CL74LV1T08 Single Power Supply 2-Input Positive AND Gate CMOS Logic Level Shifter

General Description

The CL74LV1T08 is a single 2-input AND gate with reduced input thresholds to support voltage translation applications.

Ordering Information

Part Number	Package	
CL74LV1T08	SOT-23-5 SOT-353	

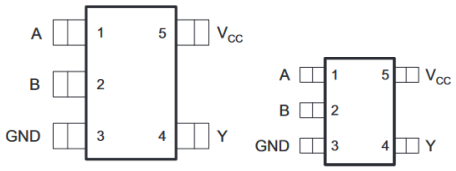
Features

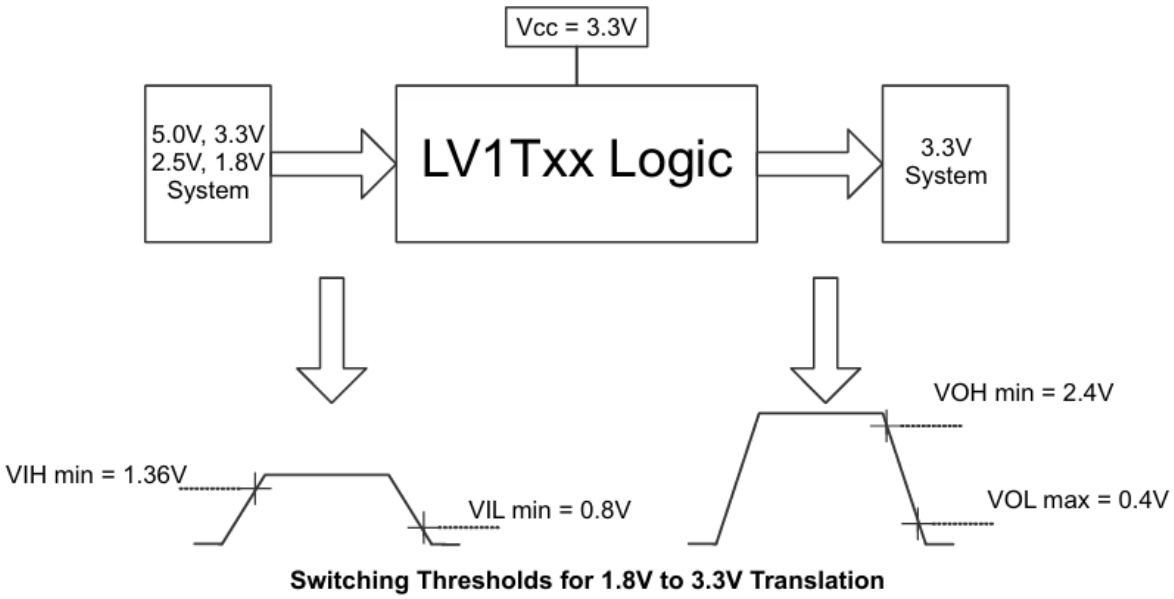
- Single-supply voltage translator at 5.0V, 3.3V, 2.5V, and 1.8V VCC
- Operating range of 1.8V to 5.5V
- Up translation:
  - 1.2V to 1.8V at 1.8V V_{CC}
  - 1.5V to 2.5V at 2.5V V_{CC}
  - 1.8V to 3.3V at 3.3V V_{CC}
  - 3.3V to 5.0V at 5.0V V_{CC}
- Down translation:
  - 3.3V to 1.8V at 1.8V V_{CC}
  - 3.3V to 2.5V at 2.5V V_{CC}
  - 5.0V to 3.3V at 3.3V V_{CC}
- Output drive:
  - 8mA output drive at 5V
  - 7mA output drive at 3.3V
  - 3mA output drive at 1.8V
- Characterized up to 50MHz at 3.3V V_{CC}
- 5V tolerance on input pins
- –40°C to +125°C operating temperature range
- Supports standard logic pinouts

Applications

- Telecom
- Portable applications
- Servers
- PC and notebooks

Pin Configuration





Switching Thresholds for 1.8V to 3.3V Translation

Pin Assignment

Pin Name	Pin No.	Pin Function
A	1	Input
B	2	Input
GND	3	Ground
Y	4	Output
V_{CC}	5	Power pin

Absolute Maximum Ratings (Note1)

- V_{CC} ---------- -0.5V to +7.0V
- V_I ---------- -0.5V to +7.0V
- V_O (Voltage range applied to any output in the high-impedance or power-off state) ---------- -0.5V to +4.6V
- V_O (Voltage range applied to any output in the high or slow state) ---------- -0.5V to V_{CC}+0.5V
- Input clamp current ---------- -20mA
- Output clamp current ---------- ±20mA
- Continuous output current ---------- ±25mA
- Storage Temperature ---------- –65°C to 150°C

Recommended Operating Conditions

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Supply voltage	V_{CC}	Operating	1.6		5.5	V
Input voltage	V_I		0		5.5	V
Output voltage	V_O		0		V_{CC}	V
High- level output current	I_{OH}	V_{CC} = 1.8V			-3	mA
		V_{CC} = 2.5V			-5	
		V_{CC} = 3.3V			-7	
		V_{CC} = 5.0V			-8	
Low- level output current	I_{OL}	V_{CC} = 1.8V			3	mA
		V_{CC} = 2.5V			5	
		V_{CC} = 3.3V			7	
		V_{CC} = 5.0V			8	
Input transition rise or fall rate	△T/△V	V_{CC} = 1.8V			20	ns/V
		V_{CC} = 3.3V or 2.5V			20	
		V_{CC} = 5V			20	
Operating temperature	T_A		-40		125	℃

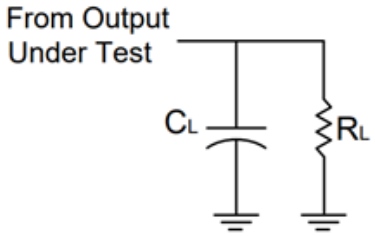
Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
High- level input voltage	V_{IH}	V_{CC} = 1.65~1.8V	0.94			V
		V_{CC} = 2.0V	1.02			
		V_{CC} = 2.25~2.5V	1.135			
		V_{CC} = 2.75V	1.21			
		V_{CC} = 3~3.3V	1.35			
		V_{CC} = 3.6V	1.47			
		V_{CC} = 4.5V~5.0V	2.02			
		V_{CC} = 5.5V	2.1			
Low- level input voltage	V_{IL}	V_{CC} = 1.65~2.0V			0.58	V
		V_{CC} = 2.25~2.75V			0.75	
		V_{CC} = 3~3.6V			0.8	
		V_{CC} = 4.5V~5.5V			0.8	
High- level output voltage	V_{OH}	V_{CC} = 1.65~5.5V, I_{OH}= -20uA	V_{CC}-0.1			V
		V_{CC} = 1.65V, I_{OH}= -2mA	1.28			
		V_{CC} = 1.8V, I_{OH}= -2mA	1.5			
		V_{CC} = 2.3V, I_{OH}= -2.3mA	2.0			
		V_{CC} = 2.3V, I_{OH}= -3mA	2.0			
		V_{CC} = 2.5V, I_{OH}= -3mA	2.25			
		V_{CC} = 3.0V, I_{OH}= -3mA	2.78			
		V_{CC} = 3.0V, I_{OH}= -5.5mA	2.6			
		V_{CC} = 3.3V, I_{OH}= -5.5mA	2.9			
		V_{CC} = 4.5V, I_{OH}= -4mA	4.2			
		V_{CC} = 4.5V, I_{OH}= -8mA	4.1			
		V_{CC} = 5.0V, I_{OH}= -8mA	4.6			
Low- level output voltage	V_{OL}	V_{CC} = 1.65~5.5V, I_{OL}= 20uA			0.1	V
		V_{CC} = 1.65V, I_{OL}= 1.9mA			0.2	
		V_{CC} = 2.3V, I_{OL}= 2.3mA			0.1	
		V_{CC} = 2.3V, I_{OL}= 3mA			0.15	
		V_{CC} = 3V, I_{OL}= 3mA			0.1	
		V_{CC} = 3V, I_{OL}= 5.5mA			0.2	
		V_{CC} = 4.5V, I_{OL}= 4mA			0.15	
		V_{CC} = 4.5V, I_{OL}= 8mA			0.3	
Input leakage current	I_I	V_{IN}= Vcc or GND, V_{CC}= 0~5.5V			0.12	uA
Supply current	I_{CC}	V_{IN}= V_{CC} or GND, I_{OUT}=0, V_{CC}=1.8~5.0V			1	uA
Additional supply current per input pin	$\triangle I_{CC}$	V_{CC}=5.5V, one input at 0.3V or 3.4V, other input at V_{CC} or GND, I_{OUT}=0			1.35	uA
		V_{CC}=1.8V, one input at 0.3V or 1.1V, other input at V_{CC} or GND, I_{OUT}=0			10	

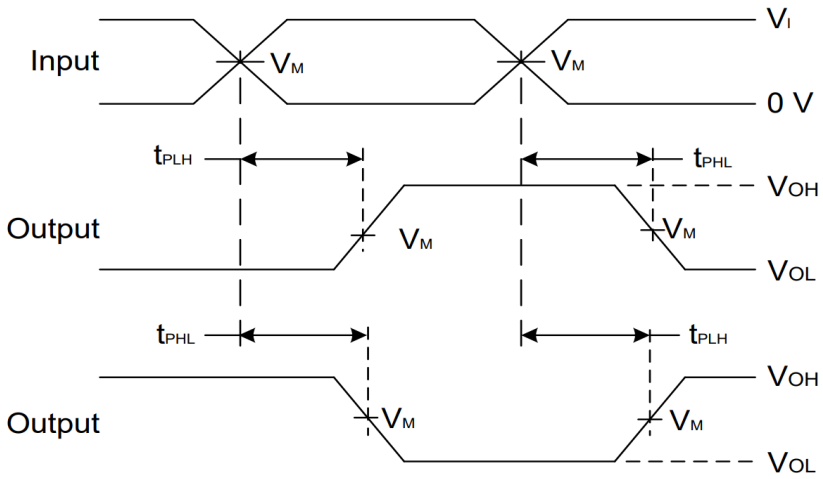
Switching Characteristics

Parameter	Symbol	Test Conditions		Min	Typ	Max	Units
Propagation delay from input(A) to output(Y)	T_{PD}	V_{CC} = 5.0V	C_L=15pF R_L=1MΩ		4	5	ns
		V_{CC} = 3.3V			4.8	5	
		V_{CC} = 2.5V			6	6.5	
		V_{CC} = 1.8V			10.5	11	

Parameter Measurement Information



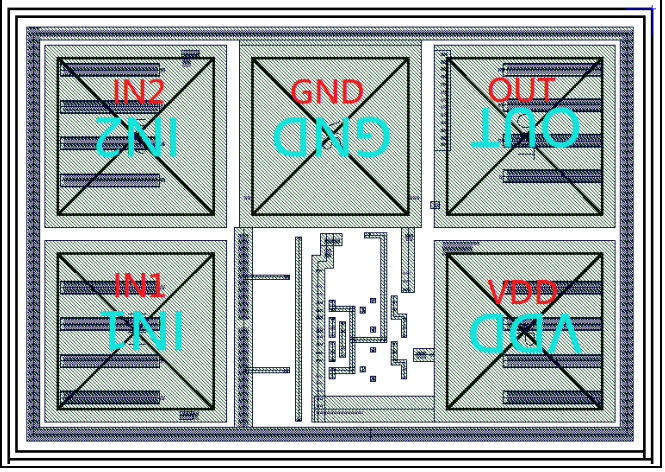
VCC	INPUTS		V_M	C_L	R_L
	V_I	t_r/t_f			
1.8V ± 0.15V	V_{CC}	≦2ns	$V_{CC}/2$	15pF	1MΩ
2.5V ± 0.2V	V_{CC}	≦2ns	$V_{CC}/2$	15pF	1MΩ
3.3V ± 0.3V	3V	≦2.5ns	1.5V	15pF	1MΩ
5V ± 0.5V	V_{CC}	≦2.5ns	$V_{CC}/2$	15pF	1MΩ



Voltage Waveform Propagation Delay Times
Inverting and Non Inverting Outputs

Notes: A. C_L includes probe and jig capacitance
B. All pulses and supplied at pulse repetition rate≦10MHz
C. t_{PLH} and t_{PHL} are the same as t_{PD}

PAD Location and Coordinates

PHYSICAL CHARACTERISTICS		UNIT	CHIP DRAWING
Wafer Size	200	mm	
Die Size (with S/L)	0.308 * 0.233	mm^2	
Scribe line width	60	um	
TOP Metal thickness	3	µm	
Top Metallization	Al-Cu		
Wafer Thickness	726	µm	
CUP (circuit under PAD) or not	YES		
Bonding Wire Diameter	20	um	

PAD NAME	PAD SIZE (µm²)	Coordinate
IN 1	60*60	(49,49)
IN 2	60*60	(49,124)
GND	60*60	(124,124)
OUT (Y)	60*60	(199,124)
VDD	60*60	(199,49)

Bonding Diagram Example