TP74AHC1G125 Series

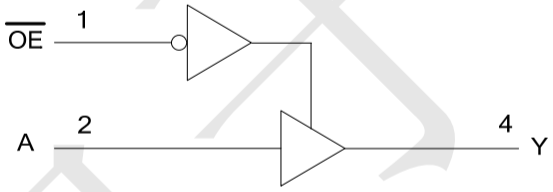
2-INPUT NAND GATE

DESCRIPTION

The TP74AHC1G125 is a single bus buffer gate/line driver with 3-state output. When $\overline{OE}$ is high, the Y output are in a high-impedance state. When $\overline{OE}$ is low, the device passes noninverted data from the A input to the Y output.

To ensure the high-impedance state during power up or power down, $\overline{OE}$ should be tied to V_{CC} through a pull-up resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

LOGIC DIAGRAM



Logic symbol

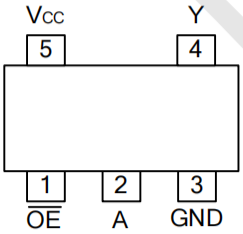
FEATURES

* Wide supply voltage range from 2V to 5.5V
* Max t_{PD} of 6 ns from A to Y at 5V
* Low power consumption, I_{CC} = 1μA (Max) at 5.5V
* ±8mA output driver at 5V

Ordering Information

ORDER NUMBER	PACKAGE DESCRIPTION	PACKAGE OPTION
TP74AHC1G125S5	SOT23-5	Tape and Reel,3000
TP74AHC1G125C5	SOT353	Tape and Reel,3000

PIN CONFIGURATION



FUNCTION TABLE

INPUT		OUTPUT
$\overline{OE}$	A	Y
L	H	H
L	L	L
H	X	Z

ABSOLUTE MAXIMUM RATING (unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage Range	V_{CC}	-0.5~7	V
Input Voltage Range	V_{IN}	-0.5~7	V
Output Voltage Range	V_{OUT}	-0.5~V_{CC} +0.5	V
Input Clamp Current (V_{IN}<0)	I_{IK}	-20	mA
Output Clamp Current (V_{OUT}<0, or V_{OUT}>V_{CC})	I_{OK}	±20	mA
Output Current	I_{OUT}	±25	mA
V_{CC} or GND Current	I_{CC}	±50	mA
Storage Temperature	T_{STG}	-65 ~ +150	°C

Notes: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

2. 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.

THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT23-5	θ_{JA}	280	°C/W
	SOT-353		350	

RECOMMENDED OPERATING COMDITIONS

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}		2		5.5	V
High-Level Input Voltage	V_{IH}	V_{CC} = 2V	1.5			V
		V_{CC} = 3V	2.1			
		V_{CC} = 5.5V	3.85			
Low-Level Input Voltage	V_{IL}	V_{CC} = 2V			0.5	V
		V_{CC} = 3V			0.9	
		V_{CC} = 5.5V			1.65	
Input Voltage	V_{IN}		0		5.5	V
Output Voltage	V_{OUT}		0		V_{CC}	V
High-Level Output Current	I_{OH}	V_{CC} = 2V			-50	μA
		V_{CC} = 3.3±0.3V			-4	mA
		V_{CC} = 5±0.5V			-8	
Low-Level Output Current	I_{OL}	V_{CC} = 2V			50	μA
		V_{CC} = 3.3±0.3V			4	mA
		V_{CC} = 5±0.5V			8	
Input Transition Rise or Fall Rate	Δt/Δv	V_{CC} = 3.3±0.3V			100	ns/V
		V_{CC} = 5±0.5V			20	
Operating Temperature	T_A		-40		125	°C

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-Level Output Voltage	V_{OH}	V_{CC} = 2V, I_{OH} = -50 μA	1.9	2		V
		V_{CC} = 3V, I_{OH} = -50 μA	2.9	3		
		V_{CC} = 4.5V, I_{OH} = -50 μA	4.4	4.5		
		V_{CC} = 3V, I_{OH} = -4 mA	2.58			
		V_{CC} = 4.5V, I_{OH} = -8 mA	3.94			
Low-Level Output Voltage	V_{OL}	V_{CC} = 2V, I_{OL} = 50 μA			0.1	V
		V_{CC} = 3V, I_{OL} = 50 μA			0.1	
		V_{CC} = 4.5V, I_{OL} = 50 μA			0.1	
		V_{CC} = 3V, I_{OL} = 4 mA			0.36	
		V_{CC} = 4.5V, I_{OL} = 8 mA			0.36	
Input Leakage Current (A or $\overline{OE}$ input)	$I_{I(LEAK)}$	V_{CC} =0 to 5.5V, V_{IN} =5.5V or GND			±0.1	μA
High-Impedance State Current	I_{OZ}	V_{CC} = 5.5V, V_{IN}=V_{CC} or GND			±0.25	μA
Quiescent Supply Current	I_{CC}	V_{CC}=5.5V, V_{IN}=V_{CC} or GND, I_{OUT} =0			1	μA
Input Capacitance	C_{IN}	V_{CC}=5V, V_{IN}=V_{CC} or GND		4	10	pF
Output Capacitance	C_{OUT}	V_{CC}=5V, V_O =V_{CC} or GND		10		pF

SWITCHING CHARACTERISTICS (V_{CC} = 3.3V ± 0.3V, T_A =25°C)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input A to output Y, t_{PD}	t_{PLH}	C_L=15pF, R_L=1kΩ		5.6	8	ns
		C_L=50pF, R_L=1kΩ		8.1	11.5	
	t_{PHL}	C_L=15pF, R_L=1kΩ		5.6	8	ns
		C_L=50pF, R_L=1kΩ		8.1	11.5	
Propagation delay from input $\overline{OE}$ to output Y, t_{EN}	t_{PZH}	C_L=15pF, R_L=1kΩ		5.4	8	ns
		C_L=50pF, R_L=1kΩ		7.9	11.5	
	t_{PZL}	C_L=15pF, R_L=1kΩ		5.4	8	ns
		C_L=50pF, R_L=1kΩ		7.9	11.5	
Propagation delay from input $\overline{OE}$ to output Y, t_{DIS}	t_{PHZ}	C_L=15pF, R_L=1kΩ		7	9.7	ns
		C_L=50pF, R_L=1kΩ		9.5	13.2	
	t_{PLZ}	C_L=15pF, R_L=1kΩ		7	9.7	ns
		C_L=50pF, R_L=1kΩ		9.5	13.2	

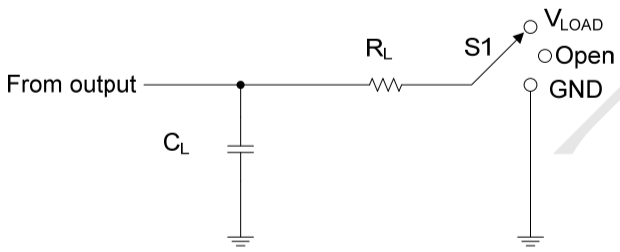
SWITCHING CHARACTERISTICS (V_{CC} = 5V ± 0.5V, T_A =25°C)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input A to output Y, t_{PD}	t_{PLH}	C_L=15pF, R_L=1kΩ		3.8	5.5	ns
		C_L=50pF, R_L=1kΩ		5.3	7.5	
	t_{PHL}	C_L=15pF, R_L=1kΩ		3.8	5.5	ns
		C_L=50pF, R_L=1kΩ		5.3	7.5	
Output enable time from input $\overline{OE}$ to output Y, t_{EN}	t_{PZH}	C_L=15pF, R_L=1kΩ		3.6	5.1	ns
		C_L=50pF, R_L=1kΩ		5.1	7.1	
	t_{PZL}	C_L=15pF, R_L=1kΩ		3.6	5.1	ns
		C_L=50pF, R_L=1kΩ		5.1	7.1	
Output disable time from input $\overline{OE}$ to output Y, t_{DIS}	t_{PHZ}	C_L=15pF, R_L=1kΩ		4.6	6.8	ns
		C_L=50pF, R_L=1kΩ		6.1	8.8	
	t_{PLZ}	C_L=15pF, R_L=1kΩ		4.6	6.8	ns
		C_L=50pF, R_L=1kΩ		6.1	8.8	

OPERATING CHARACTERISTICS (T_A =25°C)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power dissipation capacitance	C_{PD}	V_{CC} = 5V, f=1MHz, No load		14		pF

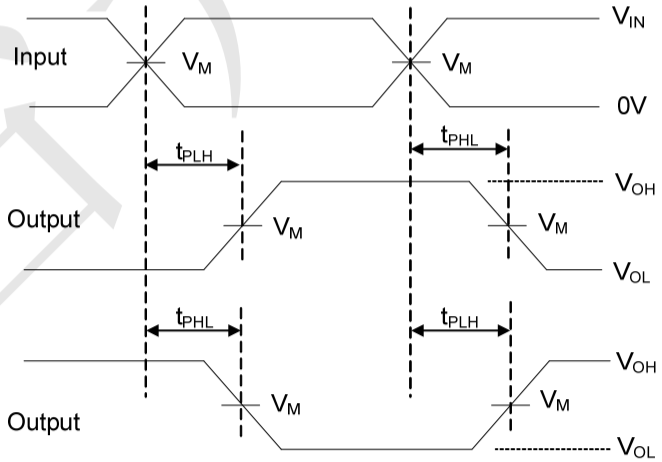
TEST CIRCUIT AND WAVEFORMS



Test Circuit

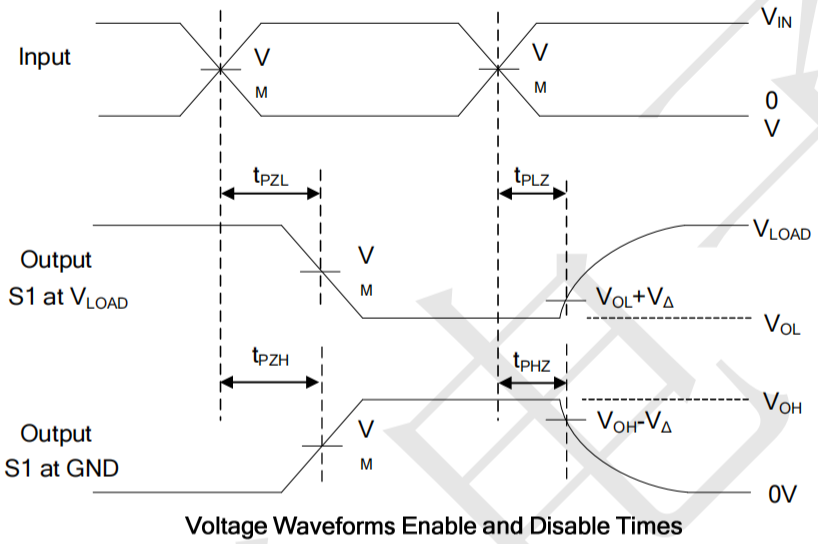
TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

V_{CC}	Input		V_M	V_{LOAD}	C_L	R_L	V_Δ
	V_{IN}	t_R, t_F					
3.3V±0.3V	V_{CC}	≤3ns	$V_{CC}/2$	V_{CC}	15pF 50pF	1kΩ	0.3V
5V±0.5V	V_{CC}	≤3ns	$V_{CC}/2$	V_{CC}	15pF 50pF	1kΩ	0.5V



Voltage Waveforms Propagation Delay Times

TEST CIRCUIT AND WAVEFORMS(Cont.)



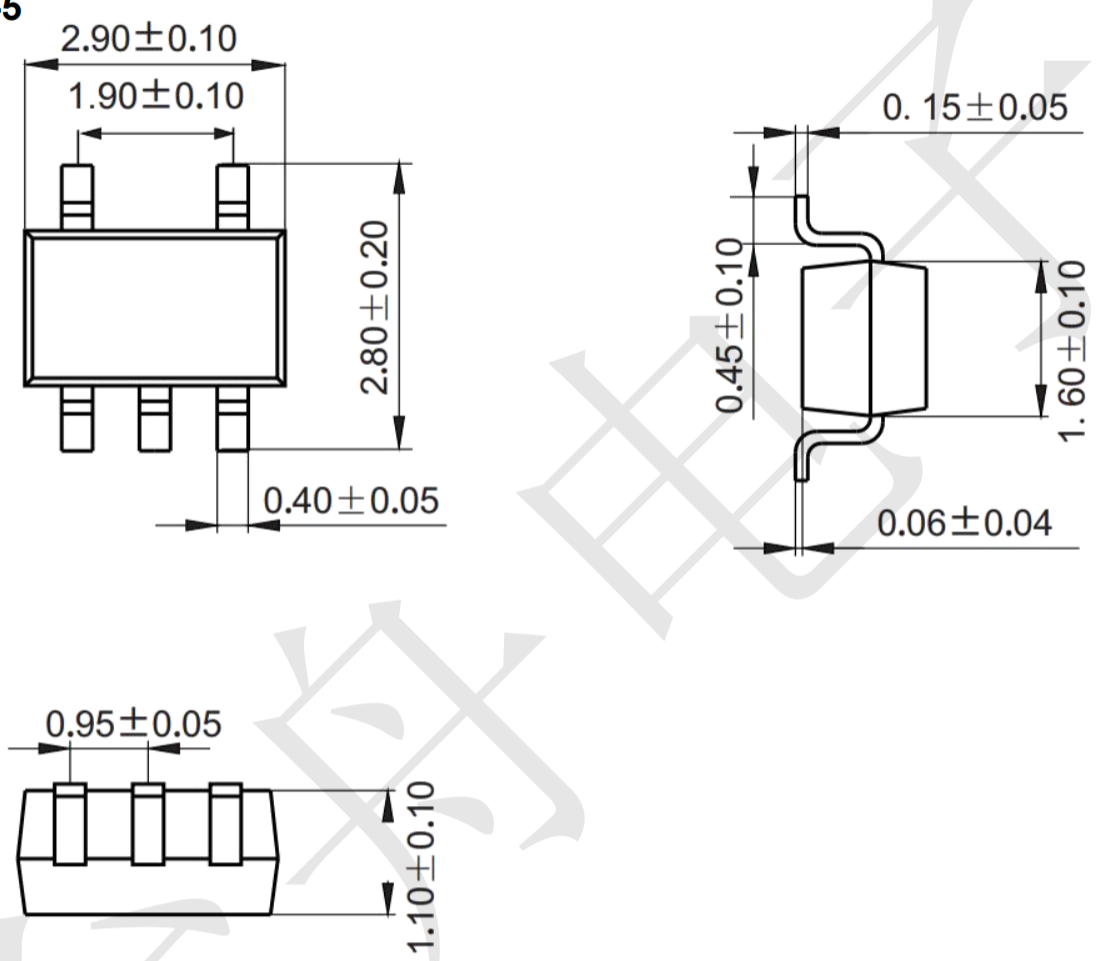
Voltage Waveforms Enable and Disable Times

Notes: 1. C_L includes probe and jig capacitance.

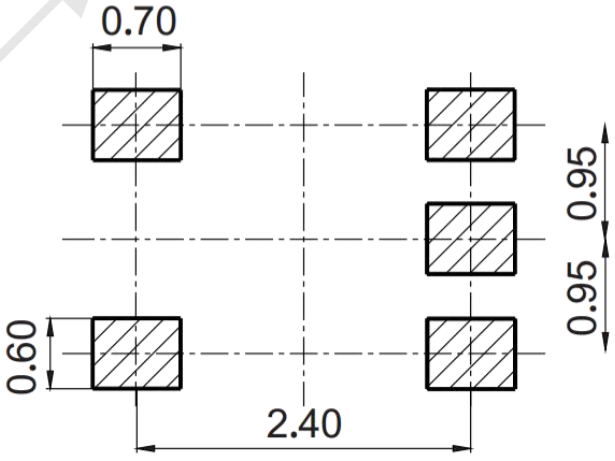
2. All input pulses are supplied by generators having the following characteristics: P_{RR} ≤1MHz, Z_O = 50Ω.

Package information (Unit: mm)

SOT23-5

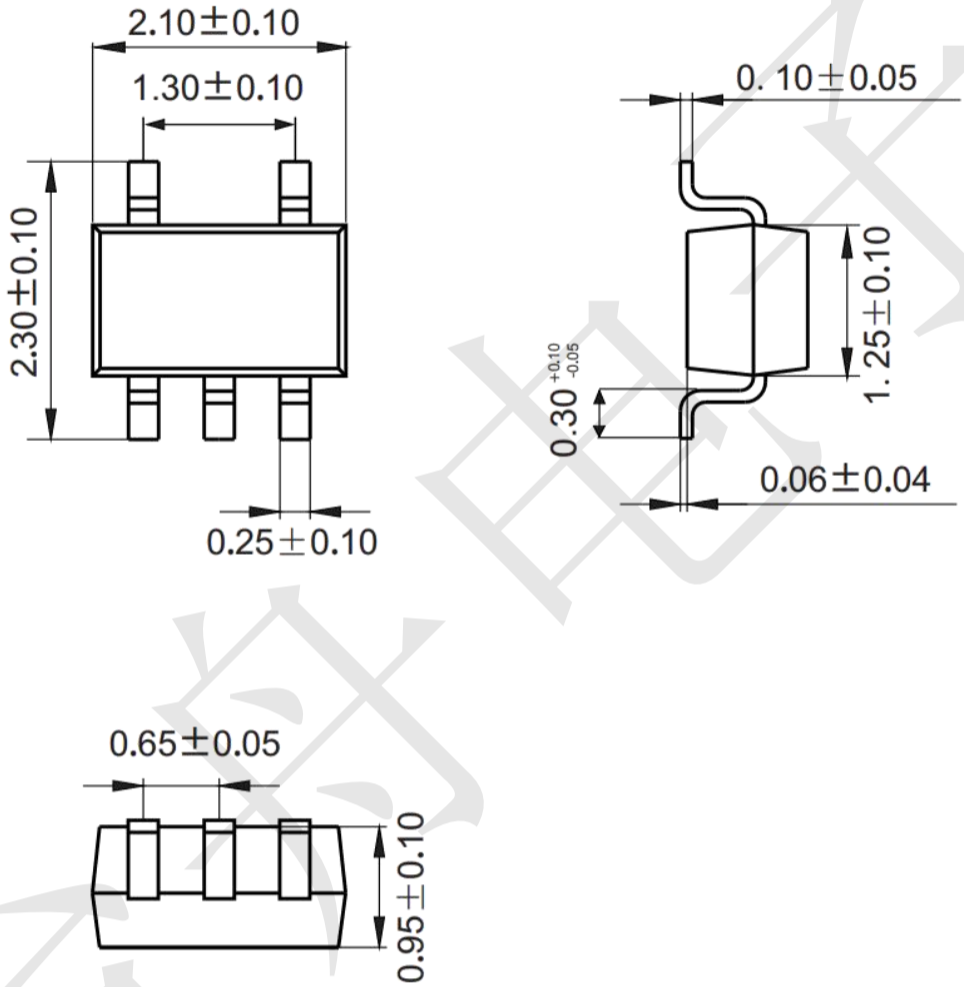
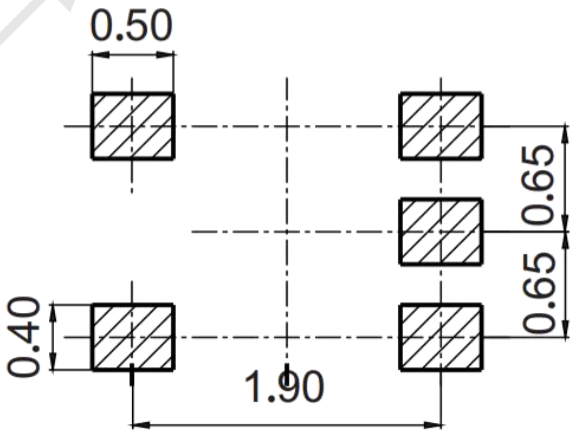


Mounting Pad Layout (Unit: mm)



Package information (Unit: mm)

SOT353



Mounting Pad Layout (Unit: mm)