



## U74LVC1G14

CMOS IC

### SINGLE SCHMITT-TRIGGER INVERTER

#### DESCRIPTION

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

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

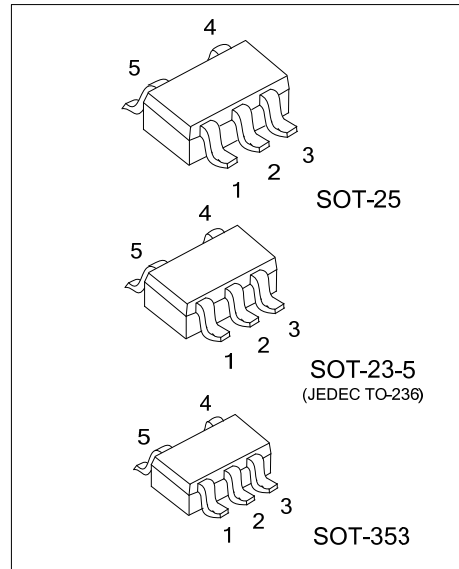
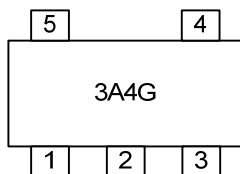
- \* Operation Voltage Range: 1.6V ~ 5.5V
- \* Low Power Current:  $I_{CC}=10\mu A$  (Max.)
- \*  $\pm 24mA$  Output Drive ( $V_{CC}=3.0V$ )
- \* Power Down Protection

#### ORDERING INFORMATION

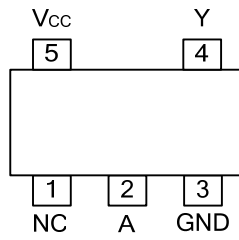
Ordering Number	Package	Packing
U74LVC1G14G-AE5-R	SOT-23-5	Tape Reel
U74LVC1G14G-AF5-R	SOT-25	Tape Reel
U74LVC1G14G-AL5-R	SOT-353	Tape Reel

<p>U74LVC1G14G-AF5-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) AE5: SOT-23-5, AF5: SOT-25, AL5: SOT-353 (3) G: Halogen Free and Lead Free</p>
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#### MARKING



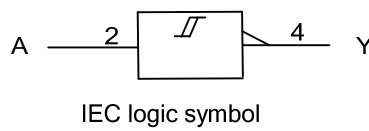
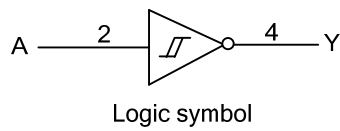
■ PIN CONFIGURATION



■ 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	
	SOT-353	350	

### ■ 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
Input Transition Rise or Fall Rate	Δt/Δv	V <sub>CC</sub> =1.8V±0.15V			20	ns/V
		V <sub>CC</sub> =2.5V±0.2V				
		V <sub>CC</sub> =3.3V±0.3V			10	ns/V
		V <sub>CC</sub> =5V±0.5V			5	ns/V
Operating Temperature	T <sub>A</sub>		-40		125	°C

### ■ ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Positive-Going Input Threshold Voltage	V <sub>T+</sub>	V <sub>CC</sub> =1.65V	0.79		1.16	V
		V <sub>CC</sub> =2.3V	1.11		1.56	V
		V <sub>CC</sub> =3.0V	1.5		1.87	V
		V <sub>CC</sub> =4.5V	2.16		2.74	V
		V <sub>CC</sub> =5.5V	2.61		3.33	V
Negative-Going Input Threshold Voltage	V <sub>T-</sub>	V <sub>CC</sub> =1.65V	0.39		0.62	V
		V <sub>CC</sub> =2.3V	0.58		0.87	V
		V <sub>CC</sub> =3.0V	0.84		1.14	V
		V <sub>CC</sub> =4.5V	1.41		1.79	V
		V <sub>CC</sub> =5.5V	1.87		2.29	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	V
		V <sub>CC</sub> =2.3V	0.48		0.77	V
		V <sub>CC</sub> =3.0V	0.56		0.87	V
		V <sub>CC</sub> =4.5V	0.71		1.04	V
		V <sub>CC</sub> =5.5V	0.71		1.11	V

### ■ ELECTRICAL CHARACTERISTICS (Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
High-Level Output Voltage	$V_{OH}$	$V_{CC}=1.65V \sim 5.5V, I_{OH}=-100\mu A$	$V_{CC}-0.1$			V	
		$V_{CC}=1.65V, I_{OH}=-4mA$	1.2	1.54		V	
		$V_{CC}=2.3V, I_{OH}=-8mA$	1.9	2.15		V	
		$V_{CC}=3.0V$	$I_{OH}=-12mA$	2.2	2.50		V
			$I_{OH}=-24mA$	2.3	2.62		V
		$V_{CC}=4.5V, I_{OH}=-32mA$	3.8	4.11		V	
Low-Level Output Voltage	$V_{OL}$	$V_{CC}=1.65V \sim 5.5V, I_{OL}=100\mu A$			0.1	V	
		$V_{CC}=1.65V, I_{OL}=4mA$		0.07	0.45	V	
		$V_{CC}=2.3V, I_{OL}=8mA$		0.12	0.3	V	
		$V_{CC}=3.0V$	$I_{OL}=-12mA$		0.17	0.4	V
			$I_{OL}=-24mA$		0.33	0.55	V
		$V_{CC}=4.5V, I_{OL}=32mA$		0.39	0.55	V	
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC}=0V \sim 5.5V, V_{IN}=V_{CC}$ or GND		$\pm 0.1$	$\pm 5$	$\mu A$	
Power OFF Leakage Current	$I_{OFF}$	$V_{CC}=0V, V_{IN}$ or $V_{CC}=5.5V$		$\pm 0.1$	$\pm 10$	$\mu A$	
Quiescent Supply Current	$I_q$	$V_{CC}=1.65V \sim 5.5V, V_{IN}=5.5V$ or GND, $I_{OUT}=0$		0.1	10	$\mu A$	
Additional Quiescent Supply Current	$\Delta I_q$	$V_{CC}=2.3\sim 5.5V$ , One input at $V_{CC}-0.6V$ , other inputs at $V_{CC}$ or GND		5	500	$\mu A$	
Input Capacitance	$C_{IN}$	$V_{CC}=3.3V, V_{IN}=V_{CC}$ or GND		5		pF	

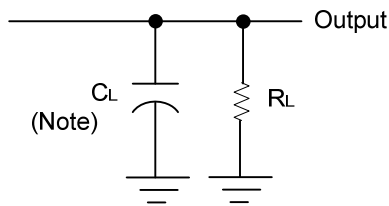
### ■ DYNAMIC CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input (A or B) to output(Y)	$t_{PLH} / t_{PHL}$	$V_{CC}=1.65\sim 1.95V, C_L=30pF, R_L=1k\Omega$	1.0	4.1	11	ns
		$V_{CC}=2.3\sim 2.7V, C_L=30pF, R_L=500\Omega$	0.7	2.8	6.5	ns
		$V_{CC}=2.7V, C_L=50pF, R_L=500\Omega$	0.7	3.2	6.5	ns
		$V_{CC}=3.0\sim 3.6V, C_L=50pF, R_L=500\Omega$	0.7	3.0	5.5	ns
		$V_{CC}=4.5\sim 5.5V, C_L=50pF, R_L=500\Omega$	0.7	2.2	5.0	ns

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

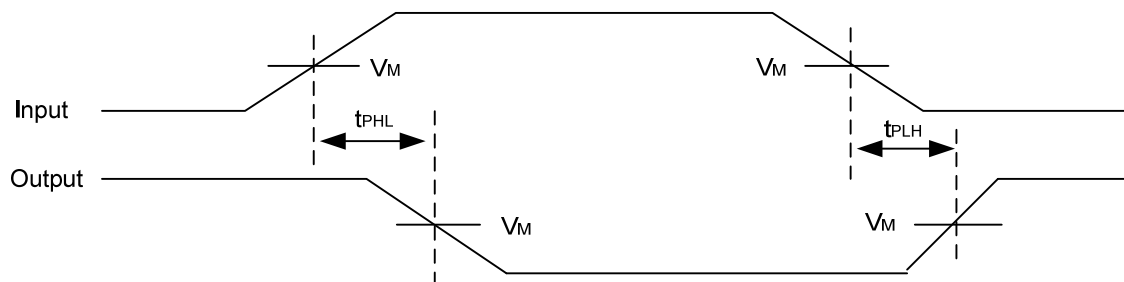
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	$C_{PD}$	$V_{CC}=3.3V, V_{IN}=GND$ to $V_{CC}$		15.4		pF

■ 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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