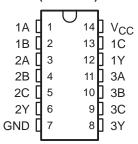
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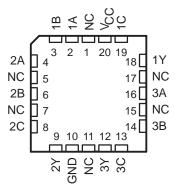
- 4.5-V to 5.5-V V<sub>CC</sub> Operation
- Inputs Accept Voltages to 5.5 V

SN54ACT10... J OR W PACKAGE SN74ACT10... D, DB, N, NS, OR PW PACKAGE (TOP VIEW)



- Max tpd of 9.5 ns at 5 V
- Inputs Are TTL-Voltage Compatible

SN54ACT10 ... FK PACKAGE (TOP VIEW)



NC - No internal connection

#### description/ordering information

The 'ACT10 devices contain three independent 3-input NAND gates. The devices perform the Boolean functions  $Y = \overline{A \cdot B \cdot C}$  or  $Y = \overline{A} + \overline{B} + \overline{C}$  in positive logic.

#### ORDERING INFORMATION

TA	PACKAGI	<u></u> =†	ORDERABLE PART NUMBER	TOP-SIDE MARKING
	PDIP – N	Tube	SN74ACT10N	SN74ACT10N
	0010 B	Tube	SN74ACT10D	AOT40
-40°C to 85°C	SOIC - D	Tape and reel	SN74ACT10DR	ACT10
	SOP - NS	Tape and reel	SN74ACT10NSR	ACT10
	SSOP – DB	Tape and reel	SN74ACT10DBR	AD10
	TOCOD DW	Tube	SN74ACT10PW	AD40
	TSSOP – PW	Tape and reel	SN74ACT10PWR	AD10
	CDIP – J	Tube	SNJ54ACT10J	SNJ54ACT10J
–55°C to 125°C	CFP – W	Tube	SNJ54ACT10W	SNJ54ACT10W
	LCCC - FK	Tube	SNJ54ACT10FK	SNJ54ACT10FK

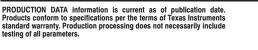
<sup>†</sup> Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

#### **FUNCTION TABLE** (each gate)

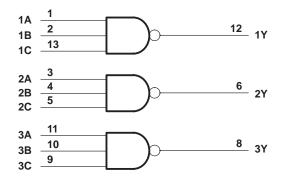
	INPUTS		OUTPUT
Α	В	С	Υ
Н	Н	Н	L
L	X	Χ	Н
Х	L	Χ	Н
Х	X	L	Н



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.



#### 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)		$\cdot \cdot -0.5 \text{ V to V}_{CC} + 0.5 \text{ V}$
Input clamp current, $I_{IK}$ ( $V_I < 0$ or $V_I > V_{CC}$ )		±20 mA
Output clamp current, I <sub>OK</sub> (V <sub>O</sub> < 0 or V <sub>O</sub> > V <sub>CO</sub>	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>stq</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)

		SN54A	CT10	SN74A	CT10	
		MIN	MAX	MIN	MAX	UNIT
Vcc	Supply voltage	4.5	5.5	4.5	5.5	V
$V_{IH}$	High-level input voltage	2		2		V
$V_{IL}$	Low-level input voltage		0.8		0.8	V
٧ <sub>I</sub>	Input voltage	0	VCC	0	VCC	V
VO	Output voltage	0	VCC	0	VCC	V
loh	High-level output current		-24		-24	mA
loL	Low-level output current		24		24	mA
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.



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.

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

242445752	TEST SOMBITIONS	.,	T	A = 25°C	;	SN54A	CT10	SN74A	CT10	
PARAMETER	TEST CONDITIONS	vcc	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
	1 50 4	4.5 V	4.4	4.49		4.4		4.4		
	I <sub>OH</sub> = -50 μA	5.5 V	5.4	5.49		5.4		5.4		
V	1	4.5 V	3.86			3.7		3.76		V
VOH	I <sub>OH</sub> = -24 mA	5.5 V	4.86			4.7		4.76		V
	$I_{OH} = -50 \text{ mA}^{\dagger}$	5.5 V				3.85				
	$I_{OH} = -75 \text{ mA}^{\dagger}$	5.5 V						3.85		
	I 50 A	4.5 V		0.001	0.1		0.1		0.1	
	$I_{OL} = 50 \mu\text{A}$	5.5 V		0.001	0.1		0.1		0.1	
.,,		4.5 V			0.36		0.5		0.44	V
VOL	$I_{OL} = 24 \text{ mA}$	5.5 V			0.36		0.5		0.44	
	I <sub>OL</sub> = 50 mA <sup>†</sup>	5.5 V					1.65			
	I <sub>OL</sub> = 75 mA <sup>†</sup>	5.5 V							1.65	
I <sub>I</sub>	$V_I = V_{CC}$ or GND	5.5 V			±0.1		±1		±1	μΑ
Icc	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V			4		80		40	μΑ
Δl <sub>CC</sub> ‡	One input at 3.4 V, Other inputs at GND or V <sub>CC</sub>	5.5 V		0.6	_		1.6		1.5	mA
Ci	$V_I = V_{CC}$ 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.

# 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			SN54ACT10		SN74ACT10		LINUT
PARAMETER	(INPUT)	(OUTPUT)	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
t <sub>PLH</sub>	A	Υ	1	6.5	9	1	10	1	10	
<sup>t</sup> PHL	Any		1	6.5	9	1	9.5	1	9.5	ns

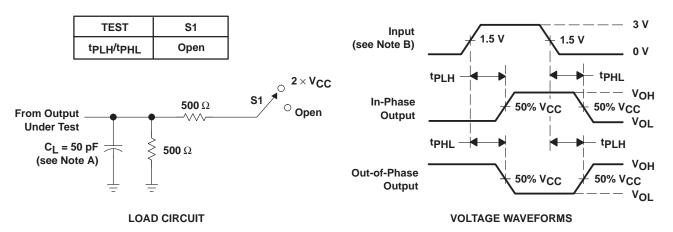
# operating characteristics, $V_{CC} = 5 \text{ V}$ , $T_A = 25^{\circ}\text{C}$

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

<sup>‡</sup> 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.

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#### PARAMETER MEASUREMENT INFORMATION



NOTES: A. C<sub>L</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.
- 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 <sup>(2)</sup>	Lead/ Ball Finish	MSL Peak Temp <sup>(3)</sup>	Samples (Requires Login)
5962-9218201M2A	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Call TI	
5962-9218201MCA	ACTIVE	CDIP	J	14	1	TBD	Call TI	Call TI	
5962-9218201MDA	ACTIVE	CFP	W	14	1	TBD	Call TI	Call TI	
SN74ACT10D	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ACT10DBLE	OBSOLETE	SSOP	DB	14		TBD	Call TI	Call TI	
SN74ACT10DBR	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ACT10DBRE4	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ACT10DBRG4	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ACT10DE4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ACT10DG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ACT10DR	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ACT10DRE4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ACT10DRG4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ACT10N	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74ACT10NE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74ACT10PW	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ACT10PWE4	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ACT10PWG4	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ACT10PWLE	OBSOLETE	TSSOP	PW	14		TBD	Call TI	Call TI	
SN74ACT10PWR	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	



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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)
SN74ACT10PWRE4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ACT10PWRG4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SNJ54ACT10FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	
SNJ54ACT10J	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	
SNJ54ACT10W	ACTIVE	CFP	W	14	1	TBD	A42	N / A for Pkg Type	

(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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#### OTHER QUALIFIED VERSIONS OF SN54ACT10, SN74ACT10:

Catalog: SN74ACT10



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Automotive: SN74ACT10-Q1, SN74ACT10-Q1

Military: SN54ACT10

NOTE: Qualified Version Definitions:

- Catalog TI's standard catalog product
- Automotive Q100 devices qualified for high-reliability automotive applications targeting zero defects
- Military QML certified for Military and Defense Applications

# PACKAGE MATERIALS INFORMATION

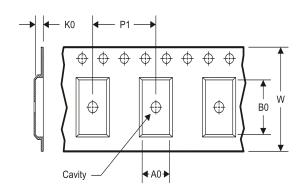
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## TAPE AND REEL INFORMATION

#### **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	Package	Pins	SPQ	Reel	Reel	Α0	В0	K0	P1	w	Pin1
201.00	Type	Drawing		0. 4	Diameter		(mm)	(mm)	(mm)	(mm)		Quadrant
SN74ACT10DBR	SSOP	DB	14	2000	330.0	16.4	8.2	6.6	2.5	12.0	16.0	Q1
SN74ACT10DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74ACT10PWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1

**PACKAGE MATERIALS INFORMATION** 

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\*All dimensions are nominal

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Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ACT10DBR	SSOP	DB	14	2000	367.0	367.0	38.0
SN74ACT10DR	SOIC	D	14	2500	367.0	367.0	38.0
SN74ACT10PWR	TSSOP	PW	14	2000	367.0	367.0	35.0

# 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.



# 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.



## 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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