



U74LV1T08

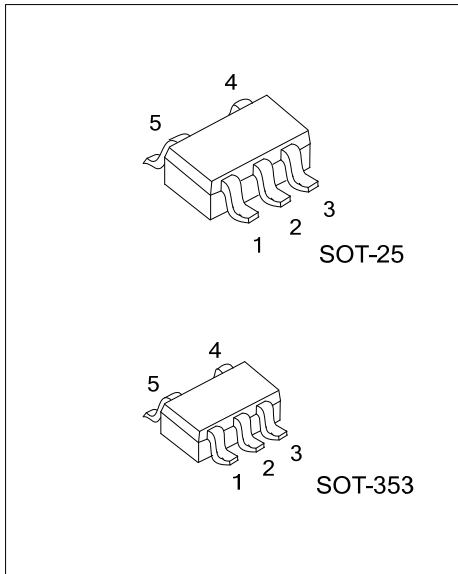
CMOS IC

SINGLE POWER SUPPLY 2-INPUT POSITIVE AND GATE CMOS LOGIC LEVEL SHIFTER

DESCRIPTION

U74LV1T08 is a low voltage CMOS gate logic that operates at a wider voltage range for industrial, portable, telecom, and automotive applications. The output level is referenced to the supply voltage and is able to support 1.8V, 2.5V, 3.3V, 5V CMOS levels.

The input is designed with a lower threshold circuit to match 1.8V input logic at $V_{CC}=3.3V$ and can be used in 1.8V to 3.3V level up translation. In addition, the 5V tolerant input pins enable down translation (e.g. 3.3V to 2.5V output at $V_{CC}=2.5V$). The wide V_{CC} range of 1.8V to 5.5V allows generation of desired output levels to connect to controllers or processors.



FEATURES

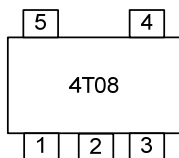
- * Single supply voltage translator at 1.8V, 2.5V, 3.3V and 5.0V
- * Low Power Current: $I_{CC}=10\mu A$ (Max.)
- * $\pm 8mA$ Output Drive ($V_{CC}=5.0V$)

ORDERING INFORMATION

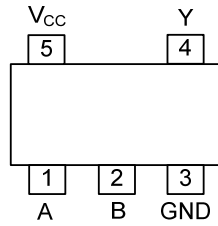
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LV1T08L-AF5-R	U74LV1T08G-AF5-R	SOT-25	Tape Reel
U74LV1T08L-AL5-R	U74LV1T08G-AL5-R	SOT-353	Tape Reel

<p>U74LV1T08G-AF5-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) AF5: SOT-25, AL5: SOT-353 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING



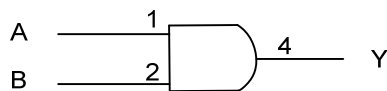
■ PIN CONFIGURATION



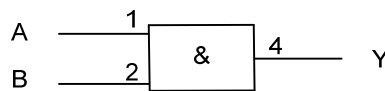
■ FUNCTION TABLE (each gate)

INPUT (Lower Level Input)		OUTPUT (V _{CC} CMOS)
A	B	Y
H	H	H
L	X	L
X	L	L

■ LOGIC DIAGRAM (positive logic)

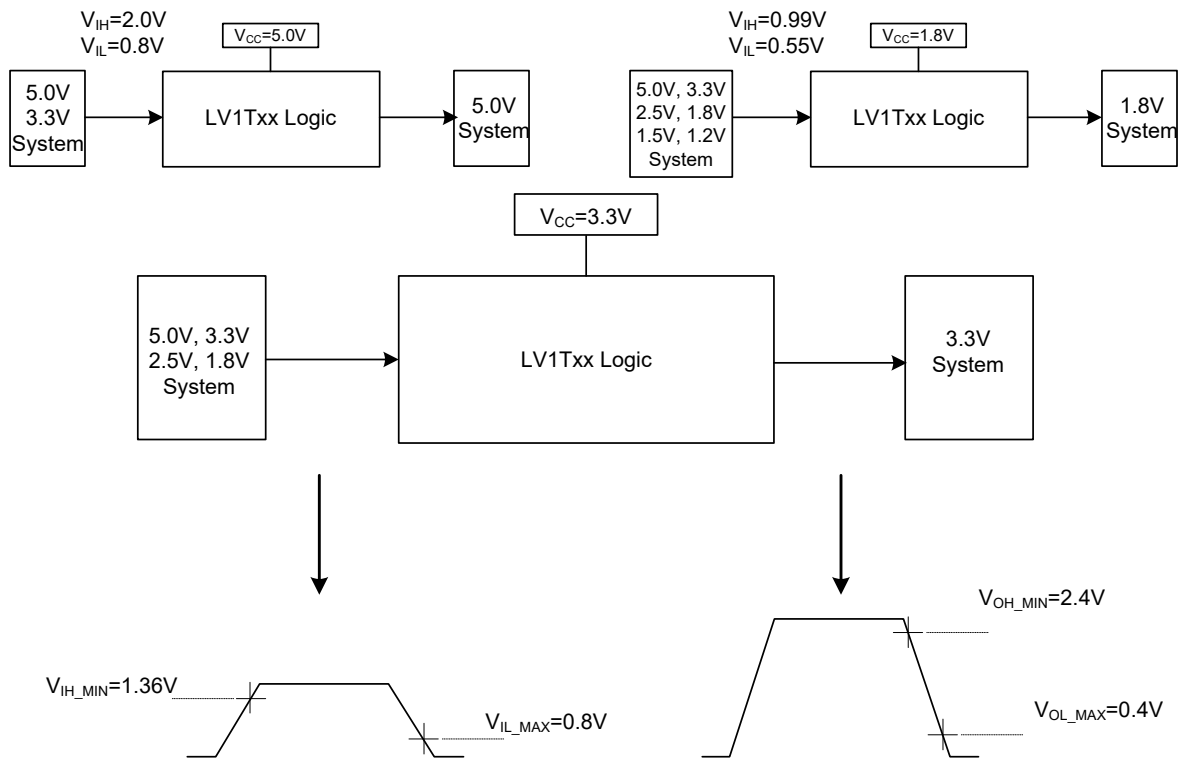


Logic symbol



IEC logic symbol

■ TYPICAL DESIGN EXAMPLES



Switching Thresholds for 1.8V~3.3V Translation

■ ABSOLUTE MAXIMUM RATING ($T_A=25^{\circ}\text{C}$, unless otherwise specified) (Note 2)

PARAMETER	SYMBOL	TEST CONDITIONS	RATINGS	UNIT
Supply Voltage	V_{CC}		-0.5 ~ 7	V
Input Voltage (Note 2)	V_{IN}		-0.5 ~ 7	V
Output Voltage (Note 2)	V_{OUT}	Output HIGH or LOW state	-0.5 ~ $V_{CC}+0.5$	V
		Output in power-off state	-0.5 ~ 4.6	V
Continuous Output Current			± 25	mA
Continuous current through V_{CC} or GND			± 50	mA
Input Clamp Current	I_{IK}	$V_{IN} < 0$	-20	mA
Output Clamp Current	I_{OK}	$V_{OUT} < 0$ or $V_{OUT} > V_{CC}$	± 20	mA
Load Temperature(soldering , 10sec)	T_L		217	$^{\circ}\text{C}$
Junction Temperature	T_J		+150	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}		-65 ~ +150	$^{\circ}\text{C}$

Notes: 1. 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.

2. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}	Operating	1.6		5.5	V
Input Voltage	V_{IN}		0		5.5	V
Output Voltage	V_{OUT}		0		V_{CC}	V
Input Transition Rise or Fall Rate	$\Delta t/\Delta v$	$V_{CC}=1.8\text{V}$			20	ns/V
		$V_{CC}=3.3\text{V}$ or 2.5V			20	ns/V
		$V_{CC}=5\text{V}$			20	ns/V
Operating Temperature	T_A		-40		+125	$^{\circ}\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-25	230	$^{\circ}\text{C}/\text{W}$
	SOT-353	350	$^{\circ}\text{C}/\text{W}$

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
High-Level Input Voltage	V _{IH}	V _{CC} = 1.65V~1.8V	0.94			V	
		V _{CC} = 2.0V	1.02			V	
		V _{CC} = 2.25V~2.5V	1.135			V	
		V _{CC} = 2.75V	1.21			V	
		V _{CC} = 3.0V~3.3V	1.35			V	
		V _{CC} = 3.6V	1.47			V	
		V _{CC} = 4.5V~5.5V	2.02			V	
		V _{CC} = 5.5V	2.1			V	
Low-Level Input Voltage	V _{IL}	V _{CC} = 1.65V~2V			0.58	V	
		V _{CC} = 2.25V~2.75V			0.75	V	
		V _{CC} = 3V~3.6V			0.8	V	
		V _{CC} = 4.5V~5.5V			0.8	V	
High-Level Output Voltage	V _{OH}	V _{CC} = 1.65V ~ 5.5V, I _{OH} = -20μA	V _{CC} -0.1			V	
		V _{CC} = 1.65V	I _{OH} = -2mA	1.28		V	
		V _{CC} = 1.8V		1.5		V	
		V _{CC} = 2.3V	I _{OH} = -2.3mA	2		V	
				I _{OH} = -3mA	2		V
		V _{CC} = 2.5V, I _{OH} = -3mA	2.25		V		
		V _{CC} = 3V	I _{OH} = -3mA	2.78		V	
			I _{OH} = -5.5mA	2.6		V	
		V _{CC} = 3.3V, I _{OH} = -5.5mA	2.9		V		
		V _{CC} = 4.5V	I _{OH} = -4mA	4.2		V	
I _{OH} = -8mA	4.1			V			
V _{CC} = 5V, I _{OH} = -8mA	4.6		V				
Low-Level Output Voltage	V _{OL}	V _{CC} = 1.65V ~ 5.5V, I _{OL} = 20μA			0.1	V	
		V _{CC} = 1.65V, I _{OL} = 1.9mA			0.2	V	
		V _{CC} = 2.3V	I _{OL} = 2.3mA			0.1	V
			I _{OL} = 3mA			0.15	V
		V _{CC} = 3V	I _{OL} = 3mA			0.1	V
			I _{OL} = 5.5mA			0.2	V
		V _{CC} = 4.5V	I _{OL} = 4mA			0.15	V
			I _{OL} = 8mA			0.3	V
Input Leakage Current	I _{I(LEAK)}	V _{CC} = 0V, 1.8V, 2.5V, 3.3V, 5.5V, V _{IN} = 0V or V _{CC}			0.12	μA	
Quiescent Supply Current	I _Q	V _{CC} = 1.8V, 2.5V, 3.3V, 5V, V _{IN} = 0V or V _{CC} , I _O = 0; Open on loading			1	μA	
Additional Quiescent Supply Current	ΔI _Q	V _{CC} = 5.5V, one input at 0.3V or 3.4V, other inputs at 0 or V _{CC} , I _O = 0			1.35	mA	
		V _{CC} = 1.8V, one input at 0.3V or 1.1V, other inputs at 0 or V _{CC} , I _O = 0			10	μA	
Input Capacitance	C _{IN}	V _{CC} = 3.3V, V _{IN} = V _{CC} or GND		2		pF	
Output Capacitance	C _{OUT}	V _{CC} = 3.3V, V _{OUT} = V _{CC} or GND		2.5		pF	

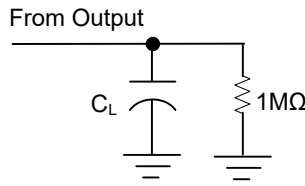
■ DYNAMIC CHARACTERISTICS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Propagation delay from input (Any In) to output(Y)	t _{PLH} /t _{PHL}	C _L =15pF	V _{CC} =1.8V		10.5	11	ns
			V _{CC} =2.5V		6	6.5	ns
			V _{CC} =3.3V		4.8	6	ns
			V _{CC} =5V		4	6	ns
		C _L =30pF	V _{CC} =1.8V		12	13	ns
			V _{CC} =2.5V		6.5	7.5	ns
			V _{CC} =3.3V		5	7	ns
			V _{CC} =5V		5.5	7	ns

■ OPERATING CHARACTERISTICS (f=1MHz & 10MHz, T_A=25°C, unless otherwise specified)

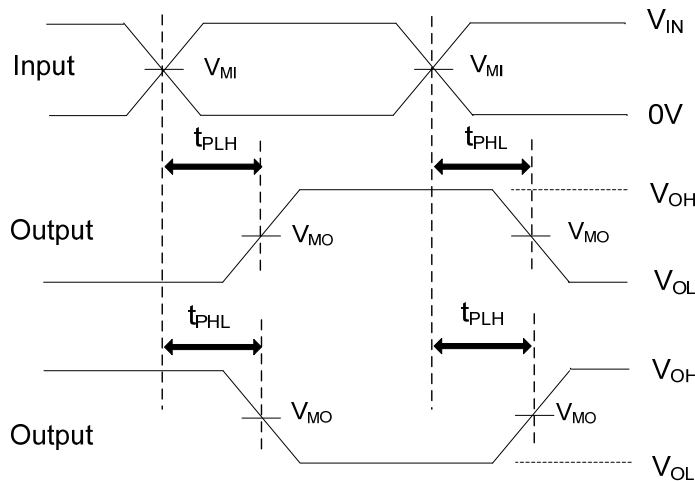
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C _{PD}	V _{CC} =1.8V±0.15V		10		pF
		V _{CC} =2.5V±0.2V		10		pF
		V _{CC} =3.3V±0.3V		10		pF
		V _{CC} =5V±0.5V		10		pF

■ TEST CIRCUIT AND WAVEFORMS



TEST CIRCUIT

	$V_{CC}=1.8V\sim 5V$
C_L	15, 30pF
V_{MI}	$V_I/2$
V_{MO}	$V_{CC}/2$



PROPAGATION DELAY TIMES

- Notes: 1. All input pulses are supplied by generators having the following characteristics: PRR \leq 10MHz, $Z_o=50W$, slew rate \geq 1V/ns.
 2. The outputs are measured one at a time, with one transition per measurement.

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