



## 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.

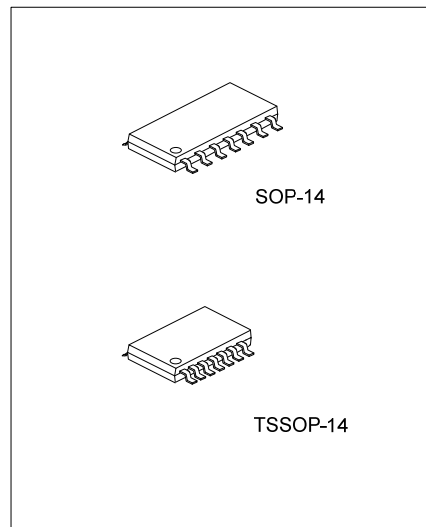
This device has power-down protective circuit preventing destruction of the device when it is powered down.

#### 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

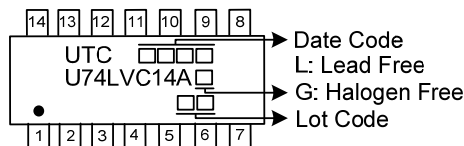
#### ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVC14AL-S14-R	U74LVC14AG-S14-R	SOP-14	Tape Reel
U74LVC14AL-P14-R	U74LVC14AG-P14-R	TSSOP-14	Tape Reel

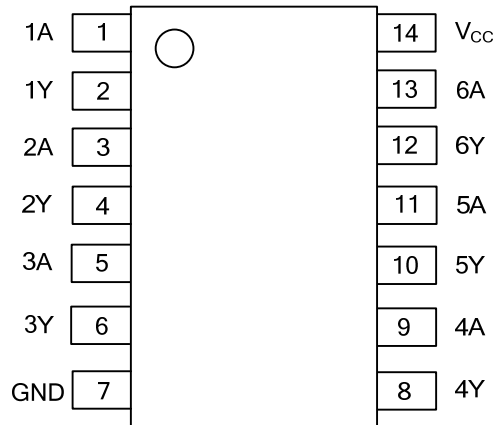


<p>U74LVC14AG-S14-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) P14: TSSOP-14, S14: SOP-14 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



■ PIN CONFIGURATION

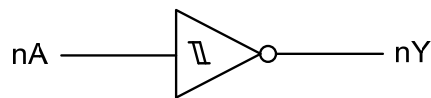


■ FUNCTION TABLE (Each Inverter)

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 $+125^{\circ}\text{C}$ )	TSSOP-14	500	mW
	SOP-14	600	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	TSSOP-14	113	$^{\circ}\text{C}/\text{W}$
	SOP-14	76	$^{\circ}\text{C}/\text{W}$

### ■ 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
Ambient Operating Temperature	$T_{OPR}$		-40		+125	$^{\circ}\text{C}$
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

### ■ ELECTRICAL CHARACTERISTICS ( $T_A=25^{\circ}\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Positive-Going Threshold	$V_{T+}$	$V_{CC}=1.65\text{V}$	0.4		1.3	V
		$V_{CC}=1.95\text{V}$	0.6		1.5	V
		$V_{CC}=2.3\text{V}$	0.8		1.7	V
		$V_{CC}=2.5\text{V}$	0.8		1.7	V
		$V_{CC}=2.7\text{V}$	0.8		2	V
		$V_{CC}=3\text{V}$	0.9		2	V
		$V_{CC}=3.6\text{V}$	1.1		2	V
Negative-Going Threshold	$V_{T-}$	$V_{CC}=1.65\text{V}$	0.15		0.85	V
		$V_{CC}=1.95\text{V}$	0.25		0.95	V
		$V_{CC}=2.3\text{V}$	0.4		1.2	V
		$V_{CC}=2.5\text{V}$	0.4		1.2	V
		$V_{CC}=2.7\text{V}$	0.4		1.4	V
		$V_{CC}=3\text{V}$	0.6		1.5	V
		$V_{CC}=3.6\text{V}$	0.8		1.7	V

## ■ ELECTRICAL CHARACTERISTICS (Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Hysteresis( $V_{T+} - V_{T-}$ )	$\Delta V_T$	$V_{CC}=1.65V$	0.1		1.15	V
		$V_{CC}=1.95V$	0.15		1.25	V
		$V_{CC}=2.3V$	0.25		1.3	V
		$V_{CC}=2.5V$	0.25		1.3	V
		$V_{CC}=2.7V$	0.3		1.1	V
		$V_{CC}=3V$	0.3		1.2	V
		$V_{CC}=3.6V$	0.3		1.2	V
High-Level Output Voltage	$V_{OH}$	$V_{CC}=1.65 \sim 3.6V, I_{OH}=-100\mu A$	$V_{CC}-0.2$			V
		$V_{CC}=1.65V, I_{OH}=-4mA$	1.29			V
		$V_{CC}=2.3V, I_{OH}=-8mA$	1.9			V
		$V_{CC}=2.7V, I_{OH}=-12mA$	2.2			V
		$V_{CC}=3.0V, I_{OH}=-12mA$	2.4			V
		$V_{CC}=3V, I_{OH}=-24mA$	2.3			V
Low-Level Output Voltage	$V_{OL}$	$V_{CC}=1.65 \sim 3.6V, I_{OL}=100\mu A$			0.1	V
		$V_{CC}=1.65V, I_{OL}=4mA$			0.24	V
		$V_{CC}=2.3V, I_{OL}=8mA$			0.3	V
		$V_{CC}=2.7V, I_{OL}=12mA$			0.4	V
		$V_{CC}=3.0V, I_{OL}=24mA$			0.55	V
Input Leakage Current	$I_{I(LEAK)}$	$V_{IN}=5.5V$ or GND, $V_{CC}=3.6V$			$\pm 1$	$\mu A$
Quiescent Supply Current	$I_Q$	$V_{IN}=V_{CC}$ or GND, $I_{OUT}=0, V_{CC}=3.6V$			1	$\mu A$
Additional Quiescent Supply Current Per Input Pin	$\Delta I_Q$	$V_{CC}=2.7 \sim 3.6V, I_{OUT}=0$ One input at $V_{CC}-0.6V$ , Other inputs at $V_{CC}$ or GND			500	$\mu A$
Input Capacitance	$C_{IN}$	$V_{IN}=V_{CC}$ or GND		5		pF

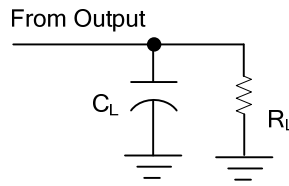
## ■ SWITCHING CHARACTERISTICS ( $T_A=25^\circ C$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input (nA) to output(nY)	$t_{PLH} / t_{PHL}$	$V_{CC}=1.8\pm 0.15V, R_L=1K\Omega, C_L=30pF$	1.0	5	10.5	ns
		$V_{CC}=2.5\pm 0.2V, R_L=500\Omega, C_L=30pF$	1.0	3.4	7.3	ns
		$V_{CC}=2.7V, R_L=500\Omega, C_L=50pF$	1.0	3.6	7.3	ns
		$V_{CC}=3.3\pm 0.3V, R_L=500\Omega, C_L=50pF$	1.0	3.2	6.2	ns

## ■ OPERATING CHARACTERISTICS ( $T_A=25^\circ C$ , unless otherwise specified)

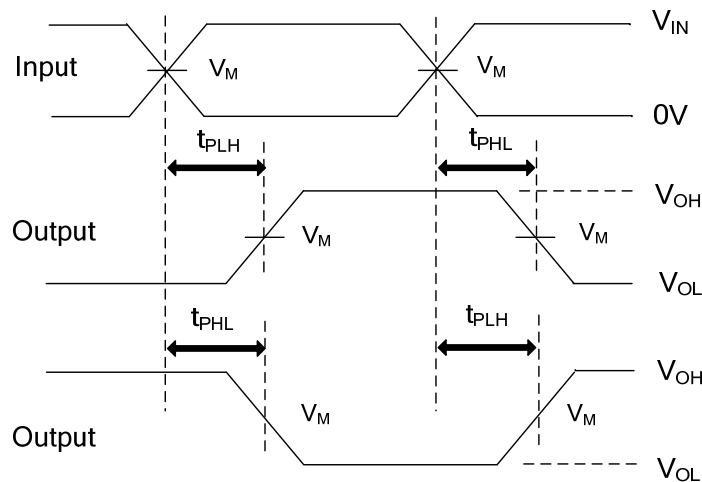
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance Per Inverter	$C_{PD}$	$f=10MHz, V_{CC}=1.8V$		11		pF
		$V_{CC}=2.5V$		12		pF
		$V_{CC}=3.3V$		15		pF

■ 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

Note:  $C_L$  includes probe and jig capacitance.

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

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