## General Description

The 74HC/HCT153 is a dual 4-input multiplexer. The device features independent enable inputs (n$\overline{E}$) 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 $\overline{E}$ 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 74HC153: CMOS level
  For 74HCT153: 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

| DEVICE | Package Type | MARKING | Packing | Packing QTY |
|---|---|---|---|---|
| SN74HC153N | DIP-16 | 74HC153N | Tube | 1000/Box |
| SN74HC153DTR | SOP-16 | 74HC153 | Tape | 2500/Reel |
| SN74HCT153DTR | SOP-16 | 74HCT153 | Tape | 2500/Reel |
| SN74HCT153TDTR | TSSOP-16 | 74HCT153 | Tape | 3000/Reel |

# Block Diagram And Pin Description

**Block Diagram**

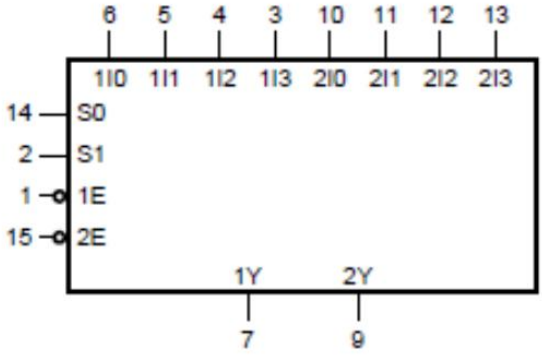



Figure 1. Logic symbol

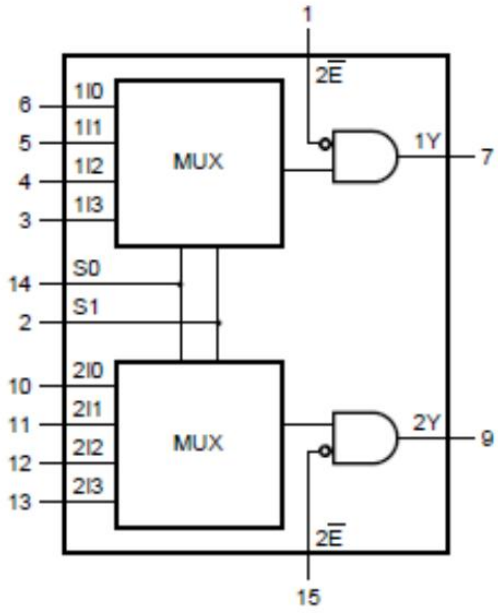



Figure 2. Functional diagram

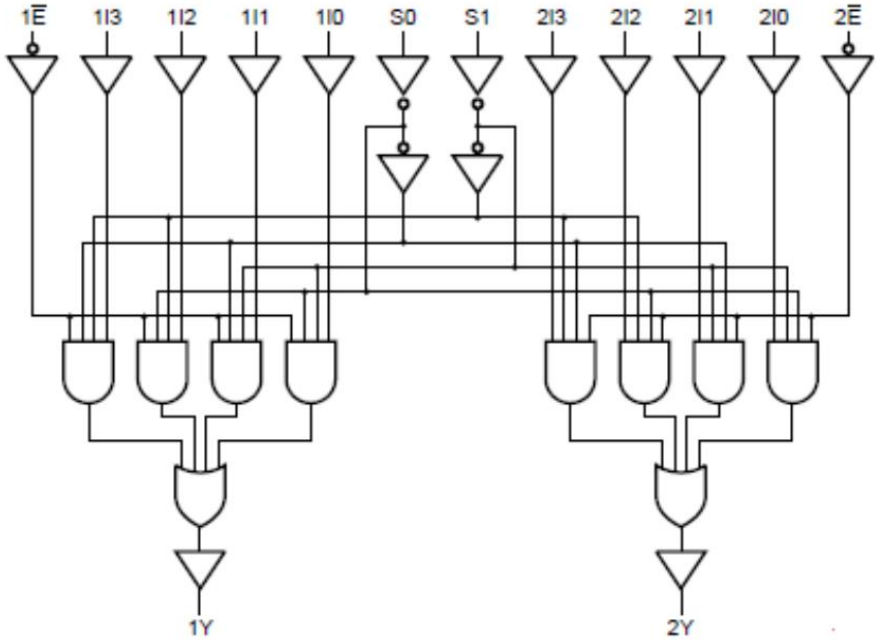
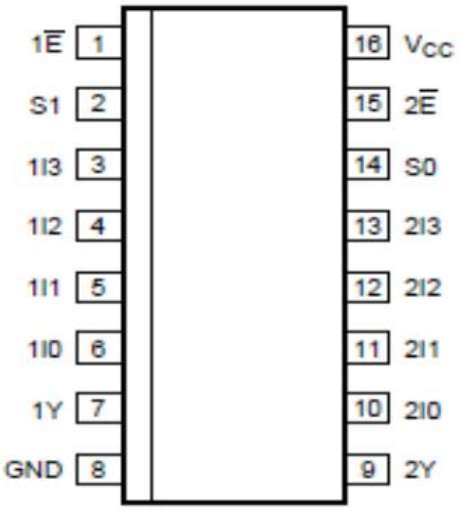



Figure 3. Logic diagram

**Pin Configurations**




**Pin Description**

| Pin No. | Pin Name | Description |
|---|---|---|
| 1 | 1$\overline{E}$ | out enable input(active LOW) |
| 2 | S1 | data select input |
| 3 | 1I3 | data input source1 |
| 4 | 1I2 | data input source1 |
| 5 | 1I1 | data input source1 |
| 6 | 1I0 | data input source1 |
| 7 | 1Y | multiplexer output source1 |
| 8 | GND | ground(0V) |
| 9 | 2Y | multiplexer output source2 |
| 10 | 2I0 | data input source2 |
| 11 | 2I1 | data input source2 |
| 12 | 2I2 | data input source2 |
| 13 | 2I3 | data input source2 |
| 14 | S0 | data select input |
| 15 | 2$\overline{E}$ | out enable input(active LOW) |
| 16 | $V_{CC}$ | supply voltage |

**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.

## Electrical Parameter

**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.

**Recommended Operating Conditions**

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **74HC153** | | | | | | |
| 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 | ℃ |
| **74HCT153** | | | | | | |
| 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 | ℃ |

## Electrical Characteristics

**DC Characteristics 1** (Tamb=25℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| **74HC153** | | | | | | | |
| 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 | $I_I$ | $V_I$=Vcc or GND;$V_{CC}$=6.0V | | - | - | ±0.1 | μA |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| supply current | $I_{CC}$ | $V_I$=$V_{CC}$ or GND;$I_O$=0A;$V_{CC}$=6.0V | | - | - | 8.0 | μA |
| input apacitance | $C_I$ | - | | - | 3.5 | - | pF |
| **74HCT153** | | | | | | | |
| 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 |
| | | | $I_O$=-4.0uA | 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 |
| | | | $I_O$=5.2uA;$V_{CC}$=6.0V | - | 0.15 | 0.26 | V |
| input leakage current | $I_I$ | $V_I$=Vcc or GND;$V_{CC}$=5.5V | | - | - | ±0.1 | μA |
| supply current | $I_{CC}$ | $V_I$=$V_{CC}$ or GND;$I_O$=0A;$V_{CC}$=5.5V | | - | - | 8.0 | μA |
| Additional Supply currend | $\Delta I_{CC}$ | $V_I$=$V_{CC}$-2.1V; other inputs at $V_{CC}$ or GND;$I_O$=0V; $V_{CC}$=4.5V to 5.5V | 1In,2In | - | 45 | 162 | μA |
| | | | n$\overline{E}$ | - | 60 | 216 | μA |
| | | | Sn | - | 135 | 486 | μA |
| input apacitance | $C_I$ | - | | - | 3.5 | - | pF |

**DC Characteristics 2**

(Tamb=-40℃ to +85℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| **74HC153** | | | | | | | |
| 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 | $I_I$ | Vi= $V_{CC}$ or GND;$V_{CC}$=6.0V | | - | - | ±1.0 | μA |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| supply current | $I_{CC}$ | Vi=Vcc or GND;Io=0A;$V_{CC}$=6.0V | | - | - | 80 | μA |
| **74HCT153** | | | | | | | |
| 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 |
| | | | $I_O$=5.2uA;$V_{CC}$=6.0V | - | - | 0.33 | V |
| input leakage current | $I_I$ | $V_I$= $V_{CC}$ or GND;$V_{CC}$=5.5V | | - | - | ±1.0 | μA |
| supply current | $I_{CC}$ | $V_I$=$V_{CC}$ or GND;$I_O$=0A;$V_{CC}$=5.5V | | - | - | 80 | μA |
| additional supply current | $\Delta I_{CC}$ | $V_I$=$V_{CC}$-2.1V; other inputs at $V_{CC}$ or GND;$I_O$=0V; $V_{CC}$=4.5V to 5.5V | 1In,2In | - | - | 203 | μA |
| | | | n$\overline{E}$ | - | - | 270 | μA |
| | | | Sn | - | - | 608 | μA |

**DC Characteristics 3**

(Tamb=-40℃ to +105℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| **74HC153** | | | | | | | |
| 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 | μA |
| supply current | $I_{CC}$ | $V_I$=Vcc or GND;Io=0A;$V_{CC}$=6.0V | | - | - | 160 | μA |
| **74HCT153** | | | | | | | |
| 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 |
| | | | $I_O$=5.2uA;$V_{CC}$=6.0V | - | - | 0.4 | V |
| input leakage current | $I_I$ | $V_I$= $V_{CC}$ or GND;$V_{CC}$=5.5V | | - | - | ±1.0 | μA |
| supply current | $I_{CC}$ | $V_I$=$V_{CC}$ or GND;$I_O$=0A;$V_{CC}$=5.5V | | - | - | 160 | μA |
| additional supply current | $\Delta I_{CC}$ | $V_I$=$V_{CC}$-2.1V; other inputs at $V_{CC}$ or GND;$I_O$=0V; $V_{CC}$=4.5V to 5.5V | 1In,2In | - | - | 221 | μA |
| | | | n$\overline{E}$ | - | - | 294 | μA |
| | | | Sn | - | - | 662 | μA |

**AC Characteristics 1** (Tamb=25℃, GND =0V; $t_r$=$t_f$=6ns; $C_L$=50pF,unless otherwise specified.)

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| **74HC153** | | | | | | | |
| Propagation delay | $t_{pd}$ | 1In to nY,2In to nY; see Figure5[1] | $V_{CC}$=2.0V | - | 47 | 145 | ns |
| | | | $V_{CC}$=4.5V | - | 17 | 29 | ns |
| | | | VCC=5.0V;CL=15pF | - | 14 | - | ns |
| | | | $V_{CC}$=6.0V | - | 14 | 25 | ns |
| | | Sn to nY; see Figure6 | $V_{CC}$=2.0V | - | 50 | 150 | ns |
| | | | $V_{CC}$=4.5V | - | 18 | 30 | ns |
| | | | VCC=5.0V;CL=15pF | - | 15 | - | ns |
| | | | $V_{CC}$=6.0V | - | 14 | 26 | ns |
| | | n$\overline{E}$ to nY see Figure6 | $V_{CC}$=2.0V | - | 33 | 100 | ns |
| | | | $V_{CC}$=4.5V | - | 12 | 20 | ns |
| | | | VCC=5.0V;CL=15pF | - | 10 | - | ns |
| | | | $V_{CC}$=6.0V | - | 10 | 17 | ns |
| transition time | $t_t$ | see Figure5[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 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **74HCT153** | | | | | | | |
| HIGH to LOW proapagation delay | $t_{PHL}$ | 1In to nY,2In to nY; see Figure5[1] | $V_{CC}$=4.5V | - | 19 | 34 | ns |
| | | | $V_{CC}$=5.0V;$C_L$=15pF | - | 16 | - | ns |
| LOW to HIGH proapagation delay | $t_{PLH}$ | 1In to nY,2In to nY; see Figure5 | $V_{CC}$=4.5V | - | 13 | 24 | ns |
| | | | $V_{CC}$=5.0V;$C_L$=15pF | - | 16 | - | ns |
| Propagation delay | $t_{pd}$ | Sn to nY see Figure6 | $V_{CC}$=4.5V | - | 20 | 34 | ns |
| | | | $V_{CC}$=5.0V;$C_L$=15pF | - | 17 | - | ns |
| | | $n\overline{E}$ to nY see Figure6 | $V_{CC}$=4.5V | - | 14 | 27 | ns |
| | | | $V_{CC}$=5.0V;$C_L$=15pF | - | 11 | - | ns |
| transition time | $t_t$ | $V_{CC}$=4.5V;see Figure5[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;

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

**AC Characteristics 2** (Tamb=-40℃ to +85℃,GND=0V; $t_r=t_f$=6ns;$C_L$=50pF, unless otherwise specified.)

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| **74HC153** | | | | | | | |
| Propagation delay | $t_{pd}$ | 1In to nY,2In to nY; see Figure5[1] | $V_{CC}$=2.0V | - | - | 180 | ns |
| | | | $V_{CC}$=4.5V | - | - | 36 | ns |
| | | | $V_{CC}$=6.0V | - | - | 31 | ns |
| | | Sn to nY; see Figure6 | $V_{CC}$=2.0V | - | - | 190 | ns |
| | | | $V_{CC}$=4.5V | - | - | 38 | ns |
| | | | $V_{CC}$=6.0V | - | - | 33 | ns |
| | | $n\overline{E}$ to nY see Figure6 | $V_{CC}$=2.0V | - | - | 125 | ns |
| | | | $V_{CC}$=4.5V | - | - | 25 | ns |
| | | | $V_{CC}$=6.0V | - | - | 21 | ns |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| transition time | $t_t$ | see Figure5[2] | $V_{CC}$=2.0V | - | - | 95 | ns |
| | | | $V_{CC}$=4.5V | - | - | 19 | ns |
| | | | $V_{CC}$=6.0V | - | - | 16 | ns |
| **74HCT153** | | | | | | | |
| HIGH to LOW proapagation delay | $t_{PHL}$ | 1In to nY,2In to nY; see Figure5[1] | $V_{CC}$=4.5V | - | - | 43 | ns |
| LOW to HIGH proapagation delay | $t_{PLH}$ | 1In to nY,2In to nY; see Figure5 | $V_{CC}$=4.5V | - | - | 30 | ns |
| Propagation delay | $t_{pd}$ | Sn to nY see Figure6 | $V_{CC}$=4.5V | - | - | 43 | ns |
| | | $n\overline{E}$ to nY see Figure6 | $V_{CC}$=4.5V | - | - | 34 | ns |
| transition time | $t_t$ | $V_{CC}$=4.5V;see Figure5[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 $t_{TLH}$.

**AC Characteristics 3** (Tamb=-40℃ to +105℃,GND=0V; $t_r$=$t_f$=6ns; $C_L$=50pF, unless otherwise specified.)

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| **74HC153** | | | | | | | |
| Propagation delay | $t_{pd}$ | 1In to nY,2In to nY; see Figure5[1] | $V_{CC}$=2.0V | - | - | 220 | ns |
| | | | $V_{CC}$=4.5V | - | - | 44 | ns |
| | | | $V_{CC}$=6.0V | - | - | 38 | ns |
| | | Sn to nY; see Figure6 | $V_{CC}$=2.0V | - | - | 225 | ns |
| | | | $V_{CC}$=4.5V | - | - | 45 | ns |
| | | | $V_{CC}$=6.0V | - | - | 38 | ns |
| | | $n\overline{E}$ to nY see Figure6 | $V_{CC}$=2.0V | - | - | 150 | ns |
| | | | $V_{CC}$=4.5V | - | - | 30 | ns |
| | | | $V_{CC}$=6.0V | - | - | 26 | ns |
| transition time | $t_t$ | see Figure5[2] | $V_{CC}$=2.0V | - | - | 110 | ns |
| | | | $V_{CC}$=4.5V | - | - | 22 | ns |
| | | | $V_{CC}$=6.0V | - | - | 19 | ns |
| **74HCT153** | | | | | | | |
| HIGH to LOW proapagation delay | $t_{PHL}$ | 1In to nY,2In to nY; see Figure5[1] | $V_{CC}$=4.5V | - | - | 51 | ns |
| LOW to HIGH proapagation delay | $t_{PLH}$ | 1In to nY,2In to nY; see Figure5 | $V_{CC}$=4.5V | - | - | 36 | ns |
| Propagation delay | $t_{pd}$ | Sn to nY see Figure6 | $V_{CC}$=4.5V | - | - | 51 | ns |
| | | $n\overline{E}$ to nY | $V_{CC}$=4.5V | - | - | 41 | ns |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | see Figure6 | | | | | |
| transition time | $t_t$ | $V_{CC}$=4.5V;see Figure5[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 $t_{TLH}$.

## Testing Circuit

**AC Testing Circuit**

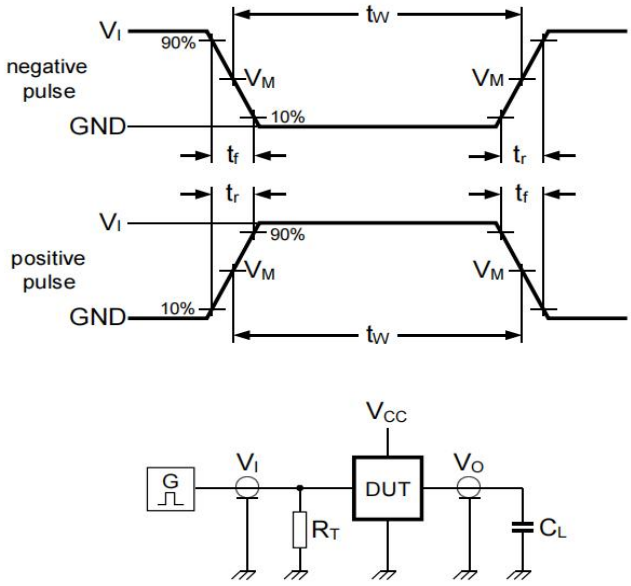



Figure 4. Test circuit for measuring switching times

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.

**AC Testing Waveforms**

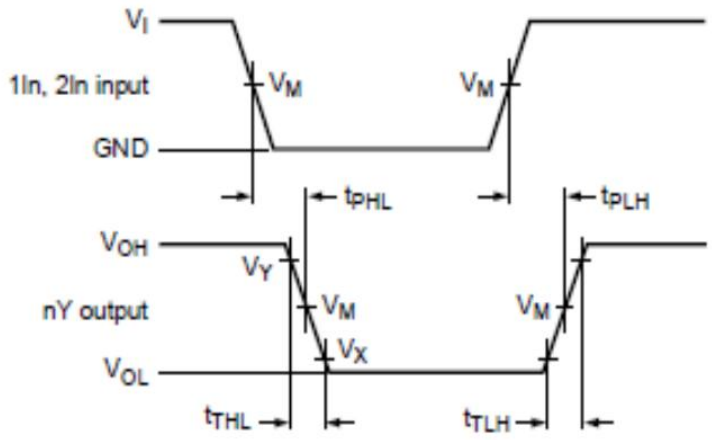



Figure 5. Waveforms showing the input (1In, 2In) to output (1Y, 2Y) propagation delays and output transition times

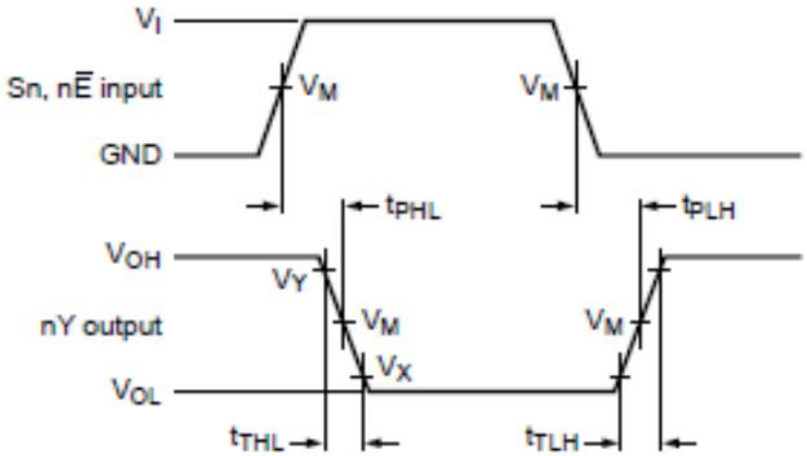



Figure 6. Waveforms showing input (Sn,n$\overline{E}$) to output (nY) propagation delays

**Measurement Points**

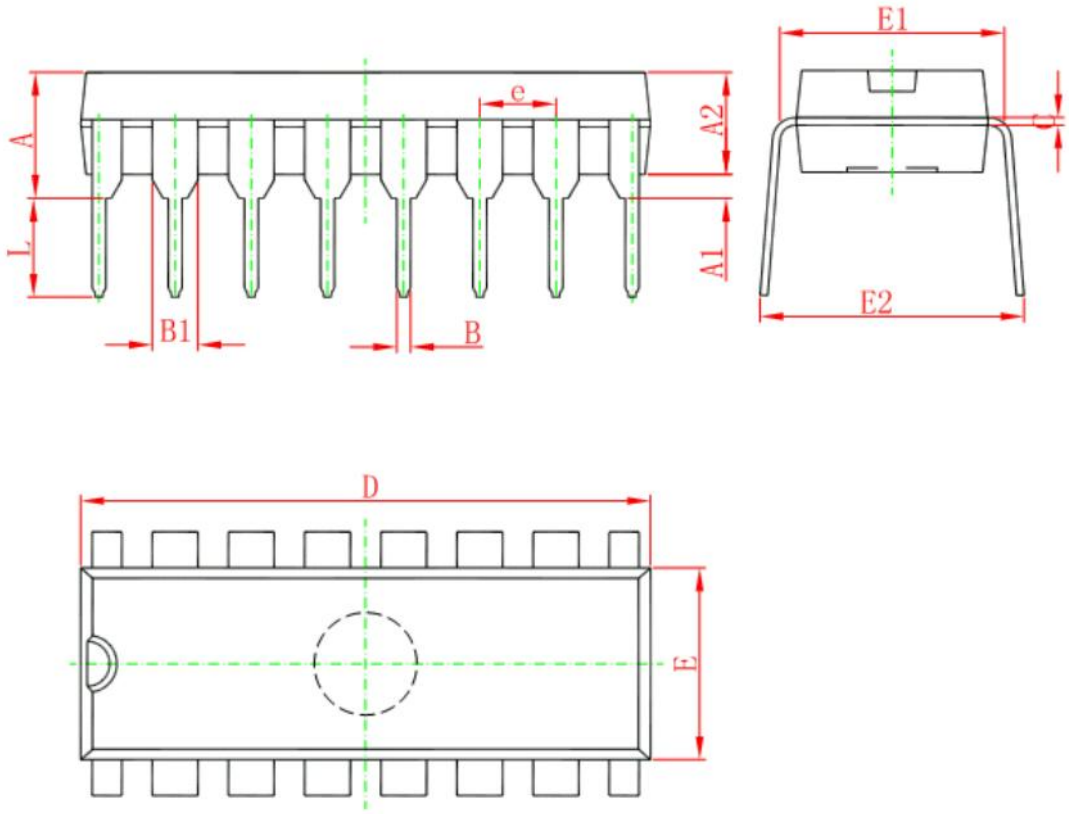
| Type | Input | Output | | |
|---|---|---|---|---|
| | $V_M$ | $V_M$ | $V_X$ | $V_Y$ |
| 74HC153 | 0.5×$V_{CC}$ | 0.5×$V_{CC}$ | 0.1×$V_{CC}$ | 0.9×$V_{CC}$ |
| 74HCT153 | 1.3V | 1.3V | 0.1×$V_{CC}$ | 0.9×$V_{CC}$ |

**Test Data**

| Type | Input | | Load | Test |
|---|---|---|---|---|
| | $V_I$ | $t_r$,$t_f$ | $C_L$ | |
| 74HC153 | $V_{CC}$ | 6.0ns | 15pF,50pF | $t_{PHL}$,$t_{PLH}$ |
| 74HCT153 | 3.0V | 6.0ns | 15pF,50pF | $t_{PHL}$,$t_{PLH}$ |

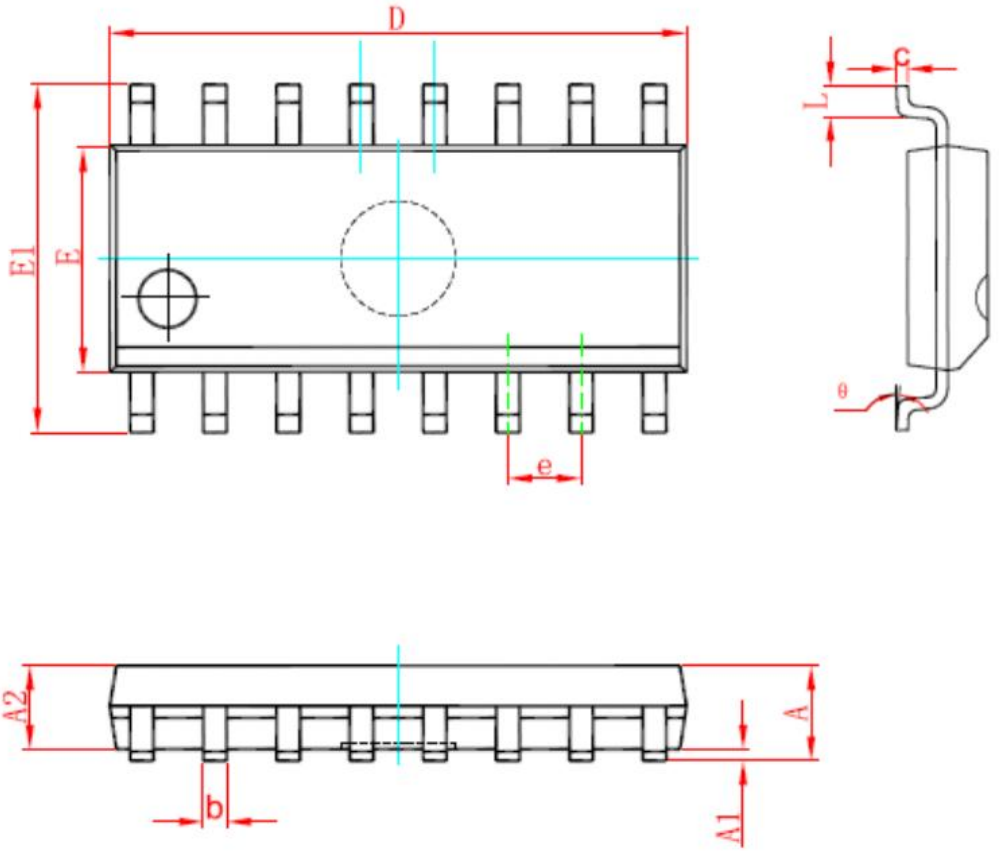
## Package Information

**DIP16**



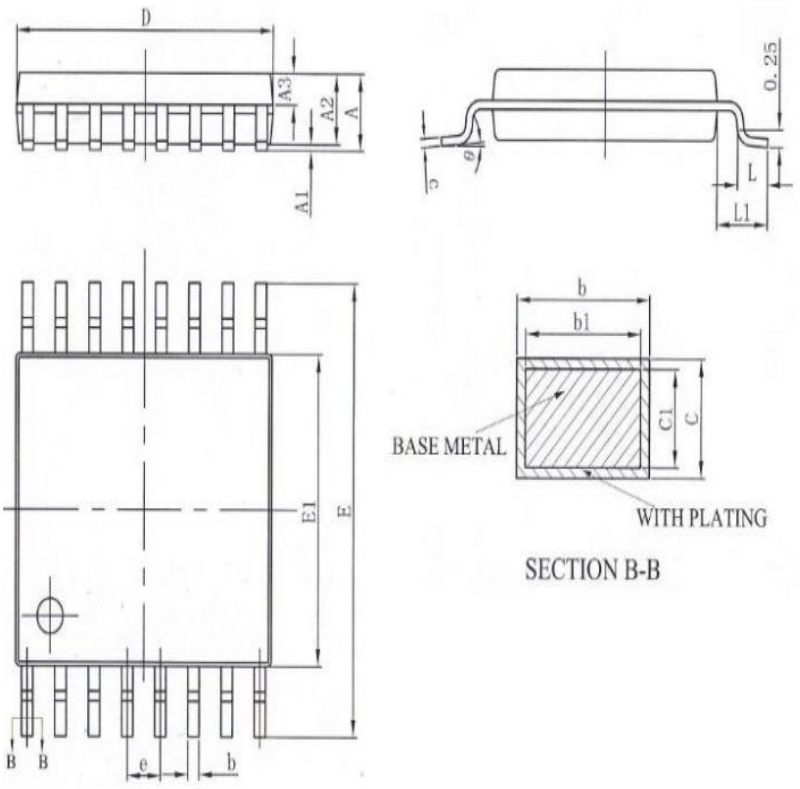

| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 3.710 | 4.310 | 0.146 | 0.170 |
| A1 | 0.510 | | 0.020 | |
| A2 | 3.200 | 3.600 | 0.126 | 0.142 |
| B | 0.380 | 0.570 | 0.015 | 0.022 |
| B1 | 1.524(BSC) | | 0.060(BSC) | |
| C |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

**SOP16**




| Symbol | Dimensions In Millimeters | | Dimens ons 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° |

**TSSOP16**




| SYMBOL | MILLIMETER | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| A | - | - | 1.20 |
| Al | 0.05 | - | 0.15 |
| A2 | 0.90 | 1.00 | 1.05 |
| A3 | 0.39 | 0.44 | 0.49 |
| b | 0.20 | - | 0.28 |
| bl | 0.19 | 0.22 | 0.25 |
| c | 0.13 | - | 0.17 |
| cl | 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° |

## Statements And Notes

| Part name | Hazardous substances or Elements | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Lead and lead compounds | Mercury and mercury compounds | Cadmium and cadmium compounds | Hexavalent chromium compounds | Polybro minated biphenyls | Polybro minated biphenyl ethers | Dibutyl phthalate | Butyl benzyl 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 | | | | | | | | | |

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