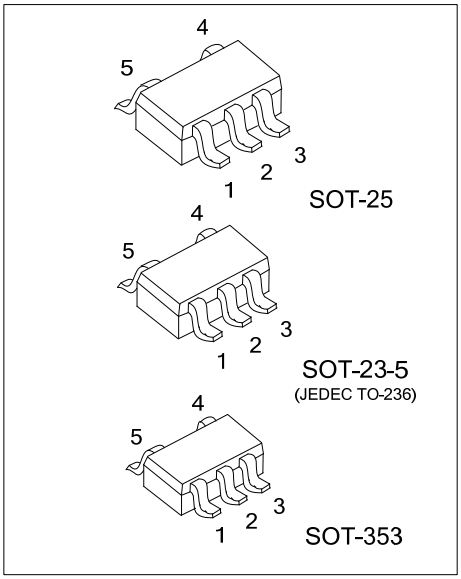
# U74LVC1G125

**CMOS IC**

## BUS BUFFER/LINE DRIVER 3-STATE




### ■ DESCRIPTION

The **U74LVC1G125** is a single bus buffer/line driver with 3-state output. When the output enable ( $\overline{OE}$ ) is high the output will be disabled. In contrast, when the $\overline{OE}$ is low, true data will pass from A input to the Y output.

This device has power-down protective circuit to prevent the device from destruction when it is powered down.

### ■ FEATURES

* Operate From 1.65V to 5.5V
* Inputs Accept Voltages to 5.5V
* High Noise Immunity
* Low Power Dissipation
* Direct Interface With TTL Level

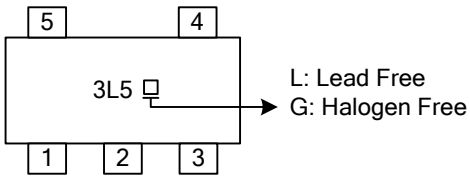
### ■ ORDERING INFORMATION

| Ordering Number | | Package | Packing |
|---|---|---|---|
| Lead Free | Halogen Free | | |
| U74LVC1G125L-AE5-R | U74LVC1G125G-AE5-R | SOT-23-5 | Tape Reel |
| U74LVC1G125L-AF5-R | U74LVC1G125G-AF5-R | SOT-25 | Tape Reel |
| U74LVC1G125L-AL5-R | U74LVC1G125G-AL5-R | SOT-353 | Tape Reel |

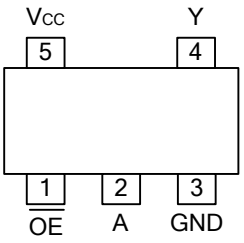
U74LVC1G125G-AF5-R
(1)Packing Type
(2)Package Type
(3)Green Package

(1) R: Tape Reel
(2) AE5: SOT-23-5, AF5: SOT-25, AL5: SOT-353
(3) G: Halogen Free and Lead Free, L: Lead Free

### ■ MARKING



## ■ PIN CONFIGURATION

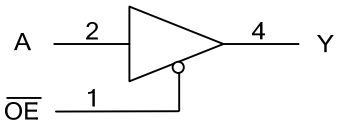



## ■ FUNCTION TABLE

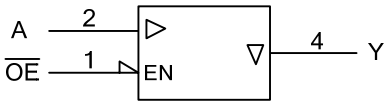
| INPUT( $\overline{OE}$ ) | INPUT(A) | OUTPUT(Y) |
|---|---|---|
| L | L | L |
| L | H | H |
| H | X | Z |

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

## ■ LOGIC DIAGRAM (Positive Logic)




Logic Symbol




IEC Logic Symbol

## ■ 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 | Enable mode | $V_{OUT}$ | -0.5 ~ $V_{CC}$ + 0.5 | V |
| | Disable mode | | -0.5 ~ +6.5 | V |
| | Power-down mode | | -0.5 ~ +6.5 | V |
| $V_{CC}$ or GND Current | | $I_{CC}$ | ±100 | mA |
| Continuous Output Current ($V_{OUT}$=0 to $V_{CC}$) | | $I_{OUT}$ | ±50 | mA |
| Input Clamp Current ($V_{IN}$<0) | | $I_{IK}$ | -50 | mA |
| Output Clamp Current ($V_{OUT}$>$V_{CC}$ or $V_{OUT}$<0) | | $I_{OK}$ | ±50 | mA |
| Power Dissipation ($T_A$=-40°C ~ +125°C) | SOT-23-5 | $P_D$ | 300 | mW |
| | SOT-25 | | 360 | |
| | SOT-353 | | 250 | |
| Operating Temperature | | $T_{OPR}$ | -40 ~ +125 | °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 | $V_{CC}$ | Operating | 1.65 | | 5.5 | V |
| Input Voltage | $V_{IN}$ | | 0 | | 5.5 | V |
| Output Voltage | $V_{OUT}$ | $V_{CC}$=1.65V ~ 5.5V; Enable mode | 0 | | $V_{CC}$ | V |
| | | $V_{CC}$=1.65V ~ 5.5V; Disable mode | 0 | | 5.5 | V |
| | | $V_{CC}$=0V; Power-down mode | 0 | | 5.5 | V |
| Input Transition Rise or Fall Rate | $t_R/t_F$ | $V_{CC}$=1.65V ~ 2.7V | | | 20 | ns/V |
| | | $V_{CC}$=2.7V ~ 5.5V | | | 10 | ns/V |

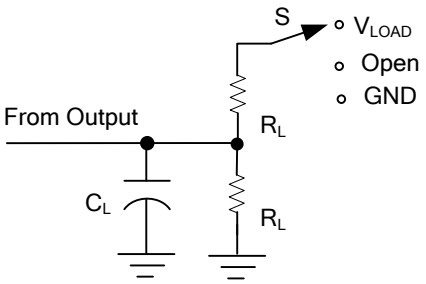
## ■ ELECTRICAL CHARACTERISTICS ($T_A$ =25°C , unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| High-Level Input Voltage | $V_{IH}$ | $V_{CC}$=1.65V ~ 1.95V | 0.65×$V_{CC}$ | | | V |
| | | $V_{CC}$=2.3V ~ 2.7V | 1.7 | | | V |
| | | $V_{CC}$=2.7V ~ 3.6V | 2 | | | V |
| | | $V_{CC}$=4.5V ~ 5.5V | 0.7×$V_{CC}$ | | | V |
| Low-Level Input Voltage | $V_{IL}$ | $V_{CC}$=1.65V ~ 1.95V | | | 0.35×$V_{CC}$ | V |
| | | $V_{CC}$=2.3V ~ 2.7V | | | 0.7 | V |
| | | $V_{CC}$=2.7V ~ 3.6V | | | 0.8 | V |
| | | $V_{CC}$=4.5V ~ 5.5V | | | 0.3×$V_{CC}$ | V |
| High-Level Output Voltage | $V_{OH}$ | $V_{CC}$=1.65 ~ 5.5V, $I_{OH}$=-100μA | $V_{CC}$-0.1 | | | V |
| | | $V_{CC}$=1.65V, $I_{OH}$=-4mA | 1.2 | | | V |
| | | $V_{CC}$=2.3V, $I_{OH}$=-8mA | 1.9 | | | V |
| | | $V_{CC}$=2.7V, $I_{OH}$=-12mA | 2.2 | | | V |
| | | $V_{CC}$=3.0V, $I_{OH}$=-24mA | 2.3 | | | V |
| | | $V_{CC}$=4.5V, $I_{OH}$=-32mA | 3.8 | | | V |
| Low-Level Output Voltage | $V_{OL}$ | $V_{CC}$=1.65 ~ 5.5V, $I_{OL}$=100μA | | | 0.1 | V |
| | | $V_{CC}$=1.65V, $I_{OL}$=4mA | | | 0.45 | V |
| | | $V_{CC}$=2.3V, $I_{OL}$=8mA | | | 0.3 | V |
| | | $V_{CC}$=2.7V, $I_{OL}$=12mA | | | 0.4 | V |
| | | $V_{CC}$=3.0V, $I_{OL}$=24mA | | | 0.55 | V |
| | | $V_{CC}$=4.5V, $I_{OL}$=32mA | | | 0.55 | V |
| Input Leakage Current | $I_{I(LEAK)}$ | $V_{CC}$=5.5V, $V_{IN}$=5.5V or GND | | ±0.1 | ±5 | μA |
| Power OFF Leakage Current | $I_{OFF}$ | $V_{CC}$=0V, $V_{IN}$ or $V_{OUT}$=5.5V | | ±0.1 | ±10 | μA |
| 3-State Output OFF-State Current | $I_{OZ}$ | $V_{CC}$ =5.5V, $V_{IN}$=$V_{IH}$ or $V_{IL}$, $V_{OUT}$=$V_{CC}$ or GND | | ±0.1 | ±10 | μA |
| Quiescent Supply Current | $I_Q$ | $V_{CC}$=5.5V, $V_{IN}$=$V_{CC}$ or GND, $I_{OUT}$=0 | | 0.1 | 10 | μA |
| Additional Quiescent Supply Current Per Input Pin | $\Delta I_Q$ | $V_{CC}$=2.3 ~ 5.5V, $V_{IN}$=$V_{CC}$ -0.6V, $I_{OUT}$=0 | | 5 | 500 | μA |

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

| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| Propagation Delay From Input A to Output Y | $t_{PLH}$ / $t_{PHL}$ | $C_L$=30pF | $V_{CC}$=1.8±0.15V, $R_L$=1KΩ | 1.0 | 3.3 | 8.0 | ns |
| | | | $V_{CC}$=2.5±0.2V, $R_L$=500Ω | 0.5 | 2.2 | 5.5 | ns |
| | | $C_L$=50pF, $R_L$=500Ω | $V_{CC}$=2.7V | 0.5 | 2.5 | 5.5 | ns |
| | | | $V_{CC}$=3.3±0.3V | 0.5 | 2.1 | 4.5 | ns |
| | | | $V_{CC}$=5±0.5V | 0.5 | 1.7 | 4.0 | ns |
| 3-State Output Enable Time From Input $\overline{OE}$ to Output Y | $t_{PZH}$ / $t_{PZL}$ | $C_L$=30pF | $V_{CC}$=1.8±0.15V, $R_L$=1KΩ | 1.0 | 4.1 | 9.4 | ns |
| | | | $V_{CC}$=2.5±0.2V, $R_L$=500Ω | 0.5 | 2.8 | 6.6 | ns |
| | | $C_L$=50pF, $R_L$=500Ω | $V_{CC}$=2.7V | 0.5 | 3.3 | 6.6 | ns |
| | | | $V_{CC}$=3.3±0.3V | 0.5 | 2.4 | 5.3 | ns |
| | | | $V_{CC}$=5±0.5V | 0.5 | 2.1 | 5.0 | ns |
| 3-State Output Disable Time From Input $\overline{OE}$ to Output Y | $t_{PLZ}$ / $t_{PHZ}$ | $C_L$=30pF | $V_{CC}$=1.8±0.15V, $R_L$=1KΩ | 1.0 | 4.3 | 9.2 | ns |
| | | | $V_{CC}$=2.5±0.2V, $R_L$=500Ω | 0.5 | 2.7 | 5.0 | ns |
| | | $C_L$=50pF, $R_L$=500Ω | $V_{CC}$=2.7V | 0.5 | 3.0 | 5.0 | ns |
| | | | $V_{CC}$=3.3±0.3V | 0.5 | 3.1 | 5.0 | ns |
| | | | $V_{CC}$=5±0.5V | 0.5 | 2.2 | 4.2 | ns |

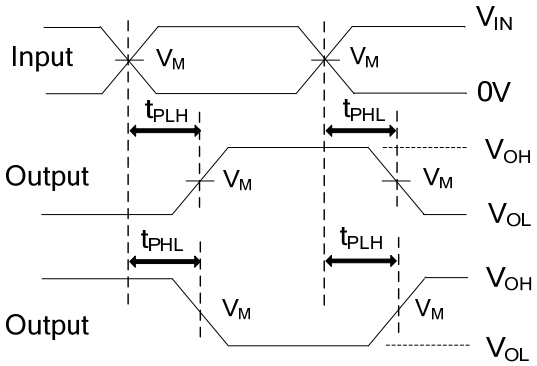
## ■ TEST CIRCUIT AND WAVEFORMS



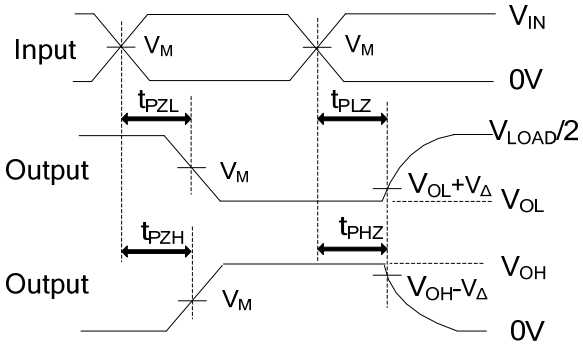

TEST CIRCUIT

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

| $V_{CC}$ | INPUTS | | $V_M$ | $V_{LOAD}$ | $V_\Delta$ | $C_L$ | $R_L$ |
|---|---|---|---|---|---|---|---|
| | $V_{IN}$ | $t_R$, $t_F$ | | | | | |
| 1.8V±0.15V | $V_{CC}$ | ≤2ns | $V_{CC}/2$ | 2 x $V_{CC}$ | 0.15V | 30pF | 1KΩ |
| 2.5V±0.2V | $V_{CC}$ | ≤2ns | $V_{CC}/2$ | 2 x $V_{CC}$ | 0.15V | 30pF | 500Ω |
| 2.7V | 2.7V | ≤2.5ns | 1.5V | 6V | 0.3V | 50pF | 500Ω |
| 3.3V±0.3V | 2.7V | ≤2.5ns | 1.5V | 6V | 0.3V | 50pF | 500Ω |
| 5V±0.5V | $V_{CC}$ | ≤2.5ns | $V_{CC}/2$ | 2 x $V_{CC}$ | 0.3V | 50pF | 500Ω |




PROPAGATION DELAY TIMES




ENABLE AND DISABLE TIMES

Note: $C_L$ includes probe and jig capacitance.
All input pulses are supplied by generators having the following characteristics: $P_{RR}$ ≤10MHz, $Z_O$ = 50Ω.

Notes: 1. $C_L$ includes probe and jig capacitance.
2. All input pulses are supplied by generators having the following characteristics: $P_{RR}$ ≤10MHz, $Z_O$ = 50Ω.