



AiP74LVC1G07 Single Buffer (Open-drain)

Product Specification

Specification Revision History:

| Version | Date | Description |
|------------|---------|---|
| 2017-07-A1 | 2019-07 | New |
| 2021-09-A2 | 2021-09 | Modify ambient temperature to $-40^{\circ}\text{C}\sim+105^{\circ}\text{C}$ and add electrical characteristics of $-40^{\circ}\text{C}\sim+105^{\circ}\text{C}$ |
| 2021-10-A3 | 2021-10 | Modify ordering information |
| 2021-12-A4 | 2021-12 | Modify ordering information |
| 2022-03-A5 | 2022-03 | Modify ordering information note 1 |



1、 General Description

The AiP74LVC1G07 provides the non-inverting buffer.

The output of this device is an open drain and can be connected to other open-drain outputs to implement active-LOW wired-OR or active-HIGH wired-AND functions.

Inputs 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.

This device is fully specified for partial power-down applications using I_{OFF} . The I_{OFF} circuitry disables the output, preventing the damaging backflow current through the device when it is powered down.

Features:

- Wide supply voltage range from 1.65V to 5.5V
- 5V tolerant inputs for interfacing with 5V logic
- -24mA output drive ($V_{CC}=3.0V$)
- CMOS low power consumption
- Latch-up performance exceeds 250mA
- Direct interface with TTL levels
- Input accepts voltages up to 5V
- Specified from -40°C to +105°C
- Packaging information: SOT-23-5/SOT-353

Ordering Information:

Reel packing specifications:

| Part number | Packaging form | Marking code | Reel quantity | Boxed reel quantity | Notes |
|----------------------|----------------|--------------|------------------|---------------------|---|
| AiP74LVC1G07GB235.TR | SOT-23-5 | ADXX | 3000 PCS/reel | 30000 PCS/box | Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm |
| AiP74LVC1G07GC353.TR | SOT-353 | ADXX | 3000 PCS/reel | 30000 PCS/box | Dimensions of plastic enclosure: 2.1mm×1.3mm Pin spacing: 0.65mm |

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

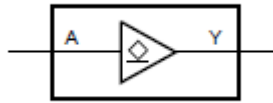


Figure 1. Logic symbol



Figure 2. IEC logic symbol

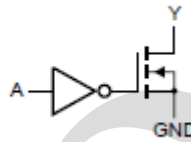
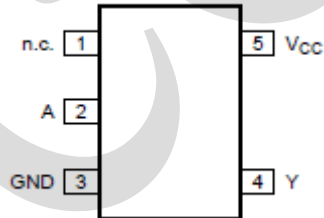


Figure 3. Logic diagram

2.2、Pin Configurations



2.3、Pin Description

| Pin No. | Pin Name | Description |
|---------|-----------------|----------------|
| 1 | n.c. | not connected |
| 2 | A | data input |
| 3 | GND | ground (0V) |
| 4 | Y | data output |
| 5 | V _{CC} | supply voltage |



2.4、Function Table

| Input | Output |
|-------|--------|
| A | Y |
| L | L |
| H | 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 clamping current | I_{IK} | $V_I < 0V$ | -50 | - | mA |
| input voltage | V_I | - | -0.5 | +6.5 | V |
| output clamping current | I_{OK} | $V_O < 0V$ | -50 | - | mA |
| output voltage | V_O | Active mode | -0.5 | +6.5 | V |
| | | Power-down mode; $V_{CC}=0V$ | -0.5 | +6.5 | V |
| output current | I_O | $V_O=0V$ to V_{CC} | - | 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} | - | - | 250 | mW |
| Soldering temperature | T_L | 10s | 250 | | °C |

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 | - | 5.5 | V |
| | | Power-down mode; $V_{CC}=0V$ | 0 | - | 5.5 | V |
| ambient temperature | T_{amb} | - | -40 | - | +105 | °C |
| input transition rise and fall rate | $\Delta t/\Delta V$ | $V_{CC}=1.65V$ to $2.7V$ | - | - | 20 | ns/V |
| | | $V_{CC}=2.7V$ to $5.5V$ | - | - | 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. | Max. | Unit | |
|---------------------------|-----------------|--|--|-----------|----------------------|---------------|---|
| HIGH-level input voltage | V_{IH} | $V_{CC}=1.65\text{V}$ to 1.95V | $0.65 \times V_{CC}$ | - | - | V | |
| | | $V_{CC}=2.3\text{V}$ to 2.7V | 1.7 | - | - | V | |
| | | $V_{CC}=2.7\text{V}$ to 3.6V | 2.0 | - | - | V | |
| | | $V_{CC}=4.5\text{V}$ to 5.5V | $0.7 \times V_{CC}$ | - | - | V | |
| LOW-level input voltage | V_{IL} | $V_{CC}=1.65\text{V}$ to 1.95V | - | - | $0.35 \times V_{CC}$ | V | |
| | | $V_{CC}=2.3\text{V}$ to 2.7V | - | - | 0.7 | V | |
| | | $V_{CC}=2.7\text{V}$ to 3.6V | - | - | 0.8 | V | |
| | | $V_{CC}=4.5\text{V}$ to 5.5V | - | - | $0.3 \times V_{CC}$ | V | |
| LOW-level output voltage | V_{OL} | $V_I = V_{IH}$ or V_{IL} | $I_O=100\mu\text{A}; V_{CC}=1.65\text{V}$ to 5.5V | - | - | 0.1 | V |
| | | | $I_O=4\text{mA}; V_{CC}=1.65\text{V}$ | - | - | 0.45 | V |
| | | | $I_O=8\text{mA}; V_{CC}=2.3\text{V}$ | - | - | 0.3 | V |
| | | | $I_O=12\text{mA}; V_{CC}=2.7\text{V}$ | - | - | 0.4 | V |
| | | | $I_O=24\text{mA}; V_{CC}=3.0\text{V}$ | - | - | 0.55 | V |
| | | | $I_O=32\text{mA}; V_{CC}=4.5\text{V}$ | - | - | 0.55 | V |
| input leakage current | I_I | $V_I=5.5\text{V}$ or GND; $V_{CC}=0\text{V}$ to 5.5V | - | ± 0.1 | ± 1 | μA | |
| OFF-state output current | I_{OZ} | $V_I=V_{IH}$ or $V_{IL};$ $V_O=V_{CC}$ or GND; $V_{CC}=5.5\text{V}$ | - | ± 0.1 | ± 2 | μA | |
| power-off leakage current | I_{OFF} | V_I or $V_O=5.5\text{V}; V_{CC}=0\text{V}$ | - | ± 0.1 | ± 2 | μA | |
| supply current | I_{CC} | $V_I=5.5\text{V}$ or GND; $I_O=0\text{A};$ $V_{CC}=1.65\text{V}$ to 5.5V | - | 0.1 | 4 | μA | |
| additional supply current | ΔI_{CC} | per pin; $V_I=V_{CC}-0.6\text{V}; I_O=0\text{A};$ $V_{CC}=2.3\text{V}$ to 5.5V | - | 5 | 500 | μA | |
| input capacitance | C_I | $V_{CC}=3.3\text{V}; V_I=\text{GND}$ to V_{CC} | - | 5 | - | pF | |

Note: All typical values are measured at $V_{CC}=3.3\text{V}$ and $T_{amb}=25^{\circ}\text{C}$.



3.3.2、DC Characteristics 2

($T_{amb}=-40^{\circ}\text{C}$ to $+105^{\circ}\text{C}$, voltages are referenced to GND (ground=0V), unless otherwise specified.)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit | |
|---------------------------|-----------------|---|--|------|----------------------|---------------|---|
| HIGH-level input voltage | V_{IH} | $V_{CC}=1.65\text{V}$ to 1.95V | $0.65 \times V_{CC}$ | - | - | V | |
| | | $V_{CC}=2.3\text{V}$ to 2.7V | 1.7 | - | - | V | |
| | | $V_{CC}=2.7\text{V}$ to 3.6V | 2.0 | - | - | V | |
| | | $V_{CC}=4.5\text{V}$ to 5.5V | $0.7 \times V_{CC}$ | - | - | V | |
| LOW-level input voltage | V_{IL} | $V_{CC}=1.65\text{V}$ to 1.95V | - | - | $0.35 \times V_{CC}$ | V | |
| | | $V_{CC}=2.3\text{V}$ to 2.7V | - | - | 0.7 | V | |
| | | $V_{CC}=2.7\text{V}$ to 3.6V | - | - | 0.8 | V | |
| | | $V_{CC}=4.5\text{V}$ to 5.5V | - | - | $0.3 \times V_{CC}$ | V | |
| LOW-level output voltage | V_{OL} | $V_I = V_{IH}$ or V_{IL} | $I_O=100\mu\text{A}; V_{CC}=1.65\text{V}$ to 5.5V | - | - | 0.1 | V |
| | | | $I_O=4\text{mA}; V_{CC}=1.65\text{V}$ | - | - | 0.7 | V |
| | | | $I_O=8\text{mA}; V_{CC}=2.3\text{V}$ | - | - | 0.45 | V |
| | | | $I_O=12\text{mA}; V_{CC}=2.7\text{V}$ | - | - | 0.6 | V |
| | | | $I_O=24\text{mA}; V_{CC}=3.0\text{V}$ | - | - | 0.8 | V |
| | | | $I_O=32\text{mA}; V_{CC}=4.5\text{V}$ | - | - | 0.8 | V |
| input leakage current | I_I | $V_I=5.5\text{V}$ or GND; $V_{CC}=0\text{V}$ to 5.5V | - | - | ± 1 | μA | |
| OFF-state output current | I_{OZ} | $V_I=V_{IH}$ or $V_{IL}; V_O=V_{CC}$ or GND; $V_{CC}=5.5\text{V}$ | - | - | ± 2 | μA | |
| power-off leakage current | I_{OFF} | V_I or $V_O=5.5\text{V}; V_{CC}=0\text{V}$ | - | - | ± 2 | μA | |
| supply current | I_{CC} | $V_I=5.5\text{V}$ or GND; $I_O=0\text{A}; V_{CC}=1.65\text{V}$ to 5.5V | - | - | 4 | μA | |
| additional supply current | ΔI_{CC} | per pin; $V_I=V_{CC}-0.6\text{V}; I_O=0\text{A}; V_{CC}=2.3\text{V}$ to 5.5V | - | - | 500 | μA | |

Note: All typical values are measured at $V_{CC}=3.3\text{V}$ and $T_{amb}=25^{\circ}\text{C}$.



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. | Max. | Unit | |
|-------------------------------|----------|---|---|------|------|------|----|
| A to Y propagation delay | t_{pd} | see Figure 5 | $V_{CC}=1.65\text{V}$ to 1.95V | 1.0 | 2.6 | 6.7 | ns |
| | | | $V_{CC}=2.3\text{V}$ to 2.7V | 0.5 | 1.7 | 5.5 | ns |
| | | | $V_{CC}=2.7\text{V}$ | 0.5 | 2.3 | 4.7 | ns |
| | | | $V_{CC}=3.0\text{V}$ to 3.6V | 0.5 | 2.2 | 4.2 | ns |
| | | | $V_{CC}=4.5\text{V}$ to 5.5V | 0.5 | 1.6 | 3.5 | ns |
| Power dissipation capacitance | C_{PD} | $V_{CC}=3.3\text{V}$; $V_I=\text{GND}$ to V_{CC} | - | 7.0 | - | pF | |

Note:

[1] Typical values are measured at $T_{amb}=25^{\circ}\text{C}$ and $V_{CC}=1.8\text{V}$, 2.5V , 2.7V , 3.3V and 5.0V respectively.

[2] t_{pd} is the same as t_{PLZ} and t_{PZL} .

[3] C_{PD} is used to determine the dynamic power dissipation (P_D in uW).

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

N =number of inputs switching;

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

3.3.4、 AC Characteristics 2

($T_{amb}=-40^{\circ}\text{C}$ to $+105^{\circ}\text{C}$, voltages are referenced to GND (ground=0V), unless otherwise specified.)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit | |
|--------------------------|----------|--------------|---|------|------|------|----|
| A to Y propagation delay | t_{pd} | see Figure 5 | $V_{CC}=1.65\text{V}$ to 1.95V | 1.0 | - | 8.4 | ns |
| | | | $V_{CC}=2.3\text{V}$ to 2.7V | 0.5 | - | 7.0 | ns |
| | | | $V_{CC}=2.7\text{V}$ | 0.5 | - | 6.0 | ns |
| | | | $V_{CC}=3.0\text{V}$ to 3.6V | 0.5 | - | 5.5 | ns |
| | | | $V_{CC}=4.5\text{V}$ to 5.5V | 0.5 | - | 4.5 | ns |

Note:

[1] Typical values are measured at $T_{amb}=25^{\circ}\text{C}$ and $V_{CC}=1.8\text{V}$, 2.5V , 2.7V , 3.3V and 5.0V respectively.

[2] t_{pd} is the same as t_{PLZ} and t_{PZL} .



4、Testing Circuit

4.1、AC Testing Circuit

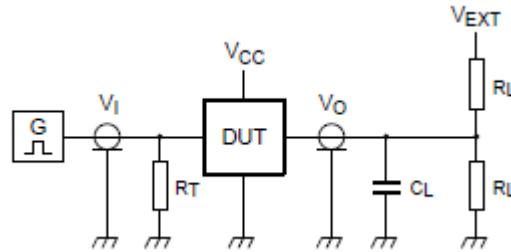


Figure 4. Test circuit for measuring switching times

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 the output impedance Z_o of the pulse generator.

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

4.2、AC Testing Waveforms

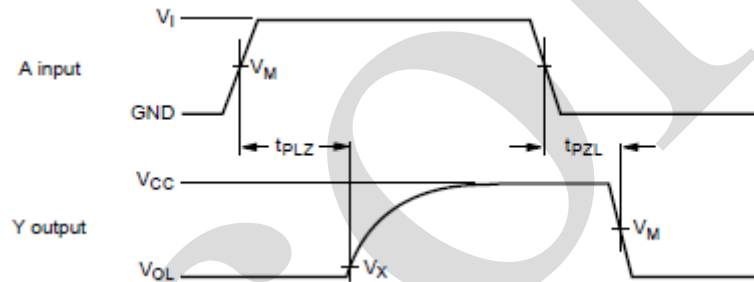


Figure 5. The input A to output Y propagation delays

4.3、Measurement Points

| Supply voltage | Input | Output | |
|----------------|---------------------|---------------------|------------------|
| V_{CC} | V_M | V_M | V_X |
| 1.65V to 1.95V | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ | $V_{OL} + 0.15V$ |
| 2.3V to 2.7V | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ | $V_{OL} + 0.15V$ |
| 2.7V | 1.5V | 1.5V | $V_{OL} + 0.3V$ |
| 3.0V to 3.6V | 1.5V | 1.5V | $V_{OL} + 0.3V$ |
| 4.5V to 5.5V | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ | $V_{OL} + 0.3V$ |

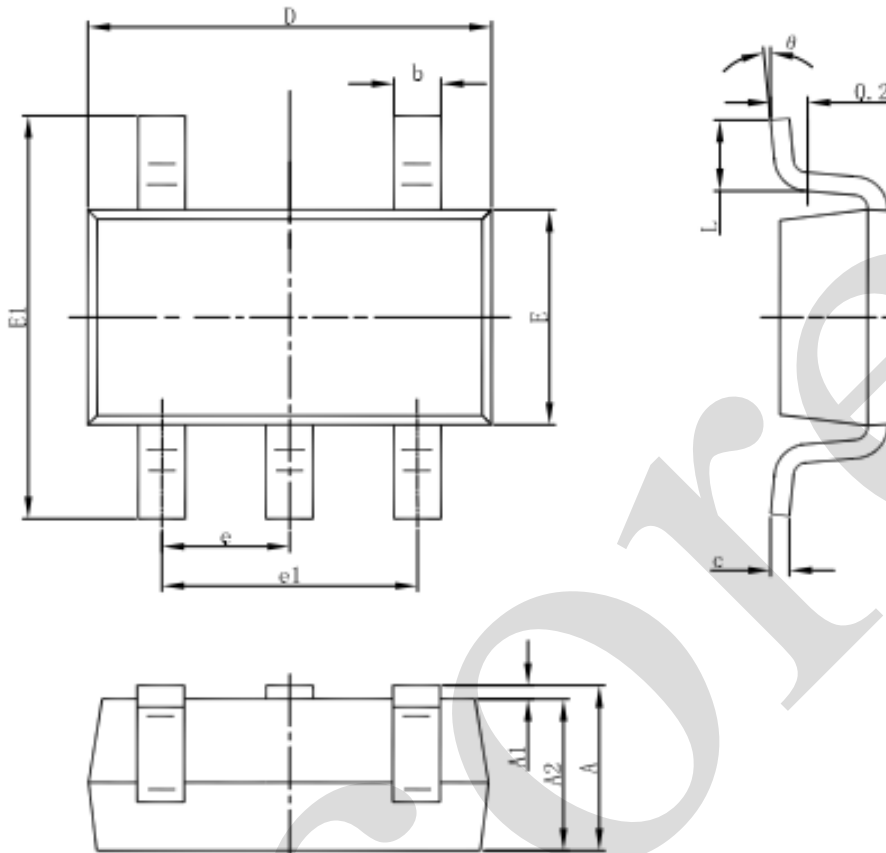
4.4、Test Data

| Supply voltage | Input | | Load | | V_{EXT} |
|----------------|----------|--------------|-------|--------------|--------------------|
| V_{CC} | V_I | t_r, t_f | C_L | R_L | t_{PLZ}, t_{PZL} |
| 1.65V to 1.95V | V_{CC} | $\leq 2.0ns$ | 30pF | 1k Ω | $2 \times V_{CC}$ |
| 2.3V to 2.7V | V_{CC} | $\leq 2.0ns$ | 30pF | 500 Ω | $2 \times V_{CC}$ |
| 2.7V | 2.7V | $\leq 2.5ns$ | 50pF | 500 Ω | 6V |
| 3.0V to 3.6V | 2.7V | $\leq 2.5ns$ | 50pF | 500 Ω | 6V |
| 4.5V to 5.5V | V_{CC} | $\leq 2.5ns$ | 50pF | 500 Ω | $2 \times V_{CC}$ |



5、Package Information

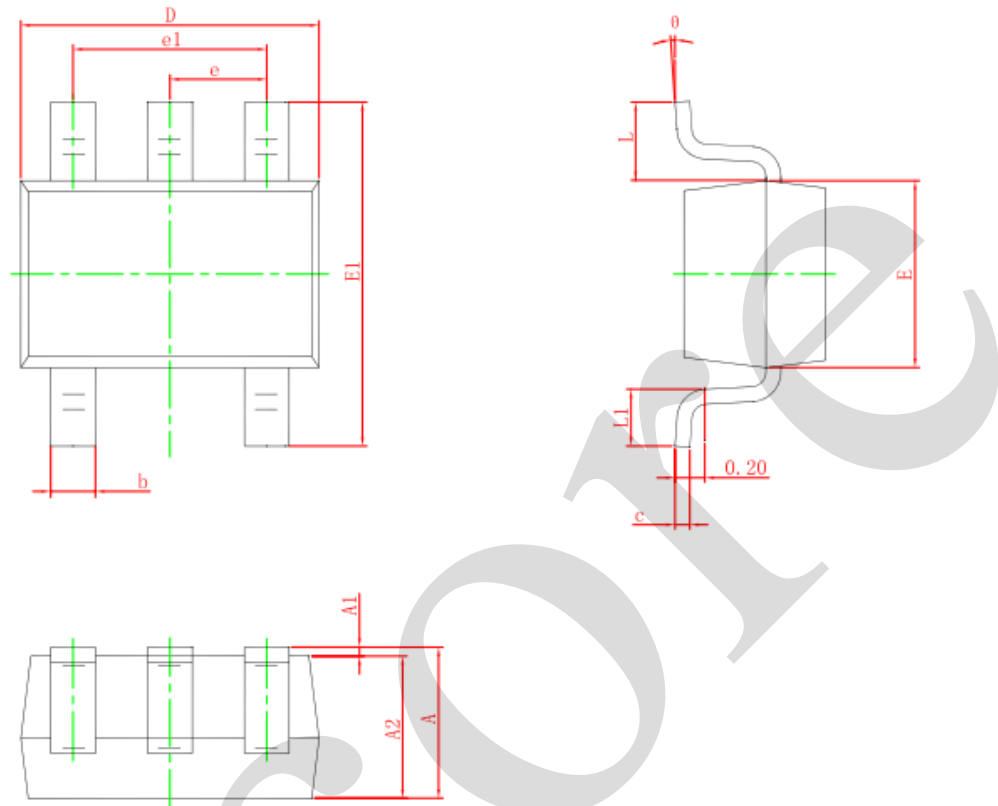
5.1、SOT-23-5



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 1.050 | 1.250 | 0.041 | 0.049 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.050 | 1.150 | 0.041 | 0.045 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.100 | 0.200 | 0.004 | 0.008 |
| D | 2.820 | 3.020 | 0.111 | 0.119 |
| E | 1.500 | 1.700 | 0.059 | 0.067 |
| E1 | 2.650 | 2.950 | 0.104 | 0.116 |
| e | 0.950(BSC) | | 0.037(BSC) | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.300 | 0.600 | 0.012 | 0.024 |
| θ | 0° | 8° | 0° | 8° |



5.2、SOT-353



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 0.900 | 1.100 | 0.035 | 0.043 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.900 | 1.000 | 0.035 | 0.039 |
| b | 0.150 | 0.350 | 0.006 | 0.014 |
| c | 0.080 | 0.150 | 0.003 | 0.006 |
| D | 2.000 | 2.200 | 0.079 | 0.087 |
| E | 1.150 | 1.350 | 0.045 | 0.053 |
| E1 | 2.150 | 2.450 | 0.085 | 0.096 |
| e | 0.650 TYP. | | 0.026 TYP. | |
| e1 | 1.200 | 1.400 | 0.047 | 0.055 |
| L | 0.525 REF. | | 0.021 REF. | |
| L1 | 0.260 | 0.460 | 0.010 | 0.018 |
| θ | 0° | 8° | 0° | 8° |



6、 Statements And Notes

6.1、 The name and content of Hazardous substances or Elements in the product

| Part name | Hazardous substances or Elements | | | | | | | | | |
|-------------------------|---|-------------------------------|-------------------------------|-------------------------------|--------------------------|--------------------------------|-------------------|-----------------------|---------------------------|----------------------|
| | Lead and lead compounds | Mercury and mercury compounds | Cadmium and cadmium compounds | Hexavalent chromium compounds | Polybrominated biphenyls | Polybrominated biphenyl ethers | Dibutyl phthalate | Butylbenzyl phthalate | Di-2-ethylhexyl phthalate | Diisobutyl phthalate |
| Lead frame | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Plastic resin | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Chip | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| The lead | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Plastic sheet installed | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| explanation | ○: Indicates that the content of hazardous substances or elements in the detection limit of the following the SJ/T11363-2006 standard. ×: Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements. | | | | | | | | | |

6.2、 Notion

Recommended carefully reading this information before the use of this product;

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