- **Functionally Equivalent to AMD's AM29823 and AM29824**
- **Provide Extra Data Width Necessary for Wider Address/Data Paths or Buses With Parity**
- **Outputs Have Undershoot-Protection Circuitry**
- **Power-Up High-Impedance State**
- **Buffered Control Inputs to Reduce dc Loading Effects**
- **Package Options Include Plastic Small-Outline (DW) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (NT) and Ceramic (JT) 300-mil DIPs**

description

These 9-bit flip-flops feature 3-state outputs designed specifically for driving highly capacitive or relatively low-impedance loads. These devices are particularly suitable for implementing wider buffer registers, I/O ports, bidirectional bus drivers, parity bus interfacing, and working registers.

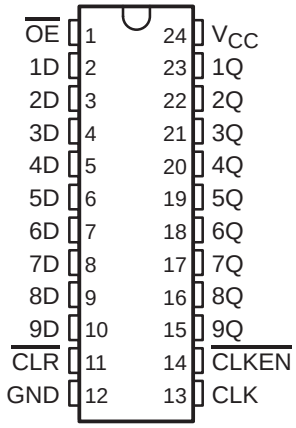
With the clock-enable ($\overline{CLKEN}$) input low, the nine D-type edge-triggered flip-flops enter data on the low-to-high transitions of the clock (CLK) input. Taking $\overline{CLKEN}$ high disables the clock buffer, latching the outputs. The SN54AS823A and SN74AS823A have noninverting data (D) inputs and the SN74AS824A has inverting ($\overline{D}$) inputs. Taking the clear ($\overline{CLR}$) input low causes the nine Q outputs to go low independently of the clock.

A buffered output-enable ($\overline{OE}$) input can be used to place the nine outputs in either a normal logic state (high or low logic level) or the high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance state and increased drive provide the capability to drive bus lines without interface or pullup components.

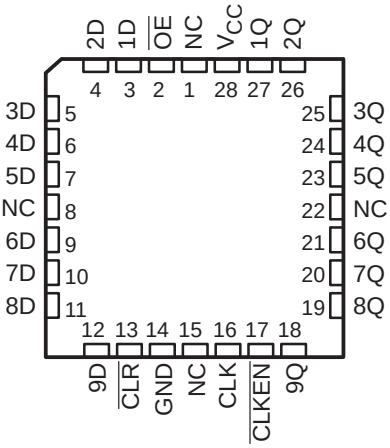
$\overline{OE}$ does not affect the internal operation of the flip-flops. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

The SN54AS823A is characterized for operation over the full military temperature range of –55°C to 125°C. The SN74AS823A and SN74AS824A are characterized for operation from 0°C to 70°C.

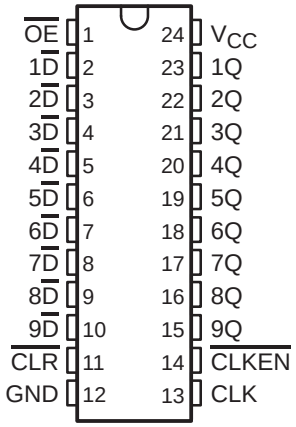
SN54AS823A . . . JT PACKAGE
SN74AS823A . . . DW OR NT PACKAGE
(TOP VIEW)



SN54AS823A . . . FK PACKAGE
(TOP VIEW)



SN74AS824A . . . DW OR NT PACKAGE
(TOP VIEW)



NC – No internal connection

Function Tables

SN54AS823A, SN74AS823A
(each flip-flop)

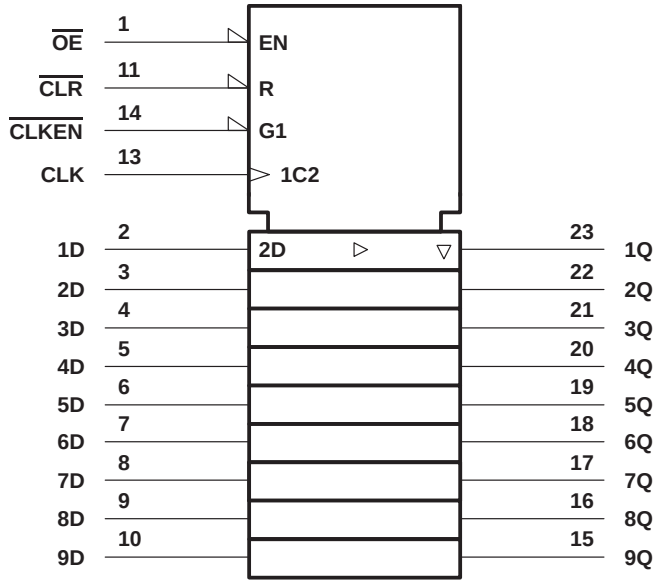
INPUTS					OUTPUT
$\overline{OE}$	$\overline{CLR}$	$\overline{CLKEN}$	CLK	D	Q
L	L	X	X	X	L
L	H	L	↑	H	H
L	H	L	↑	L	L
L	H	H	X	X	Q_0
H	X	X	X	X	Z

SN74AS824A
(each flip-flop)

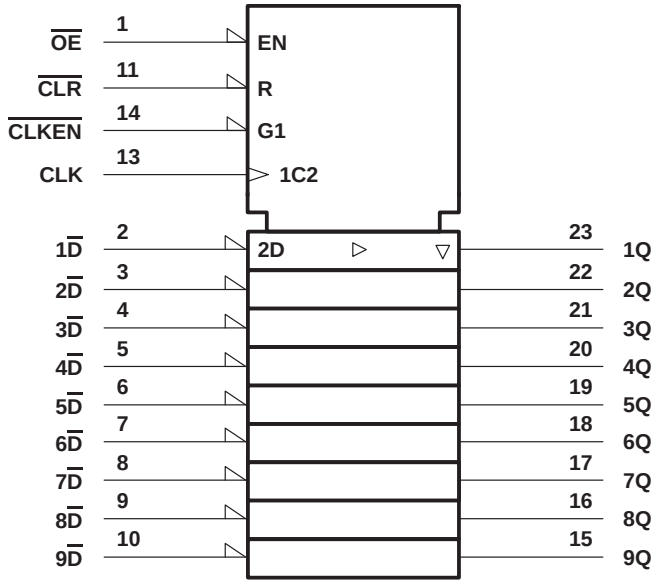
INPUTS					OUTPUT
$\overline{OE}$	$\overline{CLR}$	$\overline{CLKEN}$	CLK	$\overline{D}$	Q
L	L	X	X	X	L
L	H	L	↑	H	L
L	H	L	↑	L	H
L	H	H	X	X	Q_0
H	X	X	X	X	Z

logic symbols†

SN54AS823A, SN74AS823A



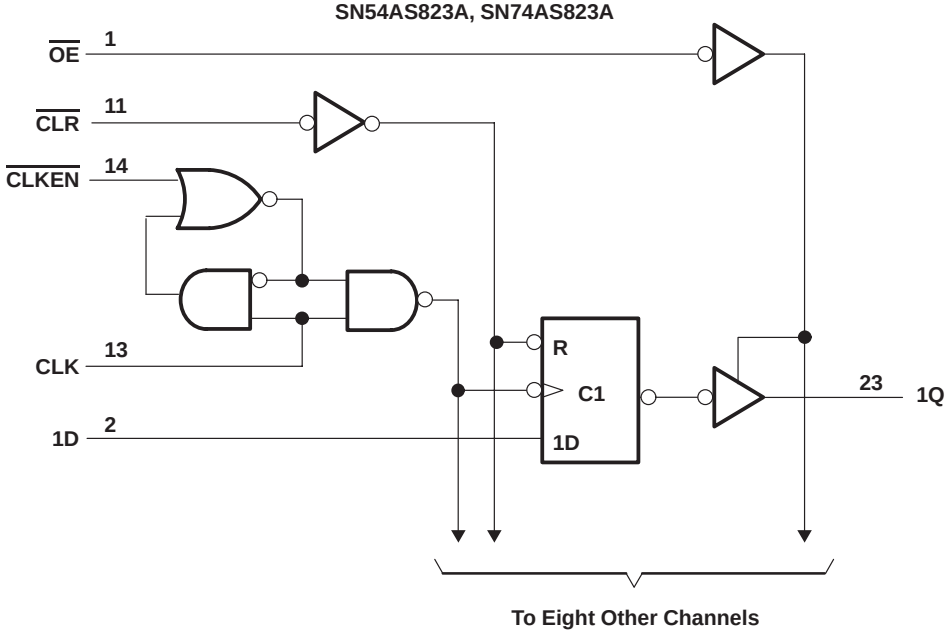
SN74AS824A



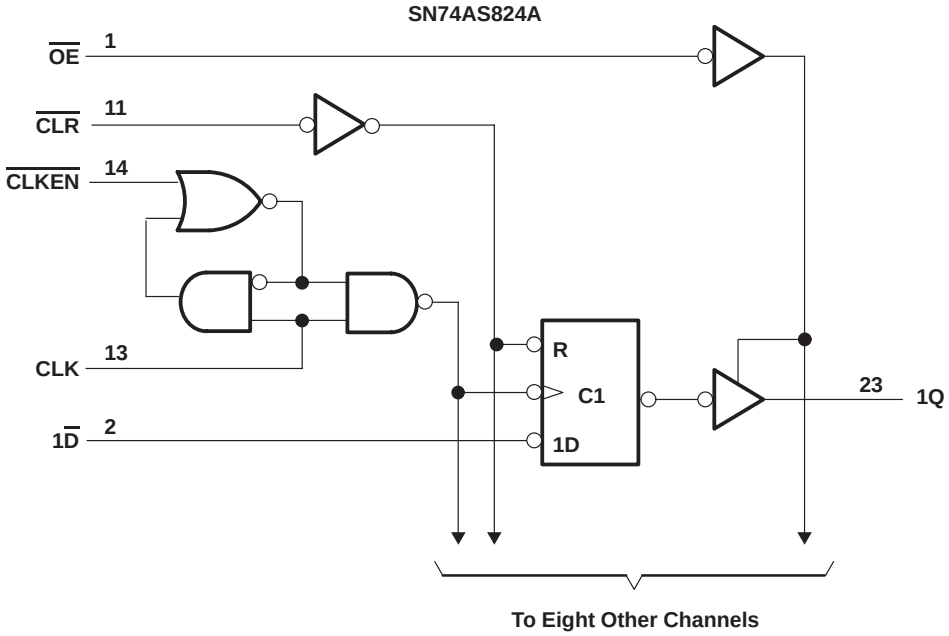
† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for the DW, JT, and NT packages.

logic diagrams (positive logic)

SN54AS823A, SN74AS823A



SN74AS824A



Pin numbers shown are for the DW, JT, and NT packages.

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

Supply voltage, V_{CC} . . . . . 7 V
Input voltage, V_I . . . . . 7 V
Voltage applied to a disabled 3-state output . . . . . 5.5 V
Operating free-air temperature range, T_A: SN54AS823A . . . . . –55°C to 125°C
SN74AS823A, SN74AS824A . . . . . 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

			SN54AS823A			SN74AS823A SN74AS824A			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
I_{OH}	High-level output current				–24			–24	mA
I_{OL}	Low-level output current				32			48	mA
t_w*	Pulse duration	$\overline{CLR}$ low	7.5			6.5			ns
		CLK high or low	9.5			8			
t_{su}*	Setup time before CLK↑	$\overline{CLR}$ high	8			8			ns
		Data	7			6			
		$\overline{CLKEN}$ high or low	8.5			7.5			
t_h*	Hold time after CLK↑	$\overline{CLKEN}$ low	0			0			ns
T_A	Operating free-air temperature		–55		125	0		70	°C

* On products compliant to MIL-STD-883, Class B, this parameter is based on characterization data but is not production tested.

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

PARAMETER		TEST CONDITIONS		SN54AS823A			SN74AS823A SN74AS824A			UNIT
				MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}		V_{CC} = 4.5 V,	I_I = –18 mA			–1.2			–1.2	V
V_{OH}		V_{CC} = 4.5 V to 5.5 V,	I_{OH} = –2 mA	V_{CC} –2			V_{CC} –2			V
		V_{CC} = 4.5 V	I_{OH} = –15 mA	2.4	3.2		2.4	3.2		
			I_{OH} = –24 mA	2			2			
V_{OL}		V_{CC} = 4.5 V	I_{OL} = 32 mA		0.3	0.5				V
			I_{OL} = 48 mA					0.35	0.5	
I_{OZH}		V_{CC} = 5.5 V,	V_O = 2.7 V			50			50	µA
I_{OZL}		V_{CC} = 5.5 V,	V_I = 0.4 V			–50			–50	µA
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			–0.5			–0.5	mA
I_O‡		V_{CC} = 5.5 V,	V_O = 2.25 V	–30		–112	–30		–112	mA
I_{CC}	SN54AS823A, SN74AS823A	V_{CC} = 5.5 V	Outputs high		49	80		49	80	mA
			Outputs low		61	100		61	100	
			Outputs disabled		64	103		64	103	
	SN74AS824A	V_{CC} = 5.5 V	Outputs high		49	80		49	80	
			Outputs low		61	100		61	100	
			Outputs disabled		64	103		64	103	

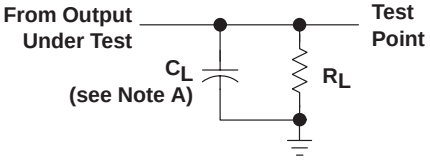
† All typical values are at V_{CC} = 5 V, T_A = 25°C.
‡ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS}.

switching characteristics (see Figure 1)

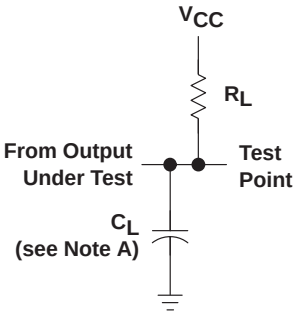
PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX§				UNIT
			SN54AS823A		SN74AS823A SN74AS824A		
			MIN	MAX	MIN	MAX	
t_{PLH}	CLK	Any Q	3.5	9	3.5	7.5	ns
t_{PHL}			3.5	14	3.5	13	
t_{PHL}	$\overline{CLR}$	Any Q	3.5	16.5	3.5	15.5	ns
t_{PZH}	$\overline{OE}$	Any Q	4	12	4	11	ns
t_{PZL}			4	13	4	12	
t_{PHZ}	$\overline{OE}$	Any Q	1	10	1	8	ns
t_{PLZ}			1	10	1.5	8	

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

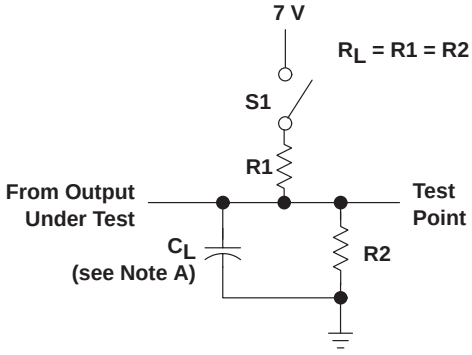
PARAMETER MEASUREMENT INFORMATION
SERIES 54ALS/74ALS AND 54AS/74AS DEVICES



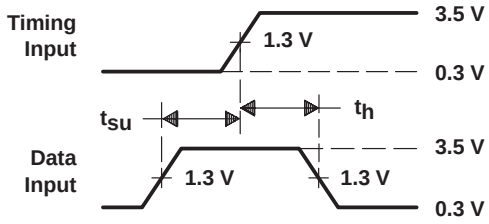
LOAD CIRCUIT FOR
BI-STATE
TOTEM-POLE OUTPUTS



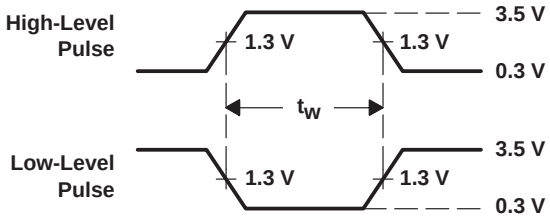
LOAD CIRCUIT
FOR OPEN-COLLECTOR OUTPUTS



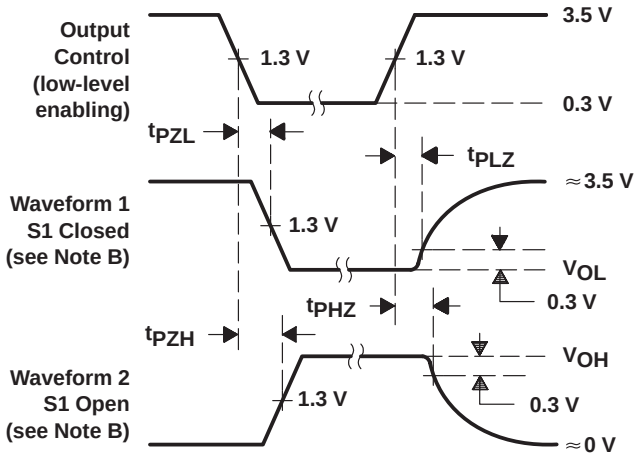
LOAD CIRCUIT
FOR 3-STATE OUTPUTS



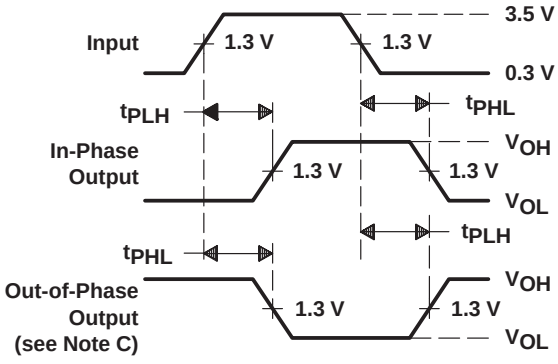
VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
PULSE DURATIONS



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES, 3-STATE OUTPUTS



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES

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 ≤ 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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SN54AS823A, 9-Bit Bus Interface Flip-Flops With 3-State Outputs
DEVICE STATUS: **ACTIVE**

PARAMETER NAME	SN74AS823A
Voltage Nodes (V)	5
Vcc range (V)	4.5 to 5.5
Input Level	TTL
Output Level	TTL
Output Drive (mA)	-24/48
No. of Outputs	9
Static Current	90
th (ns)	0
tpd max (ns)	13
tsu (ns)	6
Logic	True

FEATURES

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- Outputs Have Undershoot-Protection Circuitry
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- Buffered Control Inputs to Reduce dc Loading Effects
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DESCRIPTION

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Product Folder: SN54AS823A, 9-Bit Bus Interface Flip-Flops With 3-State Outputs

TECHNICAL DOCUMENTS

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To view the following documents, Acrobat Reader 4.0 is required.
To download a document to your hard drive, right-click on the link and choose 'Save'.

DATASHEET

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Full datasheet in Acrobat PDF: sn54as823a.pdf (112 KB,Rev.A) (Updated: 08/01/1995)

APPLICATION NOTES

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View Application Notes for Digital Logic

- Advanced Schottky (ALS and AS) Logic Families (SDAA010 - Updated: 08/01/1995)
- Advanced Schottky Load Management (SDYA016 - Updated: 02/01/1997)
- 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)
- Input and Output Characteristics of Digital Integrated Circuits (SDYA010 - Updated: 10/01/1996)
- Live Insertion (SDYA012 - Updated: 10/01/1996)
- TI IBIS File Creation, Validation, and Distribution Processes (SZZA034 - Updated: 08/29/2002)
- Understanding and Interpreting Texas Instruments Standard-Logic Products Data Sh (Rev. A) (SZZA036A - Updated: 02/27/2003)

MORE LITERATURE

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- Enhanced Plastic Portfolio Brochure (SGZB004, 387 KB - Updated: 08/19/2002)
- Logic Reference Guide (SCYB004, 1032 KB - Updated: 10/23/2001)
- MicroStar Junior BGA Design Summary (SCET004, 167 KB - Updated: 07/28/2000)
- Military Brief (SGYN138, 803 KB - Updated: 10/10/2000)
- Overview of IEEE Std 91-1984, Explanation of Logic Symbols Training Booklet (Rev. A) (SDYZ001A, 138 KB - Updated: 07/01/1996)
- Palladium Lead Finish User's Manual (SDYV001, 2041 KB - Updated: 11/01/1996)
- QML Class V Space Products Military Brief (Rev. A) (SGZN001A, 257 KB - Updated: 10/07/2002)

USER GUIDES

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- LOGIC Pocket Data Book (SCYD013, 4837 KB - Updated: 12/05/2002)

PRICING/AVAILABILITY/PKG

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DEVICE INFORMATION
Updated Daily

ORDERABLE DEVICE	STATUS	PACKAGE TYPE | PINS	TEMP (°C)	DSCC NUMBER	PRODUCT CONTENT	BUDGETARY PRICING QTY | $US	STD PACK QTY
5962-89525013A	ACTIVE	LCCC (FK) | 28	-55 TO 125		View Contents	1KU | 14.29	1
5962-8952501KA	ACTIVE	CFP (W) | 24	-55 TO 125		View Contents	1KU | 13.21	1
5962-8952501LA	ACTIVE	CDIP (JT) | 24	-55 TO 125		View Contents	1KU | 6.88	1
SN54AS823AJT	ACTIVE	CDIP (JT) | 24	-55 TO 125		View Contents	1KU | 5.79	1

TI INVENTORY STATUS
As Of 09:00 AM GMT, 17 Apr 2003

IN STOCK	IN PROGRESS QTY | DATE	LEAD TIME
117*	4331 | 20 May	8 WKS
	>10k | 27 May	
0*	>10k | 20 May	8 WKS
37*	>10k | 20 May	8 WKS
0*	>10k | 20 May	8 WKS

REPORTED DISTRIBUTOR INVENTORY
As Of 09:00 AM GMT, 17 Apr 2003

DISTRIBUTOR COMPANY | REGION	IN STOCK	PURCHASE
None Reported View Distributors		
Rochester Electronics | Americas	78	BUY NOW
None Reported View Distributors		
None Reported View Distributors		

Product Folder: SN54AS823A, 9-Bit Bus Interface Flip-Flops With 3-State Outputs

SNJ54AS823AFK	ACTIVE	LCCC (FK) | 28	-55 TO 125	5962-89525013A	View Contents	1KU | 14.29	1	0*	3536 | 20 May	8 WKS	None Reported View Distributors		
									>10k | 27 May				
SNJ54AS823AJT	ACTIVE	CDIP (JT) | 24	-55 TO 125	5962-8952501LA	View Contents	1KU | 6.88	1	0*	>10k | 20 May	8 WKS	None Reported View Distributors		
SNJ54AS823AW	OBSOLETE	CFP (W) | 24	-55 TO 125	5962-8952501KA	View Contents	1KU |		0*	>10k | 20 May	8 WKS	None Reported View Distributors		

Table Data Updated on: 4/17/2003