



## U74HC2G125

CMOS IC

### DUAL BUFFER/LINE DRIVER; 3-STATE

#### DESCRIPTION

The **U74HC2G125** is a high speed, Si-gate CMOS device.

The **U74HC2G125** provides two non-inverting buffer/line drivers with 3-state output. The 3-state output is controlled by the output enable input (pin  $\overline{nOE}$ ). A HIGH level at pin  $\overline{nOE}$  causes the output to assume a high-impedance OFF-state.

#### FEATURES

- \* Wide supply voltage range from 2.0V to 6.0V
- \* Symmetrical output impedance
- \* High noise immunity
- \* Low power consumption
- \* Balanced propagation delays
- \* Multiple package options
- \* Specified from -40 °C to +125 °C

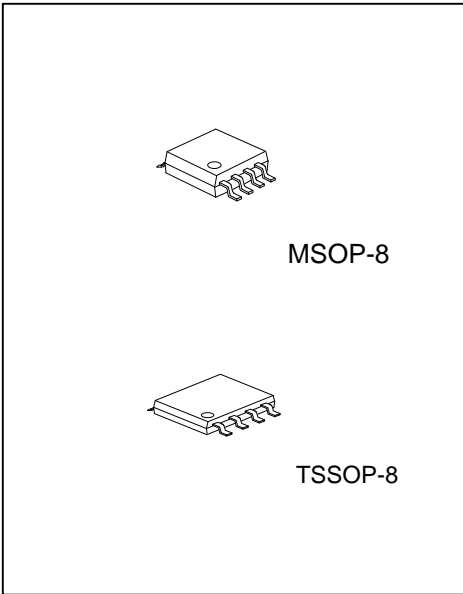
#### ORDERING INFORMATION

| Ordering Number   |                   | Package | Packing   |
|-------------------|-------------------|---------|-----------|
| Lead Free         | Halogen Free      |         |           |
| U74HC2G125L-P08-R | U74HC2G125G-P08-R | TSSOP-8 | Tape Reel |
| U74HC2G125L-SM1-R | U74HC2G125G-SM1-R | MSOP-8  | Tape Reel |

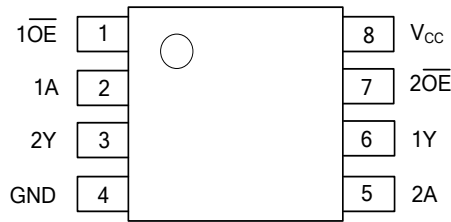
|  |  |
|--|--|
| <p>U74HC2G125G-P08-R</p> <ul style="list-style-type: none"> <li>(1) Packing Type</li> <li>(2) Package Type</li> <li>(3) Green Package</li> </ul> | <ul style="list-style-type: none"> <li>(1) R: Tape Reel</li> <li>(2) P08: TSSOP-8, SM1: MSOP-8</li> <li>(3) G: Halogen Free and Lead Free, L: Lead Free</li> </ul> |
|--|--|

#### MARKING

| MSOP-8   | TSSOP-8  |
|--|--|
| <p>           8 7 6 5 → Date Code<br/>           UTC □□□□<br/>           L: Lead Free<br/>           HC2G125 □<br/>           G: Halogen Free<br/>           □□ → Lot Code<br/>           1 2 3 4         </p> | <p>           1 2 3 4 →<br/>           8 7 6 5 → Date Code<br/>           UTC □□□□<br/>           L: Lead Free<br/>           2GC5 □ □<br/>           G: Halogen Free<br/>           Lot Code         </p> |



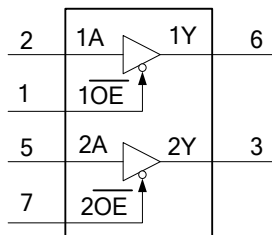
## ■ PIN CONFIGURATION



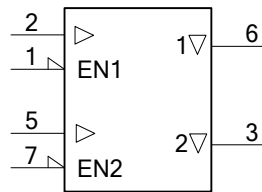
## ■ PIN CONFIGURATION

| PIN No | SYMBOL          | DESCRIPTION                      |
|--------|-----------------|----------------------------------|
| 1, 7   | 1OE, 2OE        | Output enable input (active LOW) |
| 2, 5   | 1A, 2A          | Data input                       |
| 4      | GND             | Ground (0V)                      |
| 6, 3   | 1Y, 2Y          | Data output                      |
| 8      | V <sub>CC</sub> | Supply voltage                   |

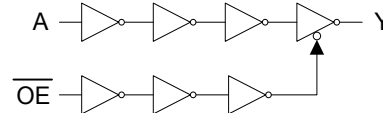
## ■ FUNCTIONAL DIAGRAM



LOGIC SYMBOL



IEC LOGIC SYMBOL



LOGIC DIAGRAM (one driver)

## ■ FUNCTION TABLE

| Control | Input | Output |
|---------|-------|--------|
| nOE     | nA    | nY     |
| L       | L     | L      |
| L       | H     | H      |
| H       | X     | Z      |

H=HIGH voltage level; L=LOW voltage level; X=don't care; Z=high-impedance OFF-state

## ■ ABSOLUTE MAXIMUM RATING

| PARAMETER               | SYMBOL    | CONDITIONS                             | MIN  | TYP | MAX      | UNIT |
|-------------------------|-----------|--|------|-----|----------|------|
| Supply Voltage          | $V_{CC}$  |  | -0.5 |     | +7.0     | V    |
| Input Voltage           | $V_I$     |  | -0.5 |     | +7.0     | V    |
| Input Clamping Current  | $I_{IK}$  | $V_I < -0.5V$ or $V_I > V_{CC} + 0.5V$ |      |     | $\pm 20$ | mA   |
| Output Clamping Current | $I_{OK}$  | $V_O < -0.5V$ or $V_O > V_{CC} + 0.5V$ |      |     | $\pm 20$ | mA   |
| Output Current          | $I_O$     | $V_O = -0.5V \sim (V_{CC} + 0.5V)$     |      |     | 35       | mA   |
| Supply Current          | $I_{CC}$  |  |      |     | 70       | mA   |
| Ground Current          | $I_{GND}$ |  | -70  |     |          | mA   |
| Power Dissipation       | $P_D$     |  |      |     | 300      | mW   |
| Storage Temperature     | $T_{STG}$ |  | -65  |     | +150     | °C   |

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

## ■ RECOMMENDED OPERATING CONDITIONS

| PARAMETER                           | SYMBOL              | TEST CONDITIONS | MIN | TYP  | MAX      | UNIT |
|-------------------------------------|---------------------|-----------------|-----|------|----------|------|
| Supply Voltage                      | $V_{CC}$            |                 | 2   | 5    | 6        | V    |
| Input Voltage                       | $V_I$               |                 | 0   |      | $V_{CC}$ | V    |
| Output Voltage                      | $V_O$               |                 | 0   |      | $V_{CC}$ | V    |
| Input Transition Rise and Fall Rate | $\Delta t/\Delta V$ | $V_{CC}=2V$     |     |      | 625      | ns/V |
|                                     |                     | $V_{CC}=4.5V$   |     | 1.67 | 139      |      |
|                                     |                     | $V_{CC}=6V$     |     |      | 83       |      |
| Ambient Temperature                 | $T_A$               |                 | -40 | +25  | +125     | °C   |

Note: Voltages are referenced to GND (ground=0V).

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

| PARAMETER                 | SYMBOL   | TEST CONDITIONS  | MIN  | TYP  | MAX     | UNIT    |
|---------------------------|----------|--|------|------|---------|---------|
| High-level Input Voltage  | $V_{IH}$ | $V_{CC}=2V$  | 1.5  | 1.2  |         | V       |
|                           |          | $V_{CC}=4.5V$  | 3.15 | 2.4  |         | V       |
|                           |          | $V_{CC}=6V$  | 4.2  | 3.2  |         | V       |
| Low-level Input Voltage   | $V_{IL}$ | $V_{CC}=2V$  |      | 0.8  | 0.5     | V       |
|                           |          | $V_{CC}=4.5V$  |      | 2.1  | 1.35    | V       |
|                           |          | $V_{CC}=6V$  |      | 2.8  | 1.8     | V       |
| Output Voltage HIGH-Level | $V_{OH}$ | $V_{CC}=2V, I_{OH}=-20\mu A$                               | 1.9  | 2.0  |         | V       |
|                           |          | $V_{CC}=4.5V, I_{OH}=-20\mu A$                             | 4.4  | 4.5  |         | V       |
|                           |          | $V_{CC}=6V, I_{OH}=-20\mu A$                               | 5.9  | 6.0  |         | V       |
|                           |          | $V_{CC}=4.5V, I_{OH}=-6mA$                                 | 3.84 | 4.32 |         | V       |
|                           |          | $V_{CC}=6V, I_{OH}=-7.8mA$                                 | 5.34 | 5.81 |         | V       |
| Output Voltage LOW-Level  | $V_{OL}$ | $V_{CC}=2V, I_{OL}=20\mu A$                                |      | 0    | 0.1     | V       |
|                           |          | $V_{CC}=4.5V, I_{OL}=20\mu A$                              |      | 0    | 0.1     | V       |
|                           |          | $V_{CC}=6V, I_{OL}=20\mu A$                                |      | 0    | 0.1     | V       |
|                           |          | $V_{CC}=4.5V, I_{OL}=6mA$                                  |      | 0.15 | 0.33    | V       |
|                           |          | $V_{CC}=6V, I_{OL}=7.8mA$                                  |      | 0.16 | 0.33    | V       |
| Input Leakage Current     | $I_I$    | $V_{CC}=6V, V_I = V_{CC}$ or GND                           |      |      | $\pm 1$ | $\mu A$ |
| OFF-state output current  | $I_{OZ}$ | $V_{CC}=6V, V_I = V_{IH}$ or $V_{IL}, V_O = V_{CC}$ or GND |      |      | 0.25    | $\mu A$ |
| Quiescent Supply Current  | $I_{CC}$ | $V_{CC}=6V, V_I = V_{CC}$ or GND, $I_{OUT}=0$              |      |      | 1       | $\mu A$ |

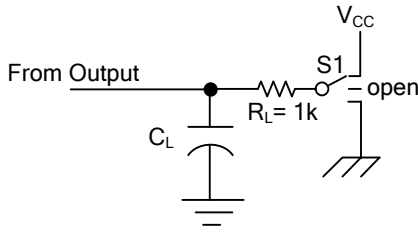
■ **SWITCHING CHARACTERISTICS** ( $t_r = t_f \leq 6\text{ns}$ ,  $C_L = 50\text{pF}$ ,  $T_A = 25^\circ\text{C}$ , unless otherwise specified)

| PARAMETER                                       | SYMBOL              | TEST CONDITIONS                        | MIN | TYP | MAX | UNIT |
|---|---------------------|--|-----|-----|-----|------|
| Propagation delay from input (nA) to output(nY) | $t_{PLH} / t_{PHL}$ | $V_{CC}=2\text{V}$                     |     | 35  | 115 | ns   |
|   |                     | $V_{CC}=4.5\text{V}$                   |     | 11  | 23  | ns   |
|   |                     | $V_{CC}=5\text{V}$ , $C_L=15\text{pF}$ |     | 10  |     | ns   |
|   |                     | $V_{CC}=6\text{V}$                     |     | 8   | 20  | ns   |
| Enable time from $\overline{nOE}$ to nY         | $t_{PZL} / t_{PZH}$ | $V_{CC}=2\text{V}$                     |     | 40  | 115 | ns   |
|   |                     | $V_{CC}=4.5\text{V}$                   |     | 11  | 23  | ns   |
|   |                     | $V_{CC}=6\text{V}$                     |     | 8   | 20  | ns   |
| Disable time from $\overline{nOE}$ to nY        | $t_{PLZ} / t_{PHZ}$ | $V_{CC}=2\text{V}$                     |     | 24  | 125 | ns   |
|   |                     | $V_{CC}=4.5\text{V}$                   |     | 12  | 25  | ns   |
|   |                     | $V_{CC}=6\text{V}$                     |     | 10  | 21  | ns   |
| Transition time                                 | $t_{THL} / t_{TLH}$ | $V_{CC}=2\text{V}$                     |     | 18  | 75  | ns   |
|   |                     | $V_{CC}=4.5\text{V}$                   |     | 6   | 15  | ns   |
|   |                     | $V_{CC}=6\text{V}$                     |     | 5   | 13  | ns   |

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

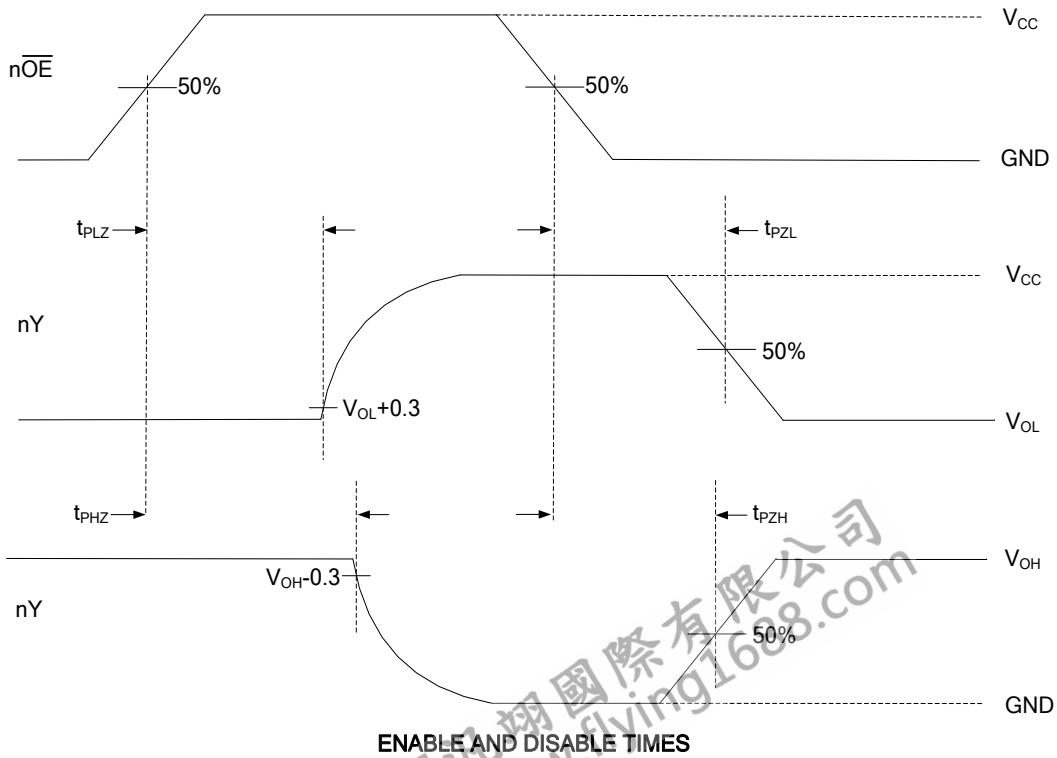
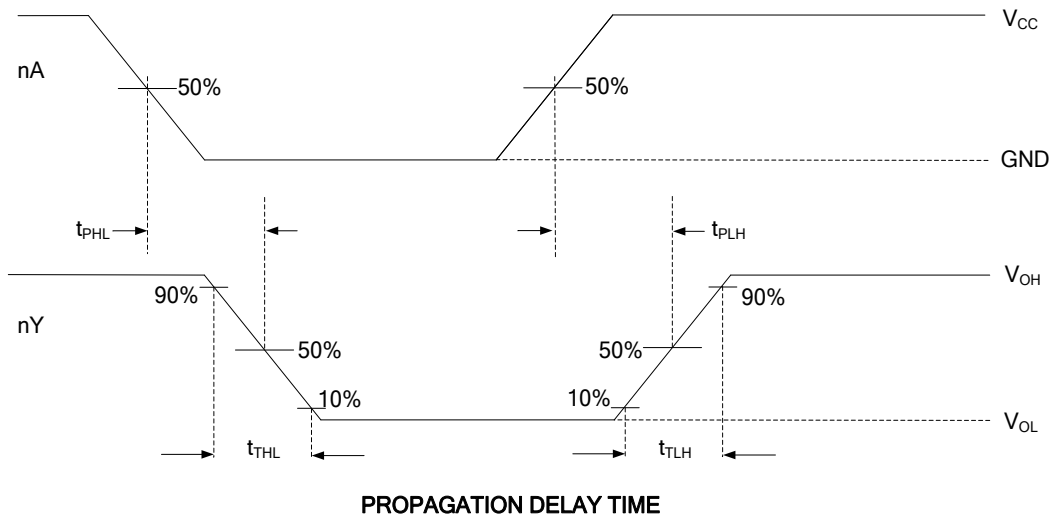
| PARAMETER                     | SYMBOL   | TEST CONDITIONS                              | MIN             | TYP | MAX | UNIT |    |
|-------------------------------|----------|--|-----------------|-----|-----|------|----|
| Input Capacitance             | $C_I$    |  |                 | 1.0 |     | pF   |    |
| Output Capacitance            | $C_O$    |  |                 | 1.5 |     | pF   |    |
| Power Dissipation Capacitance | $C_{PD}$ | per buffer;<br>$V_I = \text{GND to } V_{CC}$ | output enabled  |     | 11  |      | pF |
|                               |          |  | output disabled |     | 1   |      | pF |

## TEST CIRCUIT AND WAVEFORMS

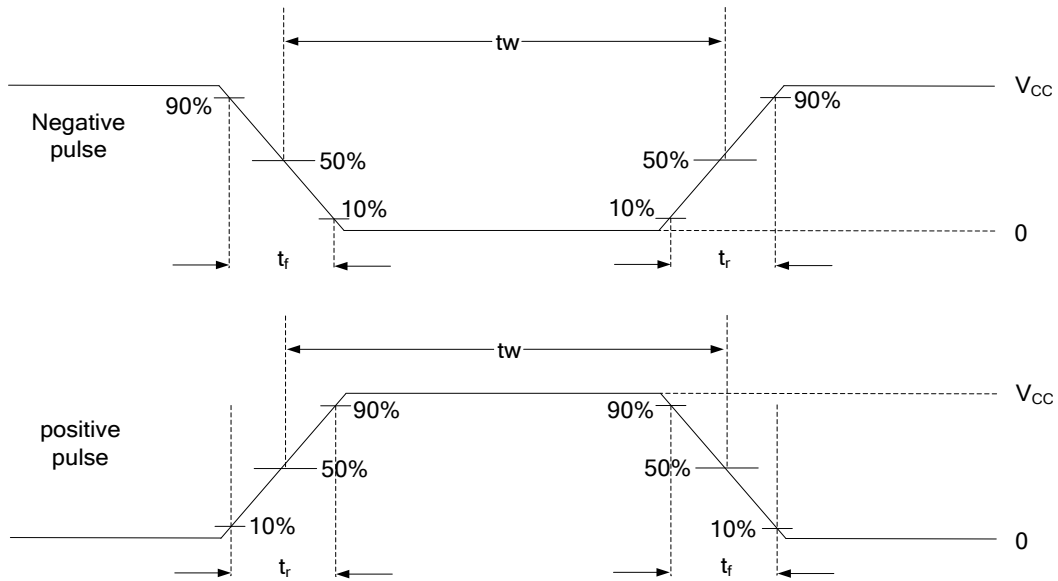


TEST CIRCUIT

| S1 position           |                       |                       |
|-----------------------|-----------------------|-----------------------|
| $t_{PHL}$ , $t_{PLH}$ | $t_{PZH}$ , $t_{PHZ}$ | $t_{PZL}$ , $t_{PLZ}$ |
| open                  | GND                   | $V_{CC}$              |



## ■ TEST CIRCUIT AND WAVEFORMS (Cont.)



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