



U74LV00

CMOS IC

QUADRUPLE 2-INPUT NAND GATE

DESCRIPTION

The **U74LV00** is designed for 2V to 5.5V V_{CC} operation.

The **U74LV00** provides the function $Y=A \cdot B$ or $Y=\overline{A} + \overline{B}$ in positive logic.

The device is fully specified for partial-power-down applications using I_{off} . The I_{off} circuitry disables the outputs, preventing damaging current backflow through the devices when it is powered down.

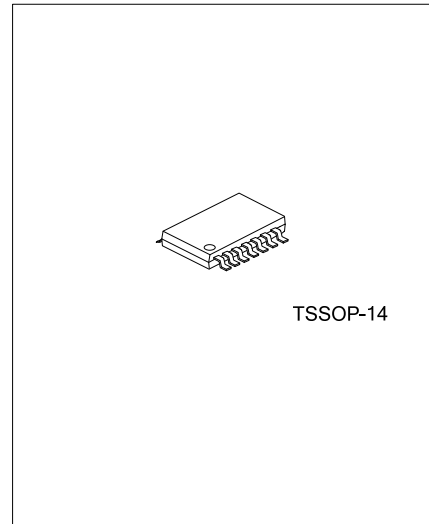
FEATURES

- * 2V to 5.5V V_{CC} Operation
- * Max t_{PD} of 6.5ns at 5V
- * Typical V_{OLP} (Output Ground Bounce) $<0.8V$ at $V_{CC}=3.3V, T_A=25^\circ C$
- * Typical V_{OHV} (output V_{OH} Undershoot) $>2.3V$ at $V_{CC}=3.3V, T_A=25^\circ C$
- * Support Mixed-Mode Voltage Operation on All Ports
- * I_{off} Supports Partial-Power-Down Mode Operation

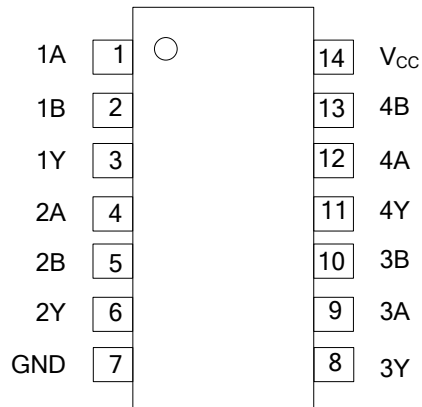
ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LV00L-P14-T	U74LV00G-P14-T	TSSOP-14	Tube
U74LV00L-P14-R	U74LV00G-P14-R	TSSOP-14	Tape Reel

<p>U74LV00L-P14-T</p>	<p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Lead Free</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) P14: TSSOP-14</p> <p>(3) L: Lead Free, G: Halogen Free</p>
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■ PIN CONFIGURATION

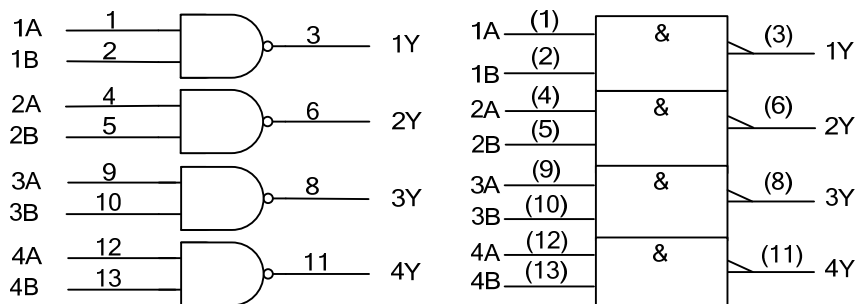


■ FUNCTION TABLE

INPUT(nA)	INPUT(nB)	OUTPUT(nY)
H	H	L
H	L	H
L	H	H
L	L	H

Note: H: HIGH voltage level; L: LOW voltage level.

■ LOGIC DIAGRAM (Positive Logic)



Logic Symbol

IEC Logic Symbol

■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	-0.5 ~ 7	V
Input Voltage range(see note 2)	V_{IN}	-0.5 ~ 7	V
Voltage range applied to any output in the high-impedance or power-off state(see note 2)	V_O	-0.5 ~ 7	V
Output Voltage range(see note 2 and 3)	V_O	-0.5 ~ $V_{CC}+0.5$	V
Continuous current through V_{CC} or GND	I_{CC}	±50	mA
Input Clamp Current ($V_{IN}<0$)	I_{IK}	-20	mA
Output Clamp Current ($V_{OUT}<0$ or $V_{OUT}>V_{CC}$)	I_{OK}	-50	mA
Continuous output current	I_O	±25	mA
Storage temperature ranges	T_{STG}	-65 ~ +150	°C

Note: 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 negative-voltage ratings may be exceeded if the output current ratings are observed.

3. The value is limited to 5.5V maximum.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	113	°C/W

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}	Operating	2		5.5	V
High-Level Input Voltage	V_{IH}	$V_{CC}=2V$	1.5			V
		$V_{CC}=2.3V$ to $2.7V$	$V_{CC}\times 0.7$			
		$V_{CC}=3V$ to $3.6V$	$V_{CC}\times 0.7$			
		$V_{CC}=4.5V$ to $5.5V$	$V_{CC}\times 0.7$			
Low-Level Input Voltage	V_{IL}	$V_{CC}=2V$			0.5	V
		$V_{CC}=2.3V$ to $2.7V$			$V_{CC}\times 0.3$	
		$V_{CC}=3V$ to $3.6V$			$V_{CC}\times 0.3$	
		$V_{CC}=4.5V$ to $5.5V$			$V_{CC}\times 0.3$	
Input Voltage	V_{IN}		0		5.5	V
Output Voltage	V_{OUT}		0		V_{CC}	V
Input transition rise or fall time	$\Delta t/\Delta v$	$V_{CC}=2.3V$ to $2.7V$			200	ns/V
		$V_{CC}=3V$ to $3.6V$			100	
		$V_{CC}=4.5V$ to $5.5V$			20	
Operating free-air Temperature	T_A		-40		85	°C

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

■ 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 to 5.5V, I _{OH} =-50μA	V _{CC} -0.1			V
		V _{CC} =2.3V, I _{OH} =-2mA	2			
		V _{CC} =3V, I _{OH} =-6mA	2.48			
		V _{CC} =4.5V, I _{OH} =-12mA	3.8			
Low-Level Output Voltage	V _{OL}	V _{CC} =2V to 5.5V, I _{OH} =50μA			0.1	V
		V _{CC} =2.3V, I _{OH} =2mA			0.4	
		V _{CC} =3V, I _{OH} =6mA			0.44	
		V _{CC} =4.5V, I _{OH} =12mA			0.55	
Input Leakage Current	I _{I(LEAK)}	V _{IN} =5.5V or GND, V _{CC} =0 to 5.5V			±1	μA
Quiescent Supply Current	I _Q	V _{IN} =V _{CC} or GND, I _{OUT} =0, V _{CC} =5.5V			20	μA
Power OFF Leakage Current	I _{off}	V _{IN} or V _{OUT} =0 to 5.5V			5	μA
Input Capacitance	C _{IN}	V _{IN} =V _{CC} or GND, V _{CC} =3.3V		3.3		pF
		V _{IN} =V _{CC} or GND, V _{CC} =5V		3.3		

■ SWITCHING CHARACTERISTICS (T_A=25°C)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Propagation Delay From Input (nA or nB) To Output(nY)	t _{PD}	V _{CC} =2.5±0.2V	C _L =15pF		7.1	12.9	Ns
			C _L =50pF		9.6	16.6	Ns
		V _{CC} =3.3V±0.3V	C _L =15pF		5	7.9	Ns
			C _L =50pF		6.9	11.4	
		V _{CC} =5±0.5V	C _L =15pF		3.6	5.5	Ns
			C _L =50pF		4.9	7.5	

■ NOISE CHARACTERISTICS (T_A=25°C, V_{CC}=3.3V, C_L=50pF)

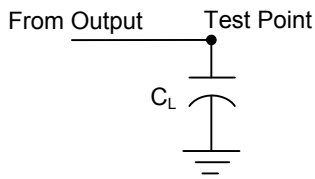
PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Quiet Output, Maximum Dynamic V _{OL}	V _{OL(P)}		0.2	0.8	V
Quiet Output, Minimum Dynamic V _{OL}	V _{OL(V)}		-0.1	-0.8	V
Quiet Output, Minimum Dynamic V _{OH}	V _{OH(V)}		3.1		V
High-Level Dynamic Input Voltage	V _{IH(D)}	2.31			V
Low-Level Dynamic Input Voltage	V _{IL(D)}			0.99	V

Note: Characteristics are for surface-mount packages only.

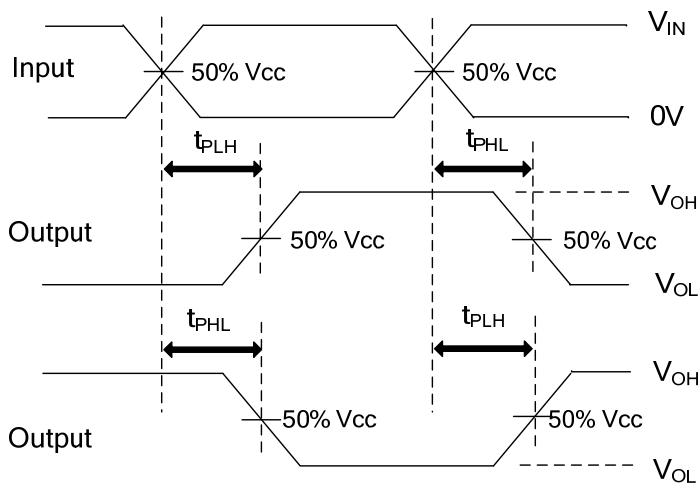
■ OPERATING CHARACTERISTICS (T_A=25°C)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C _{PD}	V _{CC} =3.3V	C _L =50pF, f=10MHz		9.5	pF
		V _{CC} =5V			11	

■ TEST CIRCUIT AND WAVEFORMS



TEST CIRCUIT



PROPAGATION DELAY TIMES

- Note: 1. C_L includes probe and jig capacitance.
 2. All input pulses are supplied by generators having the following characteristics:
 PRR \leq 1MHz, $Z_o=50\Omega$, $t_r \leq 3ns$, $t_f \leq 3ns$

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