

# RD74HC14A

## Hex Schmitt-trigger Inverters

R07DS0046EJ0100

Rev.1.00

Jul 20, 2010

### Features

- High Speed Operation:  $t_{pd} = 10.5 \text{ ns typ}$  ( $C_L = 50 \text{ pF}$ )
- High Output Current: Fanout of 10 LSTTL Loads
- Wide Operating Voltage:  $V_{CC} = 2 \text{ to } 6 \text{ V}$
- Low Input Current:  $1 \mu\text{A max}$
- Low Quiescent Supply Current:  $I_{CC} \text{ (static)} = 1 \mu\text{A max}$  ( $T_a = 25^\circ\text{C}$ )
- Ordering Information

| Part Name     | Package Type       | Package Code<br>(Previous Code) | Package<br>Abbreviation | Taping Abbreviation<br>(Quantity) | Surface<br>Treatment |
|---------------|--------------------|---------------------------------|-------------------------|-----------------------------------|----------------------|
| RD74HC14APT0  | DILP-14 pin        | PRDP0014AB-B<br>(DP-14AV)       | P                       | —                                 | 0 (Ni/Pd/Au)         |
| RD74HC14AFPH0 | SOP-14 pin (JEITA) | PRSP0014DF-B<br>(FP-14DAV)      | FP                      | H (2,000 pcs/reel)                | 0 (Ni/Pd/Au)         |
| RD74HC14ARPH0 | SOP-14 pin (JEDEC) | PRSP0014DE-A<br>(FP-14DNV)      | RP                      | H (2,500 pcs/reel)                | 0 (Ni/Pd/Au)         |

Note: Please consult the sales office for the above package availability.

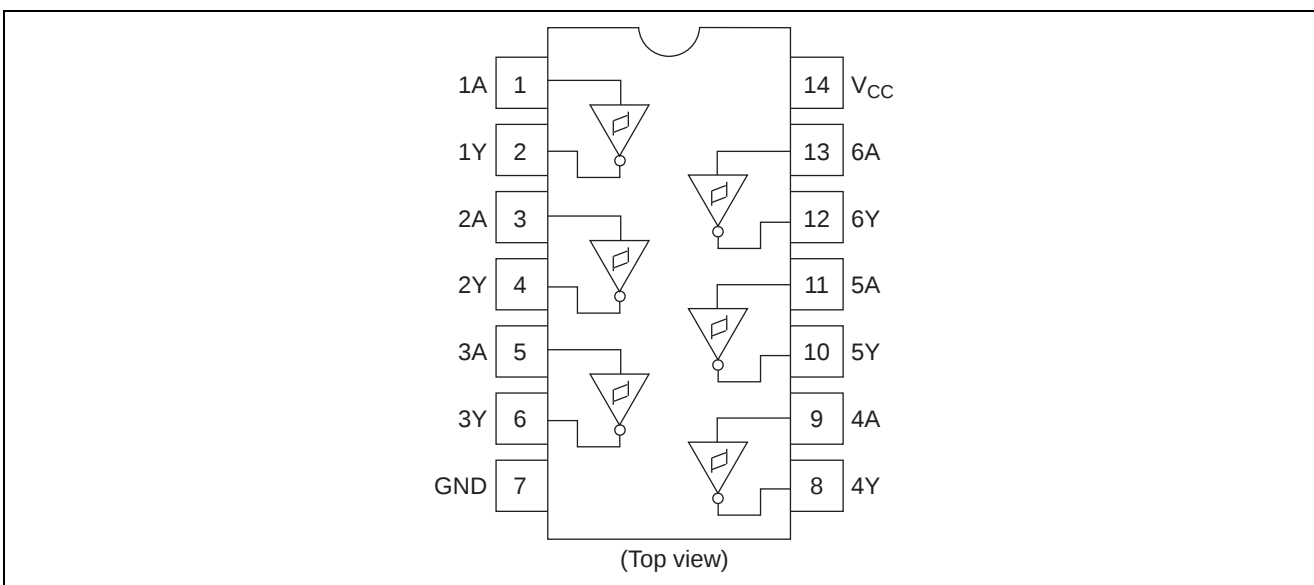
### Function Table

| Input | Output |
|-------|--------|
| A     | Y      |
| L     | H      |
| H     | L      |

H : High level

L : Low level

### Pin Arrangement



## Absolute Maximum Ratings

| Item                         | Symbol                | Ratings                | Unit | Conditions |
|------------------------------|-----------------------|------------------------|------|------------|
| Supply voltage range         | $V_{CC}$              | -0.5 to 7.0            | V    |            |
| Input / Output voltage       | $V_{in}, V_{out}$     | -0.5 to $V_{CC} + 0.5$ | V    |            |
| Input / Output diode current | $I_{IK}, I_{OK}$      | $\pm 20$               | mA   |            |
| Output current               | $I_O$                 | $\pm 25$               | mA   |            |
| $V_{CC}$ , GND current       | $I_{CC}$ or $I_{GND}$ | $\pm 50$               | mA   |            |
| Power dissipation            | $P_T$                 | 1185                   | mW   | DIP        |
|                              |                       | 785                    | mW   | SOP        |
|                              |                       | 500                    | mW   | TSSOP      |
| Storage temperature          | $T_{stg}$             | -65 to +150            | °C   |            |

Note: The absolute maximum ratings are values, which must not individually be exceeded, and furthermore, no two of which may be realized at the same time.

## Recommended Operating Conditions

| Item                                 | Symbol            | Ratings        | Unit | Conditions              |
|--------------------------------------|-------------------|----------------|------|-------------------------|
| Supply voltage                       | $V_{CC}$          | 2 to 6         | V    |                         |
| Input / Output voltage               | $V_{IN}, V_{OUT}$ | 0 to $V_{CC}$  | V    |                         |
| Operating temperature                | $T_a$             | -40 to 85      | °C   |                         |
| Input rise / fall time <sup>*1</sup> | $t_r, t_f$        | 0 to unlimited | ns   | $V_{CC} = 2.0\text{ V}$ |
|                                      |                   | 0 to unlimited |      | $V_{CC} = 4.5\text{ V}$ |
|                                      |                   | 0 to unlimited |      | $V_{CC} = 6.0\text{ V}$ |

Note: 1. This item guarantees maximum limit when one input switches.

Waveform: Refer to test circuit of switching characteristics.

## Electrical Characteristics

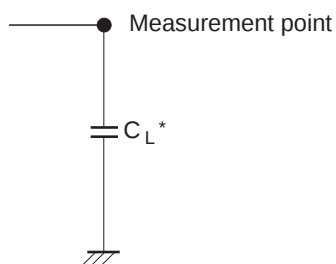
| Item                     | Symbol   | $V_{CC}$ (V) | $T_a = 25^\circ\text{C}$ |     |           | $T_a = -40\text{ to }+85^\circ\text{C}$ |           | Unit          | Test Conditions                                                   |                                   |
|--------------------------|----------|--------------|--------------------------|-----|-----------|-----------------------------------------|-----------|---------------|-------------------------------------------------------------------|-----------------------------------|
|                          |          |              | Min                      | Typ | Max       | Min                                     | Max       |               |                                                                   |                                   |
| Threshold voltage        | $V_T^+$  | 2.0          | —                        | —   | 1.5       | —                                       | 1.5       | V             |                                                                   |                                   |
|                          |          | 4.5          | —                        | —   | 3.15      | —                                       | 3.15      |               |                                                                   |                                   |
|                          |          | 6.0          | —                        | —   | 4.2       | —                                       | 4.2       |               |                                                                   |                                   |
|                          | $V_T^-$  | 2.0          | 0.3                      | —   | —         | 0.3                                     | —         | V             |                                                                   |                                   |
|                          |          | 4.5          | 0.9                      | —   | —         | 0.9                                     | —         |               |                                                                   |                                   |
|                          |          | 6.0          | 1.2                      | —   | —         | 1.2                                     | —         |               |                                                                   |                                   |
| Hysteresis voltage       | $V_H$    | 2.0          | 0.2                      | —   | 1.2       | 0.2                                     | 1.2       | V             |                                                                   |                                   |
|                          |          | 4.5          | 0.4                      | —   | 2.25      | 0.4                                     | 2.25      |               |                                                                   |                                   |
|                          |          | 6.0          | 0.6                      | —   | 3.0       | 0.6                                     | 3.0       |               |                                                                   |                                   |
| Output voltage           | $V_{OH}$ | 2.0          | 1.9                      | 2.0 | —         | 1.9                                     | —         | V             | $V_{in} = V_{IH} \text{ or } V_{IL}$                              | $I_{OH} = -20\text{ }\mu\text{A}$ |
|                          |          | 4.5          | 4.4                      | 4.5 | —         | 4.4                                     | —         |               |                                                                   |                                   |
|                          |          | 6.0          | 5.9                      | 6.0 | —         | 5.9                                     | —         |               |                                                                   |                                   |
|                          |          | 4.5          | 4.18                     | —   | —         | 4.13                                    | —         |               |                                                                   | $I_{OH} = -4\text{ mA}$           |
|                          |          | 6.0          | 5.68                     | —   | —         | 5.63                                    | —         |               |                                                                   | $I_{OH} = -5.2\text{ mA}$         |
|                          | $V_{OL}$ | 2.0          | —                        | 0.0 | 0.1       | —                                       | 0.1       | V             | $V_{in} = V_{IH} \text{ or } V_{IL}$                              | $I_{OL} = 20\text{ }\mu\text{A}$  |
|                          |          | 4.5          | —                        | 0.0 | 0.1       | —                                       | 0.1       |               |                                                                   |                                   |
|                          |          | 6.0          | —                        | 0.0 | 0.1       | —                                       | 0.1       |               |                                                                   |                                   |
|                          |          | 4.5          | —                        | —   | 0.26      | —                                       | 0.33      |               |                                                                   | $I_{OL} = 4\text{ mA}$            |
|                          |          | 6.0          | —                        | —   | 0.26      | —                                       | 0.33      |               |                                                                   | $I_{OL} = 5.2\text{ mA}$          |
| Input current            | $I_{in}$ | 6.0          | —                        | —   | $\pm 0.1$ | —                                       | $\pm 1.0$ | $\mu\text{A}$ | $V_{in} = V_{CC} \text{ or } GND$                                 |                                   |
| Quiescent supply current | $I_{CC}$ | 6.0          | —                        | —   | 1.0       | —                                       | 10        | $\mu\text{A}$ | $V_{in} = V_{CC} \text{ or } GND, I_{out} = 0\text{ }\mu\text{A}$ |                                   |

## Switching Characteristics

( $C_L = 50$  pF, Input  $t_r = t_f = 6$  ns)

| Item                   | Symbol           | V <sub>CC</sub> (V) | Ta = 25°C |     |     | Ta = −40 to +85°C |     | Unit | Test Conditions |
|------------------------|------------------|---------------------|-----------|-----|-----|-------------------|-----|------|-----------------|
|                        |                  |                     | Min       | Typ | Max | Min               | Max |      |                 |
| Propagation delay time | t <sub>PLH</sub> | 2.0                 | —         | —   | 125 | —                 | 155 | ns   |                 |
|                        |                  | 4.5                 | —         | 10  | 25  | —                 | 31  |      |                 |
|                        |                  | 6.0                 | —         | —   | 21  | —                 | 26  |      |                 |
|                        | t <sub>PHL</sub> | 2.0                 | —         | —   | 125 | —                 | 155 | ns   |                 |
|                        |                  | 4.5                 | —         | 11  | 25  | —                 | 31  |      |                 |
|                        |                  | 6.0                 | —         | —   | 21  | —                 | 26  |      |                 |
| Output rise time       | t <sub>TLH</sub> | 2.0                 | —         | —   | 75  | —                 | 95  | ns   |                 |
|                        |                  | 4.5                 | —         | 5   | 15  | —                 | 19  |      |                 |
|                        |                  | 6.0                 | —         | —   | 13  | —                 | 16  |      |                 |
| Output fall time       | t <sub>THL</sub> | 2.0                 | —         | —   | 75  | —                 | 95  | ns   |                 |
|                        |                  | 4.5                 | —         | 5   | 15  | —                 | 19  |      |                 |
|                        |                  | 6.0                 | —         | —   | 13  | —                 | 16  |      |                 |
| Input capacitance      | C <sub>in</sub>  | —                   | —         | 5   | 10  | —                 | 10  | pF   |                 |

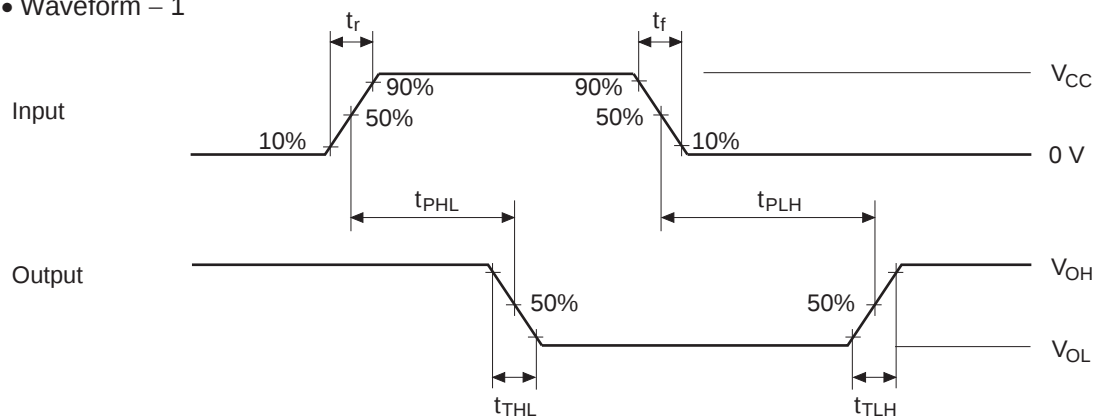
## Test Circuit



Note:  $C_L$  includes the probe and jig capacitance.

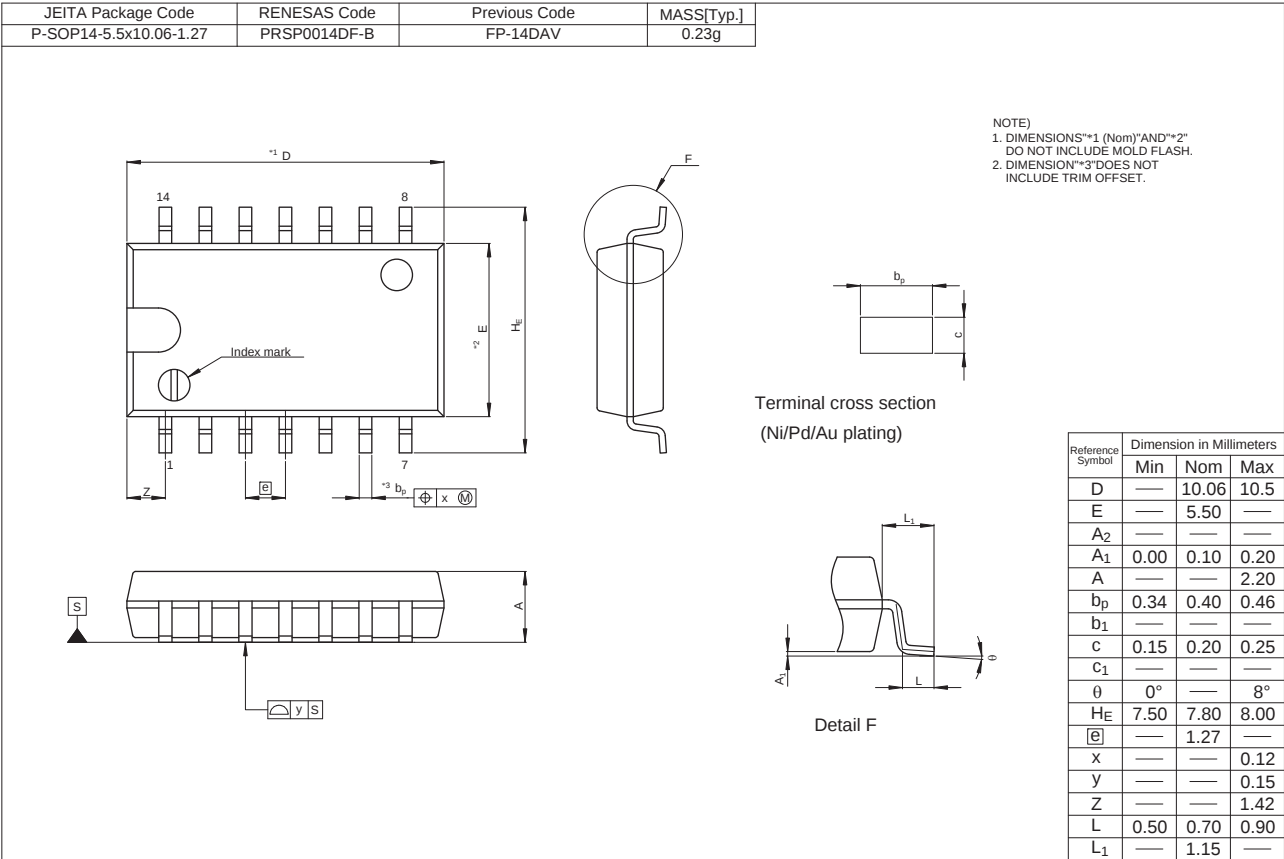
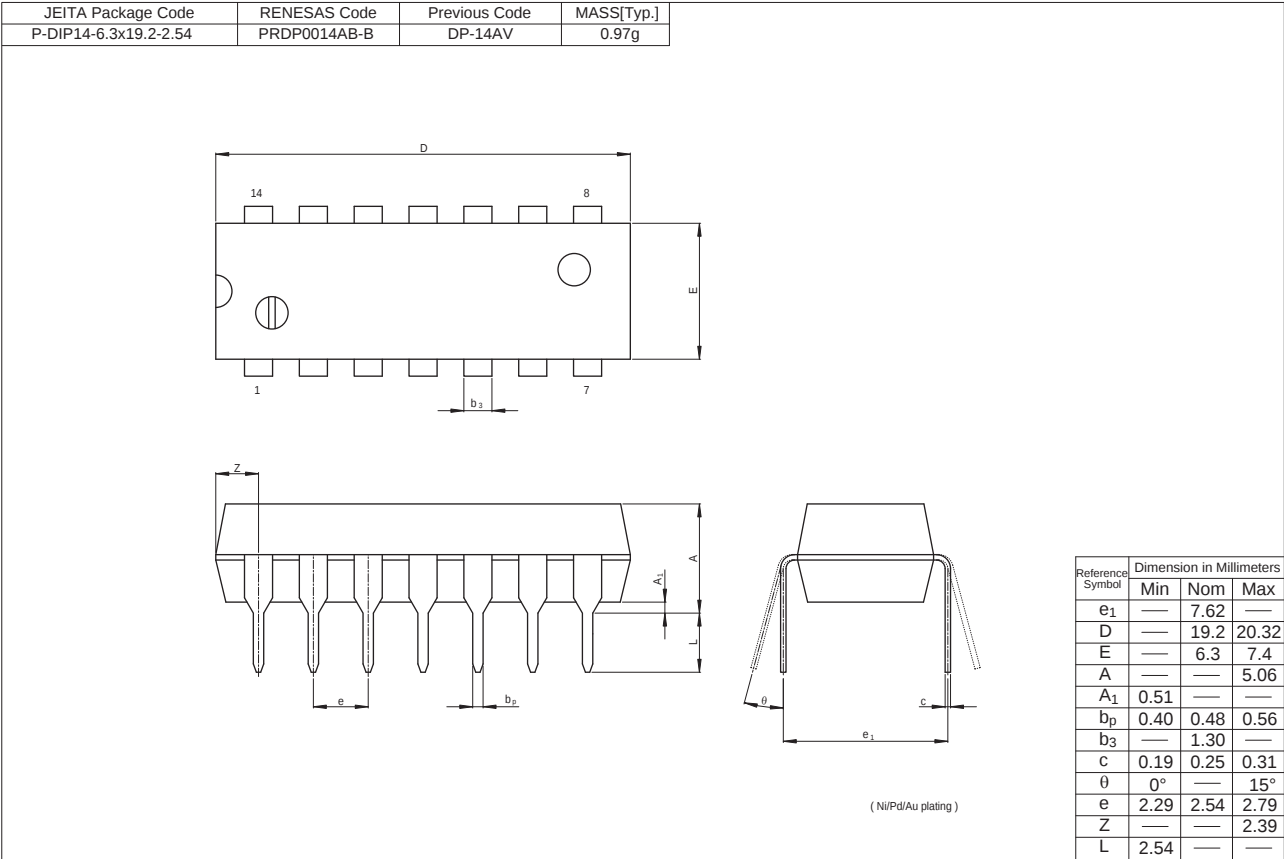
## Waveforms

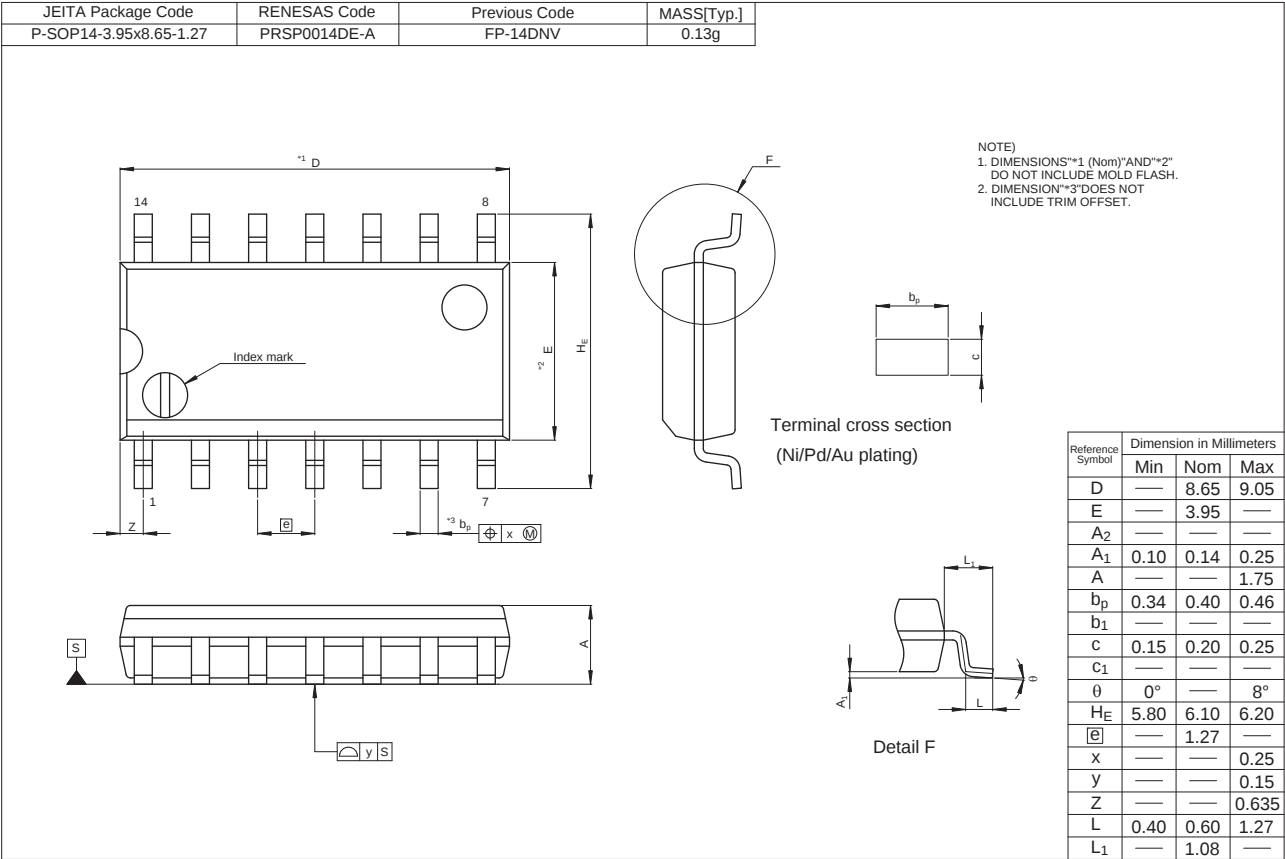
### • Waveform – 1



Notes: 1. Input waveform:  $PRR \leq 1$  MHz,  $Z_o = 50 \Omega$ ,  $t_r \leq 6$  ns,  $t_f \leq 6$  ns  
 2. The output are measured one at a time with one transition per measurement.

Package Dimensions





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