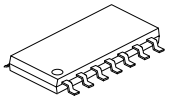
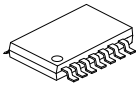
# U74HCT125

**CMOS IC**

## QUADRUPLE BUS BUFFER GATES WITH 3-STATE OUTPUTS



SOP-14



TSSOP-14

## ■ DESCRIPTION

The **U74HCT125** is a quadruple bus buffer gates with 3-state output. When $\overline{OE}$ is high, the Y outputs are in a high-impedance state. When $\overline{OE}$ is low, the device passes noninverted data from the A input to the Y output.

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

* TTL-Voltage Compatible
* Max $t_{PD}$ of 12 ns from A to Y at 5.5 V, $C_L$ = 50 pF
* Low power consumption, $I_{CC}$ = 8μA (Max) at 5.5V
* ±6mA output driver at 5V

## ■ ORDERING INFORMATION

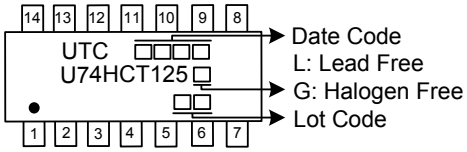
| Ordering Number | | Package | Packing |
|---|---|---|---|
| Lead Free | Halogen Free | | |
| U74HCT125L-S14-R | U74HCT125G-S14-R | SOP-14 | Tape Reel |
| U74HCT125L-P14-R | U74HCT125G-P14-R | TSSOP-14 | Tape Reel |

U74HCT125G-S14-R

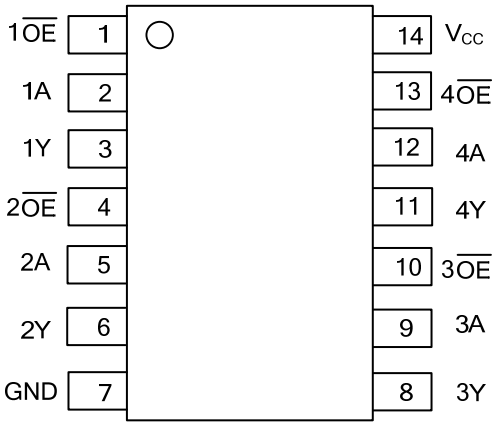
(1)Packing Type
(2)Package Type
(3)Green Package

(1) R: Tape Reel
(2) S14: SOP-14, P14: TSSOP-14
(3) G: Halogen Free and Lead Free, L: Lead Free

## ■ MARKING



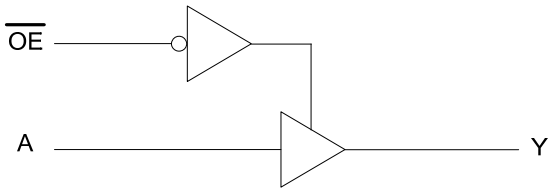
## ■ PIN CONFIGURATION




## ■ FUNCTION TABLE (each buffer)

| INPUTS | | OUTPUTS |
|---|---|---|
| $\overline{OE}$ | A | Y |
| L | H | H |
| L | L | L |
| H | X | Z |

## ■ LOGIC DIAGRAM (each buffer)



## ■ ABSOLUTE MAXIMUM RATING (unless otherwise specified)

| 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 |
| Input Clamp Current ($V_{IN}$<0, or $V_{IN}$>0) | $I_{IK}$ | ±20 | mA |
| Output Clamp Current ($V_{OUT}$<0, or $V_{OUT}$>$V_{CC}$) | $I_{OK}$ | ±20 | mA |
| Output Current | $I_{OUT}$ | ±35 | mA |
| $V_{CC}$ or GND Current | $I_{CC}$ | ±70 | mA |
| Storage Temperature | $T_{STG}$ | -65 ~ +150 | °C |

Note: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. 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 COMDITIONS

| PARAMETER | SYMBOL | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|
| Supply Voltage | $V_{CC}$ | 4.5 | 5 | 5.5 | V |
| High-Level Input Voltage ($V_{CC}$ =4.5V to 5.5V) | $V_{IH}$ | 2 | | | V |
| Low-Level Input Voltage ($V_{CC}$ = 4.5V to 5.5V) | $V_{IL}$ | | | 0.8 | V |
| Input Voltage | $V_{IN}$ | 0 | | $V_{CC}$ | V |
| Output Voltage | $V_{OUT}$ | 0 | | $V_{CC}$ | V |
| Input Transition Rise or Fall Rate | Δt/Δv | | | 500 | ns/V |
| Operating Temperature | $T_A$ | -40 | 25 | 85 | °C |

## ■ ELECTRICAL CHARACTERISTICS ($T_A$ =25°C , unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| High-Level Output Voltage | $V_{OH}$ | $I_{OH}$ = -20μA, $V_{CC}$ =4.5 V | 4.4 | 4.5 | | V |
| | | $I_{OH}$ = -6 mA, $V_{CC}$ =4.5 V | 3.98 | 4.3 | | |
| Low-Level Output Voltage | $V_{OL}$ | $I_{OL}$ = 20 μA, $V_{CC}$ =4.5 V | | 0.001 | 0.1 | V |
| | | $I_{OL}$ = 6 mA , $V_{CC}$ =4.5 V | | 0.17 | 0.26 | |
| Input Leakage Current (A or $\overline{OE}$ input) | $I_{I(LEAK)}$ | $V_{IN}$ = 5.5V or GND, $V_{CC}$ =5.5 V | | ±0.1 | ±100 | μA |
| High-Impedance State Current | $I_{OZ}$ | $V_{OUT}$ = $V_{CC}$ or GND, $V_{CC}$ =5.5 V | | ±0.01 | ±0.5 | μA |
| Quiescent Supply Current | $I_{CC}$ | $V_{IN}$ = $V_{CC}$ or GND, $I_{OUT}$ = 0, $V_{CC}$ =5.5 V | | | 8 | μA |
| Additional Quiescent Supply Current | Δ $I_{CC}$ | One input at 0.5V or 2.4V, $V_{CC}$ =5.5 V, other inputs at $V_{CC}$ or GND | | 1.4 | 2.4 | mA |
| Input Capacitance | $C_{IN}$ | $V_{CC}$ =4.5V to 5.5 V | | 3 | 10 | pF |

## ■ SWITCHING CHARACTERISTICS

($C_L$ = 50 pF, $T_A$ =25°C)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Propagation Delay from Input A to Output Y, $t_{PD}$ | $t_{PLH}$/ $t_{PHL}$ | $V_{CC}$ =4.5 V | | 15 | 26 | ns |
| | | $V_{CC}$ =5.5 V | | 12 | 23 | |
| Propagation Delay from Input $\overline{OE}$ to Output Y, $t_{EN}$ | $t_{PZH}$/ $t_{PZL}$ | $V_{CC}$ =4.5 V | | 18 | 28 | ns |
| | | $V_{CC}$ =5.5 V | | 15 | 25 | |
| Propagation delay from input OE to output Y, $t_{DIS}$ | $t_{PHZ}$/ $t_{PLZ}$ | $V_{CC}$ =4.5 V | | 15 | 26 | ns |
| | | $V_{CC}$ =5.5 V | | 13 | 23 | |
| Output transition (rise and fall) time, $t_T$ | $t_{TLH}$/ $t_{THL}$ | $V_{CC}$ =4.5 V | | 8 | 15 | ns |
| | | $V_{CC}$ =5.5 V | | 7 | 14 | |

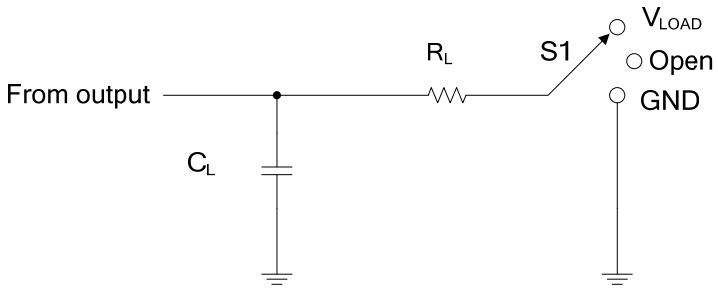
($C_L$ = 150 pF, $T_A$ =25°C)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Propagation Delay from Input A to Output Y, $t_{PD}$ | $t_{PLH}$/ $t_{PHL}$ | $V_{CC}$ =4.5 V | | 19 | 36 | ns |
| | | $V_{CC}$ =5.5 V | | 16 | 32 | |
| Propagation Delay from Input $\overline{OE}$ to Output Y, $t_{EN}$ | $t_{PZH}$/ $t_{PZL}$ | $V_{CC}$ =4.5 V | | 25 | 40 | ns |
| | | $V_{CC}$ =5.5 V | | 21 | 35 | |
| Output transition (rise and fall) time, $t_T$ | $t_{TLH}$/ $t_{THL}$ | $V_{CC}$ =4.5 V | | 17 | 42 | ns |
| | | $V_{CC}$ =5.5 V | | 14 | 38 | |

## ■ OPERATING CHARACTERISTICS ($T_A$ =25°C)

| PARAMETER | SYMBOL | TEST CONDITIONS | TYP | UNIT |
|---|---|---|---|---|
| Power dissipation capacitance | $C_{PD}$ | | 35 | pF |

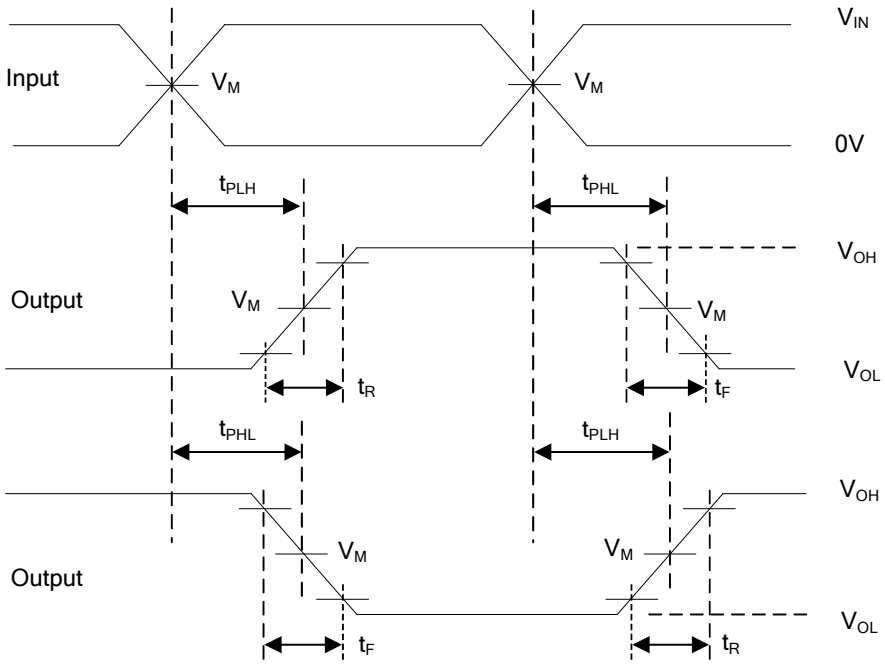
## ■ TEST CIRCUIT AND WAVEFORMS




Test Circuit

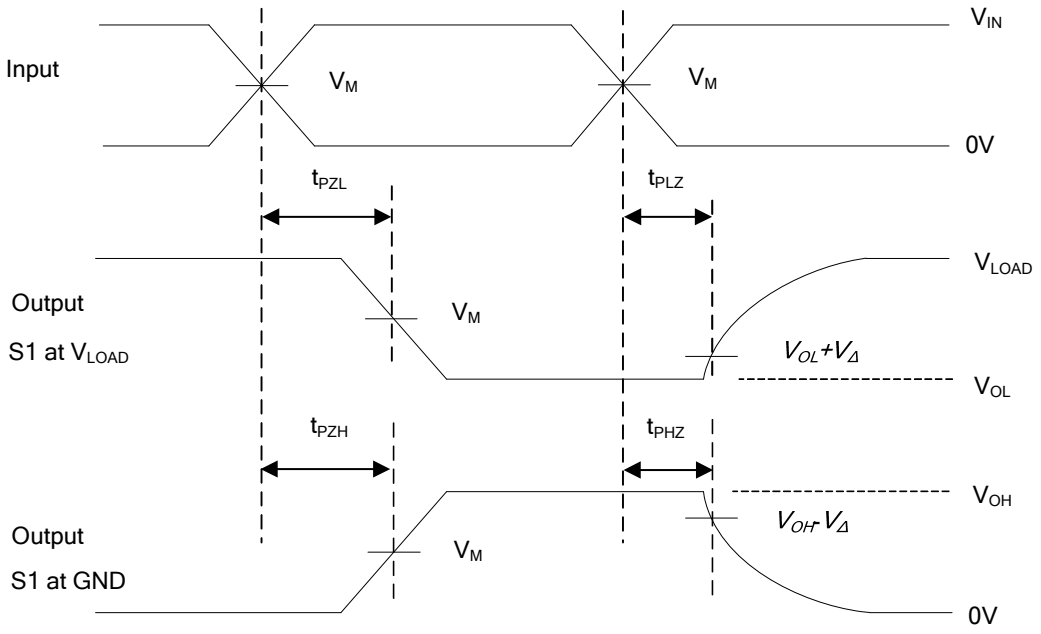
| TEST | S1 |
|---|---|
| $t_{PLH}/t_{PHL}$ | Open |
| $t_{PLZ}/t_{PZL}$ | $V_{LOAD}$ |
| $t_{PHZ}/t_{PZH}$ | GND |

| $V_{CC}$ | Input | | $V_M$ | $V_{LOAD}$ | $C_L$ | $R_L$ | $V_\Delta$ |
|---|---|---|---|---|---|---|---|
| | $V_{IN}$ | $t_R$, $t_F$ | | | | | |
| 5V±0.5V | $V_{CC}$ | ≤3ns | $V_{CC}/2$ | $V_{CC}$ | 50pF<br>150pF | 1kΩ | 0.5V |




Voltage Waveforms Ppopagation Delay Times

## ■ TEST CIRCUIT AND WAVEFORMS (Cont.)




Voltage Waveforms Enable and Disable Times

Notes: 1. $C_L$ includes probe and jig capacitance.
2. All input pulses are supplied by generators having the following characteristics: $P_{RR}$ ≤1MHz, $Z_O$ = 50Ω.