

# Device Modeling Report

COMPONENTS: VOLTAGE COMPARATOR  
PART NUMBER: uPC393C  
MANUFACTURER: NEC



**Bee Technologies Inc.**

## BJT MODEL

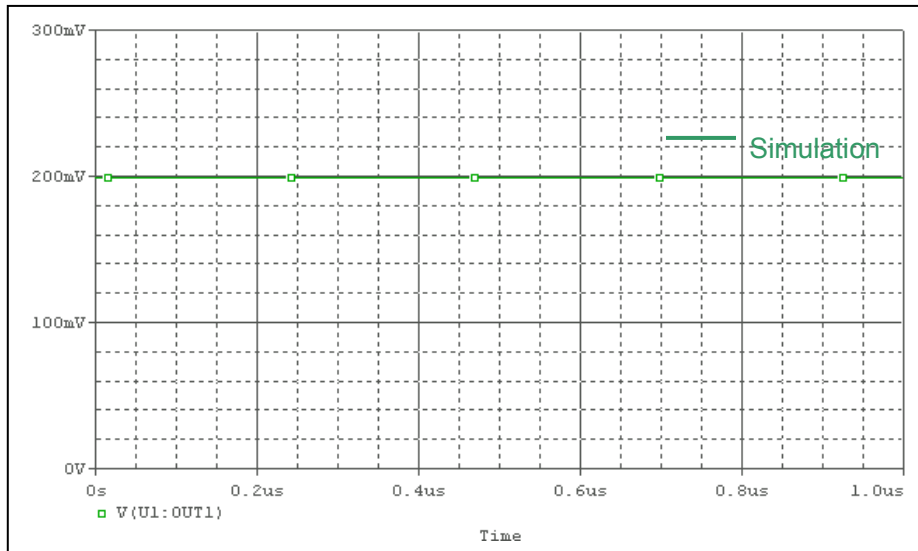
Pspice model parameter	Model description
IS	Saturation Current
BF	Ideal Maximum Forward Beta
CJC	Zero-bias Collector-Base Junction Capacitance
TF	Forward Transit Time
TR	Reverse Transit Time

## DIODE MODEL

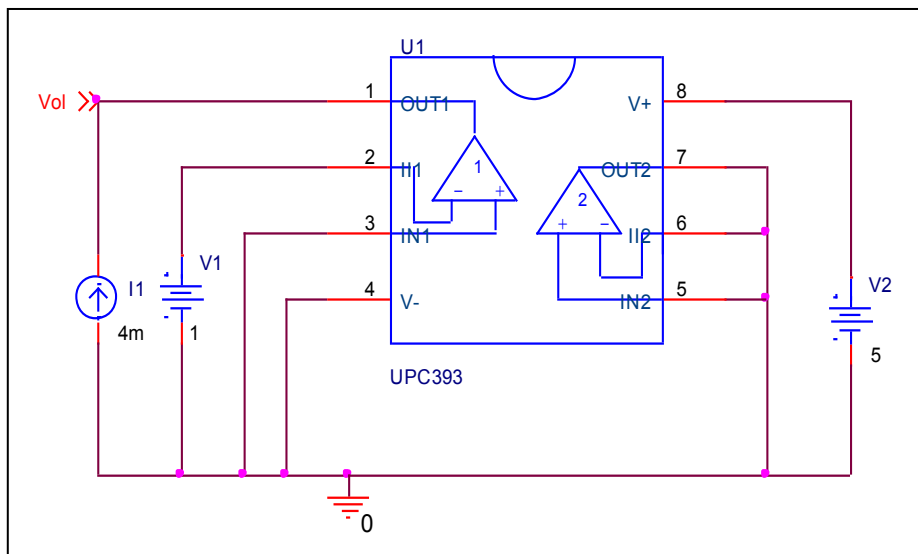
Pspice model parameter	Model description
IS	Saturation Current
RS	Series Resistance

## Output Low Voltage

### Simulation result



### Evaluation Circuit

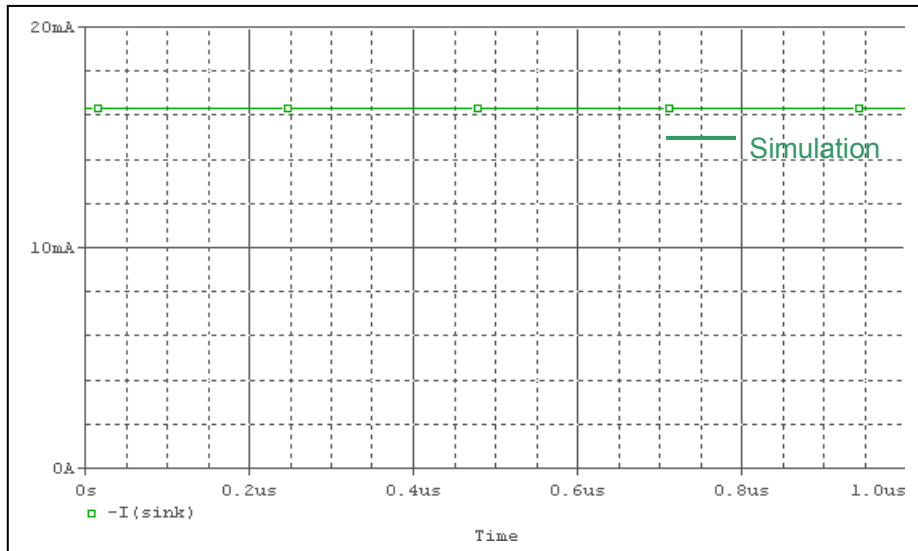


### Comparison Table

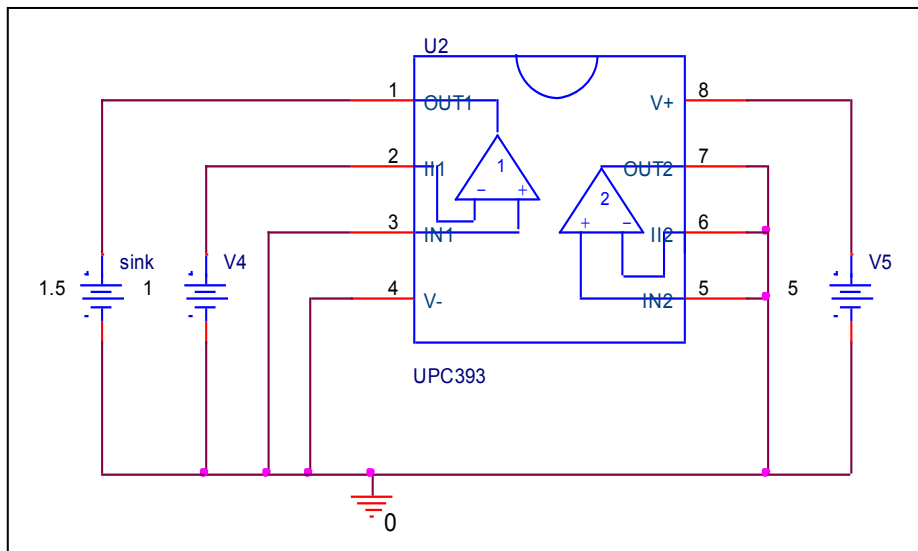
$I_{sink} = 4mA$	Measurement	Simulation	%Error
$V_{ol} (V)$	0.2	0.199325	-0.338

# Sink Current

## Simulation result



## Evaluation Circuit

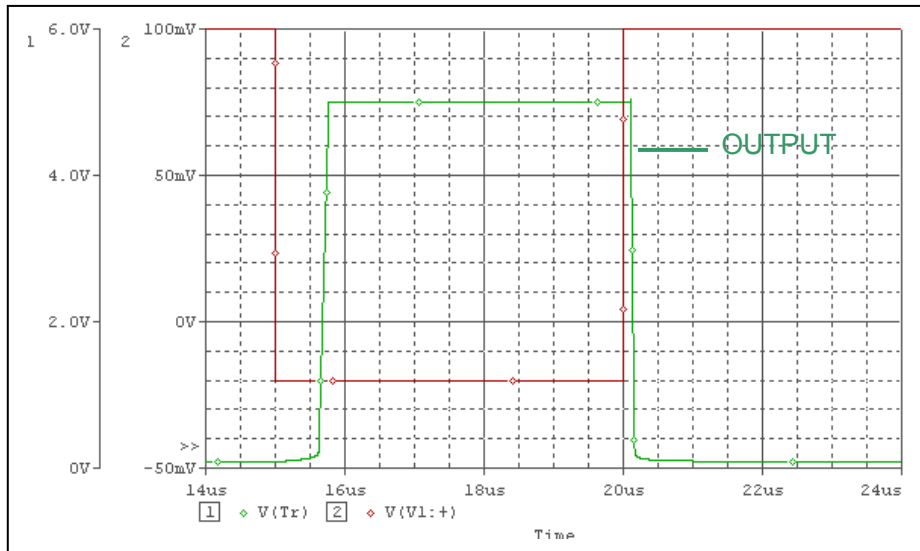


## Comparison Table

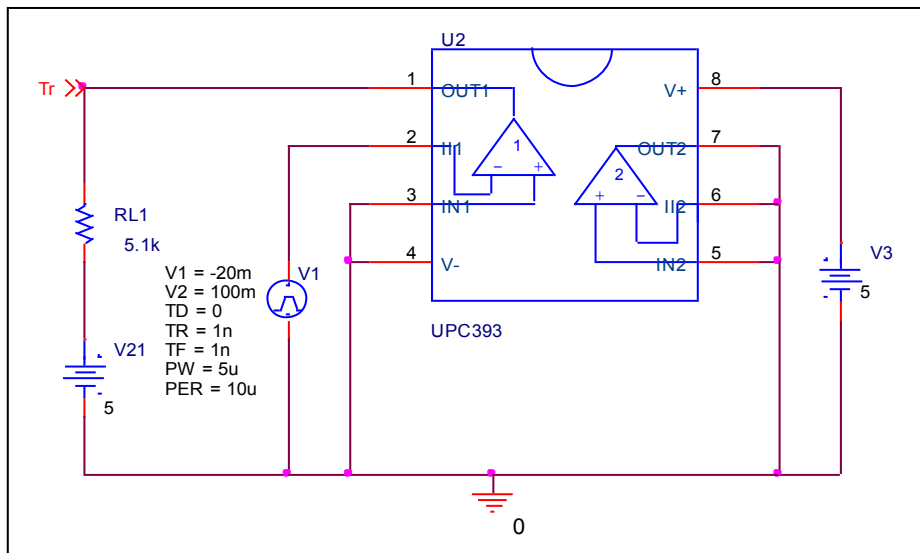
$V_{ol} = 1.5 \text{ V}$	Measurement	Simulation	%Error
$I_{\text{sink}} \text{ (mA)}$	16	16.303	1.894

## Response time (Rise time and Transition time)

### Simulation result



### Evaluation Circuit

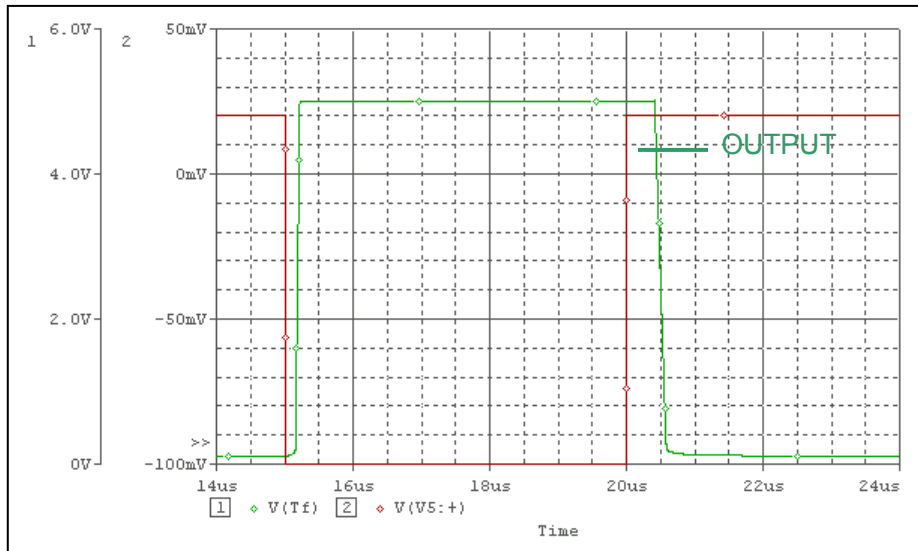


### Comparison Table

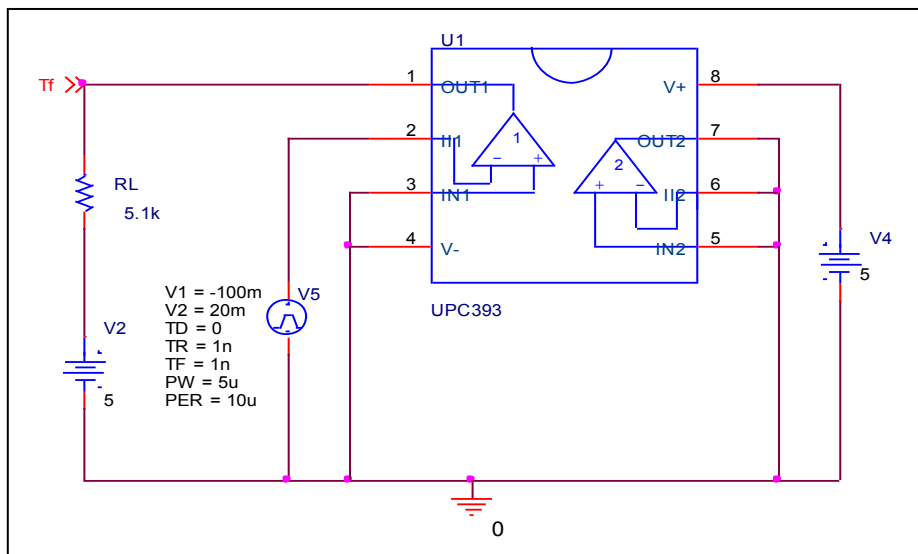
	Measurement	Simulation	% Error
<b>Rising delay time (us)</b>	0.63	0.633914	0.621
<b>Transition time (us)</b>	0.12	0.120899	0.749

## Response time (Falling time)

### Simulation result



### Evaluation Circuit

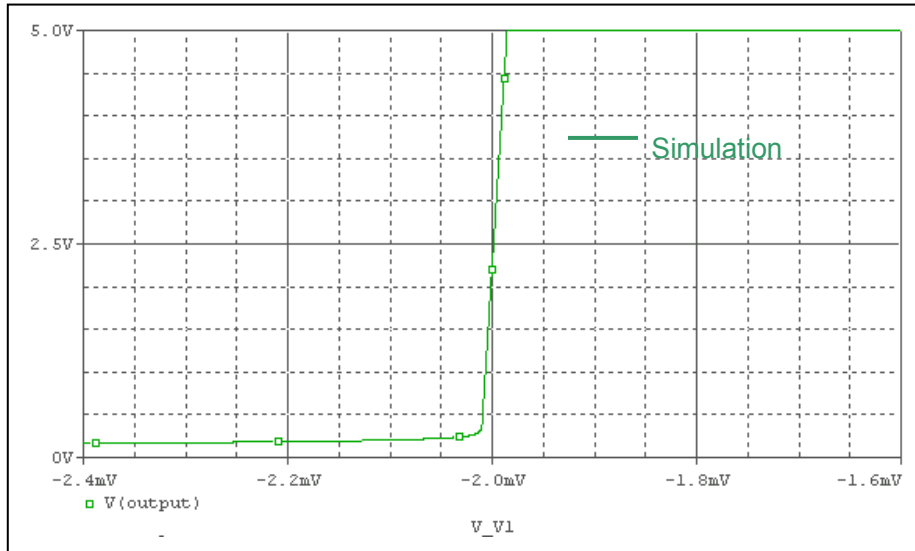


### Comparison Table

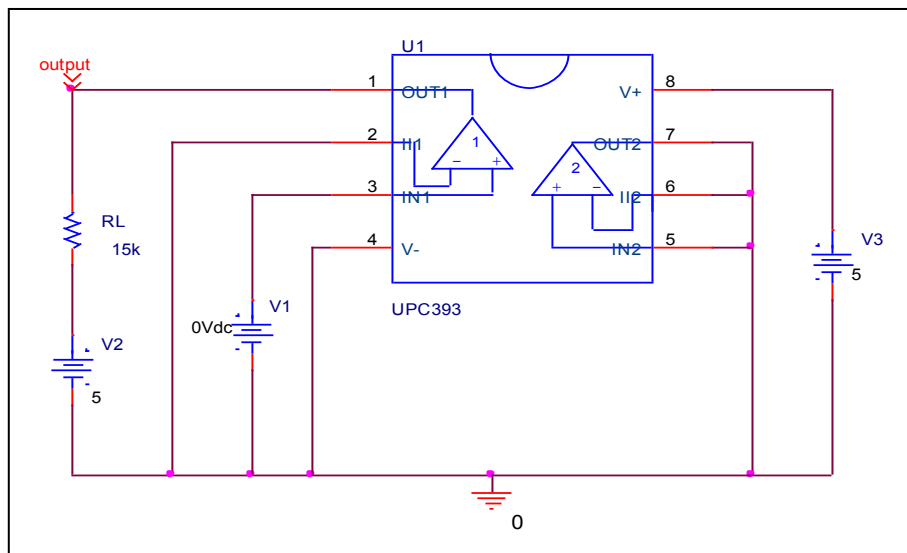
	Measurement	Simulation	% Error
<b>Falling delay time (us)</b>	0.43	0.430224	0.052

# Input Offset Voltage Characteristics

## Simulation result



## Evaluation Circuit

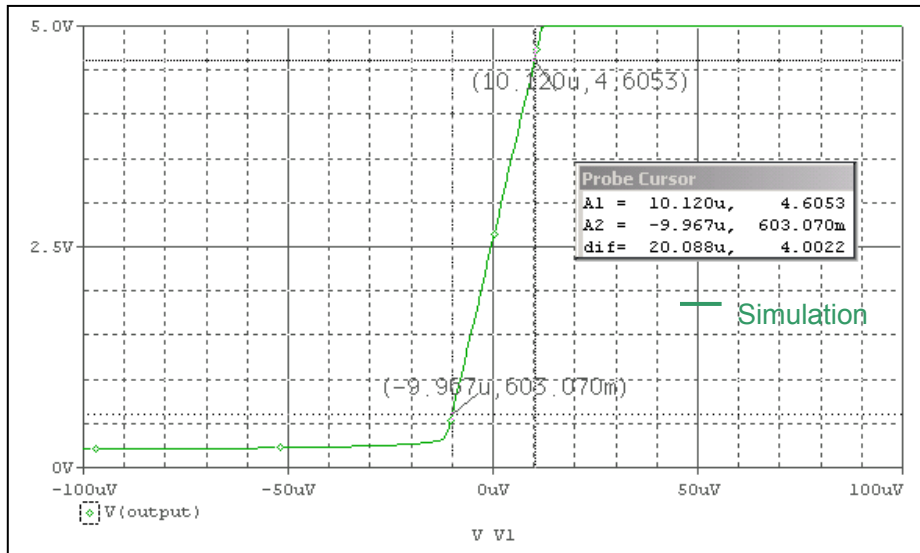


## Comparison Table

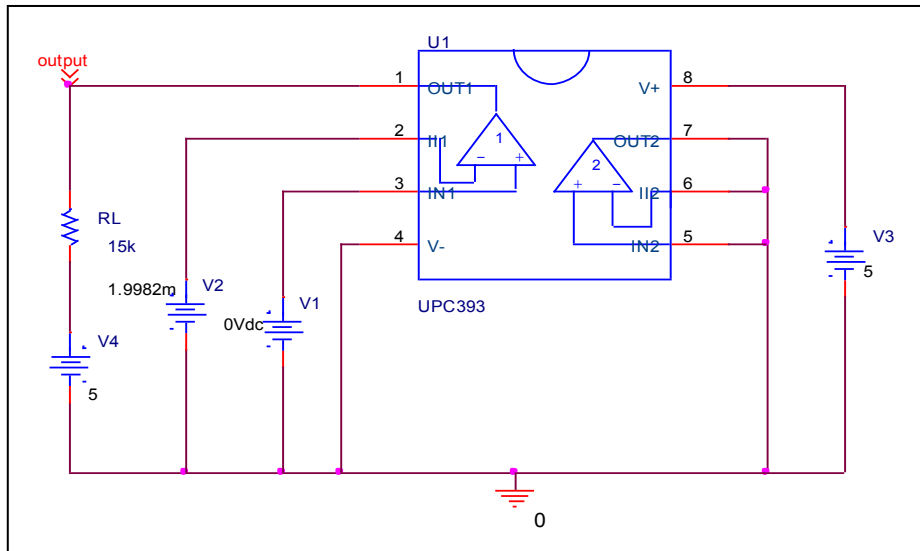
	Measurement	Simulation	%Error
$V_{io}(mV)$	-2	-1.9975	-0.125

# Av Characteristics

## Simulation result



## Evaluation Circuit



$$A_v = 4.0022 / 20.088u$$

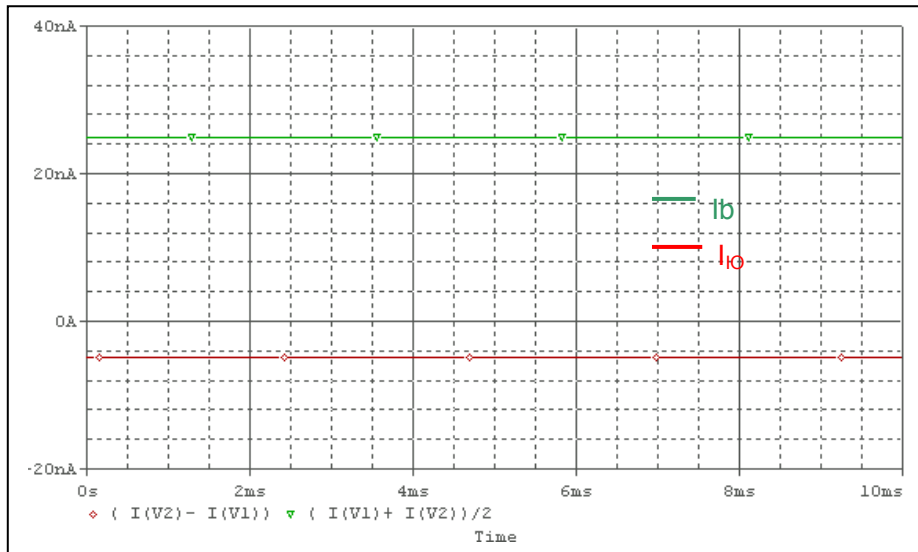
## Comparison Table

$R_L = 15k\Omega$	Measurement	Simulation	%Error
$A_v$ (v/mV)	200	199.233	-0.383

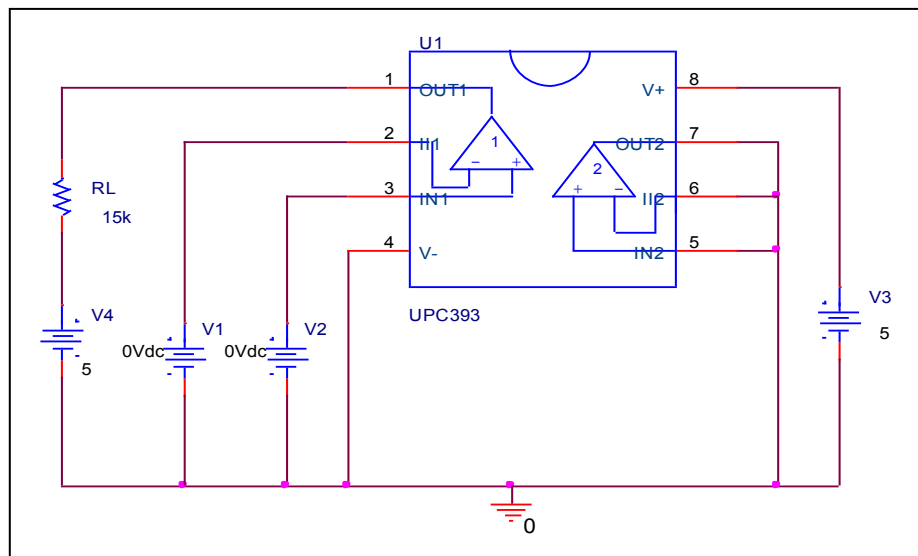


# Input Bias Current Characteristics

## Simulation result



## Evaluation Circuit



## Comparison Table

	Measurement	Simulation	% Error
<b>I<sub>b</sub> (nA)</b>	25	24.987	-0.052
<b>I<sub>io</sub> (nA)</b>	-5	-4.8161	-3.678