

To our customers,

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## Old Company Name in Catalogs and Other Documents

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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# HD74LS86

## Quadruple 2-input Exclusive-OR Gates

REJ03D0422-0200  
Rev.2.00  
Feb.18.2005

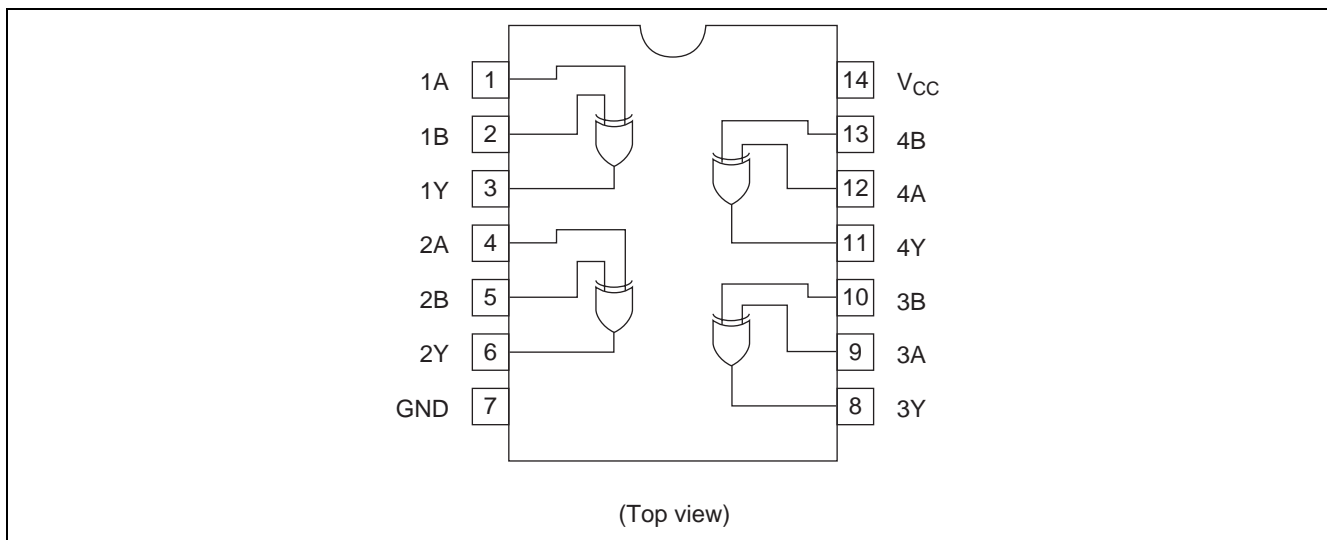
### Features

- Ordering Information

| Part Name    | Package Type       | Package Code (Previous Code) | Package Abbreviation | Taping Abbreviation (Quantity) |
|--------------|--------------------|------------------------------|----------------------|--------------------------------|
| HD74LS86P    | DILP-14 pin        | PRDP0014AB-B (DP-14AV)       | P                    | —                              |
| HD74LS86FPEL | SOP-14 pin (JEITA) | PRSP0014DF-B (FP-14DAV)      | FP                   | EL (2,000 pcs/reel)            |
| HD74LS86RPEL | SOP-14 pin (JEDEC) | PRSP0014DE-A (FP-14DNV)      | RP                   | EL (2,500 pcs/reel)            |

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

### Pin Arrangement



### Function Table

| Inputs |   | Outputs |
|--------|---|---------|
| A      | B | Y       |
| L      | L | L       |
| L      | H | H       |
| H      | L | H       |
| H      | H | L       |

H; high level, L; low level

## Absolute Maximum Ratings

| Item                | Symbol   | Ratings     | Unit |
|---------------------|----------|-------------|------|
| Supply voltage      | $V_{CC}$ | 7           | V    |
| Input voltage       | $V_{IN}$ | 7           | V    |
| Power dissipation   | $P_T$    | 400         | mW   |
| Storage temperature | Tstg     | -65 to +150 | °C   |

Note: Voltage value, unless otherwise noted, are with respect to network ground terminal.

## Recommended Operating Conditions

| Item                  | Symbol   | Min  | Typ  | Max  | Unit    |
|-----------------------|----------|------|------|------|---------|
| Supply voltage        | $V_{CC}$ | 4.75 | 5.00 | 5.25 | V       |
| Output current        | $I_{OH}$ | —    | —    | -400 | $\mu$ A |
|                       | $I_{OL}$ | —    | —    | 8    | mA      |
| Operating temperature | Topr     | -20  | 25   | 75   | °C      |

## Electrical Characteristics

( $T_a = -20$  to  $+75$  °C)

| Item                         | Symbol   | min. | typ.* | max.            | Unit    | Condition  |
|------------------------------|----------|------|-------|-----------------|---------|--|
| Input voltage                | $V_{IH}$ | 2.0  | —     | —               | V       |  |
|                              | $V_{IL}$ | —    | —     | 0.8             | V       |  |
| Output voltage               | $V_{OH}$ | 2.7  | —     | —               | V       | $V_{CC} = 4.75$ V, $V_{IH} = 2$ V, $V_{IL} = 0.8$ V, $I_{OH} = -400$ $\mu$ A |
|                              | $V_{OL}$ | —    | —     | 0.4             | V       | $I_{OL} = 4$ mA  |
| —                            |          | —    | 0.5   | $I_{OL} = 8$ mA |         |  |
| Input current                | $I_{IH}$ | —    | —     | 40              | $\mu$ A | $V_{CC} = 5.25$ V, $V_I = 2.7$ V   |
|                              | $I_{IL}$ | —    | —     | -0.8            | mA      | $V_{CC} = 5.25$ V, $V_I = 0.4$ V   |
|                              | $I_I$    | —    | —     | 0.2             | mA      | $V_{CC} = 5.25$ V, $V_I = 7$ V   |
| Short-circuit output current | $I_{OS}$ | -20  | —     | -100            | mA      | $V_{CC} = 5.25$ V  |
| Supply current**             | $I_{CC}$ | —    | 6.1   | 10              | mA      | $V_{CC} = 5.25$ V  |
| Input clamp voltage          | $V_{IK}$ | —    | —     | -1.5            | V       | $V_{CC} = 4.75$ V, $I_{IN} = -18$ mA   |

Notes: \*  $V_{CC} = 5$  V,  $T_a = 25$  °C

\*\*  $I_{CC}$  is measured with all outputs open and all other inputs grounded.

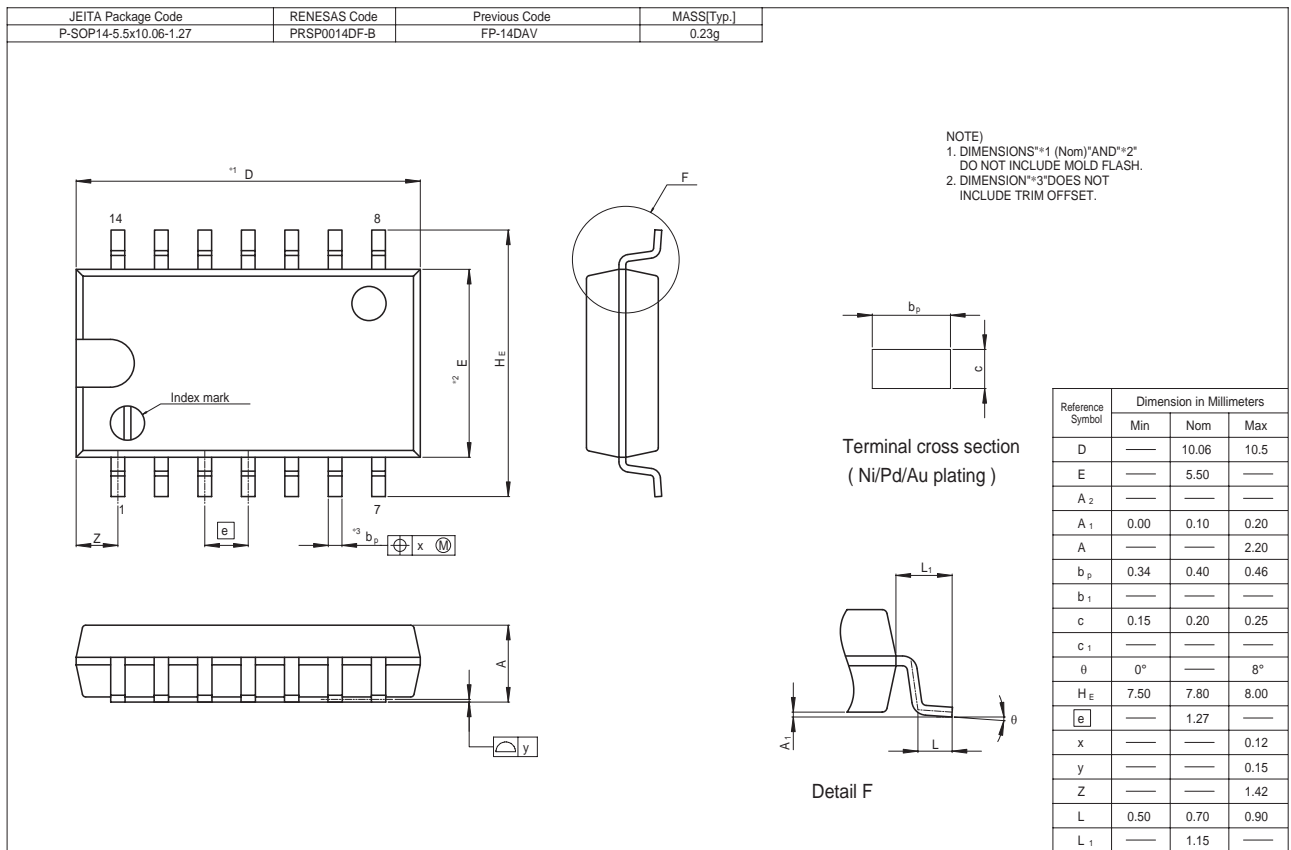
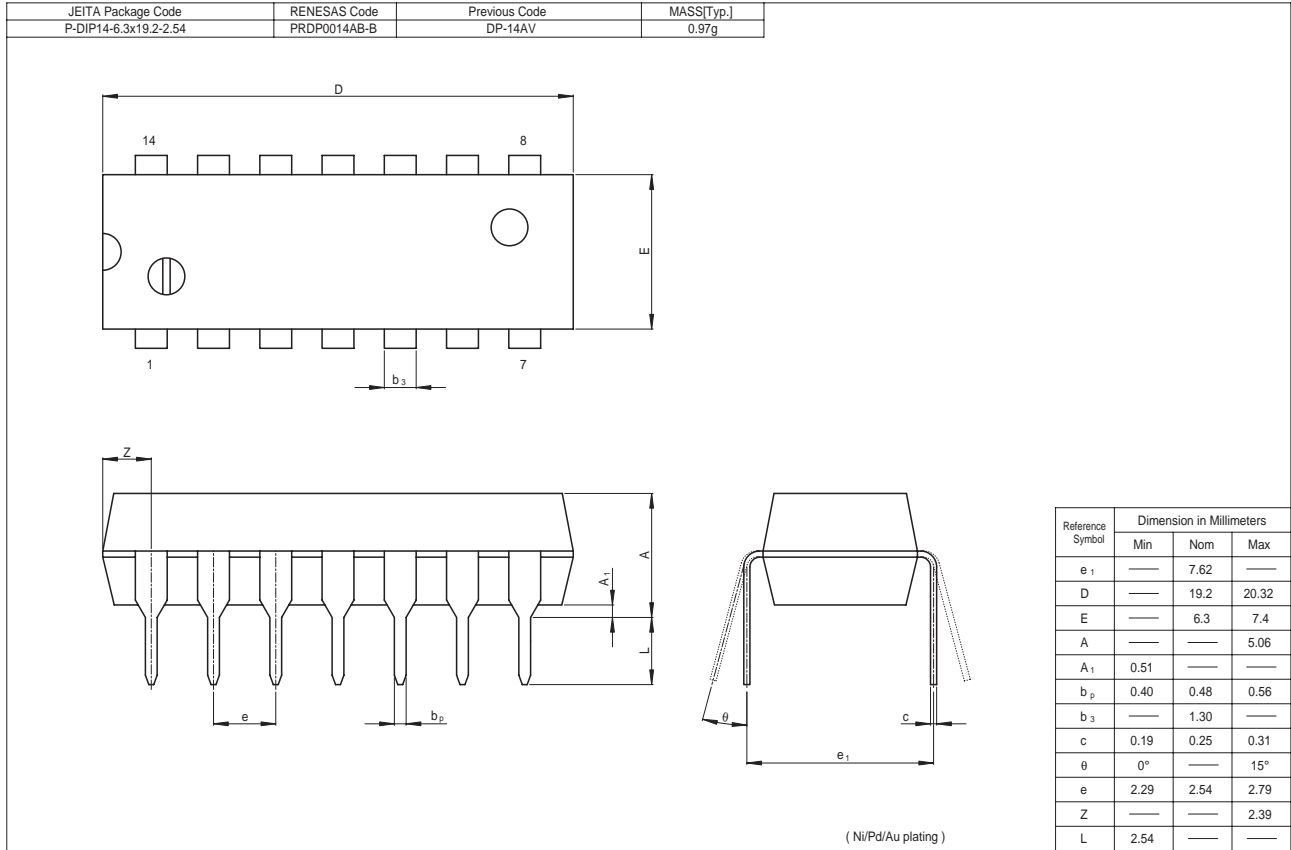
## Switching Characteristics

( $V_{CC} = 5$  V,  $T_a = 25$  °C)

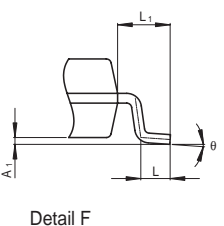
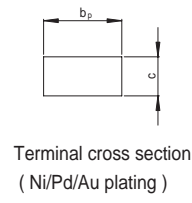
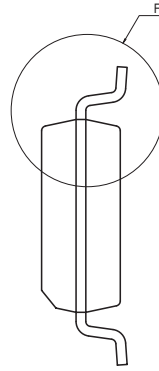
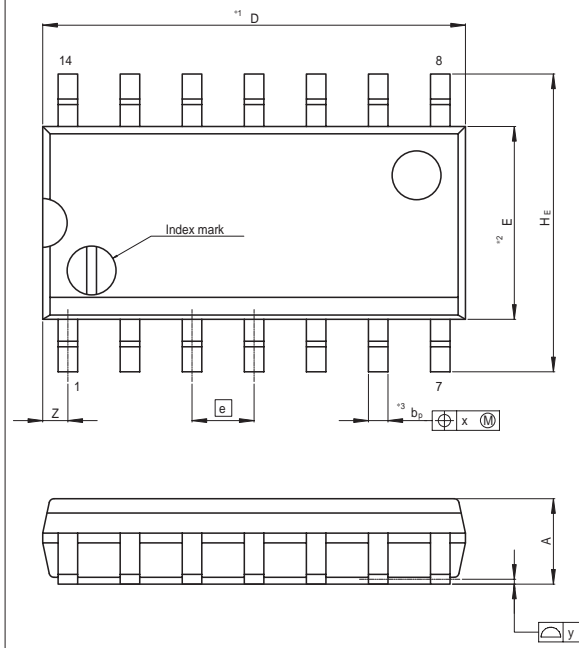
| Item                   | Symbol    | Inputs | min. | typ. | max. | Unit | Test Conditions                        |                      |
|------------------------|-----------|--------|------|------|------|------|--|----------------------|
| Propagation delay time | $t_{PLH}$ | A or B | —    | 12   | 23   | ns   | $C_L = 15$ pF,<br>$R_L = 2$ k $\Omega$ |                      |
|                        | $t_{PHL}$ |        | —    | 10   | 17   | ns   |  |                      |
|                        | $t_{PLH}$ | A or B | —    | 20   | 30   | ns   |  | Other inputs = 4.5 V |
|                        | $t_{PHL}$ |        | —    | 13   | 22   | ns   |  |                      |

Note: Refer to Test Circuit and Waveform of the Common Item "TTL Common Matter (Document No.: REJ27D0005-0100)".

Package Dimensions



|  |                              |                           |                     |
|--|------------------------------|---------------------------|---------------------|
| JEITA Package Code<br>P-SOP14-3.95x8.65-1.27 | RENESAS Code<br>PRSP0014DE-A | Previous Code<br>FP-14DNV | MASS[Typ.]<br>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 <sub>2</sub>   | —                        | —    | —     |
| A <sub>1</sub>   | 0.10                     | 0.14 | 0.25  |
| A                | —                        | —    | 1.75  |
| b <sub>p</sub>   | 0.34                     | 0.40 | 0.46  |
| b <sub>1</sub>   | —                        | —    | —     |
| c                | 0.15                     | 0.20 | 0.25  |
| c <sub>1</sub>   | —                        | —    | —     |
| $\theta$         | 0°                       | —    | 8°    |
| H <sub>E</sub>   | 5.80                     | 6.10 | 6.20  |
| e                | —                        | 1.27 | —     |
| x                | —                        | —    | 0.25  |
| y                | —                        | —    | 0.15  |
| Z                | —                        | —    | 0.635 |
| L                | 0.40                     | 0.60 | 1.27  |
| L <sub>1</sub>   | —                        | 1.08 | —     |

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