

**General Description**

The SN74AHCT1G125 device is a single bus buffer gate/line driver with 3-state output. The output is disabled when the output-enable ( $\overline{OE}$ ) input is high. When  $\overline{OE}$  is low, data is passed from the A input to the Y output.

**Features**

- Operating Range of 4.5 V to 5.5 V
- Max tpd of 10 ns at 5 V
- Low Power Consumption, 10  $\mu$ A Max ICC
- $\pm 8$ mA Output Drive at 5 V
- Inputs are TTL-Voltage Compatible
- Packages are SC70-5, SOT23-5 or small DFN6
- MSL3(SC70-5, SOT23-5, DFN6(1\*1.5))

**Pin Configuration**

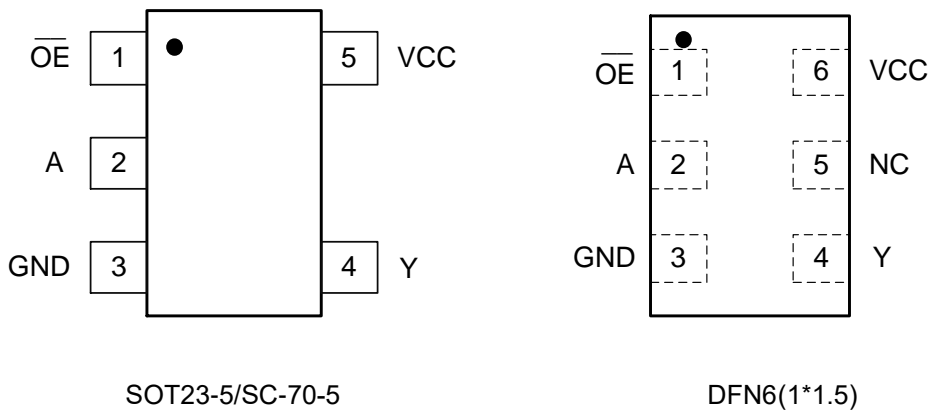


Figure1. Top View

**Pin Function**

SC70-5/ SOT23-5

| Pin No. | Pin Name        | Function       |
|---------|-----------------|----------------|
| 1       | $\overline{OE}$ | Enable input   |
| 2       | A               | Input          |
| 3       | GND             | Ground         |
| 4       | Y               | Output         |
| 5       | VCC             | Supply Voltage |

**DFN6**

| Pin No. | Pin Name        | Function       |
|---------|-----------------|----------------|
| 1       | $\overline{OE}$ | Enable input   |
| 2       | A               | Input          |
| 3       | GND             | Ground         |
| 4       | Y               | Output         |
| 5       | NC              | No connect     |
| 6       | VCC             | Supply Voltage |

**Block Diagram**

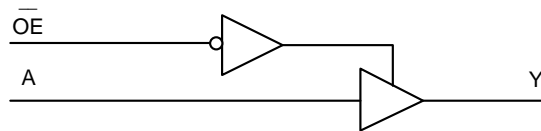


Figure2. Logic Symbol

**Functional Description**

**Function Table**

| Input           |   | Output |
|-----------------|---|--------|
| $\overline{OE}$ | A | Y      |
| L               | L | L      |
| L               | H | H      |
| H               | X | Z      |

### Absolute Maximum Ratings

| Symbol    | Parameter   | Value                               | Unit       |   |
|-----------|---|-------------------------------------|------------|---|
| $V_{CC}$  | Supply Voltage Range  | -0.5 to 7.0                         | V          |   |
| $V_I$     | Input Voltage Range <sup>(1)</sup>                                  | $-0.5 \leq V_I \leq +7.0$           | V          |   |
| $V_O$     | Output Voltage Range <sup>(1)</sup>                                 | -0.5 to $V_{CC} + 0.5$              | V          |   |
| $I_{IK}$  | Input Clamp Current $V_I < 0$                                       | -20                                 | mA         |   |
| $I_{OK}$  | Output Clamp Current $V_O < GND, V_O > V_{CC}$                      | $\pm 20$                            | mA         |   |
| $I_O$     | Continuous Output Current $V_O = 0$ to $V_{CC}$                     | $\pm 25$                            | mA         |   |
|           | Continuous channel current through $V_{CC}$ or GND                  | $\pm 50$                            | mA         |   |
| $T_{STG}$ | Storage Temperature Range   | -65 to 150                          | °C         |   |
| $T_J$     | Junction Temperature Under Bias                                     | 150                                 | °C         |   |
| $V_{ESD}$ | ESD Classification  | Human Body Model <sup>(2)</sup>     | $\pm 4000$ | V |
|           |   | Charged Device Model <sup>(3)</sup> | $\pm 1000$ |   |
| $I_{LU}$  | Max Latch up Current Above $V_{CC}$ and GND at 125°C <sup>(4)</sup> | $\pm 100$                           | mA         |   |

### Thermal Characteristics

| Symbol          | Package       | Ratings  | Value | Unit |
|-----------------|---------------|--|-------|------|
| $R_{\theta JA}$ | SC70-5        | Thermal Characteristics, Thermal Resistance, Junction-to-Air | 300   | °C/W |
|                 | SOT23-5       |  | 250   |      |
|                 | DFN6(1.0×1.5) |  | 440   |      |
| $P_D$           | SC70-5        | Power Dissipation in Still Air at 85°C                       | 215   | mW   |
|                 | SOT23-5       |  | 260   |      |
|                 | DFN6(1.0×1.5) |  | 150   |      |

**Recommended Operating Conditions**

 Over operating free-air temperature range (unless otherwise noted)<sup>(5)</sup>

| Symbol          | Parameter                          | Min | Max             | Unit |
|-----------------|------------------------------------|-----|-----------------|------|
| V <sub>CC</sub> | Supply Voltage                     | 4.5 | 5.5             | V    |
| V <sub>IH</sub> | High-level Input Voltage           | 2   |                 | V    |
| V <sub>IL</sub> | Low-level Input Voltage            |     | 0.8             | V    |
| V <sub>I</sub>  | Input Voltage                      | 0   | 5.5             | V    |
| V <sub>O</sub>  | Output Voltage                     | 0   | V <sub>CC</sub> | V    |
| I <sub>OH</sub> | High-level Output Current          |     | -8              | mA   |
| I <sub>OL</sub> | Low-level Output Current           |     | 8               | mA   |
| Δt/Δv           | Input Transition Rise or Fall Rate |     | 20              | ns/V |
| T <sub>A</sub>  | Operating Free-air Temperature     | -40 | 125             | °C   |

**Note5:** All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation.

**Electrical Characteristics**

Over recommended operating free-air temperature range (unless otherwise noted)

| Symbol                          | Parameter                 | Condition   | V <sub>CC</sub> | T <sub>A</sub> = 25 °C |     |       | -40°C to 85°C |      | -40°C to 125°C |      | Unit |
|---------------------------------|---------------------------|---|-----------------|------------------------|-----|-------|---------------|------|----------------|------|------|
|                                 |                           |   |                 | Min                    | Typ | Max   | Min           | Max  | Min            | Max  |      |
| V <sub>OH</sub>                 | High-Level Output Voltage | I <sub>OH</sub> = -50μA                                     | 4.5 V           | 4.4                    | 4.5 |       | 4.4           |      | 4.4            |      | V    |
|                                 |                           | I <sub>OH</sub> = -8mA                                      |                 | 3.94                   |     |       | 3.8           |      | 3.8            |      |      |
| V <sub>OL</sub>                 | Low-Level Output Voltage  | I <sub>OH</sub> = 50μA                                      | 4.5 V           |                        |     | 0.1   |               | 0.1  |                | 0.1  | V    |
|                                 |                           | I <sub>OL</sub> = 8mA                                       |                 |                        |     | 0.36  |               | 0.44 |                | 0.44 |      |
| I <sub>I</sub>                  | Input Leakage Current     | V <sub>I</sub> = 5.5 V or GND                               | 0V to 5.5V      |                        |     | ±0.1  |               | ±1   |                | ±1   | μA   |
| I <sub>oz</sub>                 | OFF-state Output Current  | V <sub>O</sub> = V <sub>CC</sub> or GND                     | 5.5 V           |                        |     | ±0.25 |               | ±2.5 |                | ±2.5 | μA   |
| I <sub>CC</sub>                 | Quiescent Supply Current  | V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0 | 5.5 V           |                        |     | 1     |               | 10   |                | 10   | μA   |
| ΔI <sub>CC</sub> <sup>(6)</sup> | Additional Supply Current | One input at 3.4 V, Other input at V <sub>CC</sub> or GND   | 5.5 V           |                        |     | 1.35  |               | 1.5  |                | 1.5  | mA   |
| C <sub>I</sub>                  | Input Capacitance         | V <sub>I</sub> = V <sub>CC</sub> or GND                     | 5 V             |                        | 3   | 10    |               | 10   |                | 10   | pF   |
| C <sub>O</sub>                  | Output Capacitance        | V <sub>O</sub> = V <sub>CC</sub> or GND                     | 5 V             |                        | 8   |       |               |      |                |      | pF   |

**Note6:** This is the increase in supply current for each input at one of the specified TTL voltage levels, rather than 0 V or V<sub>CC</sub>.

### Switching Characteristics

Over recommended operating free-air temperature range,  $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$  (unless otherwise noted)

|                          | Parameter           | Condition            | $T_A = 25\text{ }^\circ\text{C}$ |     |     | $-40\text{ }^\circ\text{C to } 85\text{ }^\circ\text{C}$ |     | $-40\text{ }^\circ\text{C to } 125\text{ }^\circ\text{C}$ |     | Unit |
|--------------------------|---------------------|----------------------|----------------------------------|-----|-----|--|-----|---|-----|------|
|                          |                     |                      | Min                              | Typ | Max | Min  | Max | Min   | Max |      |
| $t_{PLH}$                | Propagation Delay   | $C_L = 15\text{ pF}$ |                                  | 3.8 | 5.7 | 1  | 10  | 1   | 11  | ns   |
| $t_{PHL}$                |                     | $C_L = 50\text{ pF}$ |                                  | 5.3 | 8.0 | 1  | 11  | 1   | 12  |      |
| $t_{PZL}$ ,<br>$t_{PZH}$ | Output Enable Time  | $C_L = 15\text{ pF}$ |                                  | 3.6 | 5.5 | 1  | 9   | 1   | 10  | ns   |
|                          |                     | $C_L = 50\text{ pF}$ |                                  | 4.3 | 7.5 | 1  | 10  | 1   | 11  |      |
| $t_{PLZ}$ ,<br>$t_{PHZ}$ | Output Disable Time | $C_L = 15\text{ pF}$ |                                  | 7.1 | 12  | 1  | 15  | 1   | 17  | ns   |
|                          |                     | $C_L = 50\text{ pF}$ |                                  | 8.5 | 13  | 1  | 16  | 1   | 18  |      |

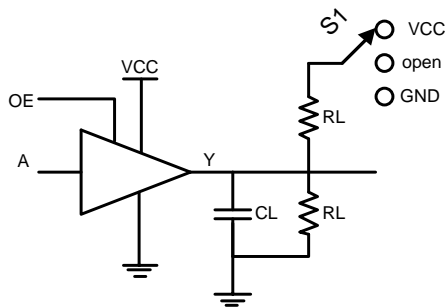
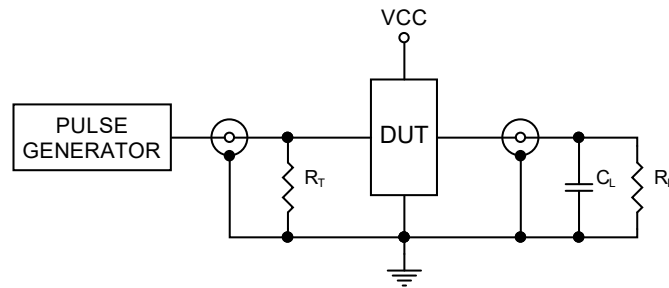
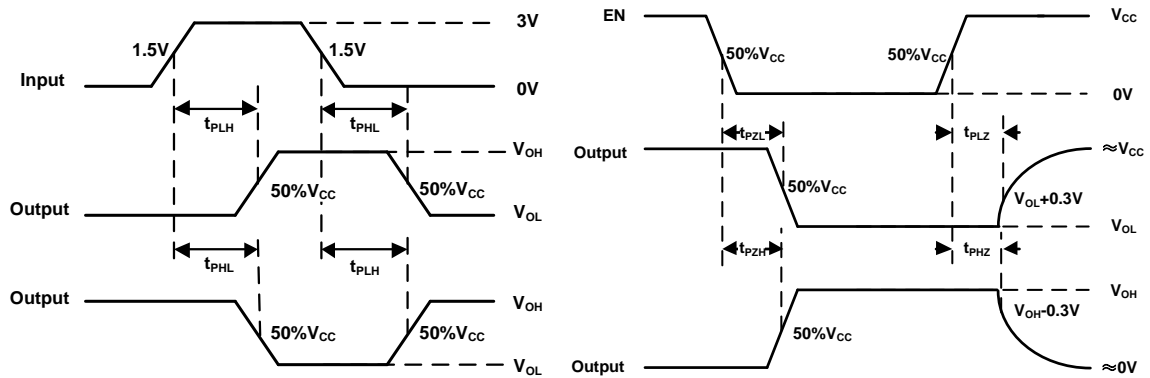
### Operating Characteristics

$V_{CC} = 5\text{ V}$ ,  $T_A = 25\text{ }^\circ\text{C}$

| Symbol   | Parameter                     | Condition                   | Typ | Unit |
|----------|-------------------------------|-----------------------------|-----|------|
| $C_{PD}$ | Power Dissipation Capacitance | No load, $f = 1\text{ MHz}$ | 10  | pF   |

**Note7:**  $C_{PD}$  is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation:  $I_{CC(OPR)} = C_{PD} \times V_{CC} \times f_{in} + I_{CC} \times C_{PD}$  is used to determine the no-load dynamic power consumption;  $P_D = C_{PD} \times V_{CC}^2 \times f_{in} + I_{CC} \times V_{CC} \times Fig.$

Parameter Measurement Information



| Test      | Switch |
|-----------|--------|
| tPD       | Open   |
| tPZL tPLZ | VCC    |
| tPZH tPHZ | GND    |

$C_L$  includes probe and jig capacitance

All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1\text{MHz}$ ,  $ZO=50\Omega$ ,  $t_r \leq 3\text{ns}$ ,  $t_f \leq 3\text{ns}$ .

The outputs are measured one at a time with one input transition per measurement.

All parameters and waveforms are not applicable to all devices.

Figure3. Load Circuit and Voltage Waveforms

Package Dimension

SC70-5

SOT23-5



DFN6(1.0×1.5)

**Ordering information**

| Order code            | Marking code | Package     | Baseqty | Deliverymode  |
|-----------------------|--------------|-------------|---------|---------------|
| UMW SN74AHCT1G125DBVR | B25S U       | SOT23-5     | 3000    | Tape and reel |
| UMW SN74AHCT1G125DCKR | BMG U        | SC70-5      | 3000    | Tape and reel |
| UMW SN74AHCT1G125DRYR | —            | DFN6(1*1.5) | 5000    | Tape and reel |

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