

PARALLEL-LOAD 8-BIT SHIFT REGISTER

S54165 N74165

S54165-B,F,W • N74165-B, F

DIGITAL 54/74 TTL SERIES

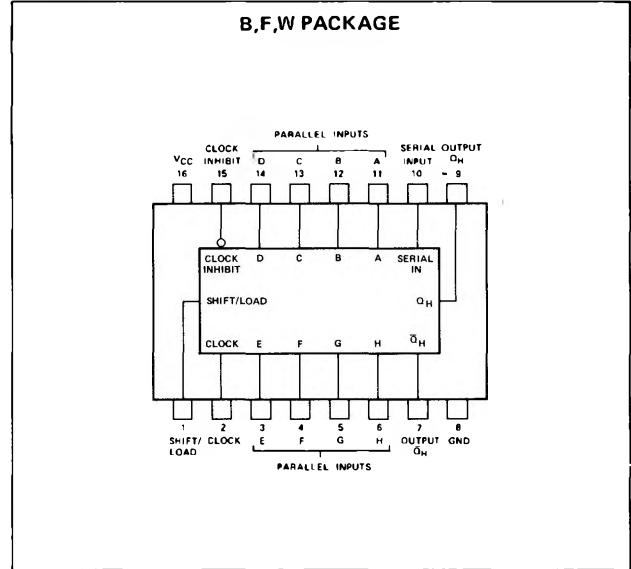
DESCRIPTION

The S54165 and N74165 are 8-bit serial shift registers that shift data to the right when clocked. Parallel-in access to each stage is made available by eight individual direct data inputs which are enabled by a low level at the shift/load input. These registers also feature gated clock inputs and complementary outputs from the eighth bit.

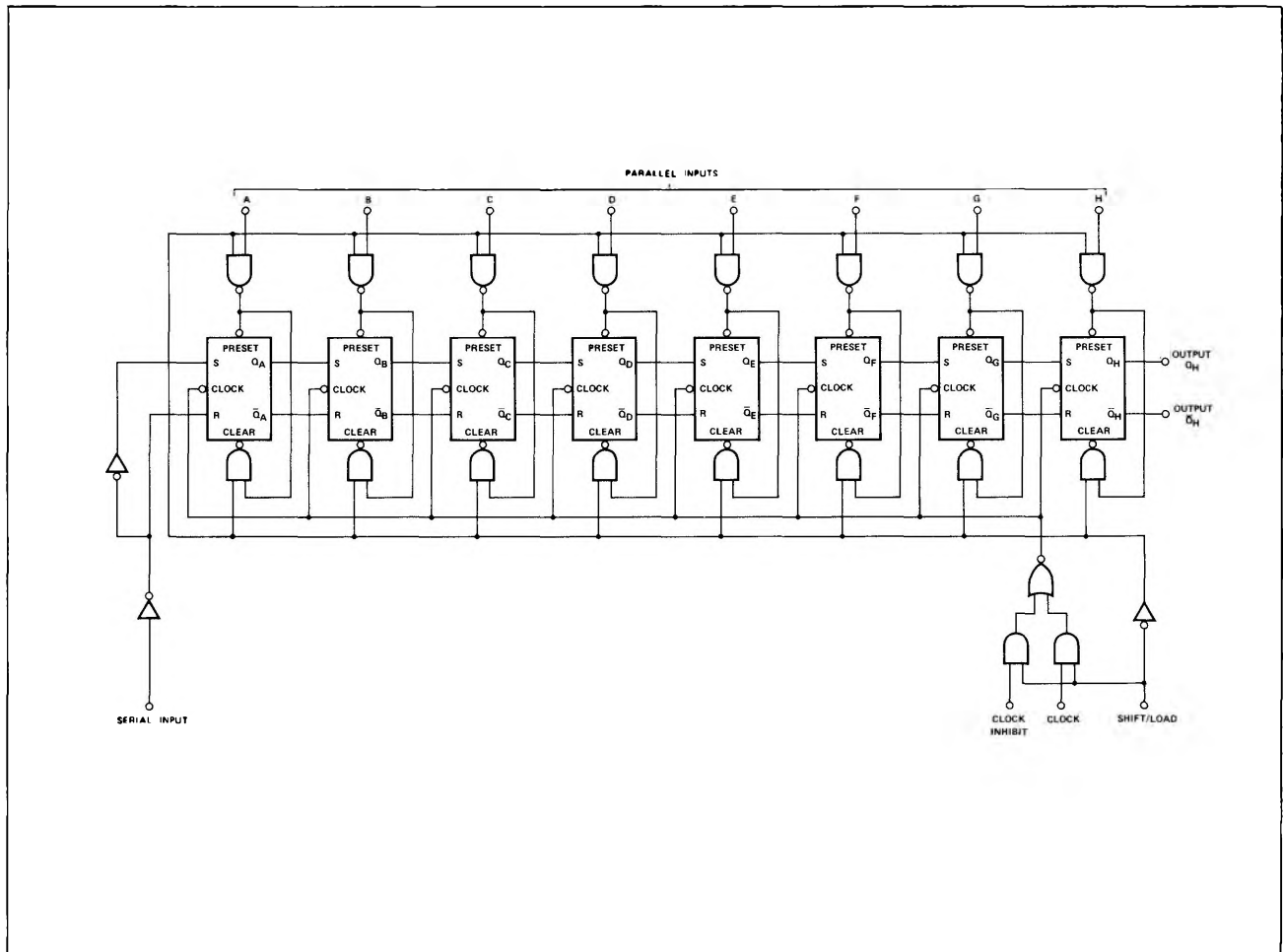
Clocking is accomplished through a 2-input positive-NOR gate, permitting one input to be used as a clock-inhibit function. Holding either of the clock inputs high inhibits clocking, and holding either clock input low with the load input high enables the other clock input. The clock-inhibit input should be changed to the high level only while the clock input is high. Parallel loading is inhibited as long as the load input is high. When taken low, data at the parallel inputs are loaded directly into the register independently of the state of the clock.

All inputs are diode-clamped to minimize transmission-line effects, thereby simplifying system design. Power dissipation is typically 210 milliwatts and maximum input clock frequency is typically 26 megahertz. The S54165 is characterized for operation over the full military temperature range of -55°C to 125°C ; the N74165 is characterized for operation from 0°C to 70°C .

PIN CONFIGURATIONS



LOGIC DIAGRAM



SIGNETICS DIGITAL 54/74 TTL SERIES — S54165 • N74165

RECOMMENDED OPERATING CONDITIONS

| | S54165 | | | N74165 | | | UNIT |
|--|------------------|-----|-----|--------|-----|------|------|
| | MIN | NOM | MAX | MIN | NOM | MAX | |
| Supply Voltage V_{CC} | 4.5 | 5 | 5.5 | 4.75 | 5 | 5.25 | V |
| Normalized Fan-Out from each Output, N: | High logic level | | | 20 | | | 20 |
| | Low logic level | | | 10 | | | 10 |
| Input Clock Frequency, f_{clock} | 0 | | 20 | 0 | | 20 | MHz |
| Width of Clock Input Pulse, $t_{w(clock)}$ | 25 | | | 25 | | | ns |
| Width of Load Input Pulse, $t_{w(load)}$ | 15 | | | 15 | | | ns |
| Clock-Enable Setup Time, t_{setup} | 30 | | | 30 | | | ns |
| Parallel Input Setup Time, t_{setup} | 10 | | | 10 | | | ns |
| Serial Input Setup Time, t_{setup} | 20 | | | 20 | | | ns |
| Shift Setup Time, t_{setup} | 45 | | | 45 | | | ns |
| Hold Time at any Input, t_{hold} | 0 | | | 0 | | | ns |
| Operating Free-Air Temperature, T_A | -55 | 25 | 125 | 0 | 25 | 70 | °C |

ELECTRICAL CHARACTERISTICS (over recommended operating free-air temperature range unless otherwise noted)

| PARAMETER | TEST CONDITIONS * | S54165 | | | N74165 | | | 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_I Input clamp voltage | | | | -1.5 | | | -1.5 | V |
| V_{OH} High-level output voltage | $V_{CC} = MAX, I_I = -12 mA$ | | | | | | | V |
| V_{OL} Low-level output voltage | $V_{CC} = MIN, V_{IH} = 2 V,$ | 2.4 | | | 2.4 | | | V |
| | $V_{IL} = 0.8 V, I_{OH} = -800 \mu A$ | | | 0.4 | | | 0.4 | V |
| I_I Input current at maximum input voltage | $V_{CC} = MIN, V_{IH} = 2 V,$ $V_{IL} = 0.8 V, I_{OL} = 16 mA$ | | | 1 | | | 1 | mA |
| I_{IH} High-level input current | $V_{CC} = MAX, V_I = 5.5 V$ | | | 80 | | | 80 | μA |
| | Load Input Other inputs | | | 40 | | | 40 | μA |
| I_{IL} Low-level input current | $V_{CC} = MAX, V_I = 2.4 V$ | | | -3.2 | | | -3.2 | mA |
| | Load input Other inputs | | | -1.6 | | | -1.6 | mA |
| I_{OS} Short-circuit output current † | $V_{CC} = MAX$ | -20 | | -55 | -18 | | -55 | mA |
| I_{CC} Supply current | $V_{CC} = MAX, \text{ See Note}$ | | 42 | 63 | | 42 | 63 | mA |

SWITCHING CHARACTERISTICS, $V_{CC} = 5 V, T_A = 25^\circ C, N = 10$

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|-----------|--------------|-------------|----------------------------------|-----|-----|-----|------|
| f_{max} | | | | 20 | 26 | | MHz |
| t_{PLH} | Load | Any | $C_L = 15 pF, R_L = 400 \Omega,$ | | 21 | 31 | ns |
| t_{PHL} | | | | | 27 | 40 | ns |
| t_{PLH} | Clock | Any | | | 16 | 27 | ns |
| t_{PHL} | | | | | 21 | 34 | ns |
| t_{PLH} | H | Q_H | | | 11 | 20 | ns |
| t_{PHL} | | | | | 24 | 36 | ns |
| t_{PLH} | H | \bar{Q}_H | | 18 | 27 | ns | |
| t_{PHL} | | | | 18 | 27 | ns | |

NOTE : With the outputs open, clock inhibit and shift/load at 4.5 V, and a clock pulse applied to the clock input, I_{CC} is measured first with the parallel inputs at 4.5 V, then with the parallel inputs grounded.

* 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 $V_{CC} = 5 V, T_A = 25^\circ C$.

† Not more than one output should be shorted at a time.

f_{max} ≡ Maximum input count frequency

t_{PLH} ≡ Propagation delay time, low-to-high-level output

t_{PHL} ≡ Propagation delay time, high-to-low-level output