



U74LVC86A

CMOS IC

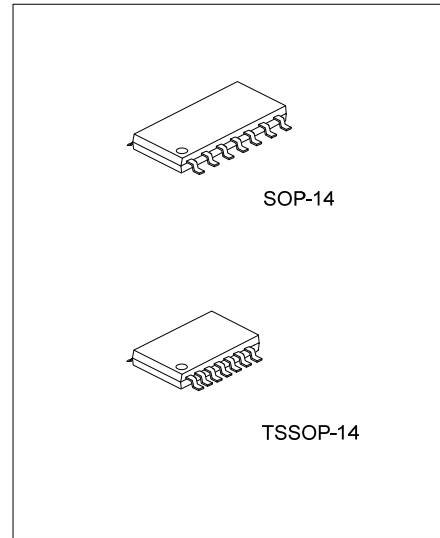
QUAD 2-INPUT EXCLUSIVE OR GATE

DESCRIPTION

The **U74LVC86A** is a quad 2-input exclusive OR gate which performs the function $Y=A \oplus B$ or $Y=\overline{A}B + A\overline{B}$. It is designed for 1.2V to 3.6V operation.

FEATURES

- * Wide supply voltage range from 1.2V to 3.6V
- * Max t_{pd} of 4.6ns at $C_L=50pF$, $V_{CC}=3.3V$
- * Up to 5.5V inputs accept voltages
- * Low power consumption, $I_{CC} = 1 \mu A$ (Max.)
- * Compatible with TTL families

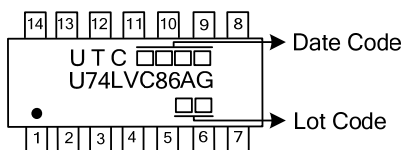


ORDERING INFORMATION

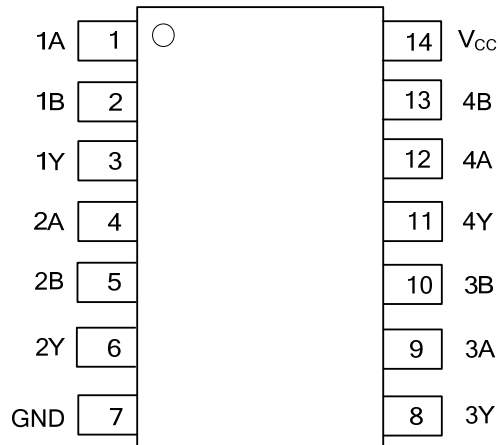
Ordering Number	Package	Packing
U74LVC86AG-S14-R	SOP-14	Tape Reel
U74LVC86AG-P14-R	TSSOP-14	Tape Reel

<p>U74LVC86AG-S14-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) S14: SOP-14, P14: TSSOP-14 (3) G: Halogen Free and Lead Free</p>
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MARKING



■ PIN CONFIGURATION



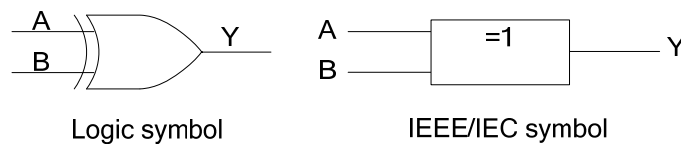
■ F PIN DESCRIPTION

PIN	SYMBOL	FUNCTION
1, 4, 9, 12	1A-4A	Data inputs
2, 5, 10, 13	1B-4B	Data inputs
3, 6, 8, 11	1Y-4Y	Data outputs
7	GND	Ground (0V)
14	V _{cc}	Positive supply voltage

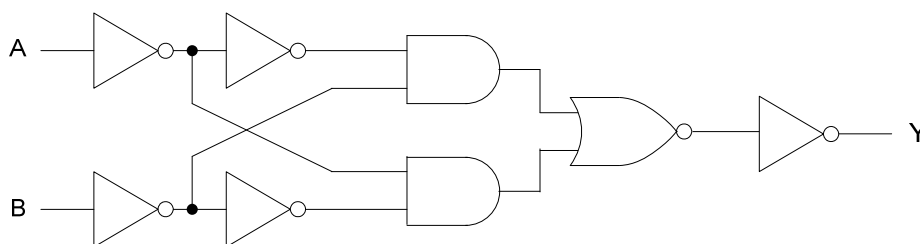
■ FUNCTION TABLE (EACH GATE)

INPUTS		OUTPUT	
A	B	Y	
L	L	L	
L	H	H	
H	L	H	
H	H	L	

■ LOGIC SYMBOL (ONE GATE)



■ LOGIC DIAGRAM (ONE GATE)



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

PARAMETER	SYMBOL	TEST CONDITIONS	UNIT
Supply Voltage	V_{CC}	-0.5 ~ 6.5	V
Input Voltage	V_{IN}	-0.5 ~ 5.5	V
Output Voltage (any output in the high or low state)	V_{OUT}	-0.5 ~ $+V_{CC}+0.5$	V
Input Clamp Current	I_{IK}	-50	mA
Output Clamp Current	I_{OK}	-50	mA
Output Current	I_{OUT}	± 50	mA
V_{CC} or GND Current	I_{CC}	± 100	mA
Power Dissipation	P_D	$T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$ 500	mW
Storage Temperature	T_{STG}	-65 ~ +150	$^\circ\text{C}$

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	RATING	UNIT
Junction to Ambient	θ_{JA}	115	$^\circ\text{C}/\text{W}$

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	MAX	UNIT
Supply Voltage	V_{CC}	Max. speed performance	2.7	3.6	V
		Low-voltage applications	1.2	3.6	
High-Level Input Voltage	V_{IH}	$V_{CC} = 1.2\text{V}$	V_{CC}		V
		$V_{CC} = 1.65\text{V} \sim 1.95\text{V}$	$0.65 \times V_{CC}$		
		$V_{CC} = 2.3\text{V} \sim 2.7\text{V}$	1.7		
		$V_{CC} = 2.7\text{V} \sim 3.6\text{V}$	2.0		
Low-Level Input Voltage	V_{IL}	$V_{CC} = 1.2\text{V}$		GND	V
		$V_{CC} = 1.65\text{V} \sim 1.95\text{V}$		$0.35 \times V_{CC}$	
		$V_{CC} = 2.3\text{V} \sim 2.7\text{V}$		0.7	
		$V_{CC} = 2.7\text{V} \sim 3.6\text{V}$		0.8	
Input Voltage	V_{IN}		0	5.5	V
Output Voltage	V_{OUT}		0	V_{CC}	V
Input Transition Rise or Fall Rate	$\Delta t/\Delta V$	$V_{CC} = 1.2 \sim 2.7\text{V}$		20	ns/V
		$V_{CC} = 2.7 \sim 3.6\text{V}$		10	
Operating Temperature	T_A		-40	+85	$^\circ\text{C}$

■ ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-Level Output Voltage	V_{OH}	$I_{OH} = -100\mu A, V_{CC} = 1.65V \sim 3.6V$ $V_I = V_{IH} \text{ or } V_{IL}$	$V_{CC} - 0.2$			V
		$I_{OH} = -4mA, V_{CC} = 1.65V$ $V_I = V_{IH} \text{ or } V_{IL}$	1.29			
		$I_{OH} = -8mA, V_{CC} = 2.3V$ $V_I = V_{IH} \text{ or } V_{IL}$	1.9			
		$I_{OH} = -12mA, V_{CC} = 2.7V$ $V_I = V_{IH} \text{ or } V_{IL}$	2.2	V_{CC}		
		$I_{OH} = -18mA, V_{CC} = 3.0V$ $V_I = V_{IH} \text{ or } V_{IL}$	2.4			
		$I_{OH} = -24mA, V_{CC} = 3.0V$ $V_I = V_{IH} \text{ or } V_{IL}$	2.3			
Low-Level Output Voltage	V_{OL}	$I_{OH} = 100\mu A, V_{CC} = 1.65V \sim 3.6V$ $V_I = V_{IH} \text{ or } V_{IL}$			0.1	V
		$I_{OH} = 4mA, V_{CC} = 1.65V,$ $V_I = V_{IH} \text{ or } V_{IL}$			0.24	
		$I_{OH} = 8mA, V_{CC} = 2.3V,$ $V_I = V_{IH} \text{ or } V_{IL}$			0.3	
		$I_{OH} = 12mA, V_{CC} = 2.7V,$ $V_I = V_{IH} \text{ or } V_{IL}$			0.4	
		$I_{OH} = 24mA, V_{CC} = 3.0V,$ $V_I = V_{IH} \text{ or } V_{IL}$			0.55	
Input Leakage Current	$I_{I(LEAK)}$	$V_{IN} = 5.5V \text{ or } GND,$ $V_{CC} = 3.6V$		± 0.1	± 1	μA
Quiescent Supply Current	I_{CC}	$V_{IN} = V_{CC} \text{ or } GND, I_{OUT} = 0,$ $V_{CC} = 3.6V$		0.1	1	μA
Additional quiescent Supply Current	ΔI_{CC}	One input at $V_{CC} - 0.6V,$ other inputs at V_{CC} or $GND,$ $I_{OUT} = 0, V_{CC} = 2.7V \sim 3.6V$		5	500	μA
Input Capacitance	C_{IN}	$V_{IN} = V_{CC} \text{ or } GND, V_{CC} = 3.3V$		5.0		pF

Note: 1. All typical values are at $V_{CC} = 3.3V, T_A = 25^\circ C$

■ SWITCHING CHARACTERISTICS

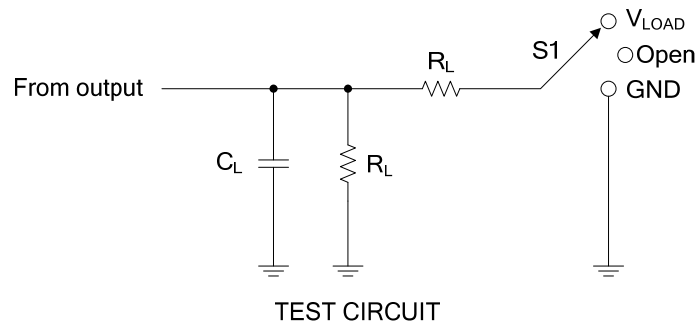
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input (A or B) to output (Y)	t_{PLH}/t_{PHL}	$V_{CC} = 1.2V, C_L = 50 pF, R_L = 500\Omega$		11		ns
		$V_{CC} = 1.8V \pm 0.15V, C_L = 30 pF, R_L = 1K\Omega$	1	4.1	9.4	
		$V_{CC} = 2.5V \pm 0.2V, C_L = 50 pF, R_L = 500\Omega$	1	2.9	7.1	
		$V_{CC} = 2.7V, C_L = 50 pF, R_L = 500\Omega$	1	2.8	5.4	
		$V_{CC} = 3.3 \pm 0.3V, C_L = 30pF, R_L = 500\Omega$	1	2.5	4.4	

Note: 1. All typical values are at $V_{CC} = 3.3V, T_A = 25^\circ C$

■ OPERATING CHARACTERISTICS

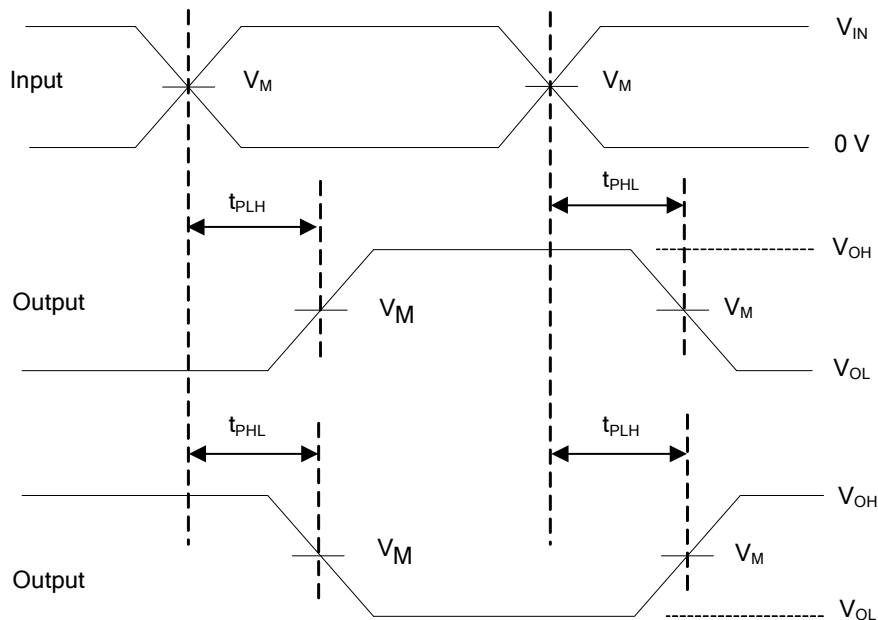
PARAMETER	SYMBOL	TEST CONDITIONS	TYP	UNIT
Power Dissipation Capacitance Per Gate	C_{pd}	$V_{CC} = 3.3V$	28	pF

■ TEST CIRCUIT AND WAVEFORMS



TEST	S1
t_{PLH}/t_{PHL}	Open

V_{CC}	Input		V_M	V_{LOAD}	C_L	R_L
	V_{IN}	t_R, t_F				
1.8V	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	1K Ω
2.5V	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	50pF	500 Ω
2.7V	2.7V	$\leq 2.5ns$	1.5V	6V	50pF	500 Ω
3.3V	3.3V	$\leq 2.5ns$	1.5V	6V	50pF	500 Ω



**Propagation delay times
Inverting and noninverting outputs**

Notes: 1. C_L includes probe and jig capacitance.

2. All input pulses are supplied by generators having the following characteristics: PRR $\leq 10MHz$, $Z_O = 50\Omega$.

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