



U74LVC32A

Preliminary

CMOS IC

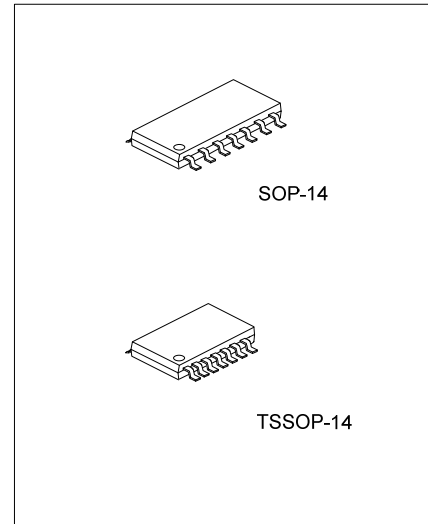
QUAD 2-INPUT POSITIVE-OR GATE

DESCRIPTION

The **U74LVC32A** is a quad 2-input positive-OR gate which performs the function $Y=A+B$ or $Y=\overline{\overline{A} \cdot \overline{B}}$. It is designed for 1.65V to 3.6V operation.

FEATURES

- * Wide supply voltage range from 1.65V to 3.6V
- * Max t_{pd} of 4.4ns at 3.3V
- * Up to 5.5V inputs accept voltages
- * Low power consumption, $I_{CC} = 10 \mu A$ (Max.)
- * ± 24 mA output driver at 3V
- * Typical V_{OLP} (Output Ground Bounce) < 0.8V, $V_{CC} = 3.3 V, T_A = 25 ^\circ C$
- * Typical V_{OHV} (Output V_{OH} undershoot) > 2V, $V_{CC} = 3.3 V, T_A = 25 ^\circ C$

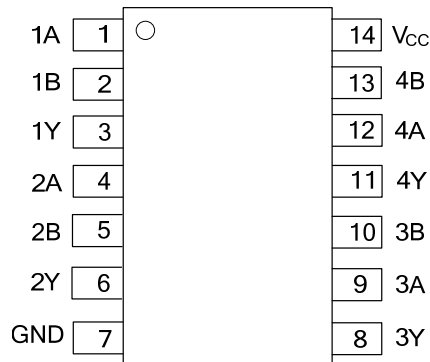


ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVC32AL-S14-R	U74LVC32AG-S14-R	SOP-14	Tape Reel
U74LVC32AL-P14-R	U74LVC32AG-P14-R	TSSOP-14	Tape Reel

<p>U74LVC32AG-P14-R</p> <p>(1) Packing Type (2) Package Type (3) Halogen Free</p>	<p>(1) R: Tape Reel (2) P14: TSSOP-14, S14: SOP-14 (3) G: Halogen Free L: Lead Free</p>
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■ PIN CONFIGURATION



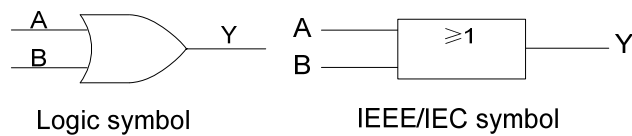
■ PIN DESCRIPTION

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	H

■ LOGIC SYMBOL (one gate)



■ ABSOLUTE MAXIMUM RATING (unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage		V_{CC}	-0.5~6.5	V
Input Voltage		V_{IN}	-0.5~6.5	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	$T_A = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	P_{tot}	500	mW
Storage Temperature		T_{STG}	-65 ~ +150	$^{\circ}\text{C}$

Note: 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	SOP-14	θ_{JA}	127	$^{\circ}\text{C}$
	TSSOP-14		170	$^{\circ}\text{C}$

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}	Operating	1.65		3.6	V
		Data retention only	1.5			
High-Level Input Voltage	V_{IH}	$V_{CC} = 1.65\text{V}$ to 1.95V	$0.65^* V_{CC}$			V
		$V_{CC} = 2.3\text{V}$ to 2.7V	1.7			
		$V_{CC} = 2.7\text{V}$ to 3.6V	2			
Low-Level Input Voltage	V_{IL}	$V_{CC} = 1.65\text{V}$ to 1.95V			$0.35^* V_{CC}$	V
		$V_{CC} = 2.3\text{V}$ to 2.7V			0.7	
		$V_{CC} = 2.7\text{V}$ to 3.6V			0.8	
Input Voltage	V_{IN}		0		5.5	V
Output Voltage	V_{OUT}		0		V_{CC}	V
High-level Output Current	I_{OH}	$V_{CC}=1.65\text{V}$			-4	mA
		$V_{CC}=2.3\text{V}$			-8	
		$V_{CC}=2.7\text{V}$			-12	
		$V_{CC}=3\text{V}$			-24	
Low-level Output Current	I_{OL}	$V_{CC}=1.65\text{V}$			4	mA
		$V_{CC}=2.3\text{V}$			8	
		$V_{CC}=2.7\text{V}$			12	
		$V_{CC}=3\text{V}$			24	
Input Transition Rise or Fall Rate	$\Delta t/\Delta V$		0		7	ns/V
Operating Temperature	T_A		-40		85	$^{\circ}\text{C}$

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP ⁽¹⁾	MAX	UNIT
High-Level Output Voltage	V _{OH}	I _{OH} = -100 μA, V _{CC} = 1.65V to 3.6V	V _{CC} -0.2			V
		I _{OH} = -4 mA, V _{CC} = 1.65V	1.2			
		I _{OH} = -8 mA, V _{CC} = 2.3V	1.7			
		I _{OH} = -12 mA, V _{CC} = 2.7V	2.2			
		I _{OH} = -12 mA, V _{CC} = 3V	2.4			
		I _{OH} = -24 mA, V _{CC} = 3V	2.2			
Low-Level Output Voltage	V _{OL}	I _{OL} = 100 μA, V _{CC} = 1.65V to 3.6V			0.2	V
		I _{OL} = 4 mA, V _{CC} = 1.65V			0.45	
		I _{OL} = 8 mA, V _{CC} = 2.3V			0.7	
		I _{OL} = 12 mA, V _{CC} = 2.7V			0.4	
		I _{OL} = 24 mA, V _{CC} = 3V			0.55	
Input Leakage Current	I _{I(LEAK)}	V _{IN} = 5.5V or GND, V _{CC} = 0 to 3.6V			±5	μA
Quiescent Supply Current	I _{CC}	V _{IN} = V _{CC} or GND, I _{OUT} = 0			10	μA
Additional quiescent Supply Current	Δ I _{CC}	One input at V _{CC} - 0.6V; other inputs at V _{CC} or GND			500	μA
Input Capacitance	C _{IN}	V _{IN} = V _{CC} or GND, V _{CC} =3.3V		5		pF

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

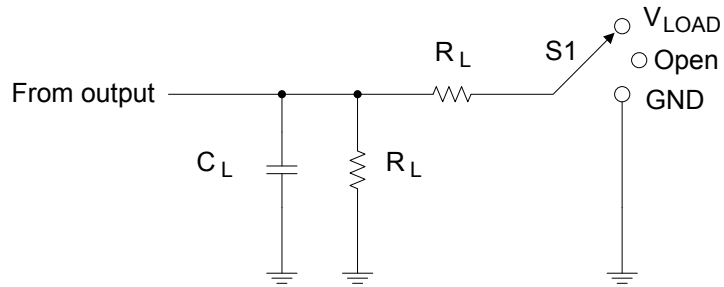
■ SWITCHING CHARACTERISTICS (T_A =25°C)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input (A or B) to output (Y)	t _{PLH} /t _{PHL}	V _{CC} =1.8V±0.15V, C _L =30pF, R _L =1KΩ	1		8.7	ns
		V _{CC} =2.5±0.2V, C _L =30pF, R _L =500Ω	1		5.4	
		V _{CC} =2.7V, C _L =50pF, R _L =500Ω			4.4	
		V _{CC} =3.3±0.3V, C _L =50pF, R _L =500Ω	1.5		3.8	
Skew between any two outputs of the same package switching in the same direction	t _{sk(o)}	V _{CC} =3.3±0.3V, C _L =50pF, R _L =500Ω			1	ns

■ OPERATING CHARACTERISTICS (T_A =25°C)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power dissipation capacitance per gate	C _{pd}	V _{CC} = 1.8V, f=10MHz		7.5		pF
		V _{CC} = 2.5V, f=10MHz		10.6		
		V _{CC} = 3.3V, f=10MHz		12.5		

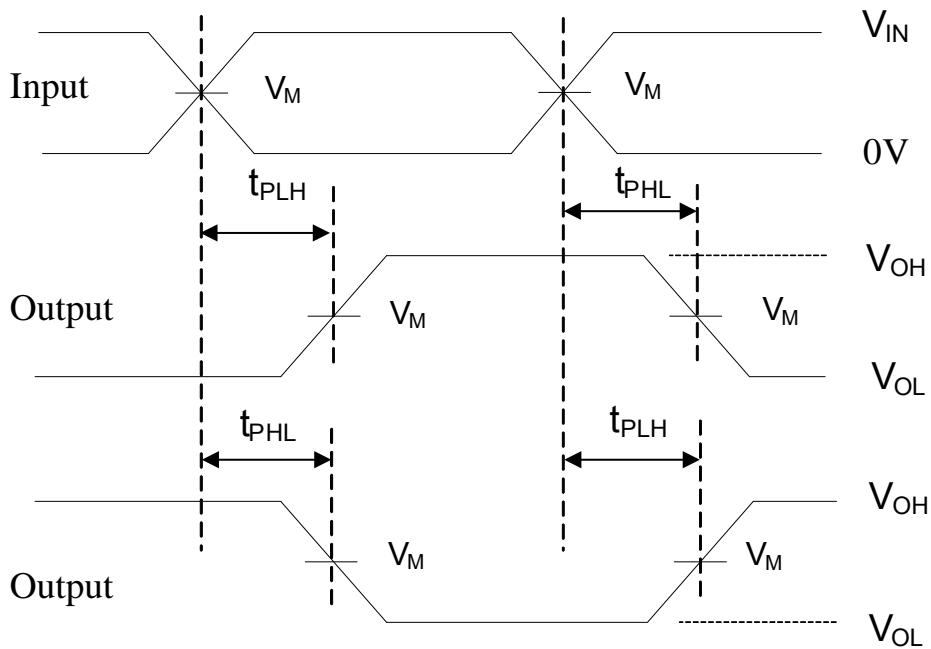
■ TEST CIRCUIT AND WAVEFORMS



TEST CIRCUIT

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

V_{CC}	Inputs		V_M	V_{LOAD}	C_L	R_L
	V_{IN}	t_r, t_f				
$1.8V \pm 0.15V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 * V_{CC}$	30pF	1K Ω
$2.5V \pm 0.2V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 * V_{CC}$	30pF	500 Ω
2.7V	V_{CC}	$\leq 2.5ns$	1.5V	6V	50pF	500 Ω
$3.3V \pm 0.3V$	V_{CC}	$\leq 2.5ns$	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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