



# AiP74HC/HCT4049 Hex Inverting Buffer

## Product Specification

### Specification Revision History:

| Version    | Date    | Description   |
|------------|---------|---|
| 2012-06-A1 | 2012-06 | New   |
| 2021-12-A2 | 2021-12 | Modify Ordering Information   |
| 2022-02-A3 | 2022-02 | Modify ambient temperature to $-40^{\circ}\text{C}\sim+105^{\circ}\text{C}$ and add electrical characteristics of $-40^{\circ}\text{C}\sim+105^{\circ}\text{C}$ |
|            |         |   |



## 1、 General Description

The AiP74HC/HCT4049 is a hex inverter with over-voltage tolerant inputs. Inputs are overvoltage tolerant to 15V. This enables the device to be used in HIGH-to-LOW level shifting applications.

### Features:

- Input levels:
  - For AiP74HC4049: CMOS level
  - For AiP74HCT4049: TTL level
- Low-power dissipation
- Specified from -40°C to +105°C
- Packaging information: DIP16/SOP16/TSSOP16

### Ordering Information:

#### Tube packing specifications:

| Part number         | Packaging form | Marking code | Tube quantity  | Boxed tube quantity | Boxed quantity   | Notes  |
|---------------------|----------------|--------------|----------------|---------------------|------------------|--|
| AiP74HC4049DA16.TB  | DIP16          | 74HC4049     | 25<br>PCS/tube | 40<br>tube/box      | 1000<br>PCS/box  | Dimensions of plastic enclosure: 19.0mm×6.4mm<br>Pin spacing: 2.54mm |
| AiP74HCT4049DA16.TB | DIP16          | 74HCT4049    | 25<br>PCS/tube | 40<br>tube/box      | 1000<br>PCS/box  | Dimensions of plastic enclosure: 19.0mm×6.4mm<br>Pin spacing: 2.54mm |
| AiP74HC4049SA16.TB  | SOP16          | 74HC4049     | 50<br>PCS/tube | 200<br>tube/box     | 10000<br>PCS/box | Dimensions of plastic enclosure: 10.0mm×3.9mm<br>Pin spacing: 1.27mm |
| AiP74HCT4049SA16.TB | SOP16          | 74HCT4049    | 50<br>PCS/tube | 200<br>tube/box     | 10000<br>PCS/box | Dimensions of plastic enclosure: 10.0mm×3.9mm<br>Pin spacing: 1.27mm |
| AiP74HC4049TA16.TB  | TSSOP16        | 74HC4049     | 96<br>PCS/tube | 200<br>tube/box     | 19200<br>PCS/box | Dimensions of plastic enclosure: 5.0mm×4.4mm<br>Pin spacing: 0.65mm  |
| AiP74HCT4049TA16.TB | TSSOP16        | 74HCT4049    | 96<br>PCS/tube | 200<br>tube/box     | 19200<br>PCS/box | Dimensions of plastic enclosure: 5.0mm×4.4mm<br>Pin spacing: 0.65mm  |

**Reel packing specifications:**

| Part number         | Packaging form | Marking code | Reel quantity    | Boxed reel quantity | Notes  |
|---------------------|----------------|--------------|------------------|---------------------|--|
| AiP74HC4049SA16.TR  | SOP16          | 74HC4049     | 4000<br>PCS/reel | 8000<br>PCS/box     | Dimensions of plastic enclosure:<br>10.0mm×3.9mm<br>Pin spacing:1.27mm |
| AiP74HCT4049SA16.TR | SOP16          | 74HCT4049    | 4000<br>PCS/reel | 8000<br>PCS/box     | Dimensions of plastic enclosure:<br>10.0mm×3.9mm<br>Pin spacing:1.27mm |
| AiP74HC4049TA16.TR  | TSSOP16        | 74HC4049     | 5000<br>PCS/reel | 10000<br>PCS/box    | Dimensions of plastic enclosure:<br>5.0mm×4.4mm<br>Pin spacing:0.65mm  |
| AiP74HCT4049TA16.TR | TSSOP16        | 74HCT4049    | 5000<br>PCS/reel | 10000<br>PCS/box    | Dimensions of plastic enclosure:<br>5.0mm×4.4mm<br>Pin spacing:0.65mm  |

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

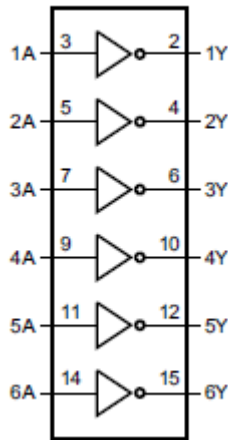


Figure 1. Logic symbol

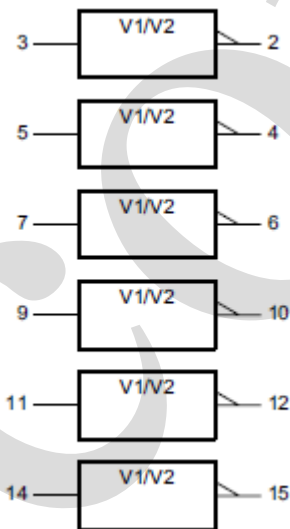


Figure 2. IEC logic symbol

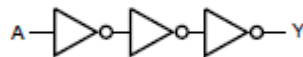
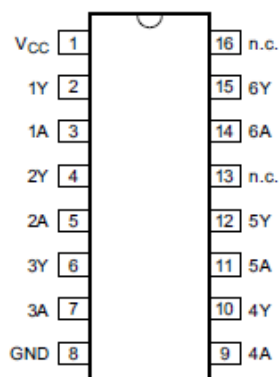


Figure 3. Logic diagram (one level shifter)



## 2.2、Pin Configurations



## 2.3、Pin Description

| Pin No. | Pin Name        | Description    |
|---------|-----------------|----------------|
| 1       | V <sub>CC</sub> | supply voltage |
| 2       | 1Y              | output         |
| 3       | 1A              | input          |
| 4       | 2Y              | output         |
| 5       | 2A              | input          |
| 6       | 3Y              | output         |
| 7       | 3A              | input          |
| 8       | GND             | ground (0V)    |
| 9       | 4A              | input          |
| 10      | 4Y              | output         |
| 11      | 5A              | input          |
| 12      | 5Y              | output         |
| 13      | n.c.            | not connected  |
| 14      | 6A              | input          |
| 15      | 6Y              | output         |
| 16      | n.c.            | not connected  |

## 2.4、Function Table

| Input | Output |
|-------|--------|
| nA    | nY     |
| L     | H      |
| H     | L      |

Note: H=HIGH voltage level; L=LOW voltage level.



## 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 clamping current  | $I_{IK}$  | $V_I < -0.5V$ or $V_I > V_{CC}+0.5V$ | -    | $\pm 20$ | mA          |
| output clamping current | $I_{OK}$  | $V_O < -0.5V$ or $V_O > V_{CC}+0.5V$ | -    | $\pm 20$ | mA          |
| output current          | $I_O$     | $-0.5V < V_O < V_{CC}+0.5V$          | -    | $\pm 25$ | mA          |
| supply current          | $I_{CC}$  | -                                    | -    | +50      | mA          |
| ground current          | $I_{GND}$ | -                                    | -50  | -        | mA          |
| storage temperature     | $T_{stg}$ | -                                    | -65  | +150     | $^{\circ}C$ |
| total power dissipation | $P_{tot}$ | -                                    | -    | 500      | mW          |
| Soldering temperature   | $T_L$     | 10s                                  | DIP  | 245      | $^{\circ}C$ |
|                         |           |                                      | SOP  | 250      |             |

Note:

[1] For DIP16 packages: above  $70^{\circ}C$  the value of  $P_{tot}$  derates linearly with 12mW/K.

[2] For SOP16 packages: above  $70^{\circ}C$  the value of  $P_{tot}$  derates linearly with 8mW/K.

[3] For (T)SSOP16 packages: above  $60^{\circ}C$  the value of  $P_{tot}$  derates linearly with 5.5mW/K.

### 3.2、Recommended Operating Conditions

| Parameter                           | Symbol              | Conditions    | Min. | Typ. | Max.     | Unit        |
|-------------------------------------|---------------------|---------------|------|------|----------|-------------|
| <b>AiP74HC4049</b>                  |                     |               |      |      |          |             |
| supply voltage                      | $V_{CC}$            | -             | 2.0  | 5.0  | 6.0      | V           |
| input voltage                       | $V_I$               | -             | 0    | -    | $V_{CC}$ | V           |
| output voltage                      | $V_O$               | -             | 0    | -    | $V_{CC}$ | V           |
| input transition rise and fall rate | $\Delta t/\Delta V$ | $V_{CC}=2.0V$ | -    | -    | 625      | ns/V        |
|                                     |                     | $V_{CC}=4.5V$ | -    | 1.67 | 139      | ns/V        |
|                                     |                     | $V_{CC}=6.0V$ | -    | -    | 83       | ns/V        |
| ambient temperature                 | $T_{amb}$           | -             | -40  | -    | +105     | $^{\circ}C$ |
| <b>AiP74HCT4049</b>                 |                     |               |      |      |          |             |
| supply voltage                      | $V_{CC}$            | -             | 4.5  | 5.0  | 5.5      | V           |
| input voltage                       | $V_I$               | -             | 0    | -    | $V_{CC}$ | V           |
| output voltage                      | $V_O$               | -             | 0    | -    | $V_{CC}$ | V           |
| input transition rise and fall rate | $\Delta t/\Delta V$ | $V_{CC}=4.5V$ | -    | 1.67 | 139      | ns/V        |
| ambient temperature                 | $T_{amb}$           | -             | -40  | -    | +105     | $^{\circ}C$ |



### 3.3、Electrical Characteristics

#### 3.3.1、DC Characteristics 1

( $T_{amb}=25^{\circ}C$ , voltages are referenced to GND (ground=0V), unless otherwise specified.)

| Parameter                 | Symbol          | Conditions   | Min.                        | Typ. | Max.      | Unit    |   |
|---------------------------|-----------------|--|-----------------------------|------|-----------|---------|---|
| <b>AiP74HC4049</b>        |                 |  |                             |      |           |         |   |
| HIGH-level input voltage  | $V_{IH}$        | $V_{CC}=2.0V$  | 1.5                         | 1.2  | -         | V       |   |
|                           |                 | $V_{CC}=4.5V$  | 3.15                        | 2.4  | -         | V       |   |
|                           |                 | $V_{CC}=6.0V$  | 4.2                         | 3.2  | -         | V       |   |
| LOW-level input voltage   | $V_{IL}$        | $V_{CC}=2.0V$  | -                           | 0.8  | 0.5       | V       |   |
|                           |                 | $V_{CC}=4.5V$  | -                           | 2.1  | 1.35      | V       |   |
|                           |                 | $V_{CC}=6.0V$  | -                           | 2.8  | 1.8       | V       |   |
| HIGH-level output voltage | $V_{OH}$        | $V_I = V_{IH} \text{ or } V_{IL}$  | $I_O=-20\mu A; V_{CC}=2.0V$ | 1.9  | 2.0       | -       | V |
|                           |                 |  | $I_O=-20\mu A; V_{CC}=4.5V$ | 4.4  | 4.5       | -       | V |
|                           |                 |  | $I_O=-20\mu A; V_{CC}=6.0V$ | 5.9  | 6.0       | -       | V |
|                           |                 |  | $I_O=-4.0mA; V_{CC}=4.5V$   | 3.98 | 4.32      | -       | V |
|                           |                 |  | $I_O=-5.2mA; V_{CC}=6.0V$   | 5.48 | 5.81      | -       | V |
| LOW-level output voltage  | $V_{OL}$        | $V_I = V_{IH} \text{ or } V_{IL}$  | $I_O=20\mu A; V_{CC}=2.0V$  | -    | 0         | 0.1     | V |
|                           |                 |  | $I_O=20\mu A; V_{CC}=4.5V$  | -    | 0         | 0.1     | V |
|                           |                 |  | $I_O=20\mu A; V_{CC}=6.0V$  | -    | 0         | 0.1     | V |
|                           |                 |  | $I_O=4.0mA; V_{CC}=4.5V$    | -    | 0.15      | 0.26    | V |
|                           |                 |  | $I_O=5.2mA; V_{CC}=6.0V$    | -    | 0.16      | 0.26    | V |
| input leakage current     | $I_I$           | $V_I=V_{CC} \text{ or } GND; V_{CC}=6.0V$  | -                           | -    | $\pm 0.1$ | $\mu A$ |   |
| supply current            | $I_{CC}$        | $V_I=V_{CC} \text{ or } GND; I_O=0A; V_{CC}=6.0V$  | -                           | -    | 2         | $\mu A$ |   |
| input capacitance         | $C_I$           | -  | -                           | 3.5  | -         | pF      |   |
| <b>AiP74HCT4049</b>       |                 |  |                             |      |           |         |   |
| HIGH-level input voltage  | $V_{IH}$        | $V_{CC}=4.5V \text{ to } 5.5V$   | 2.0                         | 1.6  | -         | V       |   |
| LOW-level input voltage   | $V_{IL}$        | $V_{CC}=4.5V \text{ to } 5.5V$   | -                           | 1.2  | 0.8       | V       |   |
| HIGH-level output voltage | $V_{OH}$        | $V_I = V_{IH} \text{ or } V_{IL}; V_{CC}=4.5V$   | $I_O=-20\mu A$              | 4.4  | 4.5       | -       | V |
|                           |                 |  | $I_O=-4.0mA$                | 3.98 | 4.32      | -       | V |
| LOW-level output voltage  | $V_{OL}$        | $V_I = V_{IH} \text{ or } V_{IL}; V_{CC}=4.5V$   | $I_O=20\mu A$               | -    | 0         | 0.1     | V |
|                           |                 |  | $I_O=5.2mA$                 | -    | 0.15      | 0.26    | V |
| input leakage current     | $I_I$           | $V_I=V_{CC} \text{ or } GND; V_{CC}=5.5V$  | -                           | -    | $\pm 0.1$ | $\mu A$ |   |
| supply current            | $I_{CC}$        | $V_I=V_{CC} \text{ or } GND; I_O=0A; V_{CC}=5.5V$  | -                           | -    | 2         | $\mu A$ |   |
| additional supply current | $\Delta I_{CC}$ | per input pin; $V_I=V_{CC}-2.1V$ ; other inputs at $V_{CC} \text{ or } GND$ ; $I_O=0A; V_{CC}=4.5V \text{ to } 5.5V$ | -                           | 120  | 432       | $\mu A$ |   |
| input capacitance         | $C_I$           | -  | -                           | 3.5  | -         | pF      |   |



### 3.3.2、DC Characteristics 2

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

| Parameter                 | Symbol          | Conditions   | Min.   | Typ. | Max.      | Unit          |   |
|---------------------------|-----------------|--|--|------|-----------|---------------|---|
| <b>AiP74HC4049</b>        |                 |  |  |      |           |               |   |
| HIGH-level input voltage  | $V_{IH}$        | $V_{CC}=2.0\text{V}$   | 1.5  | -    | -         | V             |   |
|                           |                 | $V_{CC}=4.5\text{V}$   | 3.15   | -    | -         | V             |   |
|                           |                 | $V_{CC}=6.0\text{V}$   | 4.2  | -    | -         | V             |   |
| LOW-level input voltage   | $V_{IL}$        | $V_{CC}=2.0\text{V}$   | -  | -    | 0.5       | V             |   |
|                           |                 | $V_{CC}=4.5\text{V}$   | -  | -    | 1.35      | V             |   |
|                           |                 | $V_{CC}=6.0\text{V}$   | -  | -    | 1.8       | V             |   |
| HIGH-level output voltage | $V_{OH}$        | $V_I = V_{IH} \text{ or } V_{IL}$  | $I_O = -20\mu\text{A}; V_{CC} = 2.0\text{V}$ | 1.9  | -         | -             | V |
|                           |                 |  | $I_O = -20\mu\text{A}; V_{CC} = 4.5\text{V}$ | 4.4  | -         | -             | V |
|                           |                 |  | $I_O = -20\mu\text{A}; V_{CC} = 6.0\text{V}$ | 5.9  | -         | -             | V |
|                           |                 |  | $I_O = -4.0\text{mA}; V_{CC} = 4.5\text{V}$  | 3.84 | -         | -             | V |
|                           |                 |  | $I_O = -5.2\text{mA}; V_{CC} = 6.0\text{V}$  | 5.34 | -         | -             | V |
| LOW-level output voltage  | $V_{OL}$        | $V_I = V_{IH} \text{ or } V_{IL}$  | $I_O = 20\mu\text{A}; V_{CC} = 2.0\text{V}$  | -    | -         | 0.1           | V |
|                           |                 |  | $I_O = 20\mu\text{A}; V_{CC} = 4.5\text{V}$  | -    | -         | 0.1           | V |
|                           |                 |  | $I_O = 20\mu\text{A}; V_{CC} = 6.0\text{V}$  | -    | -         | 0.1           | V |
|                           |                 |  | $I_O = 4.0\text{mA}; V_{CC} = 4.5\text{V}$   | -    | -         | 0.33          | V |
|                           |                 |  | $I_O = 5.2\text{mA}; V_{CC} = 6.0\text{V}$   | -    | -         | 0.33          | V |
| input leakage current     | $I_I$           | $V_I = V_{CC} \text{ or } \text{GND}; V_{CC} = 6.0\text{V}$  | -  | -    | $\pm 1.0$ | $\mu\text{A}$ |   |
| supply current            | $I_{CC}$        | $V_I = V_{CC} \text{ or } \text{GND}; I_O = 0\text{A}; V_{CC} = 6.0\text{V}$   | -  | -    | 20        | $\mu\text{A}$ |   |
| <b>AiP74HCT4049</b>       |                 |  |  |      |           |               |   |
| HIGH-level input voltage  | $V_{IH}$        | $V_{CC} = 4.5\text{V to } 5.5\text{V}$   | 2.0  | -    | -         | V             |   |
| LOW-level input voltage   | $V_{IL}$        | $V_{CC} = 4.5\text{V to } 5.5\text{V}$   | -  | -    | 0.8       | V             |   |
| HIGH-level output voltage | $V_{OH}$        | $V_I = V_{IH} \text{ or } V_{IL}; V_{CC} = 4.5\text{V}$  | $I_O = -20\mu\text{A}$                       | 4.4  | -         | -             | V |
|                           |                 |  | $I_O = -4.0\text{mA}$                        | 3.84 | -         | -             | V |
| LOW-level output voltage  | $V_{OL}$        | $V_I = V_{IH} \text{ or } V_{IL}; V_{CC} = 4.5\text{V}$  | $I_O = 20\mu\text{A}$                        | -    | -         | 0.1           | V |
|                           |                 |  | $I_O = 5.2\text{mA}$                         | -    | -         | 0.33          | V |
| input leakage current     | $I_I$           | $V_I = V_{CC} \text{ or } \text{GND}; V_{CC} = 5.5\text{V}$  | -  | -    | $\pm 1.0$ | $\mu\text{A}$ |   |
| supply current            | $I_{CC}$        | $V_I = V_{CC} \text{ or } \text{GND}; I_O = 0\text{A}; V_{CC} = 5.5\text{V}$   | -  | -    | 20        | $\mu\text{A}$ |   |
| additional supply current | $\Delta I_{CC}$ | per input pin; $V_I = V_{CC} - 2.1\text{V}$ ; other inputs at $V_{CC}$ or $\text{GND}$ ; $I_O = 0\text{A}; V_{CC} = 4.5\text{V to } 5.5\text{V}$ | -  | -    | 540       | $\mu\text{A}$ |   |





### 3.3.3、DC Characteristics 3

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

| Parameter                 | Symbol          | Conditions   | Min.                                       | Typ. | Max.      | Unit          |   |
|---------------------------|-----------------|--|--|------|-----------|---------------|---|
| <b>AiP74HC4049</b>        |                 |  |  |      |           |               |   |
| HIGH-level input voltage  | $V_{IH}$        | $V_{CC}=2.0\text{V}$   | 1.5  | -    | -         | V             |   |
|                           |                 | $V_{CC}=4.5\text{V}$   | 3.15                                       | -    | -         | V             |   |
|                           |                 | $V_{CC}=6.0\text{V}$   | 4.2  | -    | -         | V             |   |
| LOW-level input voltage   | $V_{IL}$        | $V_{CC}=2.0\text{V}$   | -  | -    | 0.5       | V             |   |
|                           |                 | $V_{CC}=4.5\text{V}$   | -  | -    | 1.35      | V             |   |
|                           |                 | $V_{CC}=6.0\text{V}$   | -  | -    | 1.8       | V             |   |
| HIGH-level output voltage | $V_{OH}$        | $V_I = V_{IH} \text{ or } V_{IL}$  | $I_O = -20\mu\text{A}; V_{CC}=2.0\text{V}$ | 1.9  | -         | -             | V |
|                           |                 |  | $I_O = -20\mu\text{A}; V_{CC}=4.5\text{V}$ | 4.4  | -         | -             | V |
|                           |                 |  | $I_O = -20\mu\text{A}; V_{CC}=6.0\text{V}$ | 5.9  | -         | -             | V |
|                           |                 |  | $I_O = -4.0\text{mA}; V_{CC}=4.5\text{V}$  | 3.7  | -         | -             | V |
|                           |                 |  | $I_O = -5.2\text{mA}; V_{CC}=6.0\text{V}$  | 5.2  | -         | -             | V |
| LOW-level output voltage  | $V_{OL}$        | $V_I = V_{IH} \text{ or } V_{IL}$  | $I_O = 20\mu\text{A}; V_{CC}=2.0\text{V}$  | -    | -         | 0.1           | V |
|                           |                 |  | $I_O = 20\mu\text{A}; V_{CC}=4.5\text{V}$  | -    | -         | 0.1           | V |
|                           |                 |  | $I_O = 20\mu\text{A}; V_{CC}=6.0\text{V}$  | -    | -         | 0.1           | V |
|                           |                 |  | $I_O = 4.0\text{mA}; V_{CC}=4.5\text{V}$   | -    | -         | 0.4           | V |
|                           |                 |  | $I_O = 5.2\text{mA}; V_{CC}=6.0\text{V}$   | -    | -         | 0.4           | V |
| input leakage current     | $I_I$           | $V_I = V_{CC} \text{ or } \text{GND}; V_{CC}=6.0\text{V}$  | -  | -    | $\pm 1.0$ | $\mu\text{A}$ |   |
| supply current            | $I_{CC}$        | $V_I = V_{CC} \text{ or } \text{GND}; I_O = 0\text{A}; V_{CC}=6.0\text{V}$   | -  | -    | 40        | $\mu\text{A}$ |   |
| <b>AiP74HCT4049</b>       |                 |  |  |      |           |               |   |
| HIGH-level input voltage  | $V_{IH}$        | $V_{CC}=4.5\text{V to } 5.5\text{V}$   | 2.0  | -    | -         | V             |   |
| LOW-level input voltage   | $V_{IL}$        | $V_{CC}=4.5\text{V to } 5.5\text{V}$   | -  | -    | 0.8       | V             |   |
| HIGH-level output voltage | $V_{OH}$        | $V_I = V_{IH} \text{ or } V_{IL}; V_{CC}=4.5\text{V}$  | $I_O = -20\mu\text{A}$                     | 4.4  | -         | -             | V |
|                           |                 |  | $I_O = -4.0\text{mA}$                      | 3.7  | -         | -             | V |
| LOW-level output voltage  | $V_{OL}$        | $V_I = V_{IH} \text{ or } V_{IL}; V_{CC}=4.5\text{V}$  | $I_O = 20\mu\text{A}$                      | -    | -         | 0.1           | V |
|                           |                 |  | $I_O = 5.2\text{mA}$                       | -    | -         | 0.4           | V |
| input leakage current     | $I_I$           | $V_I = V_{CC} \text{ or } \text{GND}; V_{CC}=5.5\text{V}$  | -  | -    | $\pm 1.0$ | $\mu\text{A}$ |   |
| supply current            | $I_{CC}$        | $V_I = V_{CC} \text{ or } \text{GND}; I_O = 0\text{A}; V_{CC}=5.5\text{V}$   | -  | -    | 40        | $\mu\text{A}$ |   |
| additional supply current | $\Delta I_{CC}$ | per input pin; $V_I = V_{CC} - 2.1\text{V}$ ;<br>other inputs at $V_{CC}$ or $\text{GND}$ ;<br>$I_O = 0\text{A}; V_{CC} = 4.5\text{V to } 5.5\text{V}$ | -  | -    | 590       | $\mu\text{A}$ |   |



### 3.3.4、 AC Characteristics 1

( $T_{amb}=25^{\circ}C$ ,  $GND=0V$ ,  $C_L=50pF$ , unless otherwise specified.)

| Parameter                     | Symbol   | Conditions   | Min.                       | Typ. | Max. | Unit |    |
|-------------------------------|----------|--|----------------------------|------|------|------|----|
| <b>AiP74HC4049</b>            |          |  |                            |      |      |      |    |
| nA to nY propagation delay    | $t_{pd}$ | see Figure 5                                       | $V_{CC}=2.0V$              | -    | 28   | 85   | ns |
|                               |          |  | $V_{CC}=4.5V$              | -    | 10   | 17   | ns |
|                               |          |  | $V_{CC}=5.0V$ ; $C_L=15pF$ | -    | 8    | -    | ns |
|                               |          |  | $V_{CC}=6.0V$              | -    | 8    | 14   | ns |
| transition time               | $t_t$    | nY; see Figure 5                                   | $V_{CC}=2.0V$              | -    | 19   | 75   | ns |
|                               |          |  | $V_{CC}=4.5V$              | -    | 7    | 15   | ns |
|                               |          |  | $V_{CC}=6.0V$              | -    | 6    | 13   | ns |
| power dissipation capacitance | $C_{PD}$ | $f=1MHz$ ; $C_L=50pF$ ; $V_I=GND$ to $V_{CC}$      | -                          | 14   | -    | pF   |    |
| <b>AiP74HCT4049</b>           |          |  |                            |      |      |      |    |
| nA to nY propagation delay    | $t_{pd}$ | see Figure 5                                       | $V_{CC}=4.5V$              | -    | 10   | 19   | ns |
|                               |          |  | $V_{CC}=5.0V$ ; $C_L=15pF$ | -    | 8    | -    | ns |
| transition time               | $t_t$    | nY; $V_{CC}=4.5V$ ; see Figure 5                   | -                          | 7    | 15   | ns   |    |
| power dissipation capacitance | $C_{PD}$ | $f=1MHz$ ; $C_L=50pF$ ; $V_I=GND$ to $V_{CC}-1.5V$ | -                          | 14   | -    | pF   |    |

Note:

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

[2]  $t_t$  is the same as  $t_{THL}$  and  $t_{TLH}$ .

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

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

$f_i$ =input frequency in MHz;  $f_o$ =output frequency in MHz;

$C_L$ =output load capacitance in pF;

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

$N$ =number of inputs switching;

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



### 3.3.5、 AC Characteristics 2

( $T_{amb}=-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ,  $\text{GND}=0\text{V}$ ,  $C_L=50\text{pF}$ , unless otherwise specified.)

| Parameter                  | Symbol   | Conditions                              | Min.                 | Typ. | Max. | Unit |    |
|----------------------------|----------|---|----------------------|------|------|------|----|
| <b>AiP74HC4049</b>         |          |   |                      |      |      |      |    |
| nA to nY propagation delay | $t_{pd}$ | see Figure 5                            | $V_{CC}=2.0\text{V}$ | -    | -    | 105  | ns |
|                            |          |   | $V_{CC}=4.5\text{V}$ | -    | -    | 21   | ns |
|                            |          |   | $V_{CC}=6.0\text{V}$ | -    | -    | 19   | ns |
| transition time            | $t_t$    | nY; see Figure 5                        | $V_{CC}=2.0\text{V}$ | -    | -    | 95   | ns |
|                            |          |   | $V_{CC}=4.5\text{V}$ | -    | -    | 19   | ns |
|                            |          |   | $V_{CC}=6.0\text{V}$ | -    | -    | 16   | ns |
| <b>AiP74HCT4049</b>        |          |   |                      |      |      |      |    |
| nA to nY propagation delay | $t_{pd}$ | see Figure 5                            | $V_{CC}=4.5\text{V}$ | -    | -    | 24   | ns |
| transition time            | $t_t$    | nY; $V_{CC}=4.5\text{V}$ ; see Figure 5 |                      | -    | -    | 19   | ns |

Note:

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

[2]  $t_t$  is the same as  $t_{THL}$  and  $t_{TLH}$ .

### 3.3.6、 AC Characteristics 3

( $T_{amb}=-40^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$ ,  $\text{GND}=0\text{V}$ ,  $C_L=50\text{pF}$ , unless otherwise specified.)

| Parameter                  | Symbol   | Conditions                              | Min.                 | Typ. | Max. | Unit |    |
|----------------------------|----------|---|----------------------|------|------|------|----|
| <b>AiP74HC4049</b>         |          |   |                      |      |      |      |    |
| nA to nY propagation delay | $t_{pd}$ | see Figure 5                            | $V_{CC}=2.0\text{V}$ | -    | -    | 130  | ns |
|                            |          |   | $V_{CC}=4.5\text{V}$ | -    | -    | 26   | ns |
|                            |          |   | $V_{CC}=6.0\text{V}$ | -    | -    | 22   | ns |
| transition time            | $t_t$    | nY; see Figure 5                        | $V_{CC}=2.0\text{V}$ | -    | -    | 110  | ns |
|                            |          |   | $V_{CC}=4.5\text{V}$ | -    | -    | 22   | ns |
|                            |          |   | $V_{CC}=6.0\text{V}$ | -    | -    | 19   | ns |
| <b>AiP74HCT4049</b>        |          |   |                      |      |      |      |    |
| nA to nY propagation delay | $t_{pd}$ | see Figure 5                            | $V_{CC}=4.5\text{V}$ | -    | -    | 29   | ns |
| transition time            | $t_t$    | nY; $V_{CC}=4.5\text{V}$ ; see Figure 5 |                      | -    | -    | 22   | ns |

Note:

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

[2]  $t_t$  is the same as  $t_{THL}$  and  $t_{TLH}$ .



## 4、 Testing Circuit

### 4.1、 AC Testing Circuit

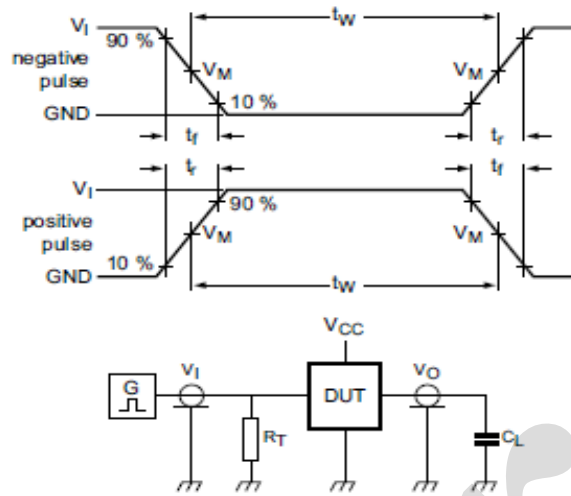


Figure 4. Test circuit for measuring switching times

Definitions for test circuit:

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

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

### 4.2、 AC Testing Waveforms

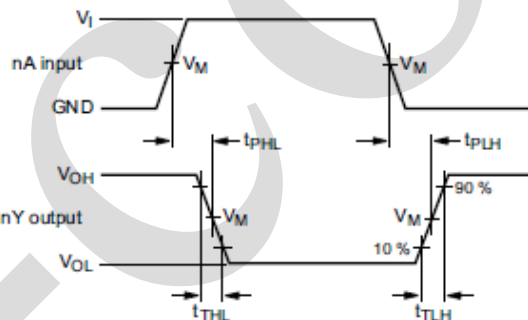


Figure 5. The input (nA) to output (nY) propagation delays

### 4.3、 Measurement Points

| Type         | Input               | Output              |
|--------------|---------------------|---------------------|
|              | $V_M$               | $V_M$               |
| AiP74HC4049  | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ |
| AiP74HCT4049 | 1.3V                | 1.3V                |

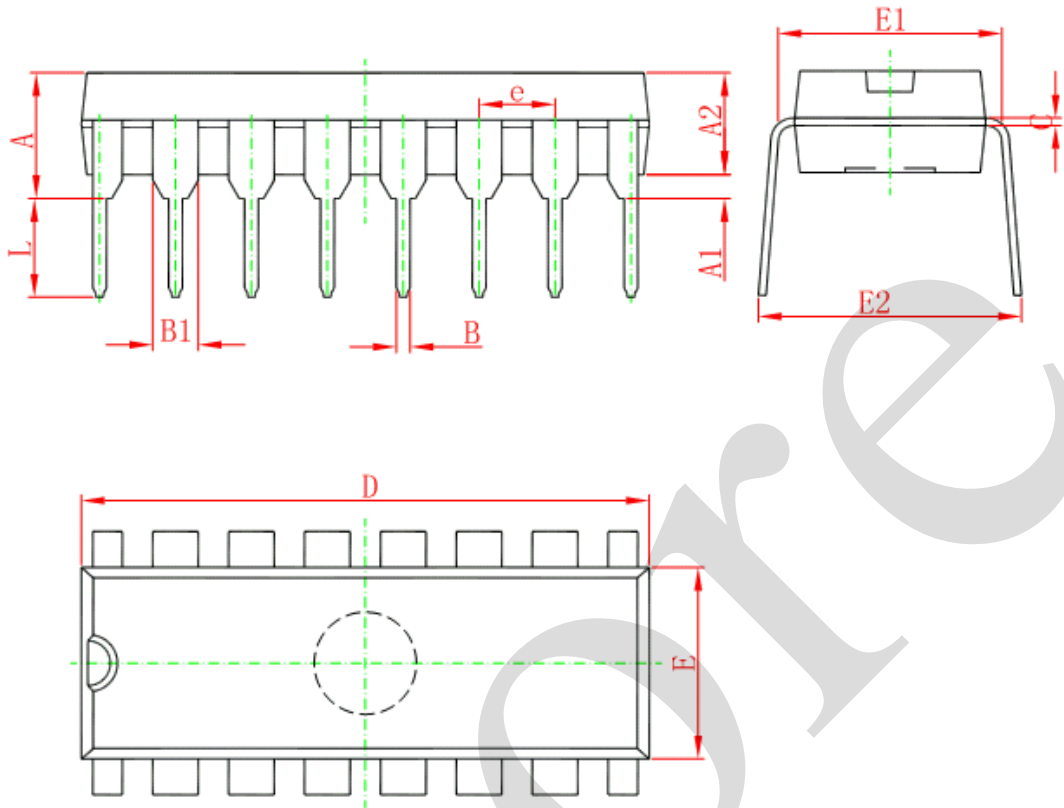
### 4.4、 Test Data

| Type         | Input    |            | Load       | Test               |
|--------------|----------|------------|------------|--------------------|
|              | $V_I$    | $t_r, t_f$ | $C_L$      |                    |
| AiP74HC4049  | $V_{CC}$ | 6ns        | 15pF, 50pF | $t_{PHL}, t_{PLH}$ |
| AiP74HCT4049 | 3V       | 6ns        | 15pF, 50pF | $t_{PHL}, t_{PLH}$ |



## 5、Package Information

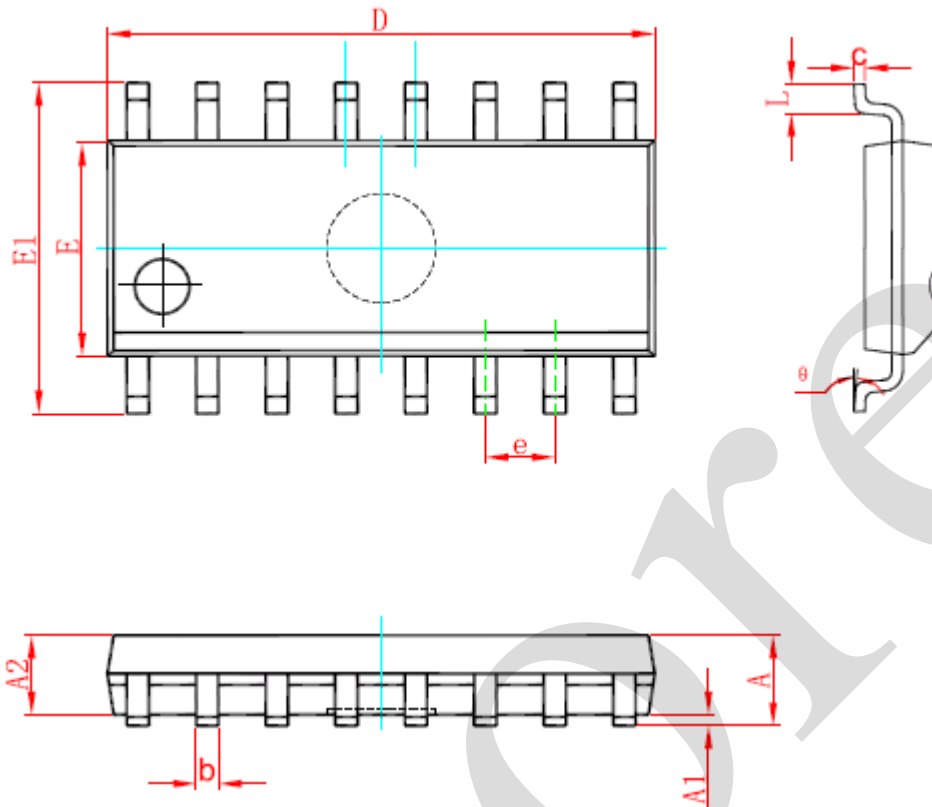
### 5.1、DIP16



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min                       | Max    | Min                  | Max   |
| A      | 3.710                     | 4.310  | 0.146                | 0.170 |
| A1     | 0.510                     |        | 0.020                |       |
| A2     | 3.200                     | 3.600  | 0.126                | 0.142 |
| B      | 0.380                     | 0.570  | 0.015                | 0.022 |
| B1     | 1.524 (BSC)               |        | 0.060 (BSC)          |       |
| C      | 0.204                     | 0.360  | 0.008                | 0.014 |
| D      | 18.800                    | 19.200 | 0.740                | 0.756 |
| E      | 6.200                     | 6.600  | 0.244                | 0.260 |
| E1     | 7.320                     | 7.920  | 0.288                | 0.312 |
| e      | 2.540 (BSC)               |        | 0.100 (BSC)          |       |
| L      | 3.000                     | 3.600  | 0.118                | 0.142 |
| E2     | 8.400                     | 9.000  | 0.331                | 0.354 |



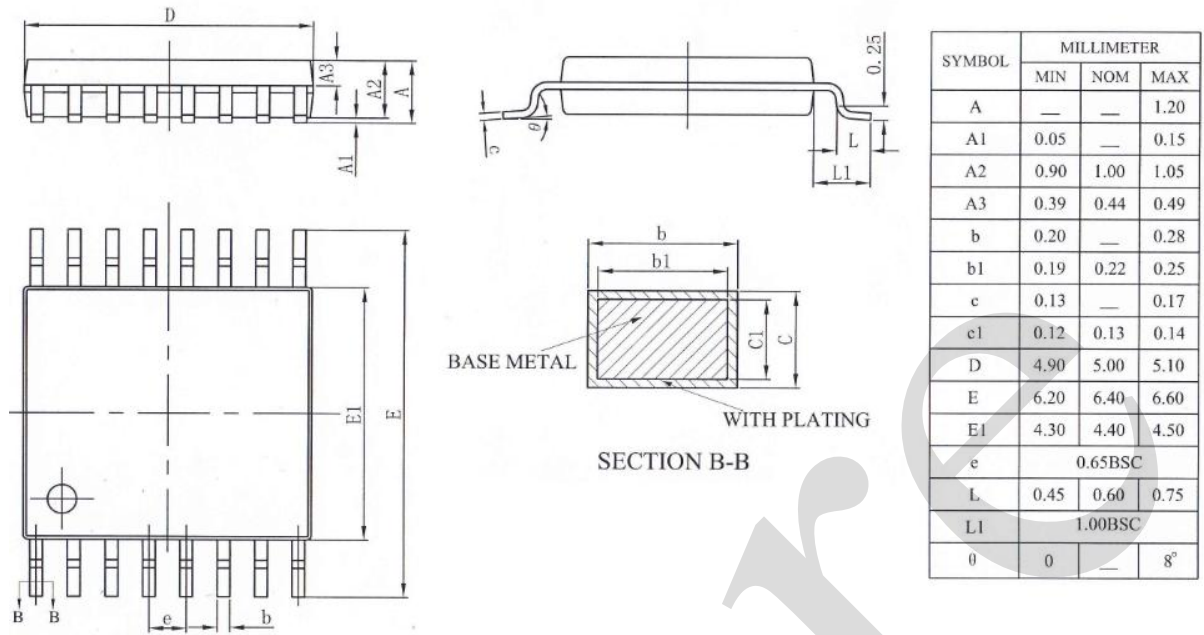
## 5.2、SOP16



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min                       | Max    | Min                  | Max   |
| A      | 1.350                     | 1.750  | 0.053                | 0.069 |
| A1     | 0.100                     | 0.250  | 0.004                | 0.010 |
| A2     | 1.350                     | 1.550  | 0.053                | 0.061 |
| b      | 0.330                     | 0.510  | 0.013                | 0.020 |
| c      | 0.170                     | 0.250  | 0.007                | 0.010 |
| D      | 9.800                     | 10.200 | 0.386                | 0.402 |
| E      | 3.800                     | 4.000  | 0.150                | 0.157 |
| E1     | 5.800                     | 6.200  | 0.228                | 0.244 |
| e      | 1.270 (BSC)               |        | 0.050 (BSC)          |       |
| L      | 0.400                     | 1.270  | 0.016                | 0.050 |
| θ      | 0°                        | 8°     | 0°                   | 8°    |



## 5.3、TSSOP16





## 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、 Notion

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

The information in this document are subject to change without notice;

This information is using to the reference only, the company is not responsible for any loss;

The company is not responsible for the any infringement of the third party patents or other rights of the responsibility.