

HD74AC14

Hex Inverter Schmitt Trigger

REJ03D0250-0300
Rev.3.00
Aug 31, 2007

Description

The HD74AC14 contains six logic inverters which accept standard CMOS input signals and provide standard CMOS output levels. They are capable of transforming slowly changing input signals into sharply defined, jitter-free output signals. In addition, they have a greater noise margin than conventional inverters.

The HD74AC14 has hysteresis between the positive-going and negative-going input thresholds (typically 1.0 V) which is determined internally by transistor ratios and is essentially insensitive to temperature and supply voltage variations.

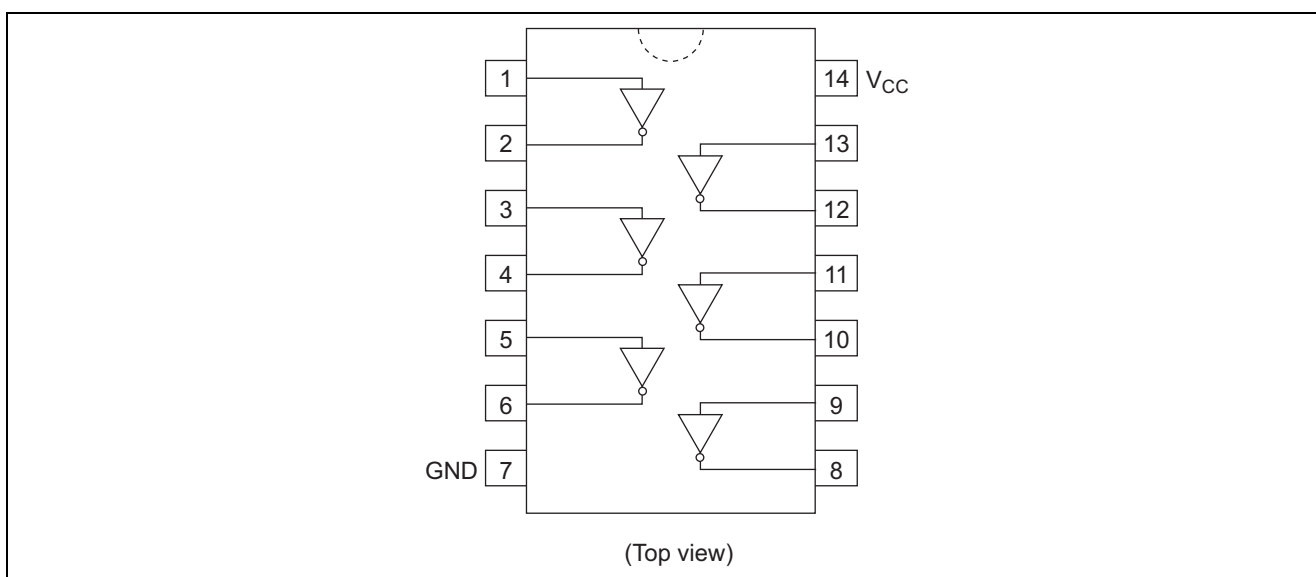
Features

- Outputs Source/Sink 24 mA
- Ordering Information

| Part Name | Package Type | Package Code (Previous Code) | Package Abbreviation | Taping Abbreviation (Quantity) |
|--------------|-----------------------|---------------------------------|-------------------------|-----------------------------------|
| HD74AC14P | DILP-14 pin | PRDP0014AB-B (DP-14AV) | P | — |
| HD74AC14FPEL | SOP-14 pin (JEITA) | PRSP0014DF-B (FP-14DAV) | FP | EL (2,000 pcs/reel) |
| HD74AC14RPEL | SOP-14 pin (JEDEC) | PRSP0014DE-A (FP-14DNV) | RP | EL (2,500 pcs/reel) |
| HD74AC14TELL | TSSOP-20 pin | PTSP0014JA-B (TTP-14DV) | T | ELL (2,000 pcs/reel) |

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

Pin Arrangement



Function Table

| Input A | Output O |
|---------|----------|
| L | H |
| H | L |

H : High level

L : Low level

Absolute Maximum Ratings

| Item | Symbol | Ratings | Unit | Condition |
|--|-------------------|----------------------|-------------|---------------------|
| Supply voltage | V_{CC} | -0.5 to 7 | V | |
| DC input diode current | I_{IK} | -20 | mA | $V_I = -0.5V$ |
| | | 20 | mA | $V_I = V_{CC}+0.5V$ |
| DC input voltage | V_I | -0.5 to $V_{CC}+0.5$ | V | |
| DC output diode current | I_{OK} | -50 | mA | $V_O = -0.5V$ |
| | | 50 | mA | $V_O = V_{CC}+0.5V$ |
| DC output voltage | V_O | -0.5 to $V_{CC}+0.5$ | V | |
| DC output source or sink current | I_O | ± 50 | mA | |
| DC V_{CC} or ground current per output pin | I_{CC}, I_{GND} | ± 50 | mA | |
| Storage temperature | T_{stg} | -65 to +150 | $^{\circ}C$ | |

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.

1. The maximum package power dissipation was calculated using a junction temperature of 150 $^{\circ}C$

Recommended Operating Conditions

| Item | Symbol | Ratings | Unit | Condition |
|---|------------|---------------|-------------|------------------|
| Supply voltage | V_{CC} | 2 to 6 | V | |
| Input and output voltage | V_I, V_O | 0 to V_{CC} | V | |
| Operating temperature | T_a | -40 to +85 | $^{\circ}C$ | |
| Input rise and fall time (except Schmitt inputs) V_{IN} 30% to 70% V_{CC} | t_r, t_f | 8 | ns/V | $V_{CC} = 3.0V$ |
| | | | | $V_{CC} = 4.5 V$ |
| | | | | $V_{CC} = 5.5 V$ |

Note : Unused or floating inputs must be held high or low.

DC Characteristics

| Item | Symbol | V _{CC} (V) | Ta = 25°C | | | Ta = -40 to +85°C | | Unit | Condition | | |
|----------------------------|-----------------------------|---------------------|-----------|-------|------|-------------------|------|------|--|--|--------------------------|
| | | | min. | typ. | max. | min. | max. | | | | |
| Positive threshold voltage | V _T ⁺ | 3.0 | — | — | 2.2 | — | 2.2 | V | | | |
| | | 4.5 | — | — | 3.2 | — | 3.2 | | | | |
| | | 5.5 | — | — | 3.9 | — | 3.9 | | | | |
| | V _T ⁻ | 3.0 | 0.5 | — | — | 0.5 | — | V | | | |
| | | 4.5 | 0.9 | — | — | 0.9 | — | | | | |
| | | 5.5 | 1.1 | — | — | 1.1 | — | | | | |
| Hysteresis voltage | V _H (max) | 3.0 | — | — | 1.2 | — | 1.2 | V | | | |
| | | 4.5 | — | — | 1.4 | — | 1.4 | | | | |
| | | 5.5 | — | — | 1.6 | — | 1.6 | | | | |
| | V _H (min) | 3.0 | 0.3 | — | — | 0.3 | — | V | | | |
| | | 4.5 | 0.4 | — | — | 0.4 | — | | | | |
| | | 5.5 | 0.5 | — | — | 0.5 | — | | | | |
| Output voltage | V _{OH} | 3.0 | 2.9 | 2.99 | — | 2.9 | — | V | V _{IN} = V _{IL} or V _{IH} , I _{OUT} = -50 μA | | |
| | | 4.5 | 4.4 | 4.49 | — | 4.4 | — | | | | |
| | | 5.5 | 5.4 | 5.49 | — | 5.4 | — | | | | |
| | | 3.0 | 2.58 | — | — | 2.48 | — | | | V _{IN} = V _{IL} or V _{IH} | I _{OH} = -12 mA |
| | | 4.5 | 3.94 | — | — | 3.80 | — | | | | I _{OH} = -24 mA |
| | | 5.5 | 4.94 | — | — | 4.80 | — | | | | I _{OH} = -24 mA |
| | V _{OL} | 3.0 | — | 0.002 | 0.1 | — | 0.1 | V | V _{IN} = V _{IL} or V _{IH} , I _{OUT} = 50 μA | | |
| | | 4.5 | — | 0.001 | 0.1 | — | 0.1 | | | | |
| | | 5.5 | — | 0.001 | 0.1 | — | 0.1 | | | | |
| | | 3.0 | — | — | 0.32 | — | 0.37 | | | V _{IN} = V _{IL} or V _{IH} | I _{OL} = 12 mA |
| | | 4.5 | — | — | 0.32 | — | 0.37 | | | | I _{OL} = 24 mA |
| | | 5.5 | — | — | 0.32 | — | 0.37 | | | | I _{OL} = 24 mA |
| Input leakage current | I _{IN} | 5.5 | — | — | ±0.1 | — | ±1.0 | μA | V _{IN} = V _{CC} or GND | | |
| Dynamic output current* | I _{OLD} | 5.5 | — | — | — | 86 | — | mA | V _{OLD} = 1.1 V | | |
| | I _{OHD} | 5.5 | — | — | — | -75 | — | mA | V _{OHD} = 3.85 V | | |
| Quiescent supply current | I _{CC} | 5.5 | — | — | 4.0 | — | 40.0 | μA | V _{IN} = V _{CC} or GND | | |

*Maximum test duration 2.0 ms, one output loaded at a time.

AC Characteristics

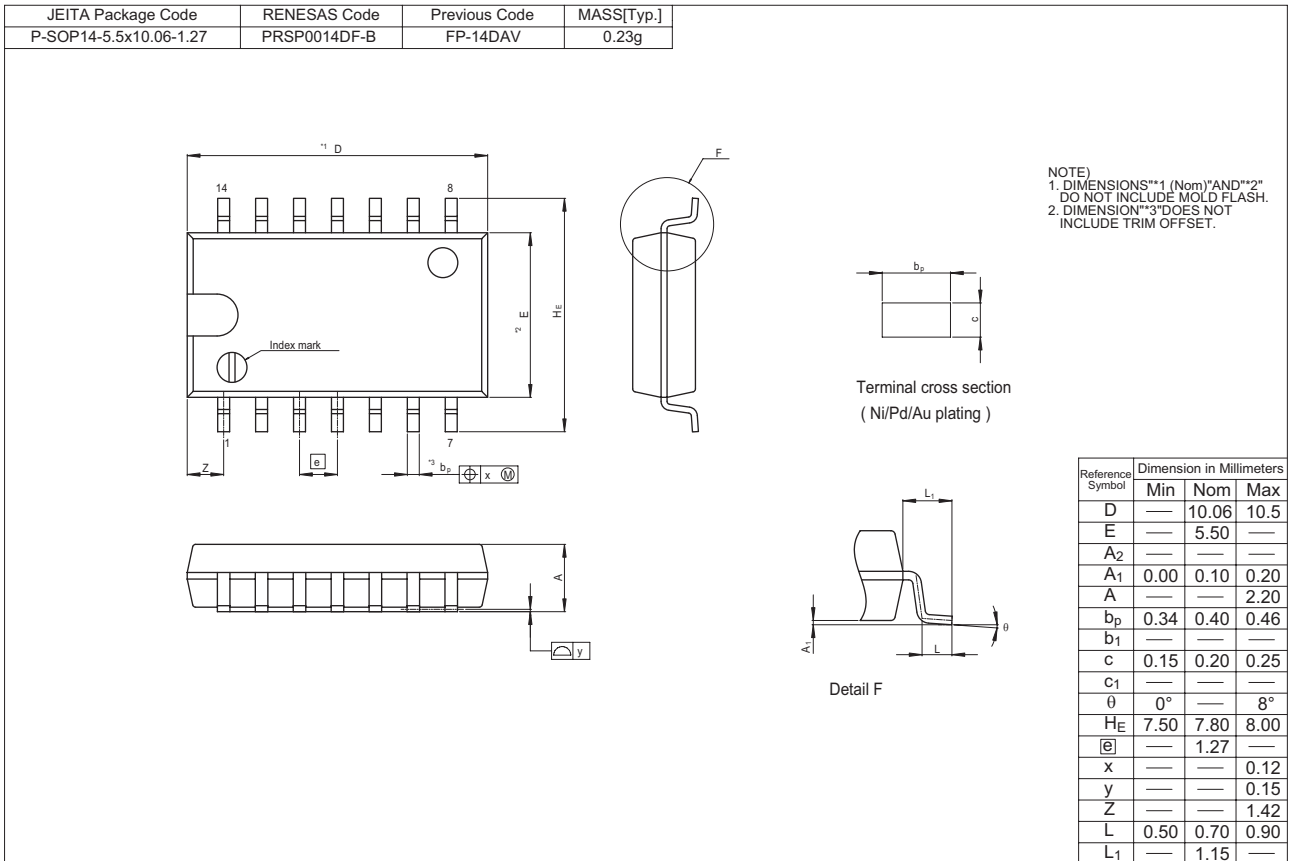
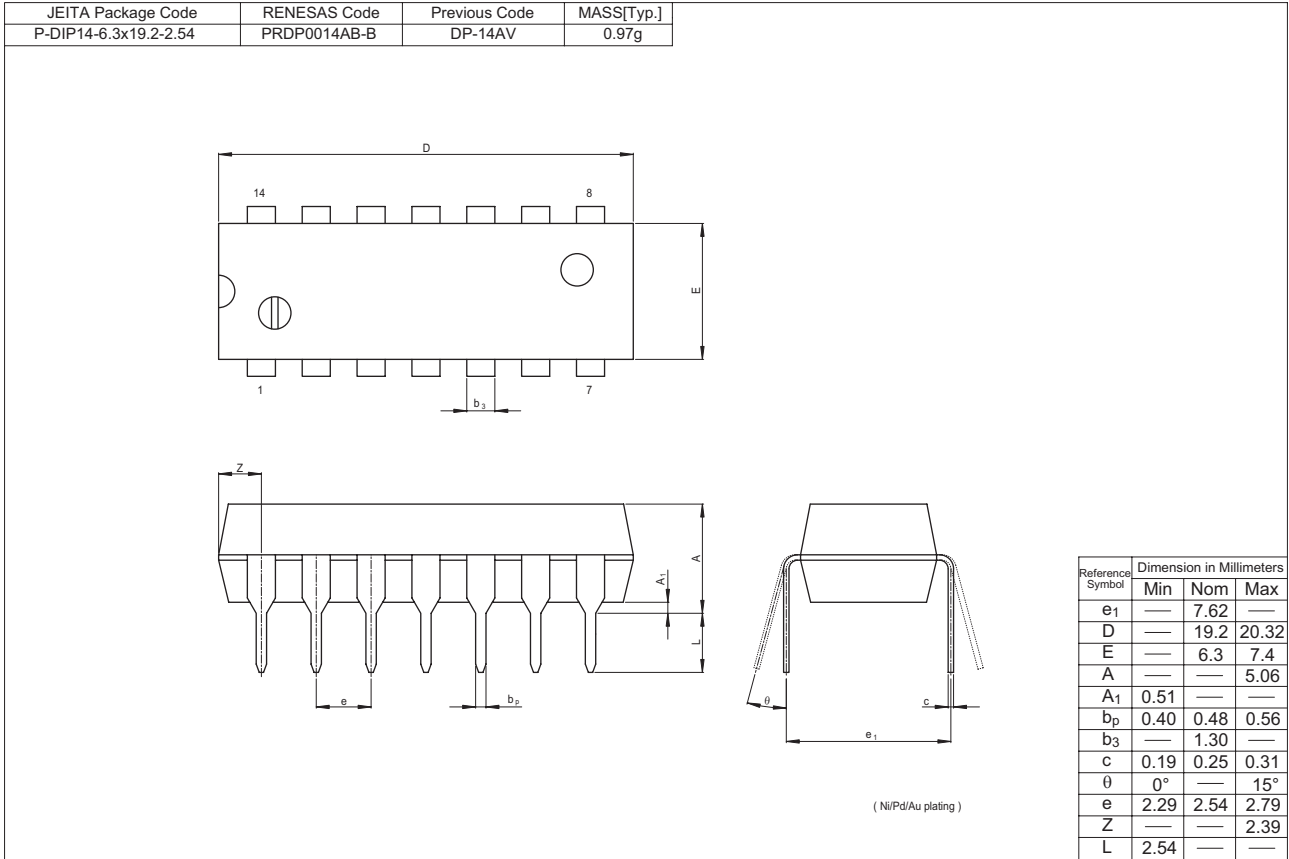
| Item | Symbol | V _{CC} (V)*1 | Ta = +25°C C _L = 50 pF | | | Ta = -40°C to +85°C C _L = 50 pF | | Unit |
|-------------------|------------------|-----------------------|--------------------------------------|-----|------|---|------|------|
| | | | Min | Typ | Max | Min | Max | |
| Propagation delay | t _{PLH} | 3.3 | 1.0 | 9.5 | 13.5 | 1.0 | 15.0 | ns |
| | | 5.0 | 1.0 | 7.0 | 10.0 | 1.0 | 11.0 | |
| Propagation delay | t _{PHL} | 3.3 | 1.0 | 7.5 | 11.5 | 1.0 | 13.0 | ns |
| | | 5.0 | 1.0 | 6.0 | 8.5 | 1.0 | 9.5 | |

Note: 1. Voltage Range 3.3 is 3.3 V ± 0.3 V
Voltage Range 5.0 is 5.0 V ± 0.5 V

Capacitance

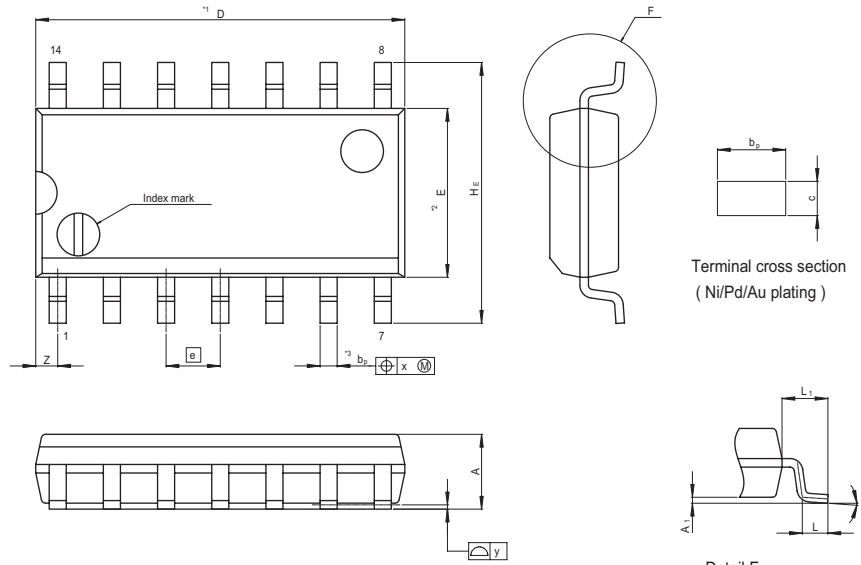
| Item | Symbol | Typ | Unit | Condition |
|-------------------------------|-----------------|------|------|-------------------------|
| Input capacitance | C _{IN} | 4.5 | pF | V _{CC} = 5.5 V |
| Power dissipation capacitance | C _{PD} | 25.0 | pF | V _{CC} = 5.0 V |

Package Dimensions



HD74AC14

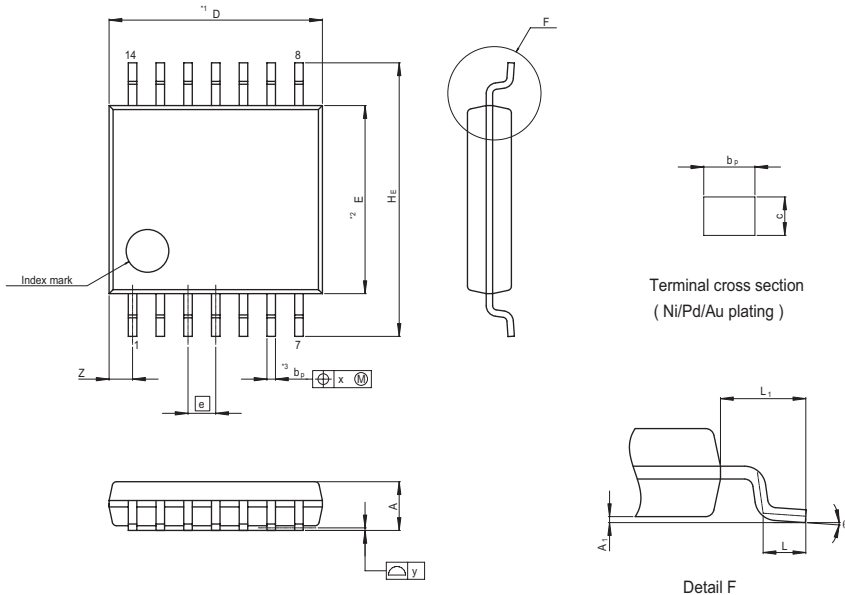
| | | | |
|------------------------|--------------|---------------|------------|
| JEITA Package Code | RENESAS Code | Previous Code | MASS[Typ.] |
| P-SOP14-3.95x8.65-1.27 | PRSP0014DE-A | FP-14DNV | 0.13g |



NOTE)
 1. DIMENSIONS**1 (Nom)*AND**2*
 DO NOT INCLUDE MOLD FLASH.
 2. DIMENSION**3*DOES NOT
 INCLUDE TRIM OFFSET.

| Reference Symbol | Dimension in Millimeters | | |
|------------------|--------------------------|------|-------|
| | Min | Nom | Max |
| D | — | 8.65 | 9.05 |
| E | — | 3.95 | — |
| A ₂ | — | — | — |
| A ₁ | 0.10 | 0.14 | 0.25 |
| A | — | — | 1.75 |
| b _p | 0.34 | 0.40 | 0.46 |
| b ₁ | — | — | — |
| c | 0.15 | 0.20 | 0.25 |
| c ₁ | — | — | — |
| θ | 0° | — | 8° |
| H _E | 5.80 | 6.10 | 6.20 |
| Ⓜ | — | 1.27 | — |
| x | — | — | 0.25 |
| y | — | — | 0.15 |
| Z | — | — | 0.635 |
| L | 0.40 | 0.60 | 1.27 |
| L ₁ | — | 1.08 | — |

| | | | |
|----------------------|--------------|---------------|------------|
| JEITA Package Code | RENESAS Code | Previous Code | MASS[Typ.] |
| P-TSSOP14-4.4x5-0.65 | PTSP0014JA-B | TTP-14DV | 0.05g |



NOTE)
 1. DIMENSIONS**1 (Nom)*AND**2*
 DO NOT INCLUDE MOLD FLASH.
 2. DIMENSION**3*DOES NOT
 INCLUDE TRIM OFFSET.

| Reference Symbol | Dimension in Millimeters | | |
|------------------|--------------------------|------|------|
| | Min | Nom | Max |
| D | — | 5.00 | 5.30 |
| E | — | 4.40 | — |
| A ₂ | — | — | — |
| A ₁ | 0.03 | 0.07 | 0.10 |
| A | — | — | 1.10 |
| b _p | 0.15 | 0.20 | 0.25 |
| b ₁ | — | — | — |
| c | 0.10 | 0.15 | 0.20 |
| c ₁ | — | — | — |
| θ | 0° | — | 8° |
| H _E | 6.20 | 6.40 | 6.60 |
| Ⓜ | — | 0.65 | — |
| x | — | — | 0.13 |
| y | — | — | 0.10 |
| Z | — | — | 0.83 |
| L | 0.4 | 0.5 | 0.6 |
| L ₁ | — | 1.0 | — |

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