

**U74AHC573****CMOS IC****OCTAL TRANSPARENT  
D-TYPE LATCHES WITH  
3-STATE OUTPUTS****DESCRIPTION**

The **U74AHC573** is an octal transparent D-type latch with 3-state outputs, and it has 8 channels.

When the  $\overline{OE}$  input is low and the LE input is high, the Q outputs follow the D inputs. When  $\overline{OE}$  is low and LE is low, the Q outputs are latched at the logic levels of the D inputs.

When the  $\overline{OE}$  input is high, the outputs are in the high-impedance. The  $\overline{OE}$  does not affect the internal operations of the latches. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

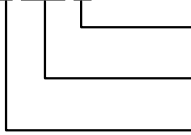
To ensure the high-impedance state during power up or power down,  $\overline{OE}$  should be tied to  $V_{CC}$  through a pull-up resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

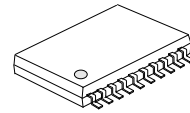
**FEATURES**

- \* Operate from 2V to 5.5V
- \* Inputs Accept Voltages to 5.5V
- \* Max  $t_{PD}$  of 13ns at  $V_{CC}=3.3V$ ,  $C_L=15pF$
- \* Typ  $V_{OL} < 0.36V$  at  $V_{CC}=4.5V$ ,  $I_{OL}=8mA$ ,  $T_A=25^\circ C$
- \* Typ  $V_{OH} > 3.94V$  at  $V_{CC}=4.5V$ ,  $I_{OH}=-8mA$ ,  $T_A=25^\circ C$

**ORDERING INFORMATION**

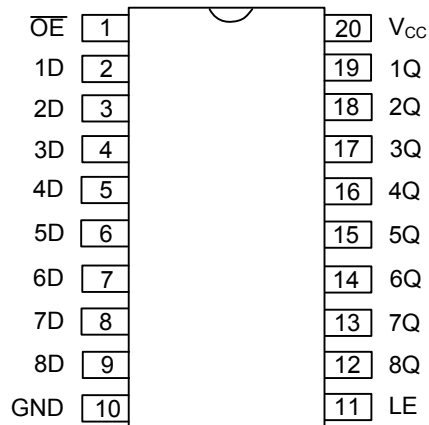
| Ordering Number  |                  | Package  | Packing   |
|------------------|------------------|----------|-----------|
| Lead Free        | Halogen Free     |          |           |
| U74AHC573L-P20-R | U74AHC573G-P20-R | TSSOP-20 | Tape Reel |
| U74AHC573L-P20-T | U74AHC573G-P20-T | TSSOP-20 | Tube      |

|                                                                                     |                                                    |                                                                                     |
|-------------------------------------------------------------------------------------|----------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>U74AHC573L-P20-R</b>                                                             |                                                    |                                                                                     |
|  | (1)Packing Type<br>(2)Package Type<br>(3)Lead Free | (1) R: Tape Reel, T: Tube<br>(2) P20: TSSOP-20<br>(3) G: Halogen Free, L: Lead Free |



TSSOP-20

## PIN CONFIGURATION

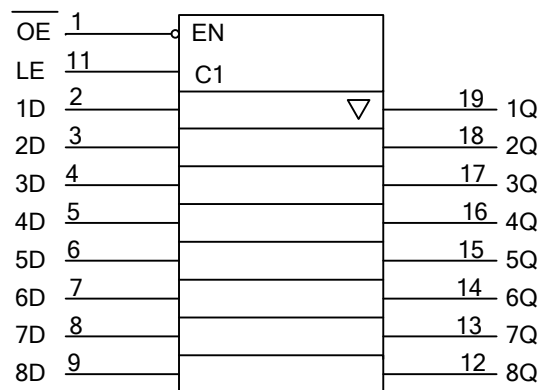


## FUNCTION TABLE

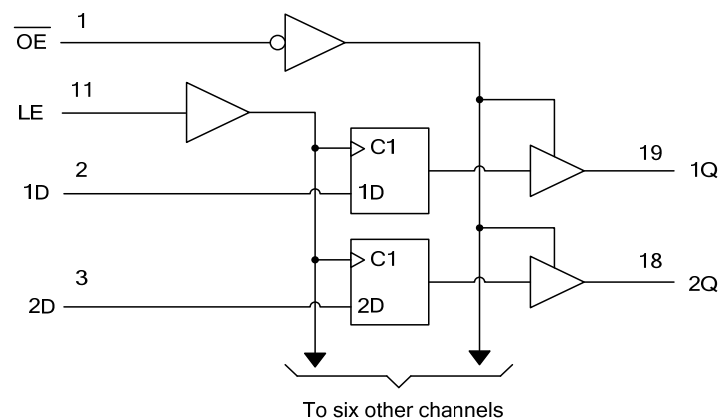
| INPUTS( $\overline{OE}$ ) | INPUTS(LE) | INPUTS(D) | OUTPUT(Q) |
|---------------------------|------------|-----------|-----------|
| L                         | H          | H         | H         |
| L                         | H          | L         | L         |
| L                         | L          | X         | $Q_0$     |
| H                         | X          | X         | Z         |

Note: H: HIGH voltage level, L: LOW voltage level.

## LOGIC SYMBOL



## LOGIC DIAGRAM



## ■ ABSOLUTE MAXIMUM RATING

| PARAMETER               | SYMBOL    | RATINGS               | UNIT |
|-------------------------|-----------|-----------------------|------|
| Supply voltage          | $V_{CC}$  | -0.5 ~ 7              | V    |
| Input voltage (Note 2)  | $V_I$     | -0.5 ~ 7              | V    |
| Output voltage (Note 2) | $V_O$     | -0.5 ~ $V_{CC} + 0.5$ | V    |
| Input clamp current     | $I_{IK}$  | -20                   | mA   |
| Output clamp current    | $I_{OK}$  | ±20                   | mA   |
| Output current          | $I_O$     | ±25                   | mA   |
| $V_{CC}$ or GND current | $I_{CC}$  | ±75                   | mA   |
| Operating Temperature   | $T_{OPR}$ | -40 ~ +85             | °C   |
| Storage temperature     | $T_{STG}$ | -65 ~ +150            | °C   |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

## ■ RECOMMENDED OPERATING CONDITIONS

| PARAMETER                 | SYMBOL     | TEST CONDITIONS                          | MIN  | TYP | MAX      | UNIT |
|---------------------------|------------|------------------------------------------|------|-----|----------|------|
| Supply Voltage            | $V_{CC}$   |                                          | 2    |     | 5.5      | V    |
| High-Level Input Voltage  | $V_{IH}$   | $V_{CC} = 2\text{ V}$                    | 1.5  |     |          | V    |
|                           |            | $V_{CC} = 3\text{ V}$                    | 2.1  |     |          |      |
|                           |            | $V_{CC} = 5.5\text{ V}$                  | 3.85 |     |          |      |
| Low-Level Input Voltage   | $V_{IL}$   | $V_{CC} = 2\text{ V}$                    |      |     | 0.5      | V    |
|                           |            | $V_{CC} = 3\text{ V}$                    |      |     | 0.9      |      |
|                           |            | $V_{CC} = 5.5\text{ V}$                  |      |     | 1.65     |      |
| Input Voltage             | $V_{IN}$   |                                          | 0    |     | 5.5      | V    |
| Output Voltage            | $V_{OUT}$  |                                          | 0    |     | $V_{CC}$ | V    |
| High-Level Output Current | $I_{OH}$   | $V_{CC} = 2\text{ V}$                    |      |     | -50      | μA   |
|                           |            | $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ |      |     | -4       | mA   |
|                           |            | $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$   |      |     | -8       |      |
| Low-Level Output Current  | $I_{OL}$   | $V_{CC} = 2\text{ V}$                    |      |     | 50       | μA   |
|                           |            | $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ |      |     | 4        | mA   |
|                           |            | $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$   |      |     | 8        |      |
| Input Rise or Fall Times  | $t_R, t_F$ | $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ |      |     | 100      | ns/V |
|                           |            | $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$   |      |     | 20       |      |

■ ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

| PARAMETER                                            | SYMBOL        | TEST CONDITIONS                                                                       | MIN  | TYP | MAX   | UNIT |
|------------------------------------------------------|---------------|---------------------------------------------------------------------------------------|------|-----|-------|------|
| Output Voltage High-Level                            | $V_{OH}$      | $V_{CC}=2\text{V}, I_{OH}=-50\mu\text{A}$                                             | 1.9  |     |       | V    |
|                                                      |               | $V_{CC}=3\text{V}, I_{OH}=-50\mu\text{A}$                                             | 2.9  |     |       |      |
|                                                      |               | $V_{CC}=4.5\text{V}, I_{OH}=-50\mu\text{A}$                                           | 4.4  |     |       |      |
|                                                      |               | $V_{CC}=3\text{V}, I_{OH}=-4\text{mA}$                                                | 2.58 |     |       |      |
|                                                      |               | $V_{CC}=4.5\text{V}, I_{OH}=-8\text{mA}$                                              | 3.94 |     |       |      |
| Output Voltage Low-Level                             | $V_{OL}$      | $V_{CC}=2\text{V}, I_{OL}=50\mu\text{A}$                                              |      |     | 0.1   | V    |
|                                                      |               | $V_{CC}=3\text{V}, I_{OL}=50\mu\text{A}$                                              |      |     | 0.1   |      |
|                                                      |               | $V_{CC}=4.5\text{V}, I_{OL}=50\mu\text{A}$                                            |      |     | 0.1   |      |
|                                                      |               | $V_{CC}=3\text{V}, I_{OL}=4\text{mA}$                                                 |      |     | 0.36  |      |
|                                                      |               | $V_{CC}=4.5\text{V}, I_{OL}=8\text{mA}$                                               |      |     | 0.36  |      |
| Input Leakage Current                                | $I_{I(LEAK)}$ | $V_{CC}=0\text{V} \sim 5.5\text{V}, V_{IN}=0\text{ or }5.5\text{V}$                   |      |     | ±0.1  | μA   |
| Leakage Current (For output in high-impedance state) | $I_{OZ}$      | $V_{CC}=5.5\text{V}, V_{IN}=V_{IH}\text{ or }V_{IH}, V_{OUT}=0\text{ or }5.5\text{V}$ |      |     | ±0.25 | μA   |
| Quiescent Supply Current                             | $I_Q$         | $V_{CC}=5.5\text{V}, V_{IN}=V_{CC}\text{ or GND}, I_{OUT}=0$                          |      |     | 4     | μA   |
| Input Capacitance                                    | $C_I$         | $V_{CC}=5\text{V}, V_{IN}=V_{CC}\text{ or GND}$                                       |      | 2.5 | 10    | pF   |
| Output Capacitance                                   | $C_O$         | $V_{CC}=5\text{V}, V_{OUT}=V_{CC}\text{ or GND}$                                      |      | 3.5 |       | pF   |

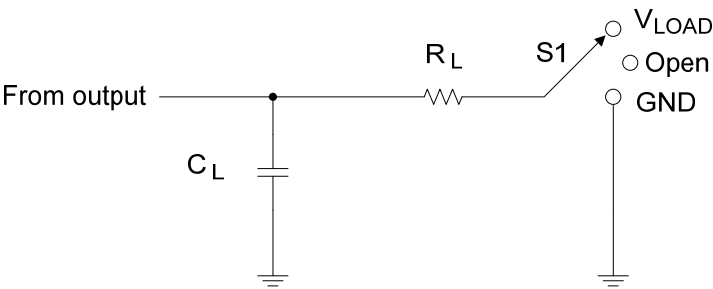
### ■ SWITCHING CHARACTERISTICS

| PARAMETER                    | SYMBOL                             | TEST CONDITIONS                                  | MIN | TYP  | MAX  | UNIT |  |
|------------------------------|------------------------------------|--------------------------------------------------|-----|------|------|------|--|
| From D to Q                  | t <sub>PLH</sub> /t <sub>PHL</sub> | V <sub>CC</sub> =3.3V±0.3V, C <sub>L</sub> =15pF |     | 7    | 11   | ns   |  |
|                              |                                    | V <sub>CC</sub> =3.3V±0.3V, C <sub>L</sub> =50pF |     | 9.5  | 14.5 |      |  |
|                              |                                    | V <sub>CC</sub> =5V±0.5V, C <sub>L</sub> =15pF   |     | 4.5  | 6.8  |      |  |
|                              |                                    | V <sub>CC</sub> =5V±0.5V, C <sub>L</sub> =50pF   |     | 6    | 8.8  |      |  |
| From LE to Q                 |                                    | V <sub>CC</sub> =3.3V±0.3V, C <sub>L</sub> =15pF |     | 7.6  | 11.9 |      |  |
|                              |                                    | V <sub>CC</sub> =3.3V±0.3V, C <sub>L</sub> =50pF |     | 10.1 | 15.4 |      |  |
|                              |                                    | V <sub>CC</sub> =5V±0.5V, C <sub>L</sub> =15pF   |     | 5    | 7.7  |      |  |
|                              |                                    | V <sub>CC</sub> =5V±0.5V, C <sub>L</sub> =50pF   |     | 6.5  | 9.7  |      |  |
| From $\overline{OE}$ to Q    | t <sub>PZL</sub> /t <sub>PZH</sub> | V <sub>CC</sub> =3.3V±0.3V, C <sub>L</sub> =15pF |     | 7.3  | 11.5 | ns   |  |
|                              |                                    | V <sub>CC</sub> =3.3V±0.3V, C <sub>L</sub> =50pF |     | 9.8  | 15   |      |  |
|                              |                                    | V <sub>CC</sub> =5V±0.5V, C <sub>L</sub> =15pF   |     | 5.2  | 7.7  |      |  |
|                              |                                    | V <sub>CC</sub> =5V±0.5V, C <sub>L</sub> =50pF   |     | 6.7  | 9.7  |      |  |
| From $\overline{OE}$ to Q    | t <sub>PLZ</sub> /t <sub>PHZ</sub> | V <sub>CC</sub> =3.3V±0.3V, C <sub>L</sub> =15pF |     | 8.3  | 11   | ns   |  |
|                              |                                    | V <sub>CC</sub> =3.3V±0.3V, C <sub>L</sub> =50pF |     | 10.7 | 14.5 |      |  |
|                              |                                    | V <sub>CC</sub> =5V±0.5V, C <sub>L</sub> =15pF   |     | 5.2  | 7.7  |      |  |
|                              |                                    | V <sub>CC</sub> =5V±0.5V, C <sub>L</sub> =50pF   |     | 6.7  | 9.7  |      |  |
| Pulse Width, LE high         | t <sub>W</sub>                     | V <sub>CC</sub> =3.3V±0.3V                       | 5   |      |      | ns   |  |
|                              |                                    | V <sub>CC</sub> =5V±0.5V                         | 5   |      |      |      |  |
| Setup Time, data before LE ↓ | t <sub>SU</sub>                    | V <sub>CC</sub> =3.3V±0.3V                       | 3.5 |      |      | ns   |  |
|                              |                                    | V <sub>CC</sub> =5V±0.5V                         | 3.5 |      |      |      |  |
| Hold Time, data after LE ↓   | t <sub>H</sub>                     | V <sub>CC</sub> =3.3V±0.3V                       | 1.5 |      |      | ns   |  |
|                              |                                    | V <sub>CC</sub> =5V±0.5V                         | 1.5 |      |      |      |  |

### ■ OPERATING CHARACTERISTICS ( $T_A=25^\circ C$ , unless otherwise specified)

| PARAMETER                     | SYMBOL   | TEST CONDITIONS   | RATINGS | UNIT |
|-------------------------------|----------|-------------------|---------|------|
| Power Dissipation Capacitance | $C_{PD}$ | No load, $f=1MHz$ | 16      | pF   |

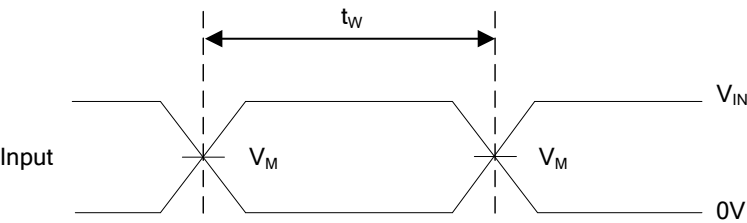
■ TEST CIRCUIT AND WAVEFORMS



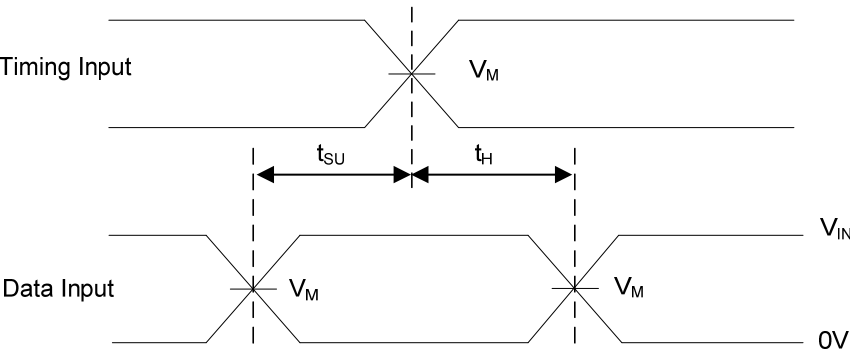
Test Circuit

| TEST              | S1         |
|-------------------|------------|
| $t_{PLH}/t_{PHL}$ | Open       |
| $t_{PLZ}/t_{PZL}$ | $V_{LOAD}$ |
| $t_{PHZ}/t_{PZH}$ | GND        |

| $V_{CC}$        | Input    |            | $V_M$      | $V_{LOAD}$ | $C_L$ | $R_L$       | $V_{\Delta}$ |
|-----------------|----------|------------|------------|------------|-------|-------------|--------------|
|                 | $V_{IN}$ | $t_R, t_F$ |            |            |       |             |              |
| $3.3V \pm 0.3V$ | $V_{CC}$ | $\leq 3ns$ | $V_{CC}/2$ | $V_{CC}$   | 15pF  | 1k $\Omega$ | 0.3V         |
|                 |          |            |            |            | 50pF  |             |              |
| $5V \pm 0.5V$   | $V_{CC}$ | $\leq 3ns$ | $V_{CC}/2$ | $V_{CC}$   | 15pF  | 1k $\Omega$ | 0.5V         |
|                 |          |            |            |            | 50pF  |             |              |

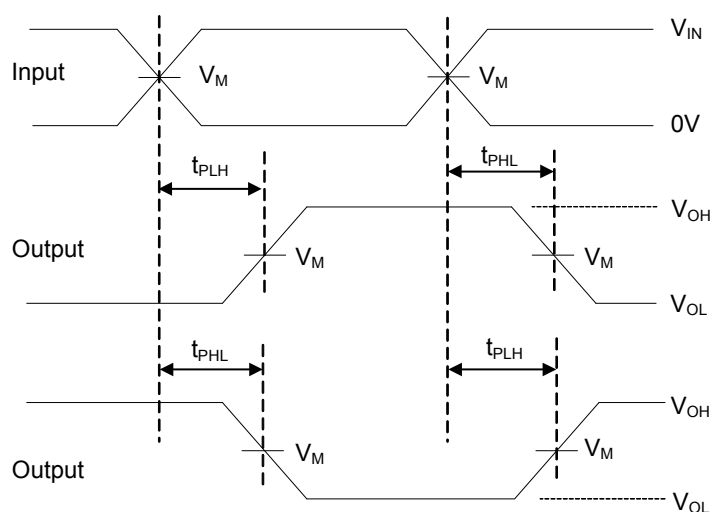


Pulse Duration

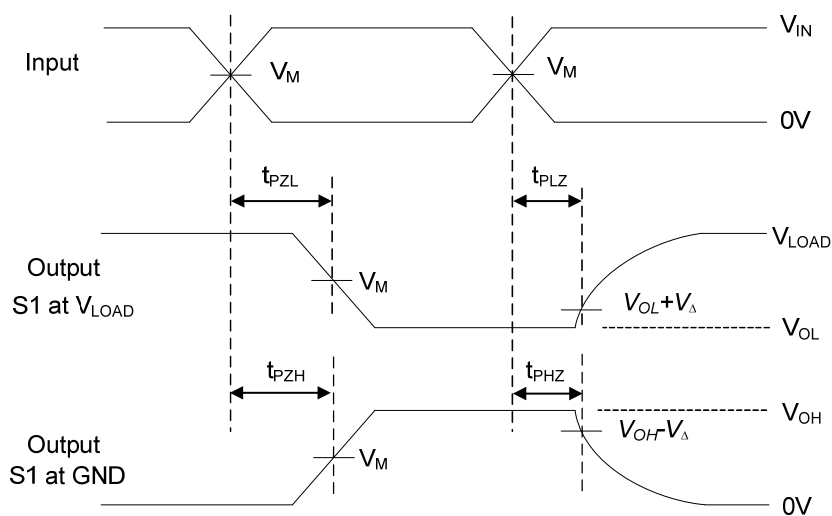


Setup and Hold Times

## ■ TEST CIRCUIT AND WAVEFORMS(Cont.)



Voltage Waveforms Propagation Delay Times



Voltage Waveforms Enable and Disable Times

Note: A.  $C_L$  includes probe and jig capacitance.

Note: B.  $P_{RR} \leq 1\text{MHz}$ ,  $Z_O = 50\Omega$ ,  $t_R \leq 3\text{ns}$ ,  $t_F \leq 3\text{ns}$ .

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