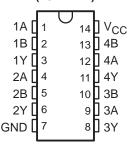
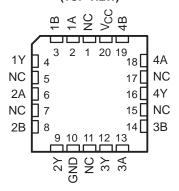
- Operating Voltage Range of 4.5 V to 5.5 V
- Outputs Can Drive Up To 10 LSTTL Loads
- Low Power Consumption, 20-μA Max I<sub>CC</sub>

SN54HCT08...J OR W PACKAGE SN74HCT08...D, DB, N, NS, OR PW PACKAGE (TOP VIEW)



- Typical t<sub>pd</sub> = 13 ns
- ±4-mA Output Drive at 5 V
- Low Input Current of 1 μA Max
- Inputs Are TTL-Voltage Compatible

SN54HCT08 . . . FK PACKAGE (TOP VIEW)



NC - No internal connection

### description/ordering information

These devices contain four independent 2-input AND gates. They perform the Boolean function  $Y = A \bullet B$  or  $Y = \overline{A} + \overline{B}$  in positive logic.

#### ORDERING INFORMATION

TA	PACKA	GE†	ORDERABLE PART NUMBER	TOP-SIDE MARKING
	PDIP – N	Tube of 25	SN74HCT08N	SN74HCT08N
		Tube of 50	SN74HCT08D	
	SOIC - D	Reel of 2500	SN74HCT08DR	HCT08
		Reel of 250	SN74HCT08DT	
–40°C to 85°C	SOP - NS	P – NS Reel of 2000 SN74HCT08NSR		HCT08
	SSOP - DB	Reel of 2000	SN74HCT08DBR	HT08
		Tube of 90	SN74HCT08PW	
	TSSOP – PW	Reel of 2000	SN74HCT08PWR	HT08
		Reel of 250	SN74HCT08PWT	
	CDIP – J	Tube of 25	SNJ54HCT08J	SNJ54HCT08J
–55°C to 125°C	CFP – W	Tube of 150	SNJ54HCT08W	SNJ54HCT08W
	LCCC – FK	Tube of 55	SNJ54HCT08FK	SNJ54HCT08FK

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



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# FUNCTION TABLE (each gate)

INP	JTS	OUTPUT
Α	В	Υ
Н	Н	Н
L	Χ	L
Х	L	L

### logic diagram (positive logic)



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

Supply voltage range, V <sub>CC</sub>		0.5	V to 7 V
Input clamp current, $I_{IK}$ ( $V_I < 0$ or $V_I > V_{CC}$ ) (see	ee Note 1)		±20 mA
Output clamp current, IOK (VO < 0 or VO > VCO	c) (see Note 1)		±20 mA
Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ )			±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
,	DB package		96°C/W
	N package		80°C/W
	NS package		76°C/W
	PW package		113°C/W
Storage temperature range, T <sub>stg</sub>	· · · · · · · · · · · · · · · · · · ·	-65°C	to 150°C

<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.

# recommended operating conditions (see Note 3)

			SI	N54HCT	08	SN	174HCT0	8	UNIT
			MIN	NOM	MAX	MIN	NOM	MAX	UNIT
Vcc	Supply voltage		4.5	5	\$ 5.5	4.5	5	5.5	V
VIH	High-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	2	Š	,/	2			V
$V_{IL}$	Low-level input voltage	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$		72	0.8			0.8	V
VI	Input voltage		0	1	VCC	0		VCC	V
Vo	Output voltage		0	3	VCC	0		VCC	V
Δt/Δν	Input transition rise/fall time		0~	)*	500			500	ns
TA	Operating free-air temperature		-55		125	-40		85	°C

NOTE 3: 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.

NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

<sup>2.</sup> The package thermal impedance is calculated in accordance with JESD 51-7.

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

PARAMETER	TEST CONDITIONS		VCC	Т	A = 25°C	;	SN54F	ICT08	SN74F	ICT08	UNIT
PARAMETER	TEST COI	TEST CONDITIONS			TYP	MAX	MIN	MAX	MIN	MAX	UNIT
Vari	VOH VI = VIH or VIL		4.5 V	4.4	4.499		4.4		4.4		V
VOH			4.5 V	3.98	4.3		3.7	7	3.84		٧
Voi	VI = VIH or VIL	I <sub>OL</sub> = 20 μA	4.5 V		0.001	0.1		0.1		0.1	V
VOL VI = VIH or VIL	AI = AIH OL AIL	I <sub>OL</sub> = 4 mA	4.5 V		0.17	0.26		0.4		0.33	٧
lį	$V_I = V_{CC}$ or 0		5.5 V		±0.1	±100	`	±1000		±1000	nA
Icc	$V_I = V_{CC}$ or 0,	I <sub>O</sub> = 0	5.5 V			2	2/2	40		20	μΑ
ΔI <sub>CC</sub> †	One input at 0.5 V of Other inputs at 0 or		5.5 V		1.4	2.4	704 <sub>0</sub>	3		2.9	mA
Ci			4.5 V to 5.5 V		3	10		10		10	pF

This is the increase in supply current for each input that is at one of the specified TTL voltage levels, rather than 0 V or VCC.

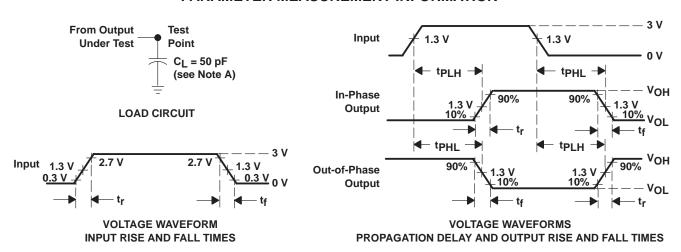
# switching characteristics over recommended operating free-air temperature range, $C_L$ = 50 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM	TO (OUTPUT)	TO T <sub>A</sub> = 25°C		SN54HCT08	SN74HC	T08	UNIT		
	(INPUT)		VCC	MIN	TYP	MAX	MIN MAX	MIN I	MAX	ONIT
4 .	t <sub>pd</sub> A or B	Y	4.5 V		15	24	35		30	20
¹рd			5.5 V		13	22	32		27	ns
	tţ	Υ	4.5 V		9	15	P 22		19	
ч			5.5 V		8	14	20		17	ns

# operating characteristics, T<sub>A</sub> = 25°C

	PARAMETER	TEST CONDITIONS	TYP	UNIT
C <sub>pd</sub>	Power dissipation capacitance per gate	No load	20	pF

#### PARAMETER MEASUREMENT INFORMATION



NOTES: A.  $C_L$  includes probe and test-fixture capacitance.

- B. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: PRR  $\leq$  1 MHz,  $Z_O = 50 \Omega$ ,  $t_r = 6$  ns,  $t_f = 6$  ns.
- C. The outputs are measured one at a time with one input transition per measurement.
- D. tplH and tpHL are the same as tpd.

Figure 1. Load Circuit and Voltage Waveforms





# **PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	e Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
SN74HCT08D	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT08DBLE	OBSOLETE	SSOP	DB	14		TBD	Call TI	Call TI
SN74HCT08DBR	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT08DBRE4	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT08DBRG4	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT08DE4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT08DG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT08DR	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT08DRE4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT08DRG4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT08DT	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT08DTE4	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT08DTG4	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT08N	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74HCT08NE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74HCT08NSR	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT08NSRE4	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT08NSRG4	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT08PW	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT08PWE4	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT08PWG4	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT08PWLE	OBSOLETE	TSSOP	PW	14		TBD	Call TI	Call TI
SN74HCT08PWR	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT08PWRE4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT08PWRG4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT08PWT	ACTIVE	TSSOP	PW	14	250	Green (RoHS &	CU NIPDAU	Level-1-260C-UNLIM



### PACKAGE OPTION ADDENDUM

18-Sep-2008

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins Pa	ackage Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
						no Sb/Br)		
SN74HCT08PWTE4	ACTIVE	TSSOP	PW	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT08PWTG4	ACTIVE	TSSOP	PW	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

(1) 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.

(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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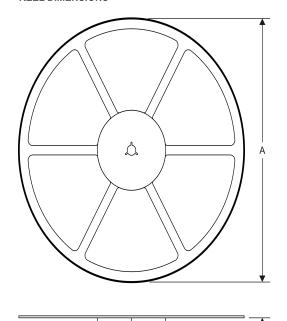
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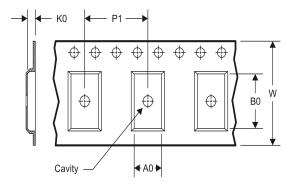
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# TAPE AND REEL INFORMATION

#### **REEL 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
SN74HCT08DBR	SSOP	DB	14	2000	330.0	16.4	8.2	6.6	2.5	12.0	16.0	Q1
SN74HCT08DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74HCT08DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74HCT08DT	SOIC	D	14	250	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74HCT08NSR	SO	NS	14	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN74HCT08PWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74HCT08PWT	TSSOP	PW	14	250	330.0	12.4	6.9	5.6	1.6	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)
SN74HCT08DBR	SSOP	DB	14	2000	367.0	367.0	38.0
SN74HCT08DR	SOIC	D	14	2500	333.2	345.9	28.6
SN74HCT08DR	SOIC	D	14	2500	367.0	367.0	38.0
SN74HCT08DT	SOIC	D	14	250	367.0	367.0	38.0
SN74HCT08NSR	SO	NS	14	2000	367.0	367.0	38.0
SN74HCT08PWR	TSSOP	PW	14	2000	367.0	367.0	35.0
SN74HCT08PWT	TSSOP	PW	14	250	367.0	367.0	35.0

# 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.



# 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

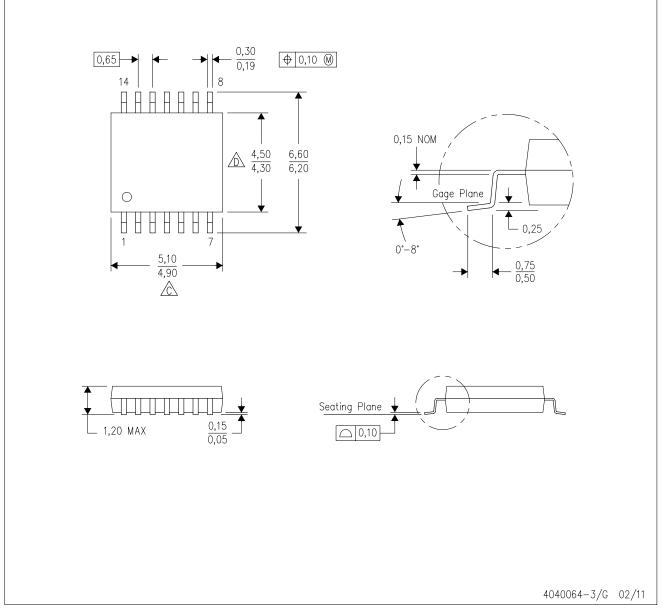


- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact 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

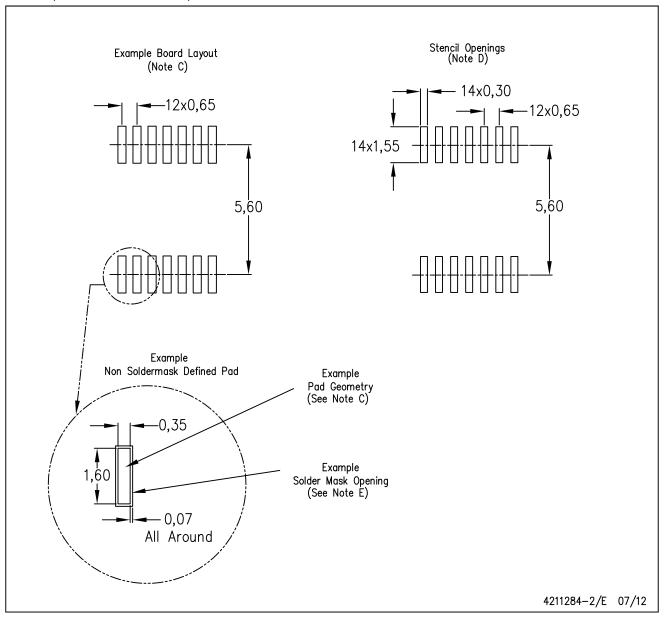


- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M—1994.
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
- Body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



# **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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