

# SN54ALS10A, SN54AS10, SN74ALS10A, SN74AS10 TRIPLE 3-INPUT POSITIVE-NAND GATES

SDAS002B – MARCH 1984 – REVISED DECEMBER 1994

- Package Options Include Plastic Small-Outline (D) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

## description

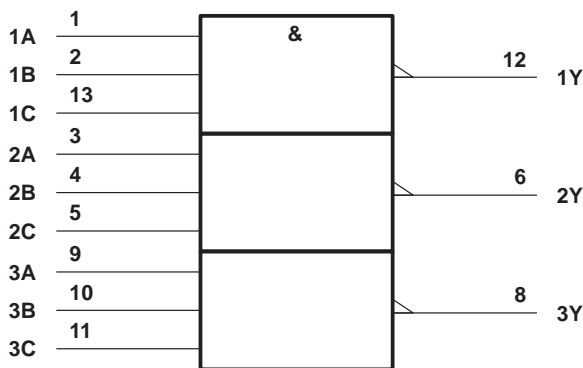
These devices contain three independent 3-input positive-NAND gates. They perform the Boolean functions  $Y = A \cdot B \cdot C$  or  $Y = \overline{A + B + C}$  in positive logic.

The SN54ALS10A and SN54AS10 are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74ALS10A and SN74AS10 are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

FUNCTION TABLE  
(each gate)

INPUTS			OUTPUT
A	B	C	Y
H	H	H	L
L	X	X	H
X	L	X	H
X	X	L	H

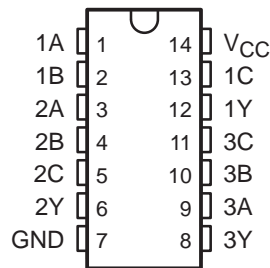
## logic symbol†



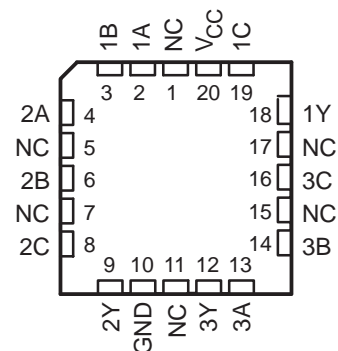
† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

Pin numbers shown are for the D, J, and N packages.

SN54ALS10A, SN54AS10 . . . J PACKAGE  
SN74ALS10A, SN74AS10 . . . D OR N PACKAGE  
(TOP VIEW)

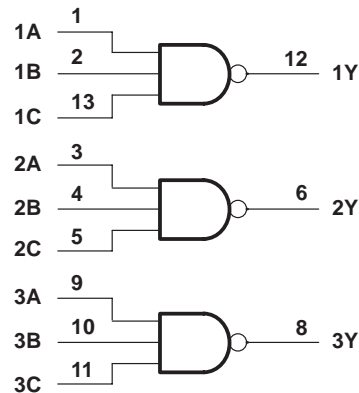


SN54ALS10A, SN54AS10 . . . FK PACKAGE  
(TOP VIEW)



NC – No internal connection

## logic diagram (positive logic)



# SN54ALS10A, SN54AS10, SN74ALS10A, SN74AS10 TRIPLE 3-INPUT POSITIVE-NAND GATES

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

Supply voltage, $V_{CC}$ .....	7 V
Input voltage, $V_I$ .....	7 V
Operating free-air temperature range, $T_A$ : SN54ALS10A .....	–55°C to 125°C
SN74ALS10A .....	0°C to 70°C
Storage temperature range .....	–65°C to 150°C

† 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

		SN54ALS10A			SN74ALS10A			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
$V_{CC}$	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
$V_{IH}$	High-level input voltage	2			2			V
$V_{IL}$	Low-level input voltage	0.8‡			0.8			V
		0.7§						
$I_{OH}$	High-level output current	–0.4			–0.4			mA
$I_{OL}$	Low-level output current	4			8			mA
$T_A$	Operating free-air temperature	–55	125		0	70		°C

‡ Applies over temperature range –55°C to 70°C

§ Applies over temperature range 70°C to 125°C

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

PARAMETER	TEST CONDITIONS	SN54ALS10A			SN74ALS10A			UNIT
		MIN	TYP†	MAX	MIN	TYP†	MAX	
$V_{IK}$	$V_{CC} = 4.5$ V, $I_I = -18$ mA	–1.5			–1.5			V
$V_{OH}$	$V_{CC} = 4.5$ V to 5.5 V, $I_{OH} = -0.4$ mA	$V_{CC} - 2$			$V_{CC} - 2$			V
$V_{OL}$	$V_{CC} = 4.5$ V	0.25 0.4			0.25 0.4			V
					0.35 0.5			
$I_I$	$V_{CC} = 5.5$ V, $V_I = 7$ V	0.1			0.1			mA
$I_{IH}$	$V_{CC} = 5.5$ V, $V_I = 2.7$ V	20			20			μA
$I_{IL}$	$V_{CC} = 5.5$ V, $V_I = 0.4$ V	–0.1			–0.1			mA
$I_{O\#}$	$V_{CC} = 5.5$ V, $V_O = 2.25$ V	–20	–112		–30	–112		mA
$I_{CCH}$	$V_{CC} = 5.5$ V, $V_I = 0$	0.32	0.6		0.32	0.6		mA
$I_{CCL}$	$V_{CC} = 5.5$ V, $V_I = 4.5$ V	1.2	2.2		1.2	2.2		mA

† All typical values are at  $V_{CC} = 5$  V,  $T_A = 25$ °C.

# The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current,  $I_{OS}$ .



# SN54ALS10A, SN54AS10, SN74ALS10A, SN74AS10 TRIPLE 3-INPUT POSITIVE-NAND GATES

SDAS002B – MARCH 1984 – REVISED DECEMBER 1994

## switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 4.5 V to 5.5 V, C <sub>L</sub> = 50 pF, R <sub>L</sub> = 500 Ω, T <sub>A</sub> = MIN to MAX†				UNIT
			SN54ALS10A		SN74ALS10A		
			MIN	MAX	MIN	MAX	
t <sub>PLH</sub>	A, B, or C	Y	2	12	2	11	ns
t <sub>PHL</sub>			2	12	2	10	

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

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

Supply voltage, V <sub>CC</sub>	7 V
Input voltage, V <sub>I</sub>	7 V
Operating free-air temperature range, T <sub>A</sub> : SN54AS10	–55°C to 125°C
SN74AS10	0°C to 70°C
Storage temperature range	–65°C to 150°C

‡ 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

	SN54AS10			SN74AS10			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
V <sub>CC</sub> Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V <sub>IH</sub> High-level input voltage	2			2			V
V <sub>IL</sub> Low-level input voltage			0.8			0.8	V
I <sub>OH</sub> High-level output current			–2			–2	mA
I <sub>OL</sub> Low-level output current			20			20	mA
T <sub>A</sub> Operating free-air temperature	–55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS	SN54AS10			SN74AS10			UNIT
		MIN	TYP§	MAX	MIN	TYP§	MAX	
V <sub>IK</sub>	V <sub>CC</sub> = 4.5 V, I <sub>I</sub> = –18 mA			–1.2			–1.2	V
V <sub>OH</sub>	V <sub>CC</sub> = 4.5 V to 5.5 V, I <sub>OH</sub> = –2 mA	V <sub>CC</sub> – 2			V <sub>CC</sub> – 2			V
V <sub>OL</sub>	V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 20 mA		0.35	0.5		0.35	0.5	V
I <sub>I</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 7 V			0.1			0.1	mA
I <sub>IH</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 2.7 V			20			20	μA
I <sub>IL</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0.4 V			–0.5			–0.5	mA
I <sub>O</sub> ¶	V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 2.25 V	–30		–112	–30		–112	mA
I <sub>CCH</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0		1.5	2.4		1.5	2.4	mA
I <sub>CCL</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 4.5 V		8.1	13		8.1	13	mA

§ All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C.

¶ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I<sub>OS</sub>.



# SN54ALS10A, SN54AS10, SN74ALS10A, SN74AS10 TRIPLE 3-INPUT POSITIVE-NAND GATES

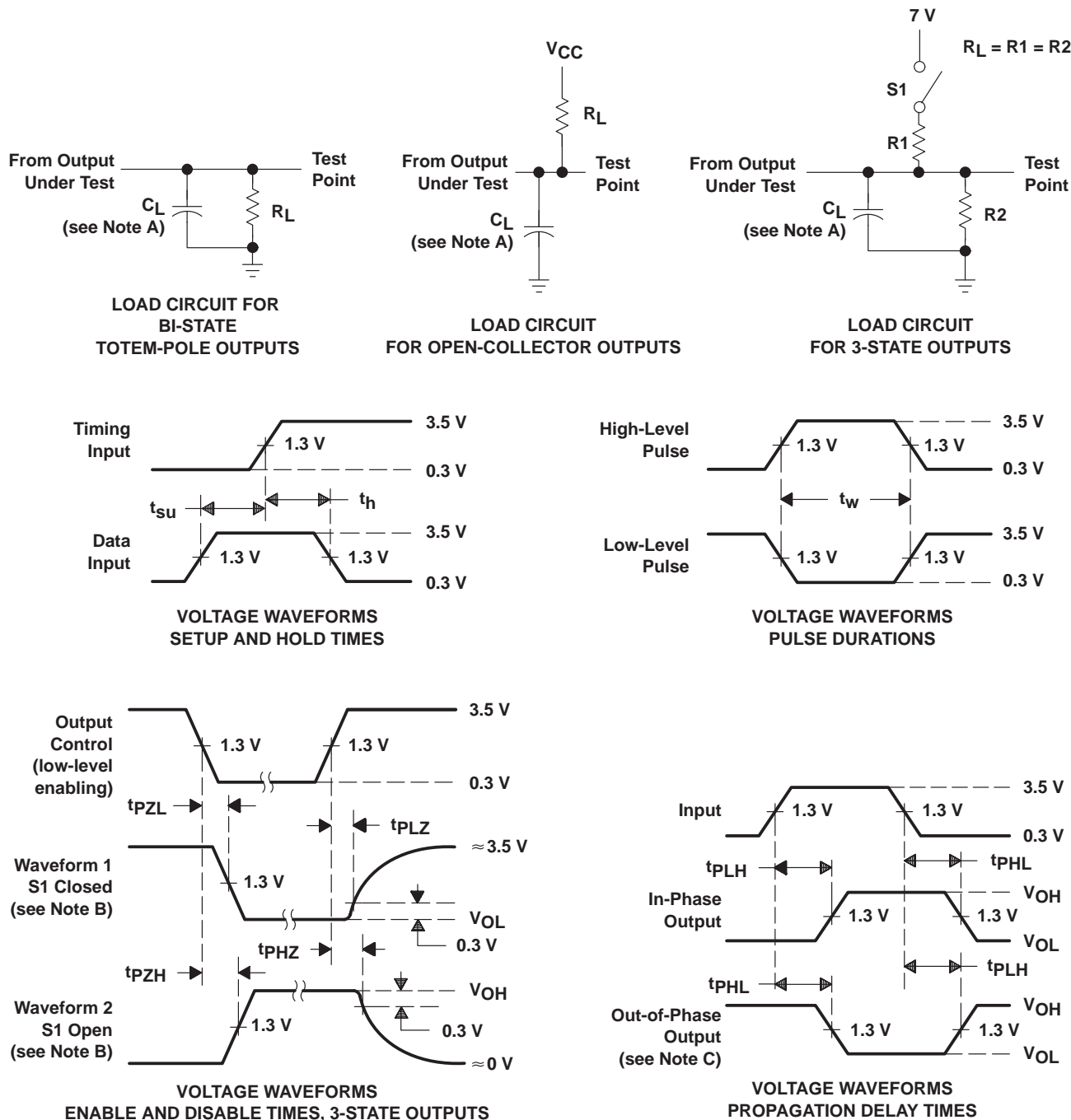
SDAS002B – MARCH 1984 – REVISED DECEMBER 1994

## switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V},$ $C_L = 50 \text{ pF},$ $R_L = 500 \Omega,$ $T_A = \text{MIN to MAX}^\dagger$				UNIT
			SN54AS10		SN74AS10		
			MIN	MAX	MIN	MAX	
$t_{PLH}$	A, B, or C	Y	1	5	1	4.5	ns
$t_{PHL}$			1	5	1	4.5	

<sup>†</sup> For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

PARAMETER MEASUREMENT INFORMATION  
SERIES 54ALS/74ALS AND 54AS/74AS DEVICES



- 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. When measuring propagation delay items of 3-state outputs, switch S1 is open.  
 D. All input pulses have the following characteristics:  $PRR \leq 1$  MHz,  $t_r = t_f = 2$  ns, duty cycle = 50%.  
 E. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuits and Voltage Waveforms

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## SN74ALS10A, Triple 3-Input Positive-NAND Gates

DEVICE STATUS: **ACTIVE**

PARAMETER NAME	SN54ALS10A	SN74ALS10A
Voltage Nodes (V)	5	5
Vcc range (V)	4.5 to 5.5	4.5 to 5.5
Input Level	TTL	TTL
Output Level	TTL	TTL
Output Drive (mA)		-0.4/8
No. of Gates	3	3
Static Current		1.4
tpd max (ns)		11

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- Package Options Include Plastic Small-Outline (D) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

### DESCRIPTION

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

The SN54ALS10A and SN54AS10 are characterized for operation over the full military temperature range of -55°C to 125°C. The SN74ALS10A and SN74AS10 are characterized for operation from 0°C to 70°C.

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### DATASHEET

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Full datasheet in Acrobat PDF: [sn74als10a.pdf](#) (95 KB, Rev.B) (Updated: 12/01/1994)

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- [Logic Selection Guide Second Half 2002 \(Rev. R\)](#) (SDYU001R, 4274 KB - Updated: 07/19/2002)
- [Military Semiconductors Selection Guide 2002 \(Rev. B\)](#) (SGYC003B, 1648 KB - Updated: 04/22/2002)

**PRICING/AVAILABILITY/PKG**

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DEVICE INFORMATION							TI INVENTORY STATUS AS OF 3:00 PM GMT, 26 Sep 2002			REPORTED DISTRIBUTOR INVENTORY AS OF 3:00 PM GMT, 26 Sep 2002		
ORDERABLE DEVICE	STATUS	PACKAGE TYPE PINS	TEMP (°C)	PRODUCT CONTENT	BUDGETARY PRICING QTY   SUS	STD PACK QTY	IN STOCK	IN PROGRESS QTY DATE	LEAD TIME	DISTRIBUTOR COMPANY REGION	IN STOCK	PURCHASE
SN74ALS10AD	ACTIVE	<a href="#">SOP (D)</a>   14	0 TO 70	<a href="#">View Contents</a>	1KU   0.24	50	<a href="#">N/A*</a>	2950   19 Sep	5 WKS	<a href="#">Avnet</a>   AMERICA	> 1k	<a href="#">BUY NOW</a>
								8690   07 Oct				
								> 10k   14 Oct				
								> 10k   21 Oct				
SN74ALS10ADR	ACTIVE	<a href="#">SOP (D)</a>   14	0 TO 70	<a href="#">View Contents</a>	1KU   0.27	2500	2500	47   25 Sep	5 WKS	<a href="#">Avnet</a>   AMERICA	> 1k	<a href="#">BUY NOW</a>
								8645   04 Oct				
								> 10k   11 Oct				
								> 10k   18 Oct				
SN74ALS10AN	ACTIVE	<a href="#">PDIP (N)</a>   14	0 TO 70	<a href="#">View Contents</a>	1KU   0.22	25	6975	1225   19 Sep	5 WKS	<a href="#">Avnet</a>   AMERICA	> 1k	<a href="#">BUY NOW</a>
								4026   23 Sep				
								> 10k   07 Oct				
								> 10k   25 Nov				
								> 10k   09 Dec				
SN74ALS10ANSR	ACTIVE	<a href="#">SOP (NS)</a>   14		<a href="#">View Contents</a>	1KU   0.22	2000	<a href="#">N/A*</a>	732   23 Sep	5 WKS			
								8647   04 Oct				



								> 10k   11 Oct			
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## SN74AS10, Triple 3-Input Positive-NAND Gates

DEVICE STATUS: **ACTIVE**

PARAMETER NAME	SN54AS10	SN74AS10
Voltage Nodes (V)	5	5
Vcc range (V)	4.5 to 5.5	4.5 to 5.5
Input Level	TTL	TTL
Output Level	TTL	TTL
Output Drive (mA)		-2/20
No. of Gates	3	3
Static Current		7.7
tpd max (ns)		4.5

### FEATURES

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- Package Options Include Plastic Small-Outline (D) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

### DESCRIPTION

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

The SN54ALS10A and SN54AS10 are characterized for operation over the full military temperature range of -55°C to 125°C. The SN74ALS10A and SN74AS10 are characterized for operation from 0°C to 70°C.

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- [Designing With Logic \(Rev. C\)](#) (SDYA009C - Updated: 06/01/1997)
- [Evaluation of Nickel/Palladium/Gold-Finished Surface-Mount Integrated Circuits](#) (SZZA026 - Updated: 06/20/2001)
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ORDERABLE DEVICE	STATUS	PACKAGE TYPE PINS	TEMP (°C)	PRODUCT CONTENT	BUDGETARY PRICING QTY   SUS	STD PACK QTY	IN STOCK	IN PROGRESS QTY DATE	LEAD TIME	DISTRIBUTOR COMPANY REGION	IN STOCK	PURCHASE
SN74AS10D	ACTIVE	<a href="#">SOP</a> <a href="#">(D)</a>   14	0 TO 70	<a href="#">View Contents</a>	1KU   0.42	50	<a href="#">N/A*</a>	>10k   07 Oct	5 WKS	<a href="#">Avnet</a>   AMERICA	194	<b>BUY NOW</b>
								>10k   14 Oct				
								>10k   21 Oct				
SN74AS10DR	ACTIVE	<a href="#">SOP</a> <a href="#">(D)</a>   14	0 TO 70	<a href="#">View Contents</a>	1KU   0.45	2500	<a href="#">N/A*</a>	586   25 Sep	5 WKS			
								>10k   03 Oct				
								>10k   10 Oct				
								>10k   17 Oct				
SN74AS10N	ACTIVE	<a href="#">PDIP</a> <a href="#">(N)</a>   14	0 TO 70	<a href="#">View Contents</a>	1KU   0.42	25	<a href="#">N/A*</a>	275   24 Sep	5 WKS			
								10   25 Sep				
								475   27 Sep				
								965   30 Sep				
								>10k   03 Oct				
SN74AS10N3	OBSOLETE	<a href="#">PDIP</a> <a href="#">(N)</a>   14	0 TO 70	<a href="#">View Contents</a>	1KU		<a href="#">N/A*</a>		Not Available			
SN74AS10NSR	ACTIVE	<a href="#">SOP</a> <a href="#">(NS)</a>   14		<a href="#">View Contents</a>	1KU   0.42	2000	<a href="#">N/A*</a>	>10k   07 Oct	5 WKS			
								>10k   14 Oct				

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