

# HD74HC77

## 4-bit Bistable Latch

REJ03D0552-0200  
 (Previous ADE-205-424)  
 Rev.2.00  
 Oct 06, 2005

### Description

The HD74HC77 is ideally suited for use as temporary storage for binary information between processing units and input/output or indicator units. Information present at a data (D) input is transferred to the Q output when the enable (G) is high and the Q output will follow the data input as long as the enable remains high. When the enable goes low the information (that was present at the data input at the time the transition occurred) is retained at the Q output until the enable is permitted to go high.

### Features

- High Speed Operation:  $t_{pd}$  (D to Q) = 12 ns typ ( $C_L = 50$  pF)
- High Output Current: Fanout of 10 LSTTL Loads
- Wide Operating Voltage:  $V_{CC} = 2$  to 6 V
- Low Input Current: 1  $\mu$ A max
- Low Quiescent Supply Current:  $I_{CC}$  (static) = 2  $\mu$ A max ( $T_a = 25^\circ\text{C}$ )
- Ordering Information

| Part Name    | Package Type       | Package Code (Previous Code) | Package Abbreviation | Taping Abbreviation (Quantity) |
|--------------|--------------------|------------------------------|----------------------|--------------------------------|
| HD74HC77P    | DILP-14 pin        | PRDP0014AB-B (DP-14AV)       | P                    | —                              |
| HD74HC77FPEL | SOP-14 pin (JEITA) | PRSP0014DF-B (FP-14DAV)      | FP                   | EL (2,000 pcs/reel)            |
| HD74HC77RPEL | 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.

### Function Table

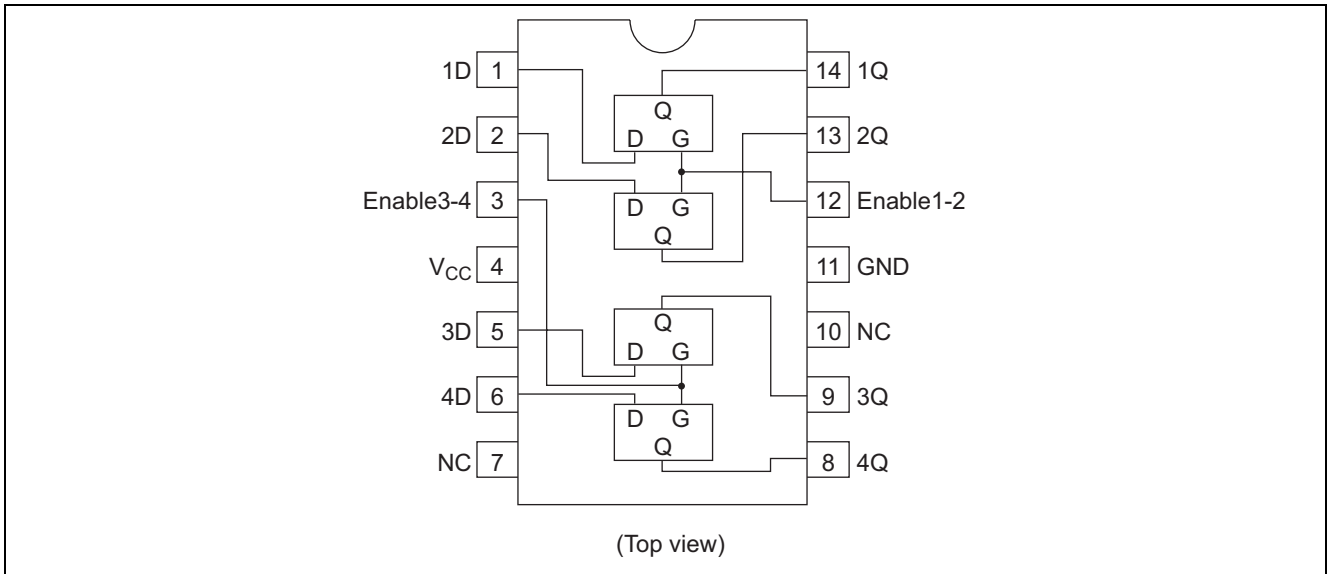
| Inputs |          | Output    |
|--------|----------|-----------|
| Data   | Enable G | Q         |
| L      | H        | L         |
| H      | H        | H         |
| X      | L        | No change |

H : High level

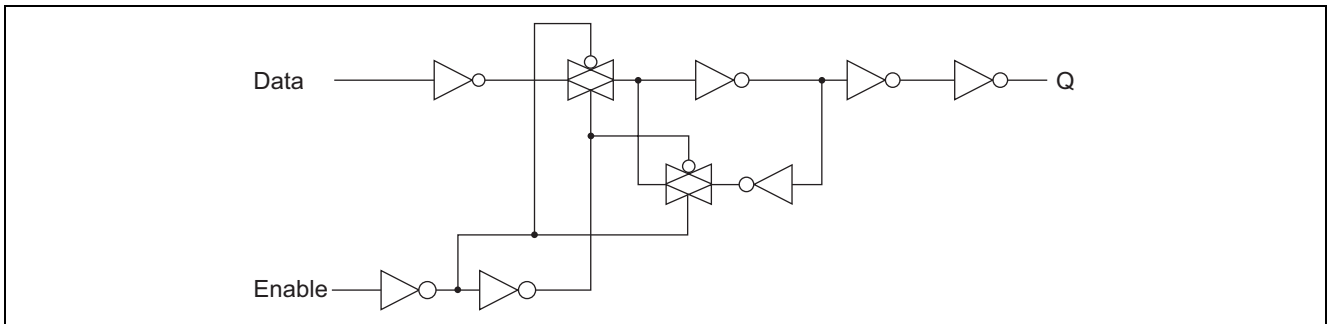
L : Low level

X : Irrelevant

### Pin Arrangement



### Logic Diagram (1/4)



### Absolute Maximum Ratings

| Item                          | Symbol                              | Ratings                      | Unit |
|-------------------------------|-------------------------------------|------------------------------|------|
| Supply voltage range          | V <sub>CC</sub>                     | -0.5 to 7.0                  | V    |
| Input / Output voltage        | V <sub>in</sub> , V <sub>out</sub>  | -0.5 to V <sub>CC</sub> +0.5 | V    |
| Input / Output diode current  | I <sub>IK</sub> , I <sub>OK</sub>   | ±20                          | mA   |
| Output current                | I <sub>O</sub>                      | ±25                          | mA   |
| V <sub>CC</sub> , GND current | I <sub>CC</sub> or I <sub>GND</sub> | ±50                          | mA   |
| Power dissipation             | P <sub>T</sub>                      | 500                          | mW   |
| Storage temperature           | T <sub>stg</sub>                    | -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 1000     | ns   | $V_{CC} = 2.0\text{ V}$ |
|                                      |                   | 0 to 500      |      | $V_{CC} = 4.5\text{ V}$ |
|                                      |                   | 0 to 400      |      | $V_{CC} = 6.0\text{ V}$ |

Note: 1. This item guarantees maximum limit when one input switches.  
 Waveform: Refer to test circuit of switching characteristics.

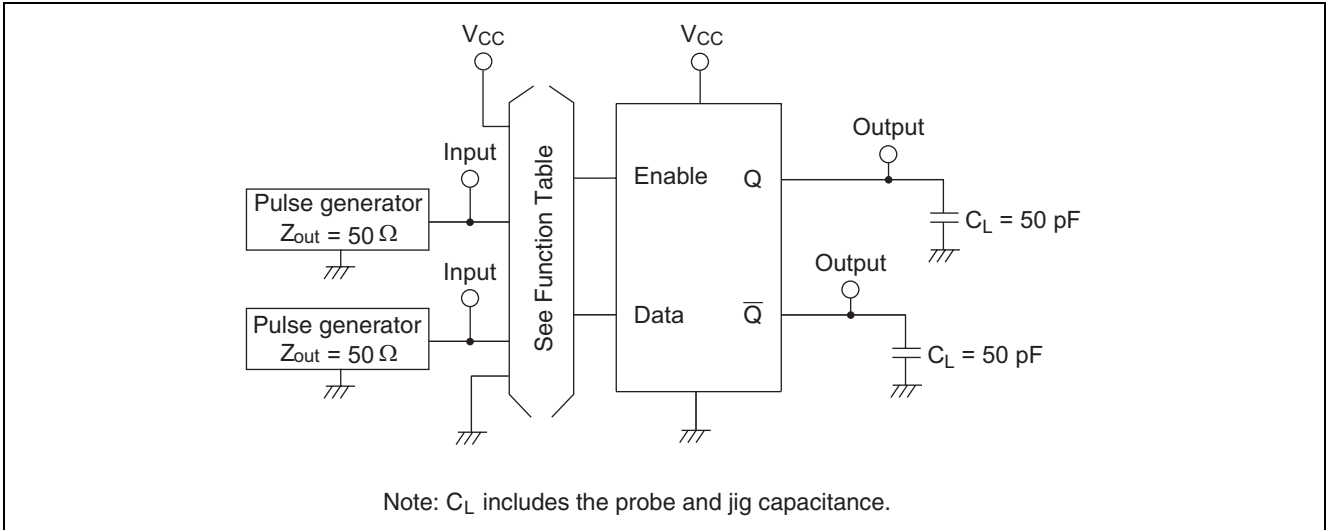
### Electrical Characteristics

| 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       |               |   |                             |
| Input voltage            | $V_{IH}$ | 2.0          | 1.5                      | —   | —         | 1.5                                     | —         | V             |   |                             |
|                          |          | 4.5          | 3.15                     | —   | —         | 3.15                                    | —         |               |   |                             |
|                          |          | 6.0          | 4.2                      | —   | —         | 4.2                                     | —         |               |   |                             |
|                          | $V_{IL}$ | 2.0          | —                        | —   | 0.5       | —                                       | 0.5       | V             |   |                             |
|                          |          | 4.5          | —                        | —   | 1.35      | —                                       | 1.35      |               |   |                             |
|                          |          | 6.0          | —                        | —   | 1.8       | —                                       | 1.8       |               |   |                             |
| Output voltage           | $V_{OH}$ | 2.0          | 1.9                      | 2.0 | —         | 1.9                                     | —         | V             | $V_{in} = V_{IH}\text{ or }V_{IL}$                        | $I_{OH} = -20\ \mu\text{A}$ |
|                          |          | 4.5          | 4.4                      | 4.5 | —         | 4.4                                     | —         |               |   | $I_{OH} = -4\ \text{mA}$    |
|                          |          | 6.0          | 5.9                      | 6.0 | —         | 5.9                                     | —         |               |   | $I_{OH} = -5.2\ \text{mA}$  |
|                          |          | 4.5          | 4.18                     | —   | —         | 4.13                                    | —         |               |   |                             |
|                          |          | 6.0          | 5.68                     | —   | —         | 5.63                                    | —         |               |   |                             |
|                          |          | 6.0          | —                        | —   | —         | —                                       | —         |               |   |                             |
|                          | $V_{OL}$ | 2.0          | —                        | 0.0 | 0.1       | —                                       | 0.1       | V             | $V_{in} = V_{IH}\text{ or }V_{IL}$                        | $I_{OL} = 20\ \mu\text{A}$  |
|                          |          | 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          | —                        | —   | 2.0       | —                                       | 20        | $\mu\text{A}$ | $V_{in} = V_{CC}\text{ or GND, }I_{out} = 0\ \mu\text{A}$ |                             |

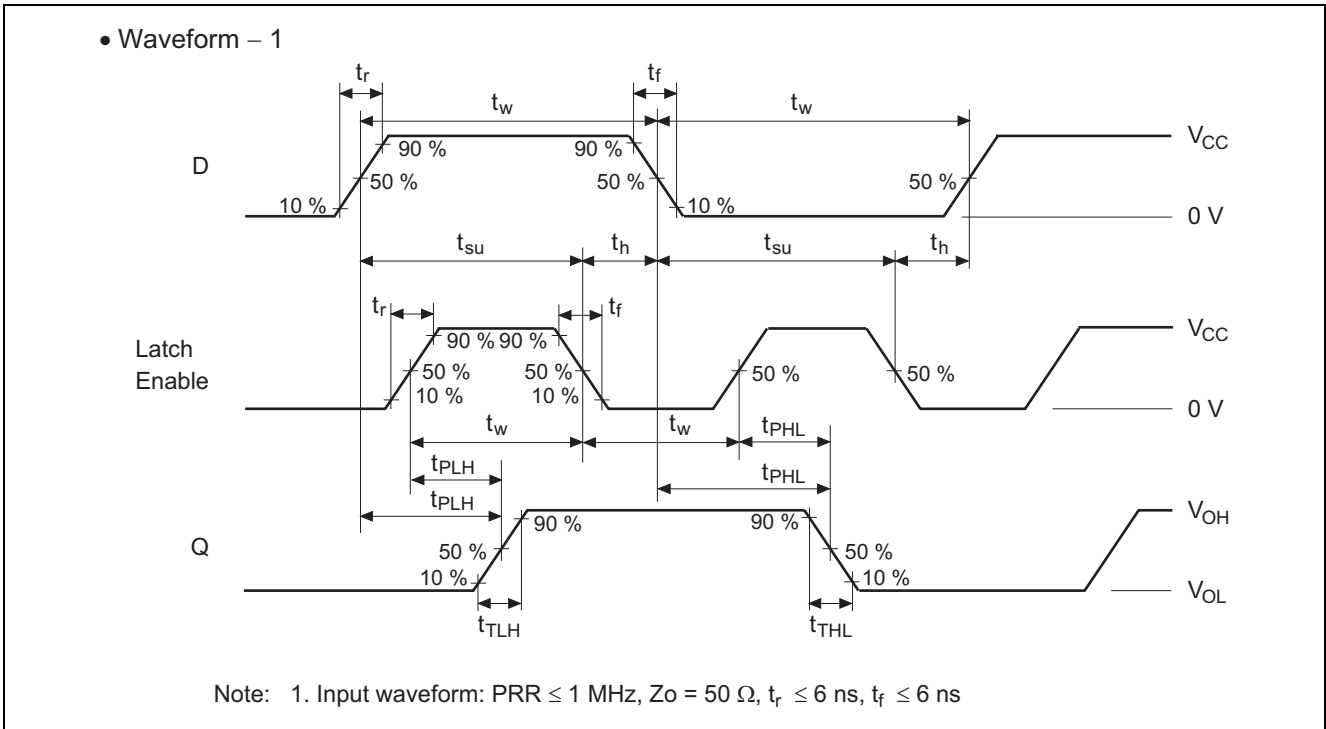
### Switching Characteristics ( $C_L = 50\ \text{pF}$ , Input $t_r = t_f = 6\ \text{ns}$ )

| 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 |      |                 |  |        |  |
| Propagation delay time | $t_{PLH}, t_{PHL}$ | 2.0          | —                        | —   | 105 | —                                       | 130 | ns   | Data to Q       |  |        |  |
|                        |                    | 4.5          | —                        | 12  | 21  | —                                       | 26  |      |                 |  |        |  |
|                        |                    | 6.0          | —                        | —   | 18  | —                                       | 22  |      |                 |  |        |  |
|                        |                    | 2.0          | —                        | —   | 100 | —                                       | 125 | ns   |                 |  | G to Q |  |
|                        |                    | 4.5          | —                        | 13  | 20  | —                                       | 25  |      |                 |  |        |  |
|                        |                    | 6.0          | —                        | —   | 17  | —                                       | 21  |      |                 |  |        |  |
| Hold time              | $t_h$              | 2.0          | 5                        | —   | —   | 5                                       | —   | ns   |                 |  |        |  |
|                        |                    | 4.5          | 5                        | 1   | —   | 5                                       | —   |      |                 |  |        |  |
|                        |                    | 6.0          | 5                        | —   | —   | 5                                       | —   |      |                 |  |        |  |
| Output rise/fall time  | $t_{TLH}, t_{THL}$ | 2.0          | —                        | —   | 75  | —                                       | 95  | ns   |                 |  |        |  |
|                        |                    | 4.5          | —                        | 5   | 15  | —                                       | 19  |      |                 |  |        |  |
|                        |                    | 6.0          | —                        | —   | 13  | —                                       | 16  |      |                 |  |        |  |
| Input capacitance      | $C_{in}$           | —            | —                        | 5   | 10  | —                                       | 10  | pF   |                 |  |        |  |

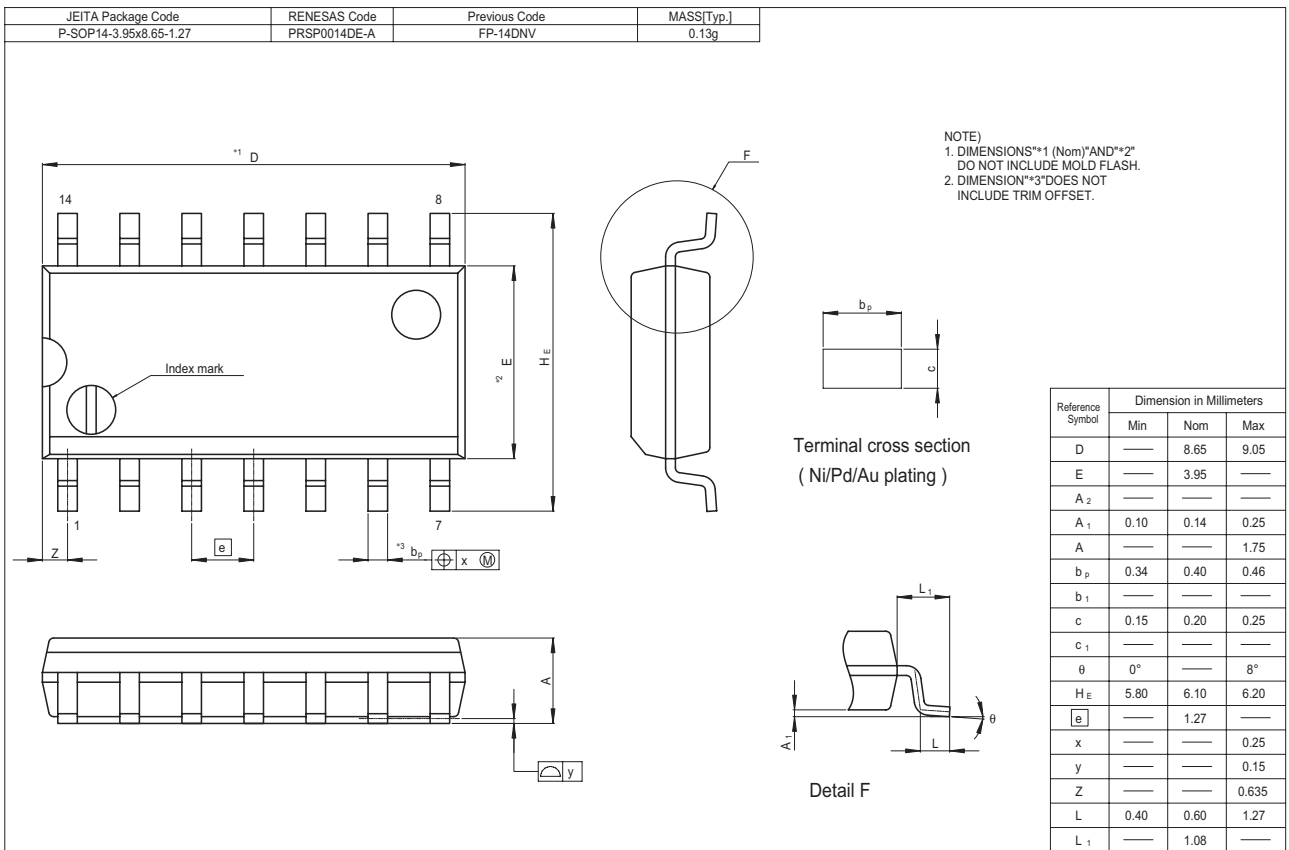
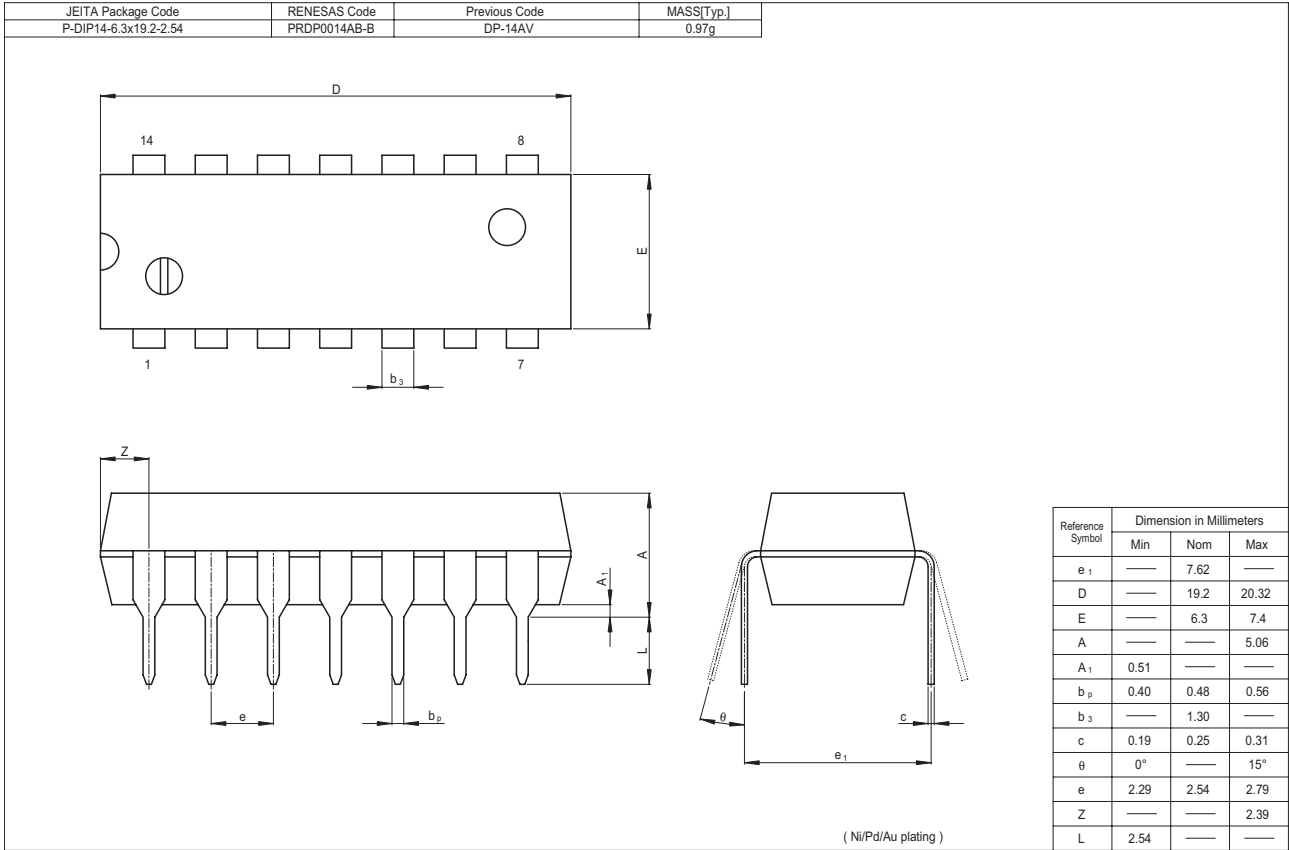
Test Circuit



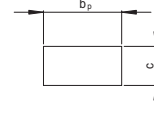
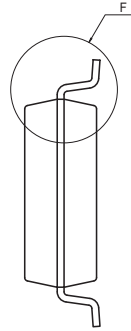
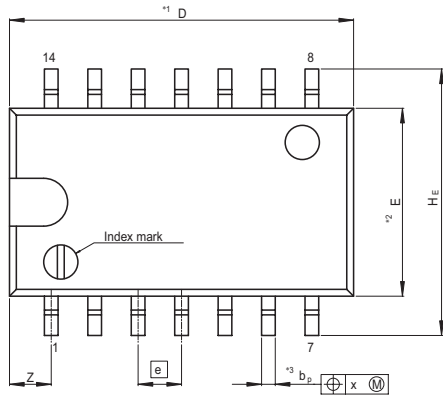
Waveforms



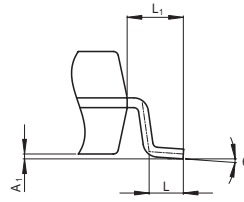
Package Dimensions



|  |                              |                           |                     |
|--|------------------------------|---------------------------|---------------------|
| JEITA Package Code<br>P-SOP14-5.5x10.06-1.27 | RENESAS Code<br>PRSP0014DF-B | Previous Code<br>FP-14DAV | MASS[Typ.]<br>0.23g |
|--|------------------------------|---------------------------|---------------------|



Terminal cross section  
( Ni/Pd/Au plating )



Detail F

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                | —                        | 10.06 | 10.5 |
| E                | —                        | 5.50  | —    |
| A <sub>2</sub>   | —                        | —     | —    |
| A <sub>1</sub>   | 0.00                     | 0.10  | 0.20 |
| A                | —                        | —     | 2.20 |
| 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>   | 7.50                     | 7.80  | 8.00 |
| e                | —                        | 1.27  | —    |
| x                | —                        | —     | 0.12 |
| y                | —                        | —     | 0.15 |
| Z                | —                        | —     | 1.42 |
| L                | 0.50                     | 0.70  | 0.90 |
| L <sub>1</sub>   | —                        | 1.15  | —    |

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