

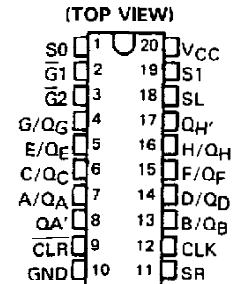
# SN54LS323, SN74LS323 8-BIT UNIVERSAL SHIFT/STORAGE REGISTERS

SDLS160

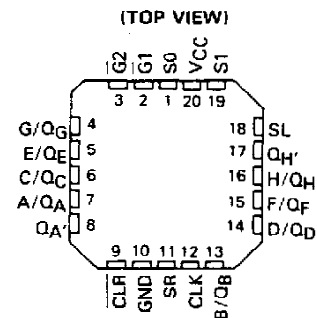
OCTOBER 1976 — REVISED MARCH 1988

- Multiplexed Inputs/Outputs Provide Improved Bit Density
- Four Modes of Operation:
  - Hold (Store)    Shift Left
  - Shift Right    Load Data
- Operates with Outputs Enabled or at High Z
- 3-State Outputs Drive Bus Lines Directly
- Can Be Cascaded for N-Bit Word Lengths
- Typical Power Dissipation . . . 175 mW
- Exceptionally Stable Shift (Clock) Frequency . . . 25 MHz
- Applications:
  - Stacked or Push-Down Registers, Buffer Storage, and Accumulator Registers
- SN54LS299 and SN74LS299 Are Similar But Have Direct Overriding Clear

SN54LS323 . . . J OR W PACKAGE  
SN74LS323 . . . DW OR N PACKAGE



SN54LS323 . . . FK PACKAGE



## description

These Low-Power Schottky eight-bit universal registers feature multiplexed inputs/outputs to achieve full eight-bit data handling in a single 20-pin package. Two function-select inputs and two output-control inputs can be used to choose the modes of operation listed in the function table. Synchronous parallel loading is accomplished by taking both function-select lines, S0 and S1, high. This places the three-state outputs in a high-impedance state, which permits data that is applied on the input/output lines to be clocked into the register. Reading out of the register can be accomplished while the outputs are enabled in any mode. The clear function is synchronous, and a low level at the clear input clears the register on the next low-to-high transition of the clock.

FUNCTION TABLE

MODE	INPUTS				INPUTS/OUTPUTS								OUTPUTS					
	CLR	FUNCTION SELECT		OUTPUT CONTROL	CLK	SERIAL		A/QA	B/QB	C/QC	D/QD	E/QE	F/QF	G/QG	H/QH	QA'	QH'	
		S1	S0	G1†		G2†	SL											SR
Clear	L	X	L	L	L	†	X	X	L	L	L	L	L	L	L	L	L	
	L	L	X	L	L	†	X	X	L	L	L	L	L	L	L	L	L	
	L	H	H	X	X	†	X	X	X	X	X	X	X	X	X	X	X	
Hold	H	L	L	L	L	X	X	X	QA0	QB0	QC0	QD0	QE0	QF0	QG0	QH0	QA0	QH0
	H	X	X	L	L	L	X	X	QA0	QB0	QC0	QD0	QE0	QF0	QG0	QH0	QA0	QH0
Shift Right	H	L	H	L	L	†	X	H	H	QA <sub>n</sub>	QB <sub>n</sub>	QC <sub>n</sub>	QD <sub>n</sub>	QE <sub>n</sub>	QF <sub>n</sub>	QG <sub>n</sub>	H	QH <sub>n</sub>
	H	L	H	L	L	†	X	L	L	QA <sub>n</sub>	QB <sub>n</sub>	QC <sub>n</sub>	QD <sub>n</sub>	QE <sub>n</sub>	QF <sub>n</sub>	QG <sub>n</sub>	L	QH <sub>n</sub>
Shift Left	H	H	L	L	L	†	H	X	QB <sub>n</sub>	QC <sub>n</sub>	QD <sub>n</sub>	QE <sub>n</sub>	QF <sub>n</sub>	QG <sub>n</sub>	QH <sub>n</sub>	H	QA <sub>n</sub>	H
	H	H	L	L	L	†	L	X	QB <sub>n</sub>	QC <sub>n</sub>	QD <sub>n</sub>	QE <sub>n</sub>	QF <sub>n</sub>	QG <sub>n</sub>	QH <sub>n</sub>	L	QA <sub>n</sub>	L
Load	H	H	H	X	X	†	X	X	a	b	c	d	e	f	g	h	a	h

†When one or both output controls are high the eight input/output terminals are disabled to the high-impedance state; however, sequential operation or clearing of the register is not affected.

a . . . h = the level of the steady-state input at inputs A through H, respectively. These data are loaded into the flip-flops while the flip-flop outputs are isolated from the input/output terminals.

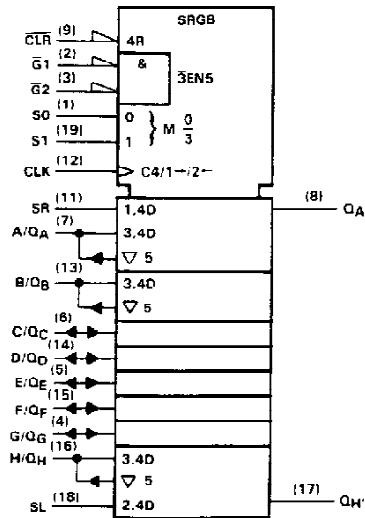
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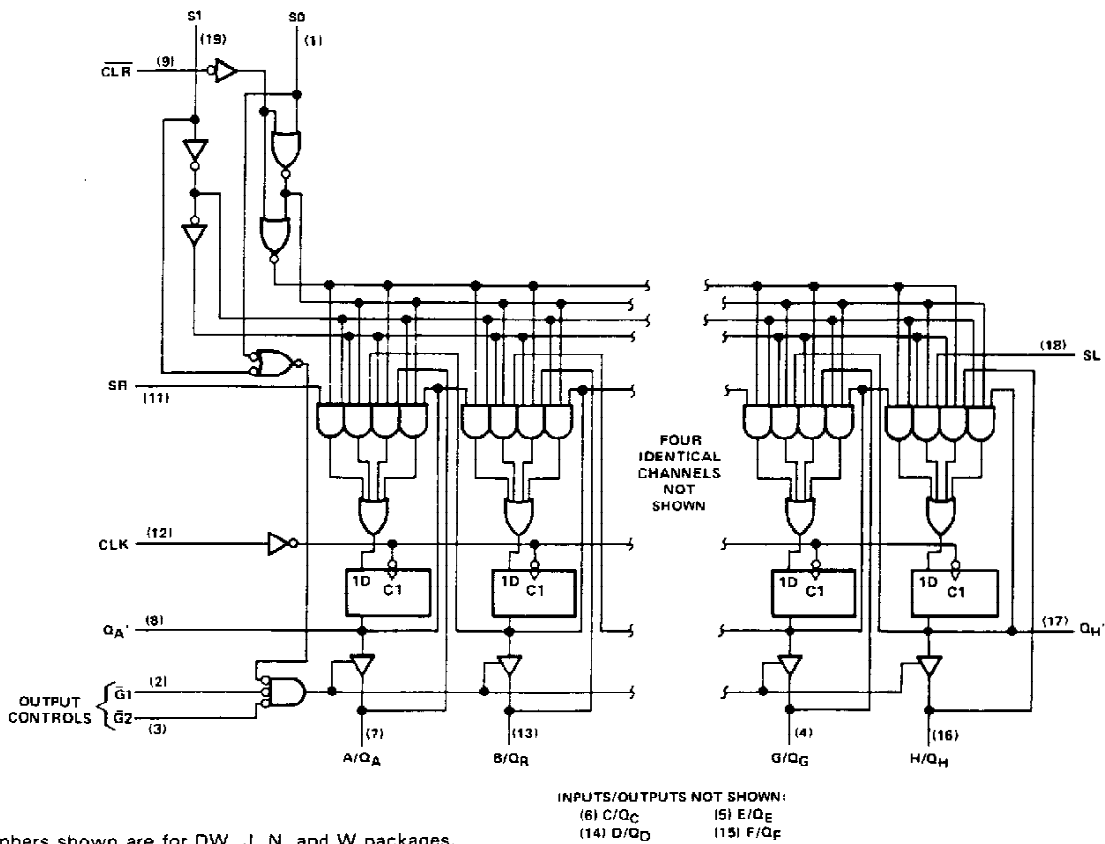
# SN54LS323, SN74LS323 8-BIT UNIVERSAL SHIFT/STORAGE REGISTERS

logic symbol†



†This symbol is in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12. Pin numbers shown are for DW, J, N, and W packages.

logic diagram (positive logic)



Pin numbers shown are for DW, J, N, and W packages.

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## SN54LS323, SN74LS323 8-BIT UNIVERSAL SHIFT/STORAGE REGISTERS

schematics of inputs and outputs, absolute maximum ratings, recommended operating conditions, and electrical characteristics

Same as SN54LS299 and SN74LS299, except  $t_{SU}$  (Clear Inactive) does not apply.

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

PARAMETER†	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$f_{max}$			See Note 1	25	35		MHz
$t_{PLH}$	CLK	$Q_A'$ or $Q_H'$	$C_L = 15\text{ pF}$ , $R_L = 2\text{ k}\Omega$		22	33	ns
$t_{PHL}$					26	39	
$t_{PLH}$	CLK	$Q_A$ thru $Q_H$	$C_L = 45\text{ pF}$ , $R_L = 665\ \Omega$		17	25	ns
$t_{PHL}$					25	39	
$t_{PZH}$	$\bar{G}_1, \bar{G}_2$	$Q_A$ thru $Q_H$	$C_L = 45\text{ pF}$ , $R_L = 665\ \Omega$		14	21	ns
$t_{PZL}$					20	30	
$t_{PHZ}$	$\bar{G}_1, \bar{G}_2$	$Q_A$ thru $Q_H$	$C_L = 5\text{ pF}$ , $R_L = 665\ \Omega$		10	20	ns
$t_{PLZ}$					10	15	

† $f_{max}$  = maximum clock frequency

$t_{PLH}$  = Propagation delay time, low-to-high-level output

$t_{PHL}$  = Propagation delay time, high-to-low-level output

$t_{PZH}$  = Output enable time to high level

$t_{PZL}$  = Output enable time to low level

$t_{PHZ}$  = Output disable time from high level

$t_{PLZ}$  = Output disable time from low level

NOTE 1: For testing  $f_{max}$ , all outputs are loaded simultaneously, each with  $C_L$  and  $R_L$  as specified for the propagation times. Load circuits and voltage waveforms are shown in Section 1.

  
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**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN54LS323J	ACTIVE	CDIP	J	20	20	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SN54LS323J	<a href="#">Samples</a>
SNJ54LS323FK	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54LS323FK	<a href="#">Samples</a>
SNJ54LS323FK	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54LS323FK	<a href="#">Samples</a>

(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) **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".

**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 (Cl) 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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**TUBE**


\*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
SNJ54LS323FK	FK	LCCC	20	55	506.98	12.06	2030	NA

J (R-GDIP-T\*\*)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



4040083/F 03/03

- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - This package is hermetically sealed with a ceramic lid using glass frit.
  - Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
  - Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

## GENERIC PACKAGE VIEW

**FK 20**

**LCCC - 2.03 mm max height**

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.



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