.6 | mA |

### 3.3.3、AC Characteristics 1

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

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| LOW to HIGH propagation delay | $t_{PLH}$ | nAn to nYn; see Figure 4 | $V_{CC}$=2.7V | - | - | 5.6 | ns |
| | | | $V_{CC}$=3.0V to 3.6V | - | - | 4.5 | ns |
| | | | $V_{CC}$=5.0V | - | - | 4.2 | ns |
| HIGH to LOW propagation delay | $t_{PHL}$ | nAn to nYn; see Figure 4 | $V_{CC}$=2.7V | - | - | 5.6 | ns |
| | | | $V_{CC}$=3.0V to 3.6V | - | - | 4.5 | ns |
| | | | $V_{CC}$=5.0V | - | - | 4.2 | ns |
| OFF-state to HIGH propagation delay | $t_{PZH}$ | $n\overline{OE}$ to nYn; see Figure 5 | $V_{CC}$=2.7V | - | - | 7.0 | ns |
| | | | $V_{CC}$=3.0V to 3.6V | - | - | 5.6 | ns |
| | | | $V_{CC}$=5.0V | - | - | 5.2 | ns |
| OFF-state to LOW propagation delay | $t_{PZL}$ | $n\overline{OE}$ to nYn; see Figure 5 | $V_{CC}$=2.7V | - | - | 7.4 | ns |
| | | | $V_{CC}$=3.0V to 3.6V | - | - | 5.6 | ns |
| | | | $V_{CC}$=5.0V | - | - | 5.2 | ns |
| HIGH to OFF-state propagation delay | $t_{PHZ}$ | $n\overline{OE}$ to nYn; see Figure 5 | $V_{CC}$=2.7V | - | - | 7.0 | ns |
| | | | $V_{CC}$=3.0V to 3.6V | - | - | 6.3 | ns |
| | | | $V_{CC}$=5.0V | - | - | 5.9 | ns |
| LOW to OFF-state propagation delay | $t_{PLZ}$ | $n\overline{OE}$ to nYn; see Figure 5 | $V_{CC}$=2.7V | - | - | 6.2 | ns |
| | | | $V_{CC}$=3.0V to 3.6V | - | - | 5.6 | ns |
| | | | $V_{CC}$=5.0V | - | - | 5.2 | ns |

### 3.3.4、AC Characteristics 2

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

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| LOW to HIGH propagation delay | $t_{PLH}$ | nAn to nYn; see Figure 4 | $V_{CC}$=2.7V | - | - | 6.7 | ns |
| | | | $V_{CC}$=3.0V to 3.6V | - | - | 5.3 | ns |
| | | | $V_{CC}$=5.0V | - | - | 5.0 | ns |
| HIGH to LOW propagation delay | $t_{PHL}$ | nAn to nYn; see Figure 4 | $V_{CC}$=2.7V | - | - | 6.7 | ns |
| | | | $V_{CC}$=3.0V to 3.6V | - | - | 5.3 | ns |
| | | | $V_{CC}$=5.0V | - | - | 5.0 | ns |
| OFF-state to HIGH propagation delay | $t_{PZH}$ | $n\overline{OE}$ to nYn; see Figure 5 | $V_{CC}$=2.7V | - | - | 8.4 | ns |
| | | | $V_{CC}$=3.0V to 3.6V | - | - | 6.7 | ns |
| | | | $V_{CC}$=5.0V | - | - | 6.2 | ns |
| OFF-state to LOW propagation delay | $t_{PZL}$ | $n\overline{OE}$ to nYn; see Figure 5 | $V_{CC}$=2.7V | - | - | 9.0 | ns |
| | | | $V_{CC}$=3.0V to 3.6V | - | - | 6.7 | ns |
| | | | $V_{CC}$=5.0V | - | - | 6.2 | ns |
| HIGH to OFF-state propagation delay | $t_{PHZ}$ | $n\overline{OE}$ to nYn; see Figure 5 | $V_{CC}$=2.7V | - | - | 8.4 | ns |
| | | | $V_{CC}$=3.0V to 3.6V | - | - | 7.6 | ns |
| | | | $V_{CC}$=5.0V | - | - | 7.1 | ns |
| LOW to OFF-state propagation delay | $t_{PLZ}$ | $n\overline{OE}$ to nYn; see Figure 5 | $V_{CC}$=2.7V | - | - | 7.4 | ns |
| | | | $V_{CC}$=3.0V to 3.6V | - | - | 6.7 | ns |
| | | | $V_{CC}$=5.0V | - | - | 6.2 | ns |

## 4、Testing Circuit

### 4.1、AC Testing Circuit

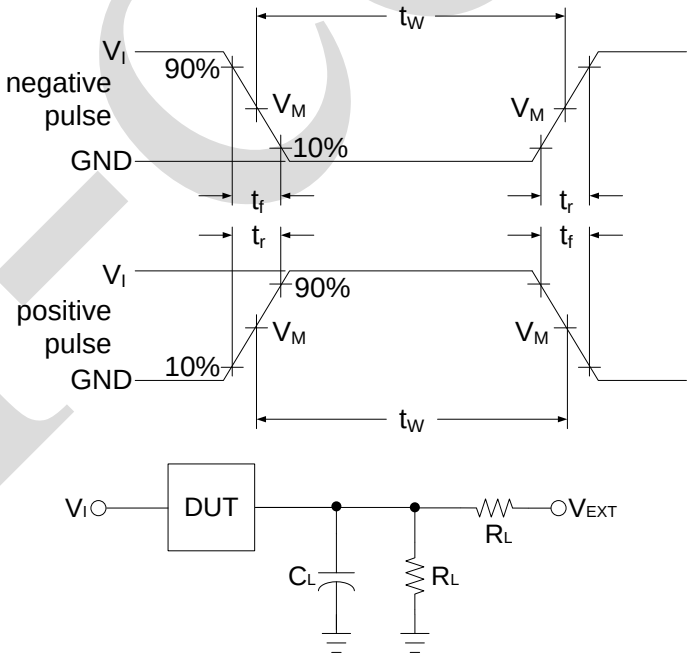



Figure 3. Test circuit for measuring switching times

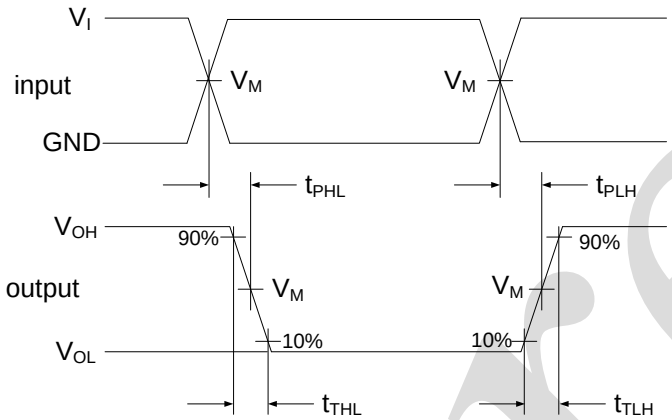
$C_L$ includes probe and jig capacitance.

$R_L$=Load resistance.

### 4.2、Test Data

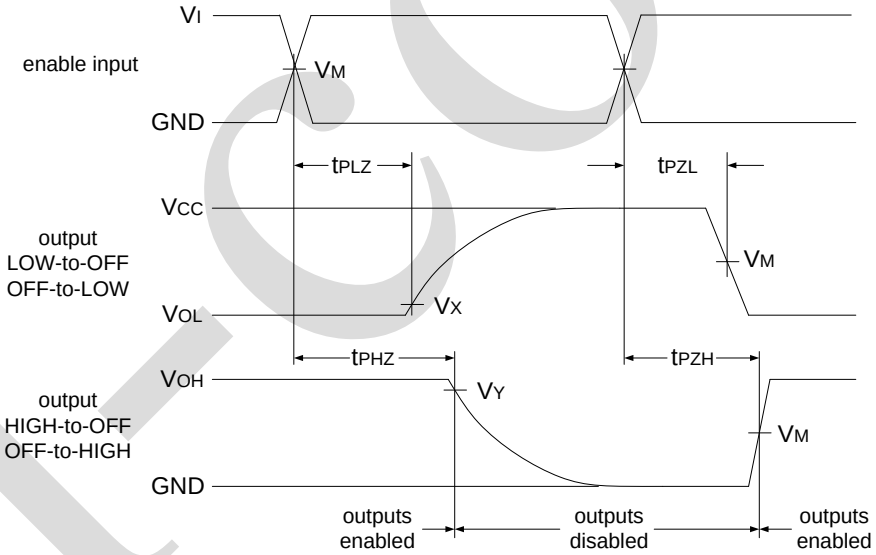
| Supply voltage | Input | | Load | | $V_{EXT}$ | | |
|---|---|---|---|---|---|---|---|
| $V_{CC}$ | $V_I$ | $t_r = t_f$ | $C_L$ | $R_L$ | $t_{PLH}/t_{PHL}$ | $t_{PLZ}/t_{PZL}$ | $t_{PHZ}/t_{PZH}$ |
| 2.7V to 5.5V | $V_{CC}$ | ≤ 3ns | 50pF | 500Ω | Open | $2\times V_{CC}$ | GND |

### 4.3、AC Testing Waveforms




$V_{OL}$ and $V_{OH}$ are typical voltage output levels that occur with the output load.

Figure 4. Propagation delay input (nAn) to output (nYn)




$V_{OL}$ and $V_{OH}$ are typical voltage output levels that occur with the output load.

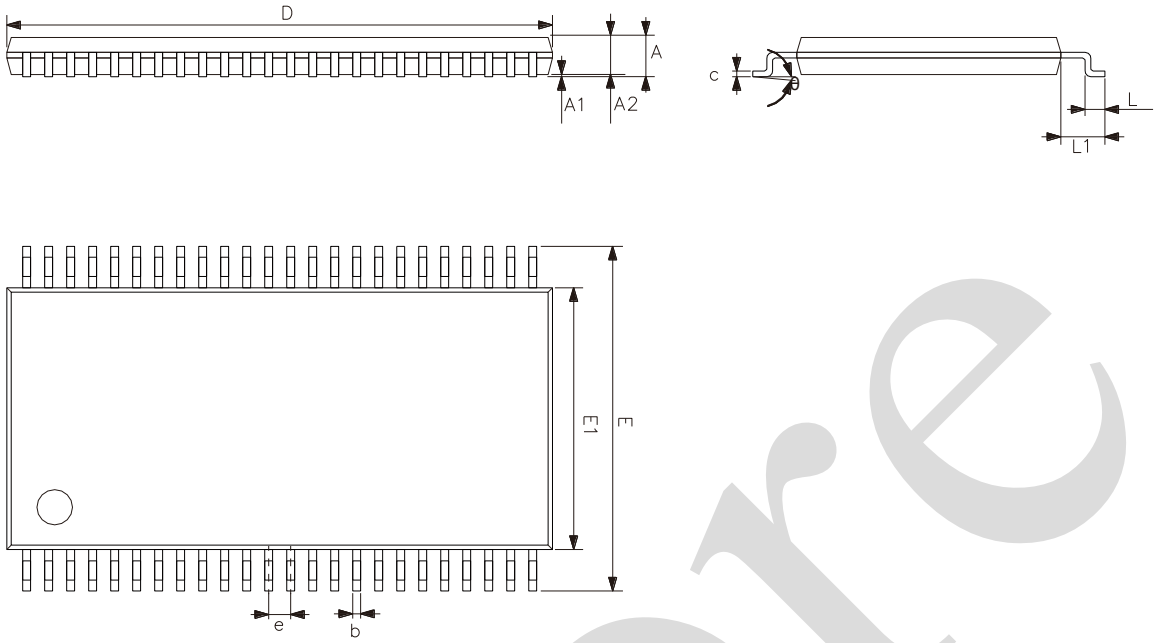
Figure 5. 3-state output enable and disable times

### 4.4、Measurement Points

| Input | Output | | |
|---|---|---|---|
| $V_M$ | $V_M$ | $V_X$ | $V_Y$ |
| $0.5V_{CC}$ | $0.5V_{CC}$ | $V_{OL}$+0.3V | $V_{OH}$-0.3V |

# 5、Package Information

## 5.1、TSSOP48




| Symbol | Dimensions (mm) | |
|---|---|---|
| | Min. | Max. |
| A | - | 1.20 |
| A1 | 0.03 | 0.15 |
| A2 | 0.82 | 1.05 |
| b | 0.17 | 0.27 |
| c | 0.12 | 0.22 |
| D | 12.40 | 12.60 |
| E | 7.90 | 8.30 |
| E1 | 6.00 | 6.20 |
| e | 0.50 | |
| L | 0.35 | 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.<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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