

# Device Modeling Report

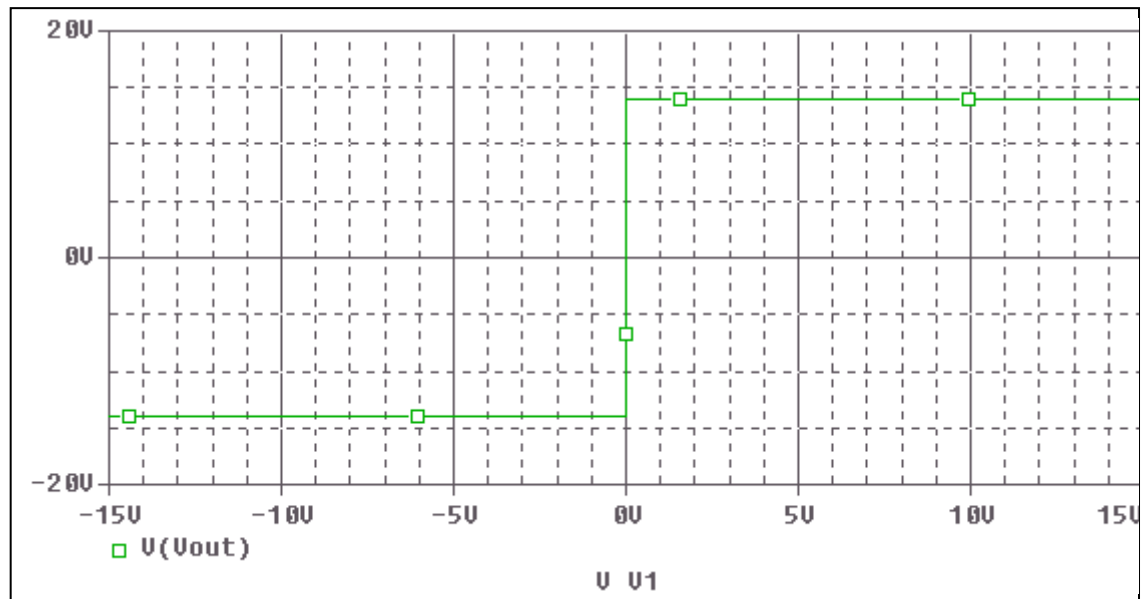
COMPONENTS: OPERATIONAL AMPLIFIER  
PART NUMBER: NJM4560L  
MANUFACTURER: NEW JAPAN RADIO CO., LTD



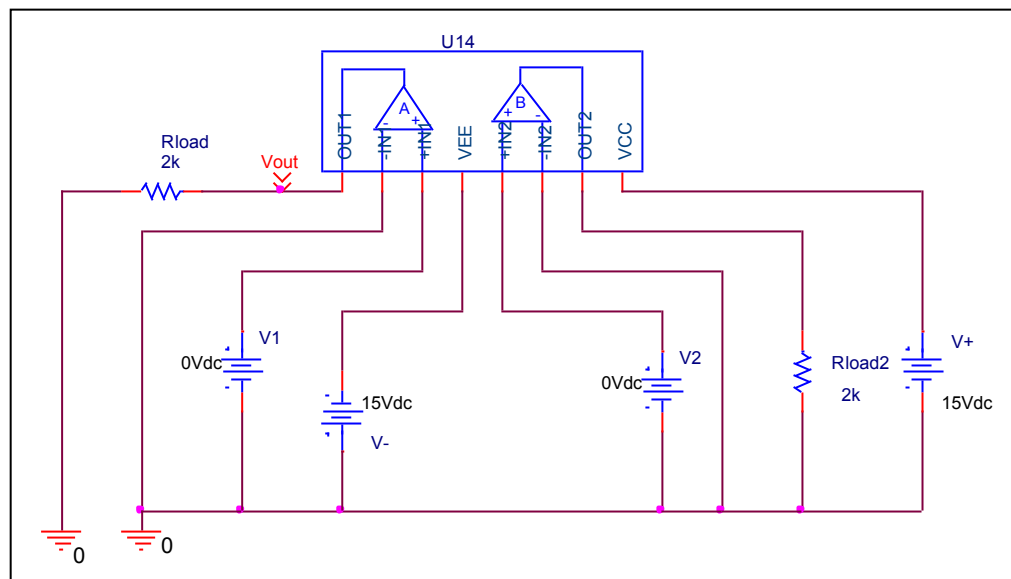
Bee Technologies Inc.

## Output Voltage Swing, +Vout and -Vout

### Simulation result



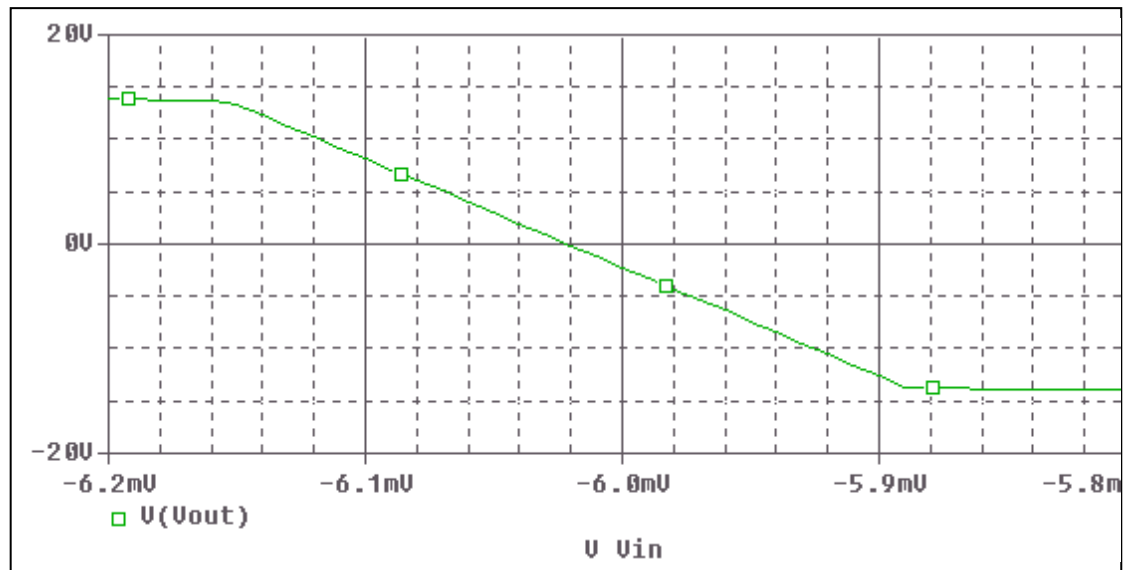
### Evaluation circuit



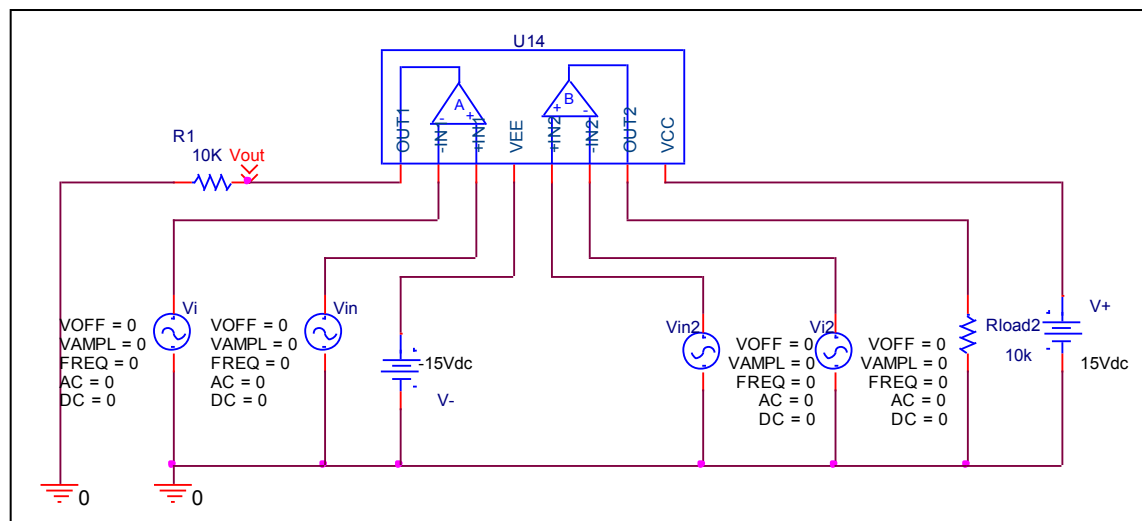
Output Voltage Swing	Data sheet	Simulation	%Error
+Vout(V)	+14	+13.998	0.0142
-Vout(V)	-14	-13.998	0.0142

# Input Offset Voltage

## Simulation result



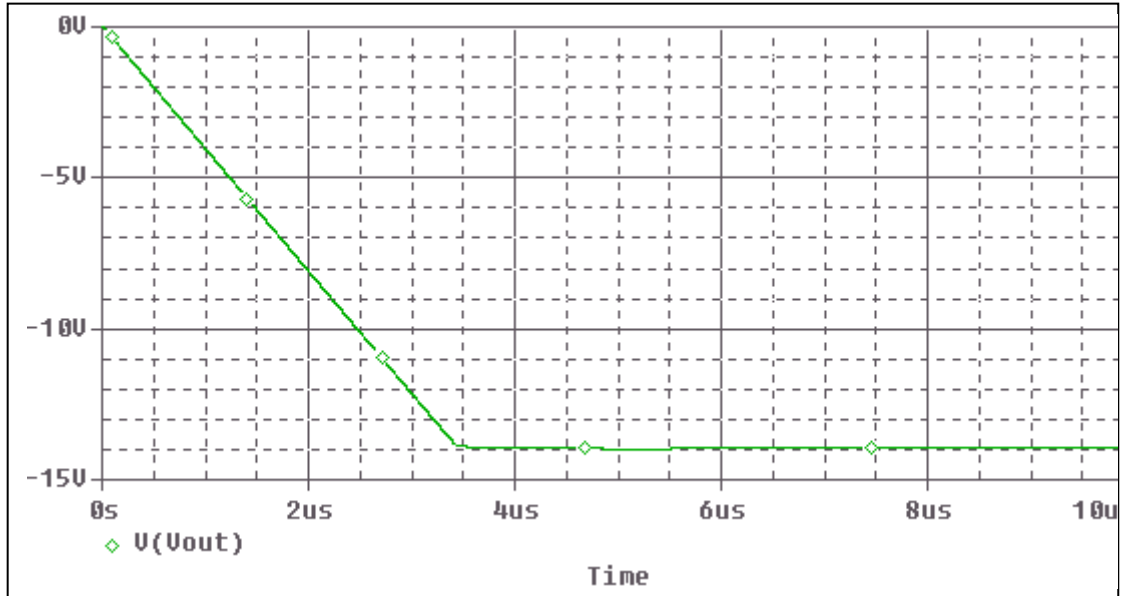
## Evaluation circuit



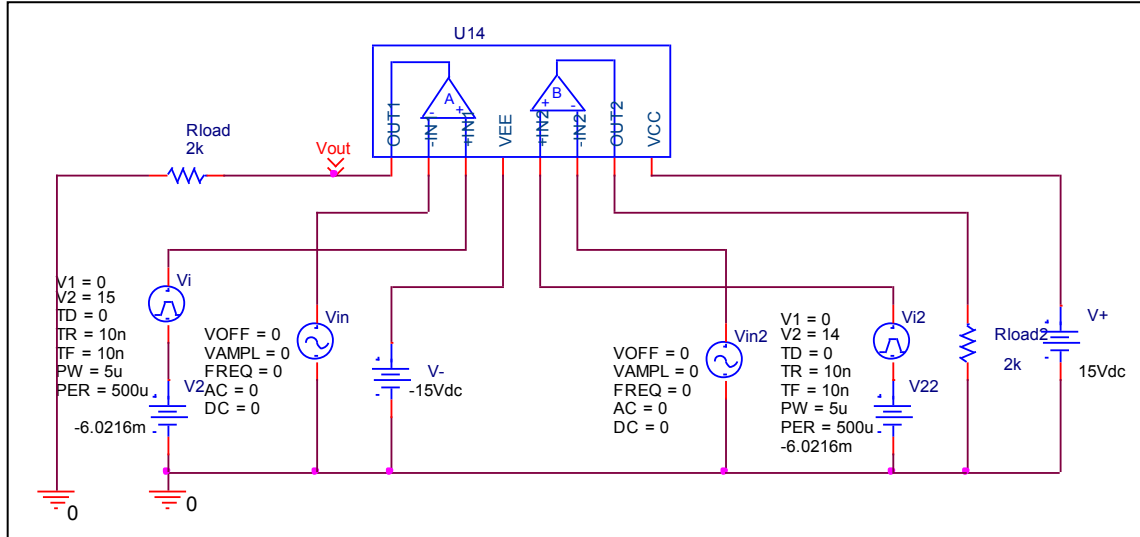
	Measurement		Simulation		Error	
Vos	6	mV	6.0216	mV	0.36	%

## Slew Rate, +SR, -SR

Simulation result



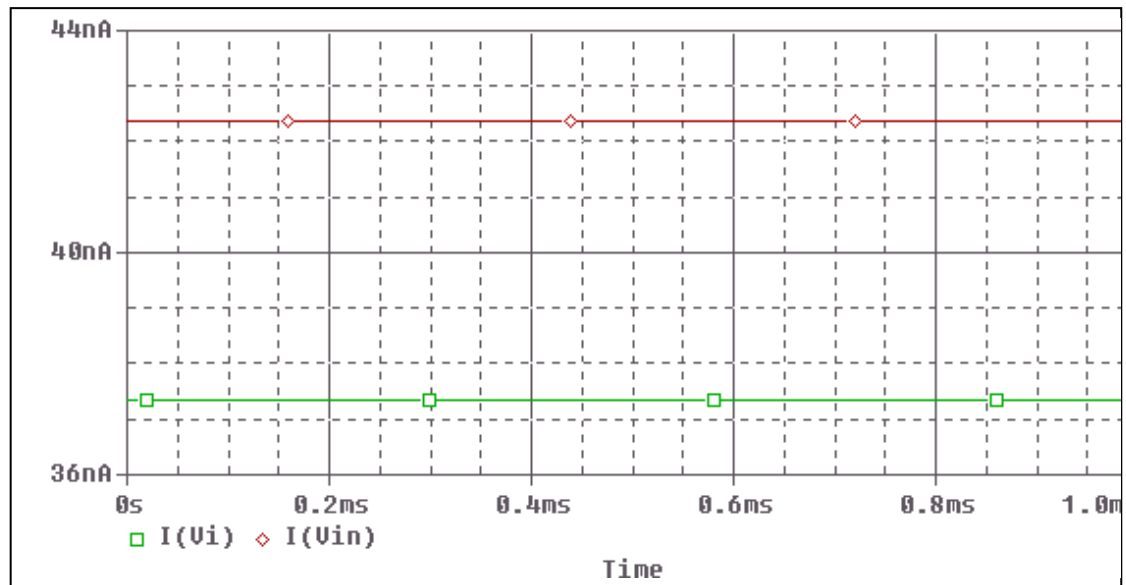
Evaluation circuit



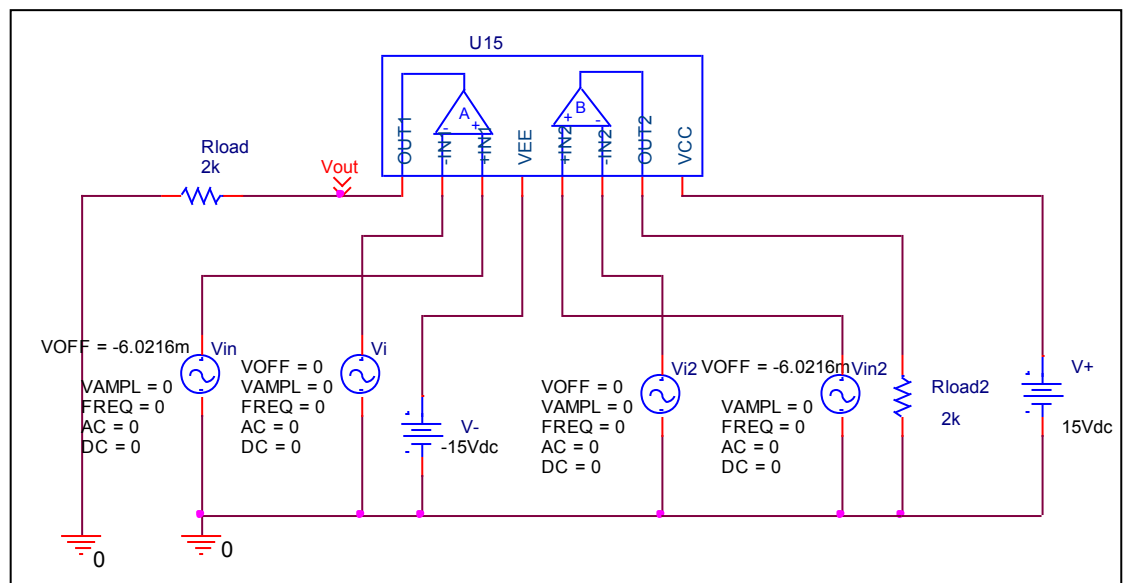
Slew Rate(v/us)	Data sheet	Simulation	%Error
		4	4.0619

# Input current Ib, Ibos

## Simulation result



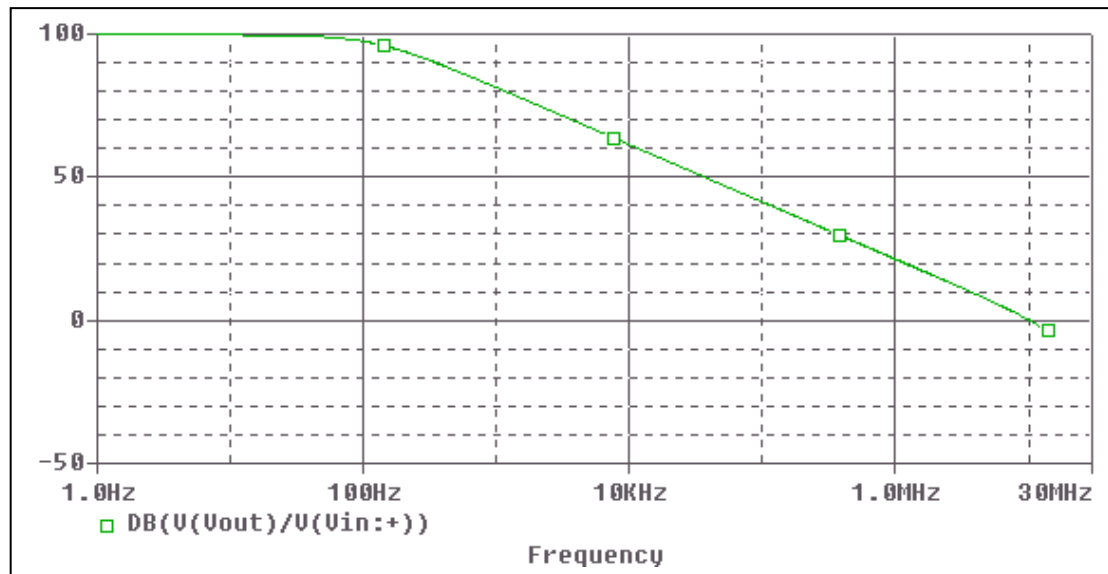
## Evaluation circuit



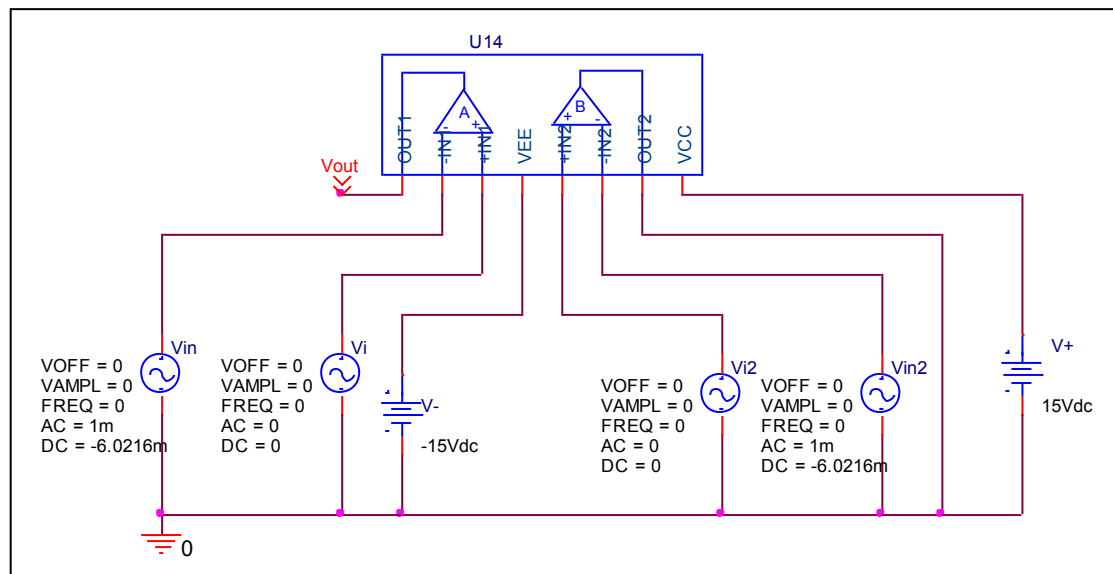
	Data sheet	Simulation	%Error
Ib(nA)	40	39.856	0.36
Ibos(nA)	5	5.011	0.22

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

### Simulation result



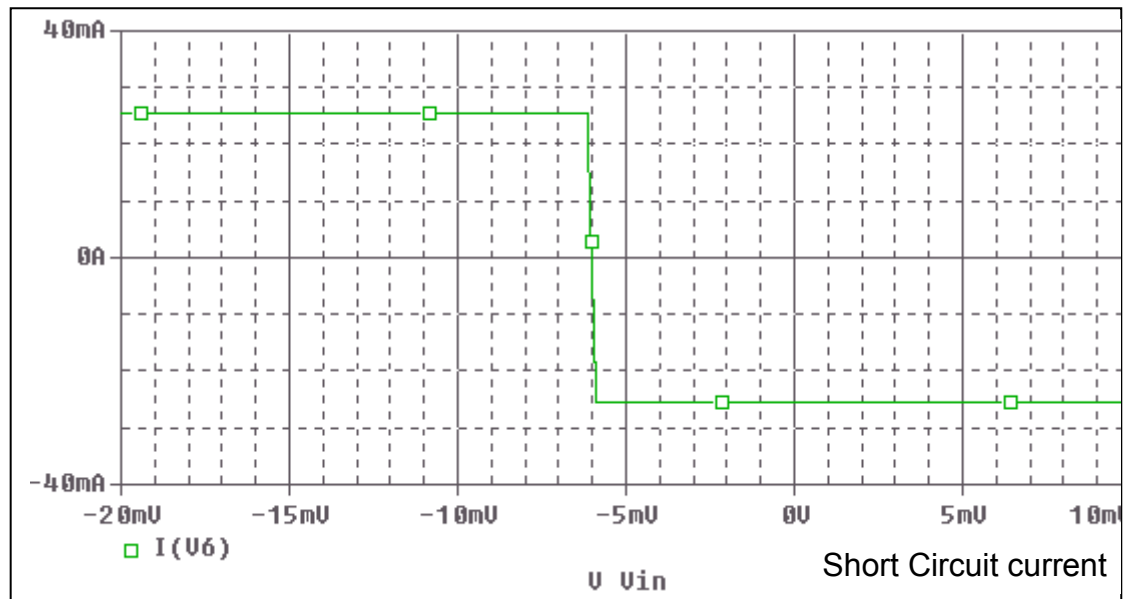
### Evaluation circuit



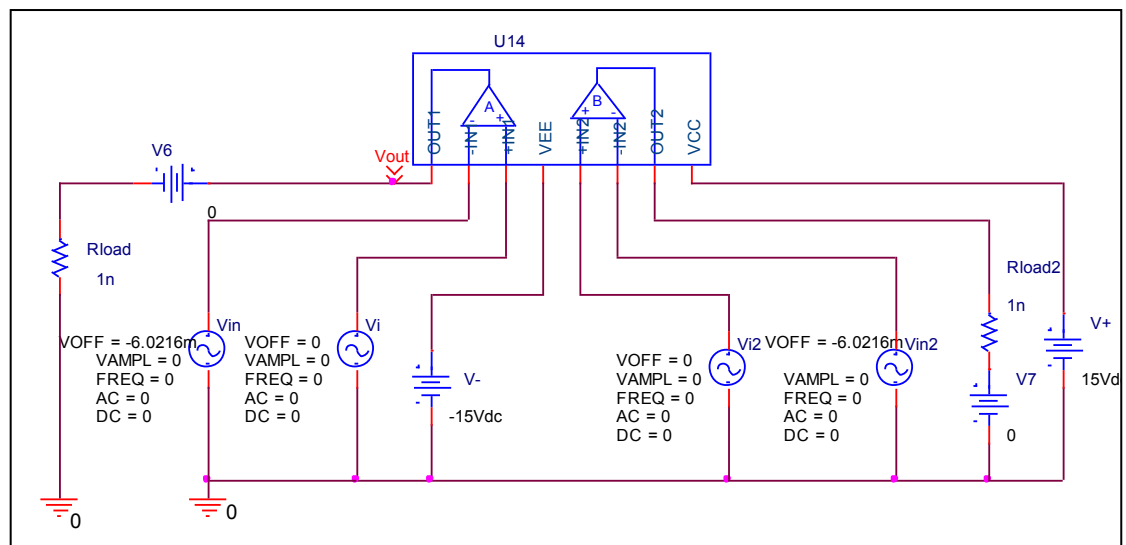
	Data sheet	Simulation	%Error
<b>f-0dB(MHz)</b>	10	10.165	1.65
<b>Av-dc</b>	100000	97723	2.27

## Output Short Circuit Current - Ios

### Simulation result



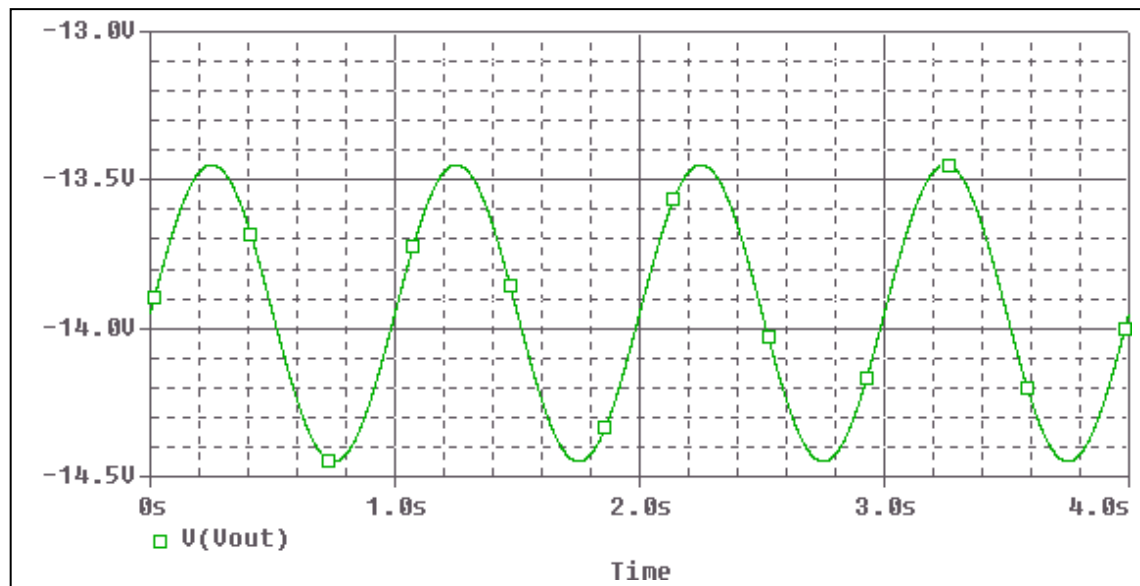
### Evaluation circuit



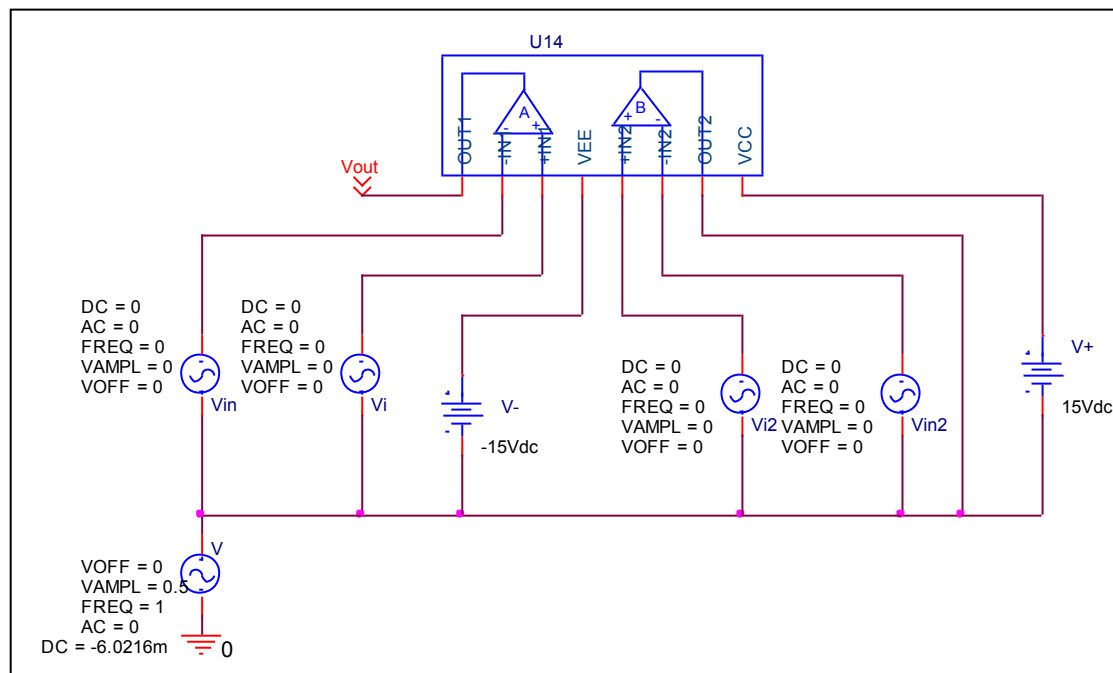
Short Circuit Current	Data sheet	Simulation	%Error
		25mA	25.6mA

## Common-Mode Rejection Voltage gain

### Simulation result



### Evaluation circuit



Common mode gain =  $1/0.3162$

Common Mode Reject Ratio =  $97723/3.1625 = 30900$

CMRR	Data sheet	Simulation	%Error
		31622	30900