

**U74LVC373****CMOS IC****OCTAL TRANSPARENT D-TYPE  
LATCHES WITH 3-STATE  
OUTPUTS****■ DESCRIPTION**

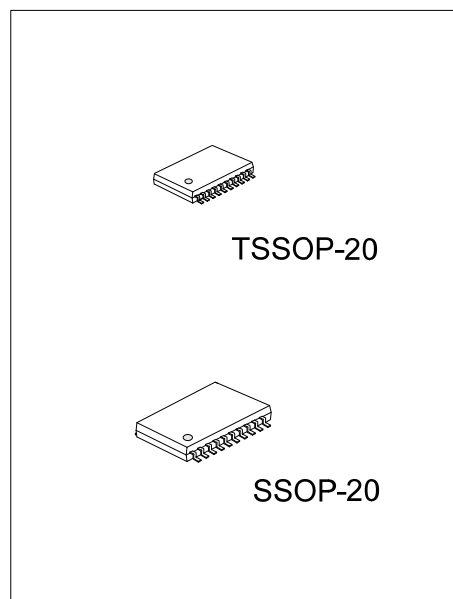
The UTC **U74LVC373** is a octal transparent D-type latch with 3-state outputs, and it has 8 channels.

**■ FEATURES**

- \* Operate from 1.65V to 3.6V
- \* Inputs accept voltages to 5.5V
- \* Max  $t_{pd}$  of 6.8ns @ 3.3V
- \* Typical  $V_{OL} < 0.8V$  @  $V_{CC}=3.3V$ ,  $T_a=25^{\circ}C$
- \* Typical  $V_{OH} > 2.0V$  @  $V_{CC}=3.3V$ ,  $T_a=25^{\circ}C$
- \* Support mixed-mode signal operation on all ports (5V input/output voltage with 3.3V  $V_{CC}$ )
- \* I off supports partial-power-down mode operation
- \* Halogen Free

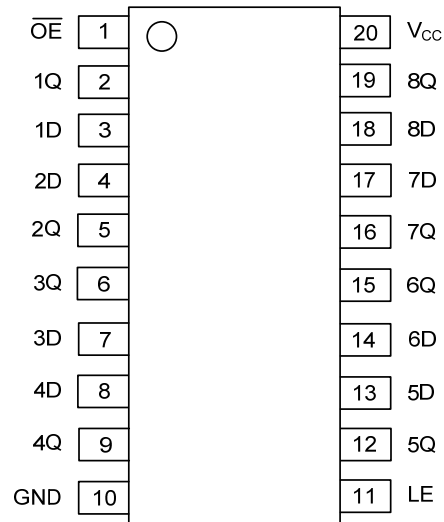
**■ ORDERING INFORMATION**

| Ordering Number  | Package  | Packing   |
|------------------|----------|-----------|
| U74LVC373G-P20-R | TSSOP-20 | Tape Reel |
| U74LVC373G-R20-R | SSOP-20  | Tape Reel |



|                  |                                                          |                                                                            |
|------------------|----------------------------------------------------------|----------------------------------------------------------------------------|
| U74LVC373G-P20-R | (1) Packing Type<br>(2) Package Type<br>(3) Lead Plating | (1) R: Tape Reel<br>(2) P20: TSSOP-20, R20: SSOP-20<br>(3) G: Halogen Free |
|------------------|----------------------------------------------------------|----------------------------------------------------------------------------|

## PIN CONFIGURATION

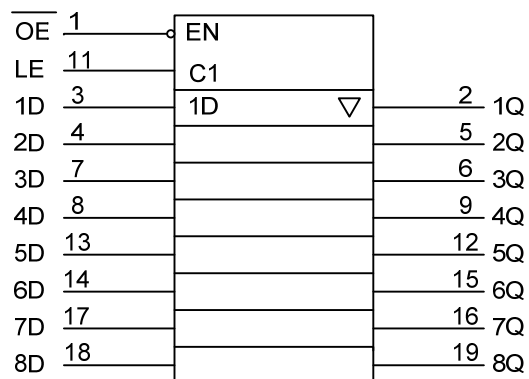


## FUNCTION TABLE

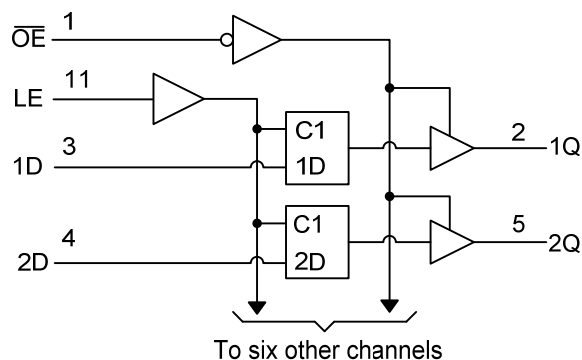
| INPUTS( $\overline{OE}$ ) | INPUTS(LE) | INPUTS(D) | OUTPUT(Q) |
|---------------------------|------------|-----------|-----------|
| L                         | H          | H         | H         |
| L                         | H          | L         | L         |
| L                         | L          | X         | Q0        |
| 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 ~ 6.5                                            | V    |
| Input Voltage           | $V_{IN}$  | -0.5 ~ 6.5                                            | V    |
| Output Voltage          | $V_{OUT}$ | -0.5 ~ 6.5 (Note 2)<br>-0.5 ~ $V_{CC} + 0.5$ (Note 3) | V    |
| $V_{CC}$ or GND Current | $I_{CC}$  | ±100                                                  | mA   |
| Output Current          | $I_{OUT}$ | ±50                                                   | mA   |
| Input Clamp Current     | $I_{IK}$  | -50                                                   | mA   |
| Output Clamp Current    | $I_{OK}$  | -50                                                   | mA   |
| Operating Temperature   | $T_{OPR}$ | -40 ~ + 85                                            | °C   |
| Storage Temperature     | $T_{STG}$ | -65 ~ + 150                                           | °C   |

Note: 1. 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.

2. Voltage range applied to any output in the high-impedance or power-off state.

3. Voltage range applied to any output in the high or low state, and  $V_{CC}$  is provided in the recommended operating conditions table.

### ■ THERMAL CHARACTERISTICS

| PARAMETER           | SYMBOL        | MIN | TYP | MAX | UNIT |
|---------------------|---------------|-----|-----|-----|------|
| Junction-to-Ambient | $\theta_{JA}$ |     |     | 115 | °C/W |

### ■ RECOMMENDED OPERATING CONDITIONS

| PARAMETER                 | SYMBOL     | TEST CONDITIONS                                                                 | MIN                              | TYP | MAX                                | UNIT |
|---------------------------|------------|---------------------------------------------------------------------------------|----------------------------------|-----|------------------------------------|------|
| Supply Voltage            | $V_{CC}$   | Operating<br>Data retention only                                                | 1.65<br>1.5                      |     | 3.6                                | V    |
| High-level Input Voltage  | $V_{IH}$   | $V_{CC}=1.65V$ to $1.95V$<br>$V_{CC}=2.3V$ to $2.7V$<br>$V_{CC}=2.7V$ to $3.6V$ | $0.65 \times V_{CC}$<br>1.7<br>2 |     |                                    | V    |
| Low-level Input Voltage   | $V_{IL}$   | $V_{CC}=1.65V$ to $1.95V$<br>$V_{CC}=2.3V$ to $2.7V$<br>$V_{CC}=2.7V$ to $3.6V$ |                                  |     | $0.35 \times V_{CC}$<br>0.7<br>0.8 | V    |
| Input Voltage             | $V_{IN}$   |                                                                                 | 0                                |     | 5.5                                | V    |
| Output Voltage            | $V_{OUT}$  | High or low state<br>3 state                                                    | 0<br>0                           |     | $V_{CC}$<br>5.5                    | V    |
| High-level Output Current | $I_{OH}$   | $V_{CC}=1.65V$<br>$V_{CC}=2.3V$<br>$V_{CC}=2.7V$<br>$V_{CC}=3V$                 |                                  |     | -4<br>-8<br>-12<br>-24             | mA   |
| Low-level Output Current  | $I_{OL}$   | $V_{CC}=1.65V$<br>$V_{CC}=2.3V$<br>$V_{CC}=2.7V$<br>$V_{CC}=3V$                 |                                  |     | 4<br>8<br>12<br>24                 | mA   |
| Input Rise or Fall Times  | $t_R, t_F$ |                                                                                 | 0                                |     | 10                                 | ns/V |

## ELECTRICAL CHARACTERISTICS

| PARAMETER                           | SYMBOL        | TEST CONDITIONS                                                                      | MIN          | TYP<br>(Note 1) | MAX      | UNIT    |
|-------------------------------------|---------------|--------------------------------------------------------------------------------------|--------------|-----------------|----------|---------|
| Output Voltage High-Level           | $V_{OH}$      | $V_{CC}=1.65\sim 3.6V, I_{OH}=-100\mu A$                                             | $V_{CC}-0.2$ |                 |          | V       |
|                                     |               | $V_{CC}=1.65V, I_{OH}=-4mA$                                                          | 1.2          |                 |          |         |
|                                     |               | $V_{CC}=2.3V, I_{OH}=-8mA$                                                           | 1.7          |                 |          |         |
|                                     |               | $V_{CC}=2.7V, I_{OH}=-12mA$                                                          | 2.2          |                 |          |         |
|                                     |               | $V_{CC}=3V, I_{OH}=-12mA$                                                            | 2.4          |                 |          |         |
|                                     |               | $V_{CC}=3V, I_{OH}=-24mA$                                                            | 2.2          |                 |          |         |
| Output Voltage Low-Level            | $V_{OL}$      | $V_{CC}=1.65\sim 3.6V, I_{OL}=100\mu A$                                              |              |                 | 0.2      | V       |
|                                     |               | $V_{CC}=1.65V, I_{OL}=4mA$                                                           |              |                 | 0.45     |         |
|                                     |               | $V_{CC}=2.3V, I_{OL}=8mA$                                                            |              |                 | 0.7      |         |
|                                     |               | $V_{CC}=2.7V, I_{OL}=12mA$                                                           |              |                 | 0.4      |         |
|                                     |               | $V_{CC}=3V, I_{OL}=24mA$                                                             |              |                 | 0.55     |         |
| Input Leakage Current               | $I_{I(LEAK)}$ | $V_{CC}=3.6V, V_{IN}=0$ to 5.5V                                                      |              |                 | $\pm 5$  | $\mu A$ |
| Power OFF Leakage Current           | $I_{OFF}$     | $V_{CC}=0V, V_{IN}$ or $V_{OUT}=5.5V$                                                |              |                 | $\pm 10$ | $\mu A$ |
| Disable Output Leakage Current      | $I_{OZ}$      | $V_{CC}=3.6V, V_{OUT}=0$ to 5.5V                                                     |              |                 | $\pm 10$ | $\mu A$ |
| Quiescent Supply Current            | $I_Q$         | $V_{CC}=3.6V, V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$                                     |              |                 | 10       | $\mu A$ |
|                                     |               | $V_{CC}=3.6V, 3.6V \leq V_{IN} \leq 5.5V, I_{OUT}=0$ (Note 2)                        |              |                 | 10       | $\mu A$ |
| Additional Quiescent Supply Current | $\Delta I_Q$  | $V_{CC}=2.7\sim 3.6V$ , One input at $V_{CC}-0.6V$ , Other inputs at $V_{CC}$ or GND |              |                 | 500      | $\mu A$ |
| Input Capacitance                   | $C_I$         | $V_{CC}=3.3V, V_{IN}=V_{CC}$ or GND                                                  |              | 4               |          | pF      |
| Output Capacitance                  | $C_O$         | $V_{CC}=3.3V, V_{OUT}=V_{CC}$ or GND                                                 |              | 5.5             |          | pF      |

Note: 1.  $V_{CC}=3.3V, T_a=25^\circ C$

2. This applies in the disabled state only.

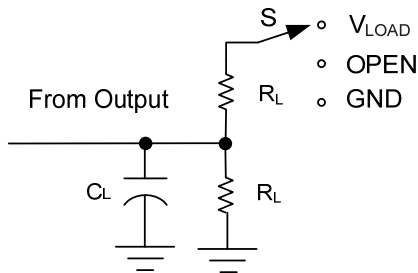
## SWITCHING CHARACTERISTICS

| PARAMETER                 | SYMBOL            | TEST CONDITIONS        | MIN | TYP | MAX | UNIT |
|---------------------------|-------------------|------------------------|-----|-----|-----|------|
| From D to Q               | $t_{PLH}/t_{PHL}$ | $V_{CC}=2.7V$          |     |     | 7.8 | ns   |
|                           |                   | $V_{CC}=3.3V \pm 0.3V$ | 1.5 |     | 6.8 |      |
| From LE to Q              |                   | $V_{CC}=2.7V$          |     |     | 8.2 |      |
|                           |                   | $V_{CC}=3.3V \pm 0.3V$ | 2   |     | 7.6 |      |
| From $\overline{OE}$ to Q | $t_{PZL}/t_{PZH}$ | $V_{CC}=2.7V$          |     |     | 8.7 | ns   |
|                           |                   | $V_{CC}=3.3V \pm 0.3V$ | 1.5 |     | 7.7 |      |
| From $\overline{OE}$ to Q | $t_{PLZ}/t_{PHZ}$ | $V_{CC}=2.7V$          |     |     | 7.6 | ns   |
|                           |                   | $V_{CC}=3.3V \pm 0.3V$ | 1.5 |     | 7   |      |
| Pulse Width               | $t_W$             | $V_{CC}=2.7V$          | 3.3 |     |     | ns   |
|                           |                   | $V_{CC}=3.3V \pm 0.3V$ | 3.3 |     |     |      |
| Setup Time                | $t_{SU}$          | $V_{CC}=2.7V$          | 2   |     |     | ns   |
|                           |                   | $V_{CC}=3.3V \pm 0.3V$ | 2   |     |     |      |
| Hold Time                 | $t_H$             | $V_{CC}=2.7V$          | 1.5 |     |     | ns   |
|                           |                   | $V_{CC}=3.3V \pm 0.3V$ | 1.5 |     |     |      |

## OPERATING CHARACTERISTICS( $T_a=25^\circ C$ )

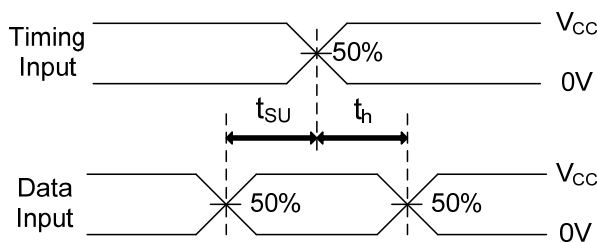
| PARAMETER                     | SYMBOL | TEST CONDITIONS                                  | MIN | TYP | MAX | UNIT |
|-------------------------------|--------|--------------------------------------------------|-----|-----|-----|------|
| Power Dissipation Capacitance | Cpd    | $\overline{OE}=0, f=10MHz, V_{CC}=3.3V \pm 0.3V$ |     | 46  |     | pF   |
|                               |        | $\overline{OE}=1, f=10MHz, V_{CC}=3.3V \pm 0.3V$ |     | 3   |     |      |

## ■ TEST CIRCUIT AND WAVEFORMS

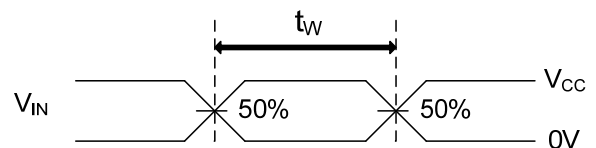


TEST CIRCUIT

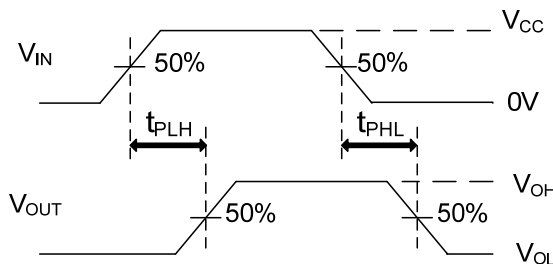
| $V_{CC}$         | $V_{IN}$ | $t_{PLZ}/t_{PZL}$<br>( $V_{LOAD}$ ) | $t_{PLH}/t_{PHL}$ | $t_{PHZ}/t_{PZH}$ | $C_L$ | $R_L$<br>(Note 1) | $\Delta V$ |
|------------------|----------|-------------------------------------|-------------------|-------------------|-------|-------------------|------------|
| $1.8V \pm 0.15V$ | $V_{CC}$ | $2 \times V_{CC}$                   | OPEN              | OPEN              | 30pF  | 1k $\Omega$       | 0.15V      |
| $2.5V \pm 0.2V$  | $V_{CC}$ | $2 \times V_{CC}$                   | OPEN              | GND               | 30pF  | 500 $\Omega$      | 0.15V      |
| 2.7V             | 2.7V     | 6V                                  | OPEN              | GND               | 50pF  | 500 $\Omega$      | 0.3V       |
| $3.3V \pm 0.3V$  | 2.7V     | 6V                                  | OPEN              | GND               | 50pF  | 500 $\Omega$      | 0.3V       |



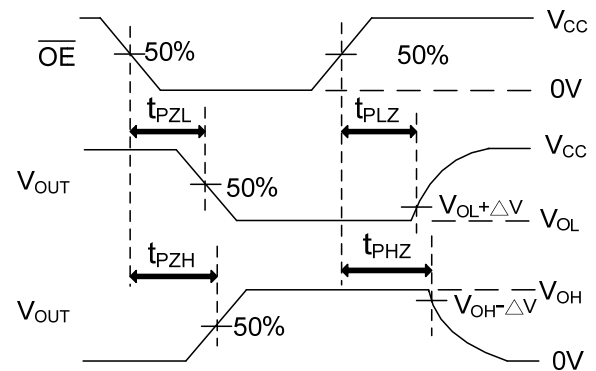
SETUP TIME AND HOLD TIME



PULSE WIDTH



PROPAGATION DELAY TIMES



ENABLE AND DISABLE TIMES

Note: 1.  $C_L$  includes probe and jig capacitance.  
2.  $PRR \leq 10\text{MHz}$ ,  $Z_O = 50\Omega$ ,  $t_{THL} \leq 2\text{ns}$ ,  $t_{TLH} \leq 2\text{ns}$ .

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