

FEATURES

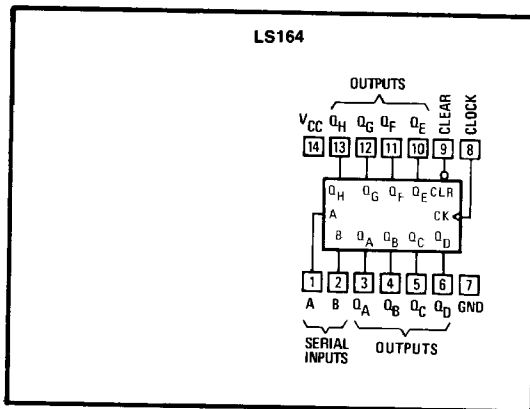
- Gated (Enable/Disable) Serial Inputs
- Fully Buffered Clock and Serial Inputs
- Asynchronous Clear

DESCRIPTION

These 8-bit shift registers feature gated serial inputs and an asynchronous clear. The gated serial inputs (A and B) permit complete control over incoming data as a low at either (or both) input(s) inhibits entry of the new data and resets the first flip-flop to the low level at the next clock pulse. A high-level input enables the other input which will then determine the state of the first flip-flop. Data at the serial inputs may be changed while the clock is high or low, but only information meeting the setup requirements will be entered. Clocking occurs on the low-to-high transition of the clock input. All inputs are diode-clamped to minimize transmission-line effects.

9LS/54LS devices are characterized for operation over the full military temperature range of -55°C to 125°C ; 9LS/74LS devices are characterized for operation from 0°C to 70°C .

PIN-OUT DIAGRAM



FUNCTION TABLES

INPUTS		OUTPUTS		
CLEAR	CLOCK	A	B	Q_A $Q_B \dots Q_H$
L	X	X	X	L L L
H	L	X	X	Q_{A0} Q_{B0} Q_{H0}
H	↑	H	H	H Q_{An} Q_{Gn}
H	↑	L	X	L Q_{An} Q_{Gn}
H	↑	X	L	L Q_{An} Q_{Gn}

H = high level (steady state), L = low level (steady state)

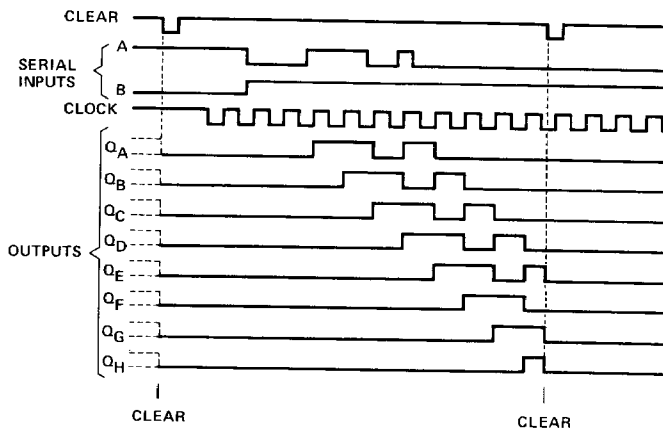
X = irrelevant (any input, including transitions)

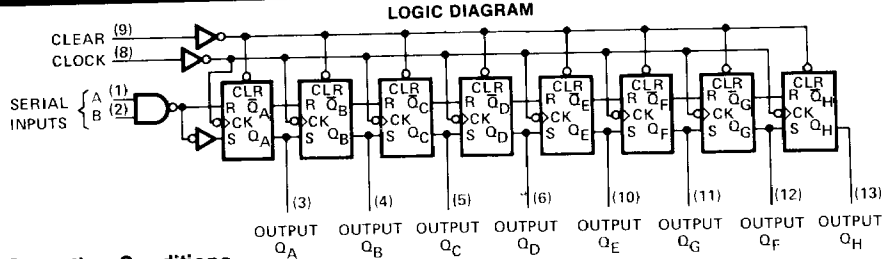
↑ = transition from low to high level.

Q_{A0} , Q_{B0} , Q_{H0} = the level of Q_A , Q_B or Q_H , respectively, before the indicated steady state input conditions were established.

Q_{An} , Q_{Gn} = the level of Q_A or Q_G before the most recent ↑ transition of the clock; indicates a one-bit shift.

TYPICAL CLEAR, SHIFT, AND CLEAR SEQUENCES





Recommended Operating Conditions

	9LS/54LS			9LS/74LS			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
Clock frequency, f_{clock}	0		25	0		25	MHz
Width of clock or clear input pulse, t_w	20			20			ns
Data setup time, t_{setup} (see Figure 1)	15			15			ns
Data hold time, t_{hold} (see Figure 1)	5			5			ns
Operating free-air temperature, T_A	-55		125	0		70	$^{\circ}$ C

Electrical Characteristics Over Recommended Free-Air Temperature Range (Unless Otherwise Noted)

Parameter	Test Conditions*	9LS/54LS			9LS/74LS			Unit
		Min	Typ**	Max	Min	Typ**	Max	
V_{IH}		2			2			V
V_{IL}				0.7			0.8	V
V_I	$V_{CC} = \text{MIN}, I_I = -18\text{mA}$			-1.5			-1.5	V
V_{OH}	$V_{CC} = \text{MIN}, V_{IH} = 2\text{V}, V_{IL} = V_{IL\text{max}}, I_{OH} = -400\mu\text{A}$	2.5	3.5		2.7	3.5		V
V_{OL}	$V_{CC} = \text{MIN}, V_{IH} = 2\text{V}, V_{IL} = V_{IL\text{max}}$			0.25	0.4	0.25	0.4	V
						0.35	0.5	
I_I	$V_{CC} = \text{MAX}, V_I = 7\text{V}$			0.1			0.1	mA
I_{IH}	$V_{CC} = \text{MAX}, V_I = 2.7\text{V}$			20			20	μ A
I_{IL}	$V_{CC} = \text{MAX}, V_I = 0.4\text{V}$			-0.4			-0.4	mA
I_{Ost}	$V_{CC} = \text{MAX}$	-15		-100	-15		-100	mA
I_{CCtt}	$V_{CC} = \text{MAX}$		16	27		16	27	mA

*For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable device type.

**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.

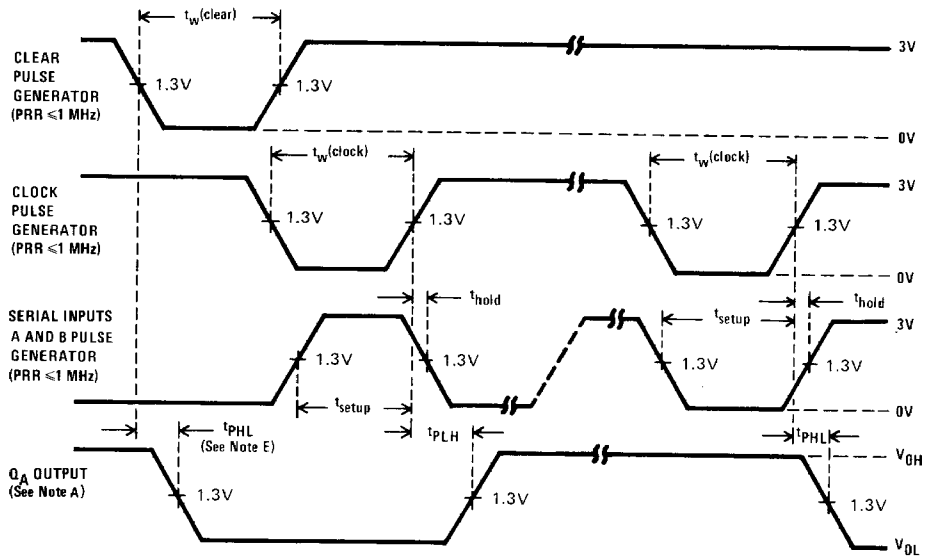
†† I_{CC} is measured with outputs open, serial inputs grounded, the clock input at 2.4V, and a momentary ground, then 4.5V applied to clear.

Switching Characteristics, $V_{CC} = 5\text{V}$ Over Recommended Free-Air Temperature Range

Parameter	-55°C			$+25^{\circ}\text{C}$			$+125^{\circ}\text{C}$			Unit
	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Test Conditions: $C_L = 15\text{pF}, R_L = 2\text{k}\Omega$ (See Fig. 1, page 2-95 and Fig. A, page 2-174)										
f_{max}				25	36					MHz
t_{PHL}		26	38		24	36		26	38	ns
t_{PLH}		20	30		17	27		20	30	ns
t_{PHL}		24	35		21	32		24	35	ns
Test Conditions: $C_L = 50\text{pF}, R_L = 2\text{k}\Omega$ (See Fig. 1, page 2-95 and Fig. A, page 2-174)										
t_{PHL}		29	42		27	40		29	42	ns
t_{PLH}		23	34		20	31		23	34	ns
t_{PHL}		27	39		24	36		27	39	ns

Note: AC specification shown under -55°C and $+125^{\circ}\text{C}$ are for 9LS devices only. All 50pF specifications are for 9LS only.

FIGURE 1
PARAMETER MEASUREMENT INFORMATION



VOLTAGE WAVEFORMS

- NOTES: A. Q_A output is illustrated. Relationship of serial input A and B data to other Q outputs is illustrated in the typical shift sequence.
 B. Outputs are set to the high level prior to the measurement of t_{PHL} from the clear input.