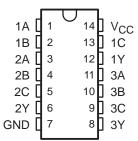
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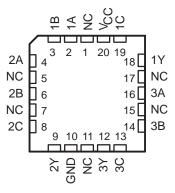
- 2-V to 6-V V<sub>CC</sub> Operation
- Inputs Accept Voltages to 6 V

SN54AC10... J OR W PACKAGE SN74AC10... D, DB, N, NS, OR PW PACKAGE (TOP VIEW)



### Max t<sub>pd</sub> of 6.5 ns at 5 V





NC - No internal connection

#### description/ordering information

The 'AC10 devices contain three independent 3-input NAND gates. The devices perform the Boolean function  $Y = \overline{A \cdot B \cdot C}$  or  $Y = \overline{A} + \overline{B} + \overline{C}$  in positive logic.

#### **ORDERING INFORMATION**

TA	PACKAGI	Ε†	ORDERABLE PART NUMBER	TOP-SIDE MARKING
	PDIP – N	Tube	SN74AC10N	SN74AC10N
	0010 D	Tube	SN74AC10D	1010
	SOIC - D	Tape and reel	SN74AC10DR	AC10
-40°C to 85°C	SOP - NS	Tape and reel	SN74AC10NSR	AC10
	SSOP – DB	Tape and reel	SN74AC10DBR	AC10
	TOCOD DW	Tube	SN74AC10PW	1010
	TSSOP – PW	Tape and reel	SN74AC10PWR	AC10
	CDIP – J	Tube	SNJ54AC10J	SNJ54AC10J
-55°C to 125°C	CFP – W	Tube	SNJ54AC10W	SNJ54AC10W
	LCCC – FK	Tube	SNJ54AC10FK	SNJ54AC10FK

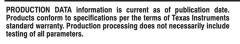
<sup>†</sup> Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

# FUNCTION TABLE (each gate)

	INPUTS	OUTPUT	
Α	В	С	Y
Н	Н	Н	L
L	X	Χ	Н
Х	L	Χ	Н
Х	X	L	Н

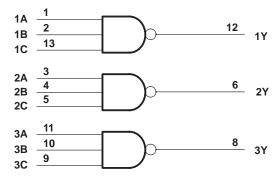


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#### logic diagram, each gate (positive logic)



Pin numbers shown are for the D, DB, J, N, NS, PW, and W packages.

### 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 voltage range, V <sub>I</sub> (see Note 1)		
Output voltage range, VO (see Note 1)		$0.5 \text{ V to V}_{CC} + 0.5 \text{ V}$
Input clamp current, $I_{IK}$ ( $V_I < 0$ or $V_I > V_{CC}$ ).		±20 mA
Output clamp current, IOK (VO < 0 or VO > VC	c)	±20 mA
Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ )		±50 mA
Continuous current through V <sub>CC</sub> or GND		±200 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>sto</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.



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.

### recommended operating conditions (see Note 3)

			SN54	AC10	SN74/	AC10	
			MIN	MAX	MIN	MAX	UNIT
VCC	Supply voltage		2	6	2	6	V
		V <sub>CC</sub> = 3 V	2.1		2.1		
$V_{IH}$	High-level input voltage	V <sub>CC</sub> = 4.5 V	3.15		3.15		V
		V <sub>CC</sub> = 5.5 V	3.85		3.85		
		V <sub>CC</sub> = 3 V		0.9		0.9	
$V_{IL}$	Low-level input voltage	V <sub>CC</sub> = 4.5 V		1.35		1.35	V
		V <sub>CC</sub> = 5.5 V		1.65		1.65	
VI	Input voltage		0	VCC	0	VCC	V
VO	Output voltage		0	VCC	0	Vcc	V
		V <sub>CC</sub> = 3 V		-12		-12	
loH	High-level output current	V <sub>CC</sub> = 4.5 V		-24		-24	mA
		V <sub>CC</sub> = 5.5 V		-24		-24	
		V <sub>CC</sub> = 3 V		12		12	
lOL	Low-level output current	V <sub>CC</sub> = 4.5 V		24		24	mA
		V <sub>CC</sub> = 5.5 V		24		24	
Δt/Δν	Input transition rise or fall rate			8		8	ns/V
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.

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

242445752	TEGT COMPLETIONS	,,	T	A = 25°C	;	SN54/	AC10	SN74	AC10	
PARAMETER	TEST CONDITIONS	VCC	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
		3 V	2.9	2.99		2.9		2.9		
	I <sub>OH</sub> = -50 μA	4.5 V	4.4	4.99		4.4		4.4		
		5.5 V	5.4	5.49		5.4		5.4		
V	$I_{OH} = -12 \text{ mA}$	3 V	2.56			2.4		2.46		V
V <sub>OH</sub>	1 24 m 1	4.5 V	3.86			3.7		3.76		V
	I <sub>OH</sub> = -24 mA	5.5 V	4.86			4.7		4.76		
	$I_{OH} = -50 \text{ mA}^{\dagger}$	5.5 V				3.85				
	$I_{OH} = -75 \text{ mA}^{\dagger}$	5.5 V						3.85		
		3 V		0.002	0.1		0.1		0.1	
	I <sub>OL</sub> = 50 μA	4.5 V		0.001	0.1		0.1		0.1	
		5.5 V		0.001	0.1		0.1		0.1	
	I <sub>OL</sub> = 12 mA	3 V			0.36		0.5		0.44	V
V <sub>OL</sub>	1- 24 m A	4.5 V			0.36		0.5		0.44	V
	I <sub>OL</sub> = 24 mA	5.5 V			0.36		0.5		0.44	
	$I_{OL} = 50 \text{ mA}^{\dagger}$	5.5 V					1.65			
	$I_{OL} = 75 \text{ mA}^{\dagger}$	5.5 V							1.65	
lį	$V_I = V_{CC}$ or GND	5.5 V			±0.1		±1		±1	μΑ
ICC	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V			2		80		20	μΑ
C <sub>i</sub>	$V_I = V_{CC}$ or GND	5 V		2.6	·				·	pF

<sup>†</sup> Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.



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# 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	T <sub>A</sub> = 25°C			SN54AC10		SN74AC10		
PARAMETER	(INPUT)	(OUTPUT)	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
t <sub>PLH</sub>	A B as C	V	1.5	6	9.5	1	11	1	10.5	
tPHL	A, B, or C	Y	1.5	5.5	8.5	1	10	1	10	ns

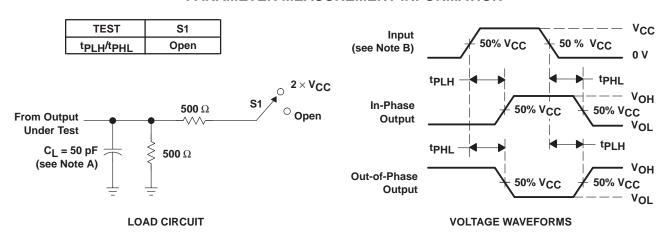
# switching characteristics over recommended operating free-air temperature range, $V_{CC}$ = 5 V $\pm$ 0.5 V (unless otherwise noted) (see Figure 1)

DADAMETED	FROM	то	T <sub>A</sub> = 25°C			SN54AC10		SN74AC10		LINUT
PARAMETER	(INPUT)	(OUTPUT)	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
<sup>t</sup> PLH	A D C	V	1.5	4.5	7	1	8.5	1	8	
t <sub>PHL</sub>	A, B, or C	Y	1.5	4	6	1	7	1	6.5	ns

### operating characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C

	PARAMETER	TEST CONDITIONS	TYP	UNIT
C <sub>pd</sub>	Power dissipation capacitance	$C_L = 50 \text{ pF}, \qquad f = 1 \text{ MHz}$	25	pF

#### PARAMETER MEASUREMENT INFORMATION



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

- B. All input pulses are supplied by generators having the following characteristics: PRR  $\leq$  1 MHz,  $Z_O = 50~\Omega$ ,  $t_f \leq 2.5$  ns,  $t_f \leq 2.5$  ns.
- C. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms



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#### **PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan	Lead finish/ Ball material	MSL Peak Temp	Op Temp (°C)	Device Marking (4/5)	Samples
5962-87610012A	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962- 87610012A SNJ54AC 10FK	Samples
5962-8761001CA	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-8761001CA SNJ54AC10J	Samples
5962-8761001DA	ACTIVE	CFP	W	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-8761001DA SNJ54AC10W	Samples
SN74AC10DBR	ACTIVE	SSOP	DB	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AC10	Samples
SN74AC10DR	ACTIVE	SOIC	D	14	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AC10	Samples
SN74AC10N	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-40 to 85	SN74AC10N	Samples
SN74AC10NSR	ACTIVE	SO	NS	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AC10	Samples
SN74AC10PWR	ACTIVE	TSSOP	PW	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AC10	Samples
SNJ54AC10FK	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962- 87610012A SNJ54AC 10FK	Samples
SNJ54AC10J	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-8761001CA SNJ54AC10J	Samples
SNJ54AC10W	ACTIVE	CFP	W	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-8761001DA SNJ54AC10W	Samples

<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.

<sup>(2)</sup> RoHS: TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

PACKAGE OPTION ADDENDUM

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RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (CI) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

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

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead finish/Ball material - Orderable Devices 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.

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#### OTHER QUALIFIED VERSIONS OF SN54AC10. SN74AC10:

Catalog : SN74AC10

Military: SN54AC10

NOTE: Qualified Version Definitions:

Catalog - TI's standard catalog product

Military - QML certified for Military and Defense Applications

## **PACKAGE MATERIALS INFORMATION**

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#### TAPE AND REEL INFORMATION





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
SN74AC10DBR	SSOP	DB	14	2000	330.0	16.4	8.35	6.6	2.4	12.0	16.0	Q1
SN74AC10DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74AC10NSR	so	NS	14	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN74AC10PWR	TSSOP	PW	14	2000	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)
SN74AC10DBR	SSOP	DB	14	2000	356.0	356.0	35.0
SN74AC10DR	SOIC	D	14	2500	356.0	356.0	35.0
SN74AC10NSR	so	NS	14	2000	356.0	356.0	35.0
SN74AC10PWR	TSSOP	PW	14	2000	356.0	356.0	35.0

## **PACKAGE MATERIALS INFORMATION**

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#### **TUBE**



\*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
5962-87610012A	FK	LCCC	20	55	506.98	12.06	2030	NA
5962-8761001DA	W	CFP	14	25	506.98	26.16	6220	NA
SN74AC10N	N	PDIP	14	25	506	13.97	11230	4.32
SN74AC10N	N	PDIP	14	25	506	13.97	11230	4.32
SNJ54AC10FK	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54AC10W	W	CFP	14	25	506.98	26.16	6220	NA

### **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.



## 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





SMALL OUTLINE PACKAGE



- 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.



SMALL OUTLINE PACKAGE



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.



SMALL OUTLINE PACKAGE



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.



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



## 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.



## 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.



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