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SNOS082C - JULY 1998-REVISED APRIL 2013

# 54AC14 Hex Inverter with Schmitt Trigger Input

Check for Samples: 54AC14

## **FEATURES**

- I<sub>CC</sub> Reduced by 50%
- Outputs Source/Sink 24 mA
- Standard Military Drawing (SMD)
  - 54AC14: 5962-87624
- 54AC14 now Qualified to 300Krad RHA Designation, Refer to the SMD for More Information

## DESCRIPTION

The 'AC14 contains six inverter gates each with a Schmitt trigger input. The 'AC14 contains six logic inverters which accept standard CMOS input signals and provide standard CMOS output levels. They are capable of transforming slowly changing input signals into sharply defined, jitter-free output signals. In addition, they have a greater noise margin than conventional inverters.

The 'AC14 has hysteresis between the positive-going and negative-going input thresholds (typically 1.0V) which is determined internally by transistor ratios and is essentially insensitive to temperature and supply voltage variations.

## **Logic Symbol**

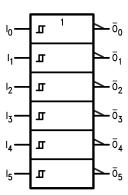


Figure 1. IEEE/IEC

**Table 1. Function Table** 

Input	Output
Α	ō
L	Н
Н	L



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### **Connection Diagrams**

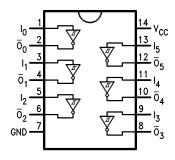


Figure 2. 14-Pin CDIP or CLGA See J or NAD0014B Package

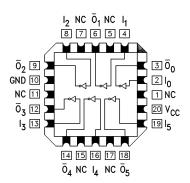


Figure 3. 20-Pin LCCC See NAJ0020A Package

Pin Names	Description
In	Inputs
$\overline{O}_n$	Outputs



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

## **Absolute Maximum Ratings**(1)(2)

Supply Voltage (V <sub>CC</sub> )		−0.5V to +7.0V
	V <sub>I</sub> = −0.5V	−20 mA
DC Input Diode Current (I <sub>IK</sub> )	$V_I = V_{CC} + 0.5V$	+20 mA
DC Input Voltage (V <sub>I</sub> )		-0.5V to V <sub>CC</sub> + 0.5V
DC Output Diode Current (I <sub>OK</sub> )	$V_{O} = -0.5V$	−20 mA
	$V_O = V_{CC} + 0.5V$	+20 mA
DC Output Voltage (V <sub>O</sub> )		-0.5V to V <sub>CC</sub> + 0.5V
DC Output Source or Sink Current (I <sub>O</sub> )		±50 mA
DC V <sub>CC</sub> or Ground Current per Output Pin (I <sub>CC</sub> or I <sub>C</sub>	GND)	±50 mA
Storage Temperature (T <sub>STG</sub> )		−65°C to +150°C
Junction Temperature (T <sub>J</sub> )	CDIP	175°C

- (1) Absolute Maximum Ratings are those values beyond which damage to the device may occur. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. TI does not recommend operation of FACT™ circuits outside databook specifications.
- (2) If Military/Aerospace specified devices are required, please contact the Texas Instruments Sales Office/Distributors for availability and specifications.

**Recommended Operating Conditions** 

Supply Voltage (V <sub>CC</sub> )	'AC	2.0V to 6.0V
Input Voltage (V <sub>I</sub> )		0V to V <sub>CC</sub>
Output Voltage (V <sub>O</sub> )		0V to V <sub>CC</sub>
Operating Temperature (T <sub>A</sub> )	54AC	−55°C to +125°C

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## **DC Characteristics for 'AC Family Devices**

	Parameter		54AC			
Symbol		V <sub>CC</sub> (V)	T <sub>A</sub> = -55°C to +125°C	Units	Conditions	
			Ensured Limits			
V <sub>OH</sub>	Minimum High Level Output Voltage	3.0	2.9		I <sub>OUT</sub> = -50 μA	
		4.5	4.4	V		
		5.5	5.4			
					$V_{IN} = V_{IL} \text{ or } V_{IH}^{(1)}$	
		3.0	2.4		−12 mA	
		4.5	3.7	V	I <sub>OH</sub> -24 mA	
		5.5	4.7		−24 mA	
V <sub>OL</sub>	Maximum Low Level Output Voltage	3.0	0.1		I <sub>OUT</sub> = 50 μA	
		4.5	0.1	V		
		5.5	0.1			
					$V_{IN} = V_{IL} \text{ or } V_{IH}^{(1)}$	
		3.0	0.5		12 mA	
		4.5	0.5	V	I <sub>OL</sub> 24 mA	
		5.5	0.5		24 mA	
I <sub>IN</sub>	Maximum Input	5.5	±1.0	μA	V <sub>I</sub> = V <sub>CC</sub> , GND	
	Leakage Current					
$V_{t+}$	Maximum Positive	3.0	2.2		T <sub>A</sub> = Worst Case	
	Threshold	4.5	3.2	V		
		5.5	3.9			
$V_{t-}$	Minimum Negative	3.0	0.5		T <sub>A</sub> = Worst Case	
	Threshold	4.5	0.9	V		
		5.5	1.1			
$V_{h(max)}$	Maximum Hysteresis	3.0	1.2		T <sub>A</sub> = Worst Case	
		4.5	1.4	V		
		5.5	1.6			
$V_{h(min)}$	Minimum Hysteresis	3.0	0.3		T <sub>A</sub> = Worst Case	
		4.5	0.4	V		
		5.5	0.5			
I <sub>OLD</sub>	Minimum Dynamic Output Current (2)	5.5	50	mA	V <sub>OLD</sub> = 1.65V Max	
I <sub>OHD</sub>		5.5	<b>-</b> 50	mA	V <sub>OHD</sub> = 3.85V Min	
I <sub>CC</sub>	Maximum Quiescent	5.5	40.0	μA	$V_{IN} = V_{CC}$	
	Supply Current				or GND	

<sup>(1)</sup> All outputs loaded; thresholds on input associated with output under test.(2) Maximum test duration 2.0 ms, one output loaded at a time.

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## **AC Electrical Characteristics**

See for waveforms

	Parameter		54AC T <sub>A</sub> = -55°C to +125°C, C <sub>L</sub> = 50 pF		Units	Fig. No.
Symbol		V <sub>CC</sub> (V) <sup>(1)</sup>				
			Min	Max		
t <sub>PLH</sub>	Propagation Delay	3.3	1.0	16.0	ns	
		5.0	1.0	12.0		
t <sub>PHL</sub>	Propagation Delay	3.3	1.0	14.0	ns	
		5.0	1.5	10.0		

<sup>(1)</sup> Voltage Range 3.3 is 3.3V  $\pm 0.3$ V. Voltage Range 5.0 is 5.0V  $\pm 0.5$ V.

Table 2. Capacitance

Symbol	Parameter	Тур	Units	Conditions
C <sub>IN</sub>	Input Capacitance	4.5	pF	V <sub>CC</sub> = OPEN
C <sub>PD</sub>	Power Dissipation Capacitance	25.0	pF	$V_{CC} = 5.0V$

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## **REVISION HISTORY**

Cł	hanges from Revision B (April 2013) to Revision C	Page
•	Changed layout of National Data Sheet to TI format	4

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