

## 8T22 Multivibrator

Retriggerable One Shot  
Product Specification

### Logic Products

#### DESCRIPTION

The 8T22 is a direct pin-for pin replacement for the 9601 retriggerable one-shot. Triggering can be performed on either the leading or falling edge of the input signal through selection of the proper input terminal.

The inputs are level-sensitive making triggering independent of signal transition times. Output pulse width is determined by external timing components ( $R_x$  and  $C_x$ ) with each trigger pulse initiating a complete new-timing cycle.

For those applications where a dual retriggerable one-shot is required the Signetics 9602 should be considered.

#### FUNCTION TABLE

| PIN NUMBER |       |       |       |
|------------|-------|-------|-------|
| 1          | 2     | 3     | 4     |
| H → L      | H     | H     | H     |
| H          | H → L | H     | H     |
| L          | X     | L → H | H     |
| X          | L     | L → H | H     |
| L          | X     | H     | L → H |
| X          | L     | H     | L → H |

| TYPE  | TYPICAL PROPAGATION DELAY | TYPICAL SUPPLY CURRENT (TOTAL) |
|-------|---------------------------|--------------------------------|
| N8T22 | 20ns                      |                                |

#### ORDERING CODE

| PACKAGES    | COMMERCIAL RANGE<br>$V_{CC} = 5V \pm 5\%$ ; $T_A = 0^\circ C$ to $+70^\circ C$ |
|-------------|--|
| Plastic DIP | N8T22N   |

#### NOTE:

For information regarding devices processed to Military Specifications, see the Signetics Military Products Data Manual.

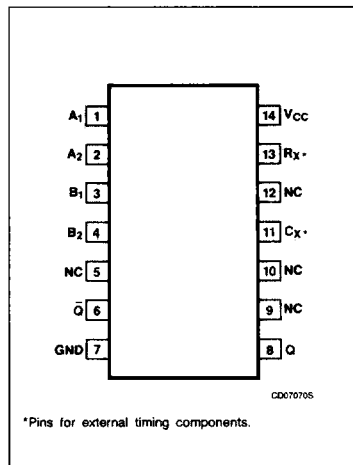
#### INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

| PINS         | DESCRIPTION | 8T    |
|--------------|-------------|-------|
| $A_n, B_n$   | Input       | 1.5ul |
| $C_x, R_x$   | Input       | 1.5ul |
| Q, $\bar{Q}$ | Output      | 8ul   |

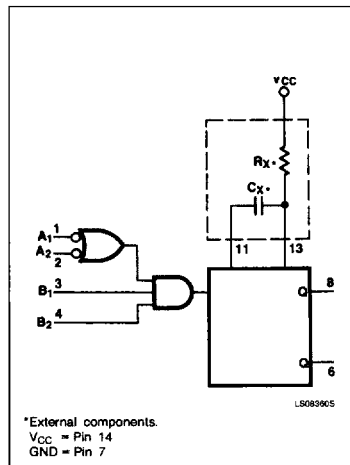
#### NOTE:

A unit load (ul) is  $40\mu A$   $I_{IH}$  and  $-1.6mA$   $I_{IL}$ .

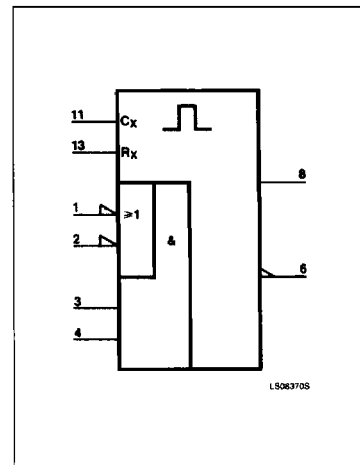
#### PIN CONFIGURATION



#### LOGIC SYMBOL



#### LOGIC SYMBOL (IEEE/IEC)



## Multivibrator

8T22

**ABSOLUTE MAXIMUM RATINGS** (Over operating free-air temperature range unless otherwise noted.)

| PARAMETER        |  | 8T                       | UNIT |
|------------------|--|--------------------------|------|
| V <sub>CC</sub>  | Supply voltage                                 | 7.0                      | V    |
| V <sub>IN</sub>  | Input voltage                                  | -0.5 to +5.5             | V    |
| V <sub>OUT</sub> | Voltage applied to output in HIGH output state | -0.5 to +V <sub>CC</sub> | V    |
| T <sub>A</sub>   | Operating free-air temperature range           | 0 to 70                  | °C   |

**RECOMMENDED OPERATING CONDITIONS**

| PARAMETER       |                                | 8T   |     |      | UNIT |
|-----------------|--------------------------------|------|-----|------|------|
|                 |                                | Min  | Nom | Max  |      |
| V <sub>CC</sub> | Supply voltage                 | 4.75 | 5.0 | 5.25 | V    |
| V <sub>IH</sub> | HIGH-level input voltage       | 1.9  |     | 2.5  | V    |
| V <sub>IL</sub> | LOW-level input voltage        |      |     | 0.9  | V    |
| I <sub>IK</sub> | Input clamp current            |      |     | -12  | mA   |
| I <sub>OH</sub> | HIGH-level output current      |      |     | 960  | μA   |
| I <sub>OL</sub> | LOW-level output current       |      |     | 12.8 | mA   |
| T <sub>A</sub>  | Operating free-air temperature | 0    |     | 70   | °C   |

**DC ELECTRICAL CHARACTERISTICS** (Over recommended operating free-air temperature range unless otherwise noted.)

| PARAMETER       |   | TEST CONDITIONS <sup>1</sup>                    | 8T22 |      | UNIT |
|-----------------|---|---|------|------|------|
|                 |   |   | Min  | Max  |      |
| V <sub>IH</sub> | Input HIGH voltage                        | Guaranteed input HIGH threshold voltage         | 1.9  |      | V    |
| V <sub>IL</sub> | Input LOW voltage                         | Guaranteed input LOW threshold voltage          |      | 0.9  | V    |
| V <sub>IK</sub> | Input clamp diode voltage                 | V <sub>CC</sub> = MIN, I <sub>IK</sub> = -12mA  |      | -1.5 | V    |
| V <sub>OH</sub> | HIGH-level output voltage                 | V <sub>CC</sub> = MIN, I <sub>OH</sub> = -960μA | 2.4  |      | V    |
| V <sub>OL</sub> | LOW-level output voltage                  | V <sub>CC</sub> = MIN, I <sub>OL</sub> = 12.8mA |      | 0.4  | V    |
| I <sub>IH</sub> | HIGH-level input current                  | V <sub>CC</sub> = MAX, V <sub>I</sub> = 4.5V    |      | 60   | μA   |
| I <sub>IL</sub> | LOW-level input current                   | V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4V    |      | -1.6 | mA   |
| I <sub>OS</sub> | Short-circuit output current <sup>2</sup> | V <sub>CC</sub> = MAX, V <sub>O</sub> = 0       | -10  | -40  | mA   |
| I <sub>CC</sub> | Supply current (total)                    | V <sub>CC</sub> = 5.25V                         |      | 25   | mA   |
| I <sub>EE</sub> | Supply current (total)                    | V <sub>CC</sub> = 5.25V                         |      | -28  | mA   |

**NOTES:**

- For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
- I<sub>OS</sub> is tested with V<sub>OUT</sub> = +0.5V and V<sub>CC</sub> = V<sub>CC</sub> MAX + 0.5V. Not more than one output should be shorted at a time and duration of the short circuit should not exceed one second.

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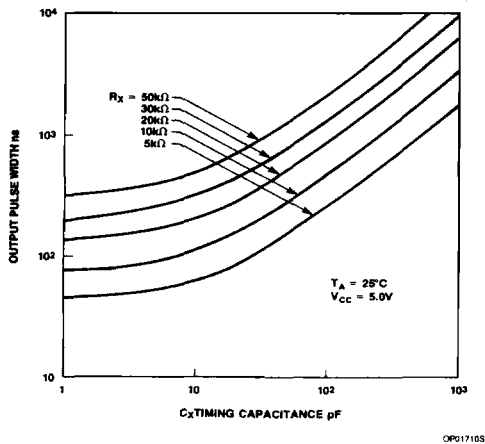
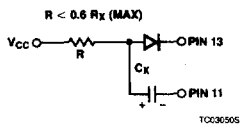
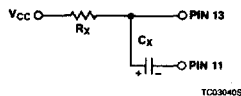
## AC ELECTRICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$ , $V_{CC} = 5.0\text{V}$

| PARAMETER  | TEST CONDITIONS  | 8T22 |      |      | UNIT             |
|--|--|------|------|------|------------------|
|  |  | Min  | Typ  | Max  |                  |
| Propagation delay<br>Negative trigger input<br>to true output ( $t_{PLH}$ )<br>Negative trigger input<br>to false output ( $t_{PHL}$ ) | $R_x = 5.0\text{k}\Omega$ , $C_x = 0$<br>$C_L = 15\text{pF}$ |      | 25   | 40   | ns               |
|  | $R_x = 5.0\text{k}\Omega$ , $C_x = 0$<br>$C_L = 15\text{pF}$ |      | 25   | 40   | ns               |
| Min. true output pulse width   | $R_x = 5.0\text{k}\Omega$ , $C_x = 0$<br>$C_L = 15\text{pF}$ |      | 45   | 65   | ns               |
| Pulse width variation  | $R_x = 10\text{k}\Omega$ , $C_x = 1000\text{pF}$             | 3.08 | 3.42 | 3.76 | $\mu\text{s}$    |
| Timing resistor  |  | 5.0  |      | 50   | $\text{k}\Omega$ |
| $C_{\text{Stray}}$ - maximum allowable<br>wiring capacitance   | P13 to ground  |      |      | 50   | pF               |

**NOTES:**

- Positive current is defined as into the pin referenced.
- Unless otherwise note,  $10\text{k}\Omega$  resistor placed between Pin 13 and  $V_{CC}(R_x)$ .

## OPERATION RULES



Typical Output Pulse Width Versus Timing Resistance And Capacitance For  $C_x < 10^3\text{pF}$  is Shown In The Above Graph.

- An external resistor ( $R_x$ ) and external capacitor ( $C_x$ ) are required as shown in the Logic Diagram.
- The value of  $R_x$  may vary from 5.0 to 50  $\text{k}\Omega$  (0 to  $75^\circ\text{C}$ ).
- $C_x$  may vary from 0 to any necessary value available. If, however, the capacitor has leakages approaching  $3.0\mu\text{A}$  or if stray capacitance from either terminal to ground is more than  $50\text{pF}$ , the timing equations may not represent the pulse width obtained.
- If electrolytic capacitors are to be used, the following configurations are recommended:
  - For use with low leakage electrolytic capacitors. The normal RC configuration can be used predictably only if the forward capacitor leakage at 5.0 volts is less than  $3\mu\text{A}$ , and the inverse capacitor leakage at 1.0 volt is less than  $5\mu\text{A}$  over the operational temperature range, and Rule 3 above is satisfied.
  - Use with high inverse leakage current electrolytic capacitors. The diode in this configuration prevents high inverse leakage currents through the capacitor by preventing an inverse voltage across the capacitor.

$$t \approx 0.3 RC_x$$

The output pulse with ( $t$ ) is defined as follows:

$$t = 0.32 R_x C_x \left[ 1 + \frac{0.7}{R_x} \right]$$

Where  $R_x$  is in  $\text{k}\Omega$ ,  $C_x$  is in pF,  $t$  is in ns; for  $C_x < 10^3\text{pF}$ .

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## AC TEST CIRCUITS AND WAVEFORMS

