



# AiP74LVC/LVCH16245

## 16-bit Bus Transceiver; 3-state

### Product Specification

#### Specification Revision History:

| Version    | Date    | Description                                                                                               |
|------------|---------|-----------------------------------------------------------------------------------------------------------|
| 2017-12-A1 | 2017-12 | New                                                                                                       |
| 2023-04-B1 | 2023-04 | Update the template                                                                                       |
| 2025-12-B2 | 2025-12 | Modify the supply voltage range; add the parameters at the condition of $V_{CC}=4.5V$ to $5.5V$ ; add ESD |
|            |         |                                                                                                           |



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## 1、General Description

The AiP74LVC/LVCH16245 are 16-bit transceivers featuring non-inverting 3-state bus compatible outputs in both send and receive directions. The device features two output enable ( $\overline{\text{nOE}}$ ) inputs for easy cascading and two send/receive ( $\overline{\text{nDIR}}$ ) inputs for direction control.  $\overline{\text{nOE}}$  controls the outputs so that the buses are effectively isolated.

This device can be used as two 8-bit transceivers or one 16-bit transceiver. Inputs can be driven from either 3.3V or 5V devices. When disabled, up to 5.5V can be applied to the outputs. These features allow the use of these devices in mixed 3.3V and 5V applications.

The AiP74LVCH16245 bus hold on data inputs eliminates the need for external pull-up resistors to hold unused inputs.

### Features:

- 5V tolerant inputs/outputs for interfacing with 5V logic
- Wide supply voltage range from 1.2V to 5.5V
- CMOS low power consumption
- MULTIBYTE flow-through standard pin-out architecture
- Low inductance multiple power and ground pins for minimum noise and ground bounce
- Direct interface with TTL levels
- High-impedance when  $V_{CC}=0V$
- All data inputs have bus hold (AiP74LVCH16245 only)
- Specified from  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Packaging information: TSSOP48

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

| Type number               | Packaging form | Marking code | Tube quantity  | Boxed tube quantity | Boxed quantity  | Notes                                                                     |
|---------------------------|----------------|--------------|----------------|---------------------|-----------------|---------------------------------------------------------------------------|
| AiP74LVC16245<br>TA48.TB  | TSSOP48        | 74LVC16245   | 38<br>PCS/tube | 100<br>tube/box     | 3800<br>PCS/box | Dimensions of plastic enclosure:<br>12.5mm×6.1mm<br>Pin spacing:<br>0.5mm |
| AiP74LVCH16245<br>TA48.TB | TSSOP48        | 74LVCH16245  | 38<br>PCS/tube | 100<br>tube/box     | 3800<br>PCS/box | Dimensions of plastic enclosure:<br>12.5mm×6.1mm<br>Pin spacing:<br>0.5mm |

**Reel packing specifications:**

| Part number               | Packaging form | Marking code | Reel quantity    | Boxed reel quantity | Notes                                                                  |
|---------------------------|----------------|--------------|------------------|---------------------|------------------------------------------------------------------------|
| AiP74LVC16245<br>TA48.TR  | TSSOP48        | 74LVC16245   | 2000<br>PCS/reel | 2000<br>PCS/box     | Dimensions of plastic enclosure:<br>12.5mm×6.1mm<br>Pin spacing: 0.5mm |
| AiP74LVCH16245<br>TA48.TR | TSSOP48        | 74LVCH16245  | 2000<br>PCS/reel | 2000<br>PCS/box     | Dimensions of plastic enclosure:<br>12.5mm×6.1mm<br>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

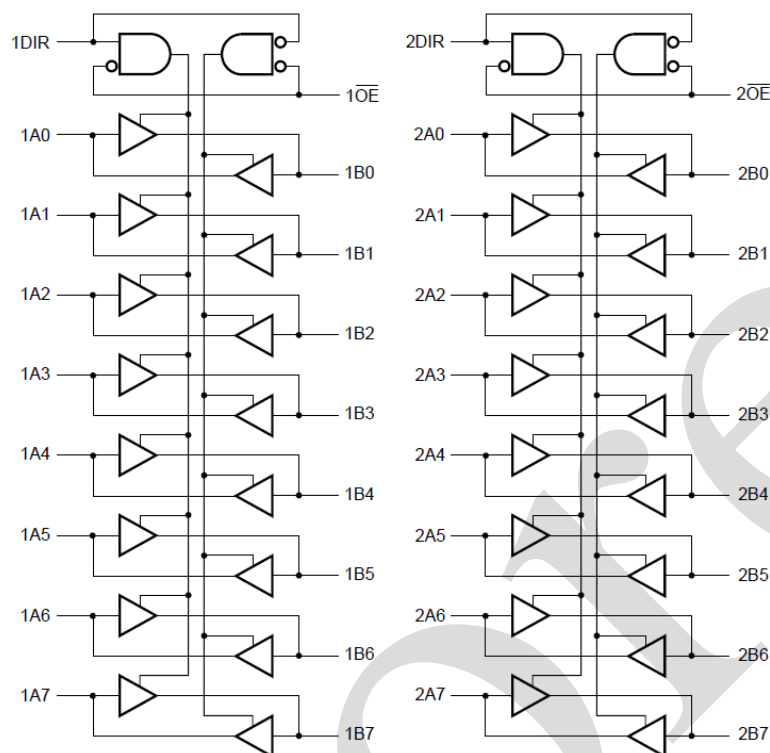


Figure 1. Logic symbol

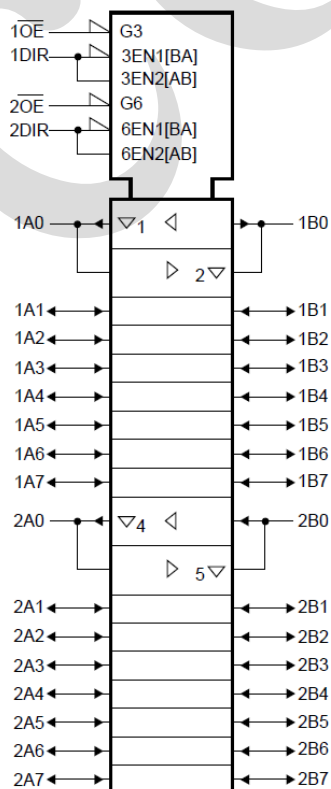


Figure 2. IEC logic symbol

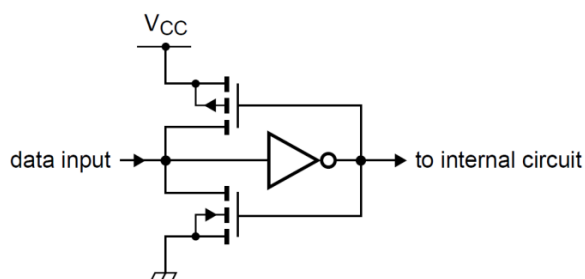
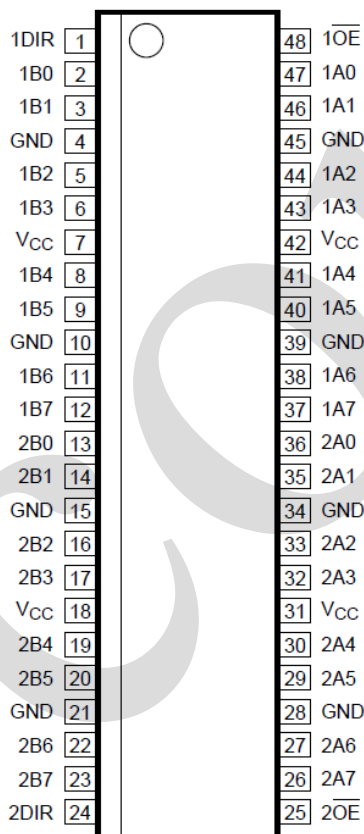


Figure 3. Bus hold circuit

## 2.2、Pin Configurations



## 2.3、Pin Description

| Pin No.                 | Pin Name                                            | Description                      |
|-------------------------|-----------------------------------------------------|----------------------------------|
| 1,24                    | 1DIR,2DIR                                           | direction control input          |
| 2,3,5,6,8,9,11,12       | 1B0 to 1B7                                          | data input/output                |
| 13,14,16,17,19,20,22,23 | 2B0 to 2B7                                          | data input/output                |
| 4,10,15,21,28,34,39,45  | GND                                                 | ground (0V)                      |
| 7,18,31,42              | V <sub>CC</sub>                                     | supply voltage                   |
| 48,25                   | 1 $\overline{\text{OE}}$ , 2 $\overline{\text{OE}}$ | output enable input (active LOW) |
| 47,46,44,43,41,40,38,37 | 1A0 to 1A7                                          | data input/output                |
| 36,35,33,32,30,29,27,26 | 2A0 to 2A7                                          | data input/output                |



## 2.4、Function Table

| Input            |      | Output    |           |
|------------------|------|-----------|-----------|
| $\overline{nOE}$ | nDIR | nAn       | nBn       |
| L                | L    | nAn = nBn | inputs    |
| L                | H    | inputs    | nBn = nAn |
| H                | X    | Z         | 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 | +6.5         | V    |
| input clamping current  | $I_{IK}$  | $V_I < 0V$                              | -50  | -            | mA   |
| input voltage           | $V_I$     | [1]                                     | -0.5 | +6.5         | V    |
| output clamping current | $I_{OK}$  | $V_O > V_{CC}$ or $V_O < 0V$            | -    | $\pm 50$     | mA   |
| output voltage          | $V_O$     | output HIGH or LOW state <sup>[2]</sup> | -0.5 | $V_{CC}+0.5$ | V    |
|                         |           | output 3-state <sup>[2]</sup>           | -0.5 | +6.5         | V    |
| output current          | $I_O$     | $V_O = 0V$ to $V_{CC}$                  | -    | $\pm 50$     | mA   |
| supply current          | $I_{CC}$  | -                                       | -    | 100          | mA   |
| ground current          | $I_{GND}$ | -                                       | -100 | -            | mA   |
| storage temperature     | $T_{stg}$ | -                                       | -65  | +150         | °C   |
| total power dissipation | $P_{tot}$ | -                                       | -    | 500          | mW   |
| soldering temperature   | $T_L$     | 10s                                     | 260  |              | °C   |
| electrostatic discharge | ESD       | HBM                                     | 2000 |              | V    |

Note:

[1] The minimum input voltage ratings may be exceeded if the input current ratings are observed.

[2] The output voltage ratings may be exceeded if the output current ratings are observed.

### 3.2、Recommended Operating Conditions

| Parameter                           | Symbol              | Conditions               | Min. | Typ. | Max.     | Unit |
|-------------------------------------|---------------------|--------------------------|------|------|----------|------|
| supply voltage                      | $V_{CC}$            | -                        | 1.65 | -    | 5.5      | V    |
|                                     |                     | functional               | 1.2  | -    | 5.5      | V    |
| input voltage                       | $V_I$               | -                        | 0    | -    | 5.5      | V    |
| output voltage                      | $V_O$               | output HIGH or LOW state | 0    | -    | $V_{CC}$ | V    |
|                                     |                     | output 3-state           | 0    | -    | 5.5      | V    |
| ambient temperature                 | $T_{amb}$           | in free air              | -40  | -    | +125     | °C   |
| input transition rise and fall rate | $\Delta t/\Delta V$ | $V_{CC}=1.2V$ to $2.7V$  | 0    | -    | 20       | ns/V |
|                                     |                     | $V_{CC}=2.7V$ to $3.6V$  | 0    | -    | 10       | ns/V |



## 3.3、Electrical Characteristics

### 3.3.1、DC Characteristics 1

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

| Parameter                                  | Symbol           | Conditions                                                                                                    |                                                           | Min.                 | Typ. <sup>[1]</sup> | Max.                 | Unit |
|--------------------------------------------|------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|----------------------|---------------------|----------------------|------|
| HIGH-level input voltage                   | V <sub>IH</sub>  | V <sub>CC</sub> =1.2V                                                                                         |                                                           | 1.08                 | -                   | -                    | V    |
|                                            |                  | V <sub>CC</sub> =1.65V to 1.95V                                                                               |                                                           | 0.65×V <sub>CC</sub> | -                   | -                    | V    |
|                                            |                  | V <sub>CC</sub> =2.3V to 2.7V                                                                                 |                                                           | 1.7                  | -                   | -                    | V    |
|                                            |                  | V <sub>CC</sub> =2.7V to 3.6V                                                                                 |                                                           | 2.0                  | -                   | -                    | V    |
|                                            |                  | V <sub>CC</sub> =4.5V to5.5V                                                                                  |                                                           | 0.7×V <sub>CC</sub>  | -                   | -                    | V    |
| LOW-level input voltage                    | V <sub>IL</sub>  | V <sub>CC</sub> =1.2V                                                                                         |                                                           | -                    | -                   | 0.12                 | V    |
|                                            |                  | V <sub>CC</sub> =1.65V to 1.95V                                                                               |                                                           | -                    | -                   | 0.35×V <sub>CC</sub> | V    |
|                                            |                  | V <sub>CC</sub> =2.3V to 2.7V                                                                                 |                                                           | -                    | -                   | 0.7                  | V    |
|                                            |                  | V <sub>CC</sub> =2.7V to 3.6V                                                                                 |                                                           | -                    | -                   | 0.8                  | V    |
|                                            |                  | V <sub>CC</sub> =4.5V to5.5V                                                                                  |                                                           | -                    | -                   | 0.3×V <sub>CC</sub>  | V    |
| HIGH-level output voltage                  | V <sub>OH</sub>  | V <sub>I</sub> =V <sub>IH</sub> or V <sub>IL</sub>                                                            | I <sub>O</sub> =-100uA;<br>V <sub>CC</sub> =1.65V to 5.5V | V <sub>CC</sub> -0.2 | -                   | -                    | V    |
|                                            |                  |                                                                                                               | I <sub>O</sub> =-4mA; V <sub>CC</sub> =1.65V              | 1.2                  | -                   | -                    | V    |
|                                            |                  |                                                                                                               | I <sub>O</sub> =-8mA; V <sub>CC</sub> =2.3V               | 1.8                  | -                   | -                    | V    |
|                                            |                  |                                                                                                               | I <sub>O</sub> =-12mA; V <sub>CC</sub> =2.7V              | 2.2                  | -                   | -                    |      |
|                                            |                  |                                                                                                               | I <sub>O</sub> =-18mA; V <sub>CC</sub> =3.0V              | 2.4                  | -                   | -                    | V    |
|                                            |                  |                                                                                                               | I <sub>O</sub> =-24mA; V <sub>CC</sub> =3.0V              | 2.2                  | -                   | -                    | V    |
|                                            |                  |                                                                                                               | I <sub>O</sub> =-32mA; V <sub>CC</sub> =4.5V              | 3.8                  | -                   | -                    | V    |
| LOW-level output voltage                   | V <sub>OL</sub>  | V <sub>I</sub> =V <sub>IH</sub> or V <sub>IL</sub>                                                            | I <sub>O</sub> =100uA;<br>V <sub>CC</sub> =1.65V to 5.5V  | -                    | -                   | 0.2                  | V    |
|                                            |                  |                                                                                                               | I <sub>O</sub> =4mA; V <sub>CC</sub> =1.65V               | -                    | -                   | 0.45                 | V    |
|                                            |                  |                                                                                                               | I <sub>O</sub> =8mA; V <sub>CC</sub> =2.3V                | -                    | -                   | 0.6                  | V    |
|                                            |                  |                                                                                                               | I <sub>O</sub> =12mA; V <sub>CC</sub> =2.7V               | -                    | -                   | 0.4                  | V    |
|                                            |                  |                                                                                                               | I <sub>O</sub> =24mA; V <sub>CC</sub> =3.0V               | -                    | -                   | 0.55                 | V    |
|                                            |                  |                                                                                                               | I <sub>O</sub> =32mA; V <sub>CC</sub> =4.5V               | -                    | -                   | 0.55                 | V    |
| input leakage current <sup>[2]</sup>       | I <sub>I</sub>   | V <sub>I</sub> =5.5V or GND;<br>V <sub>CC</sub> =3.6V                                                         |                                                           | -                    | -                   | ±5                   | uA   |
| OFF-state output current <sup>[2][3]</sup> | I <sub>OZ</sub>  | V <sub>I</sub> =V <sub>IH</sub> or V <sub>IL</sub> ;<br>V <sub>O</sub> =5.5V or GND;<br>V <sub>CC</sub> =3.6V |                                                           | -                    | -                   | ±5                   | uA   |
| power-off leakage current                  | I <sub>OFF</sub> | V <sub>I</sub> or V <sub>O</sub> =5.5V; V <sub>CC</sub> =0V                                                   |                                                           | -                    | -                   | ±10                  | 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> =3.6V                           |                                                           | -                    | -                   | 20                   | uA   |
| additional supply current                  | ΔI <sub>CC</sub> | per input pin;V <sub>I</sub> =V <sub>CC</sub> -0.6V;<br>I <sub>O</sub> =0A;V <sub>CC</sub> =2.7V to 3.6V;     |                                                           | -                    | -                   | 500                  | uA   |
| input capacitance                          | C <sub>I</sub>   | V <sub>CC</sub> =0V to 3.6V;<br>V <sub>I</sub> =GND to V <sub>CC</sub>                                        |                                                           | -                    | 5.0                 | -                    | pF   |
| input/output capacitance                   | C <sub>I/O</sub> | V <sub>CC</sub> =0V to 3.6V;<br>V <sub>I</sub> =GND to V <sub>CC</sub>                                        |                                                           | -                    | 10                  | -                    | pF   |
| bus hold LOW                               | I <sub>BHL</sub> | V <sub>CC</sub> =1.65V; V <sub>I</sub> =0.58V                                                                 |                                                           | 10                   | -                   | -                    | uA   |
|                                            |                  | V <sub>CC</sub> =2.3V; V <sub>I</sub> =0.7V                                                                   |                                                           | 30                   | -                   | -                    | uA   |



|                                                            |            |                           |      |   |   |    |
|------------------------------------------------------------|------------|---------------------------|------|---|---|----|
| current <sup>[4][5]</sup>                                  |            | $V_{CC}=3.0V; V_I=0.8V$   | 75   | - | - | uA |
| bus hold<br>HIGH<br>current <sup>[4][5]</sup>              | $I_{BHH}$  | $V_{CC}=1.65V; V_I=1.07V$ | -10  | - | - | uA |
|                                                            |            | $V_{CC}=2.3V; V_I=1.7V$   | -30  | - | - | uA |
|                                                            |            | $V_{CC}=3.0V; V_I=2.0V$   | -75  | - | - | uA |
| bus hold<br>LOW<br>overdrive<br>current <sup>[4][6]</sup>  | $I_{BHLO}$ | $V_{CC}=1.95V$            | 200  | - | - | uA |
|                                                            |            | $V_{CC}=2.7V$             | 300  | - | - | uA |
|                                                            |            | $V_{CC}=3.6V$             | 500  | - | - | uA |
| bus hold<br>HIGH<br>overdrive<br>current <sup>[4][6]</sup> | $I_{BHHO}$ | $V_{CC}=1.95V$            | -200 | - | - | uA |
|                                                            |            | $V_{CC}=2.7V$             | -300 | - | - | uA |
|                                                            |            | $V_{CC}=3.6V$             | -500 | - | - | uA |

Note:

- [1] All typical values are measured at  $V_{CC}=3.3V$  (unless stated otherwise) and  $T_{amb}=25^{\circ}C$ .
- [2] The bus hold circuit is switched off when  $V_I > V_{CC}$  allowing 5.5V on the input terminal.
- [3] For I/O ports the parameter  $I_{OZ}$  includes the input leakage current.
- [4] Valid for data inputs (AiP74LVCH16245). Note that control inputs do not have a bus hold circuit.
- [5] The specified sustaining current at the data input holds the input below the specified  $V_I$  level.
- [6] The specified overdrive current at the data input forces the data input to the opposite logic input state.

### 3.3.2、DC Characteristics 2

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

| Parameter                 | Symbol          | Conditions                                         |                                                           | Min.                 | Typ. <sup>[1]</sup> | Max.                 | Unit |
|---------------------------|-----------------|----------------------------------------------------|-----------------------------------------------------------|----------------------|---------------------|----------------------|------|
| HIGH-level input voltage  | V <sub>IH</sub> | V <sub>CC</sub> =1.2V                              |                                                           | 1.08                 | -                   | -                    | V    |
|                           |                 | V <sub>CC</sub> =1.65V to 1.95V                    |                                                           | 0.65×V <sub>CC</sub> | -                   | -                    | V    |
|                           |                 | V <sub>CC</sub> =2.3V to 2.7V                      |                                                           | 1.7                  | -                   | -                    | V    |
|                           |                 | V <sub>CC</sub> =2.7V to 3.6V                      |                                                           | 2.0                  | -                   | -                    | V    |
|                           |                 | V <sub>CC</sub> =4.5V to5.5V                       |                                                           | 0.7×V <sub>CC</sub>  | -                   | -                    | V    |
| LOW-level input voltage   | V <sub>IL</sub> | V <sub>CC</sub> =1.2V                              |                                                           | -                    | -                   | 0.12                 | V    |
|                           |                 | V <sub>CC</sub> =1.65V to 1.95V                    |                                                           | -                    | -                   | 0.35×V <sub>CC</sub> | V    |
|                           |                 | V <sub>CC</sub> =2.3V to 2.7V                      |                                                           | -                    | -                   | 0.7                  | V    |
|                           |                 | V <sub>CC</sub> =2.7V to 3.6V                      |                                                           | -                    | -                   | 0.8                  | V    |
|                           |                 | V <sub>CC</sub> =4.5V to5.5V                       |                                                           | -                    | -                   | 0.3×V <sub>CC</sub>  | V    |
| HIGH-level output voltage | V <sub>OH</sub> | V <sub>I</sub> =V <sub>IH</sub> or V <sub>IL</sub> | I <sub>O</sub> =-100uA;<br>V <sub>CC</sub> =1.65V to 5.5V | V <sub>CC</sub> -0.3 | -                   | -                    | V    |
|                           |                 |                                                    | I <sub>O</sub> =-4mA; V <sub>CC</sub> =1.65V              | 1.05                 | -                   | -                    | V    |
|                           |                 |                                                    | I <sub>O</sub> =-8mA; V <sub>CC</sub> =2.3V               | 1.65                 | -                   | -                    | V    |
|                           |                 |                                                    | I <sub>O</sub> =-12mA; V <sub>CC</sub> =2.7V              | 2.05                 | -                   | -                    | V    |
|                           |                 |                                                    | I <sub>O</sub> =-18mA; V <sub>CC</sub> =3.0V              | 2.25                 | -                   | -                    | V    |
|                           |                 |                                                    | I <sub>O</sub> =-24mA; V <sub>CC</sub> =3.0V              | 2.0                  | -                   | -                    | V    |
|                           |                 |                                                    | I <sub>O</sub> =-32mA; V <sub>CC</sub> =4.5V              | 3.4                  | -                   | -                    | V    |
| LOW-level output voltage  | V <sub>OL</sub> | V <sub>I</sub> =V <sub>IH</sub> or V <sub>IL</sub> | I <sub>O</sub> =100uA;<br>V <sub>CC</sub> =1.65V to 5.5V  | -                    | -                   | 0.3                  | V    |
|                           |                 |                                                    | I <sub>O</sub> =4mA; V <sub>CC</sub> =1.65V               | -                    | -                   | 0.65                 | V    |
|                           |                 |                                                    | I <sub>O</sub> =8mA; V <sub>CC</sub> =2.3V                | -                    | -                   | 0.8                  | V    |
|                           |                 |                                                    | I <sub>O</sub> =12mA; V <sub>CC</sub> =2.7V               | -                    | -                   | 0.6                  | V    |
|                           |                 |                                                    | I <sub>O</sub> =24mA; V <sub>CC</sub> =3.0V               | -                    | -                   | 0.8                  | V    |



|                                                   |                 |                                                                                             |                                       |      |   |          |               |
|---------------------------------------------------|-----------------|---------------------------------------------------------------------------------------------|---------------------------------------|------|---|----------|---------------|
|                                                   |                 |                                                                                             | $I_O=32\text{mA}; V_{CC}=4.5\text{V}$ | -    | - | 0.8      | V             |
| input leakage current <sup>[2]</sup>              | $I_I$           | $V_I=5.5\text{V or GND}; V_{CC}=3.6\text{V}$                                                |                                       | -    | - | $\pm 20$ | $\mu\text{A}$ |
| OFF-state output current <sup>[2][3]</sup>        | $I_{OZ}$        | $V_I=V_{IH} \text{ or } V_{IL}; V_O=5.5\text{V or GND}; V_{CC}=3.6\text{V}$                 |                                       | -    | - | $\pm 20$ | $\mu\text{A}$ |
| power-off leakage current                         | $I_{OFF}$       | $V_I \text{ or } V_O=5.5\text{V}; V_{CC}=0\text{V}$                                         |                                       | -    | - | $\pm 20$ | $\mu\text{A}$ |
| supply current                                    | $I_{CC}$        | $V_I=V_{CC} \text{ or } \text{GND}; I_O=0\text{A}; V_{CC}=3.6\text{V}$                      |                                       | -    | - | 80       | $\mu\text{A}$ |
| additional supply current                         | $\Delta I_{CC}$ | per input pin; $V_I=V_{CC}-0.6\text{V}; I_O=0\text{A}; V_{CC}=2.7\text{V to } 3.6\text{V};$ |                                       | -    | 5 | 5000     | $\mu\text{A}$ |
| bus hold LOW current <sup>[4][5]</sup>            | $I_{BHL}$       | $V_{CC}=1.65\text{V}; V_I=0.58\text{V}$                                                     |                                       | 10   | - | -        | $\mu\text{A}$ |
|                                                   |                 | $V_{CC}=2.3\text{V}; V_I=0.7\text{V}$                                                       |                                       | 25   | - | -        | $\mu\text{A}$ |
|                                                   |                 | $V_{CC}=3.0\text{V}; V_I=0.8\text{V}$                                                       |                                       | 60   | - | -        | $\mu\text{A}$ |
| bus hold HIGH current <sup>[4][5]</sup>           | $I_{BHH}$       | $V_{CC}=1.65\text{V}; V_I=1.07\text{V}$                                                     |                                       | -10  | - | -        | $\mu\text{A}$ |
|                                                   |                 | $V_{CC}=2.3\text{V}; V_I=1.7\text{V}$                                                       |                                       | -25  | - | -        | $\mu\text{A}$ |
|                                                   |                 | $V_{CC}=3.0\text{V}; V_I=2.0\text{V}$                                                       |                                       | -60  | - | -        | $\mu\text{A}$ |
| bus hold LOW overdrive current <sup>[4][6]</sup>  | $I_{BHLO}$      | $V_{CC}=1.95\text{V}$                                                                       |                                       | 200  | - | -        | $\mu\text{A}$ |
|                                                   |                 | $V_{CC}=2.7\text{V}$                                                                        |                                       | 300  | - | -        | $\mu\text{A}$ |
|                                                   |                 | $V_{CC}=3.6\text{V}$                                                                        |                                       | 500  | - | -        | $\mu\text{A}$ |
| bus hold HIGH overdrive current <sup>[4][6]</sup> | $I_{BHHO}$      | $V_{CC}=1.95\text{V}$                                                                       |                                       | -200 | - | -        | $\mu\text{A}$ |
|                                                   |                 | $V_{CC}=2.7\text{V}$                                                                        |                                       | -300 | - | -        | $\mu\text{A}$ |
|                                                   |                 | $V_{CC}=3.6\text{V}$                                                                        |                                       | -500 | - | -        | $\mu\text{A}$ |

Note:

[1] All typical values are measured at  $V_{CC}=3.3\text{V}$  (unless stated otherwise) and  $T_{amb}=25^\circ\text{C}$ .

[2] The bus hold circuit is switched off when  $V_I > V_{CC}$  allowing 5.5V on the input terminal.

[3] For I/O ports the parameter  $I_{OZ}$  includes the input leakage current.

[4] Valid for data inputs (AiP74LVCH16245). Note that control inputs do not have a bus hold circuit.

[5] The specified sustaining current at the data input holds the input below the specified  $V_I$  level.

[6] The specified overdrive current at the data input forces the data input to the opposite logic input state.



## 3.3.3、AC Characteristics 1

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

| Parameter                     | Symbol           | Conditions                                                          |                                 | Min. | Typ. <sup>[2]</sup> | Max. | Unit |
|-------------------------------|------------------|---------------------------------------------------------------------|---------------------------------|------|---------------------|------|------|
| propagation delay             | t <sub>pd</sub>  | nAn to nBn;<br>nBn to nAn;<br>see Figure 4 <sup>[1]</sup>           | V <sub>CC</sub> =1.2V           | -    | 18.2                | -    | ns   |
|                               |                  |                                                                     | V <sub>CC</sub> =1.65V to 1.95V | 1.5  | 7.3                 | 17.1 | ns   |
|                               |                  |                                                                     | V <sub>CC</sub> =2.3V to 2.7V   | 1.0  | 3.9                 | 8.4  | ns   |
|                               |                  |                                                                     | V <sub>CC</sub> =2.7V           | 1.0  | 3.8                 | 6.6  | ns   |
|                               |                  |                                                                     | V <sub>CC</sub> =3.0V to 3.6V   | 1.0  | 3.4                 | 6.3  | ns   |
|                               |                  |                                                                     | V <sub>CC</sub> =4.5V to5.5V    | 1.0  | 3.0                 | 5.5  | ns   |
| enable time                   | t <sub>en</sub>  | $\overline{\text{OE}}$ to nAn,nBn;<br>see Figure 5 <sup>[1]</sup>   | V <sub>CC</sub> =1.2V           | -    | 21.0                | -    | ns   |
|                               |                  |                                                                     | V <sub>CC</sub> =1.65V to 1.95V | 1.5  | 8.3                 | 21.0 | ns   |
|                               |                  |                                                                     | V <sub>CC</sub> =2.3V to 2.7V   | 1.0  | 4.6                 | 11.1 | ns   |
|                               |                  |                                                                     | V <sub>CC</sub> =2.7V           | 1.5  | 4.9                 | 9.4  | ns   |
|                               |                  |                                                                     | V <sub>CC</sub> =3.0V to 3.6V   | 1.0  | 3.8                 | 7.7  | ns   |
|                               |                  |                                                                     | V <sub>CC</sub> =4.5V to5.5V    | 1.0  | 3.3                 | 6.7  | ns   |
| disable time                  | t <sub>dis</sub> | $\overline{\text{OE}}$ to nAn,nBn;<br>see Figure 5 <sup>[1]</sup>   | V <sub>CC</sub> =1.2V           | -    | 15.4                | -    | ns   |
|                               |                  |                                                                     | V <sub>CC</sub> =1.65V to 1.95V | 1.0  | 6.9                 | 18.3 | ns   |
|                               |                  |                                                                     | V <sub>CC</sub> =2.3V to 2.7V   | 0.5  | 3.8                 | 9.9  | ns   |
|                               |                  |                                                                     | V <sub>CC</sub> =2.7V           | 1.5  | 4.8                 | 9.2  | ns   |
|                               |                  |                                                                     | V <sub>CC</sub> =3.0V to 3.6V   | 1.5  | 4.6                 | 7.8  | ns   |
|                               |                  |                                                                     | V <sub>CC</sub> =4.5V to5.5V    | 1.5  | 4.0                 | 6.8  | ns   |
| power dissipation capacitance | C <sub>PD</sub>  | per input;<br>V <sub>I</sub> =GND to V <sub>CC</sub> <sup>[3]</sup> | V <sub>CC</sub> =1.65V to 1.95V | -    | 16.1                | -    | pF   |
|                               |                  |                                                                     | V <sub>CC</sub> =2.3V to 2.7V   | -    | 21.3                | -    | pF   |
|                               |                  |                                                                     | V <sub>CC</sub> =3.0V to 3.6V   | -    | 25.9                | -    | pF   |

Note:

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

$t_{en}$  is the same as  $t_{PZL}$  and  $t_{PZH}$ .

$t_{dis}$  is the same as  $t_{PLZ}$  and  $t_{PHZ}$ .

[2] Typical values are measured at  $T_{amb} = 25^{\circ}\text{C}$  and  $V_{CC} = 1.2\text{V}, 1.8\text{V}, 2.5\text{V}, 2.7\text{V}$  and  $3.3\text{V}$  respectively.

[3]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ).

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

$N$  = number of inputs switching

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



## 3.3.4、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. <sup>[2]</sup> | Max. | Unit |
|-------------------|------------------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------|------|---------------------|------|------|
| propagation delay | t <sub>pd</sub>  | nAn to nBn;<br>nBn to nAn;<br>see Figure 4 <sup>[1]</sup>                                                                       | V <sub>CC</sub> =1.65V to 1.95V | 1.5  | -                   | 19.3 | ns   |
|                   |                  |                                                                                                                                 | V <sub>CC</sub> =2.3V to 2.7V   | 1.0  | -                   | 9.4  | ns   |
|                   |                  |                                                                                                                                 | V <sub>CC</sub> =2.7V           | 1.0  | -                   | 8.4  | ns   |
|                   |                  |                                                                                                                                 | V <sub>CC</sub> =3.0V to 3.6V   | 1.0  | -                   | 8.4  | ns   |
|                   |                  |                                                                                                                                 | V <sub>CC</sub> =4.5V to5.5V    | 1.0  | -                   | 7.3  | ns   |
| enable time       | t <sub>en</sub>  |  OE to nAn,nBn;<br>see Figure 5 <sup>[1]</sup> | V <sub>CC</sub> =1.65V to 1.95V | 1.5  | -                   | 23.7 | ns   |
|                   |                  |                                                                                                                                 | V <sub>CC</sub> =2.3V to 2.7V   | 1.0  | -                   | 12.3 | ns   |
|                   |                  |                                                                                                                                 | V <sub>CC</sub> =2.7V           | 1.5  | -                   | 11.9 | ns   |
|                   |                  |                                                                                                                                 | V <sub>CC</sub> =3.0V to 3.6V   | 1.0  | -                   | 9.8  | ns   |
|                   |                  |                                                                                                                                 | V <sub>CC</sub> =4.5V to5.5V    | 1.0  | -                   | 8.5  | ns   |
| disable time      | t <sub>dis</sub> |  OE to nAn,nBn;<br>see Figure 5 <sup>[1]</sup> | V <sub>CC</sub> =1.65V to 1.95V | 1.0  | -                   | 20.6 | ns   |
|                   |                  |                                                                                                                                 | V <sub>CC</sub> =2.3V to 2.7V   | 0.5  | -                   | 11.1 | ns   |
|                   |                  |                                                                                                                                 | V <sub>CC</sub> =2.7V           | 1.5  | -                   | 11.9 | ns   |
|                   |                  |                                                                                                                                 | V <sub>CC</sub> =3.0V to 3.6V   | 1.5  | -                   | 9.8  | ns   |
|                   |                  |                                                                                                                                 | V <sub>CC</sub> =4.5V to5.5V    | 1.5  | -                   | 8.5  | ns   |

Note:

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

$t_{en}$  is the same as  $t_{PZL}$  and  $t_{PZH}$ .

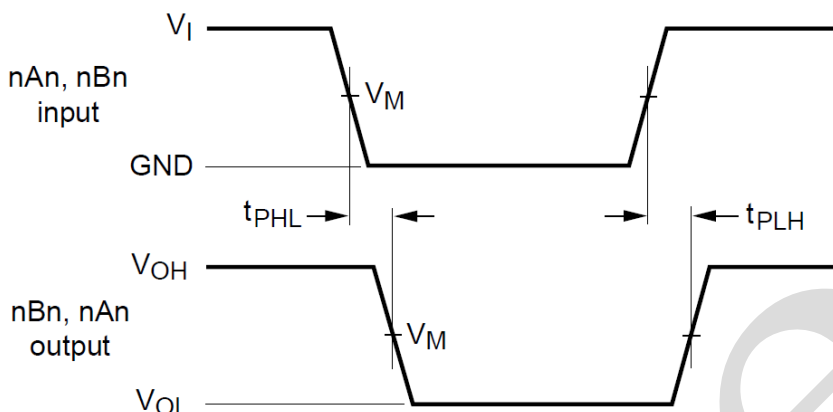
$t_{dis}$  is the same as  $t_{PLZ}$  and  $t_{PHZ}$ .

[2] Typical values are measured at  $T_{amb}=25^{\circ}\text{C}$  and  $V_{CC}=1.2\text{V}, 1.8\text{V}, 2.5\text{V}, 2.7\text{V}$  and  $3.3\text{V}$  respectively.



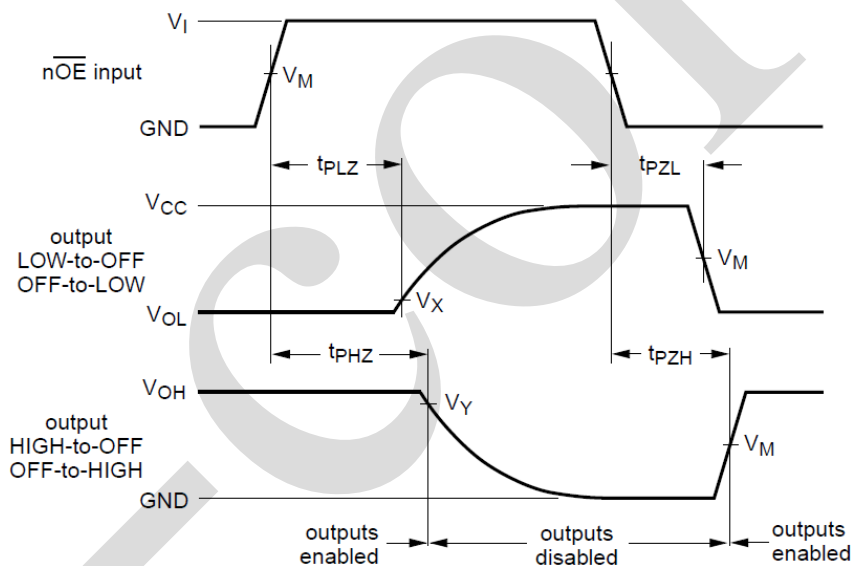
## 4、Testing Circuit

### 4.1、AC Testing Waveforms



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

Figure 4. The input (nAn, nBn) to output (nBn, nAn) propagation delays



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

Figure 5. 3-state enable and disable times



## 4.2、Measurement Points

| Supply voltage | $V_M$               | Input    |                     |                       |                       |
|----------------|---------------------|----------|---------------------|-----------------------|-----------------------|
|                |                     | $V_I$    | $t_r=t_f$           | $V_X$                 | $V_Y$                 |
| 1.2V           | $0.5 \times V_{CC}$ | $V_{CC}$ | $\leq 2.5\text{ns}$ | $V_{OL}+0.15\text{V}$ | $V_{OH}-0.15\text{V}$ |
| 1.65V to 1.95V | $0.5 \times V_{CC}$ | $V_{CC}$ | $\leq 2.5\text{ns}$ | $V_{OL}+0.15\text{V}$ | $V_{OH}-0.15\text{V}$ |
| 2.3V to 2.7V   | $0.5 \times V_{CC}$ | $V_{CC}$ | $\leq 2.5\text{ns}$ | $V_{OL}+0.15\text{V}$ | $V_{OH}-0.15\text{V}$ |
| 2.7V           | 1.5V                | 2.7V     | $\leq 2.5\text{ns}$ | $V_{OL}+0.3\text{V}$  | $V_{OH}-0.3\text{V}$  |
| 3.0V to 3.6V   | 1.5V                | 2.7V     | $\leq 2.5\text{ns}$ | $V_{OL}+0.3\text{V}$  | $V_{OH}-0.3\text{V}$  |

## 4.3、AC Testing Circuit

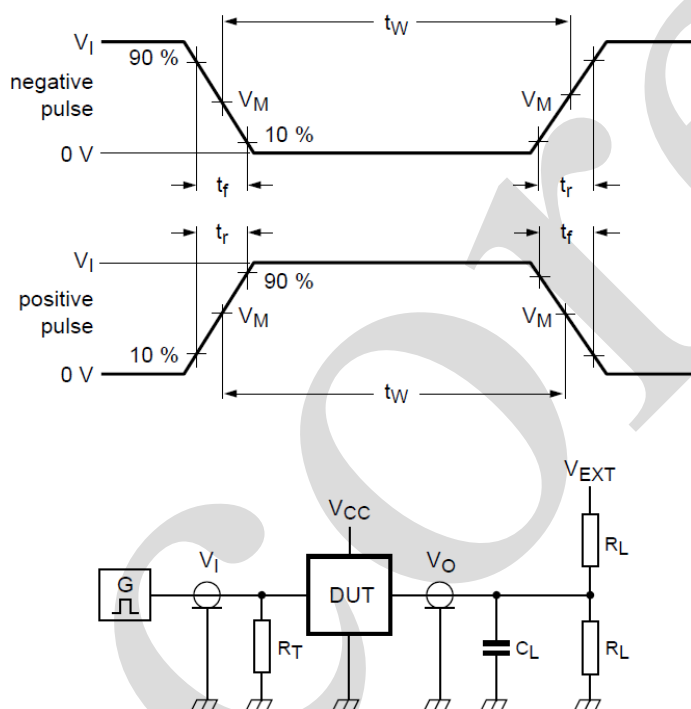


Figure 6. Test circuit for measuring switching times

Definitions for test circuit:

$R_L$ =Load resistance.

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

$R_T$ =Termination resistance should be equal to output impedance  $Z_o$  of the pulse generator.

$V_{EXT}$ =External voltage for measuring switching times.

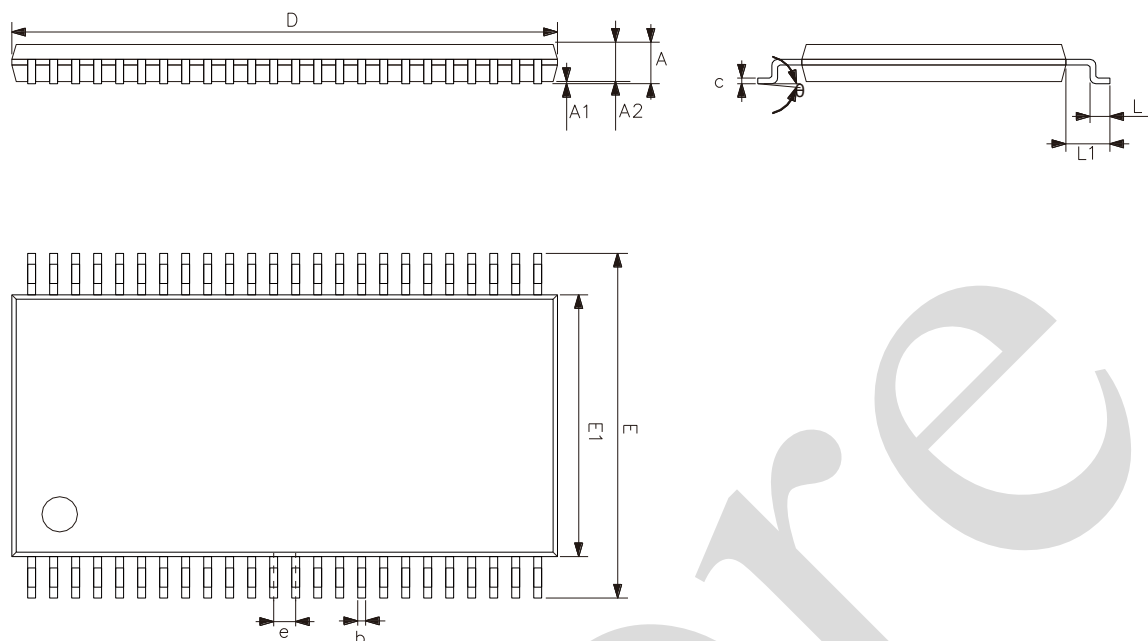
## 4.4、Test Data

| Supply voltage | Input    |                     | Load  |              | $V_{EXT}$          |                    |                    |
|----------------|----------|---------------------|-------|--------------|--------------------|--------------------|--------------------|
|                | $V_I$    | $t_r, t_f$          | $C_L$ | $R_L$        | $t_{PLH}, t_{PHL}$ | $t_{PLZ}, t_{PZL}$ | $t_{PHZ}, t_{PZH}$ |
| 1.2V           | $V_{CC}$ | $\leq 2\text{ns}$   | 30pF  | 1k $\Omega$  | open               | $2 \times V_{CC}$  | GND                |
| 1.65V to 1.95V | $V_{CC}$ | $\leq 2\text{ns}$   | 30pF  | 1k $\Omega$  | open               | $2 \times V_{CC}$  | GND                |
| 2.3V to 2.7V   | $V_{CC}$ | $\leq 2\text{ns}$   | 30pF  | 500 $\Omega$ | open               | $2 \times V_{CC}$  | GND                |
| 2.7V           | 2.7V     | $\leq 2.5\text{ns}$ | 50pF  | 500 $\Omega$ | open               | $2 \times V_{CC}$  | GND                |
| 3.0V to 3.6V   | 2.7V     | $\leq 2.5\text{ns}$ | 50pF  | 500 $\Omega$ | open               | $2 \times V_{CC}$  | GND                |



## 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            |       |
| $\theta$ | 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             | <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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