

# HD74HC373/HD74HC533

Octal D-type Transparent Latches (with 3-state outputs)  
Octal D-type Transparent Latches (with inverted 3-state outputs)

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## Description

When the latch enable input is high, the Q outputs of HD74HC373 will follow the D inputs and the Q outputs of HD74HC533 will follow the inversion of the D inputs. When the latch enable goes low, data at the D inputs will be retained at the outputs until latch enable returns high again. When a high logic level is applied to the output control input, all outputs go to a high impedance state, regardless of what signals are present at the other inputs and the state of the storage elements.

## Features

- High Speed Operation:  $t_{pd}$  (D to Q) = 16 ns typ ( $C_L = 50$  pF)
- High Output Current: Fanout of 15 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) = 4  $\mu$ A max ( $T_a = 25^\circ\text{C}$ )

## Function Table

| Output Control | Enable<br>G | D | HD74HC373<br>Q | HD74HC533<br>$\bar{Q}$ |
|----------------|-------------|---|----------------|------------------------|
| L              | H           | H | H              | L                      |
| L              | H           | L | L              | H                      |
| L              | L           | X | No change      | No change              |
| H              | X           | X | Z              | Z                      |

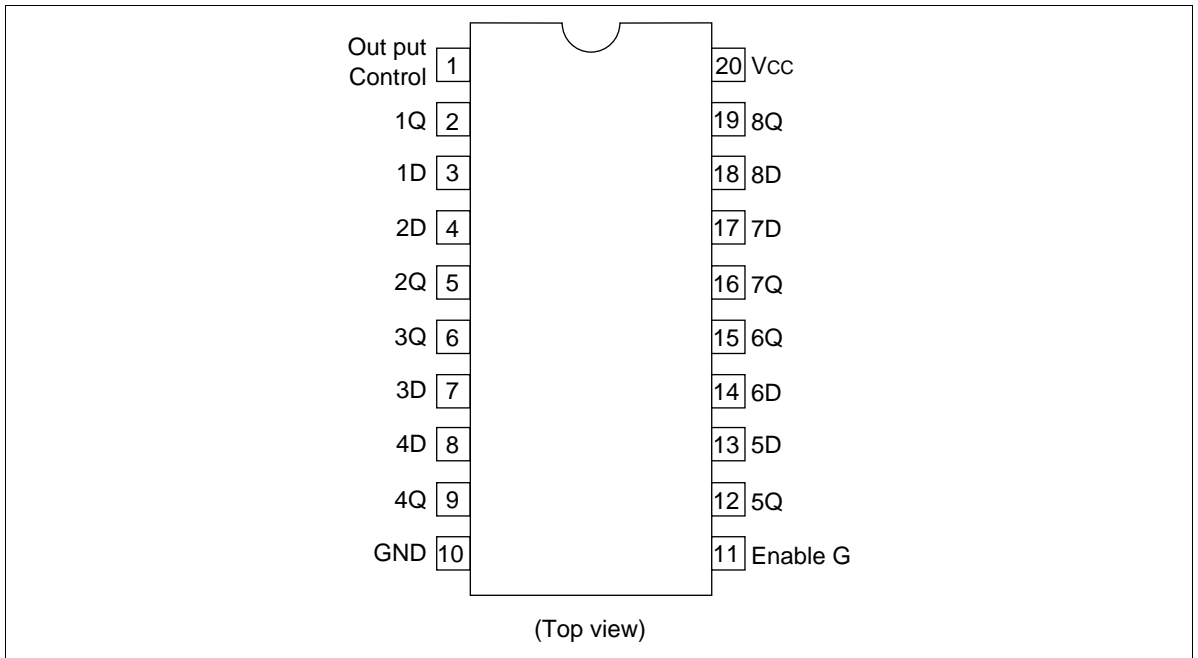
X : irrelevant

Z : Off (high-impedance) state of a 3-state output.

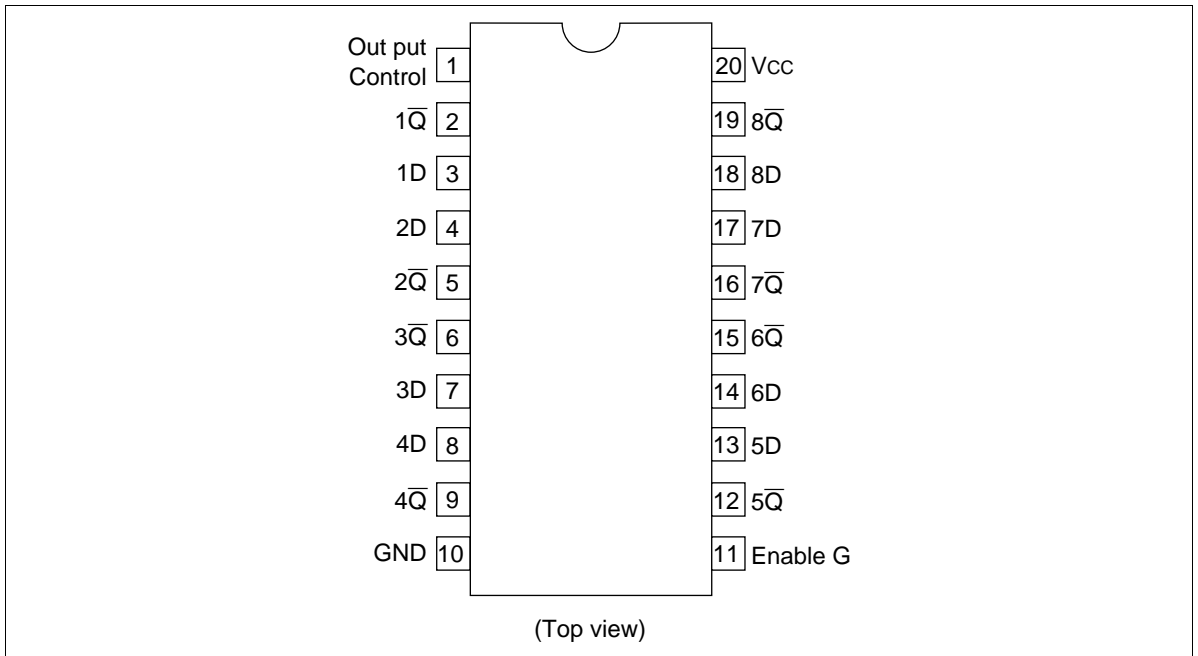
# HD74HC373/HD74HC533

## Pin Arrangement

### HD74HC373



### HD74HC533



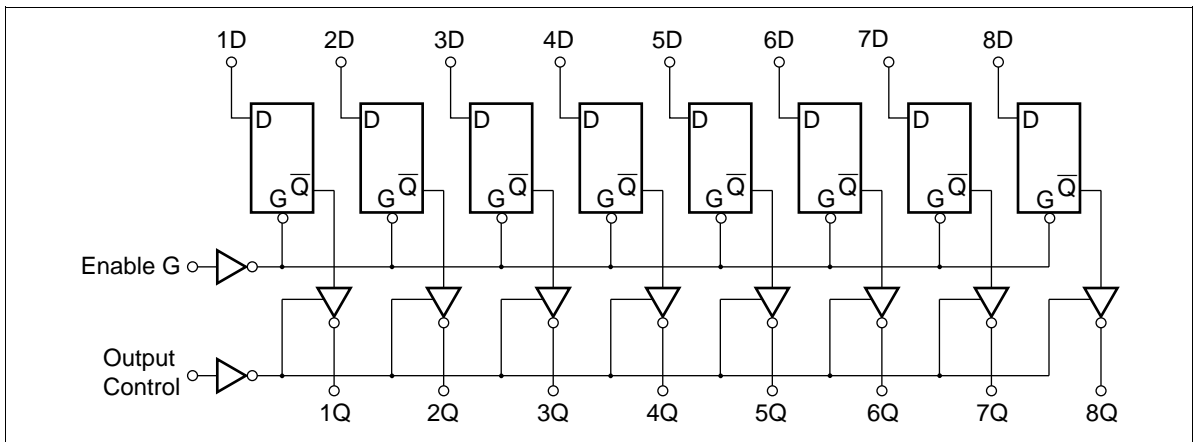
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**Absolute Maximum Ratings**

| Item                             | Symbol            | Rating                 | Unit        |
|----------------------------------|-------------------|------------------------|-------------|
| Supply voltage range             | $V_{CC}$          | -0.5 to +7.0           | V           |
| Input voltage                    | $V_{IN}$          | -0.5 to $V_{CC} + 0.5$ | V           |
| Output voltage                   | $V_{OUT}$         | -0.5 to $V_{CC} + 0.5$ | V           |
| DC current drain per pin         | $I_{OUT}$         | $\pm 35$               | mA          |
| DC current drai per $V_{CC}$ GND | $I_{CC}, I_{GND}$ | $\pm 75$               | mA          |
| DC input diode current           | $I_{IK}$          | $\pm 20$               | mA          |
| DC output diode current          | $I_{OK}$          | $\pm 20$               | mA          |
| Power Dissipation per package    | $P_T$             | 500                    | mW          |
| Storage temperature              | Tstg              | -65 to +150            | $^{\circ}C$ |

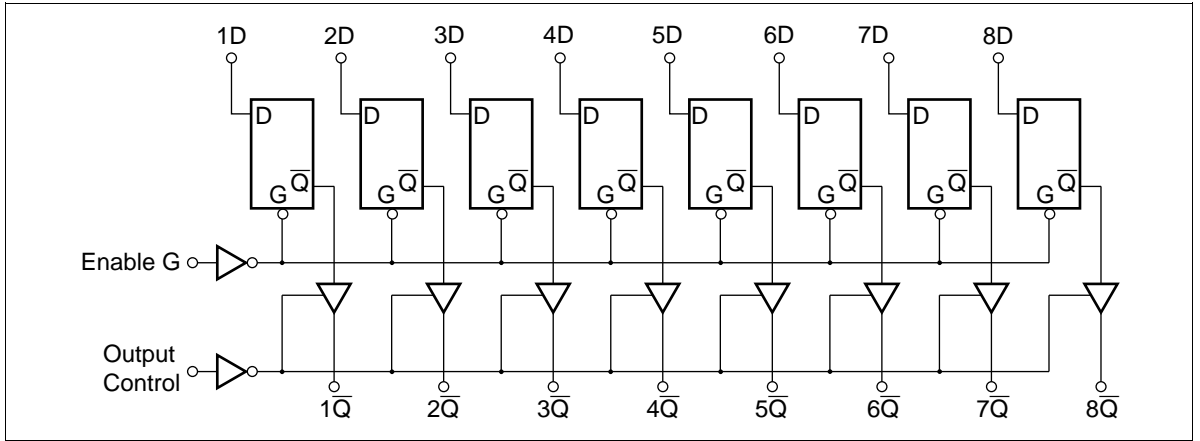
**Block Diagram**

**HD74HC373**



# HD74HC373/HD74HC533

## HD74HC533



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DC Characteristics

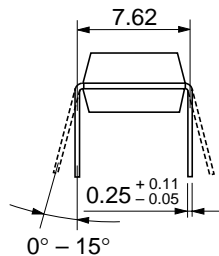
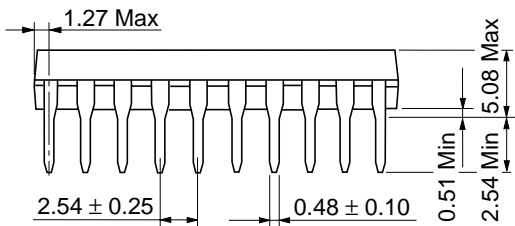
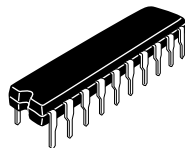
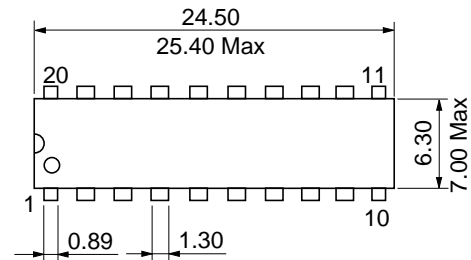
| Item                     | Symbol          | V <sub>CC</sub> (V)      | Ta = 25°C       |     | Ta = -40 to +85°C |      | Unit | Test Conditions  |  |
|--------------------------|-----------------|--------------------------|-----------------|-----|-------------------|------|------|--|--|
|                          |                 |                          | Min             | Typ | Max               | Min  |      |  | Max  |
| Input voltage            | V <sub>IH</sub> | 2.0                      | 1.5             | —   | —                 | 1.5  | —    | V  |  |
|                          |                 | 4.5                      | 3.15            | —   | —                 | 3.15 | —    |  |  |
|                          |                 | 6.0                      | 4.2             | —   | —                 | 4.2  | —    |  |  |
|                          | V <sub>IL</sub> | 2.0                      | —               | —   | 0.5               | —    | 0.5  |  | V  |
|                          |                 | 4.5                      | —               | —   | 1.35              | —    | 1.35 |  |  |
|                          |                 | 6.0                      | —               | —   | 1.8               | —    | 1.8  |  |  |
| Output voltage           | V <sub>OH</sub> | 2.0                      | 1.9             | 2.0 | —                 | 1.9  | —    | Vin = V <sub>IH</sub> or V <sub>IL</sub> I <sub>OH</sub> = -20 μA              |  |
|                          |                 | 4.5                      | 4.4             | 4.5 | —                 | 4.4  | —    |  |  |
|                          |                 | 6.0                      | 5.9             | 6.0 | —                 | 5.9  | —    |  |  |
|                          |                 | 4.5                      | 4.18            | —   | —                 | 4.13 | —    |  | I <sub>OH</sub> = -6 mA  |
|                          |                 | 6.0                      | 5.68            | —   | —                 | 5.63 | —    |  | I <sub>OH</sub> = -7.8 mA  |
|                          |                 | 6.0                      | —               | 0.0 | 0.1               | —    | 0.1  |  | Vin = V <sub>IH</sub> or V <sub>IL</sub> I <sub>OL</sub> = 20 μA |
|                          | V <sub>OL</sub> | 4.5                      | —               | 0.0 | 0.1               | —    | 0.1  |  |  |
|                          |                 | 6.0                      | —               | 0.0 | 0.1               | —    | 0.1  |  |  |
|                          |                 | 4.5                      | —               | —   | 0.26              | —    | 0.33 | I <sub>OL</sub> = 6 mA   |  |
|                          |                 | 6.0                      | —               | —   | 0.26              | —    | 0.33 | I <sub>OL</sub> = 7.8 mA   |  |
|                          |                 | 6.0                      | —               | —   | ±0.5              | —    | ±5.0 | μA Vin = V <sub>IH</sub> or V <sub>IL</sub> ,<br>Vout = V <sub>CC</sub> or GND |  |
|                          |                 | Off-state output current | I <sub>OZ</sub> | 6.0 | —                 | —    | ±0.5 |  | —  |
| Input current            | I <sub>in</sub> | 6.0                      | —               | —   | ±0.1              | —    | ±1.0 | μA Vin = V <sub>CC</sub> or GND  |  |
| Quiescent supply current | I <sub>CC</sub> | 6.0                      | —               | —   | 4.0               | —    | 40   | μA Vin = V <sub>CC</sub> or GND, Iout = 0 μA                                   |  |

# HD74HC373/HD74HC533

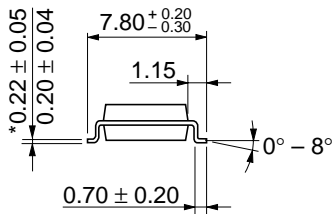
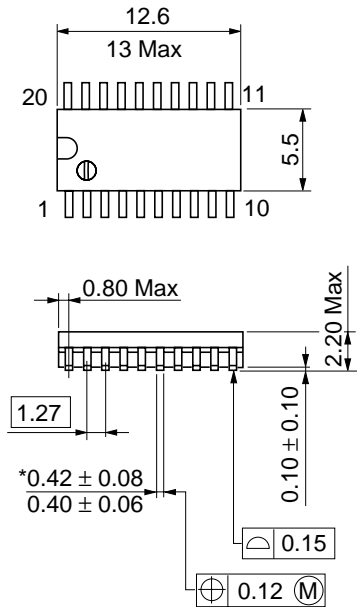
AC Characteristics ( $C_L = 50$  pF, Input  $t_r = t_f = 6$  ns)

| Item                   | Symbol    | $V_{CC}$ (V) | $T_a = 25^\circ\text{C}$ |     | $T_a = -40$ to $+85^\circ\text{C}$ |     | Unit | Test Conditions |        |
|------------------------|-----------|--------------|--------------------------|-----|------------------------------------|-----|------|-----------------|--------|
|                        |           |              | Min                      | Typ | Max                                | Min |      |                 | Max    |
| Propagation delay time | $t_{PLH}$ | 2.0          | —                        | —   | 150                                | —   | 190  | ns              | G to Q |
|                        |           | 4.5          | —                        | 18  | 30                                 | —   | 38   |                 |        |
|                        |           | 6.0          | —                        | —   | 26                                 | —   | 33   |                 |        |
|                        | $t_{PHL}$ | 2.0          | —                        | —   | 125                                | —   | 155  | ns              | D to Q |
|                        |           | 4.5          | —                        | 16  | 25                                 | —   | 31   |                 |        |
|                        |           | 6.0          | —                        | —   | 21                                 | —   | 26   |                 |        |
| Output enable time     | $t_{ZL}$  | 2.0          | —                        | —   | 150                                | —   | 190  | ns              |        |
|                        |           | 4.5          | —                        | 12  | 30                                 | —   | 38   |                 |        |
|                        |           | 6.0          | —                        | —   | 26                                 | —   | 33   |                 |        |
|                        | $t_{ZH}$  | 2.0          | —                        | —   | 150                                | —   | 190  | ns              |        |
|                        |           | 4.5          | —                        | 15  | 30                                 | —   | 38   |                 |        |
|                        |           | 6.0          | —                        | —   | 26                                 | —   | 33   |                 |        |
| Output disable time    | $t_{LZ}$  | 2.0          | —                        | —   | 150                                | —   | 190  | ns              |        |
|                        |           | 4.5          | —                        | 13  | 30                                 | —   | 38   |                 |        |
|                        |           | 6.0          | —                        | —   | 26                                 | —   | 33   |                 |        |
|                        | $t_{HZ}$  | 2.0          | —                        | —   | 150                                | —   | 190  | ns              |        |
|                        |           | 4.5          | —                        | 16  | 30                                 | —   | 38   |                 |        |
|                        |           | 6.0          | —                        | —   | 26                                 | —   | 33   |                 |        |
| Setup time             | $t_{su}$  | 2.0          | 100                      | —   | —                                  | 125 | —    | ns              |        |
|                        |           | 4.5          | 20                       | 1   | —                                  | 25  | —    |                 |        |
|                        |           | 6.0          | 17                       | —   | —                                  | 21  | —    |                 |        |
| Hold time              | $t_h$     | 2.0          | 50                       | —   | —                                  | 65  | —    | ns              |        |
|                        |           | 4.5          | 10                       | 1   | —                                  | 13  | —    |                 |        |
|                        |           | 6.0          | 9                        | —   | —                                  | 11  | —    |                 |        |
| Pulse width            | $t_w$     | 2.0          | 80                       | —   | —                                  | 100 | —    | ns              |        |
|                        |           | 4.5          | 16                       | 6   | —                                  | 20  | —    |                 |        |
|                        |           | 6.0          | 14                       | —   | —                                  | 17  | —    |                 |        |
| Output rise/fall time  | $t_{TLH}$ | 2.0          | —                        | —   | 60                                 | —   | 75   | ns              |        |
|                        | $t_{THL}$ | 4.5          | —                        | 4   | 12                                 | —   | 15   |                 |        |
|                        |           | 6.0          | —                        | —   | 10                                 | —   | 13   |                 |        |
| Input capacitance      | $C_{in}$  | —            | —                        | 5   | 10                                 | —   | 10   | pF              |        |

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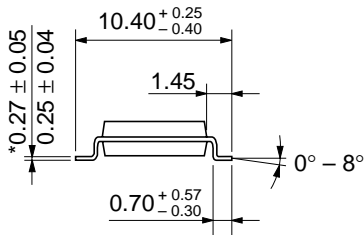
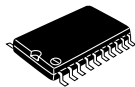
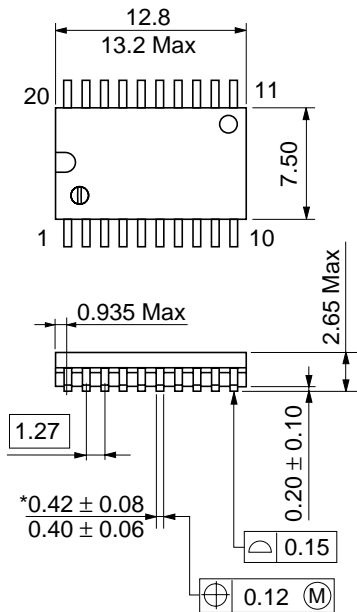
|                          |          |
|--------------------------|----------|
| Hitachi Code             | DP-20N   |
| JEDEC                    | —        |
| EIAJ                     | Conforms |
| Weight (reference value) | 1.26 g   |



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

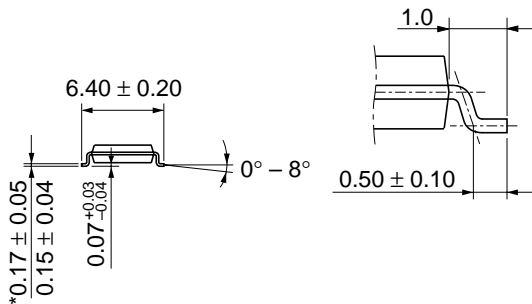
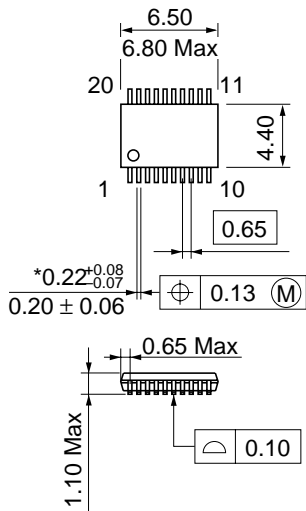
\*Dimension including the plating thickness  
Base material dimension





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

\*Dimension including the plating thickness  
 Base material dimension



\*Dimension including the plating thickness  
Base material dimension

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

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