# AiP74HC/HCT153
# Dual 4-input Multiplexer

# Product Specification

**Specification Revision History:**

| Version | Date | Description |
|---|---|---|
| 2012-06-A1 | 2012-06 | New |
| 2021-11-A2 | 2021-11 | Modify Ordering Information; Modify ambient temperature to -40℃ ~+105℃ and add electrical characteristics of -40℃~+105℃ |
| 2021-12-A3 | 2021-12 | Modify Ordering Information |
| | | |

## 1、General Description

The AiP74HC/HCT153 is a dual 4-input multiplexer. The device features independent enable inputs ($n\bar{E}$) and common data select inputs (S0 and S1). For each multiplexer, the select inputs select one of the four binary inputs and routes it to the multiplexer output (nY). A HIGH on $\bar{E}$ forces the corresponding multiplexer outputs LOW. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of $V_{CC}$.

**Features:**

- Input levels:
  For AiP74HC153: CMOS level
  For AiP74HCT153: TTL level
- Non-inverting outputs
- Separate enable input for each output
- Common select inputs
- Permits multiplexing from n lines to 1 line
- Enable line provided for cascading (n lines to 1 line)
- Specified from -40℃ to +105℃
- Packaging information: DIP16/SOP16/TSSOP16

**Ordering Information:**

**Tube packing specifications:**

| Part number | Packaging form | Marking code | Tube quantity | Boxed tube quantity | Boxed quantity | Notes |
|---|---|---|---|---|---|---|
| AiP74HC153DA16.TB | DIP16 | 74HC153 | 25 PCS/tube | 40 tube/box | 1000 PCS/box | Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm |
| AiP74HCT153DA16.TB | DIP16 | 74HCT153 | 25 PCS/tube | 40 tube/box | 1000 PCS/box | Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm |
| AiP74HC153SA16.TB | SOP16 | 74HC153 | 50 PCS/tube | 200 tube/box | 10000 PCS/box | Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm |
| AiP74HCT153SA16.TB | SOP16 | 74HCT153 | 50 PCS/tube | 200 tube/box | 10000 PCS/box | Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm |
| AiP74HC153TA16.TB | TSSOP16 | 74HC153 | 96 PCS/tube | 200 tube/box | 19200 PCS/box | Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm |
| AiP74HCT153TA16.TB | TSSOP16 | 74HCT153 | 96 PCS/tube | 200 tube/box | 19200 PCS/box | Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm |

**Reel packing specifications:**

| Part number | Packaging form | Marking code | Reel quantity | Boxed reel quantity | Notes |
|---|---|---|---|---|---|
| AiP74HC153SA16.TR | SOP16 | 74HC153 | 4000 PCS/reel | 8000 PCS/box | Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing:1.27mm |
| AiP74HCT153SA16.TR | SOP16 | 74HCT153 | 4000 PCS/reel | 8000 PCS/box | Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing:1.27mm |
| AiP74HC153TA16.TR | TSSOP16 | 74HC153 | 5000 PCS/reel | 10000 PCS/box | Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing:0.65mm |
| AiP74HCT153TA16.TR | TSSOP16 | 74HCT153 | 5000 PCS/reel | 10000 PCS/box | Dimensions of plastic enclosure: 5.0mm×4.4mm 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

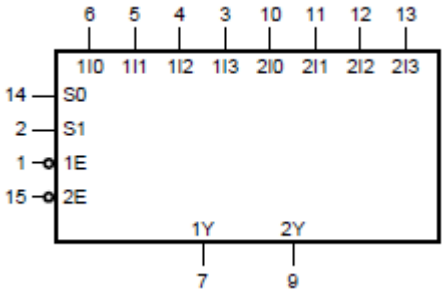



Figure 1. Logic symbol

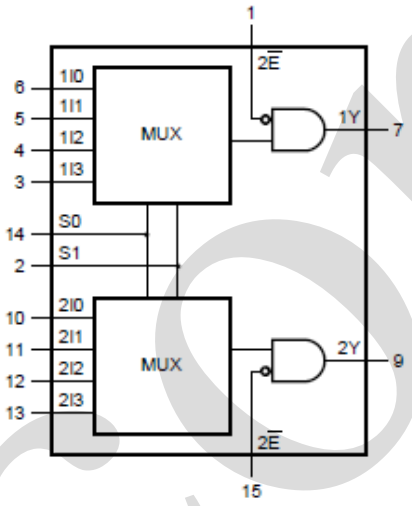



Figure 2. Functional diagram

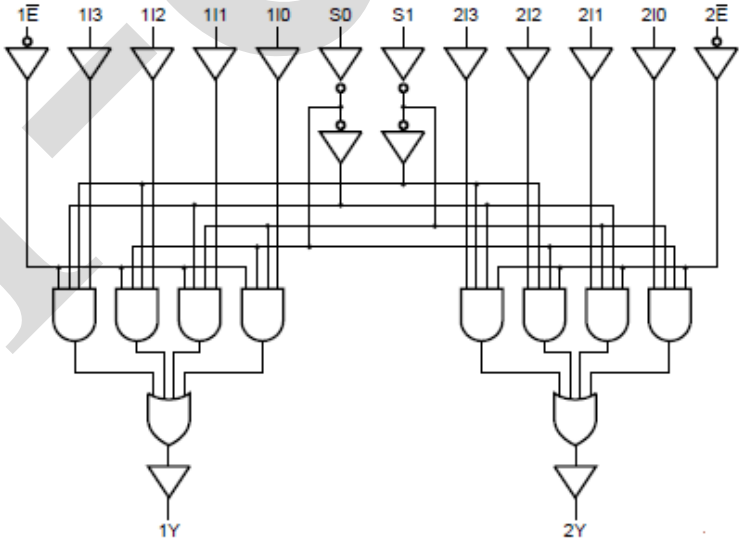
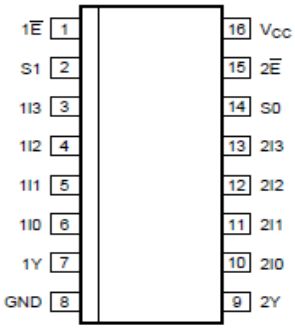



Figure 3. Logic diagram

## 2.2、Pin Configurations




## 2.3、Pin Description

| Pin No. | Pin Name | Description |
|---|---|---|
| 1 | 1$\overline{E}$ | output enable input (active LOW) |
| 2 | S1 | data select input |
| 3 | 1I3 | data input source 1 |
| 4 | 1I2 | data input source 1 |
| 5 | 1I1 | data input source 1 |
| 6 | 1I0 | data input source 1 |
| 7 | 1Y | multiplexer output source 1 |
| 8 | GND | ground (0V) |
| 9 | 2Y | multiplexer output source 2 |
| 10 | 2I0 | data input source 2 |
| 11 | 2I1 | data input source 2 |
| 12 | 2I2 | data input source 2 |
| 13 | 2I3 | data input source 2 |
| 14 | S0 | data select input |
| 15 | 2$\overline{E}$ | output enable input (active LOW) |
| 16 | $V_{CC}$ | supply voltage |

## 2.4、Function Table

| Select Input | | Input | | | | Output Enable | Output |
|---|---|---|---|---|---|---|---|
| **S0** | **S1** | **nI0** | **nI1** | **nI2** | **nI3** | **n$\overline{E}$** | **nY** |
| X | X | X | X | X | X | H | L |
| L | L | L | X | X | X | L | L |
| L | L | H | X | X | X | L | H |
| H | L | X | L | X | X | L | L |
| H | L | X | H | X | X | L | H |
| L | H | X | X | L | X | L | L |
| L | H | X | X | H | X | L | H |
| H | H | X | X | X | L | L | L |
| H | H | X | X | X | H | L | H |

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

Note:

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

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

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

### 3.2、Recommended Operating Conditions

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **AiP74HC153** | | | | | | |
| 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 | Δt/ΔV | $V_{CC}$=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 | ℃ |
| **AiP74HCT153** | | | | | | |
| 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 | Δt/ΔV | $V_{CC}$=4.5V | - | 1.67 | 139 | ns/V |
| ambient temperature | $T_{amb}$ | - | -40 | - | +105 | ℃ |

### 3.3、Electrical Characteristics

#### 3.3.1、DC Characteristics 1

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

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| **AiP74HC153** | | | | | | | |
| 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 | $V_{OH}$ | $V_I$=$V_{IH}$ or $V_{IL}$ | $I_O$=-20uA; $V_{CC}$=2.0V | 1.9 | 2.0 | - | V |
| | | | $I_O$=-20uA; $V_{CC}$=4.5V | 4.4 | 4.5 | - | V |
| | | | $I_O$=-20uA; $V_{CC}$=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 | $V_{OL}$ | $V_I$=$V_{IH}$ or $V_{IL}$ | $I_O$=20uA; $V_{CC}$=2.0V | - | 0 | 0.1 | V |
| | | | $I_O$=20uA; $V_{CC}$=4.5V | - | 0 | 0.1 | V |
| | | | $I_O$=20uA; $V_{CC}$=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 | $I_I$ | $V_I$=$V_{CC}$ or GND; $V_{CC}$=6.0V | | - | - | ±0.1 | uA |
| supply current | $I_{CC}$ | $V_I$=$V_{CC}$ or GND; $I_O$=0A; $V_{CC}$=6.0V | | - | - | 8.0 | uA |
| input capacitance | $C_I$ | - | | - | 3.5 | - | pF |
| **AiP74HCT153** | | | | | | | |
| HIGH-level input voltage | $V_{IH}$ | $V_{CC}$=4.5V to 5.5V | | 2.0 | 1.6 | - | V |
| LOW-level input voltage | $V_{IL}$ | $V_{CC}$=4.5V to 5.5V | | - | 1.2 | 0.8 | V |
| HIGH-level output voltage | $V_{OH}$ | $V_I$=$V_{IH}$ or $V_{IL}$; $V_{CC}$=4.5V | $I_O$=-20uA | 4.4 | 4.5 | - | V |
| | | | $I_O$=-4.0mA | 3.98 | 4.32 | - | V |
| LOW-level output voltage | $V_{OL}$ | $V_I$=$V_{IH}$ or $V_{IL}$ | $I_O$=20uA; $V_{CC}$=4.5V | - | 0 | 0.1 | V |
| | | | $I_O$=5.2mA; $V_{CC}$=6.0V | - | 0.15 | 0.26 | V |
| input leakage current | $I_I$ | $V_I$=$V_{CC}$ or GND; $V_{CC}$=5.5V | | - | - | ±0.1 | uA |
| supply current | $I_{CC}$ | $V_I$=$V_{CC}$ or GND; $I_O$=0A; $V_{CC}$=5.5V | | - | - | 8.0 | uA |
| additional supply current | $\Delta I_{CC}$ | $V_I$=$V_{CC}$-2.1V; other inputs at $V_{CC}$ or GND; $I_O$=0A; $V_{CC}$=4.5V to 5.5V | 1In, 2In | - | 45 | 162 | uA |
| | | | $n\bar{E}$ | - | 60 | 216 | uA |
| | | | Sn | - | 135 | 486 | uA |
| input capacitance | $C_I$ | - | | - | 3.5 | - | pF |

### 3.3.2、DC Characteristics 2

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

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| **AiP74HC153** | | | | | | | |
| HIGH-level input voltage | $V_{IH}$ | $V_{CC}$=2.0V | | 1.5 | - | - | V |
| | | $V_{CC}$=4.5V | | 3.15 | - | - | V |
| | | $V_{CC}$=6.0V | | 4.2 | - | - | V |
| LOW-level input voltage | $V_{IL}$ | $V_{CC}$=2.0V | | - | - | 0.5 | V |
| | | $V_{CC}$=4.5V | | - | - | 1.35 | V |
| | | $V_{CC}$=6.0V | | - | - | 1.8 | V |
| HIGH-level output voltage | $V_{OH}$ | $V_I$=$V_{IH}$ or $V_{IL}$ | $I_O$=-20uA; $V_{CC}$=2.0V | 1.9 | - | - | V |
| | | | $I_O$=-20uA; $V_{CC}$=4.5V | 4.4 | - | - | V |
| | | | $I_O$=-20uA; $V_{CC}$=6.0V | 5.9 | - | - | V |
| | | | $I_O$=-4.0mA; $V_{CC}$=4.5V | 3.84 | - | - | V |
| | | | $I_O$=-5.2mA; $V_{CC}$=6.0V | 5.34 | - | - | V |
| LOW-level output voltage | $V_{OL}$ | $V_I$=$V_{IH}$ or $V_{IL}$ | $I_O$=20uA; $V_{CC}$=2.0V | - | - | 0.1 | V |
| | | | $I_O$=20uA; $V_{CC}$=4.5V | - | - | 0.1 | V |
| | | | $I_O$=20uA; $V_{CC}$=6.0V | - | - | 0.1 | V |
| | | | $I_O$=4.0mA; $V_{CC}$=4.5V | - | - | 0.33 | V |
| | | | $I_O$=5.2mA; $V_{CC}$=6.0V | - | - | 0.33 | V |
| input leakage current | $I_I$ | $V_I$=$V_{CC}$ or GND; $V_{CC}$=6.0V | | - | - | ±1.0 | uA |
| supply current | $I_{CC}$ | $V_I$=$V_{CC}$ or GND; $I_O$=0A; $V_{CC}$=6.0V | | - | - | 80 | uA |
| **AiP74HCT153** | | | | | | | |
| HIGH-level input voltage | $V_{IH}$ | $V_{CC}$=4.5V to 5.5V | | 2.0 | - | - | V |
| LOW-level input voltage | $V_{IL}$ | $V_{CC}$=4.5V to 5.5V | | - | - | 0.8 | V |
| HIGH-level output voltage | $V_{OH}$ | $V_I$=$V_{IH}$ or $V_{IL}$; $V_{CC}$=4.5V | $I_O$=-20uA | 4.4 | - | - | V |
| | | | $I_O$=-4.0mA | 3.84 | - | - | V |
| LOW-level output voltage | $V_{OL}$ | $V_I$=$V_{IH}$ or $V_{IL}$ | $I_O$=20uA; $V_{CC}$=4.5V | - | - | 0.1 | V |
| | | | $I_O$=5.2mA; $V_{CC}$=6.0V | - | - | 0.33 | V |
| input leakage current | $I_I$ | $V_I$=$V_{CC}$ or GND; $V_{CC}$=5.5V | | - | - | ±1.0 | uA |
| supply current | $I_{CC}$ | $V_I$=$V_{CC}$ or GND; $I_O$=0A; $V_{CC}$=5.5V | | - | - | 80 | uA |
| additional supply current | $\Delta I_{CC}$ | $V_I$=$V_{CC}$-2.1V; other inputs at $V_{CC}$ or GND; $I_O$=0A; $V_{CC}$=4.5V to 5.5V | 1In, 2In | - | - | 203 | uA |
| | | | $n\bar{E}$ | - | - | 270 | uA |
| | | | Sn | - | - | 608 | uA |

### 3.3.3、DC Characteristics 3

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

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| **AiP74HC153** | | | | | | | |
| HIGH-level input voltage | $V_{IH}$ | $V_{CC}$=2.0V | | 1.5 | - | - | V |
| | | $V_{CC}$=4.5V | | 3.15 | - | - | V |
| | | $V_{CC}$=6.0V | | 4.2 | - | - | V |
| LOW-level input voltage | $V_{IL}$ | $V_{CC}$=2.0V | | - | - | 0.5 | V |
| | | $V_{CC}$=4.5V | | - | - | 1.35 | V |
| | | $V_{CC}$=6.0V | | - | - | 1.8 | V |
| HIGH-level output voltage | $V_{OH}$ | $V_I$=$V_{IH}$ or $V_{IL}$ | $I_O$=-20uA; $V_{CC}$=2.0V | 1.9 | - | - | V |
| | | | $I_O$=-20uA; $V_{CC}$=4.5V | 4.4 | - | - | V |
| | | | $I_O$=-20uA; $V_{CC}$=6.0V | 5.9 | - | - | V |
| | | | $I_O$=-4.0mA; $V_{CC}$=4.5V | 3.7 | - | - | V |
| | | | $I_O$=-5.2mA; $V_{CC}$=6.0V | 5.2 | - | - | V |
| LOW-level output voltage | $V_{OL}$ | $V_I$=$V_{IH}$ or $V_{IL}$ | $I_O$=20uA; $V_{CC}$=2.0V | - | - | 0.1 | V |
| | | | $I_O$=20uA; $V_{CC}$=4.5V | - | - | 0.1 | V |
| | | | $I_O$=20uA; $V_{CC}$=6.0V | - | - | 0.1 | V |
| | | | $I_O$=4.0mA; $V_{CC}$=4.5V | - | - | 0.4 | V |
| | | | $I_O$=5.2mA; $V_{CC}$=6.0V | - | - | 0.4 | V |
| input leakage current | $I_I$ | $V_I$=$V_{CC}$ or GND; $V_{CC}$=6.0V | | - | - | ±1.0 | uA |
| supply current | $I_{CC}$ | $V_I$=$V_{CC}$ or GND; $I_O$=0A; $V_{CC}$=6.0V | | - | - | 160 | uA |
| **AiP74HCT153** | | | | | | | |
| HIGH-level input voltage | $V_{IH}$ | $V_{CC}$=4.5V to 5.5V | | 2.0 | - | - | V |
| LOW-level input voltage | $V_{IL}$ | $V_{CC}$=4.5V to 5.5V | | - | - | 0.8 | V |
| HIGH-level output voltage | $V_{OH}$ | $V_I$=$V_{IH}$ or $V_{IL}$; $V_{CC}$=4.5V | $I_O$=-20uA | 4.4 | - | - | V |
| | | | $I_O$=-4.0mA | 3.7 | - | - | V |
| LOW-level output voltage | $V_{OL}$ | $V_I$=$V_{IH}$ or $V_{IL}$ | $I_O$=20uA; $V_{CC}$=4.5V | - | - | 0.1 | V |
| | | | $I_O$=5.2mA; $V_{CC}$=6.0V | - | - | 0.4 | V |
| input leakage current | $I_I$ | $V_I$=$V_{CC}$ or GND; $V_{CC}$=5.5V | | - | - | ±1.0 | uA |
| supply current | $I_{CC}$ | $V_I$=$V_{CC}$ or GND; $I_O$=0A; $V_{CC}$=5.5V | | - | - | 160 | uA |
| additional supply current | $\Delta I_{CC}$ | $V_I$=$V_{CC}$-2.1V; other inputs at $V_{CC}$ or GND; $I_O$=0A; $V_{CC}$=4.5V to 5.5V | 1In, 2In | - | - | 221 | uA |
| | | | $n\bar{E}$ | - | - | 294 | uA |
| | | | Sn | - | - | 662 | uA |

### 3.3.4、AC Characteristics 1

($T_{amb}$=25℃, GND =0V, $t_r$=$t_f$=6ns; $C_L$=50pF, unless otherwise specified.)

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| **AiP74HC153** | | | | | | | |
| propagation delay | $t_{pd}$ | 1In to nY, 2In to nY; see Figure 5[1] | $V_{CC}$=2.0V | - | 47 | 145 | ns |
| | | | $V_{CC}$=4.5V | - | 17 | 29 | ns |
| | | | $V_{CC}$=5.0V; $C_L$=15pF | - | 14 | - | ns |
| | | | $V_{CC}$=6.0V | - | 14 | 25 | ns |
| | | Sn to nY; see Figure 6 | $V_{CC}$=2.0V | - | 50 | 150 | ns |
| | | | $V_{CC}$=4.5V | - | 18 | 30 | ns |
| | | | $V_{CC}$=5.0V; $C_L$=15pF | - | 15 | - | ns |
| | | | $V_{CC}$=6.0V | - | 14 | 26 | ns |
| | | $n\bar{E}$ to nY; see Figure 6 | $V_{CC}$=2.0V | - | 33 | 100 | ns |
| | | | $V_{CC}$=4.5V | - | 12 | 20 | ns |
| | | | $V_{CC}$=5.0V; $C_L$=15pF | - | 10 | - | ns |
| | | | $V_{CC}$=6.0V | - | 10 | 17 | ns |
| transition time | $t_t$ | see Figure 5[2] | $V_{CC}$=2.0V | - | 19 | 75 | ns |
| | | | $V_{CC}$=4.5V | - | 7 | 15 | ns |
| | | | $V_{CC}$=6.0V | - | 6 | 13 | ns |
| power dissipation capacitance | $C_{PD}$ | per package; $V_I$=GND to $V_{CC}$[3] | | - | 30 | - | pF |
| **AiP74HCT153** | | | | | | | |
| HIGH to LOW propagation delay | $t_{PHL}$ | 1In to nY, 2In to nY; see Figure 5[1] | $V_{CC}$=4.5V | - | 19 | 34 | ns |
| | | | $V_{CC}$=5.0V; $C_L$=15pF | - | 16 | - | ns |
| LOW to HIGH propagation delay | $t_{PLH}$ | 1In to nY, 2In to nY; see Figure 5 | $V_{CC}$=4.5V | - | 13 | 24 | ns |
| | | | $V_{CC}$=5.0V; $C_L$=15pF | - | 16 | - | ns |
| propagation delay | $t_{pd}$ | Sn to nY; see Figure 6 | $V_{CC}$=4.5V | - | 20 | 34 | ns |
| | | | $V_{CC}$=5.0V; $C_L$=15pF | - | 17 | - | ns |
| | | $n\bar{E}$ to nY; see Figure 6 | $V_{CC}$=4.5V | - | 14 | 27 | ns |
| | | | $V_{CC}$=5.0V; $C_L$=15pF | - | 11 | - | ns |
| transition time | $t_t$ | $V_{CC}$=4.5V; see Figure 5[2] | | - | 7 | 15 | ns |
| power dissipation capacitance | $C_{PD}$ | per package; $V_I$=GND to $V_{CC}$-1.5V[3] | | - | 30 | - | 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).

$P_D=C_{PD}\times V_{CC}^2\times f_i\times N+\sum(C_L\times V_{CC}^2\times f_o)$ 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℃ to +85℃, GND=0V, $t_r$=$t_f$=6ns; $C_L$=50pF, unless otherwise specified.)

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| **AiP74HC153** | | | | | | | |
| propagation delay | $t_{pd}$ | 1In to nY, 2In to nY; see Figure 5[1] | $V_{CC}$=2.0V | - | - | 180 | ns |
| | | | $V_{CC}$=4.5V | - | - | 36 | ns |
| | | | $V_{CC}$=6.0V | - | - | 31 | ns |
| | | Sn to nY; see Figure 6 | $V_{CC}$=2.0V | - | - | 190 | ns |
| | | | $V_{CC}$=4.5V | - | - | 38 | ns |
| | | | $V_{CC}$=6.0V | - | - | 33 | ns |
| | | $n\bar{E}$ to nY; see Figure 6 | $V_{CC}$=2.0V | - | - | 125 | ns |
| | | | $V_{CC}$=4.5V | - | - | 25 | ns |
| | | | $V_{CC}$=6.0V | - | - | 21 | ns |
| transition time | $t_t$ | see Figure 5[2] | $V_{CC}$=2.0V | - | - | 95 | ns |
| | | | $V_{CC}$=4.5V | - | - | 19 | ns |
| | | | $V_{CC}$=6.0V | - | - | 16 | ns |
| **AiP74HCT153** | | | | | | | |
| HIGH to LOW propagation delay | $t_{PHL}$ | 1In to nY, 2In to nY; see Figure 5[1] | $V_{CC}$=4.5V | - | - | 43 | ns |
| LOW to HIGH propagation delay | $t_{PLH}$ | 1In to nY, 2In to nY; see Figure 5 | $V_{CC}$=4.5V | - | - | 30 | ns |
| propagation delay | $t_{pd}$ | Sn to nY; see Figure 6 | $V_{CC}$=4.5V | - | - | 43 | ns |
| | | $n\bar{E}$ to nY; see Figure 6 | $V_{CC}$=4.5V | - | - | 34 | ns |
| transition time | $t_t$ | $V_{CC}$=4.5V; see Figure 5[2] | | - | - | 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℃ to +105℃, GND=0V, $t_r$=$t_f$=6ns; $C_L$=50pF, unless otherwise specified.)

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| **AiP74HC153** | | | | | | | |
| propagation delay | $t_{pd}$ | 1In to nY, 2In to nY; see Figure 5[1] | $V_{CC}$=2.0V | - | - | 220 | ns |
| | | | $V_{CC}$=4.5V | - | - | 44 | ns |
| | | | $V_{CC}$=6.0V | - | - | 38 | ns |
| | | Sn to nY; see Figure 6 | $V_{CC}$=2.0V | - | - | 225 | ns |
| | | | $V_{CC}$=4.5V | - | - | 45 | ns |
| | | | $V_{CC}$=6.0V | - | - | 38 | ns |
| | | $n\bar{E}$ to nY; see Figure 6 | $V_{CC}$=2.0V | - | - | 150 | ns |
| | | | $V_{CC}$=4.5V | - | - | 30 | ns |
| | | | $V_{CC}$=6.0V | - | - | 26 | ns |
| transition time | $t_t$ | see Figure 5[2] | $V_{CC}$=2.0V | - | - | 110 | ns |
| | | | $V_{CC}$=4.5V | - | - | 22 | ns |
| | | | $V_{CC}$=6.0V | - | - | 19 | ns |
| **AiP74HCT153** | | | | | | | |
| HIGH to LOW propagation delay | $t_{PHL}$ | 1In to nY, 2In to nY; see Figure 5[1] | $V_{CC}$=4.5V | - | - | 51 | ns |
| LOW to HIGH propagation delay | $t_{PLH}$ | 1In to nY, 2In to nY; see Figure 5 | $V_{CC}$=4.5V | - | - | 36 | ns |
| propagation delay | $t_{pd}$ | Sn to nY; see Figure 6 | $V_{CC}$=4.5V | - | - | 51 | ns |
| | | $n\bar{E}$ to nY; see Figure 6 | $V_{CC}$=4.5V | - | - | 41 | ns |
| transition time | $t_t$ | $V_{CC}$=4.5V; see Figure 5[2] | | - | - | 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

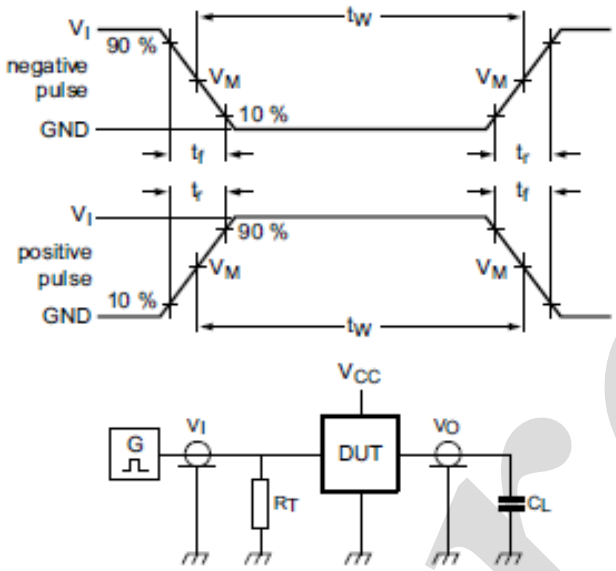



Figure 4. Test circuit for measuring switching times

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

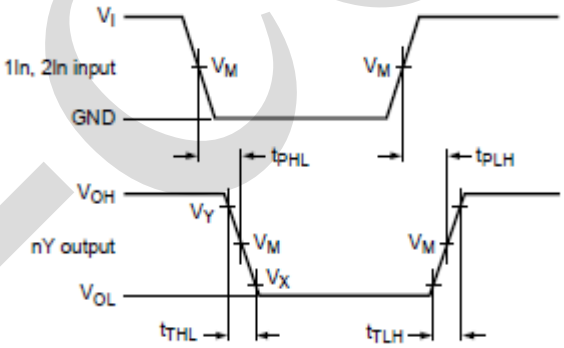



Figure 5. Waveforms showing the input (1In, 2In) to output (1Y, 2Y) propagation delays and output transition times

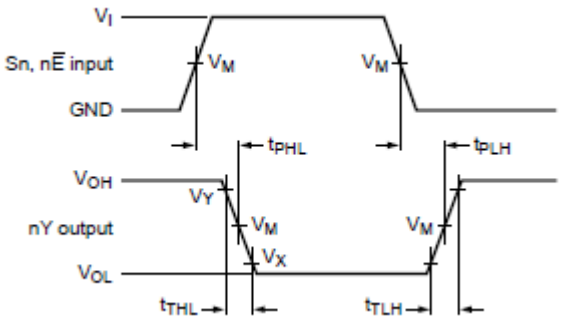



Figure 6. Waveforms showing the input (Sn, nĒ) to output (nY) propagation delays

### 4.3、Measurement Points

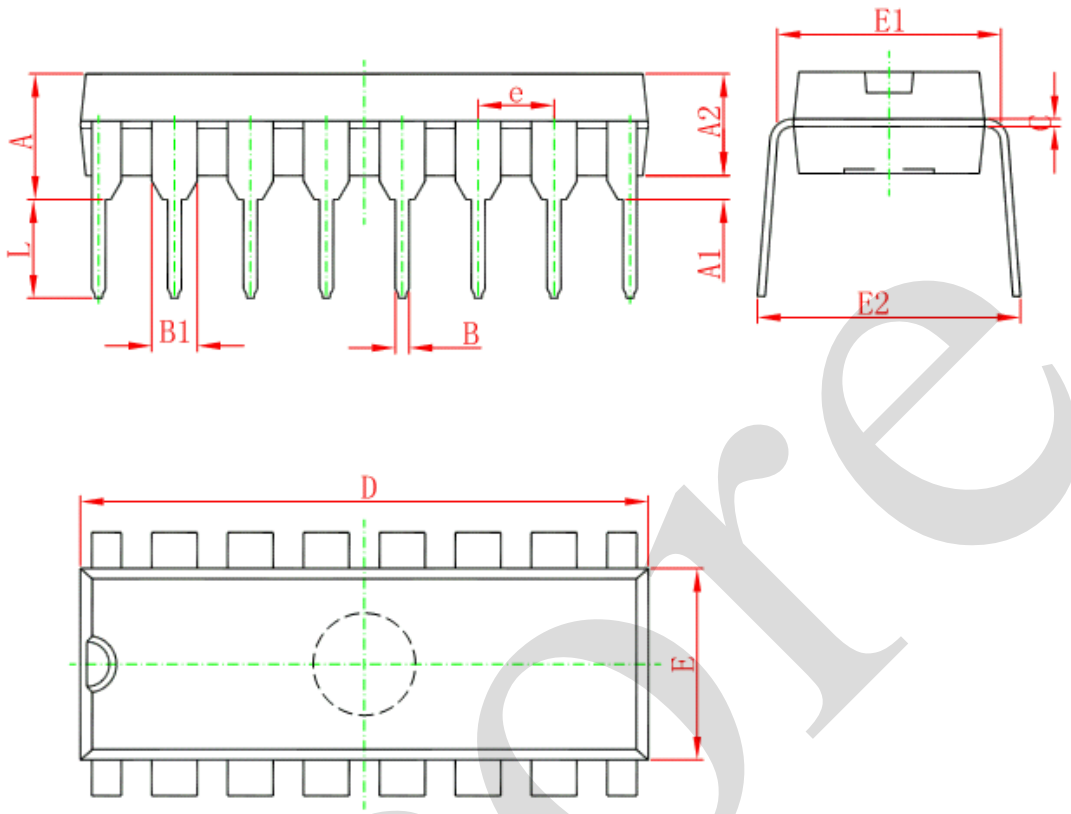
| Type | Input | Output | | |
|---|---|---|---|---|
| | $V_M$ | $V_M$ | $V_X$ | $V_Y$ |
| AiP74HC153 | $0.5\times V_{CC}$ | $0.5\times V_{CC}$ | $0.1\times V_{CC}$ | $0.9\times V_{CC}$ |
| AiP74HCT153 | 1.3V | 1.3V | $0.1\times V_{CC}$ | $0.9\times V_{CC}$ |

### 4.4、Test Data

| Type | Input | | Load | Test |
|---|---|---|---|---|
| | $V_I$ | $t_r$ , $t_f$ | $C_L$ | |
| AiP74HC153 | $V_{CC}$ | 6ns | 15pF, 50pF | $t_{PHL}$, $t_{PLH}$ |
| AiP74HCT153 | 3V | 6ns | 15pF, 50pF | $t_{PHL}$, $t_{PLH}$ |

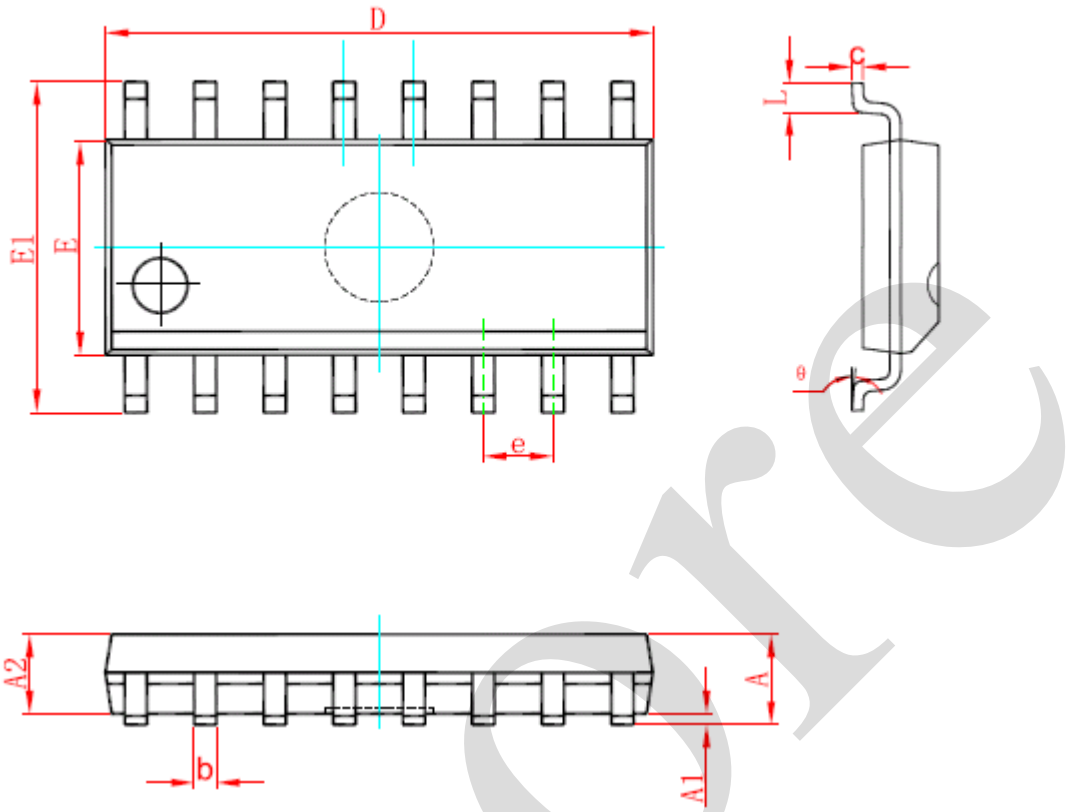
## 5、Package Information

### 5.1、DIP16



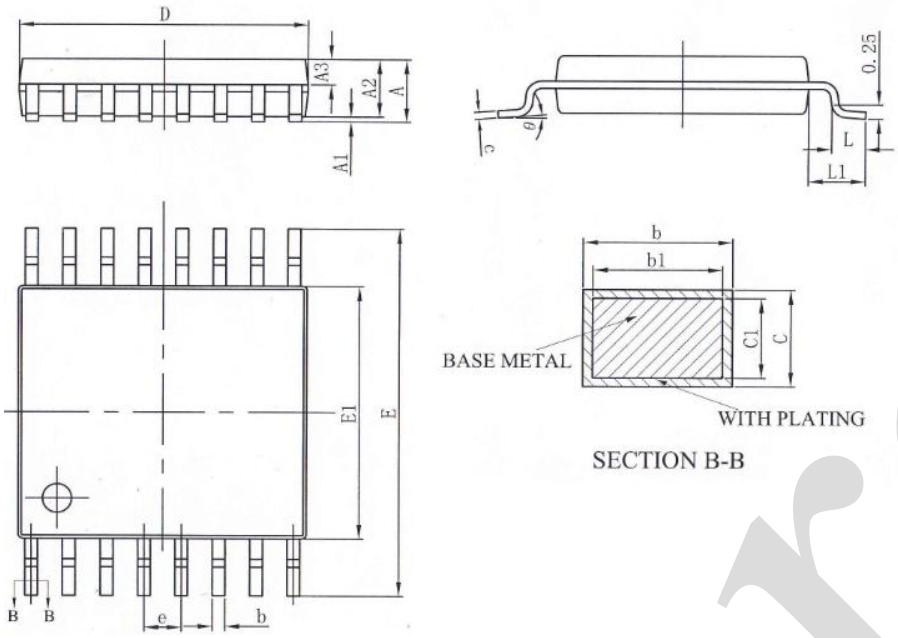

| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 3.710 | 4.310 | 0.146 | 0.170 |
| A1 | 0.510 | | 0.020 | |
| A2 | 3.200 | 3.600 | 0.126 | 0.142 |
| B | 0.380 | 0.570 | 0.015 | 0.022 |
| B1 | 1.524 (BSC) | | 0.060 (BSC) | |
| C | 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**




| SYMBOL | MILLIMETER | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| A | — | — | 1.20 |
| A1 | 0.05 | — | 0.15 |
| A2 | 0.90 | 1.00 | 1.05 |
| A3 | 0.39 | 0.44 | 0.49 |
| b | 0.20 | — | 0.28 |
| b1 | 0.19 | 0.22 | 0.25 |
| c | 0.13 | — | 0.17 |
| c1 | 0.12 | 0.13 | 0.14 |
| D | 4.90 | 5.00 | 5.10 |
| E | 6.20 | 6.40 | 6.60 |
| E1 | 4.30 | 4.40 | 4.50 |
| e | 0.65BSC | | |
| L | 0.45 | 0.60 | 0.75 |
| L1 | 1.00BSC | | |
| θ | 0 | — | 8° |

## 6、Statements And Notes

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

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

### 6.2、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.