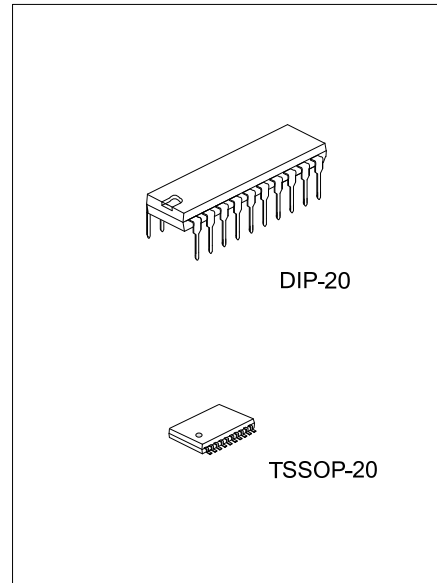




U74HCT374

CMOS IC

OCTAL EDGE-TRIGGERED D-TYPE FLIP-FLOPS WITH 3-STATE OUTPUTS



DESCRIPTION

The **U74HCT374** is a octal edge-triggered D-type flip-flops with 3-state outputs and it has 8 channels.

When the \overline{OE} input is low, on the positive transition of the clock (CLK) input, the Q outputs are set to the logic levels of the data (D) inputs.

When the \overline{OE} input is high, the outputs are in the high-impedance.

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

- * Inputs are TTL-Voltage Compatible
- * Operate from 4.5V to 5.5V
- * Inputs Accept Voltages to 5.5V
- * Max t_{pd} of 25ns at $V_{CC}=5.5V$, $C_L=50pF$
- * Typ $V_{OL} < 0.26V$ at $V_{CC}=4.5V$, $I_{OL}=6mA$, $T_A=25^\circ C$
- * Typ $V_{OH} > 3.98V$ at $V_{CC}=4.5V$, $I_{OH}=-6mA$, $T_A=25^\circ C$

ORDERING INFORMATION

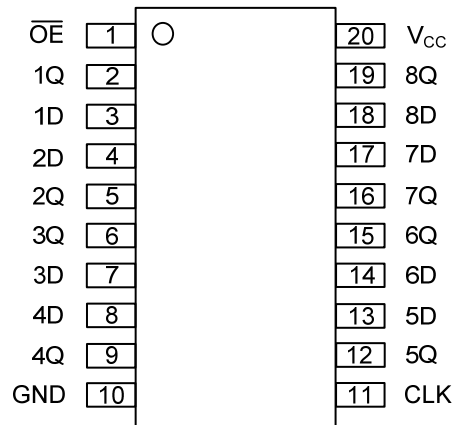
| Ordering Number | | Package | Packing |
|------------------|------------------|----------|-----------|
| Lead Free | Halogen Free | | |
| U74HCT374L-D20-T | U74HCT374G-D20-T | DIP-20 | Tube |
| U74HCT374L-P20-R | U74HCT374G-P20-R | TSSOP-20 | Tape Reel |

| | |
|---|---|
| <p>U74HCT374G-D20-T</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p> | <p>(1) T: Tube, R: Tape Reel (2) D20: DIP-20, P20: TSSOP-20 (3) G: Halogen Free and Lead Free, L: Lead Free</p> |
|---|---|

MARKING

| DIP-20 | TSSOP-20 |
|---|---|
| <p>20 19 18 17 16 15 14 13 12 11 UTC □□□□ → Date Code L: Lead Free U74HCT374 □ → G: Halogen Free □□ → Lot Code 1 2 3 4 5 6 7 8 9 10</p> | <p>20 19 18 17 16 15 14 13 12 11 UTC □□□□ → Date Code L: Lead Free U74HCT374 □ → G: Halogen Free □□ → Lot Code 1 2 3 4 5 6 7 8 9 10</p> |

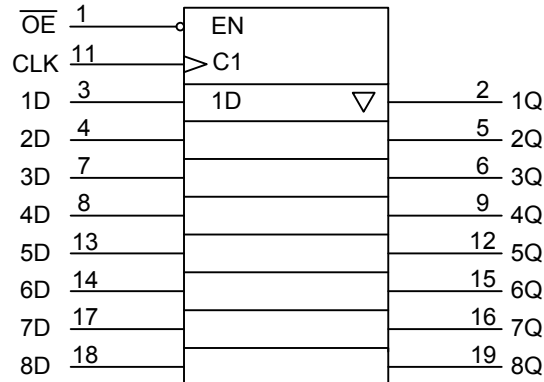
■ PIN CONFIGURATION



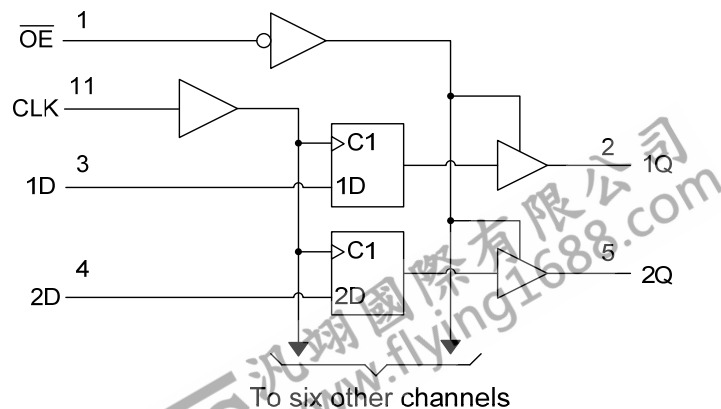
■ FUNCTION TABLE

| INPUTS(\overline{OE}) | INPUTS(CLK) | INPUTS(D) | OUTPUT(Q) |
|---------------------------|-------------|-----------|-----------|
| L | ↑ | H | H |
| L | ↑ | L | L |
| L | H or L | X | Q_0 |
| H | X | X | Z |

■ LOGIC SYMBOL



■ LOGIC DIAGRAM



■ ABSOLUTE MAXIMUM RATING

| PARAMETER | SYMBOL | RATINGS | UNIT |
|-------------------------|-----------|-----------------------|------|
| Supply Voltage | V_{CC} | -0.5 ~ 7 | V |
| Input Voltage | V_{IN} | -0.5 ~ 7 | V |
| Output Voltage | V_{OUT} | -0.5 ~ $V_{CC} + 0.5$ | V |
| V_{CC} or GND Current | I_{CC} | ±70 | mA |
| Output Current | I_{OUT} | ±35 | mA |
| Input Clamp Current | I_{IK} | -20 | mA |
| Output Clamp Current | I_{OK} | ±20 | 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 | MIN | TYP | MAX | UNIT |
|--------------------------------|------------|-----|-----|----------|------|
| Supply Voltage | V_{CC} | 4.5 | | 5.5 | V |
| High-Level Input Voltage | V_{IH} | 2 | | | V |
| Low-Level Input Voltage | V_{IL} | | | 0.8 | V |
| Input Voltage | V_{IN} | 0 | | V_{CC} | V |
| Output Voltage | V_{OUT} | 0 | | V_{CC} | V |
| Input Rise or Fall Times | t_R, t_F | | | 500 | ns/V |
| Operating free-air temperature | T_A | -40 | | 85 | °C |

■ ELECTRICAL CHARACTERISTICS

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--|-----------------|--|------|-------|------|------|
| Output Voltage High-Level | V_{OH} | $V_{CC}=4.5V, I_{OH}=-20\mu A$ | 4.4 | 4.499 | | V |
| | | $V_{CC}=4.5V, I_{OH}=-6mA$ | 3.98 | 4.3 | | |
| Output Voltage Low-Level | V_{OL} | $V_{CC}=4.5V, I_{OL}=20\mu A$ | | 0.001 | 0.1 | V |
| | | $V_{CC}=4.5V, I_{OL}=6mA$ | | 0.17 | 0.26 | |
| Input Leakage Current | $I_{I(LEAK)}$ | $V_{CC}=5.5V, V_{IN}=0$ or $5.5V$ | | ±0.1 | ±100 | nA |
| Leakage Current (For output in high-impedance state) | I_{OZ} | $V_{CC}=5.5V, V_{IN}=V_{IH}$ or $V_{IH}, V_{OUT}=0$ or $5.5V$ | | ±0.01 | ±0.5 | μA |
| Quiescent Supply Current | I_{CC} | $V_{CC}=5.5V, V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$ | | | 8 | μA |
| Additional quiescent supply current | ΔI_{CC} | $V_{CC}=5.5V$, one input at 0.5V or 3.4V, Other inputs at V_{CC} or GND | | 1.4 | 2.4 | mA |
| Input Capacitance | C_I | $V_{CC}=4.5V$ to $5V$ | | 3 | 10 | pF |

■ TIMING REQUIREMENTS

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|------------------------------|-------------|-----------------|-----|-----|-----|------|
| Clock Frequency | f_{CLOCK} | $V_{CC}=4.5V$ | | | 31 | MHz |
| | | $V_{CC}=5.5V$ | | | 36 | |
| Pulse Width, CLK High or Low | t_w | $V_{CC}=4.5V$ | 16 | | | ns |
| | | $V_{CC}=5.5V$ | 14 | | | |
| Setup Time, Data Before CLK↑ | t_{SU} | $V_{CC}=4.5V$ | 20 | | | ns |
| | | $V_{CC}=5.5V$ | 17 | | | |
| Hold Time, Data After CLK↑ | t_H | $V_{CC}=4.5V$ | 10 | | | ns |
| | | $V_{CC}=5.5V$ | 10 | | | |

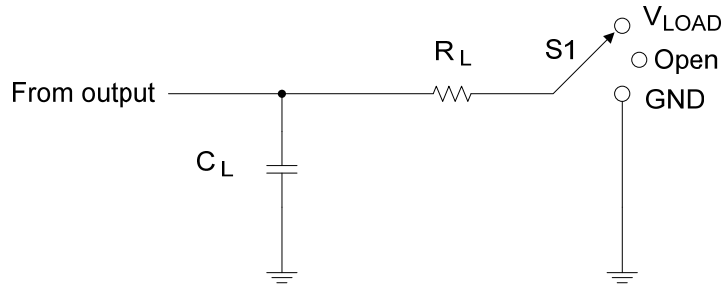
■ SWITCHING CHARACTERISTICS (See TEST CIRCUIT AND WAVEFORMS)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|----------------------------------|------------------------------------|--------------------------|-----|-----|-----|------|
| Maximum Clock Frequency | $f_{(MAX)}$ | $V_{CC}=4.5V, C_L=50pF$ | 31 | 36 | | MHz |
| | | $V_{CC}=5.5V, C_L=50pF$ | 36 | 40 | | |
| From CLK to Q | t_{PD} (t_{PLH}/t_{PHL}) | $V_{CC}=4.5V, C_L=50pF$ | | 30 | 36 | ns |
| | | $V_{CC}=5.5V, C_L=50pF$ | | 25 | 32 | |
| | | $V_{CC}=4.5V, C_L=150pF$ | | 40 | 46 | |
| | | $V_{CC}=5.5V, C_L=150pF$ | | 35 | 41 | |
| From \overline{OE} to Q | t_{EN} (t_{PZL}/t_{PZH}) | $V_{CC}=4.5V, C_L=50pF$ | | 26 | 30 | ns |
| | | $V_{CC}=5.5V, C_L=50pF$ | | 23 | 27 | |
| | | $V_{CC}=4.5V, C_L=150pF$ | | 34 | 40 | |
| | | $V_{CC}=5.5V, C_L=150pF$ | | 29 | 36 | |
| From \overline{OE} to Q | t_{DIS} (t_{PLZ}/t_{PHZ}) | $V_{CC}=4.5V, C_L=50pF$ | | 23 | 30 | ns |
| | | $V_{CC}=5.5V, C_L=50pF$ | | 22 | 27 | |
| Output transition rise/fall time | t_T (t_R/t_F) | $V_{CC}=4.5V, C_L=50pF$ | | 10 | 12 | ns |
| | | $V_{CC}=5.5V, C_L=50pF$ | | 9 | 11 | |
| | | $V_{CC}=4.5V, C_L=150pF$ | | 18 | 42 | |
| | | $V_{CC}=5.5V, C_L=150pF$ | | 16 | 38 | |

■ OPERATING CHARACTERISTICS ($T_A=25^\circ C$)

| PARAMETER | SYMBOL | TEST CONDITIONS | RATINGS | UNIT |
|-------------------------------|----------|---------------------------------|---------|------|
| Power Dissipation Capacitance | C_{PD} | No load, $V_{CC} = 5 V, f=1MHz$ | 85 | pF |

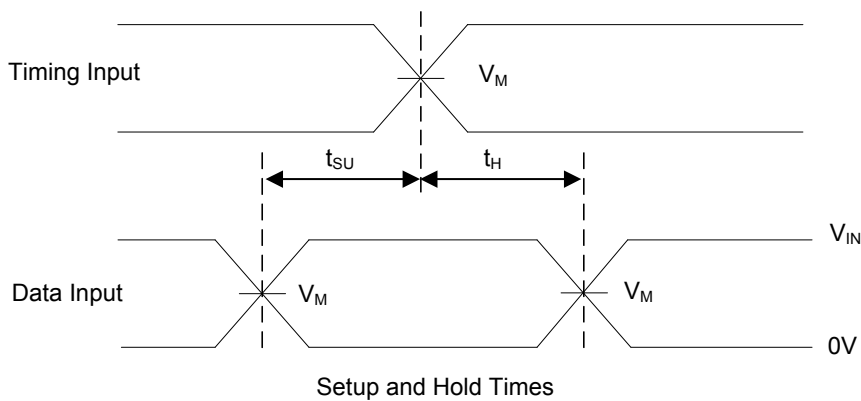
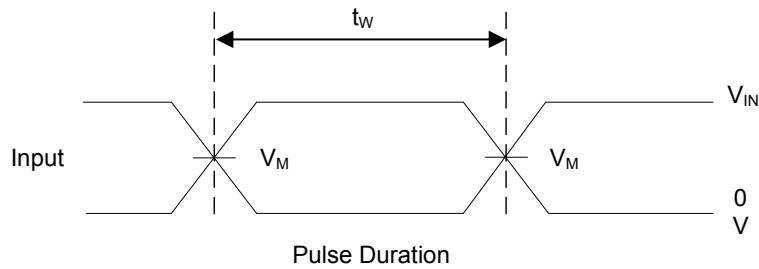
■ TEST CIRCUIT AND WAVEFORMS



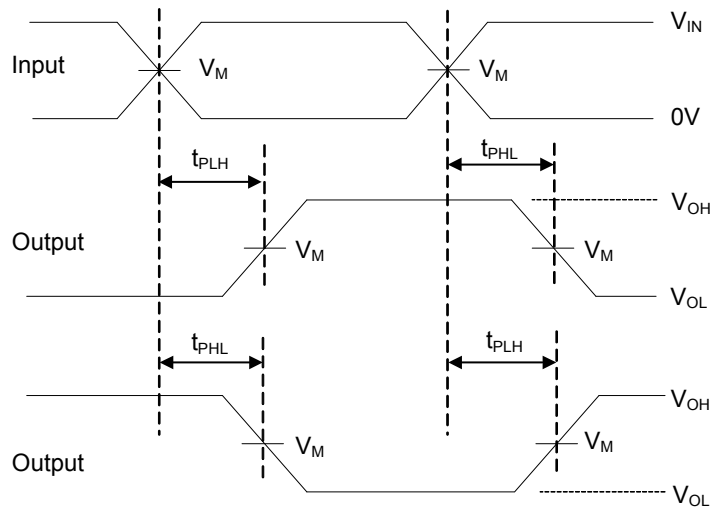
Test Circuit

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

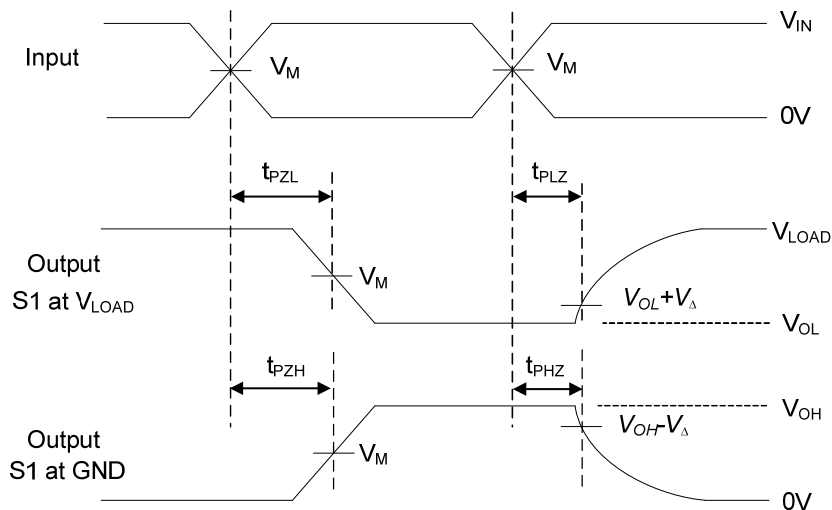
| V_{CC} | Input | | V_M | V_{LOAD} | C_L | R_L | V_{Δ} |
|---------------|----------|------------|------------|------------|-------|-------------|--------------|
| | V_{IN} | t_R, t_F | | | | | |
| $5V \pm 0.5V$ | V_{CC} | $\leq 3ns$ | $V_{CC}/2$ | V_{CC} | 15pF | 1k Ω | 0.5V |
| | | | | | 50pF | |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



■ 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.

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

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.