

# 74HC14

## DATASHEET

### Specification Revision History:

| Version | Date    | Description                                          |
|---------|---------|------------------------------------------------------|
| V1.0    | 2019/12 | New                                                  |
| V1.1    | 2021/05 | Modify Ordering Information                          |
| V1.2    | 2025/02 | Modify Ordering Information                          |
| V1.3    | 2025/03 | Add application precautions and overall typesetting. |

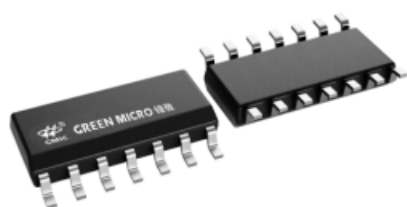
## DESCRIPTION

The 74HC14 is a hex inverter with Schmitt-trigger inputs. This device features reduced input threshold levels to allow interfacing to TTL logic levels. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of  $V_{CC}$ . Schmitt trigger inputs transform slowly changing input signals into sharply defined jitter-free output signals.

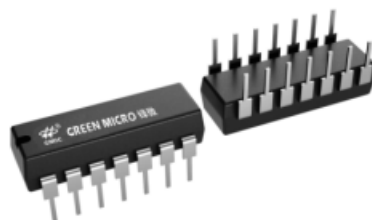
## FEATURES

- Input levels:
  - For 74HC14: CMOS level
  - For 74HC14: TTL level
- Low-power dissipation
- Specified from -40°C to +125°C
- Packaging information: DIP14/SOP14/TSSOP14

## THE APPEARANCE OF THE PRODUCT



SOP-14



DIP-14



TSSOP-14

## ORDERING INFORMATION

| Product Model | Package Type | Marking    | Packing | Packing Qty  |
|---------------|--------------|------------|---------|--------------|
| SN74HC14DS    | SOP-14       | 74HC14 333 | REEL    | 4000PCS/REEL |
| SN74HC14NCD   | DIP-14       | 74HC14 333 | TUBE    | 1000PCS/BOX  |
| SN74HC14PJS   | TSSOP-14     | 74HC14 333 | REEL    | 2500PCS/REEL |

**BLOCK DIAGRAM**

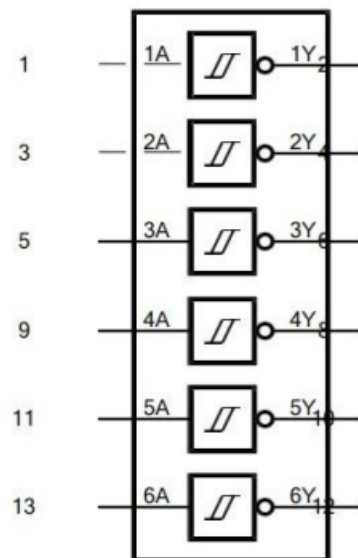


Figure 1. Logic symbol

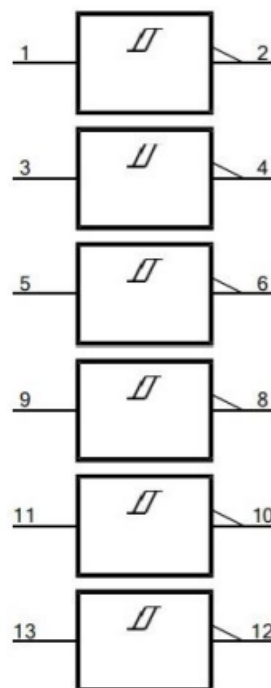
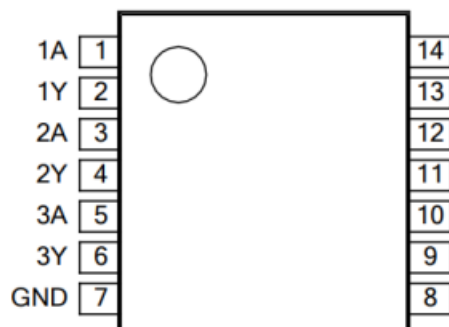


Figure 2. IEC logic symbol



Figure 3. Logic diagram for one gate

## PIN CONFIGURATION AND PIN DESCRIPTION



| Pin No. | Pin Name        | Description    |
|---------|-----------------|----------------|
| 1       | 1A              | data input     |
| 2       | 1Y              | data output    |
| 3       | 2A              | data input     |
| 4       | 2Y              | data output    |
| 5       | 3A              | data input     |
| 6       | 3Y              | data output    |
| 7       | GND             | ground (0V)    |
| 8       | 4Y              | data output    |
| 9       | 4A              | data input     |
| 10      | 5Y              | data output    |
| 11      | 5A              | data input     |
| 12      | 6Y              | data output    |
| 13      | 6A              | data input     |
| 14      | V <sub>CC</sub> | supply voltage |

## FUNCTION TABLE

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

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

## 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       | V    |
| input clamping current  | $I_{IK}$  | $V_I < -0.5V$ or $V_I > V_{CC}+0.5V$ | -         | $\pm 20$ | mA   |
| output clamping current | $I_{OK}$  | $V_O < -0.5V$ or $V_O > V_{CC}+0.5V$ | -         | $\pm 20$ | mA   |
| output current          | $I_O$     | $-0.5V < V_O < V_{CC}+0.5V$          | -         | $\pm 25$ | mA   |
| supply current          | $I_{CC}$  | -                                    | -         | 50       | mA   |
| ground current          | $I_{GND}$ | -                                    | -50       | -        | mA   |
| total power dissipation | $P_{tot}$ | -                                    | -         | 500      | mW   |
| storage temperature     | $T_{stg}$ | -                                    | -65       | +150     | °C   |
| soldering temperature   | $T_L$     | 10s                                  | DIP       | 245      | °C   |
|                         |           |                                      | SOP/TSSOP | 260      |      |

### Recommended Operating Conditions

| Parameter           | Symbol    | Conditions | Min. | Typ. | Max.     | Unit |
|---------------------|-----------|------------|------|------|----------|------|
| 74HC14              |           |            |      |      |          |      |
| 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    |
| ambient temperature | $T_{amb}$ | -          | -40  | -    | +125     | °C   |
| 74HCT14             |           |            |      |      |          |      |
| 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    |
| ambient temperature | $T_{amb}$ | -          | -40  | -    | +125     | °C   |

## Electrical Characteristics

### 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>74HC14</b>             |                 |                                                                                                                                 |                                          |      |         |               |
| HIGH-level output voltage | $V_{OH}$        | $V_I=V_T+ \text{ or } V_{T-}$                                                                                                   | $I_O=-20\mu\text{A}; V_{CC}=2.0\text{V}$ | 1.9  | 2.0     | - V           |
|                           |                 |                                                                                                                                 | $I_O=-20\mu\text{A}; V_{CC}=4.5\text{V}$ | 4.4  | 4.5     | - V           |
|                           |                 |                                                                                                                                 | $I_O=-20\mu\text{A}; V_{CC}=6.0\text{V}$ | 5.9  | 6.0     | - V           |
|                           |                 |                                                                                                                                 | $I_O=-4.0\text{mA}; V_{CC}=4.5\text{V}$  | 3.98 | 4.32    | - V           |
|                           |                 |                                                                                                                                 | $I_O=-5.2\text{mA}; V_{CC}=6.0\text{V}$  | 5.48 | 5.81    | - V           |
| LOW-level output voltage  | $V_{OL}$        | $V_I=V_T+ \text{ or } V_{T-}$                                                                                                   | $I_O=20\mu\text{A}; V_{CC}=2.0\text{V}$  | -    | 0       | 0.1 V         |
|                           |                 |                                                                                                                                 | $I_O=20\mu\text{A}; V_{CC}=4.5\text{V}$  | -    | 0       | 0.1 V         |
|                           |                 |                                                                                                                                 | $I_O=20\mu\text{A}; V_{CC}=6.0\text{V}$  | -    | 0       | 0.1 V         |
|                           |                 |                                                                                                                                 | $I_O=4.0\text{mA}; V_{CC}=4.5\text{V}$   | -    | 0.15    | 0.26 V        |
|                           |                 |                                                                                                                                 | $I_O=5.2\text{mA}; V_{CC}=6.0\text{V}$   | -    | 0.16    | 0.26 V        |
| input leakage current     | $I_I$           | $V_I=V_{CC} \text{ or } \text{GND}; V_{CC}=6.0\text{V}$                                                                         | -                                        | -    | $\pm 1$ | $\mu\text{A}$ |
| supply current            | $I_{CC}$        | $V_I=V_{CC} \text{ or } \text{GND}; I_O=0\text{A}; V_{CC}=6.0\text{V}$                                                          | -                                        | -    | 2.0     | $\mu\text{A}$ |
| input capacitance         | $C_I$           | -                                                                                                                               | -                                        | 3.5  | -       | pF            |
| <b>74HCT14</b>            |                 |                                                                                                                                 |                                          |      |         |               |
| HIGH-level output voltage | $V_{OH}$        | $V_I=V_T+ \text{ or } V_{T-}$                                                                                                   | $I_O=-20\mu\text{A}; V_{CC}=4.5\text{V}$ | 4.4  | 4.5     | - V           |
|                           |                 |                                                                                                                                 | $I_O=-4.0\text{mA}; V_{CC}=4.5\text{V}$  | 3.98 | 4.32    | - V           |
| LOW-level output voltage  | $V_{OL}$        | $V_I=V_T+ \text{ or } V_{T-}$                                                                                                   | $I_O=20\mu\text{A}; V_{CC}=4.5\text{V}$  | -    | 0       | 0.1 V         |
|                           |                 |                                                                                                                                 | $I_O=4.0\text{mA}; V_{CC}=4.5\text{V}$   | -    | 0.15    | 0.26 V        |
| input leakage current     | $I_I$           | $V_I=V_{CC} \text{ or } \text{GND}; V_{CC}=5.5\text{V}$                                                                         | -                                        | -    | $\pm 1$ | $\mu\text{A}$ |
| supply current            | $I_{CC}$        | $V_I=V_{CC} \text{ or } \text{GND}; I_O=0\text{A}; V_{CC}=5.5\text{V}$                                                          | -                                        | -    | 2.0     | $\mu\text{A}$ |
| additional supply current | $\Delta I_{CC}$ | per input pin; $V_I=V_{CC}-2.1\text{V}; I_O=0\text{A}$ ; other inputs at $V_{CC}$ or GND; $V_{CC}=4.5\text{V}$ to $5.5\text{V}$ | -                                        | 30   | 108     | $\mu\text{A}$ |
| input capacitance         | $C_I$           | -                                                                                                                               | -                                        | 3.5  | -       | pF            |

## DC Characteristics 2

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

| Parameter                 | Symbol          | Conditions                                                                                                                |                                 | Min. | Typ. | Max.    | Unit    |
|---------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------|------|------|---------|---------|
| 74HC14                    |                 |                                                                                                                           |                                 |      |      |         |         |
| HIGH-level output voltage | $V_{OH}$        | $V_I = V_T + \text{ or } V_{T-}$                                                                                          | $I_O = -20\mu A; V_{CC} = 2.0V$ | 1.9  | -    | -       | V       |
|                           |                 |                                                                                                                           | $I_O = -20\mu A; V_{CC} = 4.5V$ | 4.4  | -    | -       | V       |
|                           |                 |                                                                                                                           | $I_O = -20\mu A; V_{CC} = 6.0V$ | 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  | $V_{OL}$        | $V_I = V_T + \text{ or } V_{T-}$                                                                                          | $I_O = 20\mu A; V_{CC} = 2.0V$  | -    | -    | 0.1     | V       |
|                           |                 |                                                                                                                           | $I_O = 20\mu A; V_{CC} = 4.5V$  | -    | -    | 0.1     | V       |
|                           |                 |                                                                                                                           | $I_O = 20\mu A; V_{CC} = 6.0V$  | -    | -    | 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     | $I_I$           | $V_I = V_{CC} \text{ or } GND; V_{CC} = 6.0V$                                                                             |                                 | -    | -    | $\pm 1$ | $\mu A$ |
| supply current            | $I_{CC}$        | $V_I = V_{CC} \text{ or } GND; I_O = 0A; V_{CC} = 6.0V$                                                                   |                                 | -    | -    | 20      | $\mu A$ |
| 74HCT14                   |                 |                                                                                                                           |                                 |      |      |         |         |
| HIGH-level output voltage | $V_{OH}$        | $V_I = V_T + \text{ or } V_{T-}$                                                                                          | $I_O = -20\mu A; V_{CC} = 4.5V$ | 4.4  | -    | -       | V       |
|                           |                 |                                                                                                                           | $I_O = -4.0mA; V_{CC} = 4.5V$   | 3.84 | -    | -       | V       |
| LOW-level output voltage  | $V_{OL}$        | $V_I = V_T + \text{ or } V_{T-}$                                                                                          | $I_O = 20\mu A; V_{CC} = 4.5V$  | -    | -    | 0.1     | V       |
|                           |                 |                                                                                                                           | $I_O = 4.0mA; V_{CC} = 4.5V$    | -    | -    | 0.33    | V       |
| input leakage current     | $I_I$           | $V_I = V_{CC} \text{ or } GND; V_{CC} = 5.5V$                                                                             |                                 | -    | -    | $\pm 1$ | $\mu A$ |
| supply current            | $I_{CC}$        | $V_I = V_{CC} \text{ or } GND; I_O = 0A; V_{CC} = 5.5V$                                                                   |                                 | -    | -    | 20      | $\mu A$ |
| additional supply current | $\Delta I_{CC}$ | per input pin; $V_I = V_{CC} - 2.1V; I_O = 0A$ ; other inputs at $V_{CC} \text{ or } GND; V_{CC} = 4.5V \text{ to } 5.5V$ |                                 | -    | -    | 135     | $\mu A$ |

### DC Characteristics 3

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

| Parameter                 | Symbol          | Conditions                                                                                                                |                                 | Min. | Typ. | Max.    | Unit    |
|---------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------|------|------|---------|---------|
| 74HC14                    |                 |                                                                                                                           |                                 |      |      |         |         |
| HIGH-level output voltage | $V_{OH}$        | $V_I = V_T + \text{ or } V_{T-}$                                                                                          | $I_o = -20\mu A; V_{CC} = 2.0V$ | 1.9  | -    | -       | V       |
|                           |                 |                                                                                                                           | $I_o = -20\mu A; V_{CC} = 4.5V$ | 4.4  | -    | -       | V       |
|                           |                 |                                                                                                                           | $I_o = -20\mu A; V_{CC} = 6.0V$ | 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  | $V_{OL}$        | $V_I = V_T + \text{ or } V_{T-}$                                                                                          | $I_o = 20\mu A; V_{CC} = 2.0V$  | -    | -    | 0.1     | V       |
|                           |                 |                                                                                                                           | $I_o = 20\mu A; V_{CC} = 4.5V$  | -    | -    | 0.1     | V       |
|                           |                 |                                                                                                                           | $I_o = 20\mu A; V_{CC} = 6.0V$  | -    | -    | 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     | $I_i$           | $V_i = V_{CC} \text{ or } GND; V_{CC} = 6.0V$                                                                             |                                 | -    | -    | $\pm 1$ | $\mu A$ |
| supply current            | $I_{CC}$        | $V_i = V_{CC} \text{ or } GND; I_o = 0A; V_{CC} = 6.0V$                                                                   |                                 | -    | -    | 40      | $\mu A$ |
| 74HCT14                   |                 |                                                                                                                           |                                 |      |      |         |         |
| HIGH-level output voltage | $V_{OH}$        | $V_i = V_T + \text{ or } V_{T-}$                                                                                          | $I_o = -20\mu A; V_{CC} = 4.5V$ | 4.4  | -    | -       | V       |
|                           |                 |                                                                                                                           | $I_o = -4.0mA; V_{CC} = 4.5V$   | 3.7  | -    | -       | V       |
| LOW-level output voltage  | $V_{OL}$        | $V_i = V_T + \text{ or } V_{T-}$                                                                                          | $I_o = 20\mu A; V_{CC} = 4.5V$  | -    | -    | 0.1     | V       |
|                           |                 |                                                                                                                           | $I_o = 4.0mA; V_{CC} = 4.5V$    | -    | -    | 0.4     | V       |
| input leakage current     | $I_i$           | $V_i = V_{CC} \text{ or } GND; V_{CC} = 5.5V$                                                                             |                                 | -    | -    | $\pm 1$ | $\mu A$ |
| supply current            | $I_{CC}$        | $V_i = V_{CC} \text{ or } GND; I_o = 0A; V_{CC} = 5.5V$                                                                   |                                 | -    | -    | 40      | $\mu A$ |
| additional supply current | $\Delta I_{CC}$ | per input pin; $V_i = V_{CC} - 2.1V; I_o = 0A$ ; other inputs at $V_{CC} \text{ or } GND; V_{CC} = 4.5V \text{ to } 5.5V$ |                                 | -    | -    | 147     | $\mu A$ |

## AC 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 |
|--------------------------------------|--------------------|--------------|------------------------|------|------|------|------|
| 74HC14                               |                    |              |                        |      |      |      |      |
| nA, nB to nY<br>propagation delay    | $t_{PLH}, t_{PHL}$ | see Figure 5 | $V_{CC}=2.0V$          | -    | 41   | 125  | ns   |
|                                      |                    |              | $V_{CC}=4.5V$          | -    | 15   | 25   | ns   |
|                                      |                    |              | $V_{CC}=5.0V;C_L=15pF$ | -    | 12   | -    | ns   |
|                                      |                    |              | $V_{CC}=6.0V$          | -    | 12   | 21   | ns   |
| transition time                      | $t_{THL}, t_{TLH}$ | see Figure 5 | $V_{CC}=2.0V$          | -    | 19   | 75   | ns   |
|                                      |                    |              | $V_{CC}=4.5V$          | -    | 7    | 15   | ns   |
|                                      |                    |              | $V_{CC}=6.0V$          | -    | 6    | 13   | ns   |
| 74HCT14                              |                    |              |                        |      |      |      |      |
| nA, nB to nY<br>propagation<br>delay | $t_{PLH}, t_{PHL}$ | see Figure 5 | $V_{CC}=4.5V$          | -    | 20   | 34   | ns   |
|                                      |                    |              | $V_{CC}=5.0V;C_L=15pF$ | -    | 17   | -    | ns   |
| transition time                      | $t_{THL}, t_{TLH}$ | see Figure 5 | $V_{CC}=4.5V$          | -    | 7    | 15   | ns   |

## AC Characteristics 2

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

| Parameter                         | Symbol             | Conditions   |               | Min. | Typ. | Max. | Unit |
|-----------------------------------|--------------------|--------------|---------------|------|------|------|------|
| 74HC14                            |                    |              |               |      |      |      |      |
| nA, nB to nY<br>propagation delay | $t_{PLH}, t_{PHL}$ | see Figure 5 | $V_{CC}=2.0V$ | -    | -    | 155  | ns   |
|                                   |                    |              | $V_{CC}=4.5V$ | -    | -    | 31   | ns   |
|                                   |                    |              | $V_{CC}=6.0V$ | -    | -    | 26   | ns   |
| transition time                   | $t_{THL}, t_{TLH}$ | see Figure 5 | $V_{CC}=2.0V$ | -    | -    | 95   | ns   |
|                                   |                    |              | $V_{CC}=4.5V$ | -    | -    | 19   | ns   |
|                                   |                    |              | $V_{CC}=6.0V$ | -    | -    | 15   | ns   |
| 74HCT14                           |                    |              |               |      |      |      |      |
| nA, nB to nY<br>propagation delay | $t_{PLH}, t_{PHL}$ | see Figure 5 | $V_{CC}=4.5V$ | -    | -    | 43   | ns   |
| transition time                   | $t_{THL}, t_{TLH}$ | see Figure 5 | $V_{CC}=4.5V$ | -    | -    | 19   | ns   |

## AC Characteristics 3

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

| Parameter                            | Symbol             | Conditions   | Min.          | Typ. | Max. | Unit |    |
|--------------------------------------|--------------------|--------------|---------------|------|------|------|----|
| 74HC14                               |                    |              |               |      |      |      |    |
| nA, nB to nY<br>propagation delay    | $t_{PLH}, t_{PHL}$ | see Figure 5 | $V_{CC}=2.0V$ | -    | -    | 190  | ns |
|                                      |                    |              | $V_{CC}=4.5V$ | -    | -    | 38   | ns |
|                                      |                    |              | $V_{CC}=6.0V$ | -    | -    | 32   | ns |
| transition time                      | $t_{THL}, t_{TLH}$ | see Figure 5 | $V_{CC}=2.0V$ | -    | -    | 110  | ns |
|                                      |                    |              | $V_{CC}=4.5V$ | -    | -    | 22   | ns |
|                                      |                    |              | $V_{CC}=6.0V$ | -    | -    | 19   | ns |
| 74HCT14                              |                    |              |               |      |      |      |    |
| nA, nB to nY<br>propagation<br>delay | $t_{PLH}, t_{PHL}$ | see Figure 5 | $V_{CC}=4.5V$ | -    | -    | 51   | ns |
| transition time                      | $t_{THL}, t_{TLH}$ | see Figure 5 | $V_{CC}=4.5V$ | -    | -    | 22   | ns |

## Transfer 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 |
|-------------------------------------|-----------------|-----------------------|------|------|------|------|
| 74HC14                              |                 |                       |      |      |      |      |
| positive-going<br>threshold voltage | V <sub>T+</sub> | V <sub>cc</sub> =2.0V | 0.7  | 1.18 | 1.5  | V    |
|                                     |                 | V <sub>cc</sub> =4.5V | 1.7  | 2.38 | 3.15 | V    |
|                                     |                 | V <sub>cc</sub> =6.0V | 2.1  | 3.14 | 4.2  | V    |
| negative-going<br>threshold voltage | V <sub>T-</sub> | V <sub>cc</sub> =2.0V | 0.3  | 0.52 | 0.9  | V    |
|                                     |                 | V <sub>cc</sub> =4.5V | 0.9  | 1.4  | 2.0  | V    |
|                                     |                 | V <sub>cc</sub> =6.0V | 1.2  | 1.89 | 2.6  | V    |
| hysteresis voltage                  | V <sub>H</sub>  | V <sub>cc</sub> =2.0V | -    | 0.66 | -    | V    |
|                                     |                 | V <sub>cc</sub> =4.5V | -    | 0.98 | -    | V    |
|                                     |                 | V <sub>cc</sub> =6.0V | -    | 1.25 | -    | V    |
| 74HCT14                             |                 |                       |      |      |      |      |
| positive-going<br>threshold voltage | V <sub>T+</sub> | V <sub>cc</sub> =4.5V | 1.2  | 1.41 | 1.9  | V    |
|                                     |                 | V <sub>cc</sub> =5.5V | 1.4  | 1.59 | 2.1  | V    |
| negative-going<br>threshold voltage | V <sub>T-</sub> | V <sub>cc</sub> =4.5V | 0.5  | 0.85 | 1.2  | V    |
|                                     |                 | V <sub>cc</sub> =5.5V | 0.6  | 0.99 | 1.4  | V    |
| hysteresis voltage                  | V <sub>H</sub>  | V <sub>cc</sub> =4.5V | -    | 0.56 | -    | V    |
|                                     |                 | V <sub>cc</sub> =5.5V | -    | 0.6  | -    | V    |

**Transfer Characteristics 2** ( $T_{amb} = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ , voltages are referenced to GND (ground=0V), unless otherwise specified.)

| Parameter                        | Symbol          | Conditions            | Min. | Typ. | Max. | Unit |
|----------------------------------|-----------------|-----------------------|------|------|------|------|
| 74HC14                           |                 |                       |      |      |      |      |
| positive-going threshold voltage | V <sub>T+</sub> | V <sub>CC</sub> =2.0V | 0.7  | -    | 1.5  | V    |
|                                  |                 | V <sub>CC</sub> =4.5V | 1.7  | -    | 3.15 | V    |
|                                  |                 | V <sub>CC</sub> =6.0V | 2.1  | -    | 4.2  | V    |
| negative-going threshold voltage | V <sub>T-</sub> | V <sub>CC</sub> =2.0V | 0.3  | -    | 0.9  | V    |
|                                  |                 | V <sub>CC</sub> =4.5V | 0.9  | -    | 2.0  | V    |
|                                  |                 | V <sub>CC</sub> =6.0V | 1.2  | -    | 2.6  | V    |
| hysteresis voltage               | V <sub>H</sub>  | V <sub>CC</sub> =2.0V | -    | 0.66 | -    | V    |
|                                  |                 | V <sub>CC</sub> =4.5V | -    | 0.98 | -    | V    |
|                                  |                 | V <sub>CC</sub> =6.0V | -    | 1.25 | -    | V    |
| 74HCT14                          |                 |                       |      |      |      |      |
| positive-going threshold voltage | V <sub>T+</sub> | V <sub>CC</sub> =4.5V | 1.2  | -    | 1.9  | V    |
|                                  |                 | V <sub>CC</sub> =5.5V | 1.4  | -    | 2.1  | V    |
| negative-going threshold voltage | V <sub>T-</sub> | V <sub>CC</sub> =4.5V | 0.5  | -    | 1.2  | V    |
|                                  |                 | V <sub>CC</sub> =5.5V | 0.6  | -    | 1.4  | V    |
| hysteresis voltage               | V <sub>H</sub>  | V <sub>CC</sub> =4.5V | -    | 0.56 | -    | V    |
|                                  |                 | V <sub>CC</sub> =5.5V | -    | 0.6  | -    | V    |

**Transfer Characteristics 3** ( $T_{amb} = -40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ , voltages are referenced to GND (ground=0V), unless otherwise specified.)

| Parameter                        | Symbol          | Conditions            | Min. | Typ. | Max. | Unit |
|----------------------------------|-----------------|-----------------------|------|------|------|------|
| 74HC14                           |                 |                       |      |      |      |      |
| positive-going threshold voltage | V <sub>T+</sub> | V <sub>CC</sub> =2.0V | 0.7  | -    | 1.5  | V    |
|                                  |                 | V <sub>CC</sub> =4.5V | 1.7  | -    | 3.15 | V    |
|                                  |                 | V <sub>CC</sub> =6.0V | 2.1  | -    | 4.2  | V    |
| negative-going threshold voltage | V <sub>T-</sub> | V <sub>CC</sub> =2.0V | 0.3  | -    | 0.9  | V    |
|                                  |                 | V <sub>CC</sub> =4.5V | 0.9  | -    | 2.0  | V    |
|                                  |                 | V <sub>CC</sub> =6.0V | 1.2  | -    | 2.6  | V    |
| hysteresis voltage               | V <sub>H</sub>  | V <sub>CC</sub> =2.0V | -    | 0.66 | -    | V    |
|                                  |                 | V <sub>CC</sub> =4.5V | -    | 0.98 | -    | V    |
|                                  |                 | V <sub>CC</sub> =6.0V | -    | 1.25 | -    | V    |
| 74HCT14                          |                 |                       |      |      |      |      |
| positive-going threshold voltage | V <sub>T+</sub> | V <sub>CC</sub> =4.5V | 1.2  | -    | 1.9  | V    |
|                                  |                 | V <sub>CC</sub> =5.5V | 1.4  | -    | 2.1  | V    |
| negative-going threshold voltage | V <sub>T-</sub> | V <sub>CC</sub> =4.5V | 0.5  | -    | 1.2  | V    |
|                                  |                 | V <sub>CC</sub> =5.5V | 0.6  | -    | 1.4  | V    |
| hysteresis voltage               | V <sub>H</sub>  | V <sub>CC</sub> =4.5V | -    | 0.56 | -    | V    |
|                                  |                 | V <sub>CC</sub> =5.5V | -    | 0.6  | -    | V    |

## Testing Circuit

### AC Testing Circuit

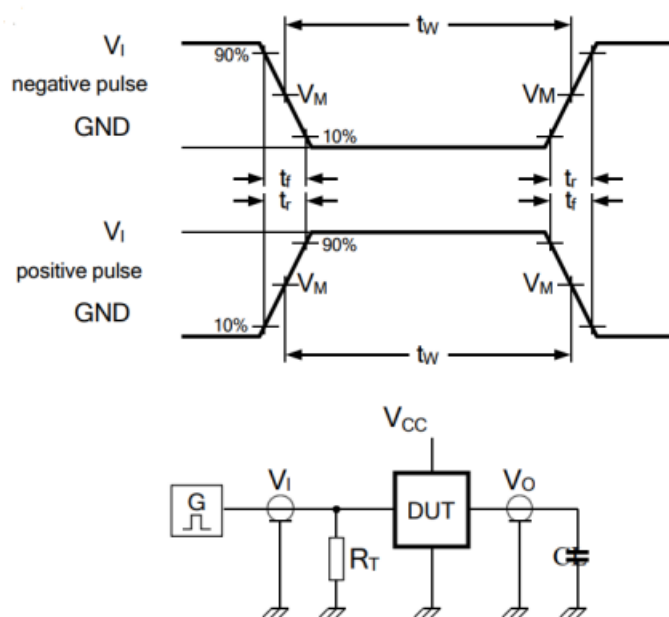


Figure 4. Test circuit for measuring switching times

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

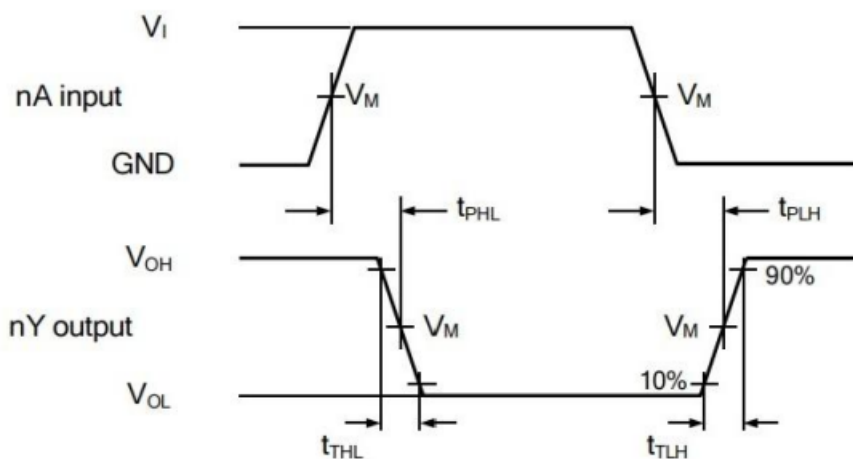


Figure 5. Input to output propagation delays

## Transfer Characteristics Waveforms

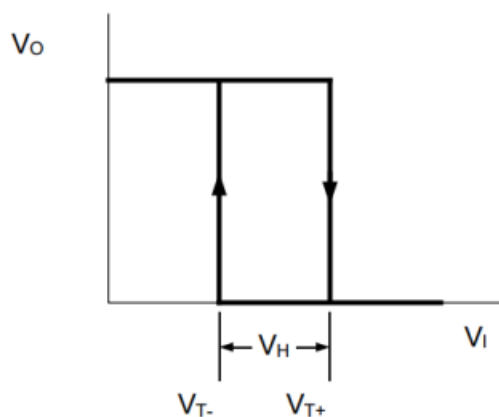


Figure 6. Transfer characteristics

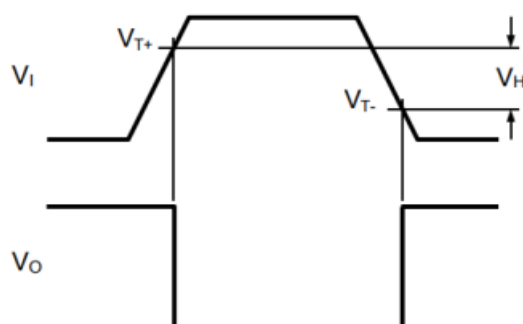


Figure 7. Transfer characteristics definitions

## Measurement Points

| Type    | Input               | Output              |                     |                     |
|---------|---------------------|---------------------|---------------------|---------------------|
|         | $V_M$               | $V_M$               | $V_X$               | $V_Y$               |
| 74HC14  | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ | $0.1 \times V_{CC}$ | $0.9 \times V_{CC}$ |
| 74HCT14 | 1.3V                | 1.3V                | $0.1 \times V_{CC}$ | $0.9 \times V_{CC}$ |

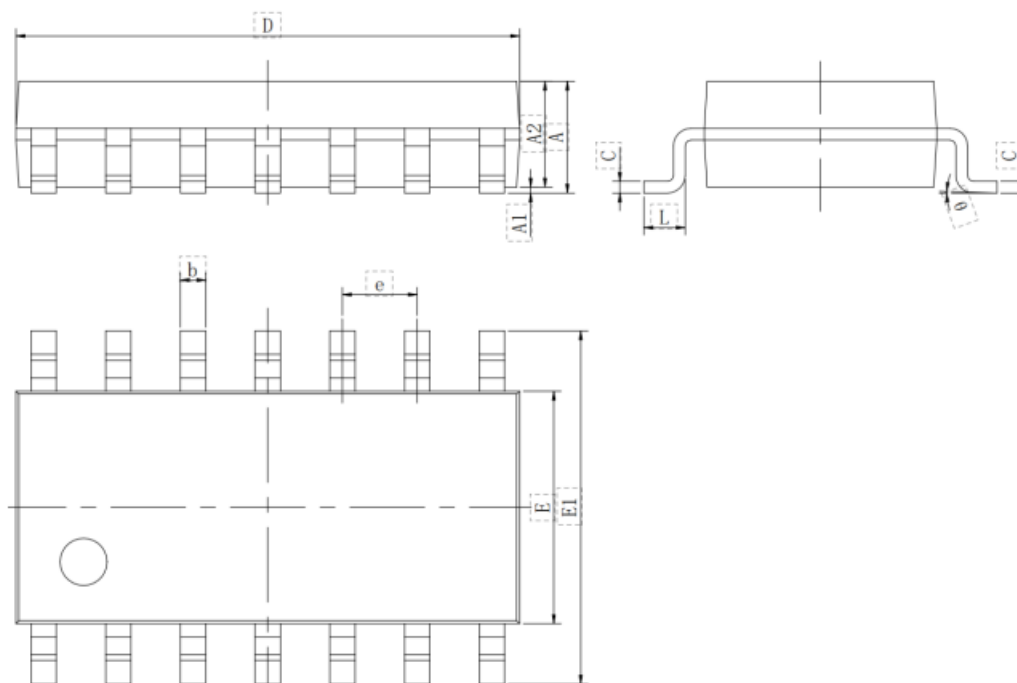
## Test Data

| Type    | Input    |            | Load       | Test               |
|---------|----------|------------|------------|--------------------|
|         | $V_I$    | $t_r, t_f$ | $C_L$      |                    |
| 74HC14  | $V_{CC}$ | 6.0ns      | 15pF, 50pF | $t_{PLH}, t_{PHL}$ |
| 74HCT14 | 3.0V     | 6.0ns      | 15pF, 50pF | $t_{PLH}, t_{PHL}$ |

# Outline Dimensions

SOP-14

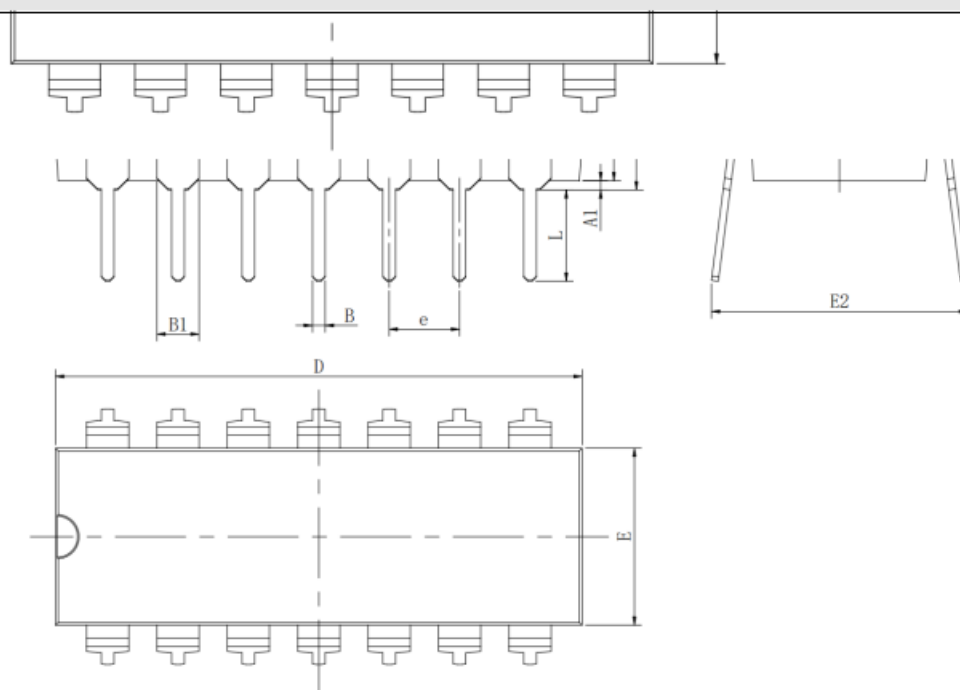
Unit : mm



| 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      | 8.360                     | 8.760 | 0.329                | 0.345 |
| 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 °   |

DIP14

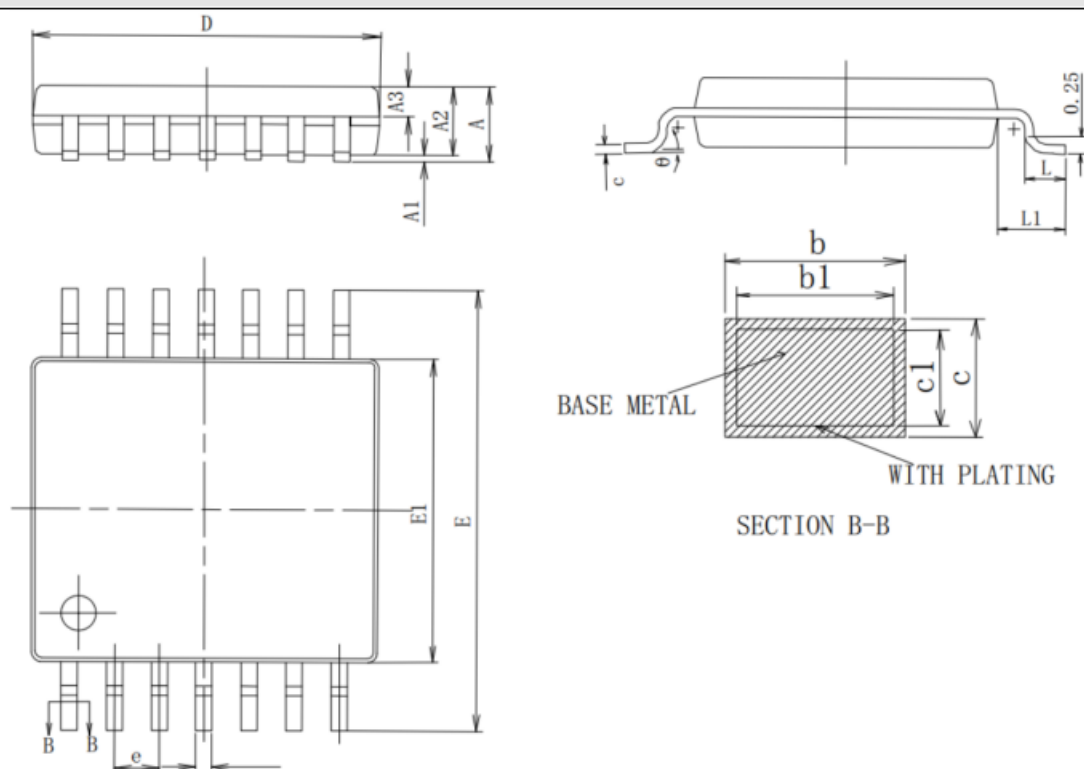
Unit:mm



| 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 |

**TSSOP-14**

**Unit:mm**



| 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 |
| E1     | 4.30       | 4.40 | 4.50 |
| E      | 6.20       | 6.40 | 6.60 |
| e      | 0.65BSC    |      |      |
| L      | 0.45       | 0.60 | 0.75 |
| L1     | 1.00BSC    |      |      |
| θ      | 0          | —    | 8°   |

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