

# Device Modeling Report

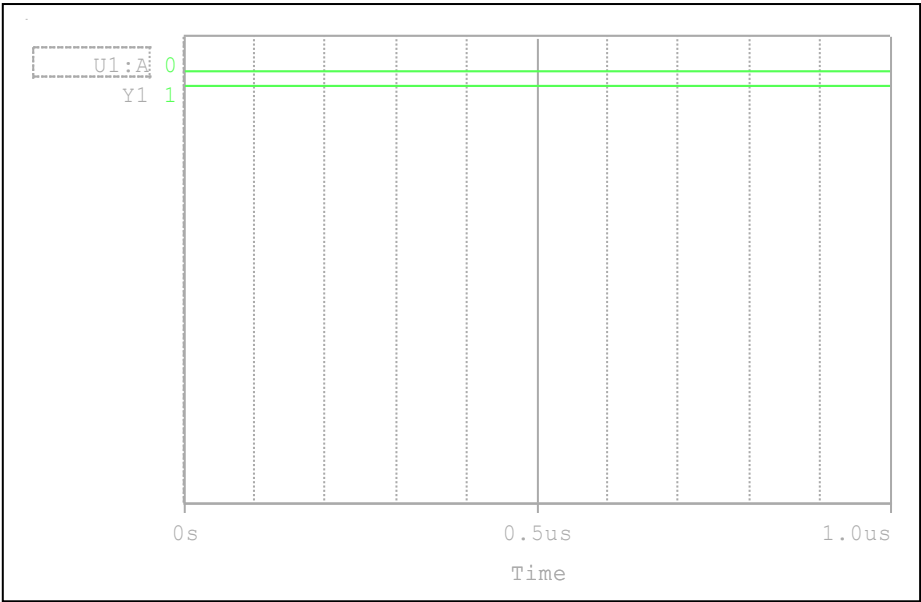
COMPONENTS : CMOS DIGITAL INTEGRATED CIRCUIT  
PART NUMBER : TC7S04FU  
MANUFACTURER : TOSHIBA



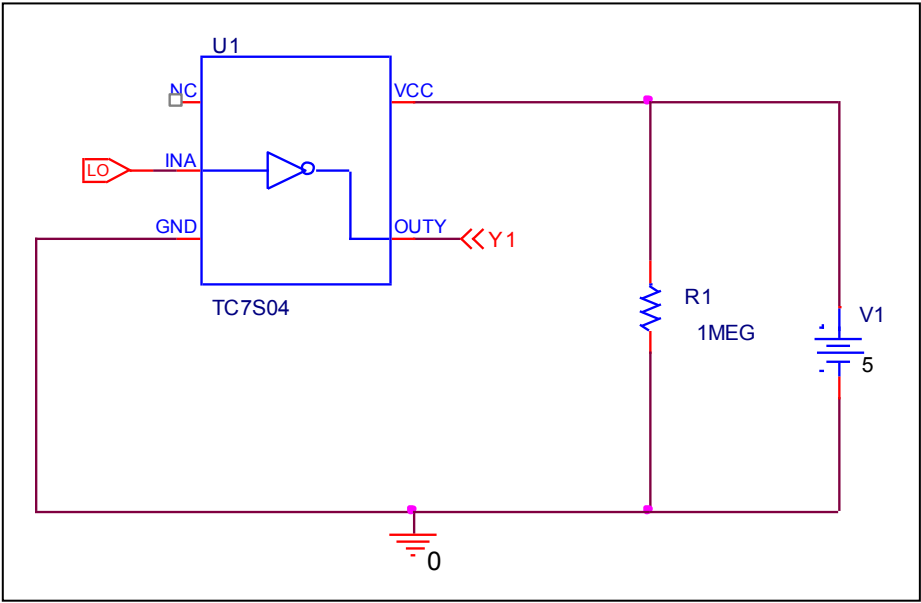
**Bee Technologies Inc.**

# Truth Table

## Circuit simulation result



## Evaluation circuit

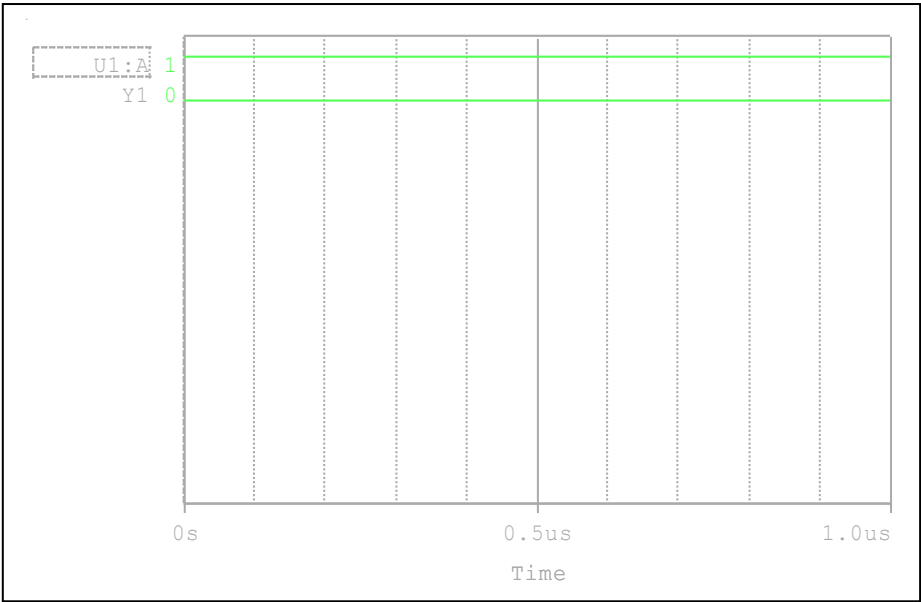


## Comparison table

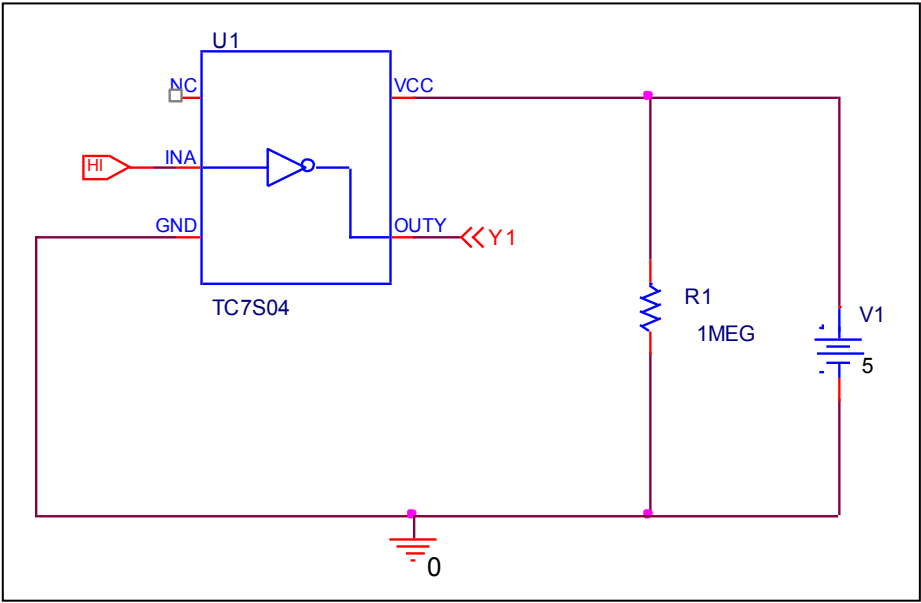
| Input | Output           |                 | %Error |
|-------|------------------|-----------------|--------|
|       | Yn (Measurement) | Yn (Simulation) |        |
| An    |                  |                 |        |
| L     | H                | H               | 0      |

# Truth Table

## Circuit simulation result



## Evaluation circuit

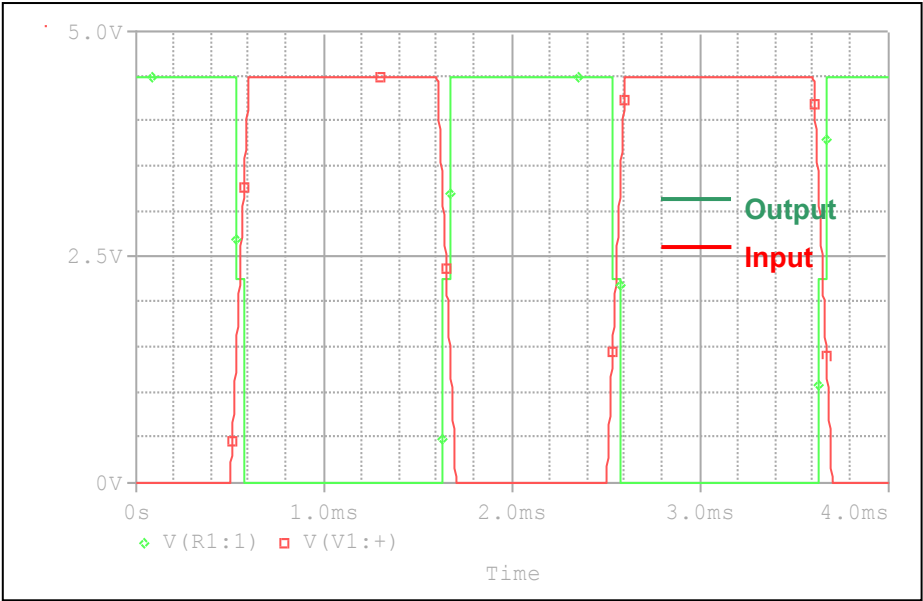


## Comparison table

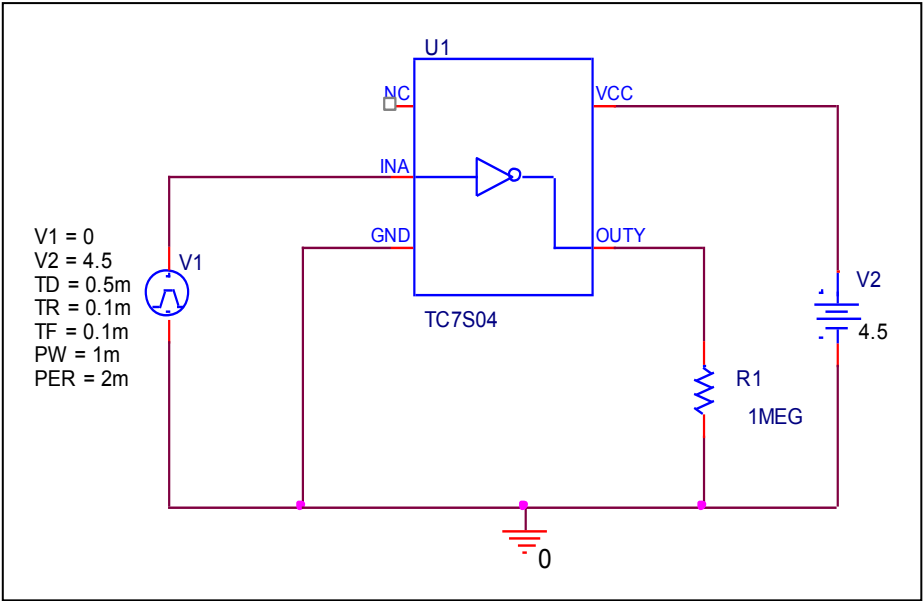
| Input | Output           |                 | %Error |
|-------|------------------|-----------------|--------|
|       | Yn (Measurement) | Yn (Simulation) |        |
| An    |                  |                 |        |
| H     | L                | L               | 0      |

# High Level and Low Level Input Voltage

Circuit simulation result



Evaluation circuit

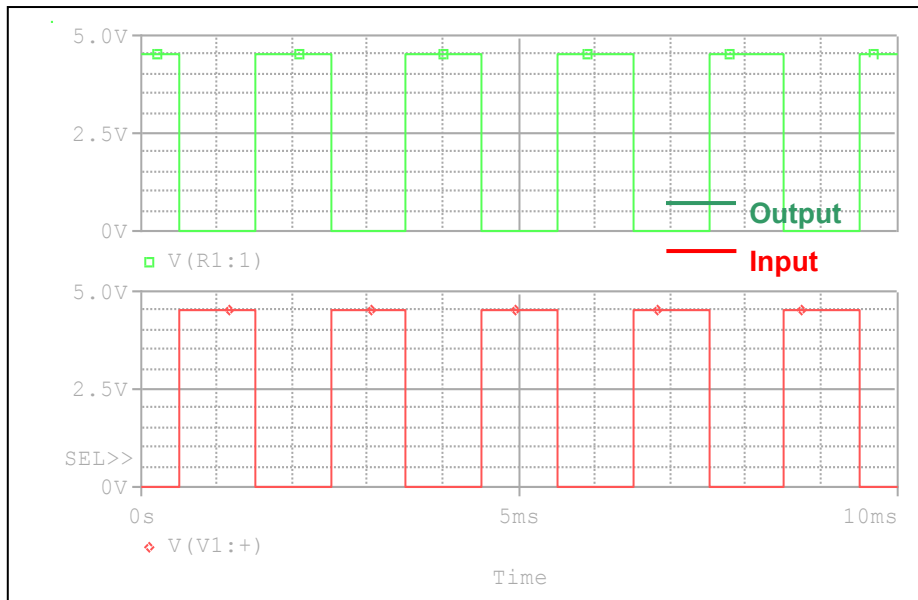


Comparison table

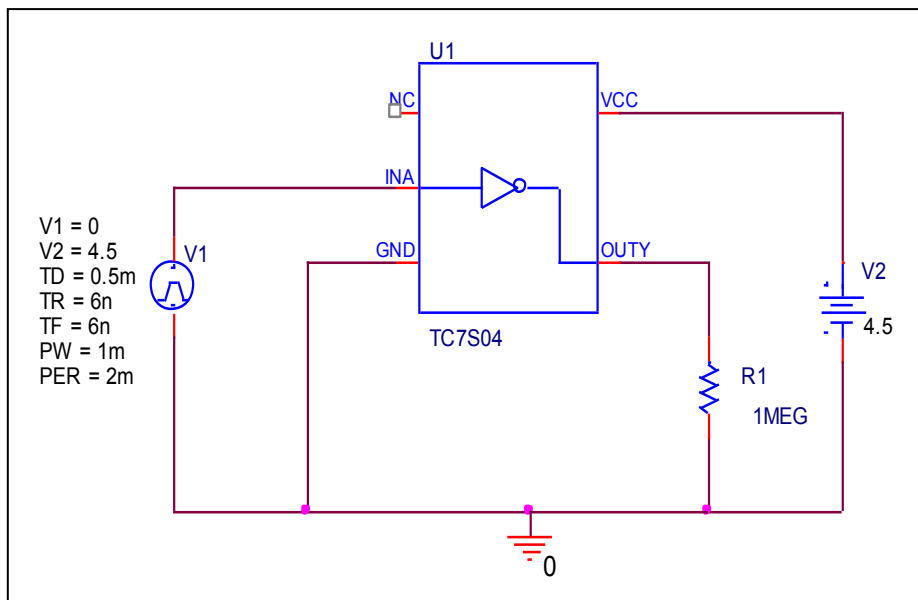
| V <sub>CC</sub> = 4.5V | Measurement | Simulation | %Error |
|------------------------|-------------|------------|--------|
| V <sub>IH</sub> (V)    | 3.15        | 3.2184     | 2.171  |
| V <sub>IL</sub> (V)    | 1.35        | 1.3455     | -0.333 |

## High Level and Low Level Output Voltage

### Circuit simulation result



### Evaluation circuit

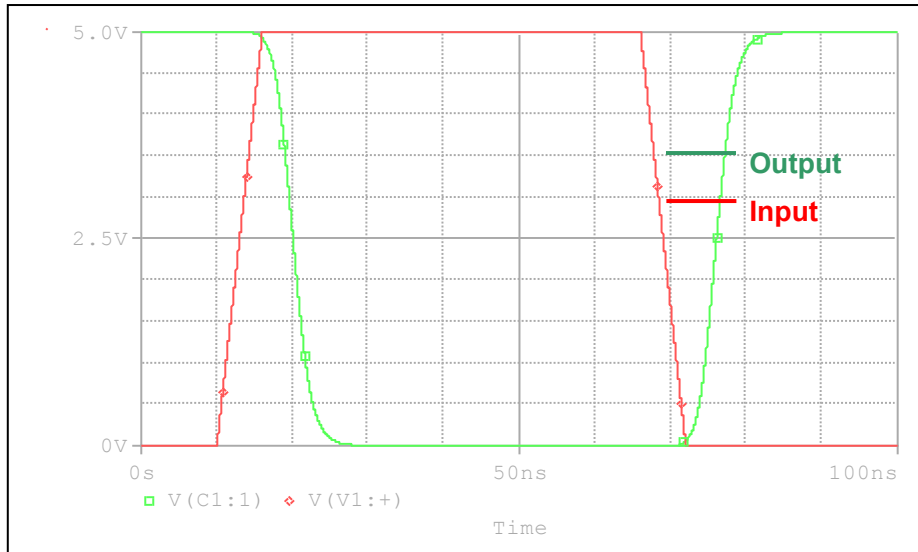


### Comparison table

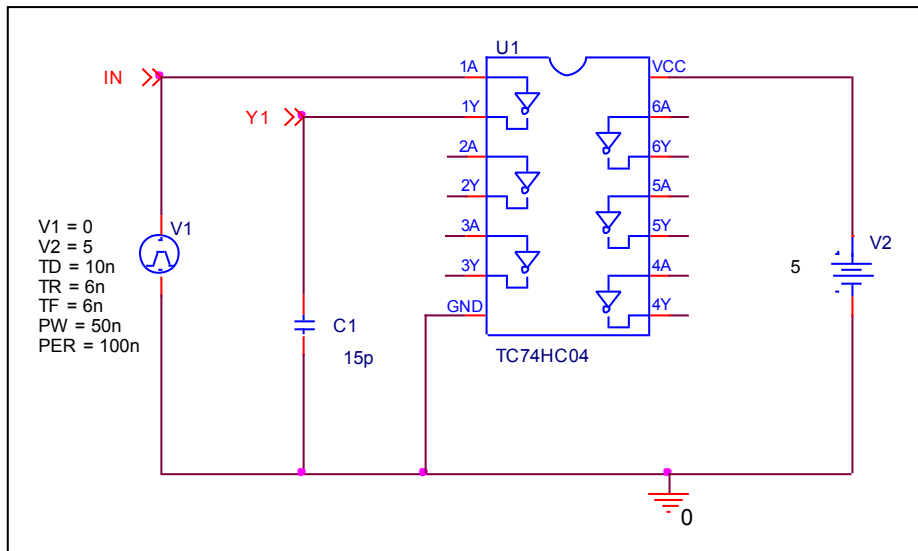
| $V_{CC} = 4.5V$ | Measurement | Simulation | %Error |
|-----------------|-------------|------------|--------|
| $V_{OH} (V)$    | 4.5         | 4.4955     | -0.1   |
| $V_{OL} (V)$    | 0           | 0          | 0      |

## Propagation Delay Time

### Circuit simulation result



### Evaluation circuit



### Comparison table

| $C_L=15pF, V_{CC} = 5V, t_r=t_f=6ns$ | Measurement | Simulation | %Error |
|--------------------------------------|-------------|------------|--------|
| $t_{TLH} (ns)$                       | 5           | 5.0063     | 0.126  |
| $t_{THL} (ns)$                       | 5           | 5.0019     | 0.038  |
| $T_{pLH} (ns)$                       | 7           | 7.0579     | 0.827  |
| $T_{pHL} (ns)$                       | 7           | 7.0689     | 0.984  |