

Device Modeling Report

COMPONENTS : VOLTAGE COMPARATOR
PART NUMBER : LM311N/14
MANUFACTURER : NATIONAL



Bee Technologies Inc.

BJT MODEL

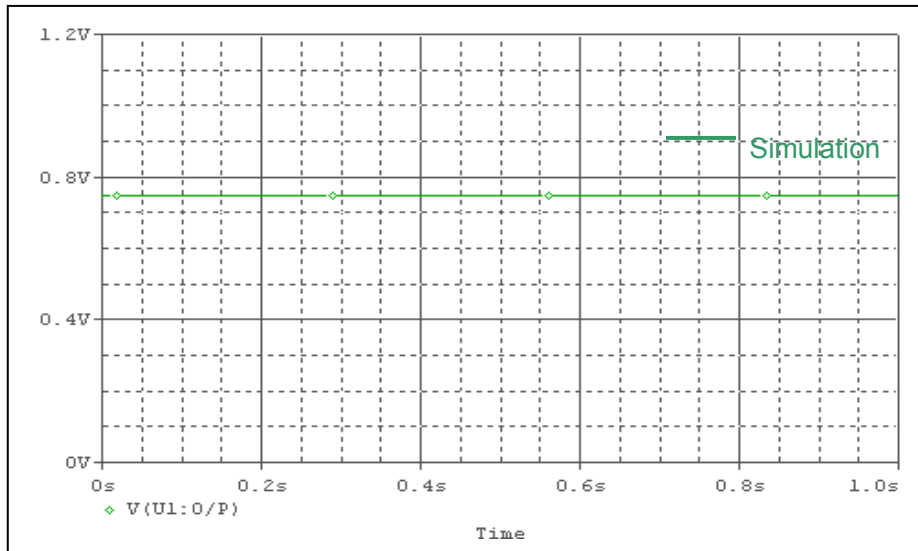
Pspice model parameter	Model description
IS	Saturation Current
BF	Ideal Maximum Forward Beta
CJC	Zero-bias Collector-Base Junction Capacitance
TF	Forward Transit Time
TR	Reverse Transit Time

DIODE MODEL

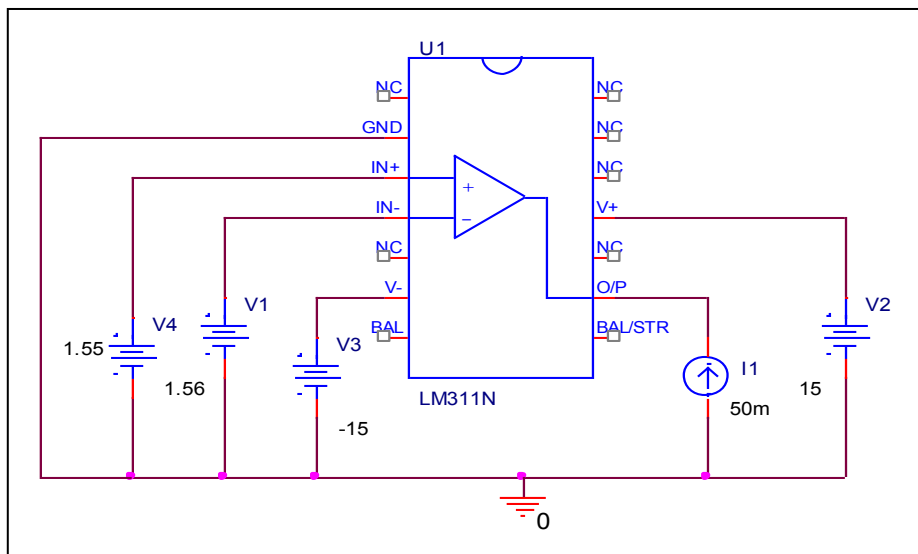
Pspice model parameter	Model description
IS	Saturation Current
RS	Series Resistance

Output Low Voltage

Simulation result



Evaluation Circuit

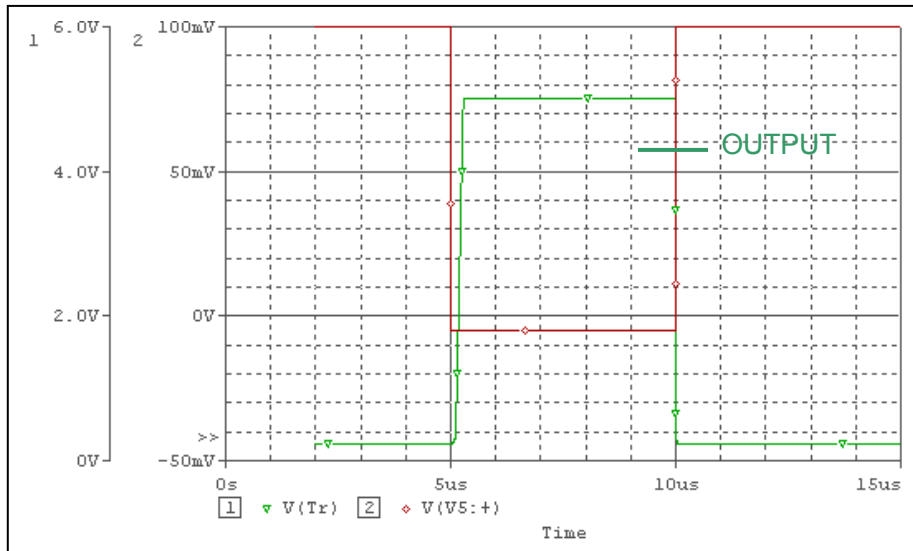


Comparison Table

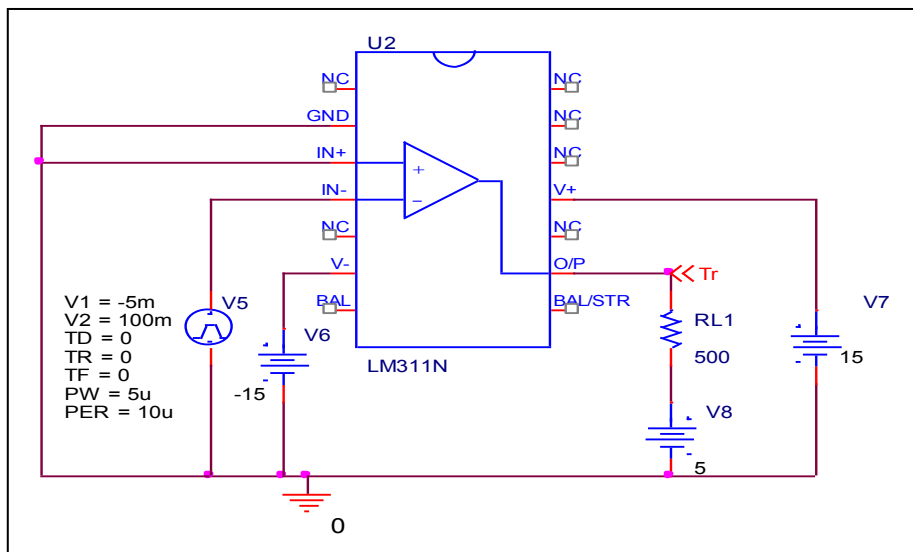
$I_o = 50\text{mA}$	Measurement	Simulation	%Error
$V_{ol} \text{ (V)}$	0.75	0.749735	-0.035

Response time (Rise time and Transition time)

Simulation result



Evaluation Circuit

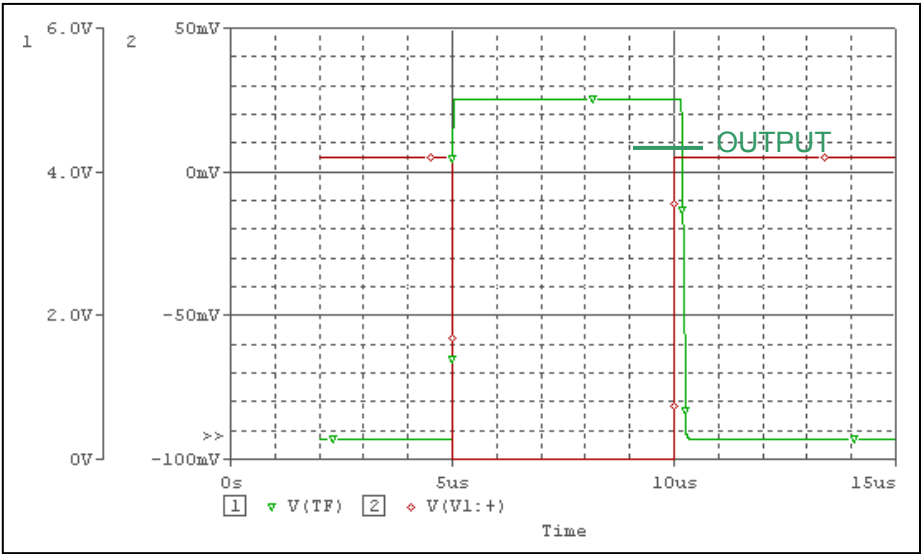


Compassion Table

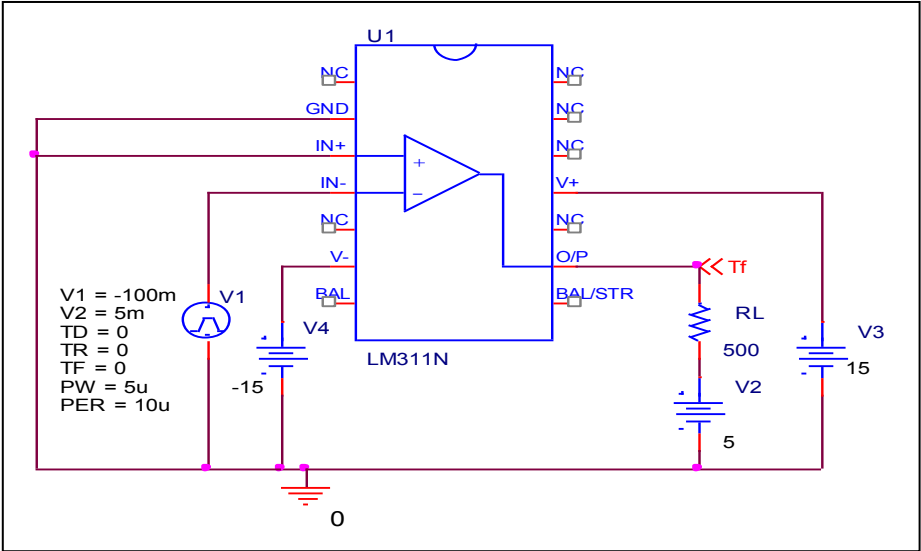
	Measurement	Simulation	% Error
Rising delay time (us)	0.125	0.124079	-0.737
Transition time (us)	0.140	0.13897	-0.736

Response time (Falling time)

Simulation result



Evaluation Circuit

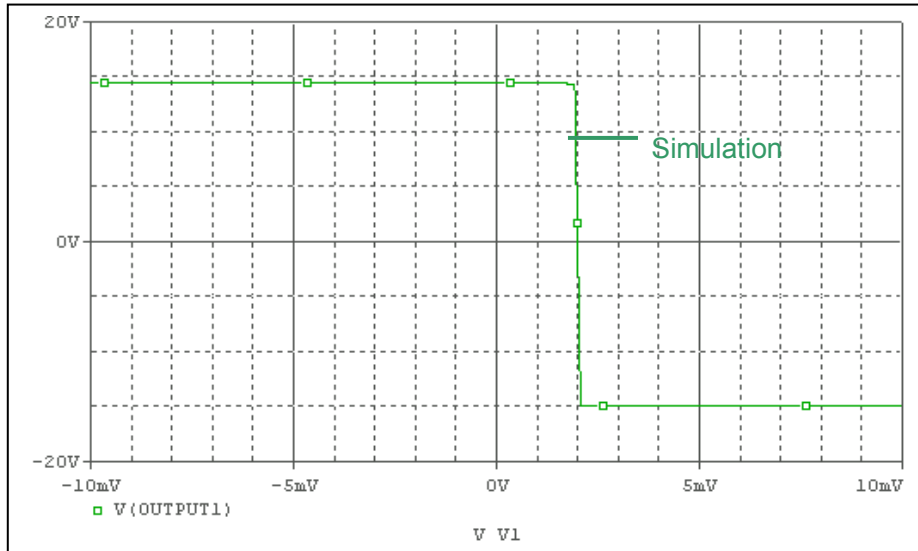


Compasion Table

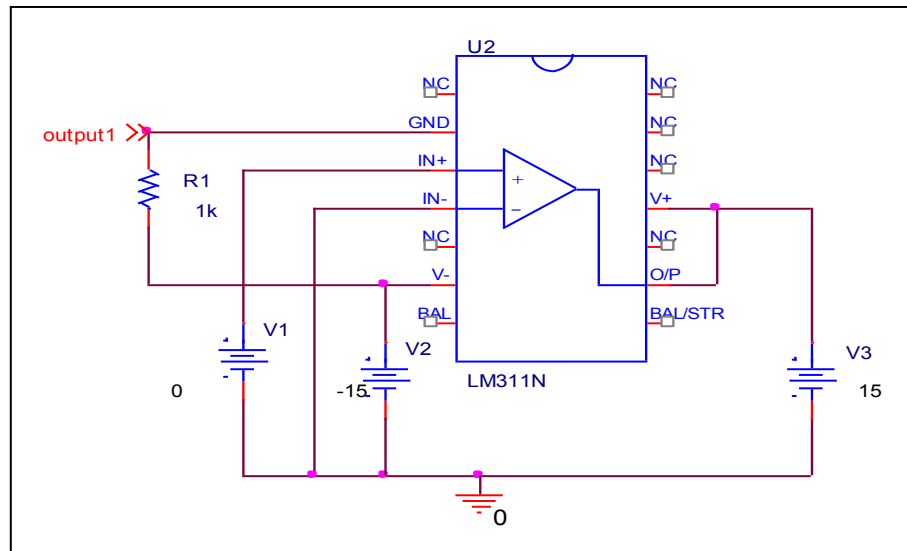
	Measurement	Simulation	% Error
Falling delay time (us)	0.175	0.174974	-0.015

Input Offset Voltage Characteristics

Simulation result



Evaluation Circuit

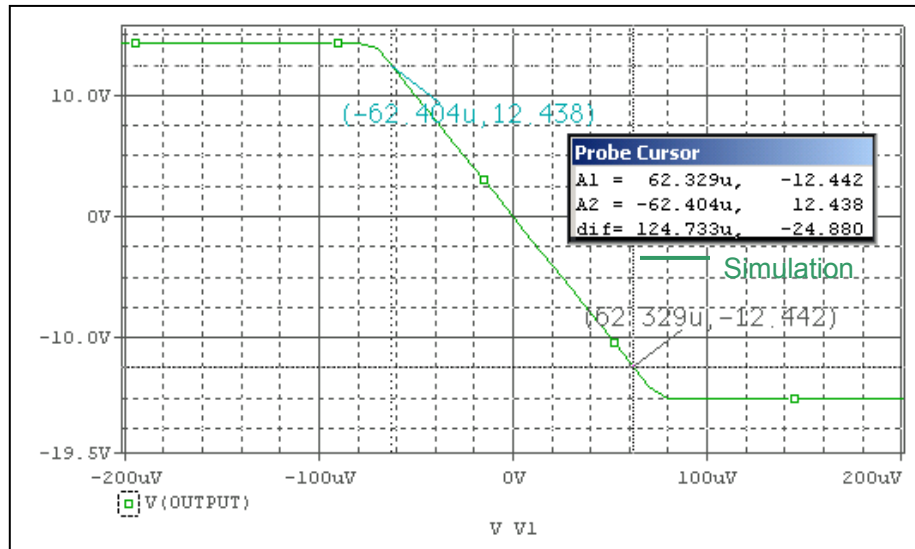


Compasion Table

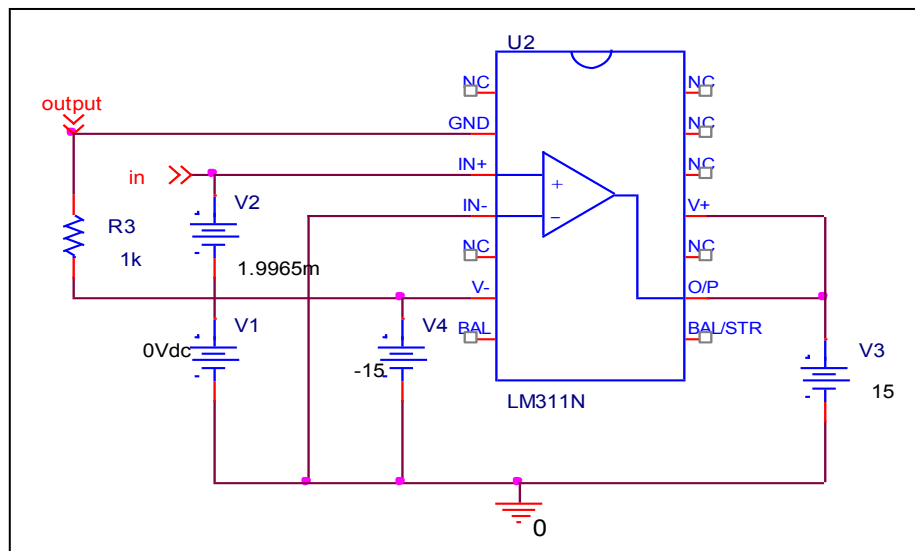
	Measurement	Simulation	%Error
$V_{io}(\text{mV})$	2	1.9965	-0.175

Av Characteristics

Simulation result



Evaluation Circuit



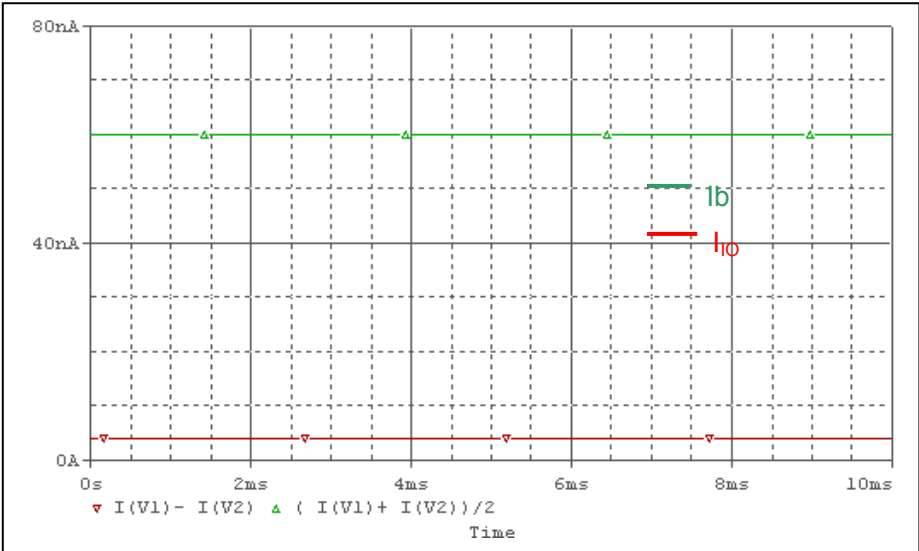
$$A_v = 24.880 / 124.733u$$

Comparison Table

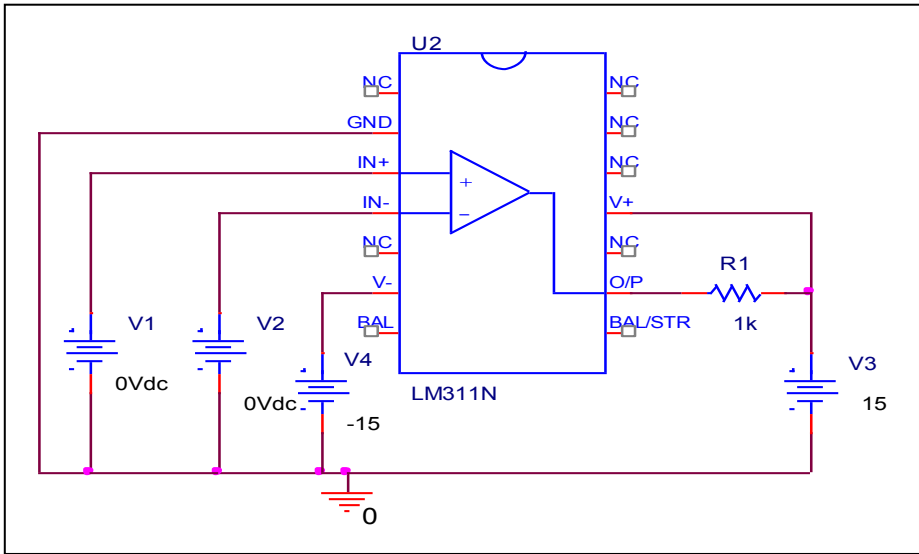
$R_L = 1k\Omega$	Measurement	Simulation	%Error
A_v (V/mV)	200	199.466	-0.267

Input Bias Current Characteristics

Simulation result



Evaluation Circuit



Comparison Table

	Measurement	Simulation	% Error
I_b (nA)	100	100.059	0.059
I_{IO} (nA)	6	6.0075	0.125