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# HD74AC373/HD74ACT373

Octal Transparent Latch with 3-State Output

## HITACHI

ADE-205-394 (Z)  
1st. Edition  
Sep. 2000

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### Description Diagram

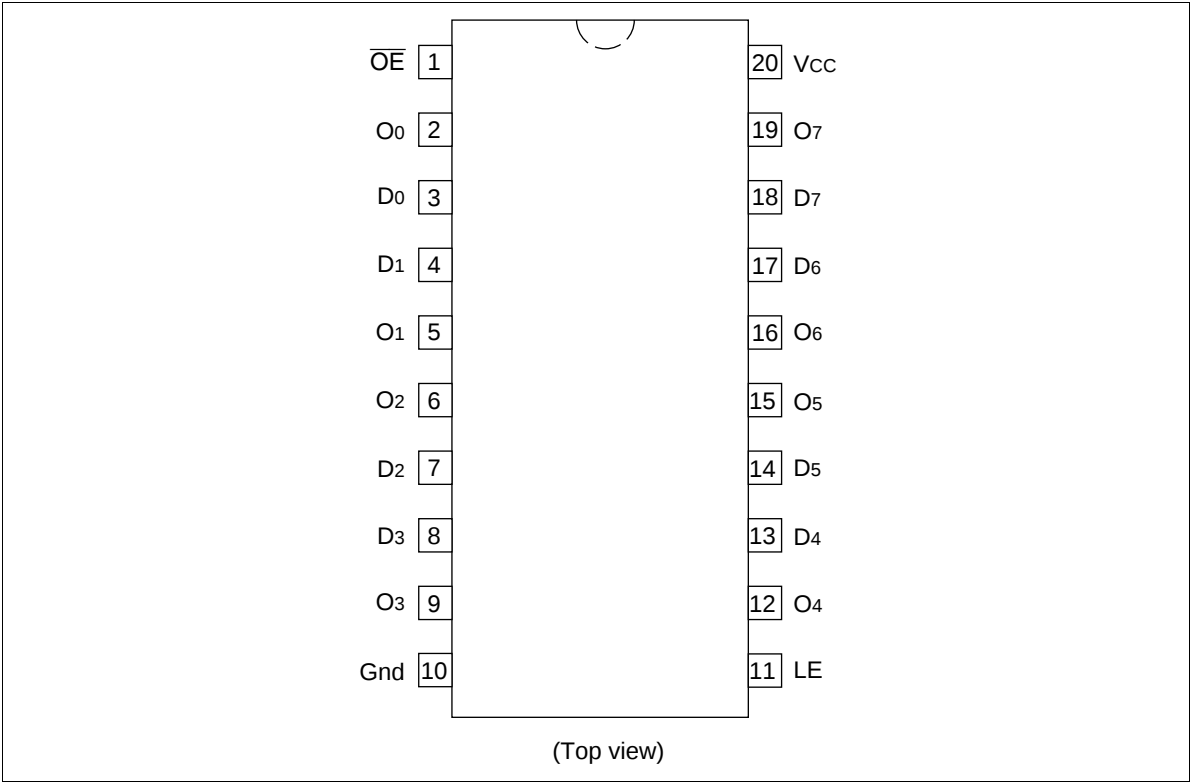
The HD74AC373/HD74ACT373 consists of eight latches with 3-state outputs from bus organized system applications. The flip-flops appear transparent to the data when Latch Enable (LE) is High. When LE is Low, the data that meets the setup time is latched. Data appears on the bus when the Output Enable ( $\overline{OE}$ ) is Low. When  $\overline{OE}$  is High, the bus output is in the high impedance state.

### Features

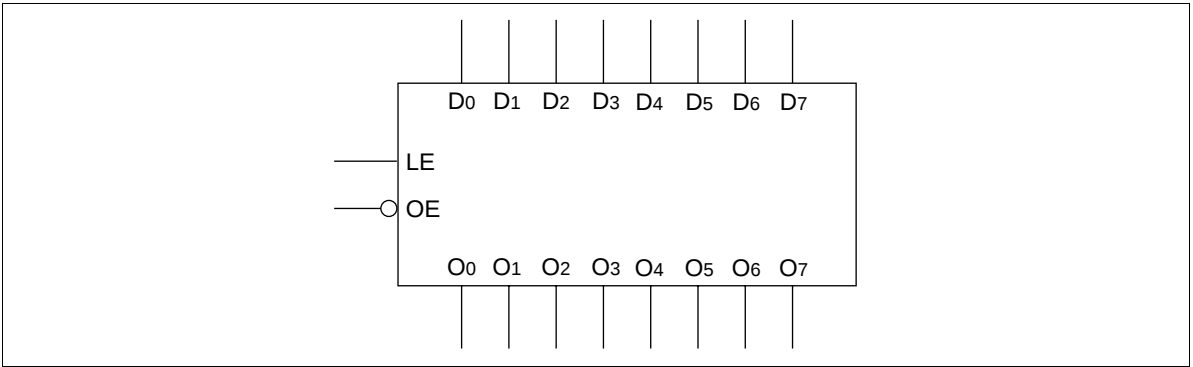
- Eight Latches in a Single Package
- 3-State Outputs for Bus Interfacing
- Outputs Source/Sink 24 mA
- HD74AC373 has TTL-Compatible Inputs

# HD74AC373/HD74ACT373

## Pin Arrangement



## Logic Symbol



## Pin Names

- D<sub>0</sub> – D<sub>7</sub> Data Inputs
- LE Latch Enable Input
- $\overline{OE}$  Output Enable Input
- O<sub>0</sub> – O<sub>7</sub> 3-State Latch Outputs

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Truth Table

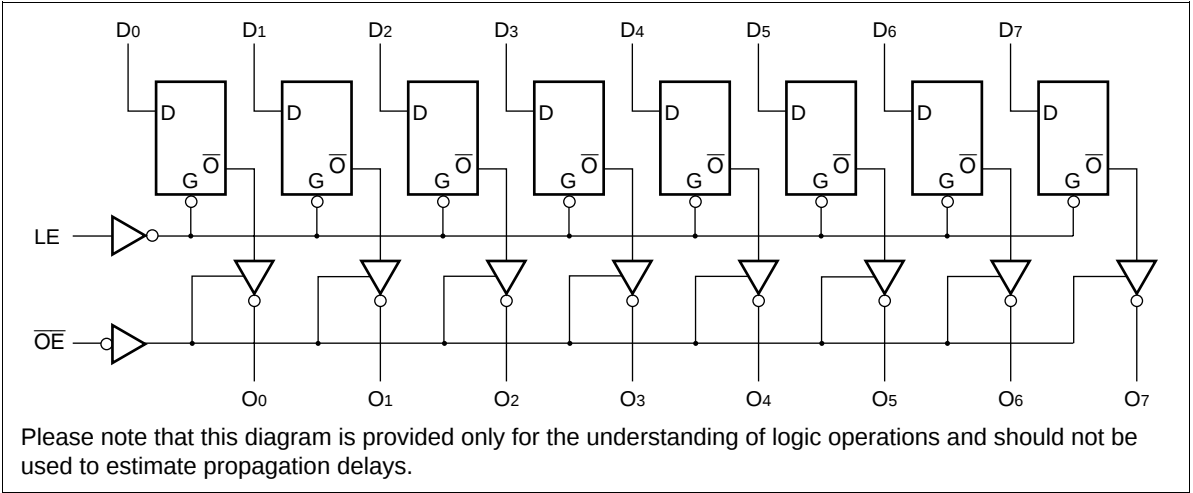
| Inputs          |    |       | Outputs |
|-----------------|----|-------|---------|
| $\overline{OE}$ | LE | $D_n$ | $O_n$   |
| H               | X  | X     | Z       |
| L               | H  | L     | L       |
| L               | H  | H     | H       |
| L               | L  | X     | $O_0$   |

- H : High Voltage Level  
L : Low Voltage Level  
Z : High Impedance  
X : Immaterial  
 $O_0$  : Previous  $O_0$  before Low-to-High Transition of Clock

Functional Description

The HD74AC373/HD74ACT373 contains eight D-type latches with 3-state standard outputs. When the Latch Enable (LE) input is High, data on the  $D_n$  inputs enters the latches. In this condition the latches are transparent, i.e., a latch output will change state each time its D input changes. When LE is Low, the latches store the information that was present on the D inputs setup time preceding the High-to-Low transition of LE. The 3-state standard outputs are controlled by the Output Enable ( $\overline{OE}$ ) input. When  $\overline{OE}$  is Low, the standard outputs are in the 2-state mode. When  $\overline{OE}$  is High, the standard outputs are in the high impedance mode but this does not interfere with entering new data into the latches.

Logic Diagram



HD74AC373/HD74ACT373

DC Characteristics (unless otherwise specified)

| Item                                        | Symbol           | Max | Unit | Condition                                                                             |
|---------------------------------------------|------------------|-----|------|---------------------------------------------------------------------------------------|
| Maximum quiescent supply current            | I <sub>CC</sub>  | 80  | μA   | V <sub>IN</sub> = V <sub>CC</sub> or ground, V <sub>CC</sub> = 5.5 V, Ta = Worst case |
| Maximum quiescent supply current            | I <sub>CC</sub>  | 8.0 | μA   | V <sub>IN</sub> = V <sub>CC</sub> or ground, V <sub>CC</sub> = 5.5 V, Ta = 25°C       |
| Maximum I <sub>CC</sub> /input (HD74ACT373) | I <sub>CCT</sub> | 1.5 | mA   | V <sub>IN</sub> = V <sub>CC</sub> – 2.1 V, V <sub>CC</sub> = 5.5 V, Ta = Worst case   |

AC Characteristics: HD74AC373

| Item                             | Symbol           | V <sub>CC</sub> (V)*1 | Ta = +25°C<br>C <sub>L</sub> = 50 pF |      |      | Ta = –40°C to +85°C<br>C <sub>L</sub> = 50 pF |      | Unit |
|----------------------------------|------------------|-----------------------|--------------------------------------|------|------|-----------------------------------------------|------|------|
|                                  |                  |                       | Min                                  | Typ  | Max  | Min                                           | Max  |      |
| Propagation delay                | t <sub>PLH</sub> | 3.3                   | 1.0                                  | 10.0 | 13.5 | 1.0                                           | 15.0 | ns   |
| D <sub>n</sub> to O <sub>n</sub> |                  | 5.0                   | 1.0                                  | 7.0  | 9.5  | 1.0                                           | 10.5 |      |
| Propagation delay                | t <sub>PHL</sub> | 3.3                   | 1.0                                  | 9.5  | 13.0 | 1.0                                           | 14.5 | ns   |
| D <sub>n</sub> to O <sub>n</sub> |                  | 5.0                   | 1.0                                  | 7.0  | 9.5  | 1.0                                           | 10.5 |      |
| Propagation delay                | t <sub>PLH</sub> | 3.3                   | 1.0                                  | 10.0 | 13.5 | 1.0                                           | 15.0 | ns   |
| LE to O <sub>n</sub>             |                  | 5.0                   | 1.0                                  | 7.5  | 9.5  | 1.0                                           | 10.5 |      |
| Propagation delay                | t <sub>PHL</sub> | 3.3                   | 1.0                                  | 9.5  | 12.5 | 1.0                                           | 14.0 | ns   |
| LE to O <sub>n</sub>             |                  | 5.0                   | 1.0                                  | 7.0  | 9.5  | 1.0                                           | 10.5 |      |
| Output enable time               | t <sub>ZH</sub>  | 3.3                   | 1.0                                  | 9.0  | 11.5 | 1.0                                           | 13.0 | ns   |
|                                  |                  | 5.0                   | 1.0                                  | 7.0  | 8.5  | 1.0                                           | 9.5  |      |
| Output enable time               | t <sub>ZL</sub>  | 3.3                   | 1.0                                  | 8.5  | 11.5 | 1.0                                           | 13.0 | ns   |
|                                  |                  | 5.0                   | 1.0                                  | 6.5  | 8.5  | 1.0                                           | 9.5  |      |
| Output disable time              | t <sub>HZ</sub>  | 3.3                   | 1.0                                  | 10.0 | 12.5 | 1.0                                           | 14.5 | ns   |
|                                  |                  | 5.0                   | 1.0                                  | 8.0  | 11.0 | 1.0                                           | 12.5 |      |
| Output disable time              | t <sub>LZ</sub>  | 3.3                   | 1.0                                  | 8.0  | 11.5 | 1.0                                           | 12.5 | ns   |
|                                  |                  | 5.0                   | 1.0                                  | 6.5  | 8.5  | 1.0                                           | 10.0 |      |

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

AC Characteristics: HD74AC373

| Item                                                  | Symbol           | V <sub>CC</sub> (V)*1 | Ta = +25°C<br>C <sub>L</sub> = 50 pF |     |      | Ta = -40°C to +85°C<br>C <sub>L</sub> = 50 pF |      | Unit |
|-------------------------------------------------------|------------------|-----------------------|--------------------------------------|-----|------|-----------------------------------------------|------|------|
|                                                       |                  |                       | Min                                  | Typ | Max  | Min                                           | Max  |      |
| Propagation delay<br>D <sub>n</sub> to O <sub>n</sub> | t <sub>PLH</sub> | 5.0                   | 1.0                                  | 8.5 | 10.0 | 1.0                                           | 11.5 | ns   |
| Propagation delay<br>D <sub>n</sub> to O <sub>n</sub> | t <sub>PHL</sub> | 5.0                   | 1.0                                  | 8.0 | 10.0 | 1.0                                           | 11.5 | ns   |
| Propagation delay<br>LE to O <sub>n</sub>             | t <sub>PLH</sub> | 5.0                   | 1.0                                  | 8.5 | 11.0 | 1.0                                           | 11.5 | ns   |
| Propagation delay<br>LE to O <sub>n</sub>             | t <sub>PHL</sub> | 5.0                   | 1.0                                  | 8.0 | 10.0 | 1.0                                           | 11.5 | ns   |
| Output enable time                                    | t <sub>ZH</sub>  | 5.0                   | 1.0                                  | 8.0 | 9.5  | 1.0                                           | 10.5 | ns   |
| Output enable time                                    | t <sub>ZL</sub>  | 5.0                   | 1.0                                  | 7.5 | 9.0  | 1.0                                           | 10.5 | ns   |
| Output disable time                                   | t <sub>HZ</sub>  | 5.0                   | 1.0                                  | 9.0 | 11.0 | 1.0                                           | 12.5 | ns   |
| Output disable time                                   | t <sub>LZ</sub>  | 5.0                   | 1.0                                  | 7.5 | 8.5  | 1.0                                           | 10.0 | ns   |

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

AC Operating Requirements: HD74AC373

| Item                                            | Symbol          | V <sub>CC</sub> (V)*1 | Ta = +25°C<br>C <sub>L</sub> = 50 pF |                    | Ta = -40°C<br>to +85°C<br>C <sub>L</sub> = 50 pF | Unit |
|-------------------------------------------------|-----------------|-----------------------|--------------------------------------|--------------------|--------------------------------------------------|------|
|                                                 |                 |                       | Typ                                  | Guaranteed Minimum |                                                  |      |
| Setup time, HIGH or LOW<br>D <sub>n</sub> to LE | t <sub>su</sub> | 3.3                   | 3.5                                  | 5.5                | 6.0                                              | ns   |
|                                                 |                 | 5.0                   | 2.0                                  | 4.0                | 4.5                                              |      |
| Hold time, HIGH or LOW<br>D <sub>n</sub> to LE  | t <sub>h</sub>  | 3.3                   | -3.0                                 | 0.0                | 0.0                                              | ns   |
|                                                 |                 | 5.0                   | -1.5                                 | 0.0                | 0.0                                              |      |
| LE pulse width, HIGH                            | t <sub>w</sub>  | 3.3                   | 4.0                                  | 5.5                | 6.0                                              | ns   |
|                                                 |                 | 5.0                   | 2.0                                  | 4.0                | 4.5                                              |      |

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

AC Operating Requirements: HD74ACT373

| Item                                            | Symbol          | V <sub>CC</sub> (V)* <sup>1</sup> | T <sub>a</sub> = +25°C<br>C <sub>L</sub> = 50 pF | T <sub>a</sub> = −40°C<br>to +85°C<br>C <sub>L</sub> = 50 pF |     | Unit |
|-------------------------------------------------|-----------------|-----------------------------------|--------------------------------------------------|--------------------------------------------------------------|-----|------|
|                                                 |                 |                                   | Typ                                              | Guaranteed Minimum                                           |     |      |
| Setup time, HIGH or LOW<br>D <sub>n</sub> to LE | t <sub>su</sub> | 5.0                               | 3.0                                              | 7.0                                                          | 8.0 | ns   |
| Hold time, HIGH or LOW<br>D <sub>n</sub> to LE  | t <sub>h</sub>  | 5.0                               | 0.0                                              | 0.0                                                          | 1.0 | ns   |
| LE pulse width, HIGH                            | t <sub>w</sub>  | 5.0                               | 2.0                                              | 7.0                                                          | 8.0 | ns   |

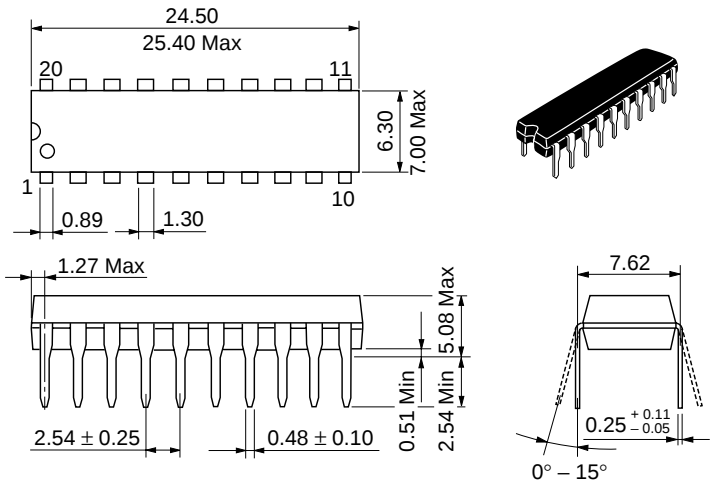
Note: 1. Voltage Range 5.0 is 5.0 V ± 0.5 V

Capacitance

| Item                          | Symbol          | Typ  | Unit | Condition               |
|-------------------------------|-----------------|------|------|-------------------------|
| Input capacitance             | C <sub>IN</sub> | 4.5  | pF   | V <sub>CC</sub> = 5.5 V |
| Power dissipation capacitance | C <sub>PD</sub> | 40.0 | pF   | V <sub>CC</sub> = 5.0 V |

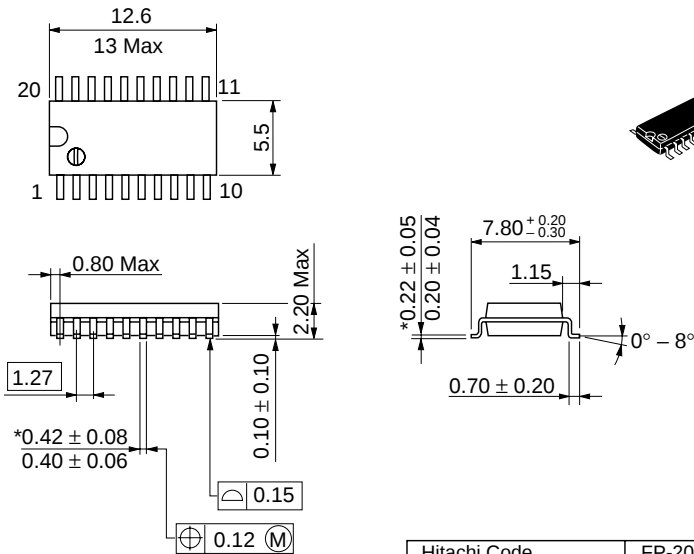
Package Dimensions

Unit: mm



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

Unit: mm

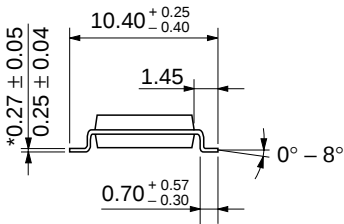
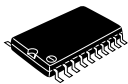
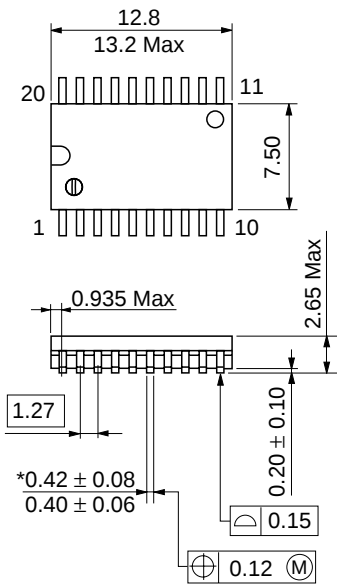


\*Dimension including the plating thickness  
Base material dimension

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

HD74AC373/HD74ACT373

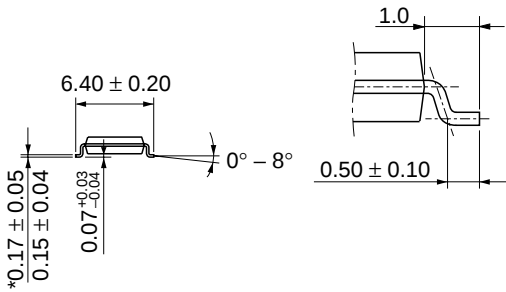
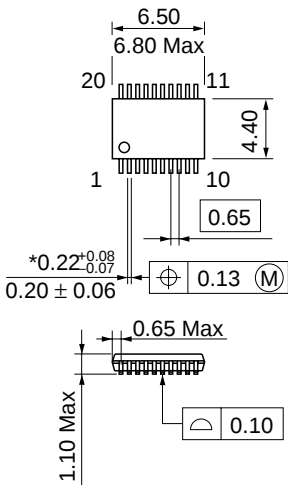
Unit: mm



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

\*Dimension including the plating thickness  
Base material dimension

Unit: mm



|                        |          |
|------------------------|----------|
| Hitachi Code           | TTP-20DA |
| JEDEC                  | —        |
| EIAJ                   | —        |
| Mass (reference value) | 0.07 g   |

\*Dimension including the plating thickness  
Base material dimension

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