

**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.

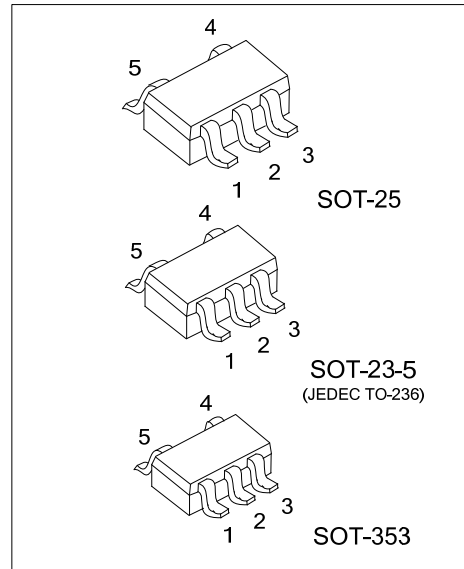
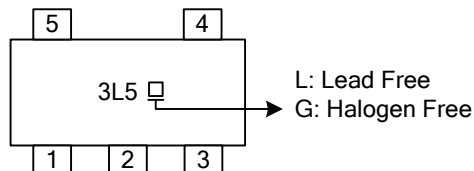
**FEATURES**

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

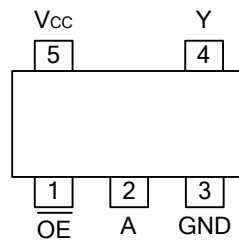
**ORDERING INFORMATION**

| 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<br>(2)Package Type<br>(3)Green Package | (1) R: Tape Reel<br>(2) AE5: SOT-23-5, AF5: SOT-25, AL5: SOT-353<br>(3) G: Halogen Free and Lead Free, L: Lead Free |
|--------------------|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|

**MARKING**

## ■ PIN CONFIGURATION

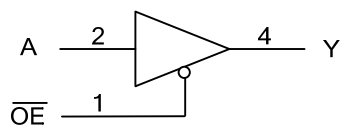


## ■ FUNCTION TABLE

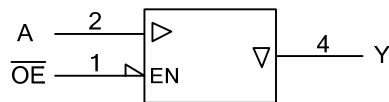
| INPUT( $\overline{OE}$ ) | INPUT(A) | OUTPUT(Y) |
|--------------------------|----------|-----------|
| L                        | L        | L         |
| L                        | H        | H         |
| H                        | X        | Z         |

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<br>( $T_A=-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$ ) | SOT-23-5        | $P_D$     | 300                   | mW                 |
|                                                                              | SOT-25          |           | 360                   |                    |
|                                                                              | SOT-353         |           | 250                   |                    |
| Operating Temperature                                                        |                 | $T_{OPR}$ | -40 ~ +125            | $^{\circ}\text{C}$ |
| Storage Temperature                                                          |                 | $T_{STG}$ | -65 ~ +150            | $^{\circ}\text{C}$ |

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                     | $V_{OUT}$ | $V_{CC}=1.65\text{V} \sim 5.5\text{V}$ ; Enable mode  | 0    |     | $V_{CC}$ | V    |
|                                    |           | $V_{CC}=1.65\text{V} \sim 5.5\text{V}$ ; Disable mode | 0    |     | 5.5      | V    |
|                                    |           | $V_{CC}=0\text{V}$ ; Power-down mode                  | 0    |     | 5.5      | V    |
| Input Transition Rise or Fall Rate | $t_R/t_F$ | $V_{CC}=1.65\text{V} \sim 2.7\text{V}$                |      |     | 20       | ns/V |
|                                    |           | $V_{CC}=2.7\text{V} \sim 5.5\text{V}$                 |      |     | 10       | ns/V |

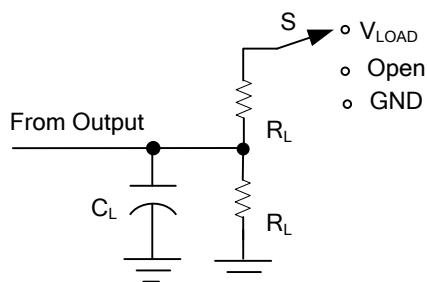
### ■ ELECTRICAL CHARACTERISTICS (T<sub>A</sub> =25°C , unless otherwise specified)

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

### ■ SWITCHING CHARACTERISTICS (T<sub>A</sub> =25°C , unless otherwise specified)

| PARAMETER                                             | SYMBOL                              | TEST CONDITIONS                                                       | MIN | TYP | MAX | UNIT |
|-------------------------------------------------------|-------------------------------------|-----------------------------------------------------------------------|-----|-----|-----|------|
| Propagation Delay From Input A to Output Y            | t <sub>PLH</sub> / t <sub>PHL</sub> | C <sub>L</sub> =30pF, V <sub>CC</sub> =1.8±0.15V, R <sub>L</sub> =1KΩ | 1.0 | 3.3 | 8.0 | ns   |
|                                                       |                                     | V <sub>CC</sub> =2.5±0.2V, R <sub>L</sub> =500Ω                       | 0.5 | 2.2 | 5.5 | ns   |
|                                                       |                                     | C <sub>L</sub> =50pF, R <sub>L</sub> =500Ω, V <sub>CC</sub> =2.7V     | 0.5 | 2.5 | 5.5 | ns   |
|                                                       |                                     | V <sub>CC</sub> =3.3±0.3V, V <sub>CC</sub> =5±0.5V                    | 0.5 | 2.1 | 4.5 | ns   |
| 3-State Output Enable Time From Input OE to Output Y  | t <sub>PZH</sub> / t <sub>PZL</sub> | C <sub>L</sub> =30pF, V <sub>CC</sub> =1.8±0.15V, R <sub>L</sub> =1KΩ | 1.0 | 4.1 | 9.4 | ns   |
|                                                       |                                     | V <sub>CC</sub> =2.5±0.2V, R <sub>L</sub> =500Ω                       | 0.5 | 2.8 | 6.6 | ns   |
|                                                       |                                     | C <sub>L</sub> =50pF, R <sub>L</sub> =500Ω, V <sub>CC</sub> =2.7V     | 0.5 | 3.3 | 6.6 | ns   |
|                                                       |                                     | V <sub>CC</sub> =3.3±0.3V, V <sub>CC</sub> =5±0.5V                    | 0.5 | 2.4 | 5.3 | ns   |
| 3-State Output Disable Time From Input OE to Output Y | t <sub>PLZ</sub> / t <sub>PHZ</sub> | C <sub>L</sub> =30pF, V <sub>CC</sub> =1.8±0.15V, R <sub>L</sub> =1KΩ | 1.0 | 4.3 | 9.2 | ns   |
|                                                       |                                     | V <sub>CC</sub> =2.5±0.2V, R <sub>L</sub> =500Ω                       | 0.5 | 2.7 | 5.0 | ns   |
|                                                       |                                     | C <sub>L</sub> =50pF, R <sub>L</sub> =500Ω, V <sub>CC</sub> =2.7V     | 0.5 | 3.0 | 5.0 | ns   |
|                                                       |                                     | V <sub>CC</sub> =3.3±0.3V, V <sub>CC</sub> =5±0.5V                    | 0.5 | 3.1 | 5.0 | ns   |

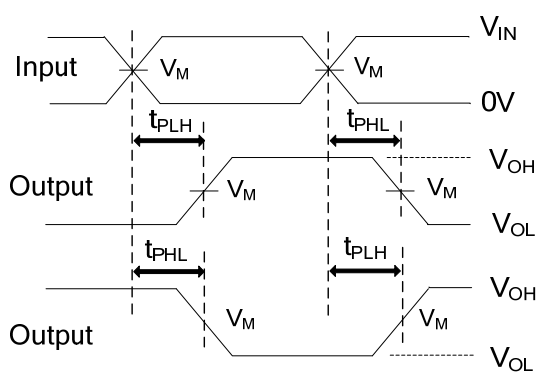
## ■ TEST CIRCUIT AND WAVEFORMS



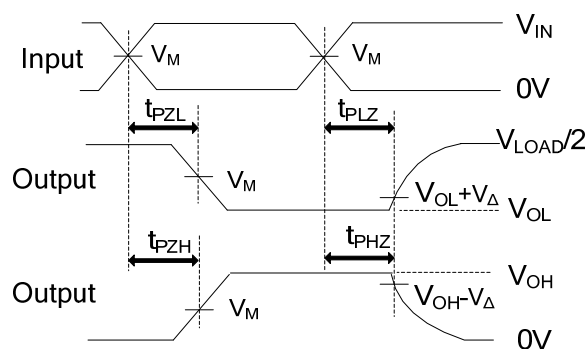
| TEST              | S          |
|-------------------|------------|
| $t_{PLH}/t_{PHL}$ | Open       |
| $t_{PHZ}/t_{PZH}$ | GND        |
| $t_{PLZ}/t_{PZL}$ | $V_{LOAD}$ |

TEST CIRCUIT

| $V_{CC}$         | INPUTS   |              | $V_M$      | $V_{LOAD}$        | $V_{\Delta}$ | $C_L$  | $R_L$       |
|------------------|----------|--------------|------------|-------------------|--------------|--------|-------------|
|                  | $V_{IN}$ | $t_R, t_F$   |            |                   |              |        |             |
| $1.8V \pm 0.15V$ | $V_{CC}$ | $\leq 2ns$   | $V_{CC}/2$ | $2 \times V_{CC}$ | $0.15V$      | $30pF$ | $1K\Omega$  |
| $2.5V \pm 0.2V$  | $V_{CC}$ | $\leq 2ns$   | $V_{CC}/2$ | $2 \times V_{CC}$ | $0.15V$      | $30pF$ | $500\Omega$ |
| $2.7V$           | $2.7V$   | $\leq 2.5ns$ | $1.5V$     | $6V$              | $0.3V$       | $50pF$ | $500\Omega$ |
| $3.3V \pm 0.3V$  | $2.7V$   | $\leq 2.5ns$ | $1.5V$     | $6V$              | $0.3V$       | $50pF$ | $500\Omega$ |
| $5V \pm 0.5V$    | $V_{CC}$ | $\leq 2.5ns$ | $V_{CC}/2$ | $2 \times V_{CC}$ | $0.3V$       | $50pF$ | $500\Omega$ |



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:  $P_{RR} \leq 10MHz$ ,  $Z_O = 50\Omega$ .

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