

## CL74AUP1G14 Low-Power Single Schmitt-Trigger Inverter

### General Description

This single Schmitt-trigger inverter is designed for 0.8-V to 3.6-V  $V_{CC}$  operation.

The CL74AUP1G14 device contains one inverter and performs the Boolean function  $Y = \overline{A}$ . The device functions as an independent inverter with Schmitt-trigger inputs, so the device has different input threshold levels for positive-going ( $V_{T+}$ ) which makes the device tolerant to slow or noisy input signals.

This device is fully specified for partial-power-down applications using  $I_{off}$ . The  $I_{off}$  circuitry disables the outputs when the device is powered down. This inhibits current backflow into the device which prevents damage to the device.

### Ordering Information

Part Number	Package	
CL74AUP1G14	SOT-23-5	
	SOT-25	
	SOT-353	
	SOT-553	
	DFN1X1-4L	

### Features

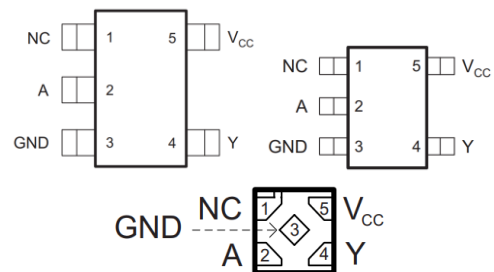
- Available in the Ultra Small DFN1X1
- Inputs Accept Voltages 0.8V to 3.6 V
- Includes Schmitt-Trigger inputs
- Max Tpd of 6.1 ns at 3.3 V
- Low Static-Consumption, 0.9- $\mu$ A Max  $I_{CC}$
- Low Noise Overshoot and Undershoot < 10% of  $V_{CC}$
- $I_{off}$  Supports Live Insertion, Partial-Power-Down Mode, and Back-Drive Protection
- Input Hysteresis Allows Slow Input Transition and Better Switching Noise Immunity at Input ( $V_{hys} = 250\text{mV}$  Typical 3.3V)

- 3.6V I/O Tolerant to Support Mixed-Mode Signal Operation
- Suitable for Point-to-Point Applications
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- ESD Protection Exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
  - 1000-V Charged-Device Model (C101)

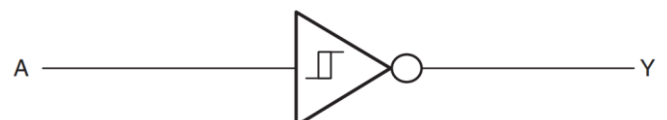
### Applications

- AV Receiver
- Smartphones
- Blu-ray Player and Home Theater
- DVD Recorders and Players
- Desktop or Notebook PCs
- Embedded PCs
- GPS: Personal Navigation Devices
- Mobile Internet Devices
- Portable Media Players
- Smoke Detectors
- Solid State Drive (SSD): Enterprise
- High-Definition (HDTV)

### Pin Configuration



### Simplified Schematic



Pin Name	Pin No.	Pin Function
NC	1	No connect
A	2	Input
GND	3	Ground
Y	4	Output
V <sub>CC</sub>	5	Power pin

**Absolute Maximum Ratings (Note1)**

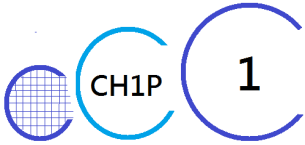
- V<sub>CC</sub> ----- -0.5V to +4.6V
- V<sub>I</sub>----- -0.5V to +4.6V
- V<sub>O</sub>(Voltage range applied to any output in the high-impedance or power-off state)----- -0.3V to +4.6V
- V<sub>O</sub>(Voltage range applied to any output in the high or slow state)----- -0.3V to V<sub>CC</sub>+0.3V
- Input clamp current ----- -50mA
- Output clamp current ----- -50mA
- Continuous output current ----- ±20mA
- Storage Temperature ----- -65°C to 150°C

**Recommended Operating Conditions**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Supply voltage	V <sub>CC</sub>	Operating	0.8		3.6	V
Input voltage	V <sub>I</sub>		0		3.6	V
Output voltage	V <sub>O</sub>		0		V <sub>CC</sub>	V
High- level output current	I <sub>OH</sub>	V <sub>CC</sub> = 0.8V			-20	uA
		V <sub>CC</sub> = 1.1V			-1.1	mA
		V <sub>CC</sub> = 1.4V			-1.7	
		V <sub>CC</sub> = 1.65V			-1.9	
		V <sub>CC</sub> = 2.3V			-3.1	
		V <sub>CC</sub> = 3V			-4	
Low- level output current	I <sub>OL</sub>	V <sub>CC</sub> = 0.8V			20	uA
		V <sub>CC</sub> = 1.1V			1.1	mA
		V <sub>CC</sub> = 1.4V			1.7	
		V <sub>CC</sub> = 1.65V			1.9	
		V <sub>CC</sub> = 2.3V			3.1	
		V <sub>CC</sub> = 3V			4	
Operating temperature	T <sub>A</sub>		-40		85	°C

## Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Positive-going input threshold voltage	$V_{T+}$	$V_{CC} = 0.8V$	0.3		0.6	V
		$V_{CC} = 1.1V$	0.53		0.9	
		$V_{CC} = 1.4V$	0.74		1.11	
		$V_{CC} = 1.65V$	0.91		1.29	
		$V_{CC} = 2.3V$	1.37		1.77	
		$V_{CC} = 3V$	1.88		2.29	
Negative-going input threshold voltage	$V_{T-}$	$V_{CC} = 0.8V$	0.1		0.6	V
		$V_{CC} = 1.1V$	0.26		0.65	
		$V_{CC} = 1.4V$	0.39		0.75	
		$V_{CC} = 1.65V$	0.47		0.84	
		$V_{CC} = 2.3V$	0.69		1.04	
		$V_{CC} = 3V$	0.88		1.24	
Hysteresis voltage	$\Delta V_T$	$V_{CC} = 0.8V$	0.07		0.5	V
		$V_{CC} = 1.1V$	0.08		0.46	
		$V_{CC} = 1.4V$	0.18		0.56	
		$V_{CC} = 1.65V$	0.27		0.66	
		$V_{CC} = 2.3V$	0.53		0.92	
		$V_{CC} = 3V$	0.79		1.31	
High- level output voltage	$V_{OH}$	$V_{CC} = 0.8\sim 3.6V, I_{OH} = -20\mu A$	$V_{CC}-0.1$			V
		$V_{CC} = 1.1V, I_{OH} = -1.1mA$	$0.75 \times V_{CC}$			
		$V_{CC} = 1.4V, I_{OH} = -1.7mA$	1.11			
		$V_{CC} = 1.65V, I_{OH} = -1.9mA$	1.32			
		$V_{CC} = 2.3V, I_{OH} = -2.3mA$	2.05			
		$V_{CC} = 2.3V, I_{OH} = -3.1mA$	1.9			
		$V_{CC} = 3V, I_{OH} = -2.7mA$	2.72			
		$V_{CC} = 3V, I_{OH} = -4mA$	2.6			
Low- level output voltage	$V_{OL}$	$V_{CC} = 0.8\sim 3.6V, I_{OL} = 20\mu A$			0.1	V
		$V_{CC} = 1.1V, I_{OL} = 1.1mA$			$0.3 \times V_{CC}$	
		$V_{CC} = 1.4V, I_{OL} = 1.7mA$			0.31	
		$V_{CC} = 1.65V, I_{OL} = 1.9mA$			0.31	
		$V_{CC} = 2.3V, I_{OL} = 2.3mA$			0.31	
		$V_{CC} = 2.3V, I_{OL} = 3.1mA$			0.44	
		$V_{CC} = 3V, I_{OL} = 2.7mA$			0.31	
		$V_{CC} = 3V, I_{OL} = 4mA$			0.44	
Input leakage current	$I_I$	$V_I = 3.6V$ or GND, $V_{CC} = 0\sim 3.6V$			0.1	$\mu A$
Power off leakage current	$I_{OFF}$	$V_I$ or $V_O = 0V$ to 3.6V, $V_{CC} = 0V$			0.2	$\mu A$
Supply current	$I_{CC}$	$V_I = GND$ or ( $V_{CC}$ to 3.6V), $I_{OUT} = 0$ , $V_{CC} = 0.8\sim 3.6V$			0.5	$\mu A$
Additional supply current per input pin	$\Delta I_{CC}$	$V_I = V_{CC} - 0.6V, I_{OUT} = 0$			40	$\mu A$

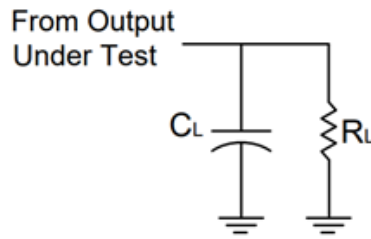


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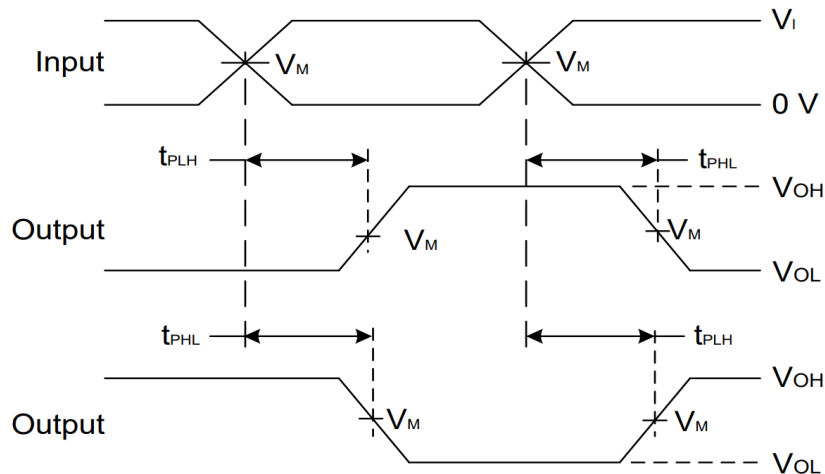
## Switching Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units	
Propagation delay from input(A or B) to output(Y)	T <sub>PD</sub>	V <sub>CC</sub> = 0.8V		20.1		ns	
		V <sub>CC</sub> = 1.2V±0.1V,	C <sub>L</sub> =15pF R <sub>L</sub> =1MΩ	5.5	8.7		14
		V <sub>CC</sub> = 1.5V±0.1V,		4.7	6.7		12.5
		V <sub>CC</sub> = 1.8V±0.15V		4.2	5.6		10.1
		V <sub>CC</sub> = 2.5V±0.2V		3.6	4.5		7.4
		V <sub>CC</sub> = 3.3V±0.3V		3.3	3.9		6.1

## Parameter Measurement Information



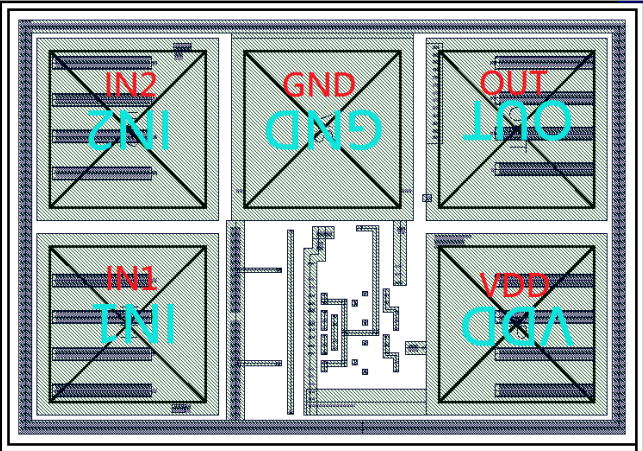
VCC	INPUTS		V <sub>M</sub>	C <sub>L</sub>	R <sub>L</sub>
	V <sub>I</sub>	t <sub>r</sub> /t <sub>f</sub>			
0.8V	V <sub>CC</sub>	≤ 2ns	V <sub>CC</sub> /2	15pF	1MΩ
1.2V ± 0.1V	V <sub>CC</sub>	≤ 2ns	V <sub>CC</sub> /2	15pF	1MΩ
1.5V ± 0.1V	V <sub>CC</sub>	≤ 2ns	V <sub>CC</sub> /2	15pF	1MΩ
1.8V ± 0.15V	V <sub>CC</sub>	≤ 2ns	V <sub>CC</sub> /2	15pF	1MΩ
2.5V ± 0.2V	3V	≤ 2.5ns	1.5V	15pF	1MΩ
3.3V ± 0.3V	V <sub>CC</sub>	≤ 2.5ns	V <sub>CC</sub> /2	15pF	1MΩ



**Voltage Waveform Propagation Delay Times  
Inverting and Non Inverting Outputs**

- Notes:
- A. C<sub>L</sub> includes probe and jig capacitance
  - B. All pulses and supplied at pulse repetition rate ≤ 10MHz
  - C. The Inputs are measured separately one transition per measurement
  - D. t<sub>PLH</sub> and t<sub>PHL</sub> are the same as t<sub>PD</sub>

## PAD Location and Coordinates

PHYSICAL CHARACTERISTICS		UNIT	CHIP DRAWING
Wafer Size	200	mm	
Die Size (with S/L)	0.308 * 0.233	mm <sup>2</sup>	
Scribe line width	60	um	
TOP Metal thickness	3	um	
Top Metallization	Al-Cu		
Wafer Thickness	726	um	
CUP (circuit under PAD) or not	YES		
Bonding Wire Diameter	20	um	

PAD NAME	PAD SIZE (μm <sup>2</sup> )	Coordinate
IN 1	60*60	(49,49)
IN 2	60*60	(49,124)
GND	60*60	(124,124)
OUT (Y)	60*60	(199,124)
VDD	60*60	(199,49)

Bonding Diagram Example

