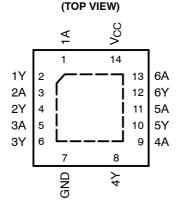
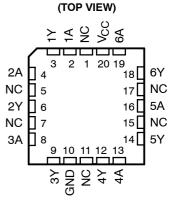
- Operating Range 2-V to 5.5-V V<sub>CC</sub>
- Latch-Up Performance Exceeds 250 mA Per JESD 17
- **ESD Protection Exceeds JESD 22** 
  - 2000-V Human-Body Model (A114-A)
  - 200-V Machine Model (A115-A)
  - 1000-V Charged-Device Model (C101)

SN54AHC14...J OR W PACKAGE SN74AHC14...D, DB, DGV, N, NS, **OR PW PACKAGE** (TOP VIEW) 14 [] V<sub>CC</sub> 1A 13 🛮 6A 1Y [ 2 12 6Y 2A [ 2Y [ ∏ 5A ЗА 5 10 5Y 9 🛮 4A 3Y 🛮 6

GND [



SN74AHC14 . . . RGY PACKAGE



SN54AHC14...FK PACKAGE

NC - No internal connection

#### description/ordering information

8∏ 4Y

The 'AHC14 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 negative-going  $(V_{T-})$  signals.

#### **ORDERING INFORMATION**

T <sub>A</sub>	PACKA	GE <sup>†</sup>	ORDERABLE PART NUMBER	TOP-SIDE MARKING	
	QFN – RGY	Tape and reel	SN74AHC14RGYR	HA14	
	PDIP – N	Tube	SN74AHC14N	SN74AHC14N	
–40°C to 85°C	SOIC - D	Tube	SN74AHC14D	AHC14	
	30IC - D	Tape and reel	SN74AHC14DRG3	AHC14	
	SOP - NS	Tape and reel	SN74AHC14NSR	AHC14	
	SSOP – DB	Tape and reel	SN74AHC14DBR	HA14	
	TOOOD DW	Tube	SN74AHC14PW	11444	
	TSSOP – PW	Tape and reel	SN74AHC14PWRG3	HA14	
	TVSOP - DGV	Tape and reel	SN74AHC14DGVR	HA14	
	CDIP – J	Tube	SNJ54AHC14J	SNJ54AHC14J	
–55°C to 125°C	CFP – W	Tube	SNJ54AHC14W	SNJ54AHC14W	
	LCCC - FK	Tube	SNJ54AHC14FK	SNJ54AHC14FK	

<sup>&</sup>lt;sup>†</sup> Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.



PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.



# FUNCTION TABLE (each inverter)

INPUT A	OUTPUT Y
Н	L
L	Н

### logic diagram (positive logic)



### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>

Supply voltage range, V <sub>CC</sub>	–0.5 V to 7 V
Input voltage range, V <sub>I</sub> (see Note 1)	–0.5 V to 7 V
Output voltage range, V <sub>O</sub> (see Note 1)	$-0.5 \text{ V to V}_{CC} + 0.5 \text{ V}$
Input clamp current, I <sub>IK</sub> (V <sub>I</sub> < 0)	–20 mA
Output clamp current, I <sub>OK</sub> (V <sub>O</sub> < 0 or V <sub>O</sub> > V <sub>CC</sub> )	±20 mA
Continuous output current, I <sub>O</sub> (V <sub>O</sub> = 0 to V <sub>CC</sub> )	±25 mA
Continuous current through V <sub>CC</sub> or GND	±50 mA
Package thermal impedance, θ <sub>JA</sub> (see Note 2): D package	86°C/W
(see Note 2): DB package	96°C/W
(see Note 2): DGV package	127°C/W
(see Note 2): N package	80°C/W
(see Note 2): NS package	76°C/W
(see Note 2): PW package	113°C/W
(see Note 3): RGY package	47°C/W
Storage temperature range, T <sub>stg</sub>	–65°C to 150°C

<sup>&</sup>lt;sup>†</sup> Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
  - 2. The package thermal impedance is calculated in accordance with JESD 51-7.
  - 3. The package thermal impedance is calculated in accordance with JESD 51-5.

## recommended operating conditions (see Note 4)

			SN54A	HC14	SN74A	HC14	
			MIN	MAX	MIN	MAX	UNIT
$V_{CC}$	Supply voltage		2	5.5	2	5.5	V
VI	Input voltage		0	5.5	0	5.5	V
Vo	Output voltage		0	$V_{CC}$	0	$V_{CC}$	V
		V <sub>CC</sub> = 2 V		-50		-50	μΑ
I <sub>OH</sub>	High-level output current	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$		-4		-4	4
		$V_{CC}$ = 5 V $\pm$ 0.5 V		-8		-8	mA
		V <sub>CC</sub> = 2 V		50		50	μΑ
l <sub>OL</sub>	Low-level output current	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$		4		4	
		$V_{CC}$ = 5 V $\pm$ 0.5 V		8		8	mA
T <sub>A</sub>	Operating free-air temperature		-55	125	-40	85	°C

NOTE 4: 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, literature number SCBA004.



# electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

DADAMETED	TEST CONDITIONS	V	T,	<sub>A</sub> = 25°C	SN54A	HC14	SN74AHC14		LINIT
PARAMETER	TEST CONDITIONS	V <sub>cc</sub>	MIN	TYP MAX	MIN	MAX	MIN	MAX	UNIT
V <sub>T+</sub>		3 V	1.2	2.2	1.2	2.2	1.2	2.2	
Positive-going		4.5 V	1.75	3.15	1.75	3.15	1.75	3.15	V
input threshold voltage		5.5 V	2.15	3.85	2.15	3.85	2.15	3.85	
V <sub>T-</sub>		3 V	0.9	1.9	0.9	1.9	0.9	1.9	
Negative-going		4.5 V	1.35	2.75	1.35	2.75	1.35	2.75	V
input threshold voltage		5.5 V	1.65	3.35	1.65	3.35	1.65	3.35	
		3 V	0.3	1.2	0.3	1.2	0.3	1.2	
$\Delta V_T$ Hysteresis ( $V_{T+} - V_{T-}$ )		4.5 V	0.4	1.4	0.4	1.4	0.4	1.4	V
11y3tc1c3i3 (V + - V -)		5.5 V	0.5	1.6	0.5	1.6	0.5	1.6	
		2 V	1.9	2	1.9		1.9		
	I <sub>OH</sub> = -50 μA	3 V	2.9	3	2.9		2.9		
V <sub>OH</sub>		4.5 V	4.4	4.5	4.4		4.4		V
	$I_{OH} = -4 \text{ mA}$	3 V	2.58		2.48		2.48		
	$I_{OH} = -8 \text{ mA}$	4.5 V	3.94		3.8		3.8		
		2 V		0.1		0.1		0.1	
	I <sub>OL</sub> = 50 μA	3 V		0.1		0.1		0.1	
V <sub>OL</sub>		4.5 V		0.1		0.1		0.1	V
	I <sub>OL</sub> = 4 mA	3 V		0.36		0.5		0.44	
	I <sub>OL</sub> = 8 mA	4.5 V		0.36		0.5		0.44	
lı	V <sub>I</sub> = 5.5 V or GND	0 V to 5.5 V		±0.1		±1*		±1	μΑ
Icc	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V		2		20		20	μΑ
C <sub>i</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND	5 V		2 10				10	pF

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

# switching characteristics over recommended operating free-air temperature range, $V_{CC}$ = 3.3 V $\pm$ 0.3 V (unless otherwise noted) (see Figure 1)

FROM		то	LOAD	T <sub>A</sub> = 25°C			SN54AHC14		SN74AHC14		
PARAMETER	(INPUT)	(OUTPUT)	CAPACITANCE	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
t <sub>PLH</sub>		V	0 45.5		8.3**	12.8**	1**	15**	1	15	
t <sub>PHL</sub>	Α	Y	C <sub>L</sub> = 15 pF		8.3**	12.8**	1**	15**	1	15	ns
t <sub>PLH</sub>		V	0 50 5		10.8	16.3	1	18.5	1	18.5	ns
t <sub>PHL</sub>	А	Y	C <sub>L</sub> = 50 pF		10.8	16.3	1	18.5	1	18.5	

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

# switching characteristics over recommended operating free-air temperature range, $V_{CC}$ = 5 V $\pm$ 0.5 V (unless otherwise noted) (see Figure 1)

DADAMETED	FROM	то	LOAD	T	<sub>A</sub> = 25°C	;	SN54A	HC14	SN74A	HC14	
PARAMETER	(INPUT)	(OUTPUT)	CAPACITANCE	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
t <sub>PLH</sub>	•	V	0 45 -5		5.5**	8.6**	1**	10**	1	10	
t <sub>PHL</sub>	А	Y	C <sub>L</sub> = 15 pF		5.5**	8.6**	1**	10**	1	10	ns
t <sub>PLH</sub>	•	V	0 50 5		7	10.6	1	12	1	12	
t <sub>PHL</sub>	Α	Y	C <sub>L</sub> = 50 pF		7	10.6	1	12	1	12	ns

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



## SN54AHC14, SN74AHC14 HEX SCHMITT-TRIGGER INVERTERS

SCLS238J - OCTOBER 1995 - REVISED OCTOBER 2010

## noise characteristics, $V_{CC}$ = 5 V, $C_L$ = 50 pF, $T_A$ = 25°C (see Note 5)

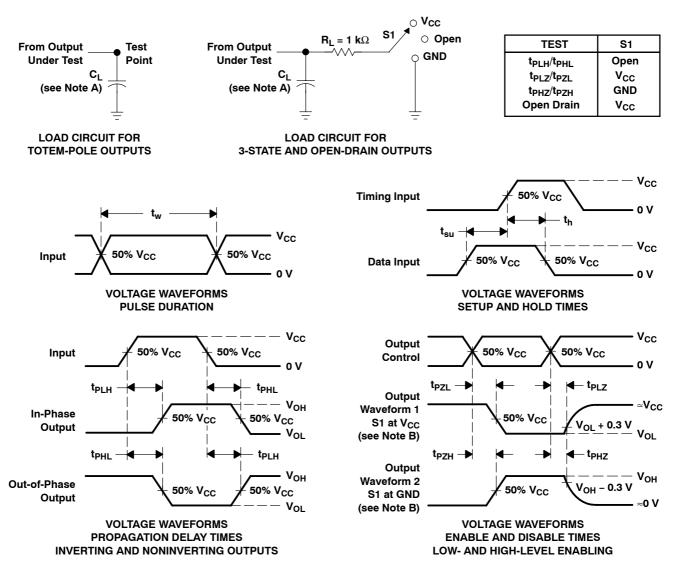
	DADAMETED	SN			
	PARAMETER	MIN	TYP	MAX	UNIT
V <sub>OL(P)</sub>	Quiet output, maximum dynamic V <sub>OL</sub>		0.8		V
V <sub>OL(V)</sub>	Quiet output, minimum dynamic V <sub>OL</sub>		-0.4		V
V <sub>OH(V)</sub>	Quiet output, minimum dynamic V <sub>OH</sub>		4.6		V
V <sub>IH(D)</sub>	High-level dynamic input voltage	3.5			٧
$V_{IL(D)}$	Low-level dynamic input voltage			1.5	V

NOTE 5: Characteristics are for surface-mount packages only.

## operating characteristics, $V_{CC}$ = 5 V, $T_A$ = 25 $^{\circ}C$

	PARAMETER	TEST CONDITIONS	TYP	UNIT
C	Power dissipation capacitance	No load, f = 1 MHz	9	pF

#### PARAMETER MEASUREMENT INFORMATION



NOTES: A.  $C_L$  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,  $Z_O = 50 \Omega$ ,  $t_f \leq$  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 1. Load Circuit and Voltage Waveforms

5-Sep-2011

#### **PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/ Ball Finish	MSL Peak Temp <sup>(3)</sup>	Samples (Requires Login)
5962-9680201Q2A	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Call TI	
5962-9680201QCA	ACTIVE	CDIP	J	14	1	TBD	Call TI	Call TI	
5962-9680201QDA	ACTIVE	CFP	W	14	1	TBD	Call TI	Call TI	
5962-9682001QCA	ACTIVE	CDIP	J	14	1	TBD	Call TI	Call TI	
5962-9682001QDA	ACTIVE	CFP	W	14	1	TBD	Call TI	Call TI	
SN74AHC14D	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC14DBLE	OBSOLETE	SSOP	DB	14		TBD	Call TI	Call TI	
SN74AHC14DBR	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC14DBRE4	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC14DBRG4	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC14DE4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC14DG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC14DGVR	ACTIVE	TVSOP	DGV	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC14DGVRE4	ACTIVE	TVSOP	DGV	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC14DGVRG4	ACTIVE	TVSOP	DGV	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC14DR	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC14DRE4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC14DRG3	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	
SN74AHC14DRG4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC14N	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	





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Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/ Ball Finish	MSL Peak Temp <sup>(3)</sup>	Samples (Requires Login)
SN74AHC14NE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74AHC14NSR	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC14NSRG4	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC14PW	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC14PWE4	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC14PWG4	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC14PWLE	OBSOLETE	TSSOP	PW	14		TBD	Call TI	Call TI	
SN74AHC14PWR	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC14PWRE4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC14PWRG3	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	
SN74AHC14PWRG4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC14RGYR	ACTIVE	VQFN	RGY	14	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
SN74AHC14RGYRG4	ACTIVE	VQFN	RGY	14	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
SNJ54AHC08J	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	
SNJ54AHC08W	ACTIVE	CFP	W	14	1	TBD	A42	N / A for Pkg Type	
SNJ54AHC14FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	
SNJ54AHC14J	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	
SNJ54AHC14W	ACTIVE	CFP	W	14	1	TBD	A42	N / A for Pkg Type	

<sup>(1)</sup> The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

## PACKAGE OPTION ADDENDUM



5-Sep-2011

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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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 SN54AHC14, SN74AHC14:

Catalog: SN74AHC14

■ Enhanced Product: SN74AHC14-EP, SN74AHC14-EP

Military: SN54AHC14

NOTE: Qualified Version Definitions:

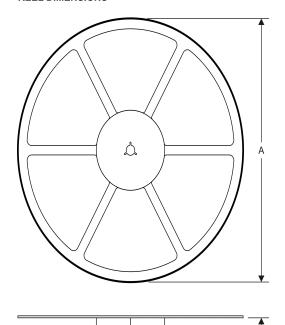
- Catalog TI's standard catalog product
- Enhanced Product Supports Defense, Aerospace and Medical Applications
- Military QML certified for Military and Defense Applications

## PACKAGE MATERIALS INFORMATION

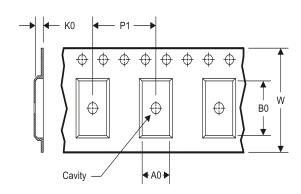
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## TAPE AND REEL INFORMATION

#### **REEL DIMENSIONS**



#### **TAPE DIMENSIONS**



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

#### TAPE AND REEL INFORMATION

\*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
SN74AHC14DBR	SSOP	DB	14	2000	330.0	16.4	8.2	6.6	2.5	12.0	16.0	Q1
SN74AHC14DGVR	TVSOP	DGV	14	2000	330.0	12.4	6.8	4.0	1.6	8.0	12.0	Q1
SN74AHC14DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74AHC14NSR	SO	NS	14	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN74AHC14PWR	TSSOP	PW	14	2000	330.0	12.4	7.0	5.6	1.6	8.0	12.0	Q1
SN74AHC14PWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74AHC14PWRG3	TSSOP	PW	14	2000	330.0	12.4	7.0	5.6	1.6	8.0	12.0	Q1
SN74AHC14RGYR	VQFN	RGY	14	3000	330.0	12.4	3.75	3.75	1.15	8.0	12.0	Q1

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\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AHC14DBR	SSOP	DB	14	2000	346.0	346.0	33.0
SN74AHC14DGVR	TVSOP	DGV	14	2000	346.0	346.0	29.0
SN74AHC14DR	SOIC	D	14	2500	346.0	346.0	33.0
SN74AHC14NSR	SO	NS	14	2000	346.0	346.0	33.0
SN74AHC14PWR	TSSOP	PW	14	2000	364.0	364.0	27.0
SN74AHC14PWR	TSSOP	PW	14	2000	346.0	346.0	29.0
SN74AHC14PWRG3	TSSOP	PW	14	2000	364.0	364.0	27.0
SN74AHC14RGYR	VQFN	RGY	14	3000	346.0	346.0	29.0

## 14 LEADS SHOWN



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. This package is hermetically sealed with a ceramic lid using glass frit.
- D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
- E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

# 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 and JEDEC MO-092AB



## FK (S-CQCC-N\*\*)

## LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



- 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 metal lid.
- D. Falls within JEDEC MS-004



## 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.



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

#### **24 PINS SHOWN**

#### **PLASTIC SMALL-OUTLINE**



NOTES: 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 per side.

D. Falls within JEDEC: 24/48 Pins – MO-153 14/16/20/56 Pins – MO-194

## D (R-PDSO-G14)

## PLASTIC SMALL OUTLINE



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
- E. Reference JEDEC MS-012 variation AB.



# D (R-PDSO-G14)

## PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



PW (R-PDSO-G14)

## PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M—1994.
- B. This drawing is subject to change without notice.
  - Sody length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
- E. Falls within JEDEC MO-153



# PW (R-PDSO-G14)

## PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.





NOTES: A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.

- B. This drawing is subject to change without notice.
- C. QFN (Quad Flatpack No-Lead) package configuration.
- D. The package thermal pad must be soldered to the board for thermal and mechanical performance.
- E. See the additional figure in the Product Data Sheet for details regarding the exposed thermal pad features and dimensions.
- Pin 1 identifiers are located on both top and bottom of the package and within the zone indicated. The Pin 1 identifiers are either a molded, marked, or metal feature.
- G. Package complies to JEDEC MO-241 variation BA.



## RGY (S-PVQFN-N14)

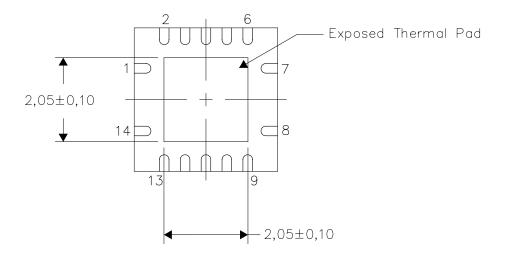
#### PLASTIC QUAD FLATPACK NO-LEAD

#### THERMAL INFORMATION

This package incorporates an exposed thermal pad that is designed to be attached directly to an external heatsink. The thermal pad must be soldered directly to the printed circuit board (PCB). After soldering, the PCB can be used as a heatsink. In addition, through the use of thermal vias, the thermal pad can be attached directly to the appropriate copper plane shown in the electrical schematic for the device, or alternatively, can be attached to a special heatsink structure designed into the PCB. This design optimizes the heat transfer from the integrated circuit (IC).

For information on the Quad Flatpack No-Lead (QFN) package and its advantages, refer to Application Report, QFN/SON PCB Attachment, Texas Instruments Literature No. SLUA271. This document is available at www.ti.com.

The exposed thermal pad dimensions for this package are shown in the following illustration.



Bottom View

Exposed Thermal Pad Dimensions

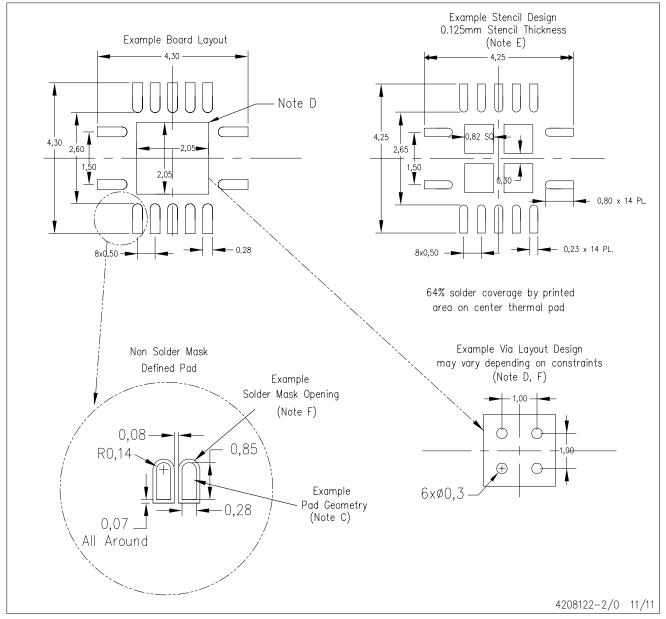
4206353-2/0 11/11

NOTE: All linear dimensions are in millimeters



## RGY (S-PVQFN-N14)

## PLASTIC QUAD FLATPACK NO-LEAD



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. This package is designed to be soldered to a thermal pad on the board. Refer to Application Note, Quad Flat—Pack QFN/SON PCB Attachment, Texas Instruments Literature No. SLUA271, and also the Product Data Sheets for specific thermal information, via requirements, and recommended board layout. These documents are available at www.ti.com <a href="https://www.ti.com">http://www.ti.com</a>.
- E. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC 7525 for stencil design considerations.
- F. Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads.



## **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.



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

## PLASTIC SMALL-OUTLINE

#### **28 PINS SHOWN**



NOTES: 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.

D. Falls within JEDEC MO-150

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