

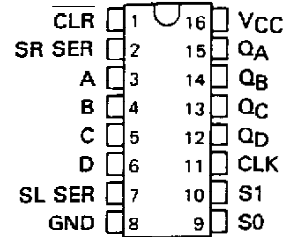
**SN54194, SN54LS194A, SN54S194,
SN74194, SN74LS194A, SN74S194**
4-BIT BIDIRECTIONAL UNIVERSAL SHIFT REGISTERS

MARCH 1974—REVISED MARCH 1988

- Parallel Inputs and Outputs
- Four Operating Modes:
Synchronous Parallel Load
Right Shift
Left Shift
Do Nothing
- Positive Edge-Triggered Clocking
- Direct Overriding Clear

SN54194, SN54LS194A, SN54S194 . . . J OR W PACKAGE
SN74194 . . . N PACKAGE
SN74LS194A, SN74S194 . . . D OR N PACKAGE

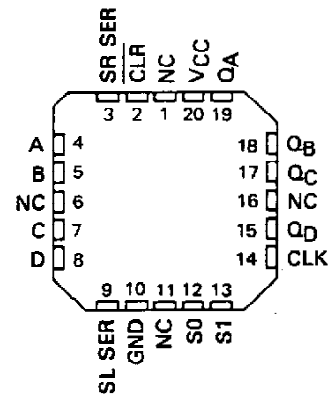
(TOP VIEW)



| TYPE | TYPICAL MAXIMUM CLOCK FREQUENCY | TYPICAL POWER DISSIPATION |
|---------|--|---------------------------------|
| '194 | 36 MHz | 195 mW |
| 'LS194A | 36 MHz | 75 mW |
| 'S194 | 105 MHz | 425 mW |

SN54LS194A, SN54S194 . . . FK PACKAGE

(TOP VIEW)



NC - No internal connection

description

These bidirectional shift registers are designed to incorporate virtually all of the features a system designer may want in a shift register. The circuit contains 46 equivalent gates and features parallel inputs, parallel outputs, right-shift and left-shift serial inputs, operating-mode-control inputs, and a direct overriding clear line. The register has four distinct modes of operation, namely:

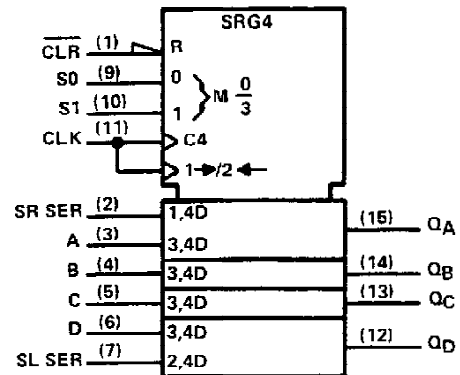
- Inhibit clock (do nothing)
- Shift right (in the direction Q_A toward Q_D)
- Shift left (in the direction Q_D toward Q_A)
- Parallel (broadside) load

Synchronous parallel loading is accomplished by applying the four bits of data and taking both mode control inputs, S0 and S1, high. The data are loaded into the associated flip-flops and appear at the outputs after the positive transition of the clock input. During loading, serial data flow is inhibited.

Shift right is accomplished synchronously with the rising edge of the clock pulse when S0 is high and S1 is low. Serial data for this mode is entered at the shift-right data input. When S0 is low and S1 is high, data shifts left synchronously and new data is entered at the shift-left serial input.

Clocking of the shift register is inhibited when both mode control inputs are low. The mode controls of the SN54194/SN74194 should be changed only while the clock input is high.

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.

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.



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**SN54194, SN54LS194A, SN54S194
SN74194, SN74LS194A, SN74S194
4-BIT BIDIRECTIONAL UNIVERSAL SHIFT REGISTERS**

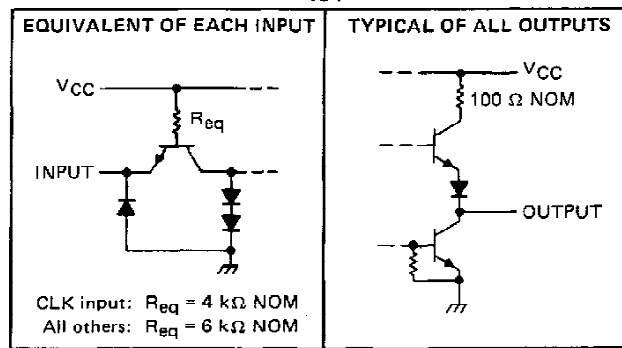
FUNCTION TABLE

| CLEAR | MODE | | CLOCK | INPUTS | | | | OUTPUTS | | | | | |
|-------|------|-------|-------|--------|---|----------|---|----------------|----------------|-----------------|-----------------|-----------------|-----------------|
| | | | | SERIAL | | PARALLEL | | Q _A | Q _B | Q _C | Q _D | | |
| | LEFT | RIGHT | | A | B | C | D | | | | | | |
| L | X | X | X | X | X | X | X | X | X | L | L | L | L |
| H | X | X | L | X | X | X | X | X | X | Q _{A0} | Q _{B0} | Q _{C0} | Q _{D0} |
| H | H | H | ↑ | X | X | a | b | c | d | a | b | c | d |
| H | L | H | ↑ | X | H | x | x | x | x | H | Q _{An} | Q _{Bn} | Q _{Cn} |
| H | L | H | ↑ | X | L | X | X | X | X | L | Q _{An} | Q _{Bn} | Q _{Cn} |
| H | H | L | ↑ | H | X | X | X | X | X | Q _{Bn} | Q _{Cn} | Q _{Dn} | H |
| H | H | L | ↑ | L | X | X | X | X | X | Q _{Bn} | Q _{Cn} | Q _{Dn} | L |
| H | L | L | X | X | X | X | X | X | X | Q _{A0} | Q _{B0} | Q _{C0} | Q _{D0} |

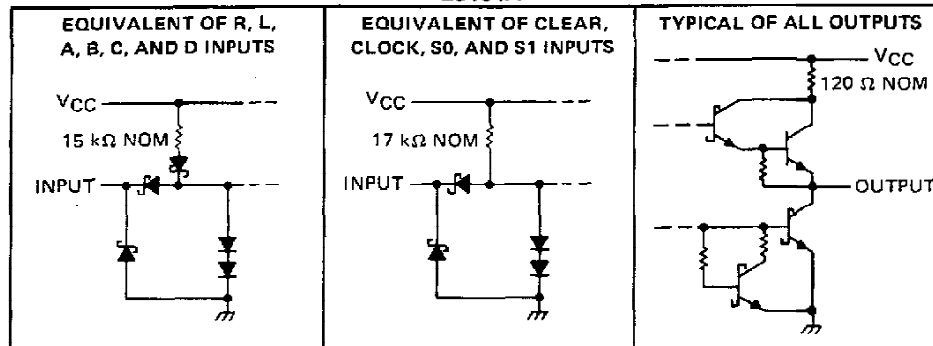
H = high level (steady state)
L = low level (steady state)
X = irrelevant (any input, including transitions)
↑ = transition from low to high level
a, b, c, d = the level of steady-state input at inputs A, B, C, or D, respectively.
Q_{A0}, Q_{B0}, Q_{C0}, Q_{D0} = the level of Q_A, Q_B, Q_C, or Q_D, respectively, before the indicated steady-state input conditions were established.
Q_{An}, Q_{Bn}, Q_{Cn}, Q_{Dn} = the level of Q_A, Q_B, Q_C, respectively, before the most-recent ↑ transition of the clock.

schematics of inputs and outputs

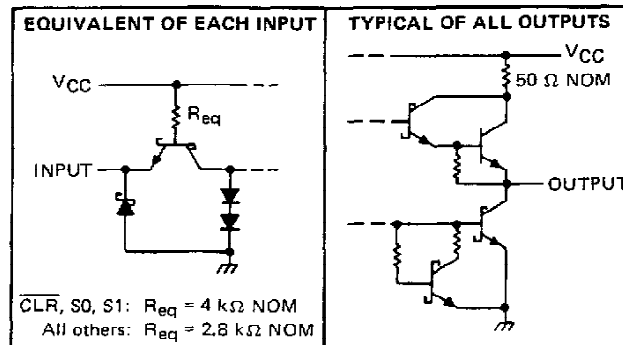
'194



'LS194A

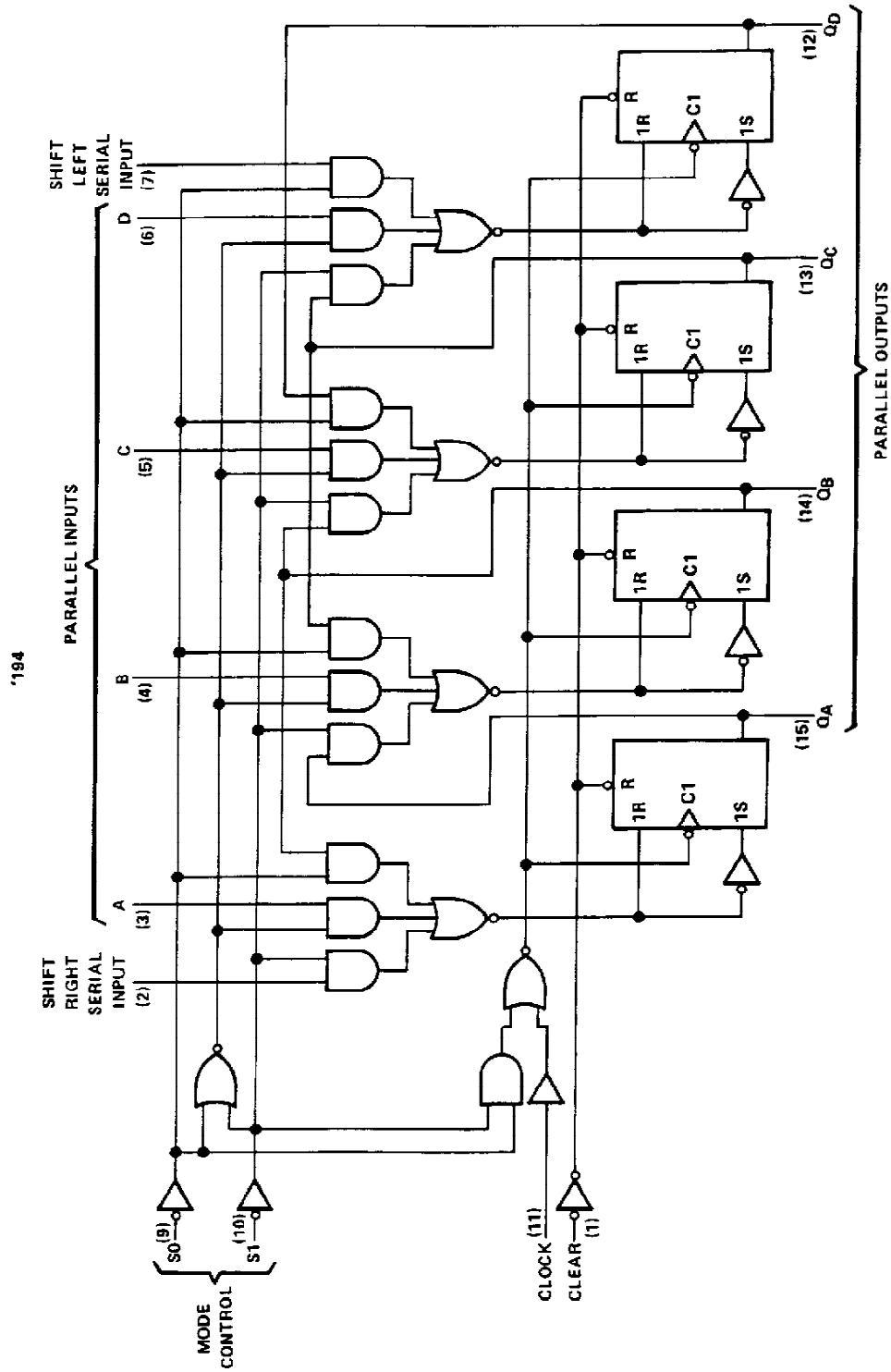


'S194



SN54194, SN74194
4-BIT BIDIRECTIONAL UNIVERSAL SHIFT REGISTERS

logic diagrams (positive logic)



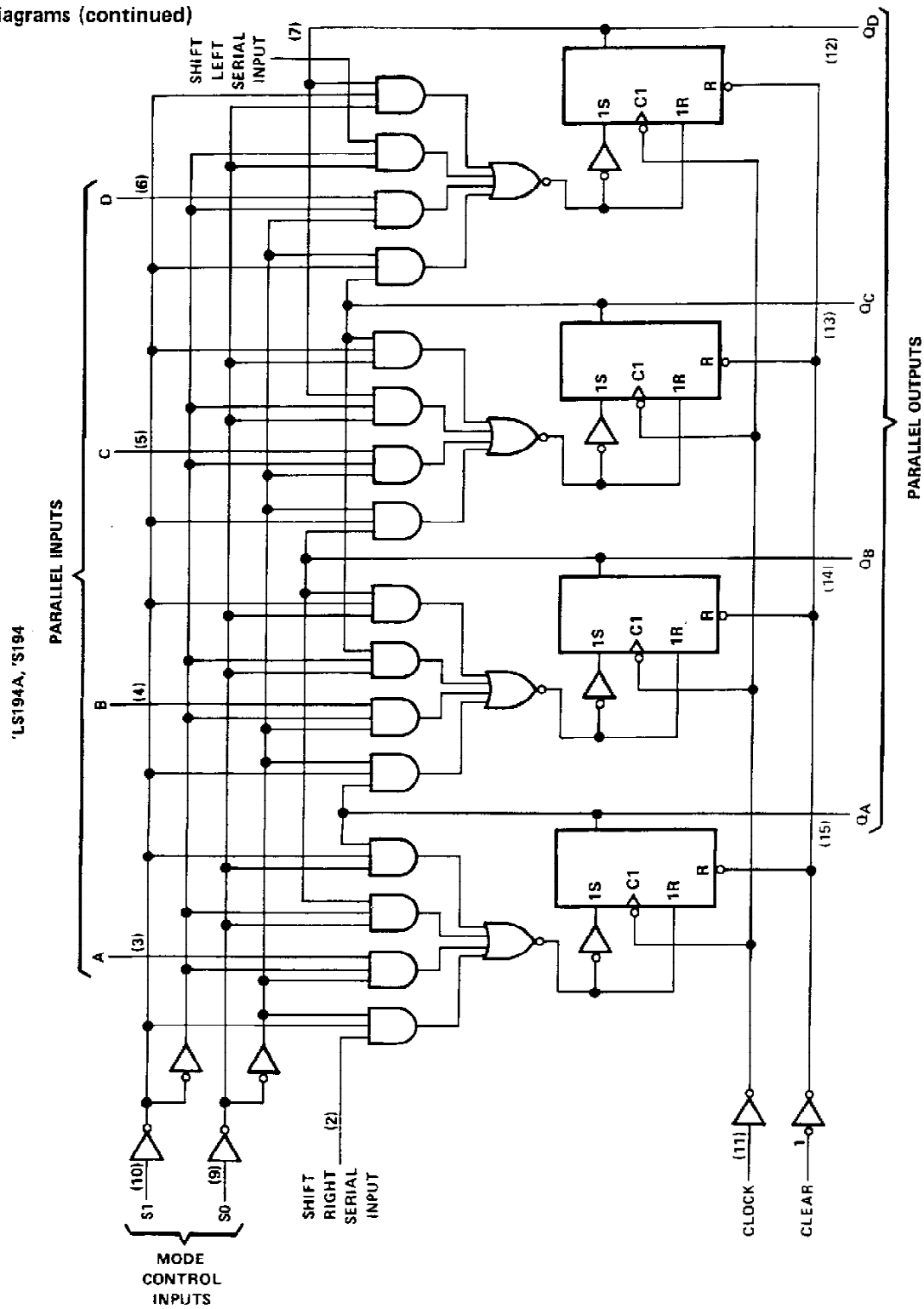
Pin numbers shown are for D, J, N, and W packages.

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**SN54LS194A, SN54S194
SN74LS194A, SN74S194
4-BIT BIDIRECTIONAL UNIVERSAL SHIFT REGISTERS**

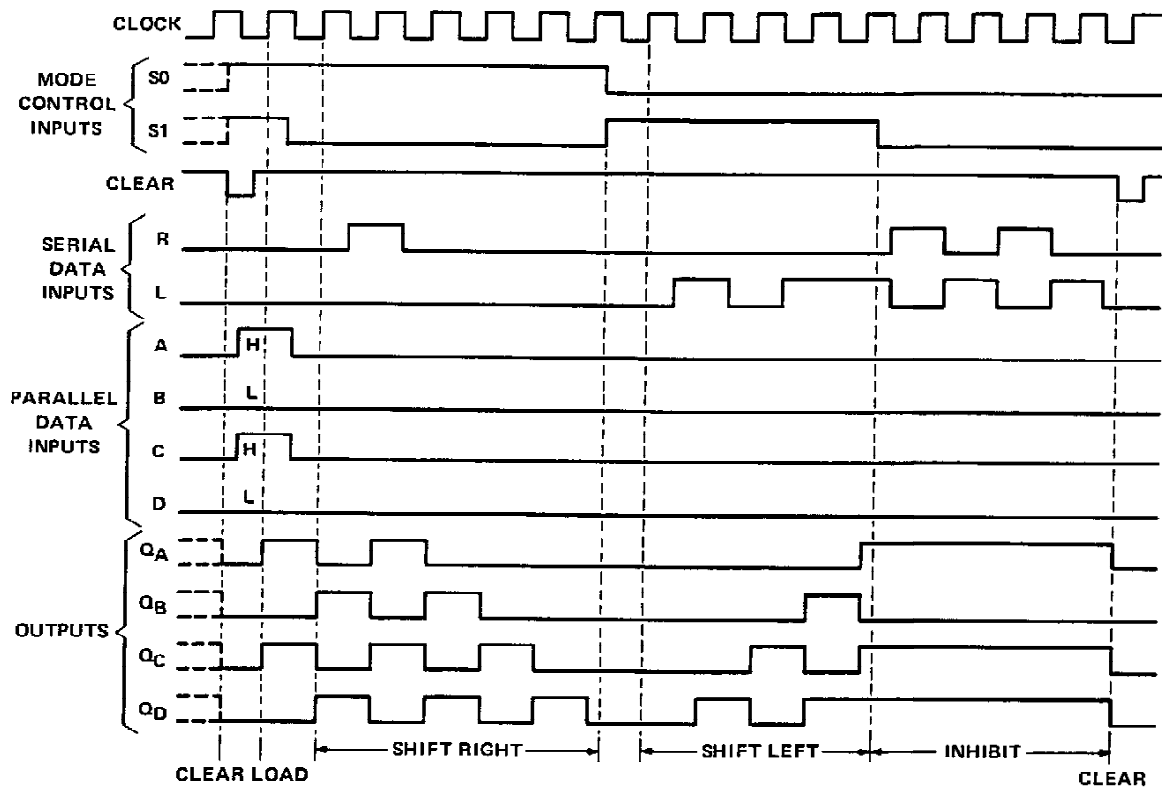
logic diagrams (continued)



Pin numbers shown on logic notation are for D, J, or N, and W packages.

SN54194, SN54LS194A, SN54S194,
SN74194, SN74LS194A, SN74S194
4-BIT BIDIRECTIONAL UNIVERSAL SHIFT REGISTERS

typical clear, load, right-shift, left-shift, inhibit, and clear sequences



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SN54194, SN74194 4-BIT BIDIRECTIONAL UNIVERSAL 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 | 5.5 V |
| Operating free-air temperature range: SN54194 | -55°C to 125°C |
| SN74194 | 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

| | SN54194 | | | SN74194 | | | 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} | | | -800 | | | -800 | μ A |
| Low-level output current, I_{OL} | | | 16 | | | 16 | mA |
| Clock frequency, f_{clock} | 0 | | 25 | 0 | | 25 | MHz |
| Width of clock or clear pulse, t_w | 20 | | | 20 | | | ns |
| Setup time, t_{SU} | Mode control | | 30 | 30 | | | ns |
| | Serial and parallel data | | 20 | 20 | | | ns |
| | Clear inactive-state | | 25 | 25 | | | ns |
| Hold time at any input, t_H | 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† | SN54194 | | | SN74194 | | | UNIT |
|--|--|---------|------|------|---------|------|------|---------|
| | | MIN | TYP‡ | MAX | MIN | TYP‡ | MAX | |
| V_{IH} High-level input voltage | | 2 | | | 2 | | | V |
| V_{IL} Low-level input voltage | | | | 0.8 | | | 0.8 | V |
| V_{IK} Input clamp voltage | $V_{CC} = \text{MIN}, I_I = -12 \text{ mA}$ | | | -1.5 | | | -1.5 | V |
| V_{OH} High-level output voltage | $V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OH} = -800 \mu\text{A}$ | 2.4 | 3.4 | | 2.4 | 3.4 | | V |
| V_{OL} Low-level output voltage | $V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OL} = 16 \text{ mA}$ | | 0.2 | 0.4 | | 0.2 | 0.4 | V |
| I_I Input current at maximum input voltage | $V_{CC} = \text{MAX}, V_I = 5.5 \text{ V}$ | | | 1 | | | 1 | mA |
| I_{IH} High-level input current | $V_{CC} = \text{MAX}, V_I = 2.4 \text{ V}$ | | | 40 | | | 40 | μ A |
| I_{IL} Low-level input current | $V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}$ | | | -1.6 | | | -1.6 | mA |
| I_{OS} Short-circuit output current§ | $V_{CC} = \text{MAX}$ | -20 | | -57 | -18 | | -57 | mA |
| I_{CC} Supply current | $V_{CC} = \text{MAX}, \text{ See Note 2}$ | | 39 | 63 | | 39 | 63 | 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.

NOTE 2: With all outputs open, inputs A through D grounded, and 4.5 V applied to S0, S1, clear, and the serial inputs, I_{CC} is tested with a momentary GND, then 4.5 V applied to clock.

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 | | 25 | 36 | | MHz |
| t_{PHL} Propagation delay time, high-to-low-level output from clear | $C_L = 15 \text{ pF}, R_L = 400 \Omega, \text{ See Figure 1}$ | | 19 | 30 | ns |
| t_{PLH} Propagation delay time, low-to-high-level output from clock | | | 14 | 22 | ns |
| t_{PHL} Propagation delay time, high-to-low-level output from clock | | | 17 | 26 | ns |

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SN54LS194A, SN74LS194A

4-BIT BIDIRECTIONAL UNIVERSAL 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: SN54LS194A | -55°C to 125°C |
| SN74LS194A | 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

| | SN54LS194A | | | SN74LS194A | | | 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 | μA |
| Low-level output current, I_{OL} | | | 4 | | | 8 | mA |
| Clock frequency, f_{clock} | 0 | | 25 | 0 | | 25 | MHz |
| Width of clock or clear pulse, t_w | 20 | | | 20 | | | ns |
| Setup time, t_{su} | Mode control | | | 30 | | | ns |
| | Serial and parallel data | | | 20 | | | ns |
| | Clear inactive-state | | | 25 | | | ns |
| Hold time at any input, t_h | 0 | | | 0 | | | ns |
| Operating free-air temperature, T_A | -55 | | 125 | 0 | | 70 | $^{\circ}\text{C}$ |

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

| PARAMETER | TEST CONDITIONS [†] | SN54LS194A | | | SN74LS194A | | | 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_I 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 | $V_{CC} = \text{MIN}$, $V_{IH} = 2 \text{ V}$, $V_{IL} = V_{IL \text{ max}}$ | | 0.25 | 0.4 | | 0.25 | 0.4 | V |
| | | | | | | 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 | μA |
| 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 | $V_{CC} = \text{MAX}$, See Note 2 | | 15 | 23 | | 15 | 23 | 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 2: With all outputs open, inputs A through D grounded, and 4.5 V applied to S0, S1, clear, and the serial inputs, I_{CC} is tested with a momentary GND, then 4.5 V, applied to clock.

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 | | 25 | 36 | | MHz |
| t_{PHL} Propagation delay time, high-to-low-level output from clear | $C_L = 15 \text{ pF}$, $R_L = 2 \text{ k}\Omega$, See Figure 1 | | 19 | 30 | ns |
| t_{PLH} Propagation delay time, low-to-high level output from clock | | | 14 | 22 | ns |
| t_{PHL} Propagation delay time, high-to-low level output from clock | | | 17 | 26 | ns |


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SN54S194, SN74S194 4-BIT BIDIRECTIONAL UNIVERSAL 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 | 5.5 V |
| Operating free-air temperature range: SN54S194 | -55°C to 125°C |
| SN74S194 | 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

| | SN54S194 | | | SN74S194 | | | 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} | | | -1 | | | -1 | mA |
| Low-level output current, I_{OL} | | | 20 | | | 20 | mA |
| Clock frequency, f_{clock} | 0 | | 70 | 0 | | 70 | MHz |
| Width of clock pulse, $t_w(\text{clock})$ | 7 | | | 7 | | | ns |
| Width of clear pulse, $t_w(\text{clear})$ | 12 | | | 12 | | | ns |
| Setup time, t_{su} | Mode control | | 11 | | | 11 | ns |
| | Serial and parallel data | | 5 | | | 5 | ns |
| | Clear inactive-state | | 9 | | | 9 | ns |
| Hold time at any input, t_h | | 3 | | | 3 | | 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† | SN54S194 | | | SN74S194 | | | UNIT |
|--|---|----------|------|------|----------|------|------|------|
| | | MIN | TYP‡ | MAX | MIN | TYP‡ | MAX | |
| V_{IH} High-level input voltage | | 2 | | | 2 | | | V |
| V_{IL} Low-level input voltage | | | | 0.8 | | | 0.8 | V |
| V_{IK} Input clamp voltage | $V_{CC} = \text{MIN}$, $I_I = -18 \text{ mA}$ | | | -1.2 | | | -1.2 | V |
| V_{OH} High-level output voltage | $V_{CC} = \text{MIN}$, $V_{IH} = 2 \text{ V}$, $V_{IL} = 0.8 \text{ V}$, $I_{OH} = -1 \text{ mA}$ | 2.5 | 3.4 | | 2.7 | 3.4 | | V |
| V_{OL} Low-level output voltage | $V_{CC} = \text{MIN}$, $V_{IH} = 2 \text{ V}$, $V_{IL} = 0.8 \text{ V}$, $I_{OL} = 20 \text{ mA}$ | | | 0.5 | | | 0.5 | V |
| I_I Input current at maximum input voltage | $V_{CC} = \text{MAX}$, $V_I = 5.5 \text{ V}$ | | | 1 | | | 1 | mA |
| I_{IH} High-level input current | $V_{CC} = \text{MAX}$, $V_I = 2.7 \text{ V}$ | | | 50 | | | 50 | µA |
| I_{IL} Low-level input current | $V_{CC} = \text{MAX}$, $V_I = 0.5 \text{ V}$ | | | -2 | | | -2 | mA |
| I_{OS} Short-circuit output current§ | $V_{CC} = \text{MAX}$ | -40 | | -100 | -40 | | -100 | mA |
| I_{CC} Supply current | $V_{CC} = \text{MAX}$, See Note 2 | | 85 | 135 | | 85 | 135 | mA |
| | $V_{CC} = \text{MAX}$, $T_A = 125^\circ\text{C}$, See Note 2 | | | 110 | | | | |
| | W package | | | | | | | |

† 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 2: With all outputs open, inputs A through D grounded, and 4.5 V applies to S0, S1, clear, and the serial inputs, I_{CC} is tested with a momentary GND, then 4.5 V, applied to clock.

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

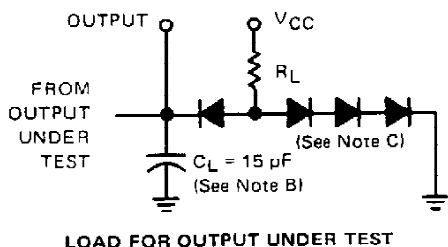
| PARAMETER | TEST CONDITIONS | MIN | TYP | MAX | UNIT | |
|---|---|-----|------|------|------|----|
| f_{max} Maximum clock frequency | $C_L = 15 \text{ pF}$, $R_L = 280 \Omega$, See Figure 1 | 70 | 106 | | MHz | |
| t_{PHL} Propagation delay time, high-to-low-level output from clear | | | 12.5 | 18.5 | ns | |
| t_{PLH} Propagation delay time, low-to-high-level output from clock | | | 4 | 8 | 12 | ns |
| t_{PHL} Propagation delay time, high-to-low-level output from clock | | | 4 | 11 | 16.5 | ns |

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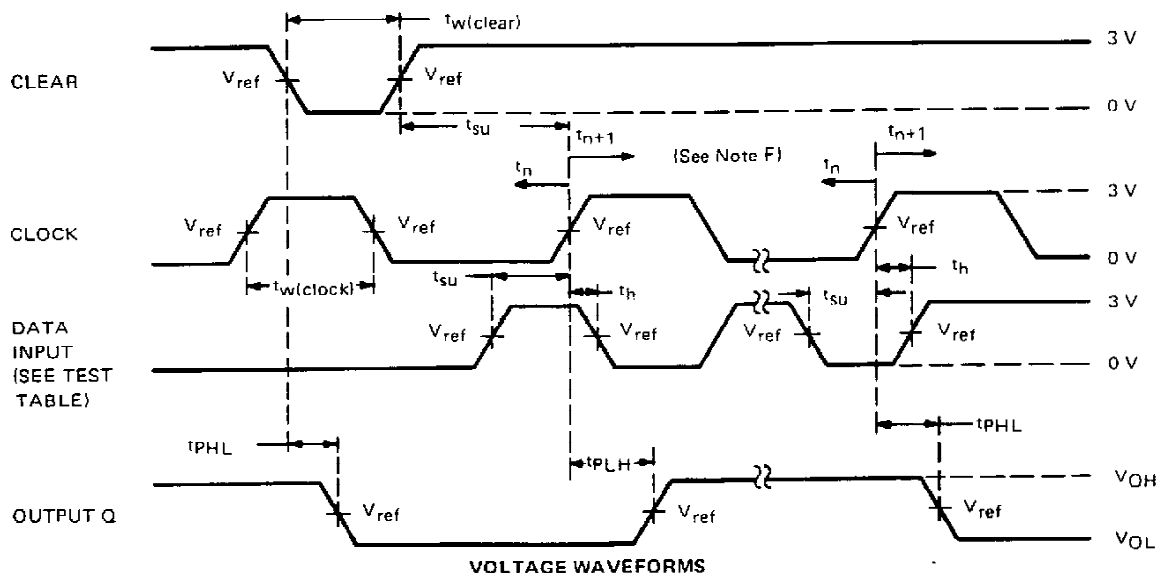
SN54194, SN54LS194A, SN54S194, SN74194, SN74LS194A, SN74S194 4-BIT BIDIRECTIONAL UNIVERSAL SHIFT REGISTERS

PARAMETER MEASUREMENT INFORMATION



TEST TABLE FOR SYNCHRONOUS INPUTS

| DATA INPUT FOR TEST | S1 | S0 | OUTPUT TESTED (SEE NOTE E) |
|---------------------|-------|-------|----------------------------|
| A | 4.5 V | 4.5 V | QA at t_{n+1} |
| B | 4.5 V | 4.5 V | QB at t_{n+1} |
| C | 4.5 V | 4.5 V | QC at t_{n+1} |
| D | 4.5 V | 4.5 V | QD at t_{n+1} |
| L Serial Input | 4.5 V | 0 V | QA at t_{n+4} |
| R Serial Input | 0 V | 4.5 V | QD at t_{n+4} |



- NOTES:**
- A. The clock pulse generator has the following characteristics: $Z_{out} \approx 50 \Omega$ and $PRR \leq 1 \text{ MHz}$. For '194, $t_r \leq 7 \text{ ns}$ and $t_f \leq 7 \text{ ns}$. For 'LS194A, $t_r \leq 15 \text{ ns}$ and $t_f \leq 6 \text{ ns}$. For 'S194, $t_r \leq 2.5 \text{ ns}$ and $t_f \leq 2.5 \text{ ns}$. When testing f_{max} , vary PRR.
 - B. C_L includes probe and jig capacitance.
 - C. All diodes are 1N3064 or 1N916.
 - D. A clear pulse is applied prior to each test.
 - E. For '194 and 'S194, $V_{ref} = 1.5 \text{ V}$; for 'LS194A, $V_{ref} = 1.3 \text{ V}$.
 - F. Propagation delay times (t_{PLH} and t_{PHL}) are measured at t_{n+1} . Proper shifting of data is verified at t_{n+4} with a functional test.
 - G. t_n = bit time before clocking transition.
 t_{n+1} = bit time after one clocking transition.
 t_{n+4} = bit time after four clocking transitions.

FIGURE 1—SWITCHING TIMES



PACKAGING INFORMATION

| Orderable part number | Status (1) | Material type (2) | Package Pins | Package qty Carrier | RoHS (3) | Lead finish/ Ball material (4) | MSL rating/ Peak reflow (5) | Op temp (°C) | Part marking (6) |
|----------------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|-------------------------|
| 7604001EA | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | 7604001EA SNJ54S194J |
| 7604001FA | Active | Production | CFP (W) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | 7604001FA SNJ54S194W |
| 7604001FA | Active | Production | CFP (W) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | 7604001FA SNJ54S194W |
| JM38510/07601BEA | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 07601BEA |
| JM38510/07601BEA | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 07601BEA |
| JM38510/07601BEA.A | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 07601BEA |
| JM38510/07601BEA.A | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 07601BEA |
| JM38510/30601B2A | Active | Production | LCCC (FK) 20 | 55 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30601B2A |
| JM38510/30601B2A | Active | Production | LCCC (FK) 20 | 55 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30601B2A |
| JM38510/30601B2A.A | Active | Production | LCCC (FK) 20 | 55 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30601B2A |
| JM38510/30601B2A.A | Active | Production | LCCC (FK) 20 | 55 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30601B2A |
| JM38510/30601BEA | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30601BEA |
| JM38510/30601BEA | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30601BEA |
| JM38510/30601BEA.A | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30601BEA |
| JM38510/30601BEA.A | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30601BEA |
| JM38510/30601BFA | Active | Production | CFP (W) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30601BFA |

| Orderable part number | Status (1) | Material type (2) | Package Pins | Package qty Carrier | RoHS (3) | Lead finish/ Ball material (4) | MSL rating/ Peak reflow (5) | Op temp (°C) | Part marking (6) |
|----------------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|----------------------|
| JM38510/30601BFA | Active | Production | CFP (W) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30601BFA |
| JM38510/30601BFA.A | Active | Production | CFP (W) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30601BFA |
| JM38510/30601BFA.A | Active | Production | CFP (W) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30601BFA |
| M38510/07601BEA | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 07601BEA |
| M38510/07601BEA | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 07601BEA |
| M38510/30601B2A | Active | Production | LCCC (FK) 20 | 55 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30601B2A |
| M38510/30601B2A | Active | Production | LCCC (FK) 20 | 55 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30601B2A |
| M38510/30601BEA | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30601BEA |
| M38510/30601BEA | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30601BEA |
| M38510/30601BFA | Active | Production | CFP (W) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30601BFA |
| M38510/30601BFA | Active | Production | CFP (W) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30601BFA |
| SN54LS194AJ | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SN54LS194AJ |
| SN54LS194AJ | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SN54LS194AJ |
| SN54LS194AJ.A | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SN54LS194AJ |
| SN54LS194AJ.A | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SN54LS194AJ |
| SN54S194J | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SN54S194J |
| SN54S194J | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SN54S194J |
| SN54S194J.A | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SN54S194J |
| SN54S194J.A | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SN54S194J |
| SN74LS194AD | Active | Production | SOIC (D) 16 | 40 TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS194A |
| SN74LS194AD | Active | Production | SOIC (D) 16 | 40 TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS194A |
| SN74LS194AD.A | Active | Production | SOIC (D) 16 | 40 TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS194A |
| SN74LS194AD.A | Active | Production | SOIC (D) 16 | 40 TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS194A |

| Orderable part number | Status (1) | Material type (2) | Package Pins | Package qty Carrier | RoHS (3) | Lead finish/ Ball material (4) | MSL rating/ Peak reflow (5) | Op temp (°C) | Part marking (6) |
|------------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|-------------------------|
| SN74LS194AN | Active | Production | PDIP (N) 16 | 25 TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | SN74LS194AN |
| SN74LS194AN | Active | Production | PDIP (N) 16 | 25 TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | SN74LS194AN |
| SN74LS194AN.A | Active | Production | PDIP (N) 16 | 25 TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | SN74LS194AN |
| SN74LS194AN.A | Active | Production | PDIP (N) 16 | 25 TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | SN74LS194AN |
| SNJ54LS194AJ | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54LS194AJ |
| SNJ54LS194AJ | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54LS194AJ |
| SNJ54LS194AJ.A | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54LS194AJ |
| SNJ54LS194AJ.A | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54LS194AJ |
| SNJ54S194J | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | 7604001EA SNJ54S194J |
| SNJ54S194J | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | 7604001EA SNJ54S194J |
| SNJ54S194J.A | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | 7604001EA SNJ54S194J |
| SNJ54S194J.A | Active | Production | CDIP (J) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | 7604001EA SNJ54S194J |
| SNJ54S194W | Active | Production | CFP (W) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | 7604001FA SNJ54S194W |
| SNJ54S194W | Active | Production | CFP (W) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | 7604001FA SNJ54S194W |
| SNJ54S194W.A | Active | Production | CFP (W) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | 7604001FA SNJ54S194W |
| SNJ54S194W.A | Active | Production | CFP (W) 16 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | 7604001FA SNJ54S194W |

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

(4) **Lead finish/Ball material:** Parts 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.

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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OTHER QUALIFIED VERSIONS OF SN54LS194A, SN74LS194A :

- Catalog : [SN74LS194A](#)
- Military : [SN54LS194A](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

TUBE


*All dimensions are nominal

| Device | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|---------------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| JM38510/30601B2A | FK | LCCC | 20 | 55 | 506.98 | 12.06 | 2030 | NA |
| JM38510/30601B2A.A | FK | LCCC | 20 | 55 | 506.98 | 12.06 | 2030 | NA |
| JM38510/30601BF A | W | CFP | 16 | 25 | 506.98 | 26.16 | 6220 | NA |
| JM38510/30601BF A.A | W | CFP | 16 | 25 | 506.98 | 26.16 | 6220 | NA |
| M38510/30601B2A | FK | LCCC | 20 | 55 | 506.98 | 12.06 | 2030 | NA |
| M38510/30601BF A | W | CFP | 16 | 25 | 506.98 | 26.16 | 6220 | NA |
| SN74LS194AD | D | SOIC | 16 | 40 | 507 | 8 | 3940 | 4.32 |
| SN74LS194AD.A | D | SOIC | 16 | 40 | 507 | 8 | 3940 | 4.32 |
| SN74LS194AN | N | PDIP | 16 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN74LS194AN | N | PDIP | 16 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN74LS194AN.A | N | PDIP | 16 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN74LS194AN.A | N | PDIP | 16 | 25 | 506 | 13.97 | 11230 | 4.32 |

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