



# **AiP74HC/HCT4851**

## **8-Channel Analog**

### **Multiplexer/Demultiplexer with**

### **Injection-Current Effect Control**

## **Product Specification**

#### **Specification Revision History:**

| <b>Version</b> | <b>Date</b> | <b>Description</b> |
|----------------|-------------|--------------------|
| 2025-11-A0     | 2025-11     | New                |
| 2026-04-A1     | 2026-04     | Modify parameters  |
|                |             |                    |
|                |             |                    |



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## 1、General Description

The AiP74HC/HCT4851 is 8-channel analog multiplexers/demultiplexers with three digital select inputs (S0 to S2), an active-LOW enable input ( $\bar{E}$ ), eight independent inputs/outputs (Y0 to Y7) and a common input/output (Z). The devices feature injection-current effect control, which has excellent value in automotive applications where voltages in excess of the supply voltage are common.

### Features:

- Wide supply voltage range  
AiP74HC4851: from 2.0V to 6.0V  
AiP74HCT4851: from 4.5V to 5.5V
- Low ON resistance:
  - 400  $\Omega$  (typical) at  $V_{CC} = 2.0V$
  - 215  $\Omega$  (typical) at  $V_{CC} = 3.0 V$
  - 120  $\Omega$  (typical) at  $V_{CC} = 3.3 V$
  - 76  $\Omega$  (typical) at  $V_{CC} = 4.5 V$
  - 59  $\Omega$  (typical) at  $V_{CC} = 6.0 V$
- Specified from -40°C to +125°C
- Packaging information: SOP16/SSOP16/TSSOP16/DHVQFN16



## Ordering Information:

### Reel packing specifications:

| Part number         | Packaging form | Marking code | Reel quantity    | Boxed reel quantity | Notes                                                                      | Moisture sensitivity level |
|---------------------|----------------|--------------|------------------|---------------------|----------------------------------------------------------------------------|----------------------------|
| AiP74HC4851SA16.TR  | SOP16          | 74HC4851     | 4000<br>PCS/reel | 8000<br>PCS/box     | Dimensions of plastic enclosure:<br>10.0mm×3.9mm<br>Pin spacing:<br>1.27mm | MSL3                       |
| AiP74HCT4851SA16.TR | SOP16          | 74HCT4851    | 4000<br>PCS/reel | 8000<br>PCS/box     | Dimensions of plastic enclosure:<br>10.0mm×3.9mm<br>Pin spacing:<br>1.27mm | MSL3                       |
| AiP74HC4851VB16.TR  | SSOP16         | 74HC4851     | 4000<br>PCS/reel | 8000<br>PCS/box     | Dimensions of plastic enclosure:<br>4.9mm×3.9mm<br>Pin spacing:<br>0.635mm | MSL3                       |
| AiP74HCT4851VB16.TR | SSOP16         | 74HCT4851    | 4000<br>PCS/reel | 8000<br>PCS/box     | Dimensions of plastic enclosure:<br>4.9mm×3.9mm<br>Pin spacing:<br>0.635mm | MSL3                       |
| AiP74HC4851TA16.TR  | TSSOP16        | 74HC4851     | 5000<br>PCS/reel | 10000<br>PCS/box    | Dimensions of plastic enclosure:<br>5.0mm×4.4mm<br>Pin spacing:<br>0.65mm  | MSL3                       |
| AiP74HCT4851TA16.TR | TSSOP16        | 74HCT4851    | 5000<br>PCS/reel | 10000<br>PCS/box    | Dimensions of plastic enclosure:<br>5.0mm×4.4mm<br>Pin spacing:<br>0.65mm  | MSL3                       |
| AiP74HC4851QE16.TR  | DHVQFN16       | 74HC4851     | 3000<br>PCS/reel | 3000<br>PCS/box     | Dimensions of plastic enclosure:<br>3.5mm×2.5mm<br>Pin spacing:<br>0.5mm   | MSL3                       |
| AiP74HCT4851QE16.TR | DHVQFN16       | 74HCT4851    | 3000<br>PCS/reel | 3000<br>PCS/box     | Dimensions of plastic enclosure:<br>3.5mm×2.5mm<br>Pin spacing:<br>0.5mm   | MSL3                       |

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

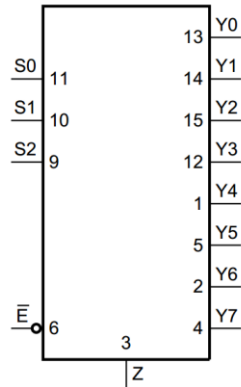


Figure 1. Logic symbol

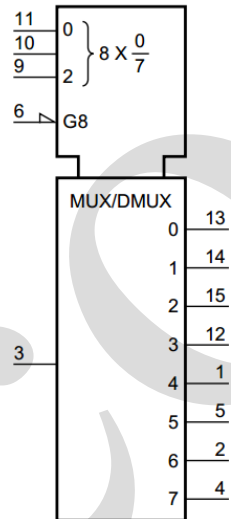


Figure 2. IEC logic symbol

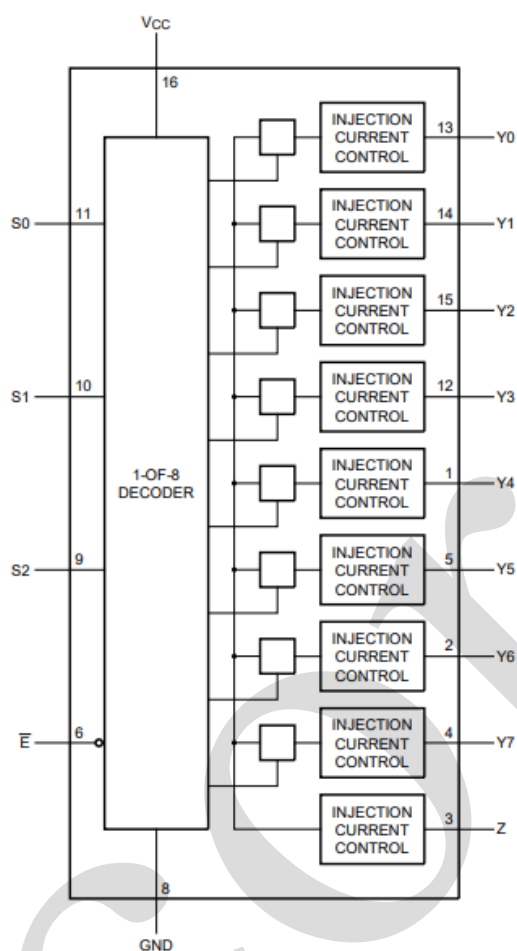
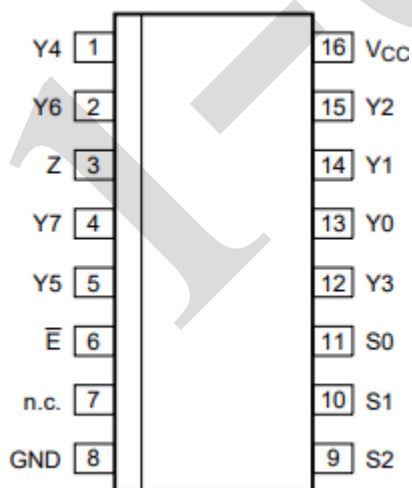
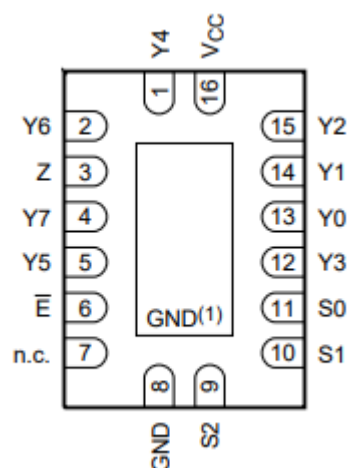


Figure 3. Functional diagram

## 2.2、Pin Configurations



SOP16/SSOP16/TSSOP16



DHVQFN16

Note: (1) If it is soldered, the solder land should remain floating or be connected to GND.



## 2.3、Pin Description

| Pin No. | Pin Name        | Description                 |
|---------|-----------------|-----------------------------|
| 1       | Y4              | independent input or output |
| 2       | Y6              | independent input or output |
| 3       | Z               | common output or input      |
| 4       | Y7              | independent input or output |
| 5       | Y5              | independent input or output |
| 6       | $\bar{E}$       | enable input (active LOW)   |
| 7       | n.c.            | not connect                 |
| 8       | GND             | ground (0V)                 |
| 9       | S2              | select input                |
| 10      | S1              | select input                |
| 11      | S0              | select input                |
| 12      | Y3              | independent input or output |
| 13      | Y0              | independent input or output |
| 14      | Y1              | independent input or output |
| 15      | Y2              | independent input or output |
| 16      | V <sub>CC</sub> | supply voltage              |

## 2.4、Function Table

| Inputs    |    |    |    | Channel ON   |
|-----------|----|----|----|--------------|
| $\bar{E}$ | S2 | S1 | S0 |              |
| L         | L  | L  | L  | Y0 to Z      |
| L         | L  | L  | H  | Y1 to Z      |
| L         | L  | H  | L  | Y2 to Z      |
| L         | L  | H  | H  | Y3 to Z      |
| L         | H  | L  | L  | Y4 to Z      |
| L         | H  | L  | H  | Y5 to Z      |
| L         | H  | H  | L  | Y6 to Z      |
| L         | H  | H  | H  | Y7 to Z      |
| H         | X  | X  | X  | switches off |

Note: H=HIGH voltage level; L=LOW voltage level; X=don't care.



## 3、Electrical Parameter

### 3.1、Absolute Maximum Ratings

(Voltages are referenced to GND, unless otherwise specified.)

| Parameter               | Symbol    | Conditions                           | Min.                  | Max.     | Unit        |
|-------------------------|-----------|--------------------------------------|-----------------------|----------|-------------|
| supply voltage          | $V_{CC}$  | -                                    | -0.5                  | +7       | V           |
| supply current          | $I_{CC}$  | -                                    | -                     | 50       | mA          |
| ground current          | $I_{GND}$ | -                                    | -50                   | -        | mA          |
| 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          |
| storage temperature     | $T_{stg}$ | -                                    | -65                   | +150     | $^{\circ}C$ |
| soldering temperature   | $T_L$     | 10s                                  | DIP                   |          | 245         |
|                         |           |                                      | SOP/SSOP/TSSOP/DHVQFN |          | 260         |
| electrostatic discharge | ESD       | HBM                                  | 3000                  |          | V           |
|                         |           | CDM                                  | 1000                  |          | V           |

### 3.2、Recommended Operating Conditions

| Parameter                           | Symbol           | Conditions              | Min. | Typ. | Max.            | Unit |
|-------------------------------------|------------------|-------------------------|------|------|-----------------|------|
| AiP74HC4851                         |                  |                         |      |      |                 |      |
| supply voltage                      | V <sub>CC</sub>  | -                       | 2.0  | -    | 6.0             | V    |
| input voltage                       | V <sub>I</sub>   | -                       | 0    | -    | V <sub>CC</sub> | V    |
| switch voltage                      | V <sub>SW</sub>  | -                       | 0    | -    | V <sub>CC</sub> | V    |
| ambient temperature                 | T <sub>amb</sub> | -                       | -40  | -    | +125            | °C   |
| input transition rise and fall rate | Δt/ΔV            | V <sub>CC</sub> = 2.0 V | -    | 6.0  | 1000            | ns/V |
|                                     |                  | V <sub>CC</sub> = 3.0 V | -    | 6.0  | 800             | ns/V |
|                                     |                  | V <sub>CC</sub> = 3.3 V | -    | 6.0  | 800             | ns/V |
|                                     |                  | V <sub>CC</sub> = 4.5 V | -    | 6.0  | 500             | ns/V |
|                                     |                  | V <sub>CC</sub> = 6.0 V | -    | 6.0  | 400             | ns/V |
| AiP74HCT4851                        |                  |                         |      |      |                 |      |
| supply voltage                      | V <sub>CC</sub>  | -                       | 4.5  | 5.0  | 5.5             | V    |
| input voltage                       | V <sub>I</sub>   | -                       | 0    | -    | V <sub>CC</sub> | V    |
| switch voltage                      | V <sub>SW</sub>  | -                       | 0    | -    | V <sub>CC</sub> | V    |
| ambient temperature                 | T <sub>amb</sub> | -                       | -40  | -    | +125            | °C   |
| input transition rise and fall rate | Δt/ΔV            | V <sub>CC</sub> = 4.5 V | -    | 6.0  | 500             | ns/V |



## 3.3、Electrical Characteristics

### 3.3.1、DC Characteristics 1

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

| Parameter                               | Symbol          | Conditions                                                                                                                           | Min.                     | Typ. | Max.    | Unit                  |
|-----------------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------|---------|-----------------------|
| <b>AiP74HC4851</b>                      |                 |                                                                                                                                      |                          |      |         |                       |
| ON resistance (peak)                    | $R_{ON(peak)}$  | $V_I = V_{CC} \text{ to GND};$<br>$\bar{E} = V_{IL};$<br>$I_{SW} \leq 2 \text{ mA};$<br>See Figure 4                                 | $V_{CC} = 2.0 \text{ V}$ | -    | 500     | 650 $\Omega$          |
|                                         |                 |                                                                                                                                      | $V_{CC} = 3.0 \text{ V}$ | -    | 215     | 330 $\Omega$          |
|                                         |                 |                                                                                                                                      | $V_{CC} = 3.3 \text{ V}$ | -    | 170     | 270 $\Omega$          |
|                                         |                 |                                                                                                                                      | $V_{CC} = 4.5 \text{ V}$ | -    | 76      | 210 $\Omega$          |
|                                         |                 |                                                                                                                                      | $V_{CC} = 6.0 \text{ V}$ | -    | 59      | 195 $\Omega$          |
| ON resistance mismatch between channels | $\Delta R_{ON}$ | $V_I = 0.5 \cdot V_{CC};$<br>$\bar{E} = V_{IL};$<br>$I_{SW} \leq 2 \text{ mA}$                                                       | $V_{CC} = 2.0 \text{ V}$ | -    | 4       | 10 $\Omega$           |
|                                         |                 |                                                                                                                                      | $V_{CC} = 3.0 \text{ V}$ | -    | 2       | 8 $\Omega$            |
|                                         |                 |                                                                                                                                      | $V_{CC} = 3.3 \text{ V}$ | -    | 2       | 8 $\Omega$            |
|                                         |                 |                                                                                                                                      | $V_{CC} = 4.5 \text{ V}$ | -    | 2       | 8 $\Omega$            |
|                                         |                 |                                                                                                                                      | $V_{CC} = 6.0 \text{ V}$ | -    | 3       | 9 $\Omega$            |
| Output voltage variation                | $\Delta V_O$    | $ I_{SW}  \leq 1 \text{ mA};$<br>$R_S \leq 3.9 \text{ k}\Omega;$<br>See Figure 5                                                     | $V_{CC} = 3.3 \text{ V}$ | -    | 0.05    | 1 mV                  |
|                                         |                 |                                                                                                                                      | $V_{CC} = 5.0 \text{ V}$ | -    | 0.03    | 1 mV                  |
|                                         |                 | $ I_{SW}  \leq 10 \text{ mA};$<br>$R_S \leq 3.9 \text{ k}\Omega;$<br>See Figure 5                                                    | $V_{CC} = 3.3 \text{ V}$ | -    | 0.55    | 5 mV                  |
|                                         |                 |                                                                                                                                      | $V_{CC} = 5.0 \text{ V}$ | -    | 0.27    | 5 mV                  |
|                                         |                 | $ I_{SW}  \leq 1 \text{ mA};$<br>$R_S \leq 20 \text{ k}\Omega;$<br>See Figure 5                                                      | $V_{CC} = 3.3 \text{ V}$ | -    | 0.04    | 2 mV                  |
|                                         |                 |                                                                                                                                      | $V_{CC} = 5.0 \text{ V}$ | -    | 0.03    | 2 mV                  |
|                                         |                 | $ I_{SW}  \leq 10 \text{ mA};$<br>$R_S \leq 20 \text{ k}\Omega;$<br>See Figure 5                                                     | $V_{CC} = 3.3 \text{ V}$ | -    | 0.56    | 20 mV                 |
|                                         |                 |                                                                                                                                      | $V_{CC} = 5.0 \text{ V}$ | -    | 0.48    | 20 mV                 |
| HIGH-level input voltage                | $V_{IH}$        | $V_{CC} = 2.0 \text{ V}$                                                                                                             | 1.5                      | -    | -       | V                     |
|                                         |                 | $V_{CC} = 3.0 \text{ V}$                                                                                                             | 2.1                      | -    | -       | V                     |
|                                         |                 | $V_{CC} = 3.3 \text{ V}$                                                                                                             | 2.3                      | -    | -       | 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                     |
|                                         |                 | $V_{CC} = 3.0 \text{ V}$                                                                                                             | -                        | -    | 0.9     | V                     |
|                                         |                 | $V_{CC} = 3.3 \text{ V}$                                                                                                             | -                        | -    | 1.0     | V                     |
|                                         |                 | $V_{CC} = 4.5 \text{ V}$                                                                                                             | -                        | -    | 1.35    | V                     |
|                                         |                 | $V_{CC} = 6.0 \text{ V}$                                                                                                             | -                        | -    | 1.8     | V                     |
| input leakage current                   | $I_I$           | Control inputs,<br>$V_I = V_{CC} \text{ or GND}$                                                                                     | $V_{CC} = 6.0 \text{ V}$ | -    | -       | $\pm 1$ $\mu\text{A}$ |
| OFF-state leakage current               | $I_{S(OFF)}$    | $\bar{E} = V_{IH};$<br>$V_I = \text{GND or } V_{CC};$<br>$V_O = V_{CC} \text{ or GND};$<br>$V_{CC} = 6.0 \text{ V};$<br>see Figure 6 | per channel              | -    | -       | $\pm 1$ $\mu\text{A}$ |
|                                         |                 |                                                                                                                                      | all channels             | -    | -       | $\pm 2$ $\mu\text{A}$ |
| ON-state leakage current                | $I_{S(ON)}$     | $\bar{E} = V_{IL};$<br>$V_I = \text{GND or } V_{CC};$<br>$V_O = V_{CC} \text{ or GND}; V_{CC} = 6 \text{ V}$<br>see Figure 7         | -                        | -    | $\pm 1$ | $\mu\text{A}$         |



|                                         |                       |                                                                                                                                                          |                         |     |      |     |    |
|-----------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----|------|-----|----|
| supply current                          | I <sub>CC</sub>       | V <sub>I</sub> = V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 6.0 V                                                                                      |                         | -   | -    | 2   | uA |
| input capacitance                       | C <sub>I</sub>        | -                                                                                                                                                        |                         | -   | 2    | 10  | pF |
| switch capacitance                      | C <sub>SW</sub>       | Z; OFF-state                                                                                                                                             |                         | -   | 15   | 40  | pF |
|                                         |                       | Y <sub>n</sub> ; OFF-state                                                                                                                               |                         | -   | 3    | 15  | pF |
| AiP74HCT4851                            |                       |                                                                                                                                                          |                         |     |      |     |    |
| ON resistance (peak)                    | R <sub>ON(peak)</sub> | V <sub>I</sub> = V <sub>CC</sub> to GND, $\bar{E} = V_{IL}$<br>I <sub>SW</sub> ≤ 2 mA, V <sub>CC</sub> = 4.5 V<br>see Figure 4                           |                         | -   | 76   | 210 | Ω  |
| ON resistance mismatch between channels | ΔR <sub>ON</sub>      | V <sub>I</sub> = 0.5*V <sub>CC</sub> , $\bar{E} = V_{IL}$<br>I <sub>SW</sub> ≤ 2 mA, V <sub>CC</sub> = 4.5 V                                             |                         | -   | 2    | 8   | Ω  |
| Output voltage variation                | ΔV <sub>O</sub>       | I <sub>SW</sub>   ≤ 1 mA;<br>R <sub>S</sub> ≤ 3.9kΩ<br>see Figure 5                                                                                      | V <sub>CC</sub> = 5.0 V | -   | 0.03 | 1   | mV |
|                                         |                       | I <sub>SW</sub>   ≤ 10 mA;<br>R <sub>S</sub> ≤ 3.9kΩ<br>see Figure 5                                                                                     | V <sub>CC</sub> = 5.0 V | -   | 0.27 | 5   | mV |
|                                         |                       | I <sub>SW</sub>   ≤ 1 mA;<br>R <sub>S</sub> ≤ 20kΩ<br>see Figure 5                                                                                       | V <sub>CC</sub> = 5.0 V | -   | 0.03 | 2   | mV |
|                                         |                       | I <sub>SW</sub>   ≤ 10 mA;<br>R <sub>S</sub> ≤ 20kΩ<br>see Figure 5                                                                                      | V <sub>CC</sub> = 5.0 V | -   | 0.48 | 20  | mV |
| HIGH-level input voltage                | V <sub>IH</sub>       | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                                                                         |                         | 2.0 | -    | -   | V  |
| LOW-level input voltage                 | V <sub>IL</sub>       | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                                                                         |                         | -   | -    | 0.8 | V  |
| input leakage current                   | I <sub>I</sub>        | Control inputs; V <sub>I</sub> = V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 5.5 V                                                                      |                         | -   | -    | ±1  | uA |
| OFF-state leakage current               | I <sub>S(OFF)</sub>   | $\bar{E} = V_{IH}$ ;<br>V <sub>I</sub> = GND or V <sub>CC</sub> ;<br>V <sub>O</sub> = V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 5.5 V<br>see Figure 6 | per channel             | -   | -    | ±1  | uA |
|                                         |                       |                                                                                                                                                          | all channels            | -   | -    | ±2  | uA |
| ON-state leakage current                | I <sub>S(ON)</sub>    | $\bar{E} = V_{IL}$ ;<br>V <sub>I</sub> = GND or V <sub>CC</sub> ;<br>V <sub>O</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V<br>see Figure 7    |                         | -   | -    | ±1  | uA |
| supply current                          | I <sub>CC</sub>       | V <sub>I</sub> = V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 5.5V                                                                                       |                         | -   | -    | 2   | uA |
| additional supply current               | ΔI <sub>CC</sub>      | per input; V <sub>I</sub> = V <sub>CC</sub> -2.1V;<br>other inputs at V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 4.5 V to 5.5 V                        |                         | -   | -    | 300 | uA |
| input capacitance                       | C <sub>I</sub>        | -                                                                                                                                                        |                         | -   | 2    | 10  | pF |
| switch capacitance                      | C <sub>SW</sub>       | Z; OFF-state                                                                                                                                             |                         | -   | 15   | 40  | pF |
|                                         |                       | Y <sub>n</sub> ;OFF-state                                                                                                                                |                         | -   | 3    | 15  | pF |



## 3.3.2、DC Characteristics 2

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

| Parameter                               | Symbol                | Conditions                                                                                                                                                              | Min.                    | Typ. | Max. | Unit |    |
|-----------------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------|------|------|----|
| AiP74HC4851                             |                       |                                                                                                                                                                         |                         |      |      |      |    |
| ON resistance (peak)                    | R <sub>ON(peak)</sub> | V <sub>I</sub> = V <sub>CC</sub> to GND;<br>E <sub>−</sub> = V <sub>IL</sub> ;<br>I <sub>SW</sub> ≤ 2 mA;<br>see Figure 4                                               | V <sub>CC</sub> = 2.0 V | -    | -    | 800  | Ω  |
|                                         |                       |                                                                                                                                                                         | V <sub>CC</sub> = 3.0 V | -    | -    | 360  | Ω  |
|                                         |                       |                                                                                                                                                                         | V <sub>CC</sub> = 3.3 V | -    | -    | 305  | Ω  |
|                                         |                       |                                                                                                                                                                         | V <sub>CC</sub> = 4.5 V | -    | -    | 240  | Ω  |
|                                         |                       |                                                                                                                                                                         | V <sub>CC</sub> = 6.0 V | -    | -    | 220  | Ω  |
| ON resistance mismatch between channels | ΔR <sub>ON</sub>      | V <sub>I</sub> = 0.5*V <sub>CC</sub> ;<br>E <sub>−</sub> = V <sub>IL</sub> ;<br>I <sub>SW</sub> ≤ 2 mA                                                                  | V <sub>CC</sub> = 2.0 V | -    | -    | 15   | Ω  |
|                                         |                       |                                                                                                                                                                         | V <sub>CC</sub> = 3.0 V | -    | -    | 12   | Ω  |
|                                         |                       |                                                                                                                                                                         | V <sub>CC</sub> = 3.3 V | -    | -    | 12   | Ω  |
|                                         |                       |                                                                                                                                                                         | V <sub>CC</sub> = 4.5 V | -    | -    | 12   | Ω  |
|                                         |                       |                                                                                                                                                                         | V <sub>CC</sub> = 6.0 V | -    | -    | 13   | Ω  |
| Output voltage variation                | ΔV <sub>O</sub>       | I <sub>SW</sub>   ≤ 1 mA;<br>R <sub>S</sub> ≤ 3.9kΩ;<br>see Figure 5                                                                                                    | V <sub>CC</sub> = 3.3 V | -    | -    | 1    | mV |
|                                         |                       |                                                                                                                                                                         | V <sub>CC</sub> = 5.0 V | -    | -    | 1    | mV |
|                                         |                       | I <sub>SW</sub>   ≤ 10 mA;<br>R <sub>S</sub> ≤ 3.9kΩ;<br>see Figure 5                                                                                                   | V <sub>CC</sub> = 3.3 V | -    | -    | 5    | mV |
|                                         |                       |                                                                                                                                                                         | V <sub>CC</sub> = 5.0 V | -    | -    | 5    | mV |
|                                         |                       | I <sub>SW</sub>   ≤ 1 mA;<br>R <sub>S</sub> ≤ 20kΩ;<br>see Figure 5                                                                                                     | V <sub>CC</sub> = 3.3 V | -    | -    | 2    | mV |
|                                         |                       |                                                                                                                                                                         | V <sub>CC</sub> = 5.0 V | -    | -    | 2    | mV |
|                                         |                       | I <sub>SW</sub>   ≤ 10 mA;<br>R <sub>S</sub> ≤ 20kΩ;<br>see Figure 5                                                                                                    | V <sub>CC</sub> = 3.3 V | -    | -    | 20   | mV |
|                                         |                       |                                                                                                                                                                         | V <sub>CC</sub> = 5.0 V | -    | -    | 20   | mV |
| HIGH-level input voltage                | V <sub>IH</sub>       | V <sub>CC</sub> = 2.0 V                                                                                                                                                 |                         | 1.5  | -    | -    | V  |
|                                         |                       | V <sub>CC</sub> = 3.0 V                                                                                                                                                 |                         | 2.1  | -    | -    | V  |
|                                         |                       | V <sub>CC</sub> = 3.3 V                                                                                                                                                 |                         | 2.3  | -    | -    | V  |
|                                         |                       | V <sub>CC</sub> = 4.5 V                                                                                                                                                 |                         | 3.15 | -    | -    | V  |
|                                         |                       | V <sub>CC</sub> = 6.0 V                                                                                                                                                 |                         | 4.2  | -    | -    | V  |
| LOW-level input voltage                 | V <sub>IL</sub>       | V <sub>CC</sub> = 2.0 V                                                                                                                                                 |                         | -    | -    | 0.5  | V  |
|                                         |                       | V <sub>CC</sub> = 3.0 V                                                                                                                                                 |                         | -    | -    | 0.9  | V  |
|                                         |                       | V <sub>CC</sub> = 3.3 V                                                                                                                                                 |                         | -    | -    | 1.0  | V  |
|                                         |                       | V <sub>CC</sub> = 4.5 V                                                                                                                                                 |                         | -    | -    | 1.35 | V  |
|                                         |                       | V <sub>CC</sub> = 6.0 V                                                                                                                                                 |                         | -    | -    | 1.8  | V  |
| input leakage current                   | I <sub>I</sub>        | Control inputs ,<br>V <sub>I</sub> = V <sub>CC</sub> or GND<br>V <sub>CC</sub> = 6.0 V                                                                                  |                         | -    | -    | ±1   | uA |
| OFF-state leakage current               | I <sub>S(OFF)</sub>   | E <sub>−</sub> = V <sub>IH</sub> ;<br>V <sub>I</sub> = GND or V <sub>CC</sub> ;<br>V <sub>O</sub> = V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 6.0 V;<br>see Figure 6 | per channel             | -    | -    | ±1   | uA |
|                                         |                       |                                                                                                                                                                         | all channels            | -    | -    | ±2   | uA |
| ON-state leakage current                | I <sub>S(ON)</sub>    | E <sub>−</sub> = V <sub>IL</sub> ;<br>V <sub>I</sub> = GND or V <sub>CC</sub> ;<br>V <sub>O</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 6 V                       |                         | -    | -    | ±1   | uA |



|                                         |                       |                                                                                                                                                          |                         |     |   |     |    |
|-----------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----|---|-----|----|
|                                         |                       | see Figure 7                                                                                                                                             |                         |     |   |     |    |
| supply current                          | I <sub>CC</sub>       | V <sub>I</sub> = V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 6.0 V                                                                                      |                         | -   | - | 5   | uA |
| input capacitance                       | C <sub>I</sub>        | -                                                                                                                                                        |                         | -   | - | 10  | pF |
| switch capacitance                      | C <sub>SW</sub>       | Z; OFF-state                                                                                                                                             |                         | -   | - | 40  | pF |
|                                         |                       | Y <sub>n</sub> ; OFF-state                                                                                                                               |                         | -   | - | 15  | pF |
| AiP74HCT4851                            |                       |                                                                                                                                                          |                         |     |   |     |    |
| ON resistance (peak)                    | R <sub>ON(peak)</sub> | V <sub>I</sub> = V <sub>CC</sub> to GND, $\bar{E} = V_{IL}$<br>I <sub>SW</sub> ≤ 2 mA, V <sub>CC</sub> = 4.5 V<br>see Figure 4                           |                         | -   | - | 240 | Ω  |
| ON resistance mismatch between channels | ΔR <sub>ON</sub>      | V <sub>I</sub> = 0.5*V <sub>CC</sub> , $\bar{E} = V_{IL}$<br>I <sub>SW</sub> ≤ 2 mA , V <sub>CC</sub> = 4.5 V                                            |                         | -   | - | 12  | Ω  |
| Output voltage variation                | ΔV <sub>O</sub>       | I <sub>SW</sub>   ≤ 1 mA;<br>R <sub>S</sub> ≤ 3.9kΩ;<br>see Figure 5                                                                                     | V <sub>CC</sub> = 5.0 V | -   | - | 1   | mV |
|                                         |                       | I <sub>SW</sub>   ≤ 10 mA;<br>R <sub>S</sub> ≤ 3.9kΩ<br>see Figure 5                                                                                     | V <sub>CC</sub> = 5.0 V | -   | - | 5   | mV |
|                                         |                       | I <sub>SW</sub>   ≤ 1 mA;<br>R <sub>S</sub> ≤ 20kΩ<br>see Figure 5                                                                                       | V <sub>CC</sub> = 5.0 V | -   | - | 2   | mV |
|                                         |                       | I <sub>SW</sub>   ≤ 10 mA;<br>R <sub>S</sub> ≤ 20kΩ<br>see Figure 5                                                                                      | V <sub>CC</sub> = 5.0 V | -   | - | 20  | mV |
| HIGH-level input voltage                | V <sub>IH</sub>       | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                                                                         |                         | 2.0 | - | -   | V  |
| LOW-level input voltage                 | V <sub>IL</sub>       | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                                                                         |                         | -   | - | 0.8 | V  |
| input leakage current                   | I <sub>I</sub>        | Control inputs; V <sub>I</sub> = V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 5.5 V                                                                      |                         | -   | - | ±1  | uA |
| OFF-state leakage current               | I <sub>S(OFF)</sub>   | $\bar{E} = V_{IH}$ ;<br>V <sub>I</sub> = GND or V <sub>CC</sub> ;<br>V <sub>O</sub> = V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 5.5 V<br>see Figure 6 | per channel             | -   | - | ±1  | uA |
|                                         |                       |                                                                                                                                                          | all channels            | -   | - | ±2  | uA |
| ON-state leakage current                | I <sub>S(ON)</sub>    | $\bar{E} = V_{IL}$ ;<br>V <sub>I</sub> = GND or V <sub>CC</sub> ;<br>V <sub>O</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V<br>see Figure 7    |                         | -   | - | ±1  | uA |
| supply current                          | I <sub>CC</sub>       | V <sub>I</sub> = V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 5.5V                                                                                       |                         | -   | - | 5   | uA |
| additional supply current               | ΔI <sub>CC</sub>      | per input; V <sub>I</sub> = V <sub>CC</sub> -2.1V;<br>other inputs at V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 4.5 V to 5.5 V                        |                         | -   | - | 370 | uA |
| input capacitance                       | C <sub>I</sub>        | -                                                                                                                                                        |                         | -   | - | 10  | pF |
| switch capacitance                      | C <sub>SW</sub>       | Z; OFF-state                                                                                                                                             |                         | -   | - | 40  | pF |
|                                         |                       | Y <sub>n</sub> ; OFF-state                                                                                                                               |                         | -   | - | 15  | pF |



## 3.3.3、DC Characteristics 3

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

| Parameter                               | Symbol          | Conditions                                                                                                                      | Min.                     | Typ. | Max.    | Unit                  |
|-----------------------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------|--------------------------|------|---------|-----------------------|
| <b>AiP74HC4851</b>                      |                 |                                                                                                                                 |                          |      |         |                       |
| ON resistance (peak)                    | $R_{ON(peak)}$  | $V_I = V_{CC}$ to GND;<br>$\bar{E} = V_{IL}$ ;<br>$I_{SW} \leq 2 \text{ mA}$<br>see Figure 4                                    | $V_{CC} = 2.0 \text{ V}$ | -    | -       | 1000 $\Omega$         |
|                                         |                 |                                                                                                                                 | $V_{CC} = 3.0 \text{ V}$ | -    | -       | 380 $\Omega$          |
|                                         |                 |                                                                                                                                 | $V_{CC} = 3.3 \text{ V}$ | -    | -       | 345 $\Omega$          |
|                                         |                 |                                                                                                                                 | $V_{CC} = 4.5 \text{ V}$ | -    | -       | 270 $\Omega$          |
|                                         |                 |                                                                                                                                 | $V_{CC} = 6.0 \text{ V}$ | -    | -       | 250 $\Omega$          |
| ON resistance mismatch between channels | $\Delta R_{ON}$ | $V_I = 0.5 \cdot V_{CC}$<br>$\bar{E} = V_{IL}$ ;<br>$I_{SW} \leq 2 \text{ mA}$                                                  | $V_{CC} = 2.0 \text{ V}$ | -    | -       | 20 $\Omega$           |
|                                         |                 |                                                                                                                                 | $V_{CC} = 3.0 \text{ V}$ | -    | -       | 16 $\Omega$           |
|                                         |                 |                                                                                                                                 | $V_{CC} = 3.3 \text{ V}$ | -    | -       | 16 $\Omega$           |
|                                         |                 |                                                                                                                                 | $V_{CC} = 4.5 \text{ V}$ | -    | -       | 16 $\Omega$           |
|                                         |                 |                                                                                                                                 | $V_{CC} = 6.0 \text{ V}$ | -    | -       | 16 $\Omega$           |
| Output voltage variation                | $\Delta V_O$    | $ I_{SW}  \leq 1 \text{ mA}$ ;<br>$R_S \leq 3.9 \text{ k}\Omega$ ;<br>see Figure 5                                              | $V_{CC} = 3.3 \text{ V}$ | -    | -       | 1 mV                  |
|                                         |                 |                                                                                                                                 | $V_{CC} = 5.0 \text{ V}$ | -    | -       | 1 mV                  |
|                                         |                 | $ I_{SW}  \leq 10 \text{ mA}$ ;<br>$R_S \leq 3.9 \text{ k}\Omega$ ;<br>see Figure 5                                             | $V_{CC} = 3.3 \text{ V}$ | -    | -       | 5 mV                  |
|                                         |                 |                                                                                                                                 | $V_{CC} = 5.0 \text{ V}$ | -    | -       | 5 mV                  |
|                                         |                 | $ I_{SW}  \leq 1 \text{ mA}$ ;<br>$R_S \leq 20 \text{ k}\Omega$ ;<br>see Figure 5                                               | $V_{CC} = 3.3 \text{ V}$ | -    | -       | 2 mV                  |
|                                         |                 |                                                                                                                                 | $V_{CC} = 5.0 \text{ V}$ | -    | -       | 2 mV                  |
| HIGH-level input voltage                | $V_{IH}$        |                                                                                                                                 | $V_{CC} = 2.0 \text{ V}$ | 1.5  | -       | - V                   |
|                                         |                 |                                                                                                                                 | $V_{CC} = 3.0 \text{ V}$ | 2.1  | -       | - V                   |
|                                         |                 |                                                                                                                                 | $V_{CC} = 3.3 \text{ V}$ | 2.3  | -       | - 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                 |
|                                         |                 |                                                                                                                                 | $V_{CC} = 3.0 \text{ V}$ | -    | -       | 0.9 V                 |
|                                         |                 |                                                                                                                                 | $V_{CC} = 3.3 \text{ V}$ | -    | -       | 1.0 V                 |
|                                         |                 |                                                                                                                                 | $V_{CC} = 4.5 \text{ V}$ | -    | -       | 1.35 V                |
|                                         |                 |                                                                                                                                 | $V_{CC} = 6.0 \text{ V}$ | -    | -       | 1.8 V                 |
| input leakage current                   | $I_I$           | Control inputs ,<br>$V_I = V_{CC}$ or GND<br>$V_{CC} = 6.0 \text{ V}$                                                           | -                        | -    | $\pm 1$ | $\mu\text{A}$         |
| OFF-state leakage current               | $I_{S(OFF)}$    | $\bar{E} = V_{IH}$ ;<br>$V_I = \text{GND or } V_{CC}$ ;<br>$V_O = V_{CC}$ or GND;<br>$V_{CC} = 6.0 \text{ V}$ ;<br>see Figure 6 | per channel              | -    | -       | $\pm 1$ $\mu\text{A}$ |
|                                         |                 |                                                                                                                                 | all channels             | -    | -       | $\pm 4$ $\mu\text{A}$ |
| ON-state leakage current                | $I_{S(ON)}$     | $\bar{E} = V_{IL}$ ;<br>$V_I = \text{GND or } V_{CC}$ ;<br>$V_O = V_{CC}$ or GND; $V_{CC} = 6 \text{ V}$ ;<br>see Figure 7      | -                        | -    | $\pm 1$ | $\mu\text{A}$         |



|                                         |                       |                                                                                                                                                          |                         |     |   |     |    |
|-----------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----|---|-----|----|
| supply current                          | I <sub>CC</sub>       | V <sub>I</sub> = V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 6.0 V                                                                                      |                         | -   | - | 20  | uA |
| input capacitance                       | C <sub>I</sub>        | -                                                                                                                                                        |                         | -   | - | 10  | pF |
| switch capacitance                      | C <sub>SW</sub>       | Z; OFF-state                                                                                                                                             |                         | -   | - | 40  | pF |
|                                         |                       | Y <sub>n</sub> ; OFF-state                                                                                                                               |                         | -   | - | 15  | pF |
| AiP74HCT4851                            |                       |                                                                                                                                                          |                         |     |   |     |    |
| ON resistance (peak)                    | R <sub>ON(peak)</sub> | V <sub>I</sub> = V <sub>CC</sub> to GND, $\bar{E} = V_{IL}$<br>I <sub>SW</sub> ≤ 2 mA, V <sub>CC</sub> = 4.5 V<br>see Figure 4                           |                         | -   | - | 270 | Ω  |
| ON resistance mismatch between channels | ΔR <sub>ON</sub>      | V <sub>I</sub> = 0.5*V <sub>CC</sub> , $\bar{E} = V_{IL}$<br>I <sub>SW</sub> ≤ 2 mA, V <sub>CC</sub> = 4.5 V                                             |                         | -   | - | 16  | Ω  |
| Output voltage variation                | ΔV <sub>O</sub>       | I <sub>SW</sub>   ≤ 1 mA;<br>R <sub>S</sub> ≤ 3.9kΩ;<br>see Figure 5                                                                                     | V <sub>CC</sub> = 5.0 V | -   | - | 1   | mV |
|                                         |                       | I <sub>SW</sub>   ≤ 10mA;<br>R <sub>S</sub> ≤ 3.9kΩ;<br>see Figure 5                                                                                     | V <sub>CC</sub> = 5.0 V | -   | - | 5   | mV |
|                                         |                       | I <sub>SW</sub>   ≤ 1 mA;<br>R <sub>S</sub> ≤ 20kΩ;<br>see Figure 5                                                                                      | V <sub>CC</sub> = 5.0 V | -   | - | 2   | mV |
|                                         |                       | I <sub>SW</sub>   ≤ 10mA;<br>R <sub>S</sub> ≤ 20kΩ;<br>see Figure 5                                                                                      | V <sub>CC</sub> = 5.0 V | -   | - | 20  | mV |
| HIGH-level input voltage                | V <sub>IH</sub>       | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                                                                         |                         | 2.0 | - | -   | V  |
| LOW-level input voltage                 | V <sub>IL</sub>       | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                                                                         |                         | -   | - | 0.8 | V  |
| input leakage current                   | I <sub>I</sub>        | Control inputs; V <sub>I</sub> = V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 5.5 V                                                                      |                         | -   | - | ±1  | uA |
| OFF-state leakage current               | I <sub>S(OFF)</sub>   | $\bar{E} = V_{IH}$ ;<br>V <sub>I</sub> = GND or V <sub>CC</sub> ;<br>V <sub>O</sub> = V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 5.5 V<br>see Figure 6 | per channel             | -   | - | ±1  | uA |
|                                         |                       |                                                                                                                                                          | all channels            | -   | - | ±4  | uA |
| ON-state leakage current                | I <sub>S(ON)</sub>    | $\bar{E} = V_{IL}$ ;<br>V <sub>I</sub> = GND or V <sub>CC</sub> ;<br>V <sub>O</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V<br>see Figure 7    |                         | -   | - | ±1  | uA |
| supply current                          | I <sub>CC</sub>       | V <sub>I</sub> = V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 5.5V                                                                                       |                         | -   | - | 20  | uA |
| additional supply current               | ΔI <sub>CC</sub>      | per input; V <sub>I</sub> = V <sub>CC</sub> -2.1V;<br>other inputs at V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 4.5 V to 5.5 V                        |                         | -   | - | 370 | uA |
| input capacitance                       | C <sub>I</sub>        | -                                                                                                                                                        |                         | -   | - | 10  | pF |
| switch capacitance                      | C <sub>SW</sub>       | Z; OFF-state                                                                                                                                             |                         | -   | - | 40  | pF |
|                                         |                       | Y <sub>n</sub> ; OFF-state                                                                                                                               |                         | -   | - | 15  | pF |



## 3.3.4、AC Characteristics 1

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

| Parameter                     | Symbol           | Conditions                                                       |                         | Min. | Typ. | Max. | Unit |
|-------------------------------|------------------|------------------------------------------------------------------|-------------------------|------|------|------|------|
| AiP74HC4851                   |                  |                                                                  |                         |      |      |      |      |
| propagation delay             | t <sub>pd</sub>  | Z to Y <sub>n</sub> , Y <sub>n</sub> to Z<br>see Figure 8        | V <sub>CC</sub> = 2.0 V | -    | 10.0 | 25   | ns   |
|                               |                  |                                                                  | V <sub>CC</sub> = 3.0 V | -    | 6.0  | 15.5 | ns   |
|                               |                  |                                                                  | V <sub>CC</sub> = 3.3 V | -    | 5.0  | 14.5 | ns   |
|                               |                  |                                                                  | V <sub>CC</sub> = 4.5 V | -    | 4.0  | 11.5 | ns   |
|                               |                  |                                                                  | V <sub>CC</sub> = 6.0 V | -    | 3.0  | 10   | ns   |
|                               |                  | Sn to Z; Sn to Y <sub>n</sub><br>see Figure 8                    | V <sub>CC</sub> = 2.0 V | -    | 18.0 | 32   | ns   |
|                               |                  |                                                                  | V <sub>CC</sub> = 3.0 V | -    | 9.5  | 17.5 | ns   |
|                               |                  |                                                                  | V <sub>CC</sub> = 3.3 V | -    | 8.5  | 16.5 | ns   |
|                               |                  |                                                                  | V <sub>CC</sub> = 4.5 V | -    | 6.5  | 13   | ns   |
|                               |                  |                                                                  | V <sub>CC</sub> = 6.0 V | -    | 5.0  | 12.5 | ns   |
| enable time                   | t <sub>en</sub>  | $\bar{E}$ to Z; $\bar{E}$ to Y <sub>n</sub> ;<br>see Figure 9    | V <sub>CC</sub> = 2.0 V | -    | -    | 95   | ns   |
|                               |                  |                                                                  | V <sub>CC</sub> = 3.0 V | -    | -    | 90   | ns   |
|                               |                  |                                                                  | V <sub>CC</sub> = 3.3 V | -    | -    | 85   | ns   |
|                               |                  |                                                                  | V <sub>CC</sub> = 4.5 V | -    | -    | 80   | ns   |
|                               |                  |                                                                  | V <sub>CC</sub> = 6.0 V | -    | -    | 78   | ns   |
| disable time                  | t <sub>dis</sub> | $\bar{E}$ to Z; $\bar{E}$ to Y <sub>n</sub> ;<br>see Figure 9    | V <sub>CC</sub> = 2.0 V | -    | -    | 99   | ns   |
|                               |                  |                                                                  | V <sub>CC</sub> = 3.0 V | -    | -    | 90   | ns   |
|                               |                  |                                                                  | V <sub>CC</sub> = 3.3 V | -    | -    | 85   | ns   |
|                               |                  |                                                                  | V <sub>CC</sub> = 4.5 V | -    | -    | 80   | ns   |
|                               |                  |                                                                  | V <sub>CC</sub> = 6.0 V | -    | -    | 78   | ns   |
| power dissipation capacitance | C <sub>PD</sub>  | per channel                                                      | V <sub>CC</sub> = 3.3 V | -    | 28   | -    | pF   |
|                               |                  |                                                                  | V <sub>CC</sub> = 5.0 V | -    | 33   | -    | pF   |
| AiP74HCT4851                  |                  |                                                                  |                         |      |      |      |      |
| propagation delay             | t <sub>pd</sub>  | Z to Y <sub>n</sub> , Y <sub>n</sub> to Z<br>see Figure 8        | V <sub>CC</sub> = 4.5 V | 1.6  | 3.7  | 11.5 | ns   |
|                               |                  | Sn to Z, Sn to Y <sub>n</sub><br>see Figure 8                    | V <sub>CC</sub> = 4.5 V | 3.2  | 8.0  | 13   | ns   |
| enable time                   | t <sub>en</sub>  | $\bar{E}$ to Z;<br>$\bar{E}$ to Y <sub>n</sub> ;<br>see Figure 9 | V <sub>CC</sub> = 4.5 V | 4.2  | 8.6  | 25   | ns   |
| disable time                  | t <sub>dis</sub> | $\bar{E}$ to Z;<br>$\bar{E}$ to Y <sub>n</sub> ;<br>see Figure 9 | V <sub>CC</sub> = 4.5 V | 28.5 | 64.7 | 80   | ns   |
| power dissipation capacitance | C <sub>PD</sub>  | per switch; V <sub>CC</sub> = 5V                                 |                         | -    | 30   | -    | pF   |

Note:

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

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

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

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



$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma \{(C_L + C_{SW}) \times V_{CC}^2 \times f_O\}$  where:

$f_i$  = input frequency in MHz;

$f_O$  = output frequency in MHz;

$N$  = number of inputs switching;

$\Sigma \{(C_L + C_{SW}) \times V_{CC}^2 \times f_O\}$  = sum of outputs;

$C_L$  = output load capacitance in pF;

$C_{SW}$  = switch capacitance in pF;

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

## 3.3.5、AC Characteristics 2

( $T_{amb}$  = -40°C to +85°C; GND = 0 V, unless otherwise specified.)

| Parameter         | Symbol           | Conditions                                                                 |                         | Min. | Typ. | Max. | Unit |
|-------------------|------------------|----------------------------------------------------------------------------|-------------------------|------|------|------|------|
| AiP74HC4851       |                  |                                                                            |                         |      |      |      |      |
| propagation delay | t <sub>pd</sub>  | Z to Y <sub>n</sub> , Y <sub>n</sub> to Z<br>see Figure 8                  | V <sub>CC</sub> = 2.0 V | -    | -    | 29   | ns   |
|                   |                  |                                                                            | V <sub>CC</sub> = 3.0 V | -    | -    | 17.5 | ns   |
|                   |                  |                                                                            | V <sub>CC</sub> = 3.3 V | -    | -    | 16.5 | ns   |
|                   |                  |                                                                            | V <sub>CC</sub> = 4.5 V | -    | -    | 12.5 | ns   |
|                   |                  |                                                                            | V <sub>CC</sub> = 6.0 V | -    | -    | 11   | ns   |
|                   |                  | S <sub>n</sub> to Z;S <sub>n</sub> to Y <sub>n</sub><br>see Figure 8       | V <sub>CC</sub> = 2.0 V | -    | -    | 35   | ns   |
|                   |                  |                                                                            | V <sub>CC</sub> = 3.0 V | -    | -    | 20   | ns   |
|                   |                  |                                                                            | V <sub>CC</sub> = 3.3 V | -    | -    | 19   | ns   |
|                   |                  |                                                                            | V <sub>CC</sub> = 4.5 V | -    | -    | 15   | ns   |
|                   |                  |                                                                            | V <sub>CC</sub> = 6.0 V | -    | -    | 14.5 | ns   |
| enable time       | t <sub>en</sub>  | $\overline{E}$ to Z; $\overline{E}$ to Y <sub>n</sub> ;<br>see Figure 9    | V <sub>CC</sub> = 2.0 V | -    | -    | 105  | ns   |
|                   |                  |                                                                            | V <sub>CC</sub> = 3.0 V | -    | -    | 100  | ns   |
|                   |                  |                                                                            | V <sub>CC</sub> = 3.3 V | -    | -    | 95   | ns   |
|                   |                  |                                                                            | V <sub>CC</sub> = 4.5 V | -    | -    | 90   | ns   |
|                   |                  |                                                                            | V <sub>CC</sub> = 6.0 V | -    | -    | 80   | ns   |
| disable time      | t <sub>dis</sub> | $\overline{E}$ to Z; $\overline{E}$ to Y <sub>n</sub> ;<br>see Figure 9    | V <sub>CC</sub> = 2.0 V | -    | -    | 105  | ns   |
|                   |                  |                                                                            | V <sub>CC</sub> = 3.0 V | -    | -    | 100  | ns   |
|                   |                  |                                                                            | V <sub>CC</sub> = 3.3 V | -    | -    | 95   | ns   |
|                   |                  |                                                                            | V <sub>CC</sub> = 4.5 V | -    | -    | 80   | ns   |
|                   |                  |                                                                            | V <sub>CC</sub> = 6.0 V | -    | -    | 80   | ns   |
| AiP74HCT4851      |                  |                                                                            |                         |      |      |      |      |
| propagation delay | t <sub>pd</sub>  | Z to Y <sub>n</sub> , Y <sub>n</sub> to Z;<br>see Figure 8                 | V <sub>CC</sub> = 4.5 V | 1.1  | -    | 13.5 | ns   |
|                   |                  | S <sub>n</sub> to Z, S <sub>n</sub> to Y <sub>n</sub> ;<br>see Figure 8    | V <sub>CC</sub> = 4.5 V | 2.3  | -    | 17   | ns   |
| enable time       | t <sub>en</sub>  | $\overline{E}$ to Z;<br>$\overline{E}$ to Y <sub>n</sub> ;<br>see Figure 9 | V <sub>CC</sub> = 4.5 V | 3.0  | -    | 35   | ns   |
| disable time      | t <sub>dis</sub> | $\overline{E}$ to Z;<br>$\overline{E}$ to Y <sub>n</sub> ;<br>see Figure 9 | V <sub>CC</sub> = 4.5 V | 28.2 | -    | 100  | ns   |



Note:

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

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

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

### 3.3.6、AC Characteristics 3

( $T_{amb} = -40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ ; GND = 0 V; unless otherwise specified.)

| Parameter         | Symbol           | Conditions                                                              |                         | Min. | Typ. | Max. | Unit |
|-------------------|------------------|-------------------------------------------------------------------------|-------------------------|------|------|------|------|
| AiP74HC4851       |                  |                                                                         |                         |      |      |      |      |
| propagation delay | t <sub>pd</sub>  | Z to Y <sub>n</sub> , Y <sub>n</sub> to Z;<br>see Figure 8              | V <sub>CC</sub> = 2.0 V | -    | -    | 32   | ns   |
|                   |                  |                                                                         | V <sub>CC</sub> = 3.0 V | -    | -    | 19.5 | ns   |
|                   |                  |                                                                         | V <sub>CC</sub> = 3.3 V | -    | -    | 18.5 | ns   |
|                   |                  |                                                                         | V <sub>CC</sub> = 4.5 V | -    | -    | 13.5 | ns   |
|                   |                  |                                                                         | V <sub>CC</sub> = 6.0 V | -    | -    | 12   | ns   |
|                   |                  | S <sub>n</sub> to Z;S <sub>n</sub> to Y <sub>n</sub> ;<br>see Figure 8  | V <sub>CC</sub> = 2.0 V | -    | -    | 40   | ns   |
|                   |                  |                                                                         | V <sub>CC</sub> = 3.0 V | -    | -    | 23   | ns   |
|                   |                  |                                                                         | V <sub>CC</sub> = 3.3 V | -    | -    | 22   | ns   |
|                   |                  |                                                                         | V <sub>CC</sub> = 4.5 V | -    | -    | 17   | ns   |
|                   |                  |                                                                         | V <sub>CC</sub> = 6.0 V | -    | -    | 16.5 | ns   |
| enable time       | t <sub>en</sub>  | $\bar{E}$ to Z; $\bar{E}$ to Y <sub>n</sub> ;<br>see Figure 9           | V <sub>CC</sub> = 2.0 V | -    | -    | 115  | ns   |
|                   |                  |                                                                         | V <sub>CC</sub> = 3.0 V | -    | -    | 110  | ns   |
|                   |                  |                                                                         | V <sub>CC</sub> = 3.3 V | -    | -    | 105  | ns   |
|                   |                  |                                                                         | V <sub>CC</sub> = 4.5 V | -    | -    | 100  | ns   |
|                   |                  |                                                                         | V <sub>CC</sub> = 6.0 V | -    | -    | 80   | ns   |
| disable time      | t <sub>dis</sub> | $\bar{E}$ to Z; $\bar{E}$ to Y <sub>n</sub> ;<br>see Figure 9           | V <sub>CC</sub> = 2.0 V | -    | -    | 115  | ns   |
|                   |                  |                                                                         | V <sub>CC</sub> = 3.0 V | -    | -    | 110  | ns   |
|                   |                  |                                                                         | V <sub>CC</sub> = 3.3 V | -    | -    | 105  | ns   |
|                   |                  |                                                                         | V <sub>CC</sub> = 4.5 V | -    | -    | 100  | ns   |
|                   |                  |                                                                         | V <sub>CC</sub> = 6.0 V | -    | -    | 80   | ns   |
| AiP74HCT4851      |                  |                                                                         |                         |      |      |      |      |
| propagation delay | t <sub>pd</sub>  | Z to Y <sub>n</sub> , Y <sub>n</sub> to Z;<br>see Figure 8              | V <sub>CC</sub> = 4.5 V | 1.1  | -    | 13.5 | ns   |
|                   |                  | S <sub>n</sub> to Z, S <sub>n</sub> to Y <sub>n</sub> ;<br>see Figure 8 | V <sub>CC</sub> = 4.5 V | 2.3  | -    | 17   | ns   |
| enable time       | t <sub>en</sub>  | $\bar{E}$ to Z;<br>$\bar{E}$ to Y <sub>n</sub> ;<br>see Figure 9        | V <sub>CC</sub> = 4.5 V | 3.0  | -    | 35   | ns   |
| disable time      | t <sub>dis</sub> | $\bar{E}$ to Z;<br>$\bar{E}$ to Y <sub>n</sub> ;<br>see Figure 9        | V <sub>CC</sub> = 4.5 V | 28   | -    | 100  | ns   |

Note:

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

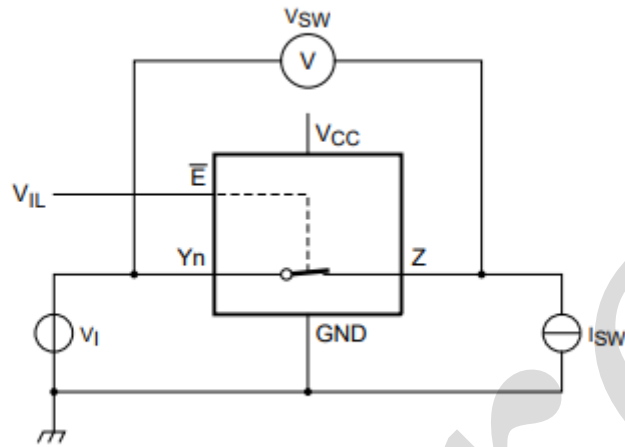
[2]  $t_{en}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .

[3]  $t_{dia}$  is the same as  $t_{PHZ}$  and  $t_{PLZ}$ .



## 4、Testing Circuit

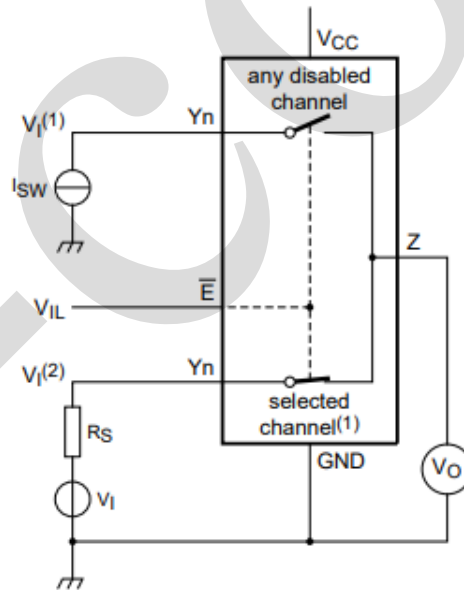
### 4.1、DC Testing Circuit 1



$$R_{ON} = V_{SW}/I_{SW}$$

Figure 4. Test circuit for measuring  $R_{ON}$

### 4.2、DC Testing Circuit 2



(1) Channel is selected by S0, S1 and S2.  $V_I(1) < GND$  or  $V_I(1) > V_{CC}$ .  $GND < V_I(2) < V_{CC}$ .

Figure 5. Test circuit for injection current coupling

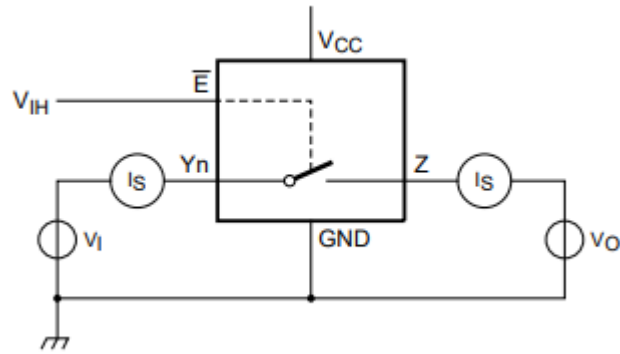


Figure 6. Test circuit for measuring OFF-state current

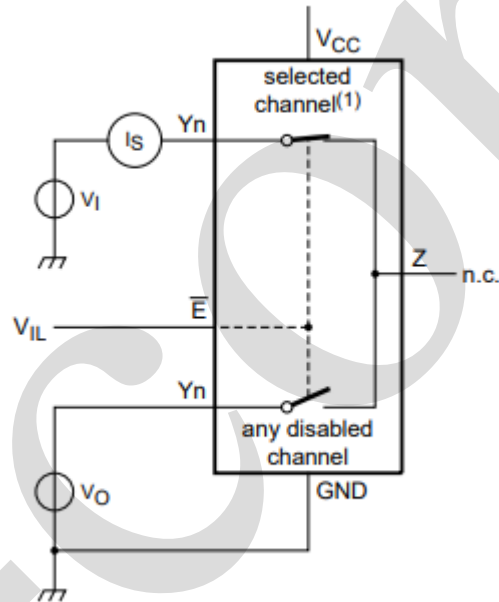


Figure 7. Test circuit for measuring ON-state current



## 4.3、AC Testing Waveforms

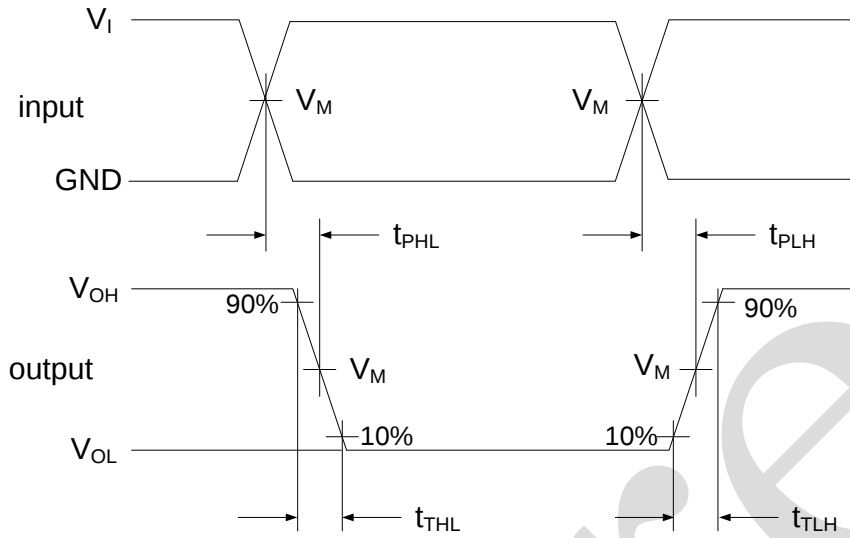


Figure 8. Propagation delay, output transition time

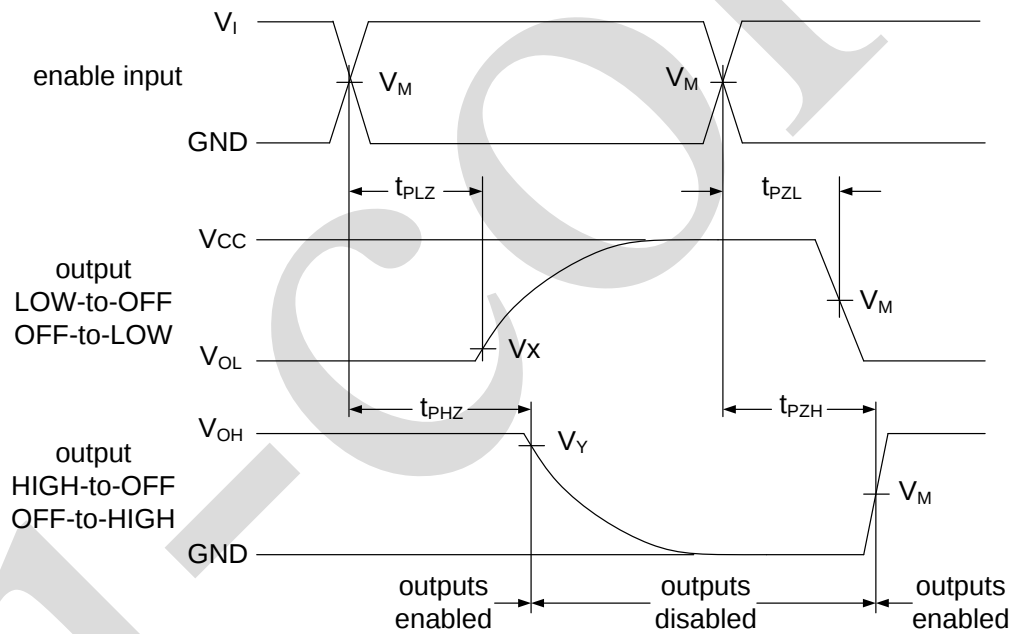


Figure 9. 3-state enable and disable times



## 4.4、AC Testing Circuit

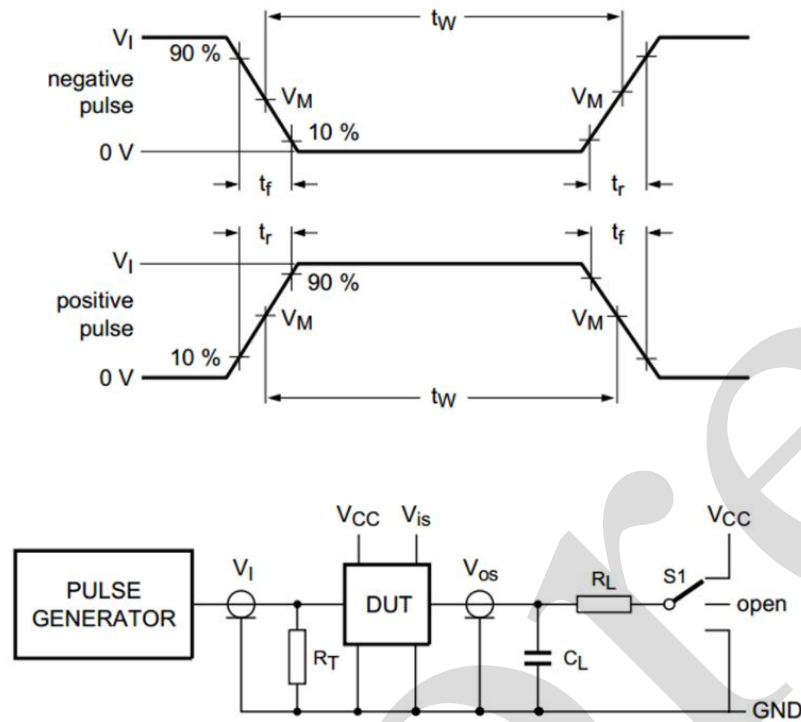


Figure 10. Test circuit for measuring switching times

Definitions for test circuit:

$R_T$  = termination resistance should be equal to the output impedance  $Z_O$  of the pulse generator.

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

$R_L$  = load resistance.

S1 = Test selection switch.

## 4.5、Test Data

| Test       | Input            |                 |        | Load |      | S1 position |
|------------|------------------|-----------------|--------|------|------|-------------|
|            | Control<br>E, Sn | Switch<br>Yn(Z) | tr, tf | CL   | RL   |             |
|            | VI[1]            | VI              |        |      |      |             |
| tPHL, tPLH | VCC              | VCC             | 6ns    | 50pF | -    | open        |
| tPZH, tPHZ | VCC              | VCC             | 6ns    | 50pF | 10kΩ | GND         |
| tPZL, tPLZ | VCC              | VCC             | 6ns    | 50pF | 10kΩ | VCC         |
| CPD        | VCC              | VCC             | 6ns    | 0pF  | -    | open        |

Note:

[1]  $V_I$  values:

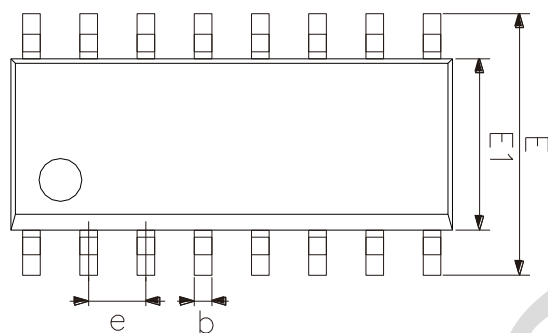
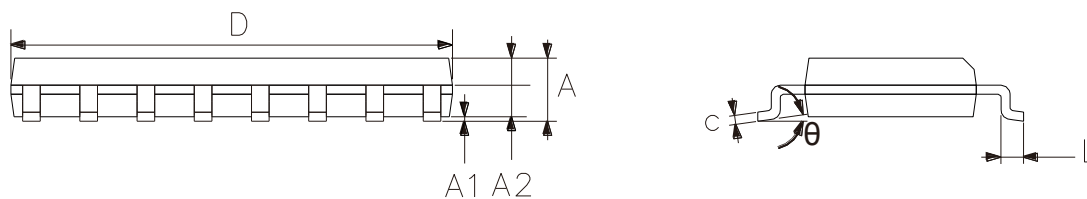
For AiP74HC4851:  $V_I = V_{CC}$ .

For AiP74HCT4851:  $V_I = 3V$ .



## 5、Package Information

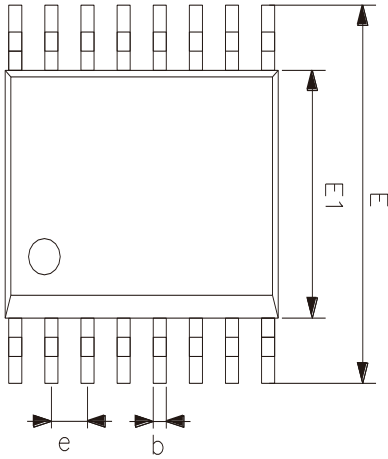
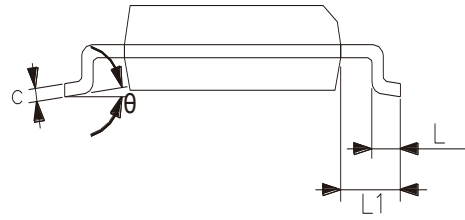
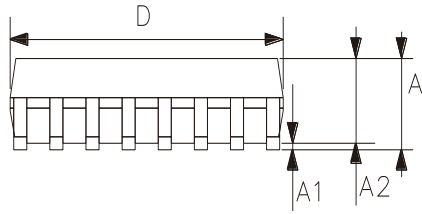
### 5.1、SOP16



| 2023/12/A | Dimensions In Millimeters |       |
|-----------|---------------------------|-------|
| Symbol    | Min.                      | Max.  |
| A         | 1.35                      | 1.80  |
| A1        | 0.10                      | 0.25  |
| A2        | 1.25                      | 1.55  |
| b         | 0.33                      | 0.51  |
| c         | 0.19                      | 0.25  |
| D         | 9.50                      | 10.10 |
| E         | 5.80                      | 6.30  |
| E1        | 3.70                      | 4.10  |
| e         | 1.27                      |       |
| L         | 0.35                      | 0.89  |
| $\theta$  | 0°                        | 8°    |



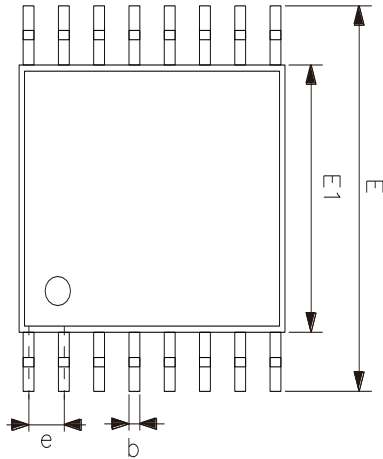
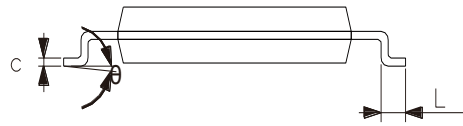
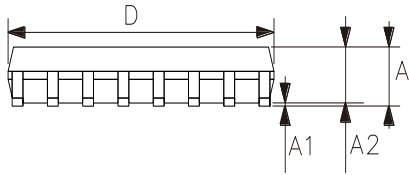
## 5.2、SSOP16



| 2023/12/A | Dimensions In Millimeters |      |
|-----------|---------------------------|------|
| Symbol    | Min                       | Max  |
| A         | —                         | 1.75 |
| A1        | 0.02                      | 0.23 |
| A2        | 1.30                      | 1.50 |
| b         | 0.23                      | 0.31 |
| c         | 0.20                      | 0.24 |
| D         | 4.70                      | 5.10 |
| E         | 5.80                      | 6.25 |
| E1        | 3.80                      | 4.02 |
| e         | 0.635                     |      |
| L         | 0.45                      | 0.80 |
| L1        | 1.05                      |      |
| $\theta$  | 0°                        | 8°   |



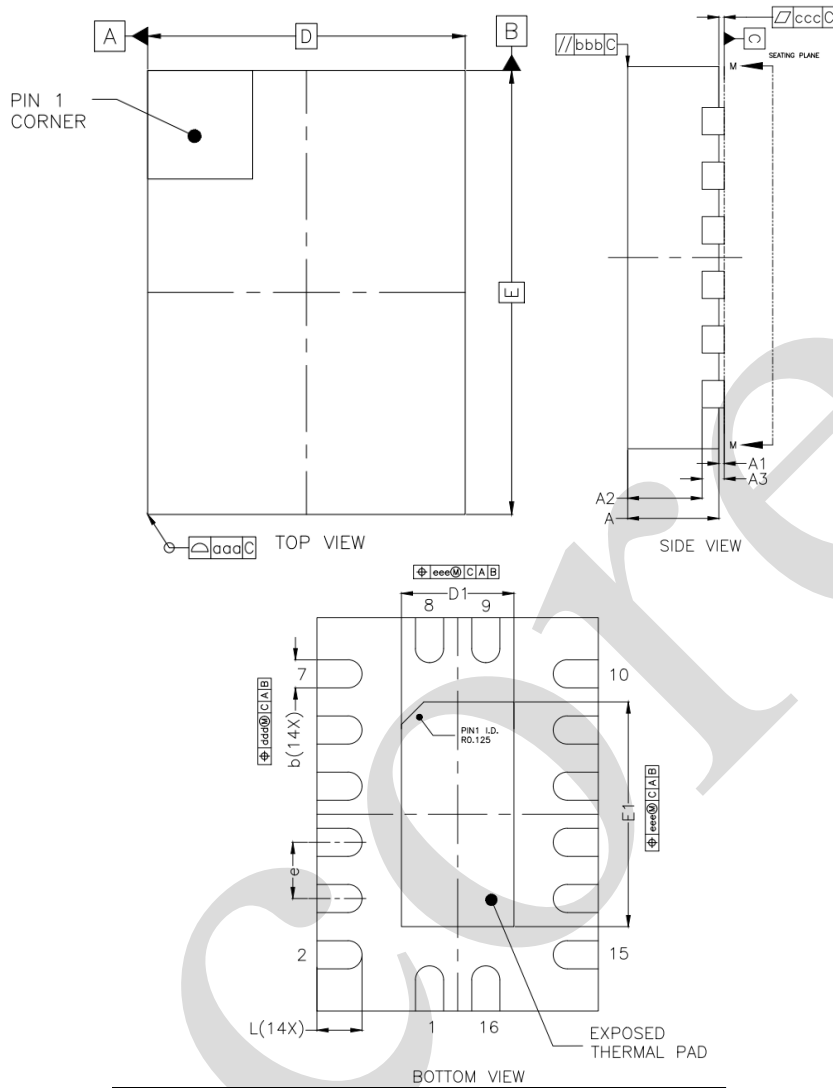
## 5.3、TSSOP16



| 2023/12/A | Dimensions In Millimeters |      |
|-----------|---------------------------|------|
| Symbol    | Min                       | Max  |
| A         | —                         | 1.20 |
| A1        | 0.05                      | 0.15 |
| A2        | 0.80                      | 1.05 |
| b         | 0.19                      | 0.30 |
| c         | 0.09                      | 0.20 |
| D         | 4.90                      | 5.10 |
| E1        | 4.30                      | 4.50 |
| E         | 6.20                      | 6.60 |
| e         | 0.65                      |      |
| L         | 0.45                      | 0.75 |
| θ         | 0°                        | 8°   |



## 5.4、DHVQFN16



| 2023/12/A | Dimensions In Millimeters |      |
|-----------|---------------------------|------|
| Symbol    | Min                       | Max  |
| A         | 0.80                      | 1.00 |
| A1        | 0.00                      | 0.05 |
| A2        | 0.60                      | 0.70 |
| A3        | 0.20                      |      |
| D         | 2.40                      | 2.60 |
| E         | 3.40                      | 3.60 |
| e         | 0.50                      |      |
| b         | 0.18                      | 0.30 |
| L         | 0.30                      | 0.50 |
| D1        | 0.85                      | 1.15 |
| E1        | 1.85                      | 2.15 |



## 6、Statements And Notes

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

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

### 6.2、Notes

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