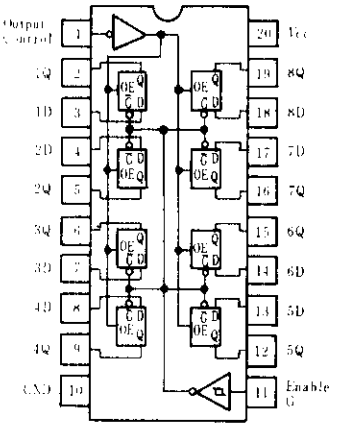
# HD74LS373 ●Octal D-type Transparent Latches (with three-state outputs)

The HD74LS373, 8-bit register features totem-pole three-state outputs designed specifically for driving highly-capacitive or relatively low-impedance loads. The high-impedance third state and increased high-logic-level drive provide this register with the capacity of being connected directly to and driving the bus lines in a bus-organized system without need for interface or pull-up components. They are particularly attractive for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

The eight latches are transparent D-type latches meaning that while the enable (G) is high the Q outputs will follow the data (D) inputs. When the enable is taken low the output will be latched at the level of the data that was setup.

## ■PIN ARRANGEMENT



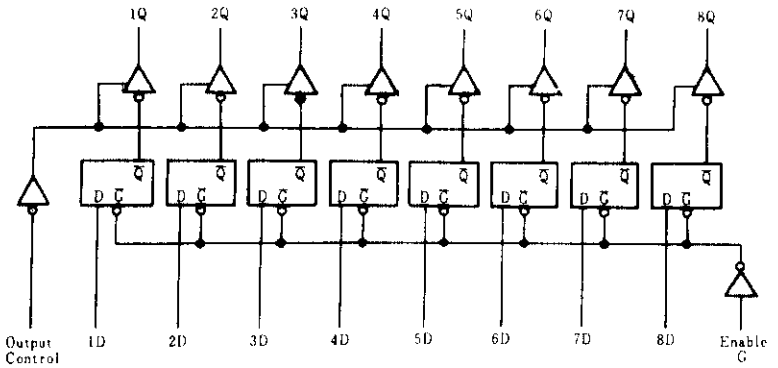

(Top View)

## ■FUNCTION TABLE

| Inputs | | | Output |
|---|---|---|---|
| Output control | Enable G | D | Q |
| L | H | H | H |
| L | H | L | L |
| L | L | × | $Q_0$ |
| H | × | × | Z |

Notes: H = high level, L = low level, X = irrelevant
$Q_0$ = level of Q before the indicated steady-state input conditions were established.
Z = off (high-impedance) state of a three-state output

## ■BLOCK DIAGRAM




## ■RECOMMENDED OPERATING CONDITIONS

| Item | | Symbol | min | typ | max | Unit |
|---|---|---|---|---|---|---|
| Supply voltage | | $V_{CC}$ | 4.75 | 5.00 | 5.25 | V |
| Output voltage | | $V_{OH}$ | — | — | 5.5 | V |
| Output current | | $I_{OH}$ | — | — | −2.6 | mA |
| | | $I_{OL}$ | — | — | 24 | mA |
| Enable pulse width | "H" level | $t_w$ | 15 | — | — | ns |
| | "L" level | | 15 | — | — | |
| Data setup time | | $t_{su}$ | 5↓ | — | — | ns |
| Data hold time | | $t_h$ | 25↓ | — | — | ns |

Note) ↓ : The arrow indicates the falling edge of clock pulse.

## ■ELECTRICAL CHARACTERISTICS ($Ta$=−20～+75°C)

| Item | Symbol | Test Conditions | | min | typ* | max | Unit |
|---|---|---|---|---|---|---|---|
| Input voltage | $V_{IH}$ | | | 2.0 | — | — | V |
| | $V_{IL}$ | Data inputs | | — | — | 0.7 | V |
| | | G, Output control inputs | | — | — | 0.8 | |
| Output voltage | $V_{OH}$ | $V_{CC}$=4.75V, $V_{IH}$=2V, $V_{IL}$=$V_{IL\ max}$, $I_{OH}$=−2.6mA | | 2.4 | — | — | V |
| | $V_{OL}$ | $V_{CC}$=4.75V, $V_{IH}$=2V, $V_{IL}$=$V_{IL\ max}$ | $I_{OL}$=12mA | — | — | 0.4 | V |
| | | | $I_{OL}$=24mA | — | — | 0.5 | |
| Off-state output current | $I_{OZH}$ | $V_{CC}$=5.25V, $V_{IH}$=2V | $V_O$=2.7V | — | — | 20 | μA |
| | $I_{OZL}$ | | $V_O$=0.4V | — | — | −20 | |
| Input current | $I_{IH}$ | $V_{CC}$=5.25V, $V_I$=2.7V | | — | — | 20 | μA |
| | $I_{IL}$ | $V_{CC}$=5.25V, $V_I$=0.4V | | — | — | −0.4 | mA |
| | $I_I$ | $V_{CC}$=5.25V, $V_I$=7V | | — | — | 0.1 | mA |
| Short-circuit output current | $I_{OS}$ | $V_{CC}$=5.25V | | −30 | — | −130 | mA |
| Supply current | $I_{CC}$ | $V_{CC}$=5.25V, $V_I$=4.5V (Output control) | | — | 24 | 40 | mA |
| Input clamp voltage | $V_{IK}$ | $V_{CC}$=4.75V, $I_{IN}$=−18mA | | — | — | −1.5 | V |

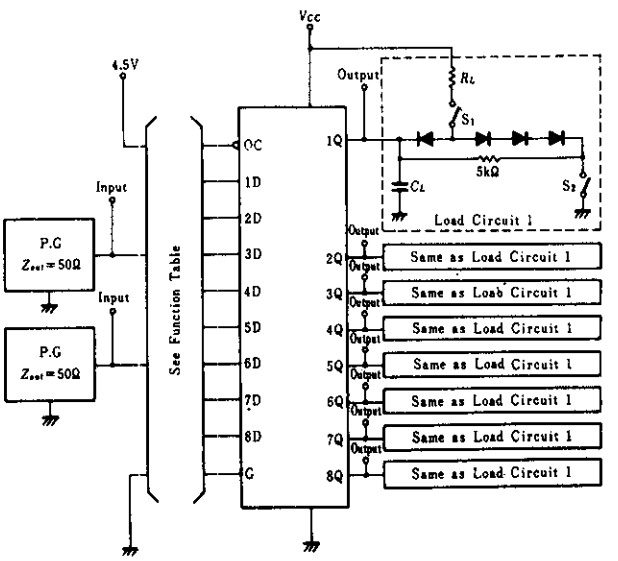
* $V_{CC}$=5V, $Ta$=25°C

## ■SWITCHING CHARACTERISTICS ($V_{CC}$=5V, $Ta$=25°C)

| Item | Symbol | Input | Output | Test Conditions | min | typ | max | Unit |
|---|---|---|---|---|---|---|---|---|
| Propagation delay time | $t_{PLH}$ | D | Q | $C_L$=45pF, $R_L$=667Ω | — | 12 | 18 | ns |
| | $t_{PHL}$ | | | | — | 12 | 18 | |
| | $t_{PLH}$ | G | Q | | — | 20 | 30 | |
| | $t_{PHL}$ | | | | — | 18 | 30 | |
| Output enable time | $t_{ZH}$ | OC | Q | | — | 15 | 28 | |
| | $t_{ZL}$ | | | | — | 25 | 36 | |
| Output disable time | $t_{HZ}$ | OC | Q | $C_L$=5pF, $R_L$=667Ω | — | 12 | 20 | |
| | $t_{LZ}$ | | | | — | 15 | 25 | |

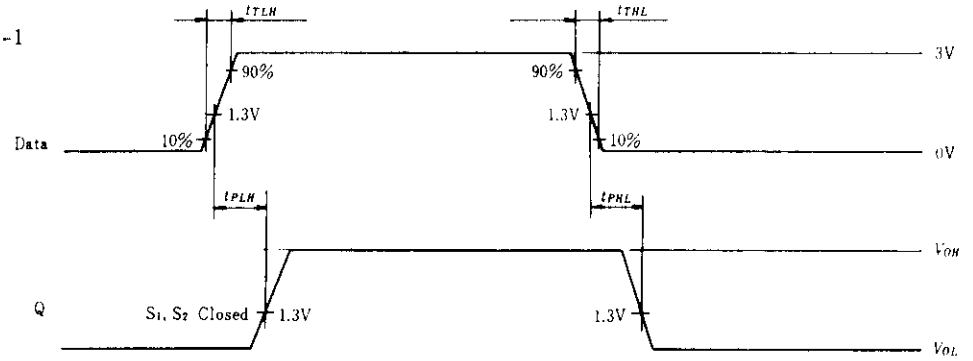
## ■TESTING METHOD

Test Circuit



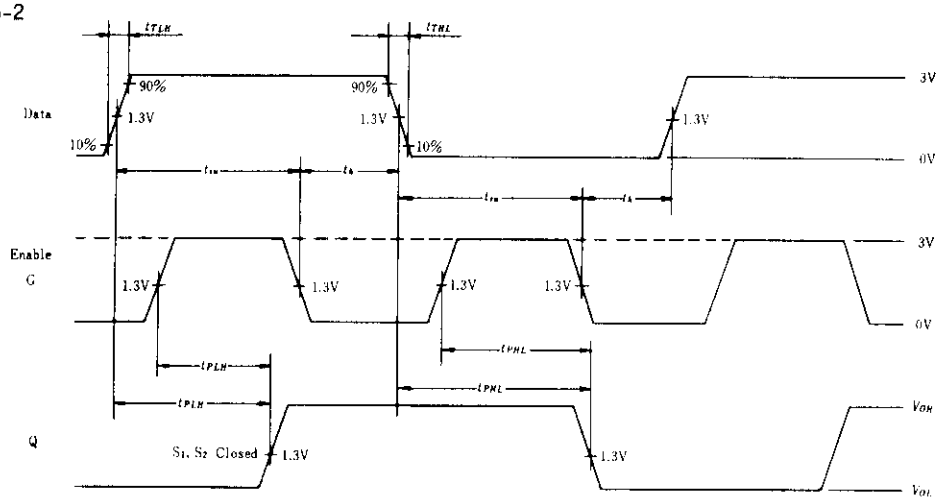

Notes: 1. $C_L$ includes probe jig capacitance.
2. All diodes are 1S2074 (H).

Waveform-1




**Notes:** Input pulse; $t_{TLH} \leqq 15$ns, $t_{THL} \leqq 6$ns, $PRR = 1$MHz, duty cycle 50%

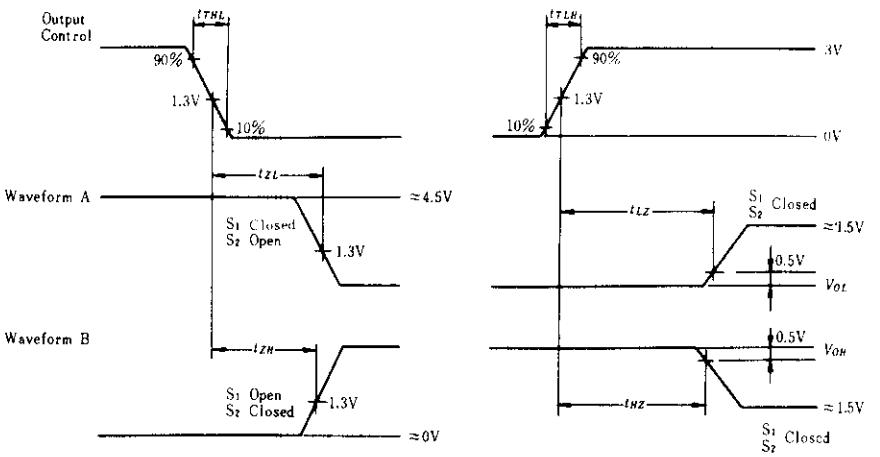
Waveform-2




**Note:** Enable input pulse; $t_{TLH} \leqq 15$ns, $t_{THL} \leqq 6$ns, $PRR = 1$MHz

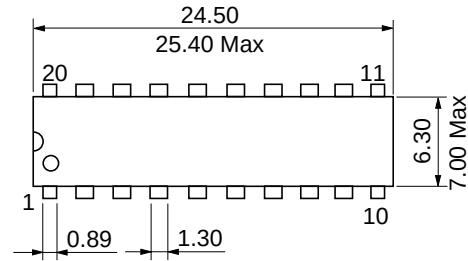
Data input pulse; $t_{TLH} \leqq 15$ns, $t_{THL} \leqq 6$ns, $PRR = 1$MHz, G input is high.

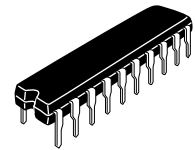
Waveform-3

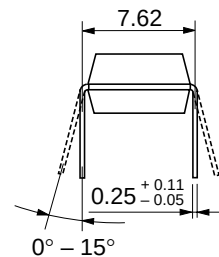



**Notes:**
1. Input pulse; $t_{TLH} \leqq 15$ns, $t_{THL} \leqq 6$ns, $PRR = 1$MHz, duty cycle 50%
2. Waveform A if for an output with internal conditions such that the output is low except when disabled by the output control. Waveform B is for an output with internal conditions such that the output is high except when disabled by the output control.

Unit: mm

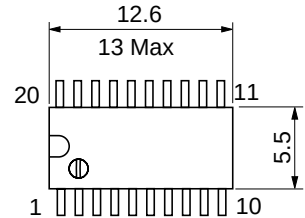


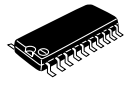



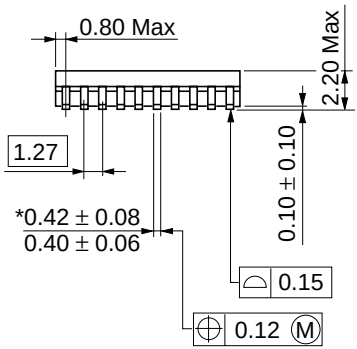


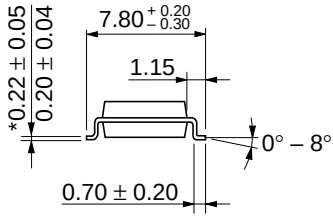

| | |
|---|---|
| Hitachi Code | DP-20N |
| JEDEC | — |
| EIAJ | Conforms |
| Weight (reference value) | 1.26 g |

Unit: mm



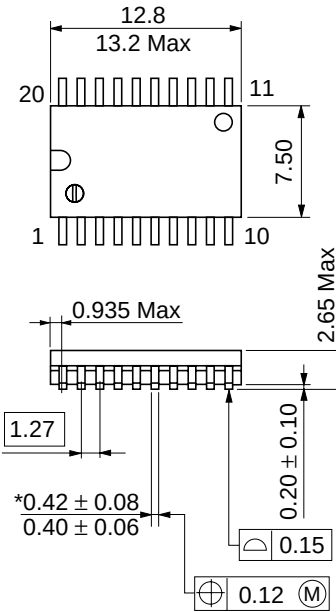


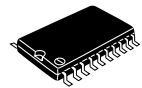



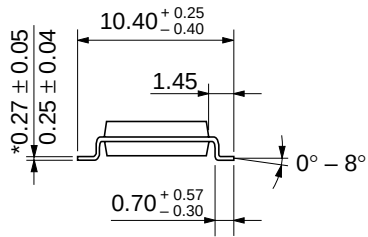

*Dimension including the plating thickness
Base material dimension

| | |
|---|---|
| Hitachi Code | FP-20DA |
| JEDEC | — |
| EIAJ | Conforms |
| Weight (reference value) | 0.31 g |

Unit: mm






*Dimension including the plating thickness
Base material dimension

| | |
|---|---|
| Hitachi Code | FP-20DB |
| JEDEC | Conforms |
| EIAJ | — |
| Weight (reference value) | 0.52 g |

## Cautions

1. Hitachi neither warrants nor grants licenses of any rights of Hitachi's or any third party's patent, copyright, trademark, or other intellectual property rights for information contained in this document. Hitachi bears no responsibility for problems that may arise with third party's rights, including intellectual property rights, in connection with use of the information contained in this document.
2. Products and product specifications may be subject to change without notice. Confirm that you have received the latest product standards or specifications before final design, purchase or use.
3. Hitachi makes every attempt to ensure that its products are of high quality and reliability. However, contact Hitachi's sales office before using the product in an application that demands especially high quality and reliability or where its failure or malfunction may directly threaten human life or cause risk of bodily injury, such as aerospace, aeronautics, nuclear power, combustion control, transportation, traffic, safety equipment or medical equipment for life support.
4. Design your application so that the product is used within the ranges guaranteed by Hitachi particularly for maximum rating, operating supply voltage range, heat radiation characteristics, installation conditions and other characteristics. Hitachi bears no responsibility for failure or damage when used beyond the guaranteed ranges. Even within the guaranteed ranges, consider normally foreseeable failure rates or failure modes in semiconductor devices and employ systemic measures such as fail-safes, so that the equipment incorporating Hitachi product does not cause bodily injury, fire or other consequential damage due to operation of the Hitachi product.
5. This product is not designed to be radiation resistant.
6. No one is permitted to reproduce or duplicate, in any form, the whole or part of this document without written approval from Hitachi.
7. Contact Hitachi's sales office for any questions regarding this document or Hitachi semiconductor products.

# HITACHI

**Hitachi, Ltd.**
Semiconductor & Integrated Circuits.
Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan
Tel: Tokyo (03) 3270-2111 Fax: (03) 3270-5109

URL
NorthAmerica : http:semiconductor.hitachi.com/
Europe : http://www.hitachi-eu.com/hel/ecg
Asia (Singapore) : http://www.has.hitachi.com.sg/grp3/sicd/index.htm
Asia (Taiwan) : http://www.hitachi.com.tw/E/Product/SICD_Frame.htm
Asia (HongKong) : http://www.hitachi.com.hk/eng/bo/grp3/index.htm
Japan : http://www.hitachi.co.jp/Sicd/indx.htm

**For further information write to:**

Hitachi Semiconductor
(America) Inc.
179 East Tasman Drive,
San Jose,CA 95134
Tel: <1> (408) 433-1990
Fax: <1>(408) 433-0223

Hitachi Europe GmbH
Electronic components Group
Dornacher Straße 3
D-85622 Feldkirchen, Munich
Germany
Tel: <49> (89) 9 9180-0
Fax: <49> (89) 9 29 30 00

Hitachi Europe Ltd.
Electronic Components Group.
Whitebrook Park
Lower Cookham Road
Maidenhead
Berkshire SL6 8YA, United Kingdom
Tel: <44> (1628) 585000
Fax: <44> (1628) 778322

Hitachi Asia Pte. Ltd.
16 Collyer Quay #20-00
Hitachi Tower
Singapore 049318
Tel: 535-2100
Fax: 535-1533

Hitachi Asia Ltd.
Taipei Branch Office
3F, Hung Kuo Building. No.167,
Tun-Hwa North Road, Taipei (105)
Tel: <886> (2) 2718-3666
Fax: <886> (2) 2718-8180

Hitachi Asia (Hong Kong) Ltd.
Group III (Electronic Components)
7/F., North Tower, World Finance Centre,
Harbour City, Canton Road, Tsim Sha Tsui,
Kowloon, Hong Kong
Tel: <852> (2) 735 9218
Fax: <852> (2) 730 0281
Telex: 40815 HITEC HX