# DIVIDE-BY-TWELVE COUNTER (DIVIDE-BY-TWO AND DIVIDE-BY-SIX)

# S5492 N7492

S5492–A,F,W • N7492–A,F

DIGITAL 54/74 TTL SERIES

## DESCRIPTION

The S5492/N7492 is a high-speed monolithic 4-bit binary counter consisting of four master-slave flip-flops which are internally interconnected to provide a divide-by-two counter and a divide-by-six counter. A gated direct reset line is provided which inhibits the count inputs and simultaneously returns the four flip-flops outputs to a logical 0. As the output from flip-flop A is not internally connected to the succeeding flip-flops the counter may be operated in two independent modes:

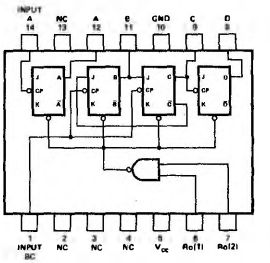
1. When used as a divide-by-twelve counter, output A must be externally connected to input BC. The input count pulses are applied to input A. Simultaneous division of 2, 6, and 12 are performed at the A, C, and D outputs as shown in the truth table.

2. When used as a divide-by-six counter, the input count pulses are applied to input BC. Simultaneously, frequency division of 3 and 6 are available at the C and D outputs. Independent use of flip-flop A is available if the reset function coincides with reset of the divide-by-six counter.

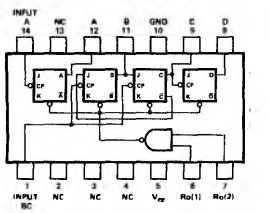
The S5492/N7492 is completely compatible with Series 54 and Series 74 logic families. Average power dissipation is 155mW.

## PIN CONFIGURATIONS

W PACKAGE



A,F PACKAGE



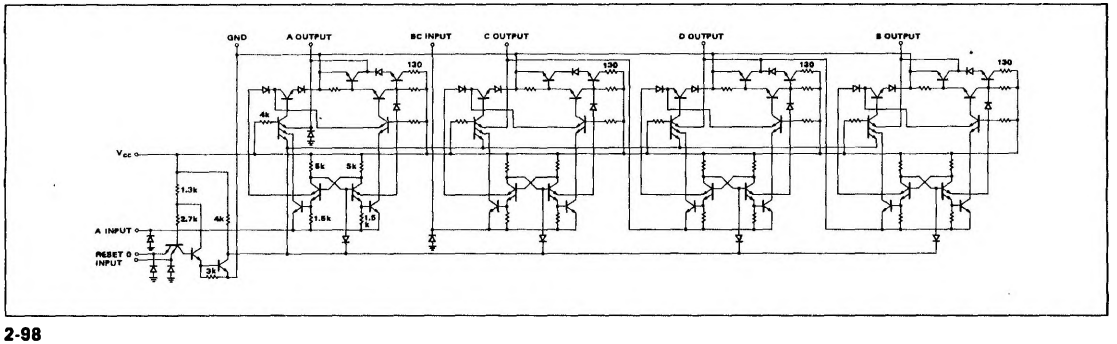
## TRUTH TABLE (See Notes 1 and 2)

| COUNT | OUTPUT | | | |
|---|---|---|---|---|
| | D | C | B | A |
| 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 1 |
| 2 | 0 | 0 | 1 | 0 |
| 3 | 0 | 0 | 1 | 1 |
| 4 | 0 | 1 | 0 | 0 |
| 5 | 0 | 1 | 0 | 1 |

| COUNT | OUTPUT | | | |
|---|---|---|---|---|
| | D | C | B | A |
| 6 | 1 | 0 | 0 | 0 |
| 7 | 1 | 0 | 0 | 1 |
| 8 | 1 | 0 | 1 | 0 |
| 9 | 1 | 0 | 1 | 1 |
| 10 | 1 | 1 | 0 | 0 |
| 11 | 1 | 1 | 0 | 1 |

NOTES:
1. Output A connected to input B.
2. To reset all outputs to logical 0, both $R_{0(1)}$ and $R_{0(2)}$ inputs must be at logical 1.

## SCHEMATIC DIAGRAM



## RECOMMENDED OPERATING CONDITIONS

| | | MIN | NOM | MAX | UNIT |
|---|---|---|---|---|---|
| Supply Voltage $V_{CC}$: S5492 Circuits | | 4.5 | 5 | 5.5 | V |
| N7492 Circuits | | 4.75 | 5 | 5.25 | V |
| Operating Free-Air Temperature Range, $T_A$: | S5492 Circuits | -55 | 25 | 125 | °C |
| | N7492 Circuits | 0 | 25 | 70 | °C |
| Normalized Fan-Out from each Output, N | | | | 10 | |
| Width of Input Count Pulse, $t_{p(in)}$ | | 50 | | | ns |
| Width of Reset Pulse, $t_{p(reset)}$ | | 50 | | | ns |

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

| | PARAMETER | TEST CONDITIONS * | | | MIN | TYP** | MAX | UNIT |
|---|---|---|---|---|---|---|---|---|
| $V_{in(1)}$ | Input voltage required to ensure logical 1 at any input terminal | $V_{CC}$ = MIN | | | 2 | | | V |
| $V_{in(0)}$ | Input voltage required to ensure logical 0 at any input terminal | $V_{CC}$ = MIN | | | | | 0.8 | V |
| $V_{out(1)}$ | Logical 1 output voltage | $V_{CC}$ = MIN, | $I_{load}$ = -400μA | | 2.4 | | | V |
| $V_{out(0)}$ | Logical 0 output voltage | $V_{CC}$ = MIN, | $I_{sink}$ = 16mA | | | | 0.4 | V |
| $I_{in(1)}$ | Logical 1 level input current at $R_{0(1)}$ or $R_{0(2)}$ inputs | $V_{CC}$ = MAX,<br>$V_{CC}$ = MAX, | $V_{in}$ = 2.4V<br>$V_{in}$ = 5.5V | | | | 40<br>1 | μA<br>mA |
| $I_{in(1)}$ | Logical 1 level input current at input A | $V_{CC}$ = MAX,<br>$V_{CC}$ = MAX, | $V_{in}$ = 2.4V<br>$V_{in}$ = 5.5V | | | | 80<br>1 | μA<br>mA |
| $I_{in(1)}$ | Logical 1 level input current at input BC | $V_{CC}$ = MAX,<br>$V_{CC}$ = MAX, | $V_{in}$ = 2.4V<br>$V_{in}$ = 5.5V | | | | 160<br>1 | μA<br>mA |
| $I_{in(0)}$ | Logical 0 level input current at $R_{0(1)}$ or $R_{0(2)}$ inputs | $V_{CC}$ = MAX, | $V_{in}$ = 0.4V | | | | -1.6 | mA |
| $I_{in(0)}$ | Logical 0 level input current input A | $V_{CC}$ = MAX, | $V_{in}$ = 0.4V | | | | -3.2 | mA |
| $I_{in(0)}$ | Logical 0 level input current at input BC | $V_{CC}$ = MAX, | $V_{in}$ = 0.4V | | | | -6.4 | mA |
| $I_{OS}$ | Short circuit output current † | $V_{CC}$ = MAX, | $V_{out}$ = 0 | S5492<br>N7492 | -20<br>-18 | | -57<br>-57 | mA<br>mA |
| $I_{CC}$ | Supply current | $V_{CC}$ = MAX, | $V_{in}$ = 4.5V | S5492<br>N7492 | | 31<br>31 | 44<br>51 | mA<br>mA |

## SWITCHING CHARACTERISTICS, $V_{CC}$ = 5V, $T_A$ = 25°C, N = 10

| | PARAMETER | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| $f_{max}$ | Maximum frequency of input count pulses | $C_L$ = 15pF, | $R_L$ = 400Ω | 10 | 18 | | MHz |
| $t_{pd1}$ | Propagation delay time to logical 1 level from input count pulse to output D | $C_L$ = 15pF, | $R_L$ = 400Ω | | 60 | 100 | ns |
| $t_{pd0}$ | Propagation delay time to logical 0 level from input count pulse to output D | $C_L$ = 15pF, | $R_L$ = 400Ω | | 60 | 100 | ns |

* 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 $V_{CC}$ = 5V, $T_A$ = 25°C.
† Not more than one output should be shorted at a time.