

# SN54LS396, SN74LS396 OCTAL STORAGE REGISTERS

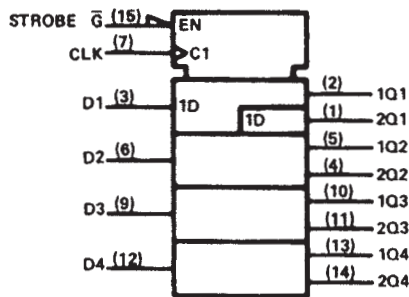
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- Parallel Access
- Typical Propagation Delay Time . . . 20 ns
- Typical Power Dissipation . . . 120 mW
- Applications:  
    N-Bit Storage Files  
    Hex/BCD Serial-To-Parallel Converters

## description

These octal registers are organized as two 4-bit bytes of storage. Upon application of a positive-going clock signal, the information stored in byte 1 is transferred into byte 2 as a new 4-bit byte is loaded into the byte 1 location via the four data lines. The full 8-bit word is available at the outputs after two clock cycles. Both the clock and the strobe lines are fully buffered.

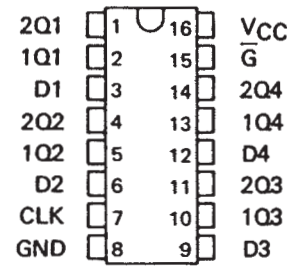
## logic symbol†



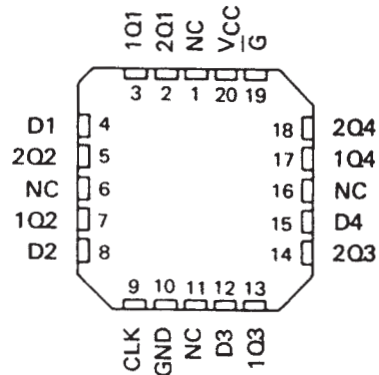
†This symbol is in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12.

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

SN54LS396 . . . J OR W PACKAGE  
SN74LS396 . . . D OR N PACKAGE  
(TOP VIEW)



SN54LS396 . . . FK PACKAGE  
(TOP VIEW)



NC - No internal connection

FUNCTION TABLE

INPUTS		OUTPUTS											
STROBE $\bar{G}$	CLOCK	DATA				BYTE 1				BYTE 2			
		D1	D2	D3	D4	1Q1	1Q2	1Q3	1Q4	2Q1	2Q2	2Q3	2Q4
H	X	X	X	X	X	L	L	L	L	L	L	L	L
L	↑	a	b	c	d	a	b	c	d	1Q1 <sub>n</sub>	1Q2 <sub>n</sub>	1Q3 <sub>n</sub>	1Q4 <sub>n</sub>

H = high level (steady state), L = low level (steady state), X = irrelevant (any input, including transitions)

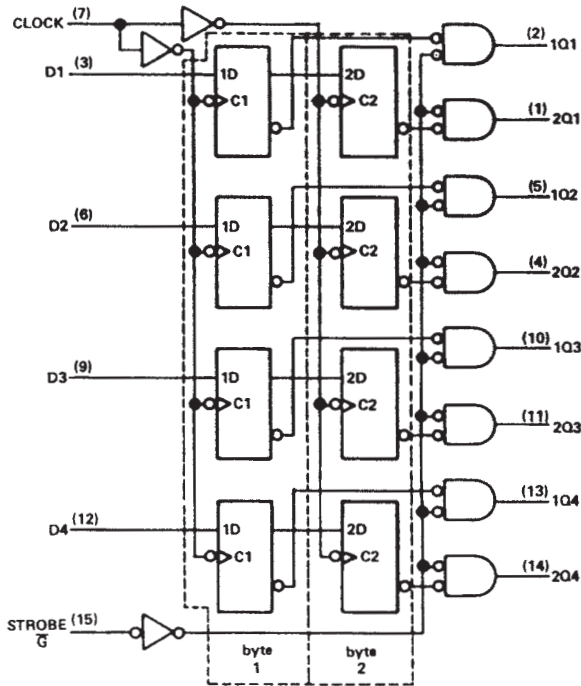
↑ = transition from low to high level

1Q1<sub>n</sub>, 1Q2<sub>n</sub>, 1Q3<sub>n</sub>, 1Q4<sub>n</sub> = the level of 1Q1, 1Q2, 1Q3, and 1Q4, respectively, before the most recent ↑ transition of the clock.

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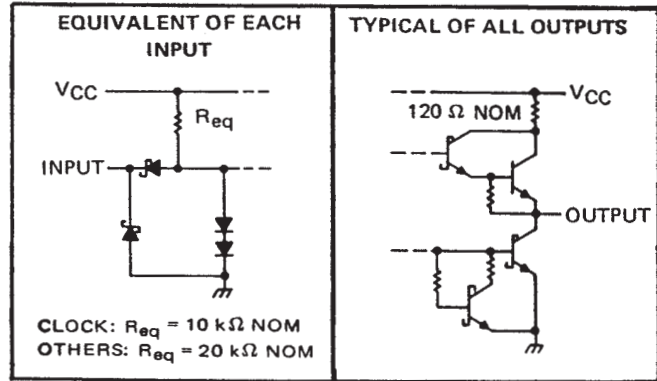
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## logic diagram (positive logic)



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

## schematics of inputs and outputs



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

Supply voltage, VCC (see Note 1)	7 V
Input voltage	7 V
Operating free-air temperature range: SN54LS396	-55°C to 125°C
SN74LS396	0°C to 70°C
Storage temperature range	-65°C to 150°C

NOTE 1: Voltage values are with respect to network ground terminal.

## recommended operating conditions

	SN54LS396			SN74LS396			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, VCC	4.5	5	5.5	4.75	5	5.25	V
High-level output current, I <sub>OH</sub>			-400			-400	μA
Low-level output current, I <sub>OL</sub>			4			8	mA
Clock frequency, f <sub>clock</sub>	0		30	0		30	MHz
Width of clock pulse, t <sub>w</sub>	20			20			ns
Setup time, t <sub>su</sub>	20			20			ns
Hold time, t <sub>h</sub>	5			5			ns
Operating free-air temperature, T <sub>A</sub>	-55		125	0		70	°C



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

PARAMETER		TEST CONDITIONS†	SN54LS396			SN74LS396			UNIT
			MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V <sub>IH</sub>	High-level input voltage		2			2			V
V <sub>IL</sub>	Low-level input voltage		0.7			0.8			V
V <sub>IK</sub>	Input clamp voltage	V <sub>CC</sub> = MIN, I <sub>I</sub> = -18 mA	-1.5			-1.5			V
V <sub>OH</sub>	High-level output voltage	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX, I <sub>OH</sub> = -400 μA	2.5	3.4		2.7	3.4		V
V <sub>OL</sub>	Low-level output voltage	V <sub>CC</sub> = MIN, I <sub>OL</sub> = 4 mA	0.25	0.4		0.25	0.4		V
		V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX, I <sub>OL</sub> = 8 mA				0.35	0.5		
I <sub>I</sub>	Input current at maximum input voltage	Clock input	0.2			0.2			mA
		Other inputs	0.1			0.1			
I <sub>IH</sub>	High-level input current	Clock input	40			40			μA
		Other inputs	20			20			
I <sub>IL</sub>	Low-level input current	Clock input	-0.8			-0.8			mA
		Other inputs	-0.4			-0.4			
I <sub>OS</sub>	Short-circuit output current§	V <sub>CC</sub> = MAX	-20	-100		-20	-100		mA
I <sub>CC</sub>	Supply current	V <sub>CC</sub> = MAX, See Note 2	24	40		24	40		mA

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

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

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

NOTE 2: I<sub>CC</sub> is measured with 4.5 V applied to all inputs and all outputs open.

switching characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t <sub>PLH</sub>	Propagation delay time, low-to-high-level output from clock	C <sub>L</sub> = 15 pF, R <sub>L</sub> = 2 kΩ, See Note 3		20	30	ns
t <sub>PHL</sub>	Propagation delay time, high-to-low-level output from clock			20	30	
t <sub>PLH</sub>	Propagation delay time, low-to-high-level output from strobe			20	30	ns
t <sub>PHL</sub>	Propagation delay time, high-to-low-level output from strobe			20	30	

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.



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SN74LS396N - <http://www.ti.com/product/sn74ls396n?HQS=TI-null-null-dscatalog-df-pf-null-ww>

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