

Single Bus Buffer Gate with 3-state Output

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 μ A Max ICC
- ± 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

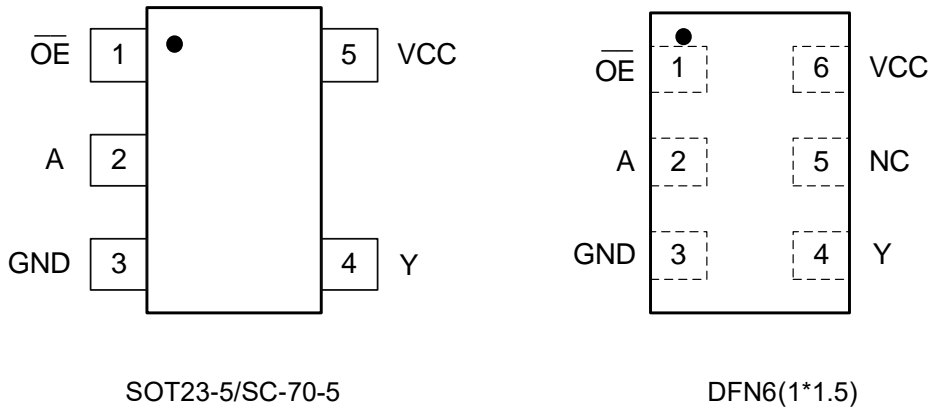


Figure1. Top View

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

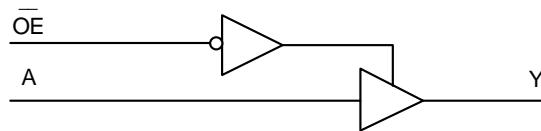


Figure2. Logic Symbol

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 ⁽¹⁾		$-0.5 \leq V_I \leq +7.0$	V
V_O	Output Voltage Range ⁽¹⁾		-0.5 to $V_{CC} + 0.5$	V
I_{IK}	Input Clamp Current	$V_I < 0$	-20	mA
I_{OK}	Output Clamp Current	$V_O < GND, V_O > V_{CC}$	± 20	mA
I_O	Continuous Output Current $V_O = 0$ to V_{CC}		± 25	mA
	Continuous channel current through V_{CC} or GND		± 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 ⁽²⁾	± 4000	V
		Charged Device Model ⁽³⁾	± 1000	
I_{LU}	Max Latch up Current Above V_{CC} and GND at 125°C ⁽⁴⁾		± 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	

Single Bus Buffer Gate with 3-state Output

Recommended Operating Conditions

Over operating free-air temperature range (unless otherwise noted)⁽⁵⁾

Symbol	Parameter	Min	Max	Unit
V _{CC}	Supply Voltage	4.5	5.5	V
V _{IH}	High-level Input Voltage	2		V
V _{IL}	Low-level Input Voltage		0.8	V
V _I	Input Voltage	0	5.5	V
V _O	Output Voltage	0	V _{CC}	V
I _{OH}	High-level Output Current		-8	mA
I _{OL}	Low-level Output Current		8	mA
Δt/Δv	Input Transition Rise or Fall Rate		20	ns/V
T _A	Operating Free-air Temperature	-40	125	°C

Note5: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

Electrical Characteristics

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

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

Single Bus Buffer Gate with 3-state Output

Switching Characteristics

Over recommended operating free-air temperature range, VCC = 5 V ± 0.5 V (unless otherwise noted)

	Parameter	Condition	T _A = 25 °C			-40°C to 85°C		-40°C to 125°C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
t _{PLH}	Propagation Delay	C _L = 15pF		3.8	5.7	1	10	1	11	ns
t _{PHL}		C _L = 50pF		5.3	8.0	1	11	1	12	
t _{PZL} ,	Output Enable Time	C _L = 15pF		3.6	5.5	1	9	1	10	ns
t _{PZH}		C _L = 50pF		4.3	7.5	1	10	1	11	
t _{PLZ} ,	Output Disable Time	C _L = 15pF		7.1	12	1	15	1	17	ns
t _{PHZ}		C _L = 50pF		8.5	13	1	16	1	18	

Operating Characteristics

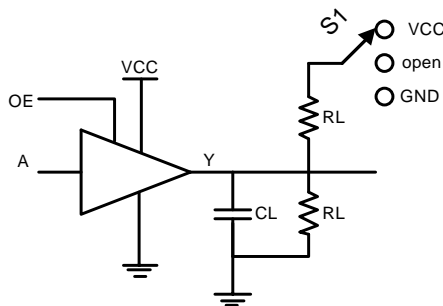
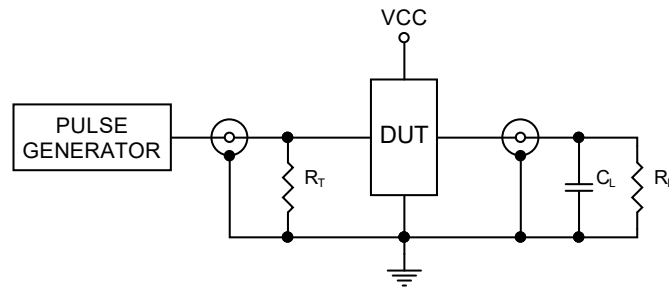
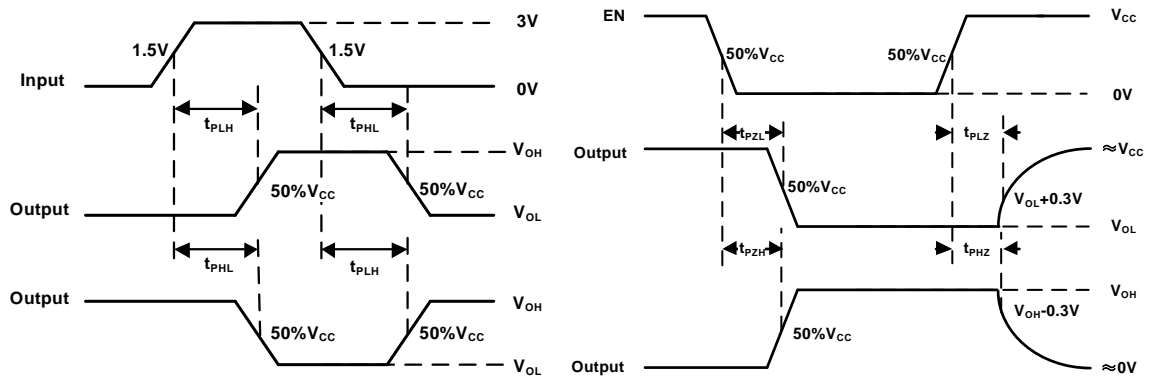
V_{CC} = 5 V, T_A = 25°C

Symbol	Parameter	Condition	Typ	Unit
C _{PD}	Power Dissipation Capacitance	No load, f = 1 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}×V_{CC}×f_{in}+I_{CC}×C_{PD} is used to determine the no-load dynamic power consumption; P_D=C_{PD}×V_{CC}² ×f_{in}+I_{CC}×V_{CC}×Fig.

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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: $PRR \leq 1\text{MHz}$, $Z_0=50\Omega$, $t_r \leq 3\text{ns}$, $t_f \leq 3\text{ns}$.

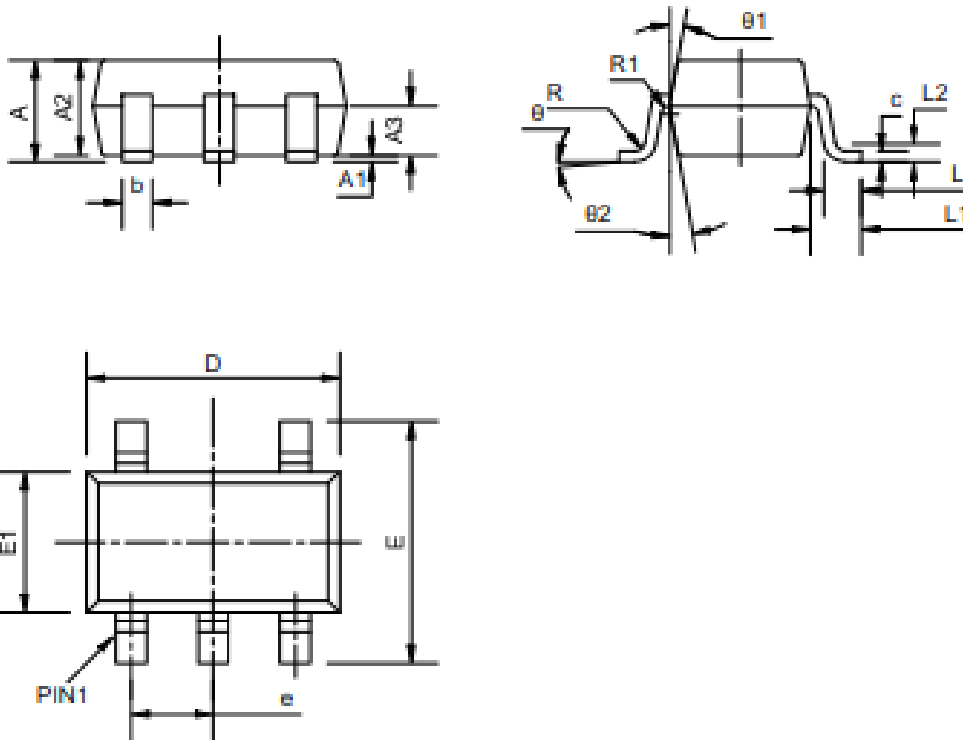
The outputs are measured one at a time with one input transition per measurement.

All parameters and waveforms are not applicable to all devices.

Figure3. Load Circuit and Voltage Waveforms

Package Dimension

SC70-5

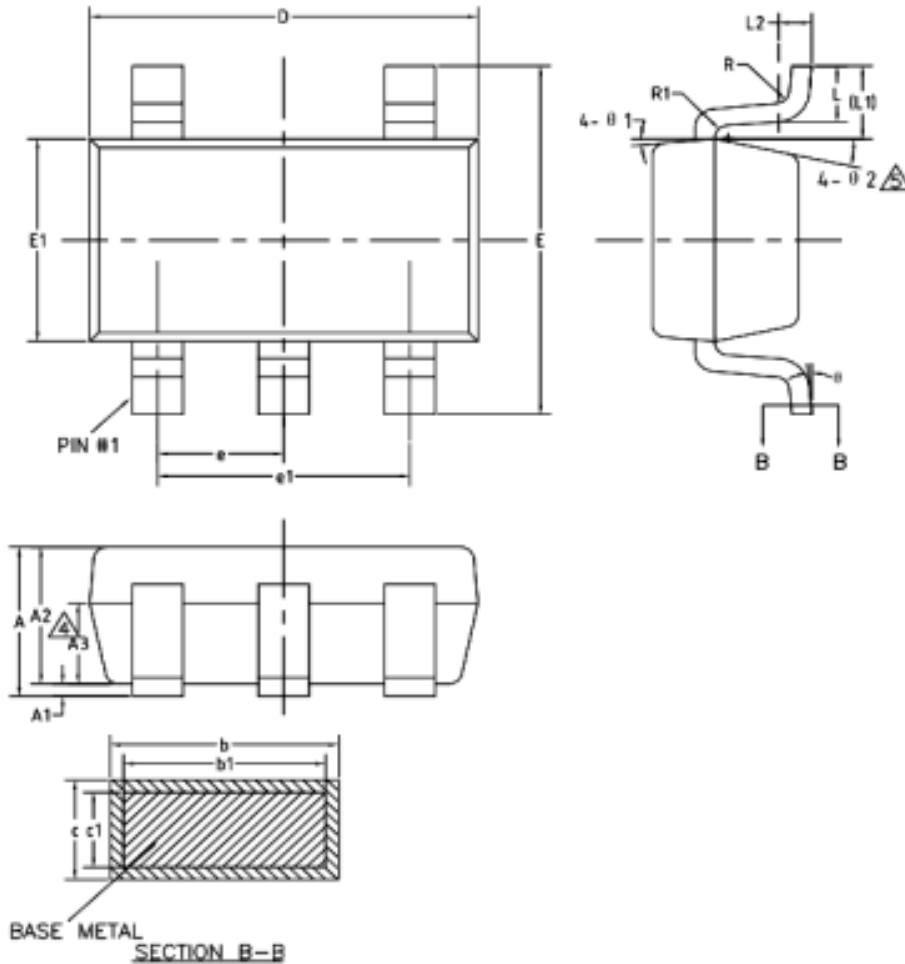


COMMON DIMENSIONS

(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.85	--	1.05
A1	0	--	0.10
A2	0.80	0.90	1.00
A3	0.47	0.52	0.57
b	0.23	--	0.33
c	0.12	--	0.18
D	2.02	2.07	2.12
E	2.20	2.30	2.40
E1	1.25	1.30	1.35
e	0.60	0.65	0.70
L	0.28	0.33	0.38
L1	0.50REF		
L2	0.15BSC		
R	0.10	--	--
R1	0.10	--	0.25
theta	0°	--	8°
theta1	6°	9°	12°
theta2	6°	9°	12°

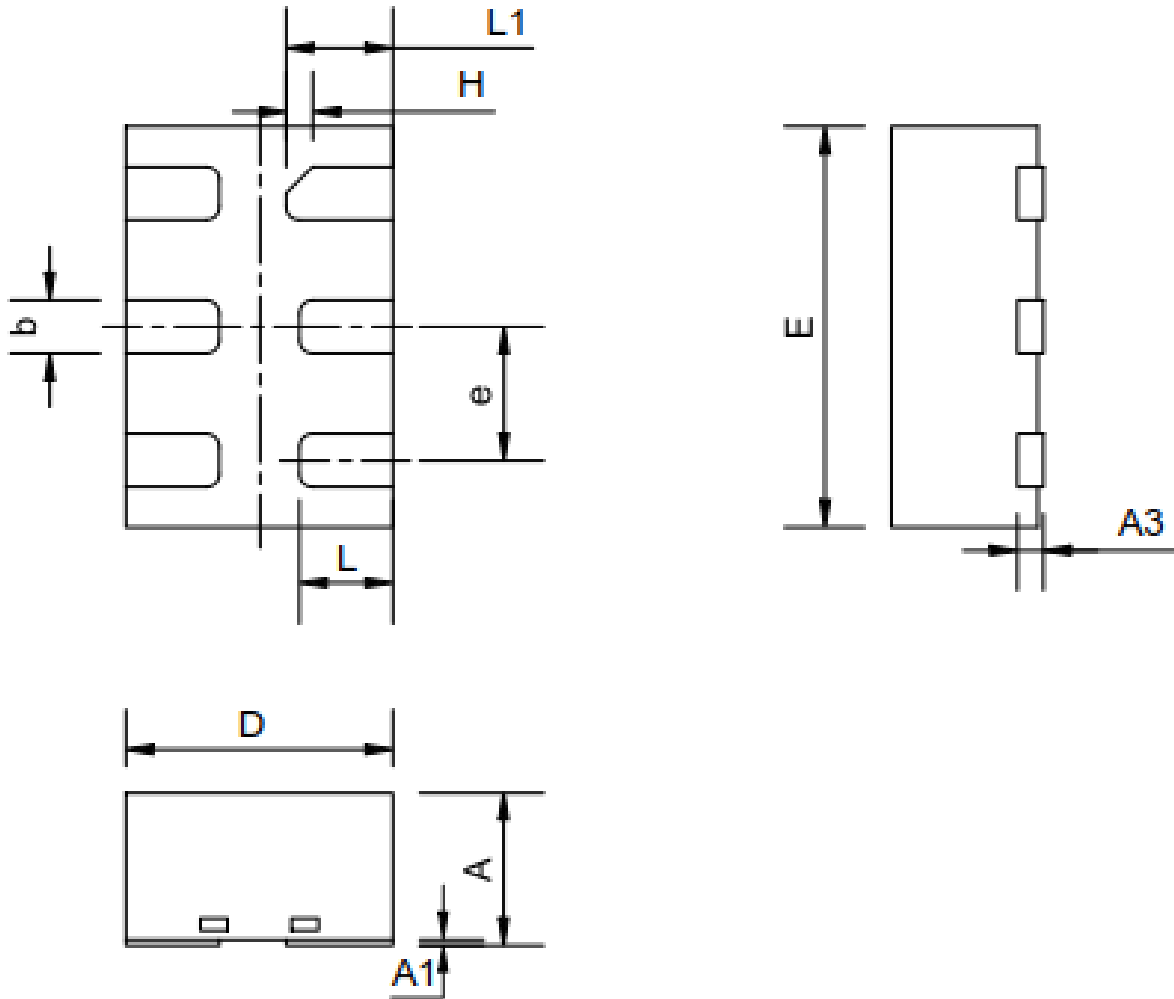
SOT23-5



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	—	—	1.25
△ A1	0	—	0.15
A2	1.00	1.10	1.20
A3	0.60	0.65	0.70
b	0.36	—	0.50
b1	0.36	0.38	0.45
c	0.14	—	0.20
c1	0.14	0.15	0.16
D	2.826	2.926	3.026
E	2.60	2.80	3.00
E1	1.526	1.626	1.726
e	0.90	0.95	1.00
e1	1.80	1.90	2.00
L	0.35	0.45	0.60
L1	0.59REF		
L2	0.25BSC		
R	0.10	—	—
R1	0.10	—	0.25
Ø	0° — 8°		
△ Ø 1	3°	5°	7°
△ Ø 2	6°	—	14°

DFN6(1.0x1.5)



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.50	--	0.60
A1	0	0.02	0.05
A3	0.10REF		
b	0.15	0.20	0.25
D	0.90	1.00	1.10
E	1.40	1.50	1.60
e	0.40	0.50	0.60
H	0.10REF		
L	0.30	0.35	0.40
L1	0.35	0.40	0.45