

## SN74LS74N

### ■ Product Introduction

The SN74LS74N is a D trigger with two sets of positive edge triggers. It has preset (Preset) and Clear function. The design of TTL output structure can be used as the interface of MCU control circuit.

### ■ Product Features

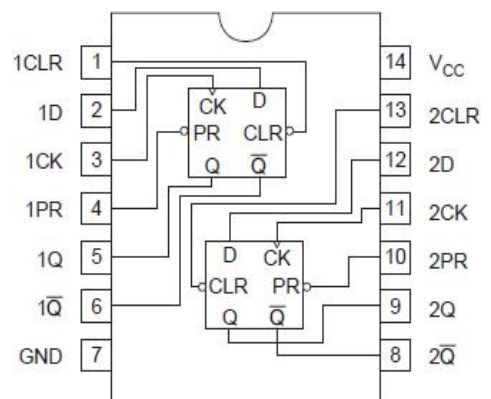
- D trigger with 2 sets of positive edge triggers
- It can be used as the interface of MCU control circuit.
- TTL circuit output design
- Input clamping diode to simplify system design
- With preset (Preset) and Clear function.
- Package : DIP14, SOP14

### ■ Product Applications

- Digital logic driver or Industrial control applications
- Other application areas Battery-powered equipment

### ■ Package and Pin Assignment

| SOP14 or DIP14. |                |        |                |
|-----------------|----------------|--------|----------------|
| Pin NO          | Pin Definition | Pin NO | Pin Definition |
| 1               | Input 1CLR     | 14     | Supply VCC     |
| 2               | Input 1D       | 13     | Input 2CLR     |
| 3               | Input 1CK      | 12     | Input 2D       |
| 4               | Input 1PR      | 11     | Input 2CK      |
| 5               | Output 1Q      | 10     | Input 2PR      |
| 6               | Output 1Q      | 9      | Output 2Q      |
| 7               | Supply GND     | 8      | Output 2Q      |



### ■ Absolute Maximum Ratings

| Item                  | Symbol   | Maximum Ratings | Unit   |
|-----------------------|----------|-----------------|--------|
| Supply voltage        | $V_{CC}$ | 7               | V      |
| Input voltage         | $V_I$    | 7               | V      |
| Power dissipation     | $P_D$    | 500             | mW     |
| Operating temperature | $T_A$    | 0-70            | °C     |
| Storage temperature   | $T_S$    | -65-150         | °C     |
| welding temperature   | $T_W$    | 260             | °C,10s |

Note: the limit parameter is the limit value that cannot be exceeded under any condition. Once this limit is exceeded, it may cause physical damage such as deterioration of the product. At the same time, the chip can not be guaranteed to work properly when it is close to the limit parameters.

### ■ Function Table

| Inputs |     |    |   | Outputs        |             |
|--------|-----|----|---|----------------|-------------|
| PR     | CLR | CK | D | Q              | $\bar{Q}$   |
| L      | H   | ×  | × | H              | L           |
| H      | L   | ×  | × | L              | H           |
| L      | L   | ×  | × | H*             | H*          |
| H      | H   | ↑  | H | H              | L           |
| H      | H   | ↑  | L | L              | H           |
| H      | H   | L  | X | Q <sub>0</sub> | $\bar{Q}_0$ |

H:high level, L: low level, X: irrelevant, ↑ :transition from low to high level.

Q<sub>0</sub>:level of Q before the indicated steady-state input conditions were established.

$\bar{Q}_0$ : complement of Q<sub>0</sub> or level of Q before the indicated steady-state input conditions were established.

\*:This configuration is nonstable, that is, it will not persist when preset and clear inputs return to their inactive (high) level.

### ■ Recommended Operating Conditions

| Item                  | Symbol        | Min      | Tpy  | Max  | Unit |
|-----------------------|---------------|----------|------|------|------|
| Supply voltage        | $V_{CC}$      | 4.75     | 5.00 | 5.25 | V    |
| Output current        | $I_{OH}$      | —        | —    | -400 | uA   |
|                       | $I_{OL}$      | —        | —    | 8    | mA   |
| Operating temperature | $T_A$         | 0        | —    | 60   | °C   |
| Pulse width           | Clock         | $t_w$    | 25   | —    | ns   |
|                       | Clear, Preset | $t_w$    | 25   | —    |      |
| Hold time             | $t_h$         | 5 ↑      | —    | —    | ns   |
| Setup time            | “H” Data      | $t_{su}$ | 20 ↑ | —    | ns   |
|                       | “L” Data      | $t_{su}$ | 20 ↑ | —    |      |

Note: ↑ : The arrow indicates the rising edge.

#### Electrical Characteristics (T<sub>A</sub>=25°C, Unless specified)

| Item                           |        | Symbol          | Min | Tpy                    | Max  | Unit | Conditions  |
|--------------------------------|--------|-----------------|-----|------------------------|------|------|---|
| Input voltage                  |        | V <sub>IH</sub> | 2   | —                      | —    | V    |   |
|                                |        | V <sub>IL</sub> | —   | —                      | 0.7  | V    |   |
| Output voltage                 |        | V <sub>OH</sub> | 2.7 | 3.3                    | —    | V    | V <sub>CC</sub> =4.75V, V <sub>IH</sub> =2V, V <sub>IL</sub> =0.7V,<br>I <sub>OH</sub> = -400uA |
|                                |        | V <sub>OL</sub> | —   | 0.25                   | 0.5  | V    | V <sub>CC</sub> =4.75V, V <sub>IL</sub> =0.7V,<br>V <sub>IH</sub> =2V                           |
| —                              | 0.15   |                 | 0.4 | I <sub>OL</sub> = 8 mA |      |      |   |
| Input current                  | D      | I <sub>IH</sub> | —   | —                      | 20   | uA   | V <sub>CC</sub> = 5.25V, V <sub>I</sub> = 2.7V  |
|                                | Clear  |                 | —   | —                      | 40   |      |   |
|                                | Preset |                 | —   | —                      | 40   |      |   |
|                                | Clock  |                 | —   | —                      | 20   |      |   |
|                                | D      | I <sub>IL</sub> | —   | -0.13                  | -0.4 | mA   | V <sub>CC</sub> = 5.25V, V <sub>I</sub> = 0.4V  |
|                                | Clear  |                 | —   | -0.20                  | -0.8 |      |   |
|                                | Preset |                 | —   | -0.20                  | -0.8 |      |   |
|                                | Clock  |                 | —   | -0.20                  | -0.4 |      |   |
|                                | D      | I <sub>I</sub>  | —   | —                      | 0.1  | mA   | V <sub>CC</sub> = 5.25V, V <sub>I</sub> = 7V  |
|                                | Clear  |                 | —   | —                      | 0.2  |      |   |
|                                | Preset |                 | —   | —                      | 0.2  |      |   |
|                                | Clock  |                 | —   | —                      | 0.1  |      |   |
| Short-circuit output current * |        | I <sub>OS</sub> | —   | -35                    | -100 | mA   | V <sub>CC</sub> = 5.25V   |
| Supply current **              |        | I <sub>CC</sub> | —   | 3.3                    | 8    | mA   | V <sub>CC</sub> = 5.25V   |
| Input clamp voltage            |        | V <sub>IR</sub> | —   | -0.9                   | -1.5 | V    | V <sub>CC</sub> =4.75 V, I <sub>IN</sub> = -18 mA   |

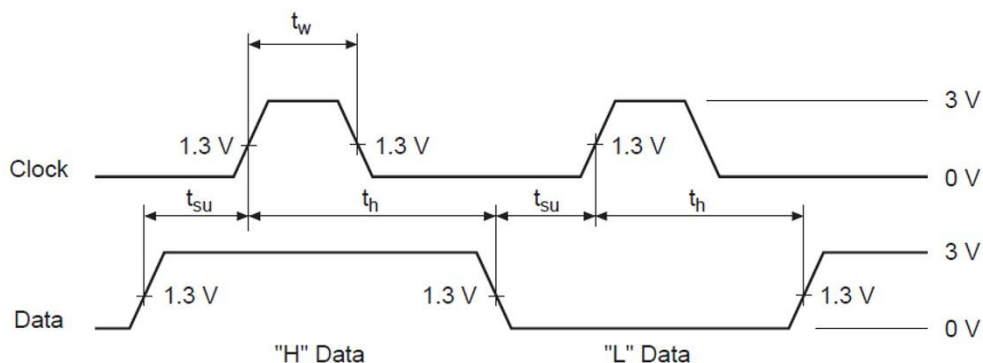
Note1: \* only one output port is short circuited each time, and the short circuit time is not more than one second.

Note 2: \*\*With all output open, I<sub>CC</sub> is measured with the Q and Q outputs high in turn. At the time of measurement, the clock input is grounded.

#### Switching Characteristics (T<sub>A</sub>=25°C, Unless specified)

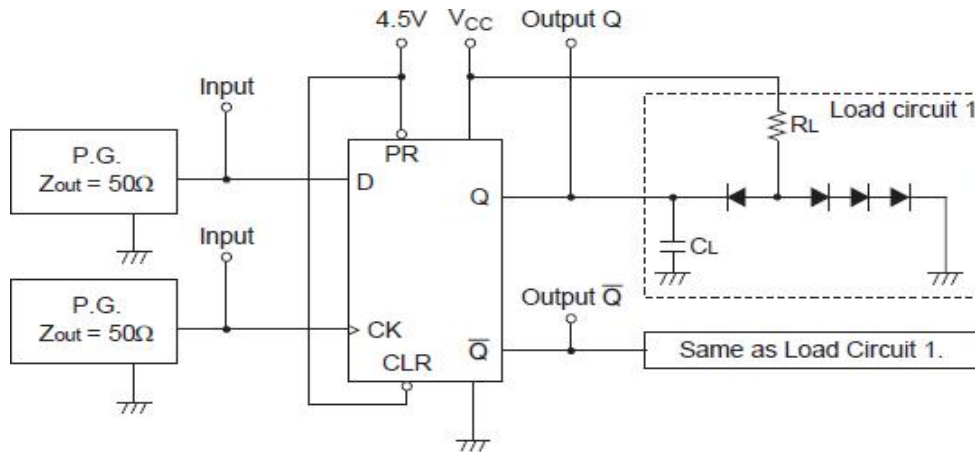
| Item                   | Symbol           | Input                  | Output       | Min | Tpy | Max | Unit | Conditions                                 |
|------------------------|------------------|------------------------|--------------|-----|-----|-----|------|--|
| Propagation delay time | t <sub>PLH</sub> | Clear, Clock or Preset | Q, $\bar{Q}$ | —   | 22  | 40  | ns   | R <sub>L</sub> =2k<br>C <sub>L</sub> =15pF |
|                        | t <sub>PHL</sub> |                        |              | —   | 12  | 25  | ns   |  |

#### Timing Definition



### ■ Testing Method

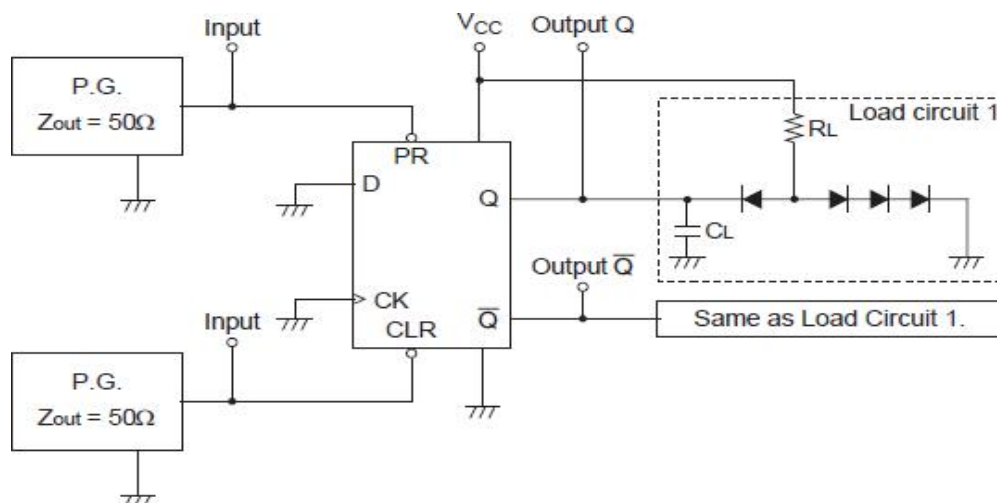
#### 1、 $t_{PLH}$ , $t_{PHL}$ (Clock→Q, $\bar{Q}$ )



Notes:

1. Only one trigger is tested at a time.
2. the CL capacitor is an external patch capacitor (0603), which is connected to the output pin and the capacitor is near the chip GND.
3. All diode models are 1S2074 (H).

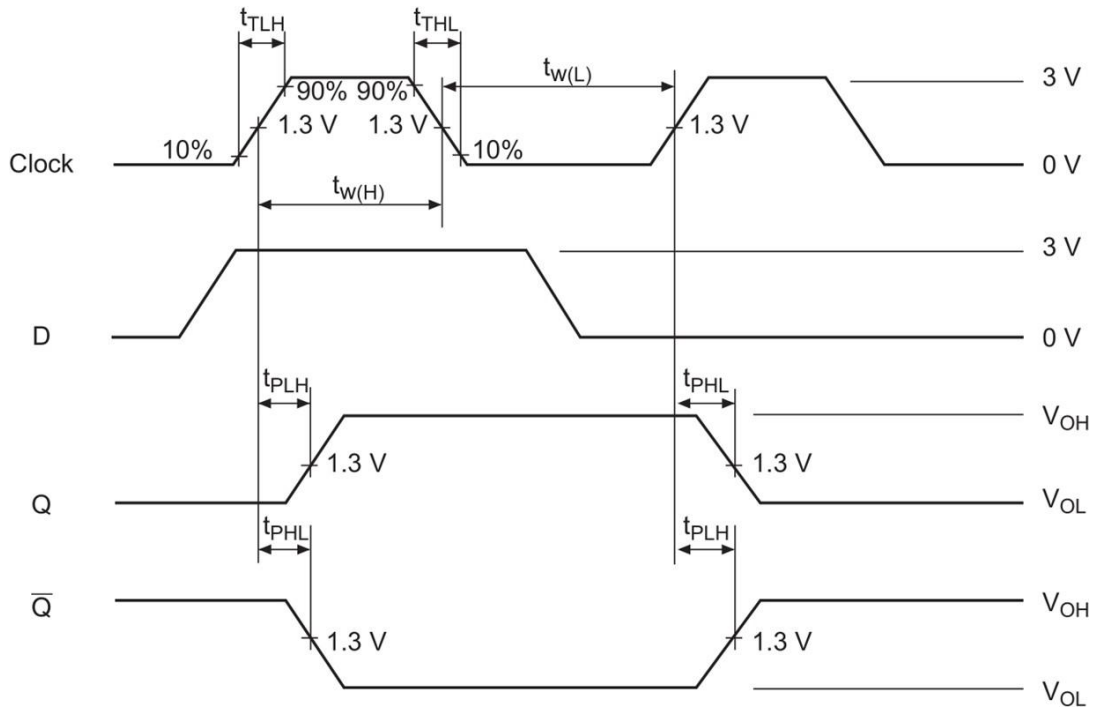
#### 2、 $t_{PHL}$ , $t_{PLH}$ (Clear or Preset→Q, $\bar{Q}$ )



Notes:

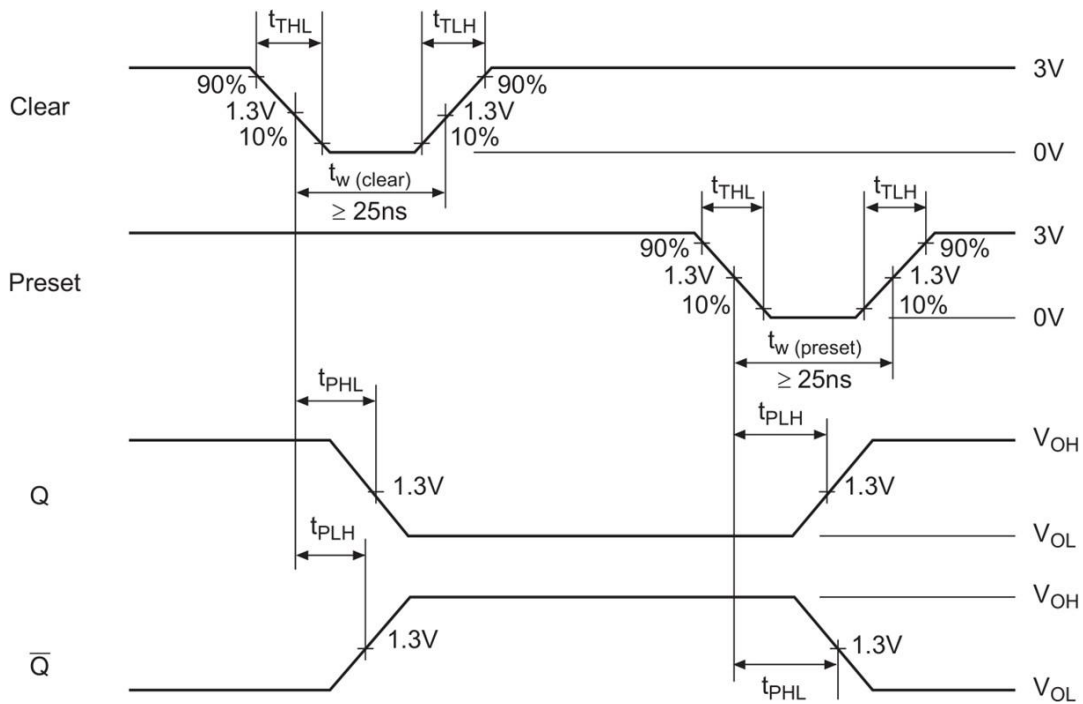
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### Waveform1 :



Note:  $t_{TLH} \leq 20$  ns,  $t_{THL} \leq 20$  ns, PRR = 1 MHz, duty cycle = 50%

### Waveform2 :

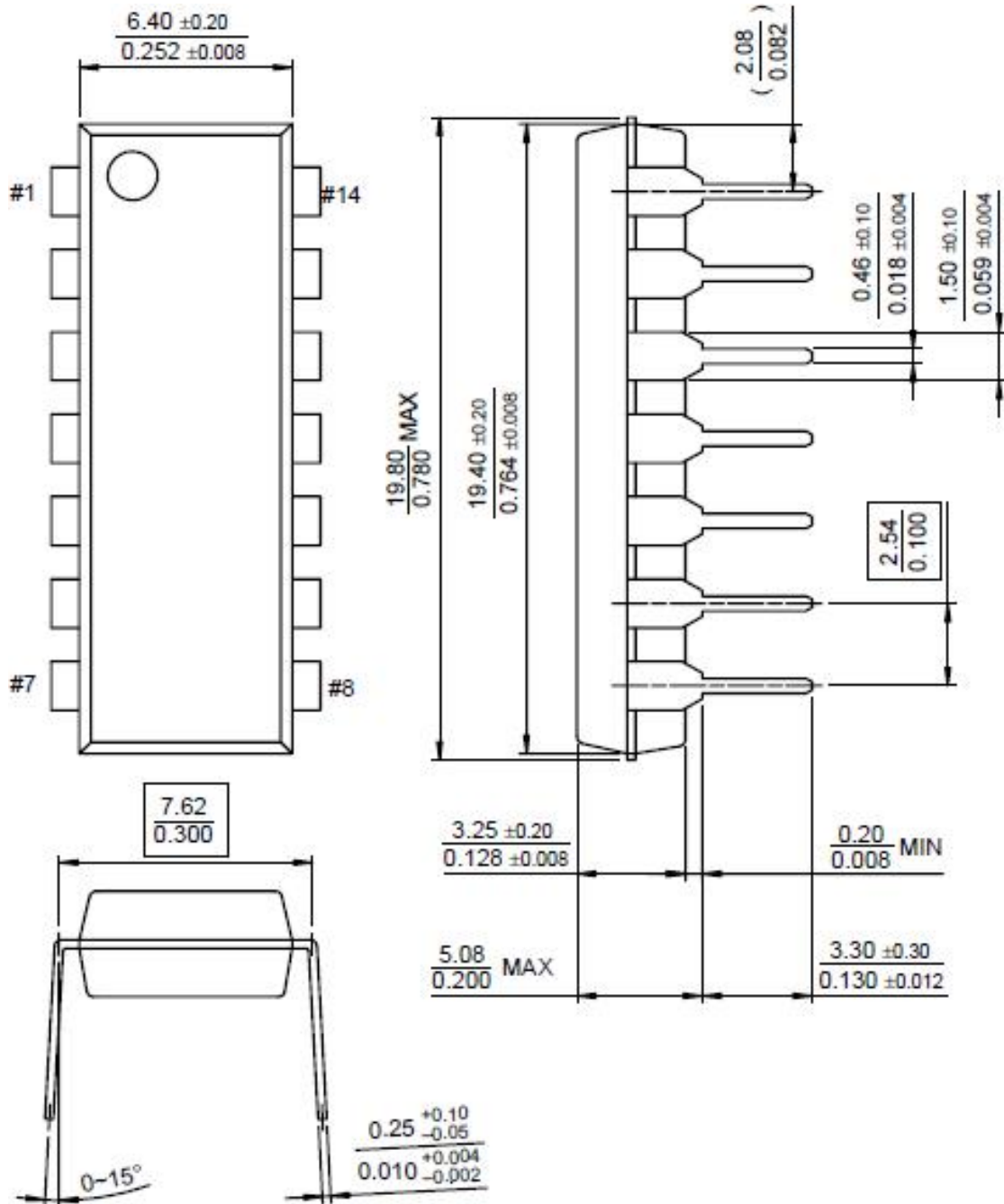


Note:  $t_{TLH} \leq 20$  ns,  $t_{THL} \leq 20$  ns, PRR = 1 MHz, duty cycle = 50%

■ Package Dimensions

Unit : mm / inch

DIP14



SOP14

