









SN54AHCT14, SN74AHCT14

## SCLS246T - OCTOBER 1995 - REVISED OCTOBER 2023

# **SNx4AHCT14 Hex Schmitt-Trigger Inverters**

#### 1 Features

- Inputs are TTL-voltage compatible
- Latch-up performance exceeds 250 mA per JESD
- ESD protection exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
  - 200-V Machine Model (A115-A)
  - 1000-V Charged-Device Model (C101)
- On products compliant to MIL-PRF-38535, all parameters are tested unless otherwise noted. On all other products, production processing does not necessarily include testing of all parameters.

## 2 Applications

- Servers
- **Network switches**
- Telecom infrastructures
- Tests and measurements

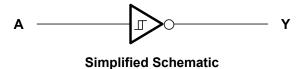
## 3 Description

The SNx4AHCT14 devices contain six independent inverters. These devices perform the Boolean function  $Y = \overline{A}$ 

#### **Device Information**

PART NUMBER	RATING	PACKAGE <sup>(1)</sup>
		J (CDIP, 14)
SN54AHCT14	Military	W (CFP, 14)
		FK (LCCC, 20)
		D (SOIC, 14)
		DB (SSOP, 14)
		DGV (TVSOP, 14)
CNIZAALIOTAA	Communicat	N (PDIP, 14)
SN74AHCT14	Commercial	NS (SOP, 14)
		PW (TSSOP, 14)
		RGY (VQFN, 14)
		BQA (WQFN, 14)

For all available packages, see the orderable addendum at the end of the data sheet.





Page

## **Table of Contents**

	iable of v	Soments	
1 Features	1	8.2 Functional Block Diagram	9
2 Applications	1	8.3 Feature Description	9
3 Description	1	8.4 Device Functional Modes	9
4 Revision History		9 Application and Implementation	10
5 Pin Configuration and Functions	3	9.1 Application Information	10
6 Specifications		9.2 Typical Application	10
6.1 Absolute Maximum Ratings	4	9.3 Power Supply Recommendations	11
6.2 Handling Ratings	4	9.4 Layout	11
6.3 Recommended Operating Conditions	4	10 Device and Documentation Support	13
6.4 Thermal Information		10.1 Documentation Support	
6.5 Electrical Characteristics	<mark>5</mark>	10.2 Receiving Notification of Documentation l	Updates 13
6.6 Switching Characteristics	6	10.3 Support Resources	
6.7 Noise Characteristics	6	10.4 Trademarks	
6.8 Operating Characteristics	<u>6</u>	10.5 Electrostatic Discharge Caution	13
6.9 Typical Characteristics		10.6 Glossary	13
7 Parameter Measurement Information	8	11 Mechanical, Packaging, and Orderable	
8 Detailed Description	9	Information	13
8.1 Overview	9		
<b>4 Revision History</b> NOTE: Page numbers for previous revisions i	may differ fr	rom page numbers in the current version.	
Changes from Revision S (June 2023) to R	evision T (	October 2023)	Page
		.9 to 147.7; Updated D and PW packages for es in °C/W	5
Changes from Revision R (September 202)	2) to Revis	ion S (June 2023)	Page

# Changes from Revision Q (June 2014) to Revision R (September 2022)



## 5 Pin Configuration and Functions

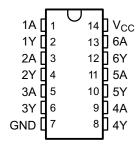


Figure 5-1. SN54AHCT14 J or W Package, 14-Pin CDIP or CFP

SN74AHCT14 D, DB, DGV, N, NS, or PW Package, 14-Pin SOIC, SSOP, TVSOP, PDIP, SOP, or TSSOP (Top View)

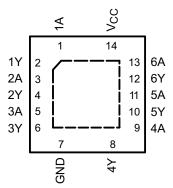
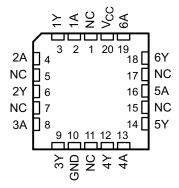


Figure 5-2. SN74AHCT14 RGY or BQA Package, 14-Pin VQFN or WQFN (Top View)



NC - No internal connection

Figure 5-3. SN54AHCT14 FK Package, 20-Pin LCCC (Top View)

Table 5-1. Pin Functions

F	PIN TYPE(1)		DESCRIPTION
NAME	NO.	ITPE(')	DESCRIPTION
1A	1	I	1A1
1Y	2	0	1Y1
2A	3	I	2A1
2Y	4	0	2Y1
3A	5	1	3A1
3Y	6	0	3Y1
GND	7	_	Ground pin
4Y	8	0	4Y1
4A	9	1	4A1
5Y	10	0	5Y1
5A	11	1	5A1
6Y	12	0	6Y1
6A	13	I	6A1
VCC	14	_	Power pin

<sup>(1)</sup> I = input, O = output

## **6 Specifications**

## **6.1 Absolute Maximum Ratings**

over operating free-air temperature range (unless otherwise noted)(1)

			MIN	MAX	UNIT
V <sub>CC</sub>	Supply voltage range		-0.5	7	V
VI	Input voltage range <sup>(2)</sup>		-0.5	7	V
Vo	Output voltage range <sup>(2)</sup>		-0.5	V <sub>CC</sub> + 0.5	V
I <sub>IK</sub>	Input clamp current	V <sub>I</sub> < 0		-20	mA
I <sub>OK</sub>	Output clamp current	$V_O < 0$ or $V_O > V_{CC}$		±20	mA
Io	Continuous output current	$V_O = 0$ to $V_{CC}$		±25	mA
	Continuous current through V <sub>CC</sub> or GND			±50	mA

<sup>(1)</sup> Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability

## 6.2 Handling Ratings

			MIN	MAX	UNIT
T <sub>stg</sub>	Storage temperature rang	е	-65	150	°C
V	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins <sup>(1)</sup>	0	2000	V
V <sub>(ESD)</sub>	Electrostatic discriarge	Charged device model (CDM), per JEDEC specification JESD22-C101, all pins <sup>(2)</sup>	0	1000	V

<sup>(1)</sup> JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

#### 6.3 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)(1)

		SN54AHC	SN54AHCT14		SN74AHCT14	
		MIN	MAX	MIN	MAX	UNIT
V <sub>CC</sub>	Supply voltage	4.5	5.5	4.5	5.5	V
VI	Input voltage	0	5.5	0	5.5	V
Vo	Output voltage	0	V <sub>CC</sub>	0	V <sub>CC</sub>	V
I <sub>OH</sub>	High-level output current		-8		-8	mA
I <sub>OL</sub>	Low-level output current		8		8	mA
T <sub>A</sub>	Operating free-air temperature	-55	125	-40	125	°C

All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation. Refer to the TI Application Report, Implications of Slow or Floating CMOS Inputs, (SCBA004).

<sup>(2)</sup> The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.



## **6.4 Thermal Information**

					SN	174AHCT14				
	THERMAL METRIC(1)	D	DGV	DB	N	NS	PW	RGY	BQA	UNIT
						14 PINS				
$R_{\theta JA}$	Junction-to-ambient thermal resistance	124.5	138.7	113.1	61.1	98.6	147.7	63.7	88.3	
R <sub>θJC(top)</sub>	Junction-to-case (top) thermal resistance	78.8	60.6	65.6	48.0	54.1	77.4	77.6	90.9	
R <sub>0JB</sub>	Junction-to-board thermal resistance	81	71.8	60.4	41.0	57.4	90.9	39.7	56.8	°C/W
Ψлт	Junction-to-top characterization parameter	37	10.6	25.5	32.4	19.6	27.2	5.7	9.9	- *C/vv
ΨЈВ	Junction-to-board characterization parameter	80.6	71.1	59.9	40.9	57.0	90.2	39.9	56.7	
R <sub>0JC(bot)</sub>	Junction-to-case (bottom) thermal resistance	N/A	N/A	N/A	N/A	N/A	N/A	19.9	33.4	

(1) For more information about traditional and new thermal metrics, see the IC Package Thermal Metrics application report, (SPRA953).

#### 6.5 Electrical Characteristics

over operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST COMPITIONS		T	= 25°C		SN54AH	CT14	SN74AH	CT14	UNIT
PARAMETER	TEST CONDITIONS	V <sub>cc</sub>	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNII
V <sub>T+</sub>		4.5 V	0.9		1.9	0.9	1.9	0.9	1.9	
Positive-going input threshold voltage		5.5 V	1		2.1	1	2.1	1	2.1	V
V <sub>T</sub>		4.5 V	0.5		1.5	0.5	1.5	0.5	1.5	
Negative-going input threshold voltage		5.5 V	0.6		1.7	0.6	1.7	0.6	1.7	V
$\Delta V_{T}$		4.5 V	0.4		1.4	0.4	1.4	0.4	1.4	.,
Hysteresis ( V <sub>T+</sub> – V <sub>T-</sub> )		5.5 V	0.4		1.5	0.4	1.5	0.4	1.5	V
V <sub>OH</sub>	I <sub>OH</sub> = -50 μA	4.5 V	4.4	4.5		4.4		4.4		V
∨он	I <sub>OH</sub> = -8 mA	4.5 V	3.94			3.8		3.8		V
V <sub>OL</sub>	I <sub>OL</sub> = 50 μA	4.5 V			0.1		0.1		0.1	V
VOL	I <sub>OL</sub> = 8 mA	7.5 V			0.36		0.44		0.44	V
I <sub>I</sub>	V <sub>I</sub> = 5.5 V or GND	0 V to 5.5 V			±0.1		±1 <sup>(1)</sup>		±1	μΑ
I <sub>CC</sub>	$V_I = V_{CC}$ or GND $I_O = 0$	5.5 V			2		20		20	μΑ
ΔI <sub>CC</sub> <sup>(2)</sup>	One input at 3.4 V, Other inputs at V <sub>CC</sub> or GND	5.5 V			1.35		1.5		1.5	mA
C <sub>i</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND	5 V		2	10				10	pF

<sup>(1)</sup> On products compliant to MIL-PRF-38535, this parameter is not production tested at  $V_{CC} = 0 \text{ V}$ .

<sup>(2)</sup> This is the increase in supply current for each input at one of the specified TTL voltage levels, rather than 0 V or V<sub>CC</sub>.



## **6.6 Switching Characteristics**

over operating free-air temperature range (unless otherwise noted)

PARAMETER	FROM	то	LOAD	T,	<sub>A</sub> = 25°C		SN54Al	ICT14	SN74AH	ICT14	UNIT	
PARAMETER	(INPUT)	(OUTPUT)	CAPACITANCE	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNII	
t <sub>PLH</sub>	۸	V	C <sub>I</sub> = 15 pF		4 <sup>(1)</sup>	7 <sup>(1)</sup>	1 <sup>(1)</sup>	8(1)	1	8	ns	
t <sub>PHL</sub>	A	ľ		CL = 15 pr		4 <sup>(1)</sup>	7 <sup>(1)</sup>	1 <sup>(1)</sup>	8 <sup>(1)</sup>	1	8	115
t <sub>PLH</sub>	۸	V	C = 50 pE		5.5	8	1	9	1	9	no	
t <sub>PHL</sub>	A	Ţ	C <sub>L</sub> = 50 pF		5.5	8	1	9	1	9	ns	

<sup>(1)</sup> On products compliant to MIL-PRF-38535, this parameter is not production tested.

## **6.7 Noise Characteristics**

 $V_{CC} = 5 \text{ V}, C_1 = 50 \text{ pF}, T_A = 25^{\circ}\text{C}^{(1)}$ 

	PARAMETER		SN74AHCT14				
	PARAMETER	MIN	TYP	MAX	UNIT		
V <sub>OL(P)</sub>	Quiet output, maximum dynamic V <sub>OL</sub>		0.9		V		
V <sub>OL(V)</sub>	Quiet output, minimum dynamic V <sub>OL</sub>		-0.7		V		
V <sub>OH(V)</sub>	Quiet output, minimum dynamic V <sub>OH</sub>		4.3		V		
$V_{IH(D)}$	High-level dynamic input voltage	2.1			V		
V <sub>IL(D)</sub>	Low-level dynamic input voltage			0.5	V		

<sup>(1)</sup> Characteristics are for surface-mount packages only.

## **6.8 Operating Characteristics**

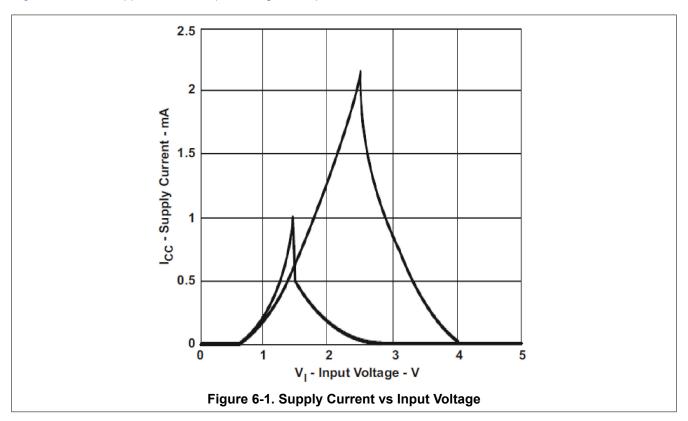
 $V_{CC}$  = 5 V,  $T_A$  = 25°C

	PARAMETER	TEST C	CONDITIONS	TYP	UNIT
C <sub>pd</sub>	Power dissipation capacitance	No load,	f = 1 MHz	12	pF



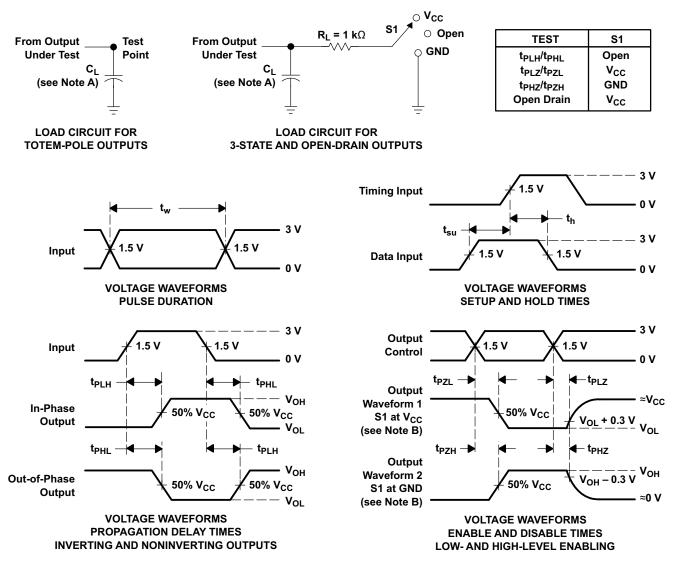
## **6.9 Typical Characteristics**

One common misconception is that the current consumption will be less when switching a slow signal into a Schmitt trigger. This is partly true because the Schmitt trigger prevents oscillation which can draw a lot of current; however, you will see higher  $I_{CC}$  current due to the amount of time the input is not at the rail. This is Delta  $I_{CC}$ . Delta  $I_{CC}$  is where the inputs are not at the rails and upper or lower drive transistors are partially on. Figure 6-1 shows  $I_{CC}$  across the input voltage sweep.





#### 7 Parameter Measurement Information



NOTES: A. C<sub>L</sub> includes probe and jig capacitance.

- B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
- C. All input pulses are supplied by generators having the following characteristics: PRR  $\leq$  1 MHz,  $Z_O$  = 50  $\Omega$ ,  $t_r \leq$  3 ns,  $t_f \leq$  3 ns.
- D. The outputs are measured one at a time with one input transition per measurement.
- E. All parameters and waveforms are not applicable to all devices.

Figure 7-1. Load Circuit and Voltage Waveforms

## **8 Detailed Description**

## 8.1 Overview

The SNx4AHCT14 devices contain six independent inverters. These devices perform the Boolean function  $Y = \overline{A}$ . Each circuit functions as an independent inverter, but because of the Schmitt action, the inverters have different input threshold levels for positive-going  $(V_{T+})$  and for negative-going  $(V_{T-})$  signals.

## 8.2 Functional Block Diagram



#### 8.3 Feature Description

- Inputs are TTL-Voltage compatible
- · Inputs accept very slow or noisy inputs

#### **8.4 Device Functional Modes**

Table 8-1. Function Table (Each Inverter)

INPUT A	OUTPUT Y
Н	L
L	н

## 9 Application and Implementation

#### Note

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes, as well as validating and testing their design implementation to confirm system functionality.

#### 9.1 Application Information

Schmitt triggers should be used anytime you need to translate a sign wave into a square wave, or used where a slow or noisy input needs to be sped up or cleaned up as in the switch de-bouncer circuit.

#### 9.2 Typical Application

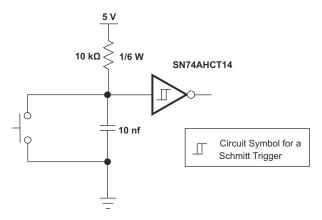


Figure 9-1. Switch De-Bouncer Using Schmitt Trigger Inverter

#### 9.2.1 Design Requirements

This device uses CMOS technology and has balanced output drive. Care should be taken to avoid bus contention because it can drive currents that would exceed maximum limits. The high drive will also create fast edges into light loads; therefore, routing and load conditions should be considered to prevent ringing.

#### 9.2.2 Detailed Design Procedure

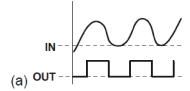
- 1. Recommended input conditions:
  - Specified High and low levels: See (V<sub>IH</sub> and V<sub>IL</sub>) in the *Recommended Operating Conditions* table.
  - Inputs are overvoltage tolerant allowing them to go as high as 5.5 V at any valid V<sub>CC</sub>
- 2. Recommended output conditions:
  - Load currents should not exceed 25 mA per output and 50 mA total for the part
  - Outputs should not be pulled above V<sub>CC</sub>



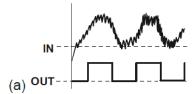
#### 9.2.3 Application Curves

Schmitt triggers should be used any time you need to

1. Change a sign wave into a square wave.



2. Have noisy signals that need to be cleaned up



3. Have slow edges that need to be converted to fast edges.

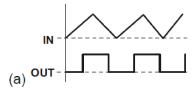


Figure 9-2. Typical Application Curves

#### 9.3 Power Supply Recommendations

The power supply can be any voltage between the MIN and MAX supply voltage rating located in the *Recommended Operating Conditions* table.

Each VCC pin should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, 0.1  $\mu$ f is recommended. If there are multiple VCC pins, 0.01  $\mu$ f or 0.022  $\mu$ f is recommended for each power pin. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. A 0.1  $\mu$ f and 1  $\mu$ f are commonly used in parallel. The bypass capacitor should be installed as close to the power pin as possible for best results.

#### 9.4 Layout

#### 9.4.1 Layout Guidelines

When using multiple bit logic devices inputs should not ever float.

In many cases, functions or parts of functions of digital logic devices are unused, for example, when only two inputs of a triple-input AND gate are used or only 3 of the 4 buffer gates are used. Such input pins should not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. Figure 9-3 shows the rules that must be observed under all circumstances. All unused inputs of digital logic devices must be connected to a high or low bias to prevent them from floating. The logic level that should be applied to any particular unused input depends on the function of the device. Generally they will be tied to GND or VCC; whichever makes more sense or is more convenient. It is generally acceptable to float outputs unless the part is a transceiver. If the transceiver has an output enable pin, it will disable the outputs section of the part when asserted. This will not disable the input section of the IO's so they cannot float when disabled.



## 9.4.2 Layout Example

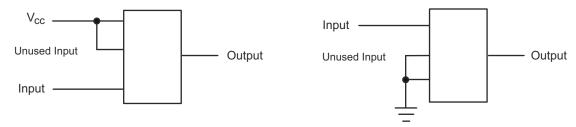


Figure 9-3. Layout Diagram

## 10 Device and Documentation Support

## **10.1 Documentation Support**

## 10.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. Click on *Subscribe to updates* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

#### 10.3 Support Resources

TI E2E<sup>™</sup> support forums are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

Linked content is provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's Terms of Use.

#### 10.4 Trademarks

TI E2E™ is a trademark of Texas Instruments.

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#### 10.5 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

#### 10.6 Glossary

TI Glossary

This glossary lists and explains terms, acronyms, and definitions.

#### 11 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

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## **PACKAGING INFORMATION**

Orderable part number	Status (1)	Material type	Package   Pins	Package qty   Carrier	<b>RoHS</b> (3)	Lead finish/ Ball material	MSL rating/ Peak reflow	Op temp (°C)	Part marking (6)
5962-9680101Q2A	Active	Production	LCCC (FK)   20	55   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962- 9680101Q2A SNJ54AHCT 14FK
5962-9680101QCA	Active	Production	CDIP (J)   14	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9680101QC A SNJ54AHCT14J
5962-9680101QDA	Active	Production	CFP (W)   14	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9680101QD A SNJ54AHCT14W
5962-9680101VCA	Active	Production	CDIP (J)   14	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9680101VC A SNV54AHCT14J
5962-9680101VCA.A	Active	Production	CDIP (J)   14	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9680101VC A SNV54AHCT14J
5962-9680101VDA	Active	Production	CFP (W)   14	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9680101VD A SNV54AHCT14W
5962-9680101VDA.A	Active	Production	CFP (W)   14	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9680101VD A SNV54AHCT14W
SN74AHCT14BQAR	Active	Production	WQFN (BQA)   14	3000   LARGE T&R	Yes	SELECTIVE AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	AHCT14
SN74AHCT14BQAR.A	Active	Production	WQFN (BQA)   14	3000   LARGE T&R	Yes	SELECTIVE AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	AHCT14
SN74AHCT14D	Obsolete	Production	SOIC (D)   14	-	-	Call TI	Call TI	-40 to 125	AHCT14
SN74AHCT14DBR	Active	Production	SSOP (DB)   14	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	HB14
SN74AHCT14DBR.A	Active	Production	SSOP (DB)   14	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	HB14
SN74AHCT14DGVR	Active	Production	TVSOP (DGV)   14	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB14
SN74AHCT14DGVR.A	Active	Production	TVSOP (DGV)   14	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB14
SN74AHCT14DGVRE4	Active	Production	TVSOP (DGV)   14	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	HB14
SN74AHCT14DR	Active	Production	SOIC (D)   14	2500   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	AHCT14





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Orderable part number	Status (1)	Material type	Package   Pins	Package qty   Carrier	<b>RoHS</b> (3)	Lead finish/ Ball material	MSL rating/ Peak reflow	Op temp (°C)	Part marking (6)
SN74AHCT14DR.A	Active	Production	SOIC (D)   14	2500   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	AHCT14
SN74AHCT14N	Active	Production	PDIP (N)   14	25   TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 125	SN74AHCT14N
SN74AHCT14N.A	Active	Production	PDIP (N)   14	25   TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 125	SN74AHCT14N
SN74AHCT14NSR	Active	Production	SOP (NS)   14	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	AHCT14
SN74AHCT14NSR.A	Active	Production	SOP (NS)   14	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	AHCT14
SN74AHCT14PW	Obsolete	Production	TSSOP (PW)   14	-	-	Call TI	Call TI	-40 to 125	HB14
SN74AHCT14PWR	Active	Production	TSSOP (PW)   14	2000   LARGE T&R	Yes	NIPDAU   SN	Level-1-260C-UNLIM	-40 to 125	HB14
SN74AHCT14PWR.A	Active	Production	TSSOP (PW)   14	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	HB14
SN74AHCT14RGYR	Active	Production	VQFN (RGY)   14	3000   LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-40 to 125	HB14
SN74AHCT14RGYR.A	Active	Production	VQFN (RGY)   14	3000   LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-40 to 125	HB14
SNJ54AHCT14FK	Active	Production	LCCC (FK)   20	55   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962- 9680101Q2A SNJ54AHCT 14FK
SNJ54AHCT14FK.A	Active	Production	LCCC (FK)   20	55   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962- 9680101Q2A SNJ54AHCT 14FK
SNJ54AHCT14J	Active	Production	CDIP (J)   14	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9680101QC A SNJ54AHCT14J
SNJ54AHCT14J.A	Active	Production	CDIP (J)   14	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9680101QC A SNJ54AHCT14J
SNJ54AHCT14W	Active	Production	CFP (W)   14	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9680101QD A SNJ54AHCT14W
SNJ54AHCT14W.A	Active	Production	CFP (W)   14	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9680101QD A SNJ54AHCT14W

<sup>(1)</sup> Status: For more details on status, see our product life cycle.

## PACKAGE OPTION ADDENDUM

www.ti.com 7-Oct-2025

(2) Material type: When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) RoHS values: Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

(4) Lead finish/Ball material: Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

(5) MSL rating/Peak reflow: The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) Part marking: There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

#### OTHER QUALIFIED VERSIONS OF SN54AHCT14, SN54AHCT14-SP, SN74AHCT14:

Catalog: SN74AHCT14, SN54AHCT14

Enhanced Product: SN74AHCT14-EP, SN74AHCT14-EP

Military: SN54AHCT14

Space: SN54AHCT14-SP

NOTE: Qualified Version Definitions:

Catalog - TI's standard catalog product



## PACKAGE OPTION ADDENDUM

www.ti.com 7-Oct-2025

- Enhanced Product Supports Defense, Aerospace and Medical Applications
- Military QML certified for Military and Defense Applications
- Space Radiation tolerant, ceramic packaging and qualified for use in Space-based application

## **PACKAGE MATERIALS INFORMATION**

www.ti.com 6-Nov-2025

## TAPE AND REEL INFORMATION



# TAPE DIMENSIONS + K0 - P1 - B0 W Cavity - A0 -

A0	Dimension designed to accommodate the component width
В0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

#### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



#### \*All dimensions are nominal

Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74AHCT14BQAR	WQFN	BQA	14	3000	180.0	12.4	2.8	3.3	1.1	4.0	12.0	Q1
SN74AHCT14DBR	SSOP	DB	14	2000	330.0	16.4	8.35	6.6	2.4	12.0	16.0	Q1
SN74AHCT14DGVR	TVSOP	DGV	14	2000	330.0	12.4	6.8	4.0	1.6	8.0	12.0	Q1
SN74AHCT14DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74AHCT14NSR	SOP	NS	14	2000	330.0	16.4	8.1	10.4	2.5	12.0	16.0	Q1
SN74AHCT14PWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74AHCT14RGYR	VQFN	RGY	14	3000	330.0	12.4	3.75	3.75	1.15	8.0	12.0	Q1



www.ti.com 6-Nov-2025



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AHCT14BQAR	WQFN	BQA	14	3000	210.0	185.0	35.0
SN74AHCT14DBR	SSOP	DB	14	2000	353.0	353.0	32.0
SN74AHCT14DGVR	TVSOP	DGV	14	2000	353.0	353.0	32.0
SN74AHCT14DR	SOIC	D	14	2500	333.2	345.9	28.6
SN74AHCT14NSR	SOP	NS	14	2000	353.0	353.0	32.0
SN74AHCT14PWR	TSSOP	PW	14	2000	353.0	353.0	32.0
SN74AHCT14RGYR	VQFN	RGY	14	3000	353.0	353.0	32.0

# **PACKAGE MATERIALS INFORMATION**

www.ti.com 6-Nov-2025

## **TUBE**



\*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
5962-9680101Q2A	FK	LCCC	20	55	506.98	12.06	2030	NA
5962-9680101QDA	W	CFP	14	25	506.98	26.16	6220	NA
5962-9680101VDA	W	CFP	14	25	506.98	26.16	6220	NA
5962-9680101VDA.A	W	CFP	14	25	506.98	26.16	6220	NA
SN74AHCT14N	N	PDIP	14	25	506	13.97	11230	4.32
SN74AHCT14N	N	PDIP	14	25	506	13.97	11230	4.32
SN74AHCT14N.A	N	PDIP	14	25	506	13.97	11230	4.32
SN74AHCT14N.A	N	PDIP	14	25	506	13.97	11230	4.32
SNJ54AHCT14FK	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54AHCT14FK.A	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54AHCT14W	W	CFP	14	25	506.98	26.16	6220	NA
SNJ54AHCT14W.A	W	CFP	14	25	506.98	26.16	6220	NA

# W (R-GDFP-F14)

## CERAMIC DUAL FLATPACK



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. This package can be hermetically sealed with a ceramic lid using glass frit.
- D. Index point is provided on cap for terminal identification only.
- E. Falls within MIL STD 1835 GDFP1-F14







- 1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.

  2. This drawing is subject to change without notice.

  3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not
- exceed 0.15 mm per side.
  4. Reference JEDEC registration MO-150.





NOTES: (continued)

- 5. Publication IPC-7351 may have alternate designs.
- 6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.





NOTES: (continued)

- 7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
- 8. Board assembly site may have different recommendations for stencil design.



8.89 x 8.89, 1.27 mm pitch

LEADLESS CERAMIC CHIP CARRIER

This image is a representation of the package family, actual package may vary. Refer to the product data sheet for package details.



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CERAMIC DUAL IN LINE PACKAGE



Images above are just a representation of the package family, actual package may vary. Refer to the product data sheet for package details.

4040083-5/G





CERAMIC DUAL IN LINE PACKAGE



- 1. All controlling linear dimensions are in inches. Dimensions in brackets are in millimeters. Any dimension in brackets or parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
- 2. This drawing is subject to change without notice.
- 3. This package is hermitically sealed with a ceramic lid using glass frit.
- His package is remitted by sealed with a ceramic its using glass mit.
   Index point is provided on cap for terminal identification only and on press ceramic glass frit seal only.
   Falls within MIL-STD-1835 and GDIP1-T14.



CERAMIC DUAL IN LINE PACKAGE



# N (R-PDIP-T\*\*)

## PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
- The 20 pin end lead shoulder width is a vendor option, either half or full width.







- 1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.

  2. This drawing is subject to change without notice.

  3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not
- exceed 0.15 mm per side.
- 4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
- 5. Reference JEDEC registration MO-153.





NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.





NOTES: (continued)

- 8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
- 9. Board assembly site may have different recommendations for stencil design.



3.5 x 3.5, 0.5 mm pitch

PLASTIC QUAD FLATPACK - NO LEAD

This image is a representation of the package family, actual package may vary. Refer to the product data sheet for package details.



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PLASTIC QUAD FLATPACK - NO LEAD



- 1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
- This drawing is subject to change without notice.
   The package thermal pad must be soldered to the printed circuit board for thermal and mechanical performance.



PLASTIC QUAD FLATPACK - NO LEAD



NOTES: (continued)

4. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).



PLASTIC QUAD FLATPACK - NO LEAD



NOTES: (continued)

5. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.





SMALL OUTLINE INTEGRATED CIRCUIT



- 1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.

  2. This drawing is subject to change without notice.

  3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not
- exceed 0.15 mm, per side.
- 4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm, per side.
- 5. Reference JEDEC registration MS-012, variation AB.



SMALL OUTLINE INTEGRATED CIRCUIT



NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



SMALL OUTLINE INTEGRATED CIRCUIT



NOTES: (continued)

- 8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
- 9. Board assembly site may have different recommendations for stencil design.



2.5 x 3, 0.5 mm pitch

PLASTIC QUAD FLATPACK - NO LEAD

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PLASTIC QUAD FLAT PACK-NO LEAD



- All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
- 2. This drawing is subject to change without notice.
- 3. The package thermal pad must be soldered to the printed circuit board for optimal thermal and mechanical performance.



PLASTIC QUAD FLAT PACK-NO LEAD



NOTES: (continued)

- 4. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).
- 5. Vias are optional depending on application, refer to device data sheet. If any vias are implemented, refer to their locations shown on this view. It is recommended that vias under paste be filled, plugged or tented.



PLASTIC QUAD FLAT PACK-NO LEAD



NOTES: (continued)

6. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.



## **MECHANICAL DATA**

## NS (R-PDSO-G\*\*)

# 14-PINS SHOWN

## PLASTIC SMALL-OUTLINE PACKAGE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.



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