

# Device Modeling Report

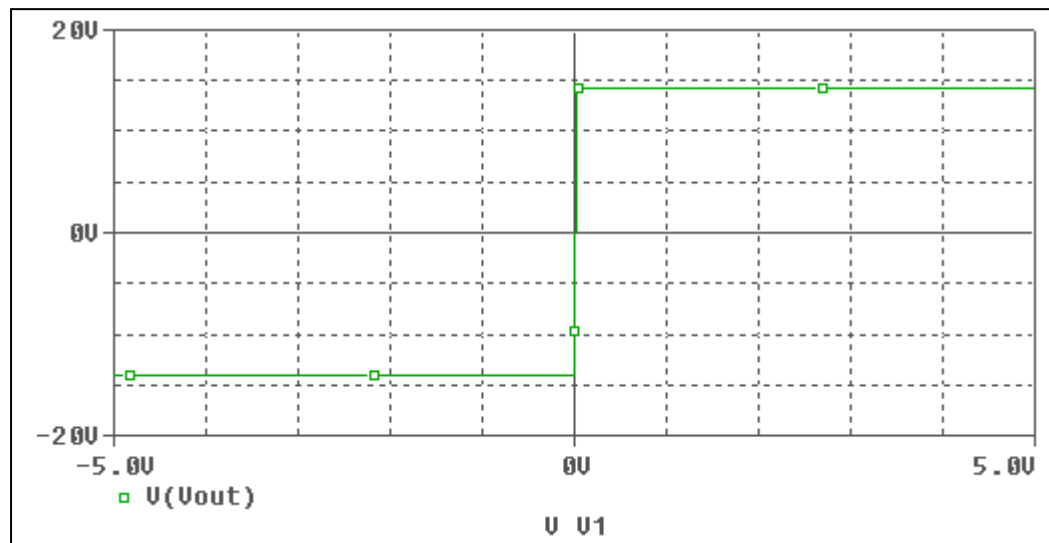
COMPONENTS: OPERATIONAL AMPLIFIER  
PART NUMBER: NJM064D  
MANUFACTURER: NEW JAPAN RADIO CO.,LTD



**Bee Technologies Inc.**

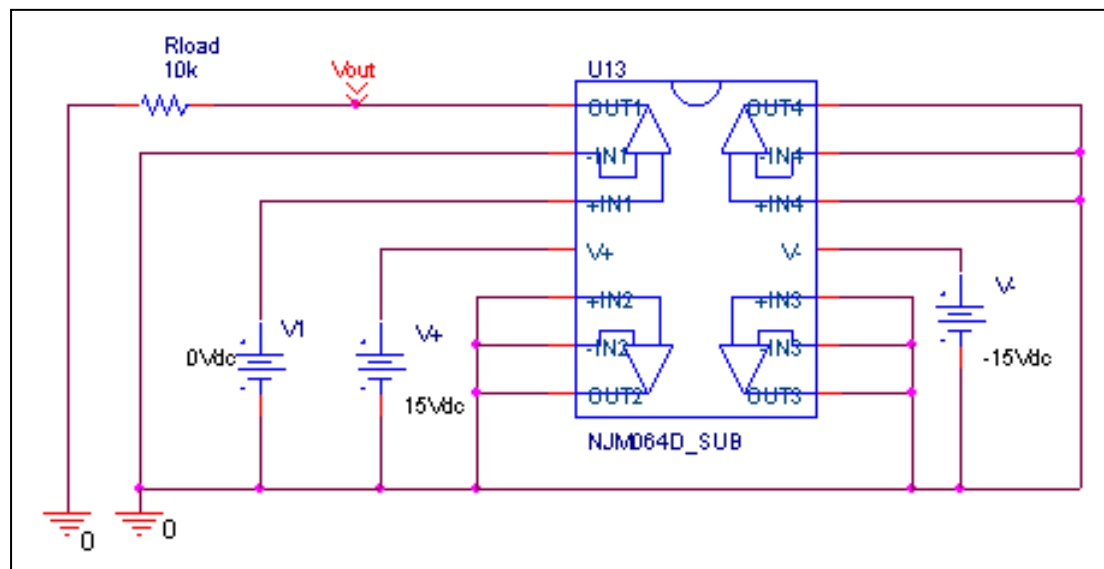
## Output Voltage Swing, +Vout and -Vout

Simulation result



These simulation results are compared with  $\pm V_{out}$

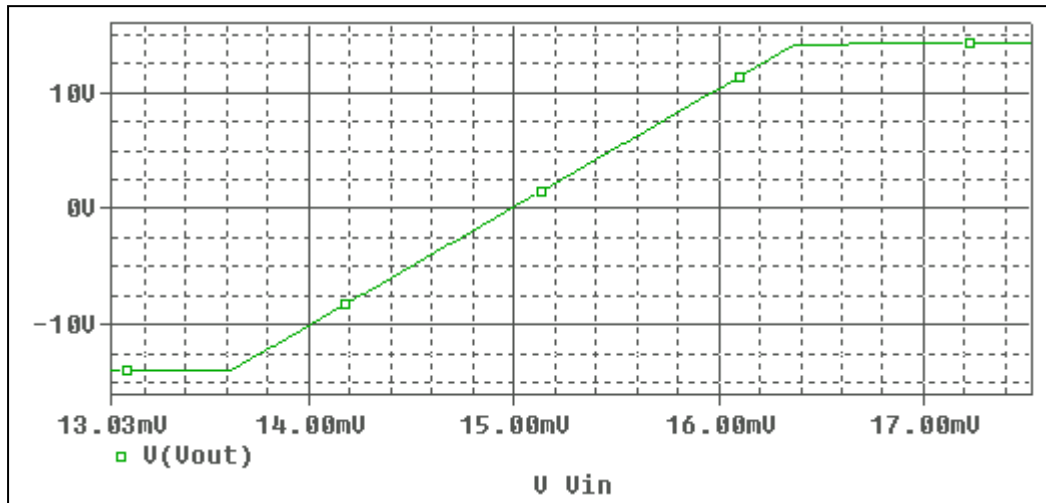
Evaluation circuit



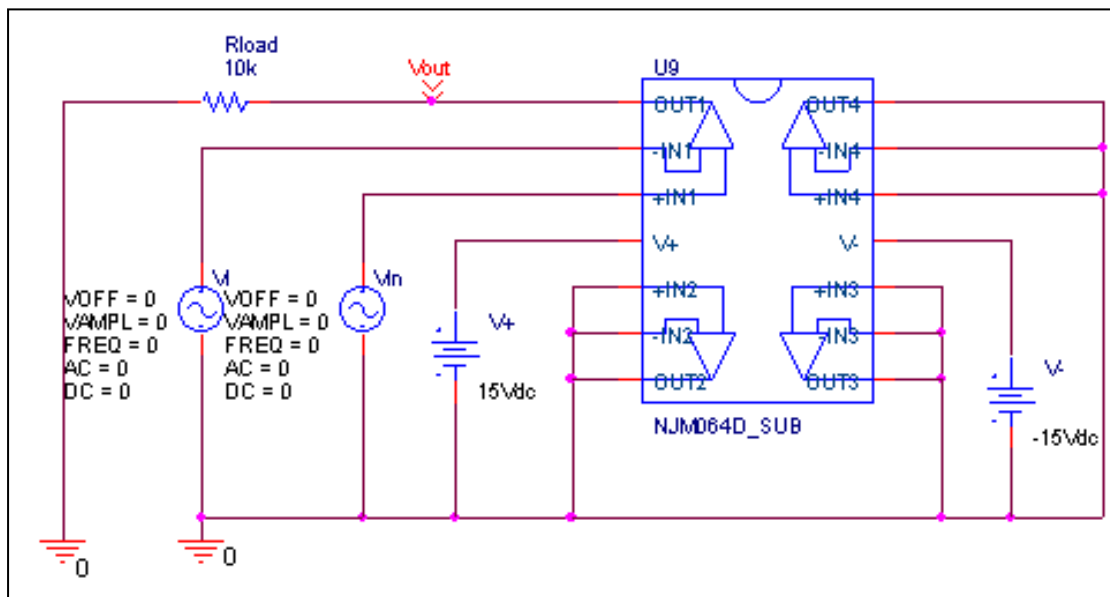
Output Voltage Swing	Data sheet	Simulation	%Error
+Vout(V)	+14.2	+14.29	0.633
-Vout(V)	-14	-14.09	0.642

# Input Offset Voltage

## Simulation result



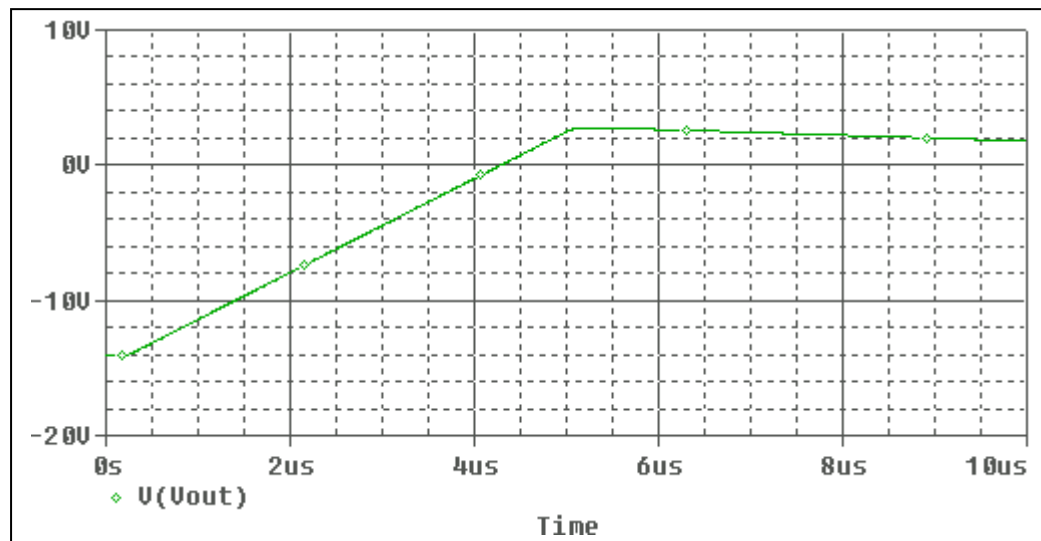
## Evaluation circuit



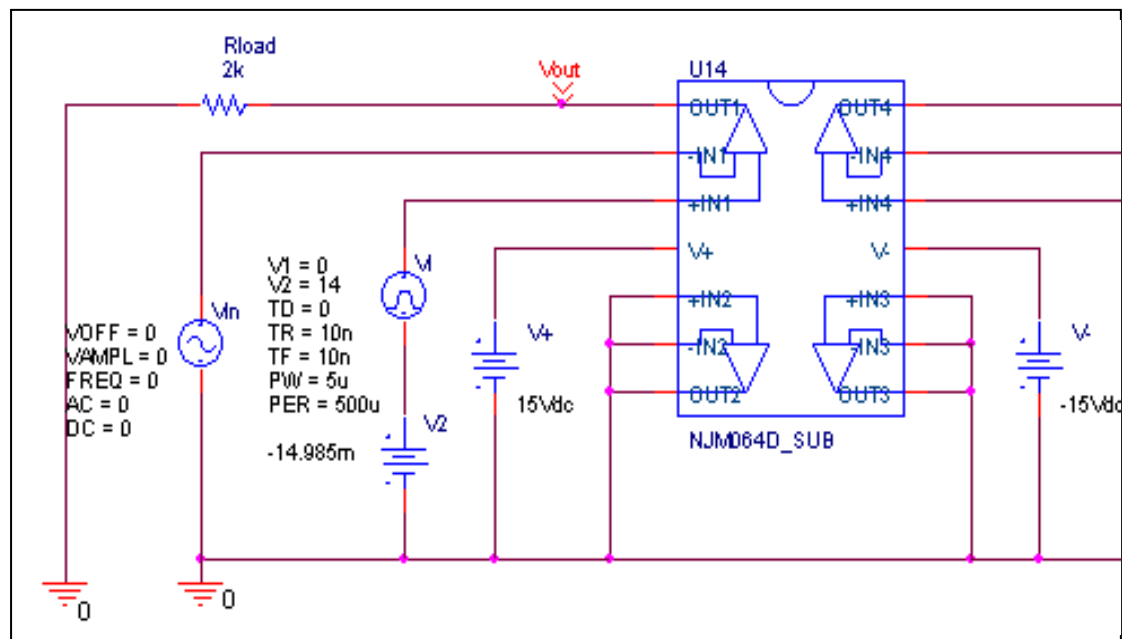
Vos	Measurement		Simulation		Error	
	15	mV	14.985	mV	0.1	%

## Slew Rate, +SR, -SR

### Simulation result



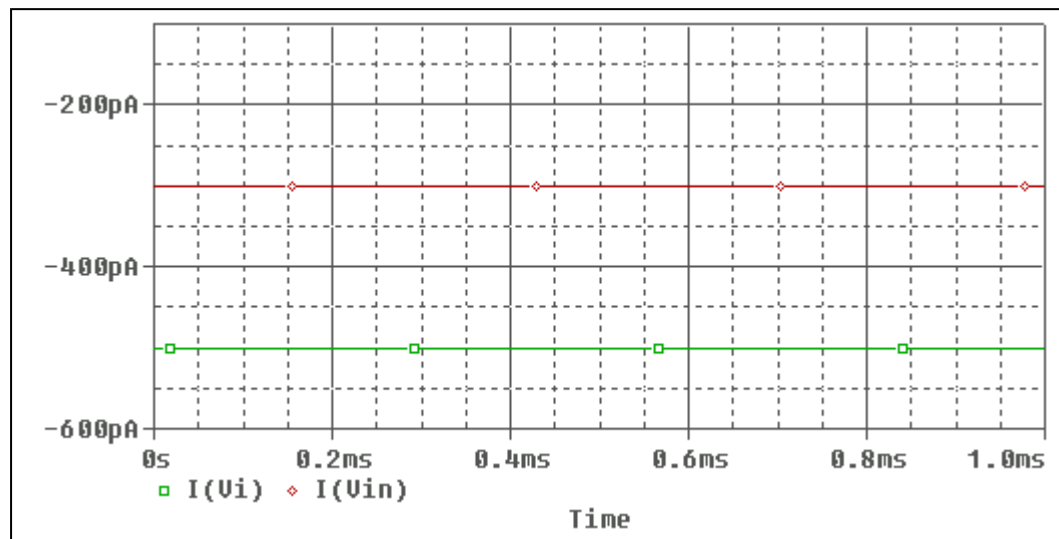
### Evaluation circuit



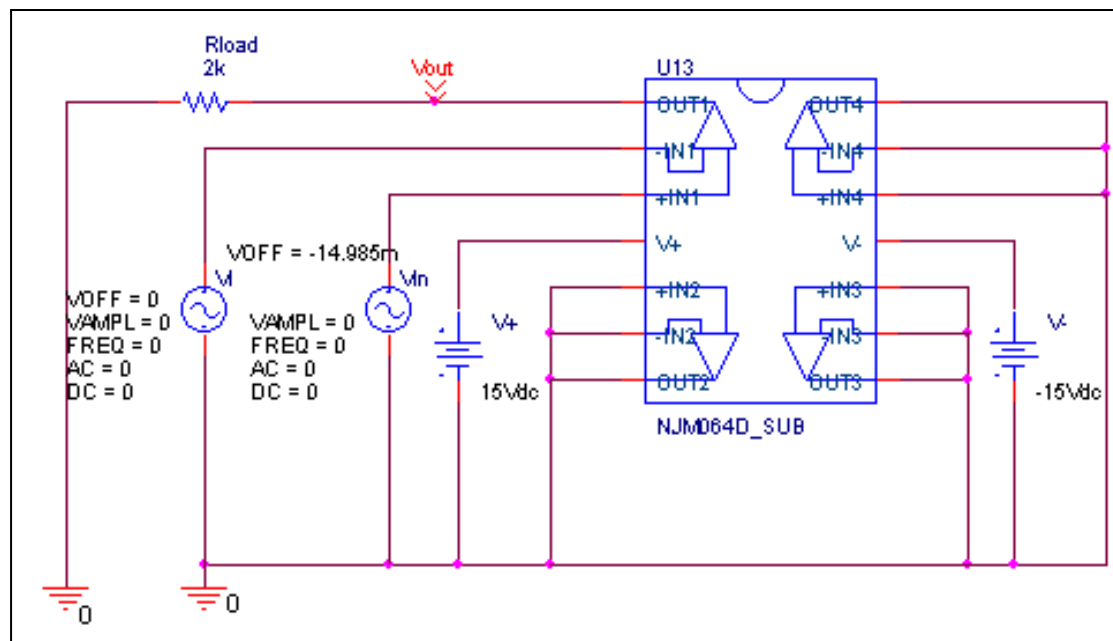
Slew Rate(v/us)	Data sheet	Simulation	%Error
		3.5V/us	3.475V/us

## Input current $I_b$ , $I_{bos}$

### Simulation result



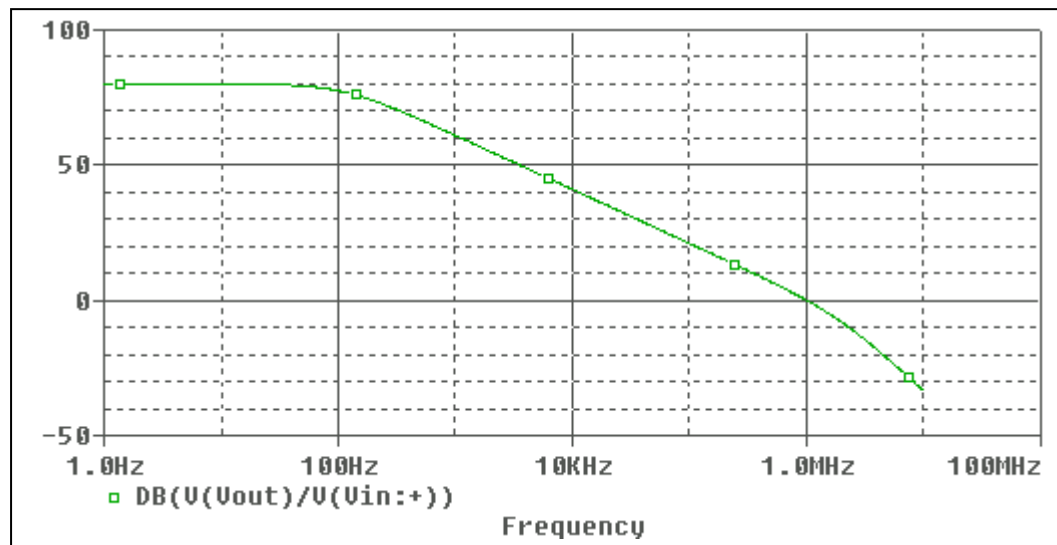
### Evaluation circuit



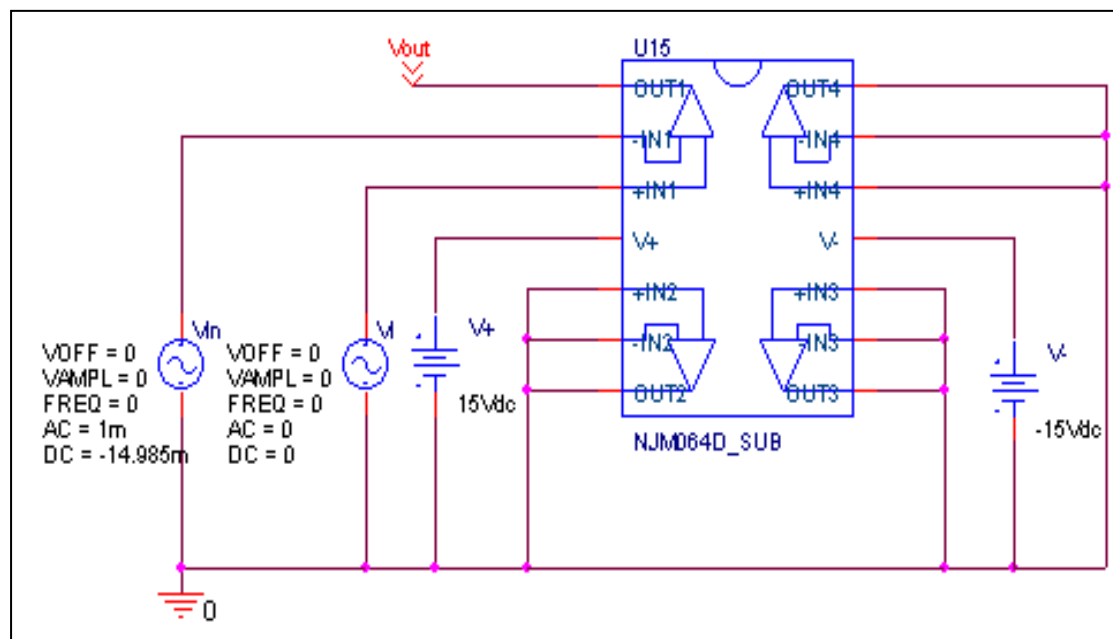
	Data sheet	Simulation	%Error
$I_b$ (pA)	400	400.15	0.037
$I_{bos}$ (pA)	200	200.06	0.03

## Open Loop Voltage Gain vs. Frequency , Av-dc, f-0dB

### Simulation result



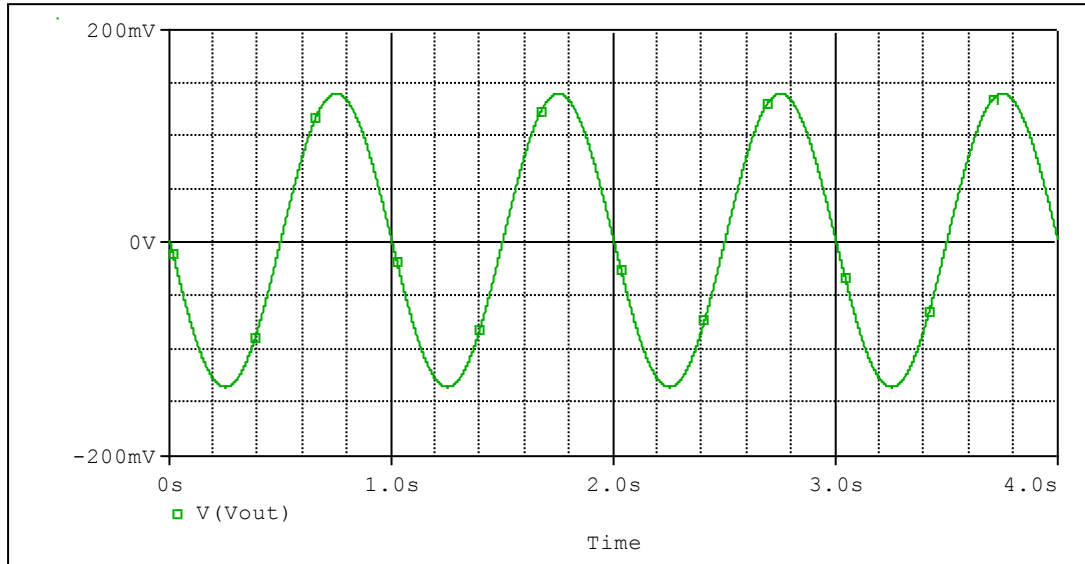
### Evaluation circuit



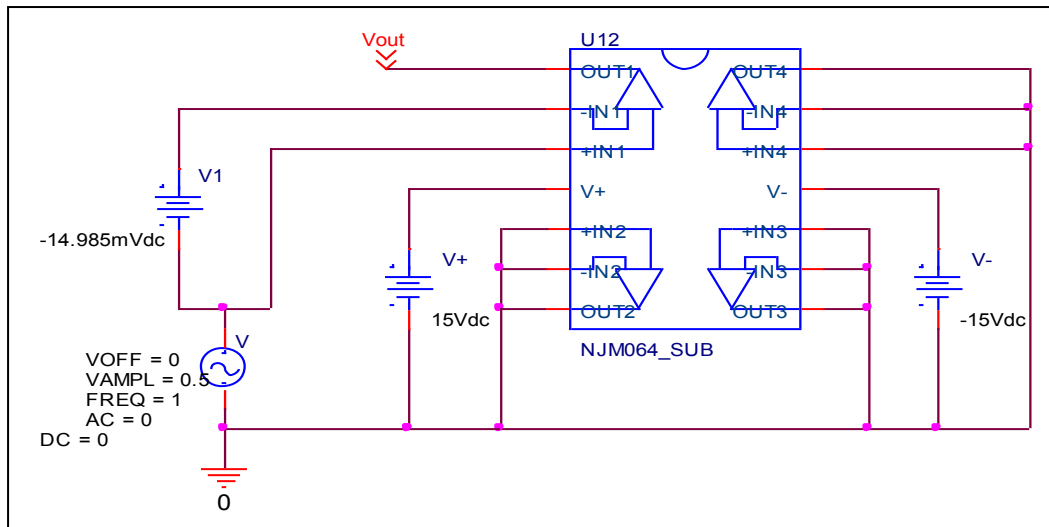
	Data sheet	Simulation	%Error
<b>f-0dB(MHz)</b>	1	1	0
<b>Av-dc</b>	80	80.1	0.125

## Common-Mode Rejection Voltage gain

### Simulation result



### Evaluation circuit



Common Mode Reject Ratio= $10115/0.275=36781$

CMRR	Data sheet	Simulation	%Error
		90	91.312