

**Rochester Electronics
Manufactured Components**

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceed the OCM data sheet.

Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-35835
 - Class Q Military
 - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)
 - Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

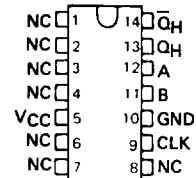
The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

SN5491A, SN54LS91, SN7491A, SN74LS91 8-BIT SHIFT REGISTERS

MARCH 1974 — REVISED MARCH 1988

- For applications in:
Digital Computer Systems
Data-Handling Systems
Control Systems

SN5491A, SN54LS91 . . . J PACKAGE
SN7491A . . . N PACKAGE
SN74LS91 . . . D OR N PACKAGE
(TOP VIEW)

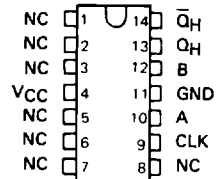


TYPE	TYPICAL MAXIMUM CLOCK FREQUENCY	TYPICAL POWER DISSIPATION
'91A	18 MHz	175 mW
'LS91	18 MHz	60 mW

description

These monolithic serial-in, serial-out, 8-bit shift registers utilize transistor-transistor logic (TTL) circuits and are composed of eight R-S master-slave flip-flops, input gating, and a clock driver. Single-rail data and input control are gated through inputs A and B and an internal inverter to form the complementary inputs to the first bit of the shift register. Drive for the internal common clock line is provided by an inverting clock driver. This clock pulse inverter/driver causes these circuits to shift information one bit on the positive edge of an input clock pulse.

SN5491A, SN54LS91 . . . W PACKAGE
(TOP VIEW)



NC — No internal connection

schematics of inputs and outputs

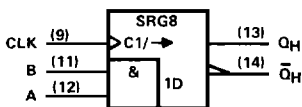
FUNCTION TABLE

INPUTS AT t_n		OUTPUTS AT $t_n + 8$	
A	B	Q_H	$\bar{Q}_H$
H	H	H	L
L	X	L	H
X	L	L	H

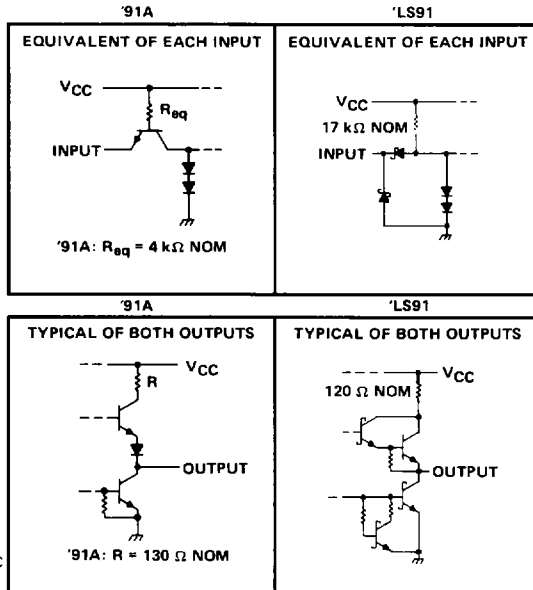
t_n = Reference bit time,
clock low

$t_n + 8$ = Bit time after 8
low-to-high
clock transitions.

logic symbol†



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



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TTL Devices

PRODUCTION DATA documents contain information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

TEXAS
INSTRUMENTS

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2-289

TTL Devices

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

Supply voltage, V _{CC} (see Note 1)	7 V
Input voltage (see Note 2)	5.5 V
Operating free-air temperature range: SN5491A	–55°C to 125°C
SN7491A	0°C to 70°C
Storage temperature range	–65°C to 150°C

recommended operating conditions

	SN5491A			SN7491A			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC}	4.5	5	5.5	4.75	5	5.25	V
High-level output current, I_{OH}			-400			-400	μ A
Low-level output current, I_{OL}			16			16	mA
Width of clock input pulse, t_W	25			25			ns
Setup time, t_{su} (see Figure 1)	25			25			ns
Hold time, t_h (see Figure 1)	0			0			ns
Operating free-air temperature, T_A	-55		125	0		70	$^{\circ}$ C

PARAMETER	TEST CONDITIONS†	SN5491A			SN7491A			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V _{IH} High-level input voltage		2			2			V
V _{IL} Low-level input voltage				0.8			0.8	V
V _{OH} High-level output voltage	V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = 0.8 V, I _{OH} = -400 µA	2.4	3.5		2.4	3.5		V
V _{OL} Low-level output voltage	V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = 0.8 V, I _{OL} = 16 mA		0.2	0.4		0.2	0.4	V
I _I Input current at maximum input voltage	V _{CC} = MAX, V _I = 5.5 V			1			1	mA
I _{IH} High-level input current	V _{CC} = MAX, V _I = 2.4 V			40			40	µA
I _{IL} Low-level input current	V _{CC} = MAX, V _I = 0.4 V			-1.6			-1.6	mA
I _{OS} Short-circuit output current‡	V _{CC} = MAX	-20		-57	-18		-57	mA
I _{CC} Supply current	V _{CC} = MAX, See Note 3		35	50		35	58	mA

NOTE 3: I_{CC} is measured after the eighth clock pulse with the output open and A and B inputs grounded.

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$f_{\max}$ Maximum clock frequency	$C_L = 15 \text{ pF}$,	10	18		MHz
t_{PLH} Propagation delay time, low-to-high-level output	$R_L = 400 \, \Omega$,		24	40	ns
t_{PHL} Propagation delay time, high-to-low-level output	See Figure 1		27	40	ns

SN54LS91, SN74LS91 8-BIT SHIFT REGISTERS

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

Supply voltage, V_{CC} (see Note 1)	7 V
Input voltage	7 V
Operating free-air temperature range: SN54LS91	55°C to 125°C
SN74LS91	0°C to 70°C
Storage temperature range	-65°C to 150°C

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

recommended operating conditions

	SN54LS91			SN74LS91			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC}	4.5	5	5.5	4.75	5	5.25	V
High-level output current, I_{OH}			-400			-400	μ A
Low-level output current, I_{OL}			4			8	mA
Width of clock input pulse, t_W	25			25			ns
Setup time, t_{SU} (see Figure 1)	25			25			ns
Hold time, t_H (see Figure 1)	0			0			ns
Operating free-air temperature, T_A	-55		125	0		70	C

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

PARAMETER	TEST CONDITIONS†	SN54LS91			SN74LS91			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IH} High-level input voltage		2			2			V
V_{IL} Low-level input voltage				0.7			0.8	V
V_{IK} Input clamp voltage	$V_{CC} = \text{MIN}, I_I = -18 \text{ mA}$			-1.5			-1.5	V
V_{OH} High-level output voltage	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = V_{IL \text{ max}}, I_{OH} = -400 \mu\text{A}$	2.5	3.5		2.7	3.5		V
V_{OL} Low-level output voltage	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = V_{IL \text{ max}}$	$I_{OL} = 4 \text{ mA}$		0.25	0.4	0.25		0.4
		$I_{OL} = 8 \text{ mA}$				0.35		0.5
I_I Input current at maximum input voltage	$V_{CC} = \text{MAX}, V_I = 7 \text{ V}$			0.1			0.1	mA
I_{IH} High-level input current	$V_{CC} = \text{MAX}, V_I = 2.7 \text{ V}$			20			20	μ A
I_{IL} Low-level input current	$V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}$			-0.4			-0.4	mA
I_{OS} Short-circuit output current§	$V_{CC} = \text{MAX}$	-20		-100	-20		-100	mA
I_{CC} Supply current	$V_{CC} = \text{MAX}, \text{ See Note 3}$	12		20	12		20	mA

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

‡ All typical values are at $V_{CC} = 5 \text{ V}, T_A = 25^\circ \text{C}$.

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

NOTE 3: I_{CC} is measured after the eighth clock pulse with the output open and A and B inputs grounded.

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

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
f_{max} Maximum clock frequency	$C_L = 15 \text{ pF}, R_L = 2 \text{ k}\Omega, \text{ See Figure 1}$	10	18		MHz
t_{PLH} Propagation delay time, low-to-high-level output			24	40	ns
t_{PHL} Propagation delay time, high-to-low-level output			27	40	ns

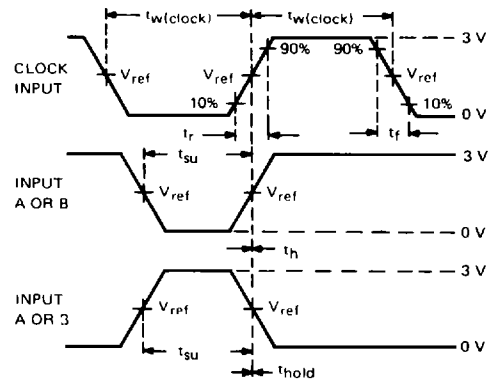
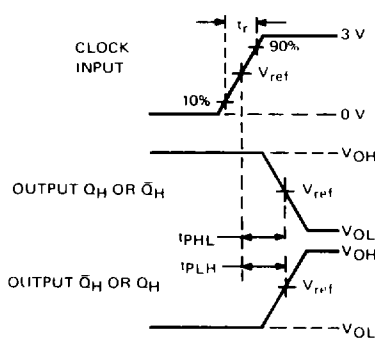
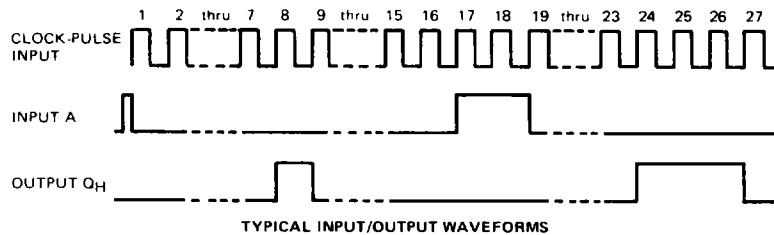
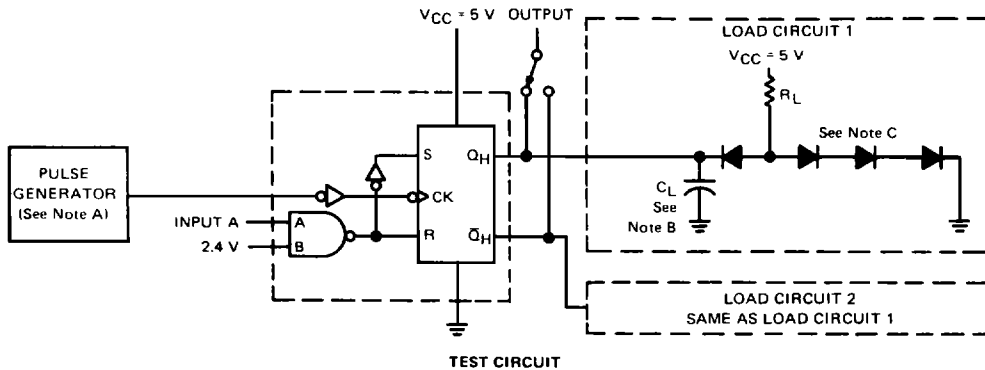
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TTL Devices

SN5491A, SN54LS91, SN7491A, SN74LS91

8-BIT SHIFT REGISTERS

PARAMETER MEASUREMENT INFORMATION



- NOTES.** A. The generator has the following characteristics: $t_w(\text{clock}) = 500 \text{ ns}$, $\text{PRR} \leq 1 \text{ MHz}$, $Z_{\text{out}} = 50 \Omega$. For SN5491A/SN7491A, $t_r \leq 10 \text{ ns}$ and $t_f \leq 10 \text{ ns}$; for SN54LS91, $t_r = 15 \text{ ns}$, and $t_f = 6 \text{ ns}$.
 B. C_L includes probe and jig capacitance.
 C. All diodes are 1N3064 or equivalent.
 D. For SN5491A/SN7491A, $V_{\text{ref}} = 1.5 \text{ V}$; for SN54LS91/SN74LS91, $V_{\text{ref}} = 1.3 \text{ V}$.

FIGURE 1—SWITCHING TIMES