



## U74LVC32A

CMOS IC

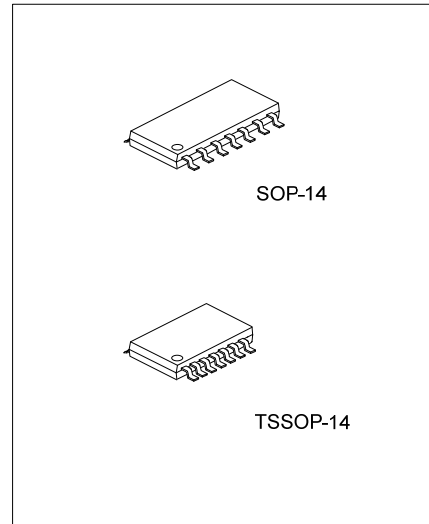
### QUAD 2-INPUT POSITIVE-OR GATE

#### DESCRIPTION

The **U74LVC32A** is a quad 2-input positive-OR gate which performs the function  $Y=A+B$  or  $Y=\overline{A \cdot B}$ . 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.)
- \*  $\pm 24$  mA output driver at 3V
- \* Typical  $V_{OLP}$  (Output Ground Bounce) < 0.8V,  $V_{CC} = 3.3 V, T_A = 25 \text{ }^\circ C$
- \* Typical  $V_{OHV}$  (Output  $V_{OH}$  undershoot) > 2V,  $V_{CC} = 3.3 V, T_A = 25 \text{ }^\circ C$

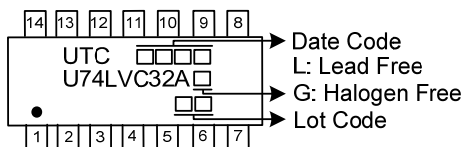


#### ORDERING INFORMATION

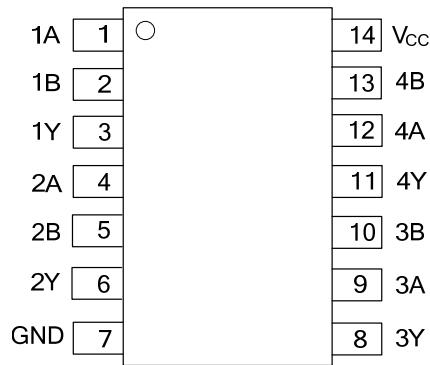
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVC32AL-S14-R	U74LVC32AG-S14-R	SOP-14	Tape Reel
U74LVC32AL-P14-R	U74LVC32AG-P14-R	TSSOP-14	Tape Reel

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



■ PIN CONFIGURATION



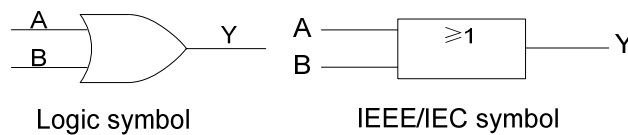
■ PIN DESCRIPTION

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 <sub>CC</sub>	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	$I_{OUT}$	$\pm 50$	mA
$V_{CC}$ or GND Current	$I_{CC}$	$\pm 100$	mA
Power Dissipation	$P_D$	500	mW
Storage Temperature	$T_{STG}$	-65 ~ +150	$^{\circ}C$

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.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	SOP-14	127	$^{\circ}C$
	TSSOP-14	170	$^{\circ}C$

■ 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	$V_{IH}$	$V_{CC}=1.65V$ to $1.95V$	$0.65 \times V_{CC}$			V
		$V_{CC}=2.3V$ to $2.7V$	1.7			
		$V_{CC}=2.7V$ to $3.6V$	2			
Low-Level Input Voltage	$V_{IL}$	$V_{CC}=1.65V$ to $1.95V$			$0.35 \times V_{CC}$	V
		$V_{CC}=2.3V$ to $2.7V$			0.7	
		$V_{CC}=2.7V$ 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	$I_{OH}$	$V_{CC}=1.65V$			-4	mA
		$V_{CC}=2.3V$			-8	
		$V_{CC}=2.7V$			-12	
		$V_{CC}=3V$			-24	
Low-level Output Current	$I_{OL}$	$V_{CC}=1.65V$			4	mA
		$V_{CC}=2.3V$			8	
		$V_{CC}=2.7V$			12	
		$V_{CC}=3V$			24	
Input Transition Rise or Fall Rate	$\Delta t/\Delta V$		0		7	ns/V
Operating Temperature	$T_A$		-40		+85	$^{\circ}C$

■ ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C, unless otherwise specified)

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

Note: 1. All typical values are at V<sub>CC</sub> = 3.3 V, T<sub>A</sub> = 25 °C.

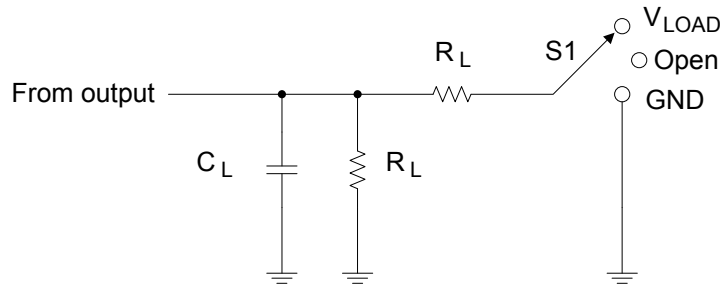
■ SWITCHING CHARACTERISTICS (T<sub>A</sub>=25°C, unless otherwise specified)

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

■ OPERATING CHARACTERISTICS (f=10MHz, T<sub>A</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power dissipation capacitance per gate	C <sub>PD</sub>	V <sub>CC</sub> =1.8V		7.5		pF
		V <sub>CC</sub> =2.5V		10.6		pF
		V <sub>CC</sub> =3.3V		12.5		pF

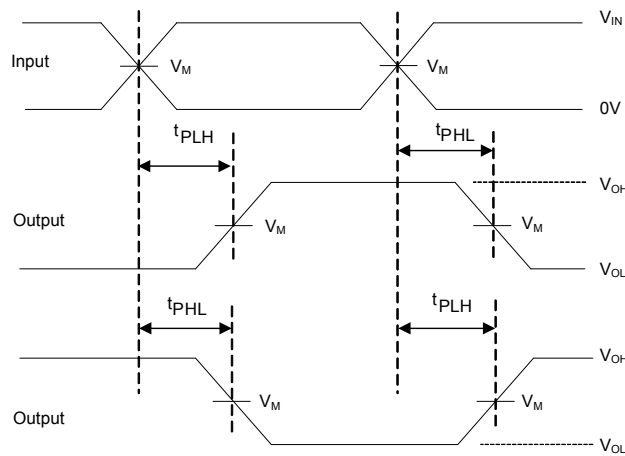
## ■ TEST CIRCUIT AND WAVEFORMS



TEST CIRCUIT

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

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



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  $\leq 10MHz$ ,  $Z_0 = 50\Omega$ .

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