8-Bit Latch/Register with Readback
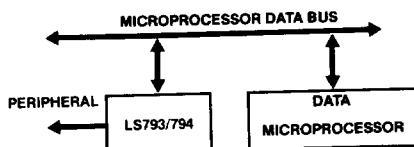
SN54/74LS793   SN54/74LS794

Features/Benefits

- I/O port configuration enables output data back onto input bus
- 8-bit data path matches byte boundaries
- Ideal for microprocessor interface

Description

These 8-bit latches/registers are useful for I/O operations on a microprocessor bus. An image of the output data can be read back by the CPU. This operation is important in control algorithms which make decisions based on the previous status of output controls. Rather than storing a redundant copy of the output data in memory, simply reading the register as an I/O port allows the data to be retrieved from where it has been stored in an 'LS793/4, for verification and/or updating.

The data is loaded in the registers on the low-to-high transition of the clock (CK), for the 'LS794. The data is passed through the 'LS793 when the gate, (G), is High, and it is "latched" when G changes to Low. The output enable, $\overline{OE}$ is used to enable data on D7-D0. When $\overline{OE}$ is low the output of the latches/registers is enabled on D0-D7, enabling D as an output bus so that the host can perform a read operation. When $\overline{OE}$ is High, D7-D0 are inputs to the latches/registers configuring D as an input bus.

The output drive of these commercial parts for any output pin is $I_{OL} = 24$ mA.

Ordering Information

PART NUMBER	PKG	TEMP	POLARITY	TYPE	POWER
SN54LS793	J,W,L,	Mil	Non-invert	Latch	LS
SN74LS793	N,J,NL	Com			
SN54LS794	J,W,L,	Mil		Register	
SN74LS794	N,J,NL	Com			

Logic Symbols

'LS793   'LS794

'LS793 Function Table

G	$\overline{OE}$	Q	D
L	L	Q_0**	Output, Q
L	H	Q_0**	Input
H†	L	D*	Output, Q*
H	H	D	Input

* In this case the output of the latch feeds the input, and a "race" condition results.
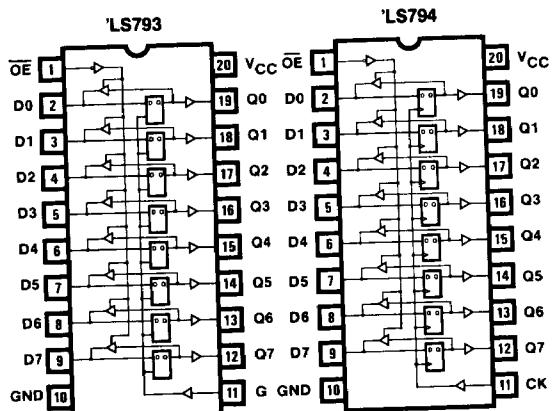
** Q_0 represents the previous "latched" state.

† This transition is not a normal mode of operation and may produce hazards.
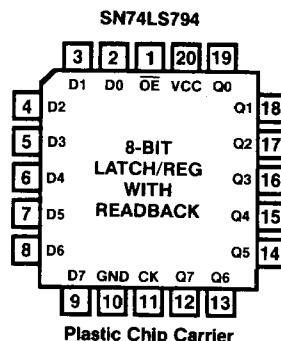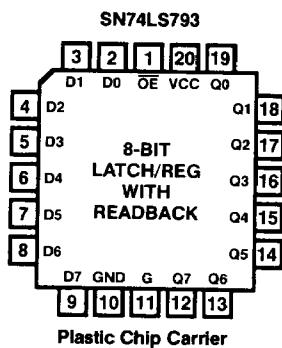
'LS794 Function Table

CK	$\overline{OE}$	Q	D
L or H or ↓	L	Q_0	Output, Q
L or H or ↓	H	Q_0	Input
↑	L	Q_0	Output, Q*
↑	H	D	Input
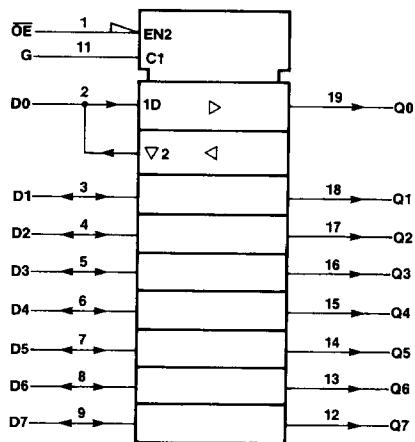
* In this case the output of the register is clocked to the inputs and the overall Q output is unchanged at Q_0.

Pin Configurations

SN74LS793

8-BIT
LATCH/REG
WITH
READBACK

Plastic Chip Carrier

SN74LS794

8-BIT
LATCH/REG
WITH
READBACK

Plastic Chip Carrier
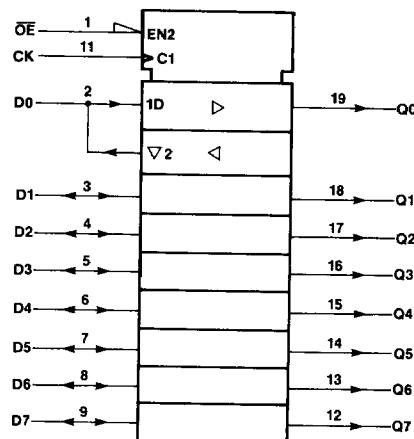
IEEE Symbols

'LS793

'LS794

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Absolute Maximum Ratings

Supply voltage V_{CC} .... −0.5 V to 7 V
Input voltage .... −1.5 V to 7 V
Off-state output voltage .... −0.5 V to 5.5 V
Storage temperature .... −65°C to +150°C

Operating Conditions

SYMBOL	PARAMETER			MILITARY MIN TYP MAX			COMMERCIAL MIN TYP MAX			UNIT
V_{CC}	Supply voltage			4.5	5	5.5	4.75	5	5.25	V
T_A	Operating free air temperature			−55		125	0		75	°C
t_w	Width of Clock/Gate	High		15			15			ns
		Low ('LS794 only)		15			15			
t_{su}	Setup time		'LS793	15↓			10↓			ns
			'LS794	15↑			15↑			
t_h	Hold time		'LS793	10↓			10↓			
			'LS794	0↑			0↑			

↑ ↓ The arrow indicates the transition of the clock/gate input used for reference. ↑ for the low-to-high transitions, ↓ for the high-to-low transitions.

Electrical Characteristics Over Operating Conditions

SYMBOL	PARAMETER		TEST CONDITIONS		MILITARY MIN TYP MAX			COMMERCIAL MIN TYP MAX			UNIT
V_{IL}	Low-level input voltage						0.7			0.8	V
V_{IH}	High-level input voltage				2			2			V
V_{IC}	Input clamp voltage		V_{CC} = MIN	I_I = −18 mA			−1.5			−1.5	V
I_{IL}	Low-level input current		V_{CC} = MAX	V_I = 0.4 V			−250			−250	μA
I_{IH}	High-level input current		V_{CC} = MAX	V_I = 2.7 V			40			40	μA
I_I	Maximum input current	D or Q	V_{CC} = MAX	V_I = 5.5 V			0.1			0.1	mA
		All others		V_I = 7 V							
V_{OL}	Low-level output voltage		V_{CC} = MIN V_{IL} = MAX V_{IH} = 2 V	I_{OL} = 12 mA		0.25	0.4		0.25	0.4	V
				I_{OL} = 24 mA					0.35	0.5	
V_{OH}	High-level output voltage		V_{CC} = MIN V_{IL} = MAX V_{IH} = 2 V	I_{OH} = −1 mA	2.4	3.4					V
				I_{OH} = −2.6 mA				2.4	3.1		
I_{OZL}	Off-state output current		V_{CC} = MAX V_{IL} = MAX V_{IH} = = 2 V	V_O = 0.4 V			−250			−250	μA
I_{OZH}				V_O = 2.7 V			40			40	
I_{OS}	Output short-circuit current*		V_{CC} = MAX		−30		−130	−30		−130	mA
I_{CC}	Supply current		V_{CC} = MAX Outputs open	'LS793			120			120	mA
				'LS794			120			120	

* Not more than one output should be shorted at a time and duration of the short-circuit should not exceed one second.