

# Device Modeling Report

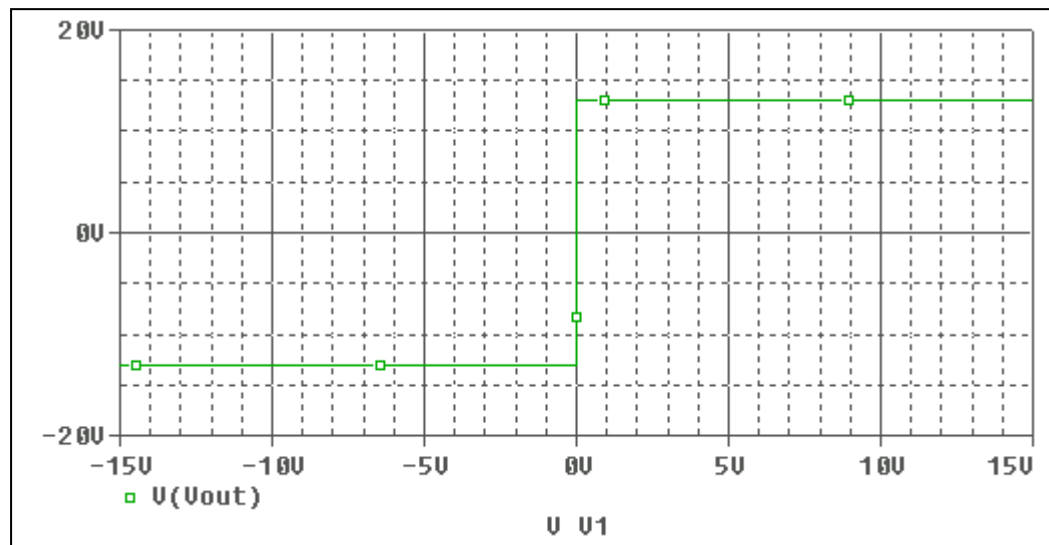
COMPONENTS: OPERATIONAL AMPLIFIER  
PART NUMBER: NJM022BM  
MANUFACTURER: NEW JAPAN RADIO CO.,LTD



**Bee Technologies Inc.**

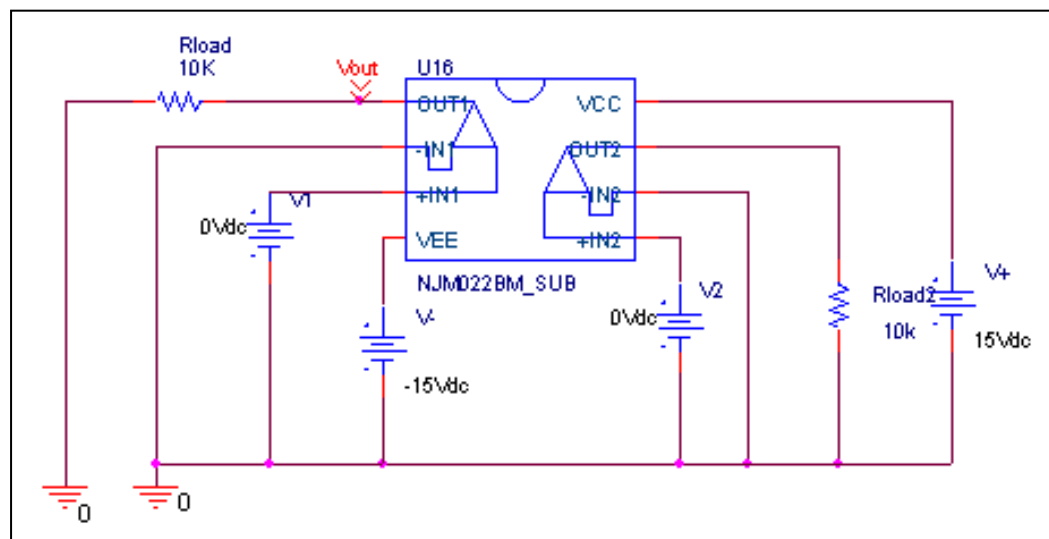
## Output Voltage Swing, +Vout and -Vout

### Simulation result



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

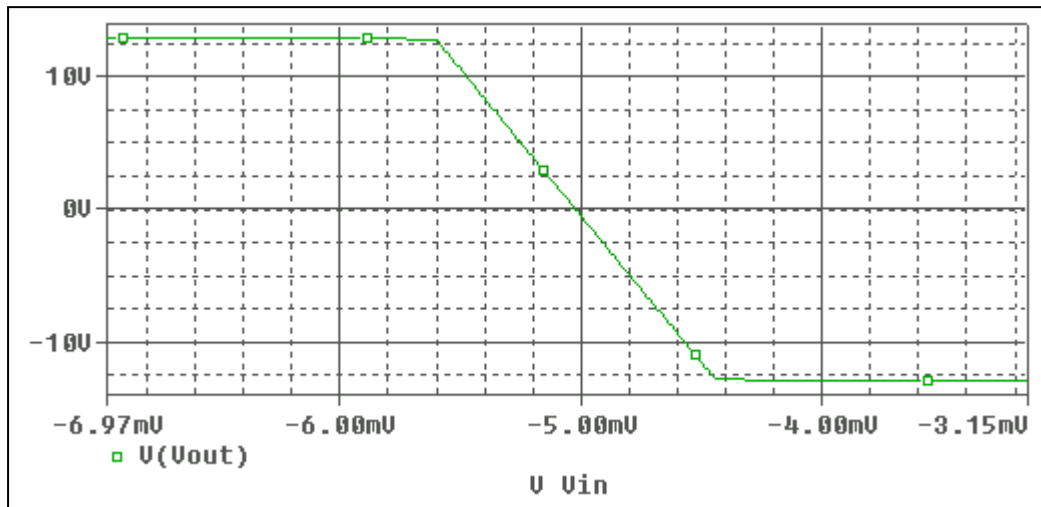
### Evaluation circuit



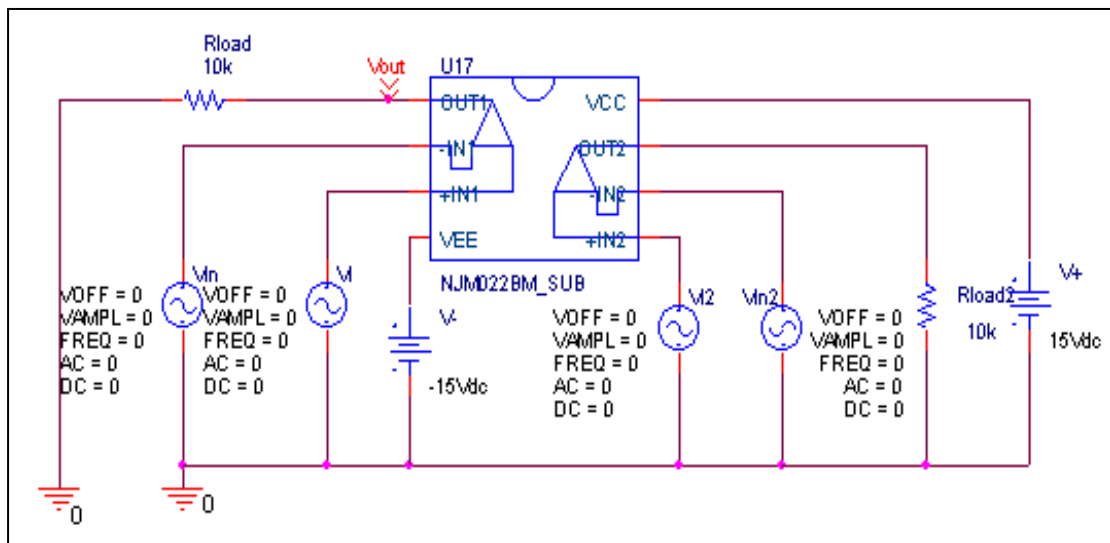
Output Voltage Swing	Data sheet	Simulation	%Error
+Vout(V)	+13	+12.972	0.215
-Vout(V)	-13	-12.972	0.215

# Input Offset Voltage

## Simulation result



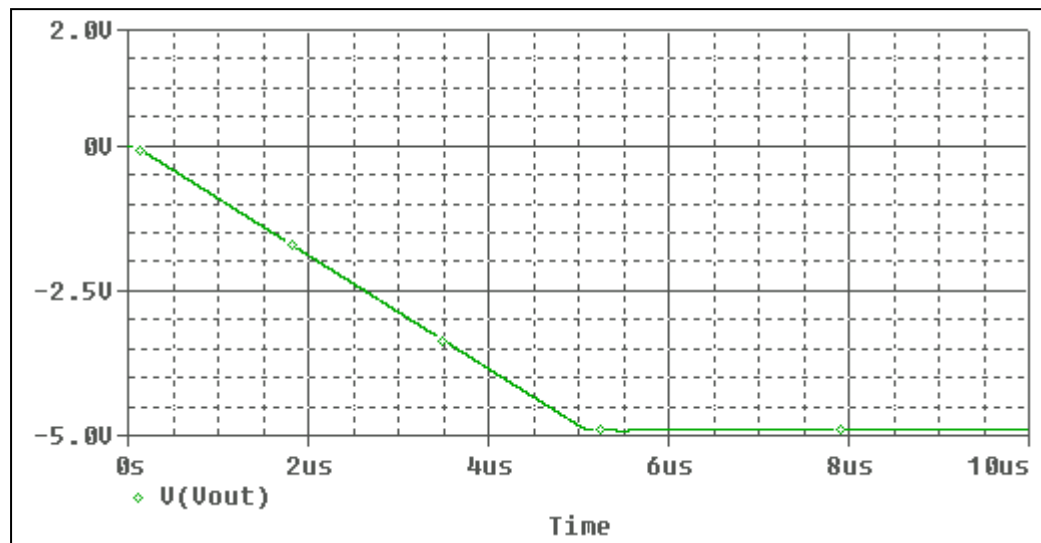
## Evaluation circuit



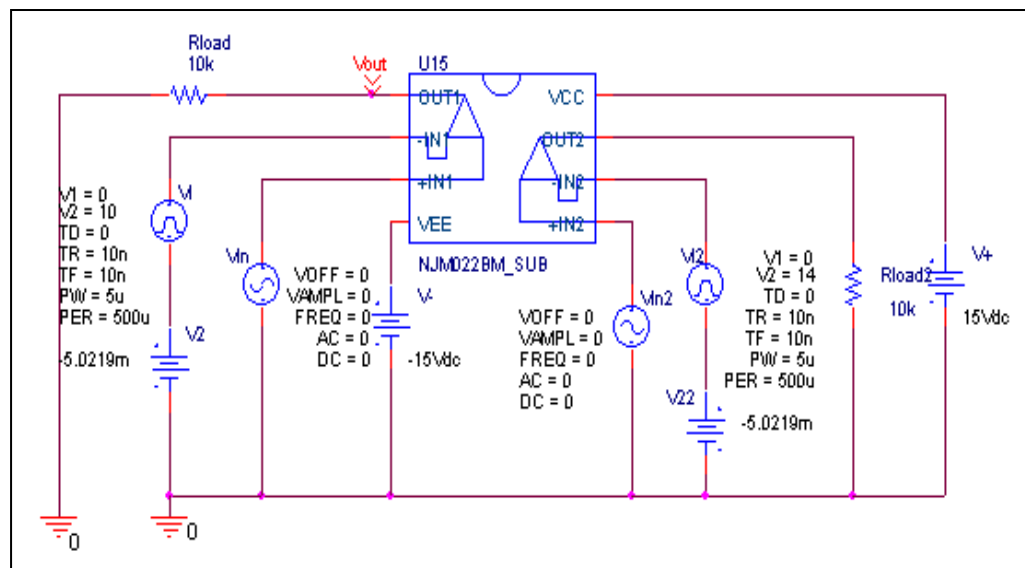
Vos	Measurement		Simulation		Error	
	5	mV	5.0219	mV	0.438	%

## Slew Rate, +SR, -SR

### Simulation result



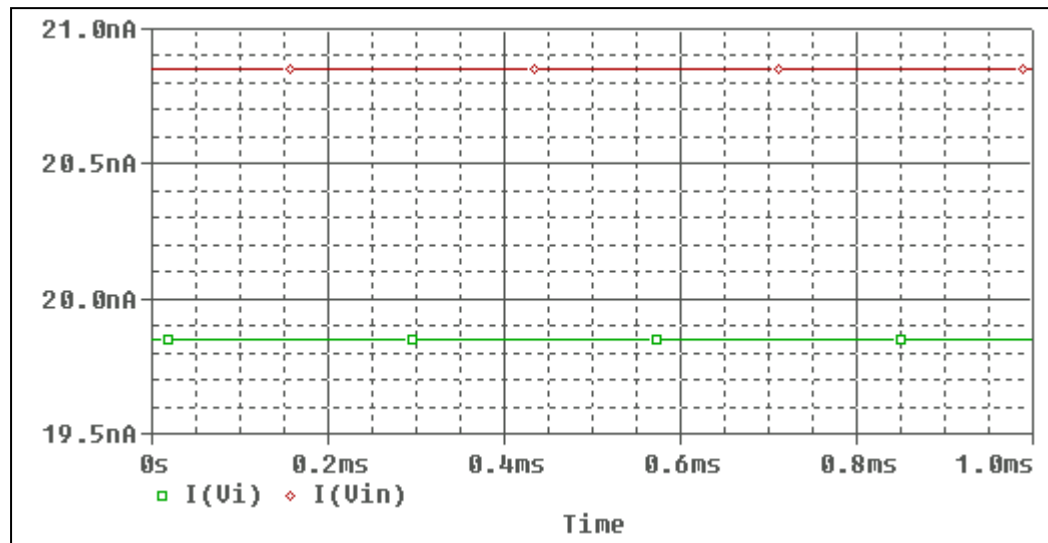
### Evaluation circuit



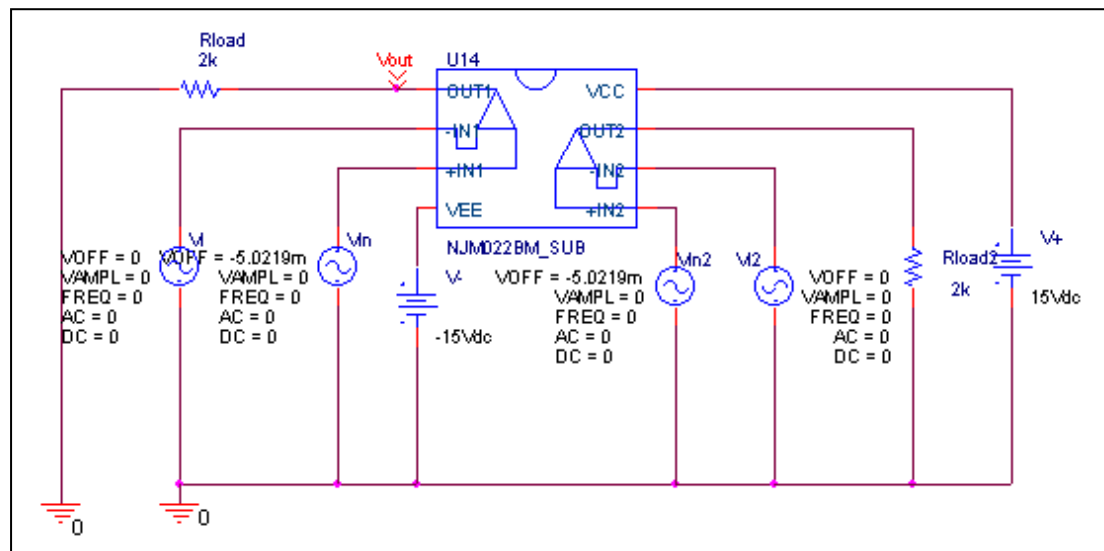
Slew Rate(v/us)	Data sheet	Simulation	%Error
		1V/us	0.979V/us

## Input current Ib, Ibos

### Simulation result



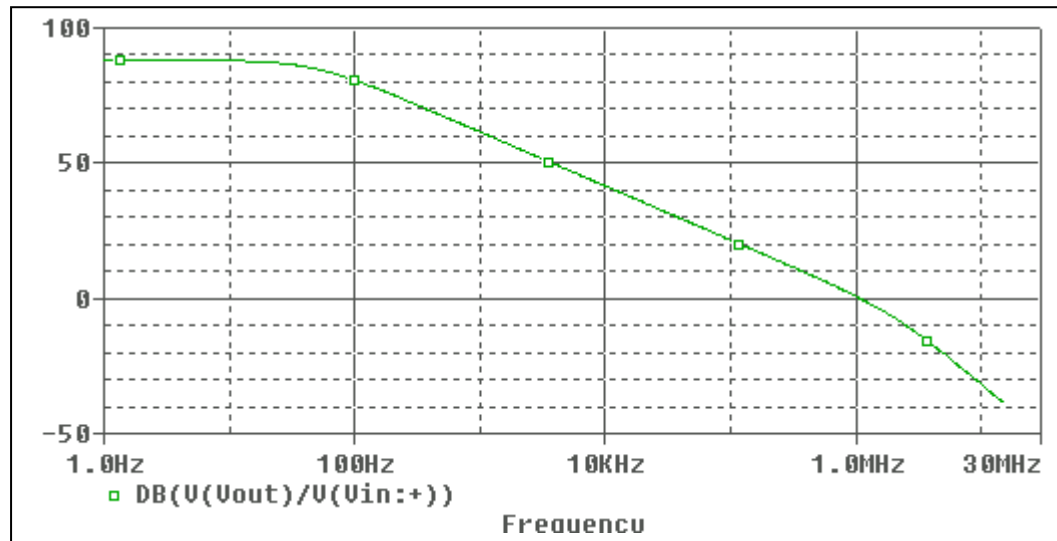
### Evaluation circuit



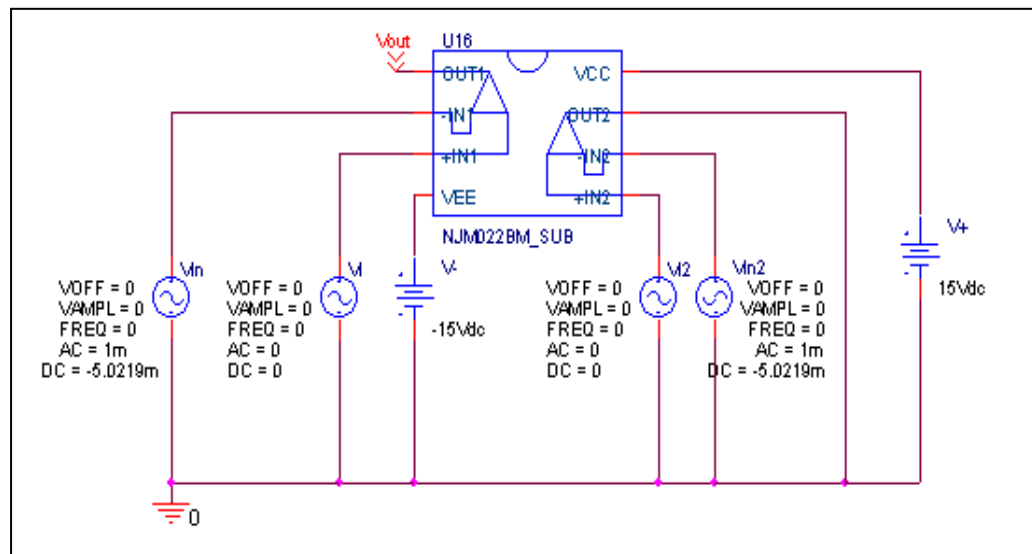
	Data sheet	Simulation	%Error
Ib(nA)	20	20.34	1.7
Ibos(nA)	1	1.001	0.1

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

Simulation result



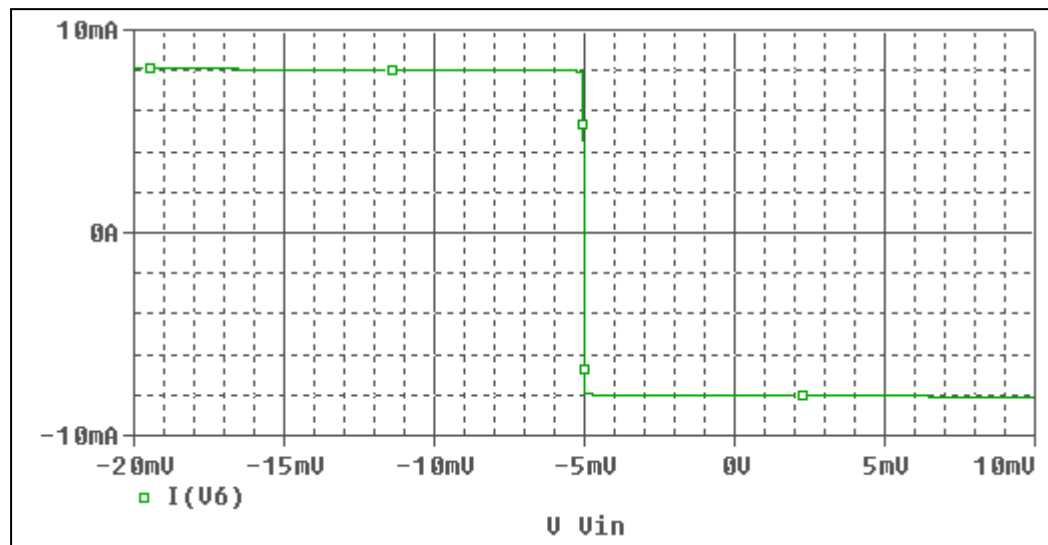
Evaluation circuit



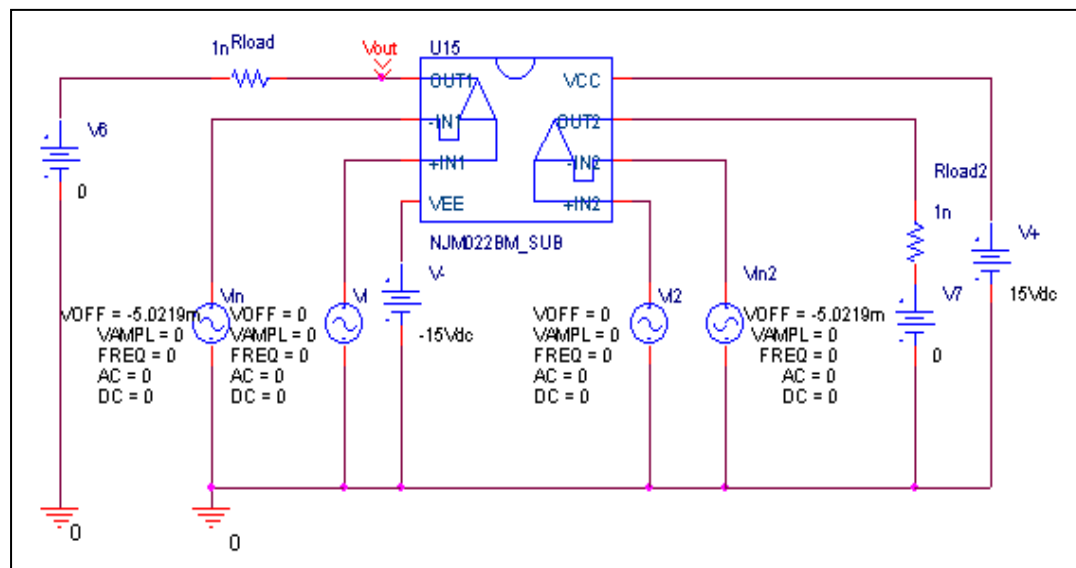
	Data sheet	Simulation	%Error
f-0dB(MHz)	1	1.05	5
Av-dc	88	88.079	0.089

## Output Short Circuit Current - Ios

Simulation result



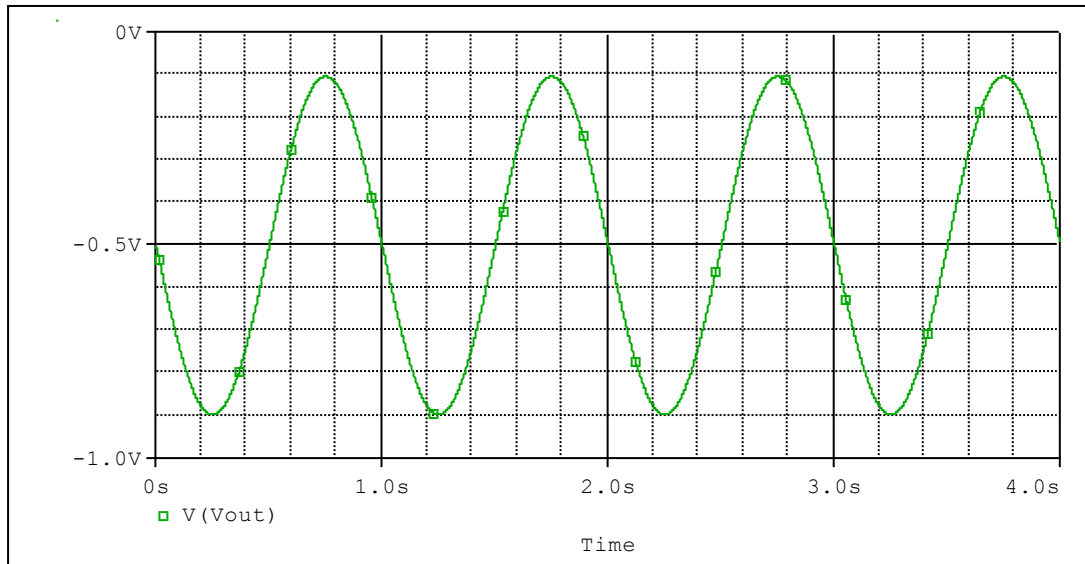
Evaluation circuit



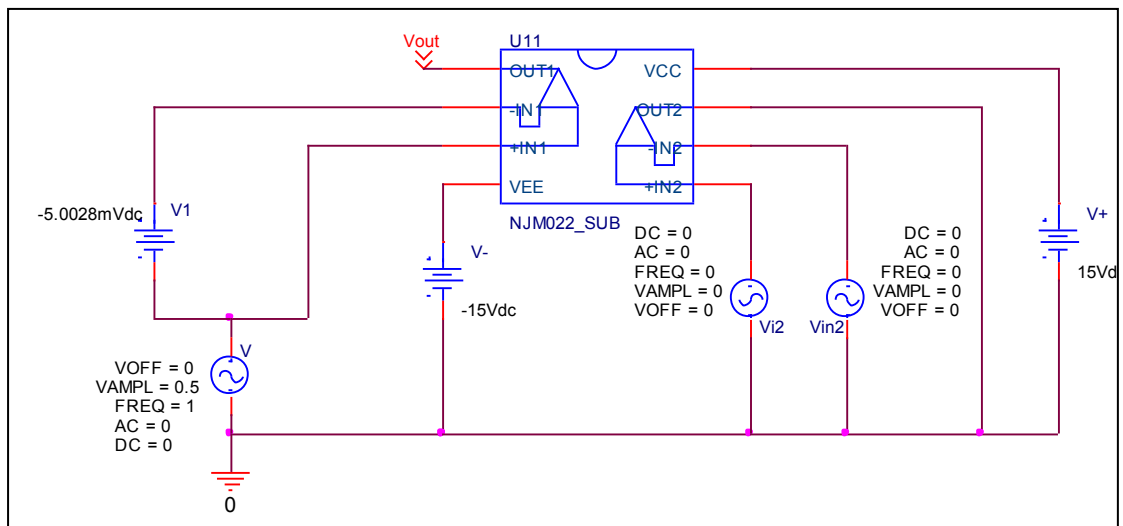
Short Circuit Current	Data sheet	Simulation	%Error
		8mA	8.015mA

# Common-Mode Rejection Voltage gain

## Simulation result



## Evaluation circuit



Common Mode Reject Ratio= $25032/0.79432=31566$

CMRR	Data sheet	Simulation	%Error
		90	89.98