



## U74LVC1G14

CMOS IC

### SINGLE SCHMITT-TRIGGER INVERTER

#### DESCRIPTION

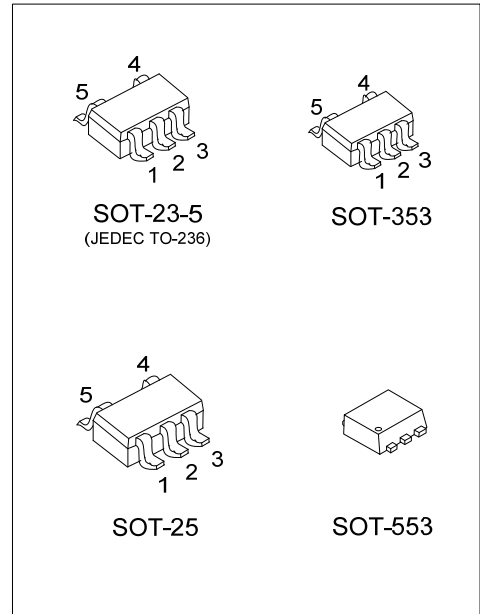
The UTC **U74LVC1G14** is a single Schmitt-trigger inverter, it provides the function  $Y = \overline{A}$ .

The device have different input threshold levels for positive-going ( $V_{T+}$ ) and negative-going ( $V_{T-}$ ) signals because of the Schmitt-trigger action in the input.

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

#### FEATURES

- \* Operation Voltage Range: 1.65V ~ 5.5V
- \* Low Power Current:  $I_{CC}=10\mu A$  (Max.)
- \*  $\pm 24mA$  Output Drive ( $V_{CC}=3.0V$ )
- \* Power Down Protection

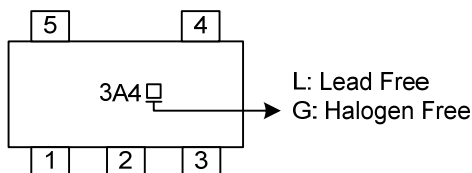


#### ORDERING INFORMATION

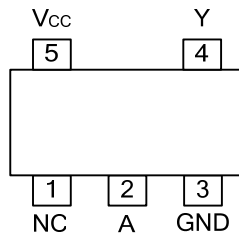
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVC1G14L-AE5-R	U74LVC1G14G-AE5-R	SOT-23-5	Tape Reel
U74LVC1G14L-AF5-R	U74LVC1G14G-AF5-R	SOT-25	Tape Reel
U74LVC1G14L-AL5-R	U74LVC1G14G-AL5-R	SOT-353	Tape Reel
U74LVC1G14L-AN5-R	U74LVC1G14G-AN5-R	SOT-553	Tape Reel

<p>U74LVC1G14G-AE5-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) AE5: SOT-23-5, AF5: SOT-25, AL5: SOT-353 AN5: SOT-553</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



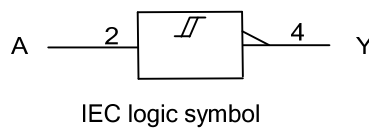
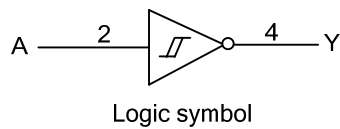
■ PIN CONFIGURATION



■ FUNCTION TABLE (each gate)

INPUT	OUTPUT
A	Y
L	H
H	L

■ LOGIC DIAGRAM



■ ABSOLUTE MAXIMUM RATING (T<sub>A</sub>=25°C, unless otherwise specified) (Note 2)

PARAMETER	SYMBOL	TEST CONDITIONS	RATINGS	UNIT
Supply Voltage	V <sub>CC</sub>		-0.5 ~ 6.5	V
Input Voltage	V <sub>IN</sub>		-0.5 ~ 6.5	V
Output Voltage	V <sub>OUT</sub>	Output in the high or low state	-0.5 ~ V <sub>CC</sub> +0.5	V
		Output in the power-off state	-0.5 ~ 6.5	V
Continuous V <sub>CC</sub> or GND Current	I <sub>CC</sub>		±100	mA
Continuous Output Current	I <sub>OUT</sub>		±50	mA
Input Clamp Current	I <sub>IK</sub>	V <sub>IN</sub> <0	-50	mA
Output Clamp Current	I <sub>OK</sub>	V <sub>OUT</sub> <0	-50	mA
Storage Temperature Range	T <sub>STG</sub>		-65 ~ +150	°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	SOT-23-5	280	°C/W
	SOT-25	230	°C/W
	SOT-353	350	°C/W
	SOT-553	370	°C/W

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V <sub>CC</sub>	Operating	1.65		5.5	V
		Data retention only	1.5			V
Input Voltage	V <sub>IN</sub>		0		5.5	V
Output Voltage	V <sub>OUT</sub>	High or low state	0		V <sub>CC</sub>	V
Ambient Operating Temperature	T <sub>A</sub>		-40		+125	°C

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

PARAMETER	SYMBOL	TEST CONDITIONS	T <sub>A</sub> =25°C			T <sub>A</sub> =-40°C~+125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Positive-Going Input Threshold Voltage	V <sub>T+</sub>	V <sub>CC</sub> =1.65V	0.79		1.16	0.76		1.16	V
		V <sub>CC</sub> =2.3V	1.11		1.56	1.07		1.56	V
		V <sub>CC</sub> =3.0V	1.5		1.87	1.47		1.87	V
		V <sub>CC</sub> =4.5V	2.16		2.74	2.13		2.74	V
		V <sub>CC</sub> =5.5V	2.61		3.33	2.58		3.33	V
Negative-Going Input Threshold Voltage	V <sub>T-</sub>	V <sub>CC</sub> =1.65V	0.39		0.62	0.39		0.65	V
		V <sub>CC</sub> =2.3V	0.58		0.87	0.58		0.9	V
		V <sub>CC</sub> =3.0V	0.84		1.14	0.84		1.17	V
		V <sub>CC</sub> =4.5V	1.41		1.79	1.41		1.82	V
		V <sub>CC</sub> =5.5V	1.87		2.29	1.87		2.31	V
Hysteresis Voltage (V <sub>T+</sub> -V <sub>T-</sub> )	ΔV <sub>T</sub>	V <sub>CC</sub> =1.65V	0.37		0.62	0.3		0.62	V
		V <sub>CC</sub> =2.3V	0.48		0.77	0.42		0.77	V
		V <sub>CC</sub> =3.0V	0.56		0.87	0.5		0.87	V
		V <sub>CC</sub> =4.5V	0.71		1.04	0.65		1.04	V
		V <sub>CC</sub> =5.5V	0.71		1.11	0.65		1.11	V

## ■ ELECTRICAL CHARACTERISTICS (Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	T <sub>A</sub> =25°C			T <sub>A</sub> =-40°C~+125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
High-Level Output Voltage	V <sub>OH</sub>	V <sub>CC</sub> = 1.65V ~ 5.5V, I <sub>OH</sub> = -100μA	V <sub>CC</sub> -0.1			V <sub>CC</sub> -0.1			V
		V <sub>CC</sub> = 1.65V, I <sub>OH</sub> = -4mA	1.2	1.54		0.95			V
		V <sub>CC</sub> = 2.3V, I <sub>OH</sub> = -8mA	1.9	2.15		1.7			V
		V <sub>CC</sub> = 2.7V, I <sub>OH</sub> = -12mA	2.2	2.5		1.9			V
		V <sub>CC</sub> = 3.0V, I <sub>OH</sub> = -24mA	2.3	2.62		2			V
		V <sub>CC</sub> = 4.5V, I <sub>OH</sub> = -32mA	3.8	4.11		3.4			V
Low-Level Output Voltage	V <sub>OL</sub>	V <sub>CC</sub> = 1.65V ~ 5.5V, I <sub>OL</sub> = 100μA			0.1			0.1	V
		V <sub>CC</sub> = 1.65V, I <sub>OL</sub> = 4mA		0.07	0.45			0.7	V
		V <sub>CC</sub> = 2.3V, I <sub>OL</sub> = 8mA		0.12	0.3			0.45	V
		V <sub>CC</sub> = 2.7V, I <sub>OL</sub> = 12mA		0.17	0.4			0.6	V
		V <sub>CC</sub> = 3.0V, I <sub>OL</sub> = 24mA		0.33	0.55			0.8	V
		V <sub>CC</sub> = 4.5V, I <sub>OL</sub> = 32mA		0.39	0.55			0.8	V
Input Leakage Current	I <sub>I(LEAK)</sub>	V <sub>CC</sub> = 0V ~ 5.5V, V <sub>IN</sub> = V <sub>CC</sub> or GND		±0.1	±5			±5	μA
Power OFF Leakage Current	I <sub>OFF</sub>	V <sub>CC</sub> = 0V, V <sub>IN</sub> or V <sub>CC</sub> = 5.5V		±0.1	±10			±10	μA
Quiescent Supply Current	I <sub>Q</sub>	V <sub>CC</sub> = 1.65V ~ 5.5V, V <sub>IN</sub> = 5.5V or GND, I <sub>OUT</sub> = 0		0.1	10			10	μA
Additional Quiescent Supply Current	ΔI <sub>Q</sub>	V <sub>CC</sub> = 2.3~5.5V, One input at V <sub>CC</sub> -0.6V, other inputs at V <sub>CC</sub> or GND		5	500			500	μA

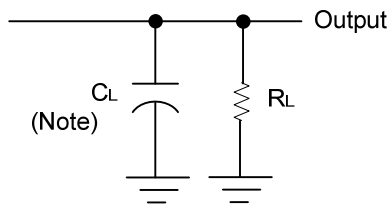
## ■ DYNAMIC CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	T <sub>A</sub> =25°C			T <sub>A</sub> =-40°C~+125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Propagation delay from input (A or B) to output(Y)	t <sub>PLH</sub> / t <sub>PHL</sub>	V <sub>CC</sub> = 1.65~1.95V, C <sub>L</sub> = 30pF, R <sub>L</sub> = 1kΩ	1	8	13			15	ns
		V <sub>CC</sub> = 2.3~2.7V, C <sub>L</sub> = 30pF, R <sub>L</sub> = 500Ω	0.7	5	9			11	ns
		V <sub>CC</sub> = 2.7V, C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω	0.7	5	8			10	ns
		V <sub>CC</sub> = 3.0~3.6V, C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω	0.7	4.5	7			9	ns
		V <sub>CC</sub> = 4.5~5.5V, C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω	0.7	4	6			8	ns

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

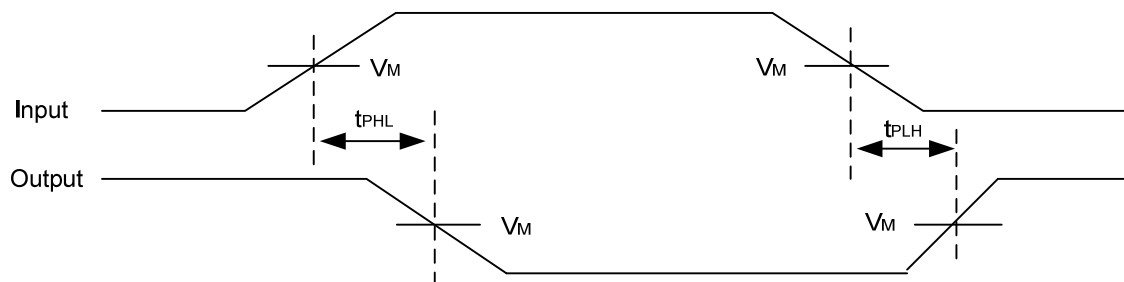
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Capacitance	C <sub>IN</sub>	V <sub>CC</sub> = 3.3V, V <sub>IN</sub> = V <sub>CC</sub> or GND		5		pF
Power Dissipation Capacitance	C <sub>PD</sub>	V <sub>CC</sub> = 3.3V, V <sub>IN</sub> = GND to V <sub>CC</sub>		15.4		pF

■ TEST CIRCUIT AND WAVEFORMS



Note:  $C_L$  includes probe and jig capacitance.

$V_{CC}$	$V_{IN}$	$t_R, t_F$	$V_M$	$C_L$	$R_L$
1.65V~1.95V	$V_{CC}$	$\leq 2\text{ns}$	$\frac{V_{CC}}{2}$	30pF	1k $\Omega$
2.3V~2.7V	$V_{CC}$	$\leq 2\text{ns}$	$\frac{V_{CC}}{2}$	30pF	500 $\Omega$
2.7V	2.7V	$\leq 2.5\text{ns}$	1.5V	50pF	500 $\Omega$
3.0V~3.6V	2.7V	$\leq 2.5\text{ns}$	1.5V	50pF	500 $\Omega$
4.5V~5.5V	$V_{CC}$	$\leq 2.5\text{ns}$	$\frac{V_{CC}}{2}$	50pF	500 $\Omega$



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