



# U74LVC14A

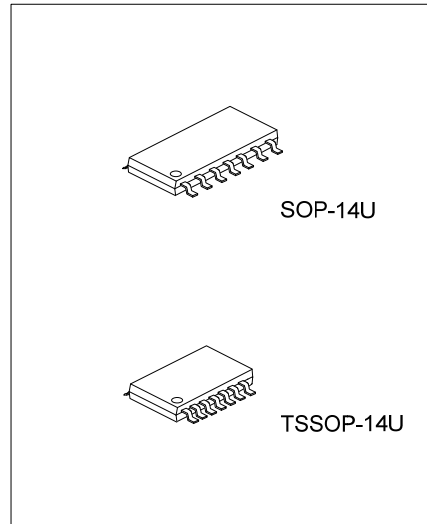
**CMOS IC**

## HEX SCHMITT-TRIGGER INVERTERS

### DESCRIPTION

The **U74LVC14A** devices contain six independent inverters with Schmitt-trigger action which perform the Boolean function  $Y = \overline{A}$  in positive logic.

This device has power-down protective circuit preventing destruction of the device when it is powered down.



### FEATURES

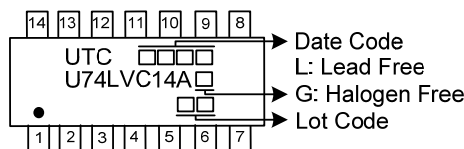
- \* Operate From 1.65V to 3.6V
- \* Inputs Accept Voltages to 5.5V
- \* I<sub>OFF</sub> Supports Partial-Power-Down Mode
- \* Low Power Dissipation
- \* Max t<sub>PD</sub> of 6.4 ns at 3.3V

### ORDERING INFORMATION

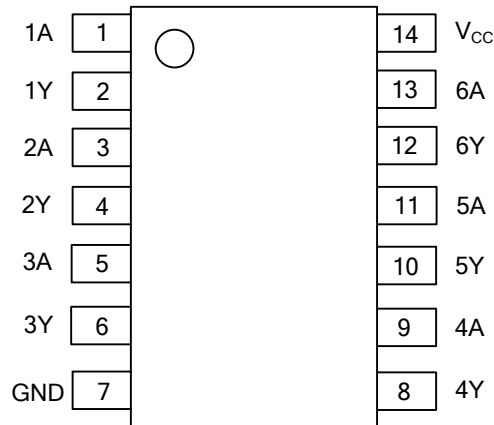
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVC14AL-UEA-R	U74LVC14AG-UEA-R	SOP-14U	Tape Reel
U74LVC14AL-UEB-R	U74LVC14AG-UEB-R	TSSOP-14U	Tape Reel

<p>U74LVC14AG-UEA-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) UEA: SOP-14U, UEB: TSSOP-14U (3) G: Halogen Free and Lead Free, L: Lead Free</p>
--	--

### MARKING



■ PIN CONFIGURATION

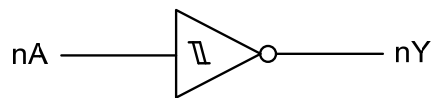


■ FUNCTION TABLE (Each Inverter)

INPUT(A)	OUTPUT(Y)
H	L
L	H

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

■ LOGIC DIAGRAM (Each Inverter)



Logic Symbol

### ■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT	
Supply Voltage	$V_{CC}$	-0.5 ~ +6.5	V	
Input Voltage	$V_{IN}$	-0.5 ~ +6.5	V	
Output Voltage	$V_{OUT}$	-0.5 ~ $V_{CC}+0.5$	V	
$V_{CC}$ or GND Current	$I_{CC}$	±100	mA	
Continuous Output Current ( $V_{OUT}=0$ to $V_{CC}$ )	$I_{OUT}$	±50	mA	
Input Clamp Current ( $V_{IN}<0$ )	$I_{IK}$	-50	mA	
Output Clamp Current ( $V_{OUT}<0$ )	$I_{OK}$	-50	mA	
Power Dissipation ( $T_A=-40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ )	SOP-14U	$P_D$	600	mW
	TSSOP-14U		500	mW
Storage Temperature Range	$T_{STG}$	-65 ~ +150	$^{\circ}\text{C}$	

Note: 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-14U	95	$^{\circ}\text{C/W}$
	TSSOP-14U	115	$^{\circ}\text{C/W}$

### ■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	$V_{CC}$	Operating	1.65		3.6	V
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	mA
		$V_{CC}=2.7\text{V}$			-12	mA
		$V_{CC}=3\text{V}$			-24	mA
Low-level Output Current	$I_{OL}$	$V_{CC}=1.65\text{V}$			4	mA
		$V_{CC}=2.3\text{V}$			8	mA
		$V_{CC}=2.7\text{V}$			12	mA
		$V_{CC}=3\text{V}$			24	mA
Ambient Operating Temperature	$T_A$		-40		+125	$^{\circ}\text{C}$

■ ELECTRICAL CHARACTERISTICS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	TA=25°C			TA=-40~+125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Positive-Going Threshold	V <sub>T+</sub>	V <sub>CC</sub> =1.65V	0.4		1.3	0.4		1.3	V
		V <sub>CC</sub> =1.95V	0.6		1.5	0.6		1.5	V
		V <sub>CC</sub> =2.3V	0.8		1.7	0.8		1.7	V
		V <sub>CC</sub> =2.5V	0.8		1.7	0.8		1.7	V
		V <sub>CC</sub> =2.7V	0.8		2	0.8		2	V
		V <sub>CC</sub> =3V	0.9		2	0.9		2	V
		V <sub>CC</sub> =3.6V	1.1		2	1.1		2	V
Negative-Going Threshold	V <sub>T-</sub>	V <sub>CC</sub> =1.65V	0.15		0.85	0.15		0.85	V
		V <sub>CC</sub> =1.95V	0.25		0.95	0.25		0.95	V
		V <sub>CC</sub> =2.3V	0.4		1.2	0.4		1.2	V
		V <sub>CC</sub> =2.5V	0.4		1.2	0.4		1.2	V
		V <sub>CC</sub> =2.7V	0.4		1.4	0.4		1.4	V
		V <sub>CC</sub> =3V	0.6		1.5	0.6		1.5	V
		V <sub>CC</sub> =3.6V	0.8		1.7	0.8		1.7	V
Hysteresis(V <sub>T+</sub> - V <sub>T-</sub> )	ΔV <sub>T</sub>	V <sub>CC</sub> =1.65V	0.1		1.15	0.1		1.15	V
		V <sub>CC</sub> =1.95V	0.15		1.25	0.15		1.25	V
		V <sub>CC</sub> =2.3V	0.25		1.3	0.25		1.3	V
		V <sub>CC</sub> =2.5V	0.25		1.3	0.25		1.3	V
		V <sub>CC</sub> =2.7V	0.3		1.1	0.3		1.1	V
		V <sub>CC</sub> =3V	0.3		1.2	0.3		1.2	V
		V <sub>CC</sub> =3.6V	0.3		1.2	0.3		1.2	V
High-Level Output Voltage	V <sub>OH</sub>	V <sub>CC</sub> =1.65 ~ 3.6V, I <sub>OH</sub> =-100μA	V <sub>CC</sub> -0.2			V <sub>CC</sub> -0.3			V
		V <sub>CC</sub> =1.65V, I <sub>OH</sub> =-4mA	1.29			1.05			V
		V <sub>CC</sub> =2.3V, I <sub>OH</sub> =-8mA	1.9			1.65			V
		V <sub>CC</sub> =2.7V, I <sub>OH</sub> =-12mA	2.2			2.05			V
		V <sub>CC</sub> =3.0V, I <sub>OH</sub> =-12mA	2.4			2.25			V
		V <sub>CC</sub> =3V, I <sub>OH</sub> =-24mA	2.3			2.0			V
Low-Level Output Voltage	V <sub>OL</sub>	V <sub>CC</sub> =1.65 ~ 3.6V, I <sub>OL</sub> =100μA			0.1			0.3	V
		V <sub>CC</sub> =1.65V, I <sub>OL</sub> =4mA			0.24			0.65	V
		V <sub>CC</sub> =2.3V, I <sub>OL</sub> =8mA			0.3			0.8	V
		V <sub>CC</sub> =2.7V, I <sub>OL</sub> =12mA			0.4			0.6	V
		V <sub>CC</sub> =3.0V, I <sub>OL</sub> =24mA			0.55			0.8	V
Input Leakage Current	I <sub>I(LEAK)</sub>	V <sub>IN</sub> =5.5V or GND, V <sub>CC</sub> =3.6V			±1			±20	μA
Quiescent Supply Current	I <sub>Q</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND, I <sub>OUT</sub> =0, V <sub>CC</sub> =3.6V			1			40	μA
Additional Quiescent Supply Current Per Input Pin	ΔI <sub>Q</sub>	V <sub>CC</sub> =2.7 ~ 3.6V, I <sub>OUT</sub> =0 One input at V <sub>CC</sub> -0.6V, Other inputs at V <sub>CC</sub> or GND			500			5000	μA

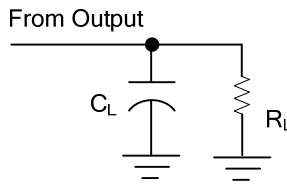
■ SWITCHING CHARACTERISTICS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	TA=25°C			TA=-40~+125°C			UNIT	
			MIN	TYP	MAX	MIN	TYP	MAX		
Propagation Delay From Input (nA) to Output (nY)	t <sub>PLH</sub> / t <sub>PHL</sub>	V <sub>CC</sub> =1.8±0.15V R <sub>L</sub> =1KΩ	C <sub>L</sub> =30pF	1.0	8	14			16	ns
		V <sub>CC</sub> =2.5±0.2V R <sub>L</sub> =500Ω		1.0	6	10			12	ns
		C <sub>L</sub> =50pF	V <sub>CC</sub> =2.7V R <sub>L</sub> =500Ω	1.0	6	10			12	ns
			V <sub>CC</sub> =3.3±0.3V R <sub>L</sub> =500Ω	1.0	5	9			11	ns

■ OPERATING CHARACTERISTICS (TA=25°C, unless otherwise specified)

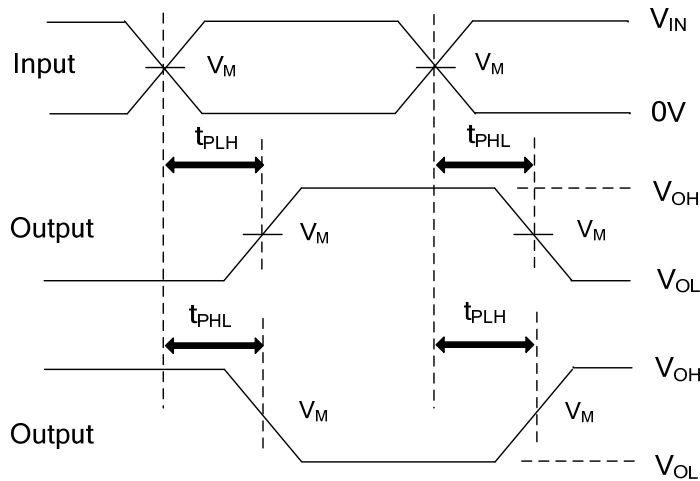
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Input Capacitance	C <sub>IN</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND		5		pF	
Power Dissipation Capacitance Per Inverter	C <sub>PD</sub>	f=10MHz	V <sub>CC</sub> =1.8V		11		pF
			V <sub>CC</sub> =2.5V		12		pF
			V <sub>CC</sub> =3.3V		15		pF

■ TEST CIRCUIT AND WAVEFORMS



TEST CIRCUIT

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



PROPAGATION DELAY TIMES

Notes: 1.  $C_L$  includes probe and jig capacitance.

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

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.