

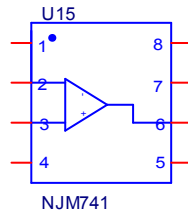
Device Modeling Report

COMPONENTS:MOSFET: OPERATIONAL AMPLIFIER
PART NUMBER:NJM741
MANUFACTURER: NEW JAPAN RADIO CO.,LTD



Bee Technologies Inc.

Spice Model



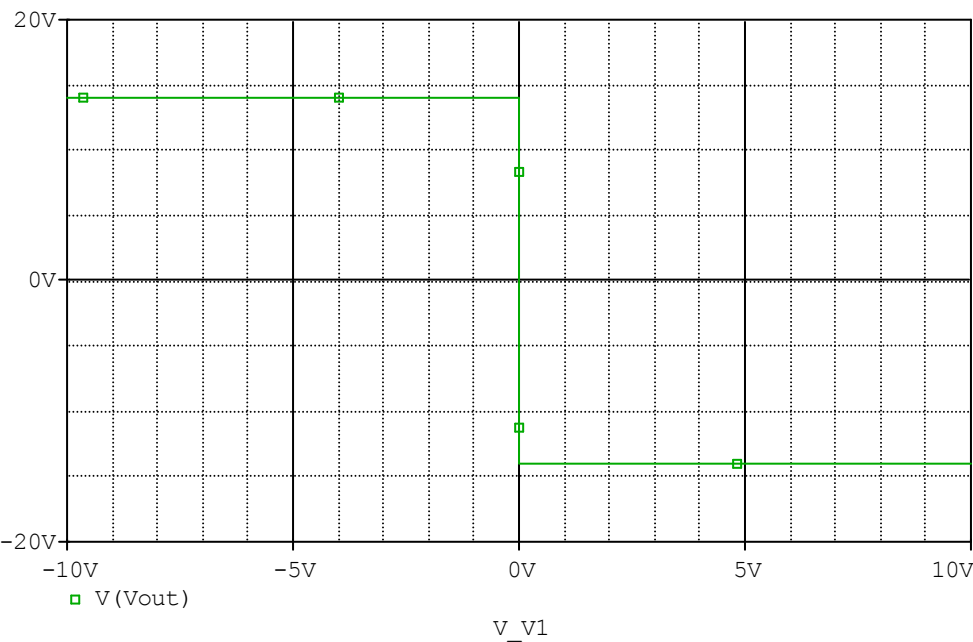
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*$
* PART NUMBER: NJM741
* MANUFACTURER: NEW JAPAN RADIO
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.Subckt NJM741 Vos1 -IN +IN V- Vos2 OUT V+ NC
X_U1  +IN -IN V+ V- OUT NJM741_ME
.ends NJM741
.subckt NJM741_ME 1 2 3 4 5
c1 11 12 8.6603E-12
c2 6 7 30.000E-12
dc 5 53 dy
de 54 5 dy
dlp 90 91 dx
dln 92 90 dx
dp 4 3 dx
egnd 99 0 poly(2) (3,0) (4,0) 0 .5 .5
fb 7 99 poly(5) vb vc ve vlp vln 0 61.006E6 -1E3 1E3 61E6 -61E6
ga 6 0 11 12 207.35E-6
gcm 0 6 10 99 2.0735E-9
iee 10 4 dc 14.160E-6
hlim 90 0 vlim 1K
q1 11 2 13 qx1
q2 12 1 14 qx2
r2 6 9 100.00E3
rc1 3 11 4.8229E3
rc2 3 12 4.8229E3
re1 13 10 1.1494E3
re2 14 10 1.1494E3
ree 10 99 14.124E6
ro1 8 5 50
ro2 7 99 25
rp 3 4 1.8015E3
vb 9 0 dc 0
vc 3 53 dc 1.7979
ve 54 4 dc 1.7979
vlim 7 8 dc 0
vlp 91 0 dc 20
vln 0 92 dc 20
.model dx D(Is=800.00E-18)
.model dy D(Is=800.00E-18 Rs=1m Cjo=10p)
.model qx1 NPN(Is=800.00E-18 Bf=205.84)
.model qx2 NPN(Is=864.3162E-18 Bf=273.79)
.ends
*$

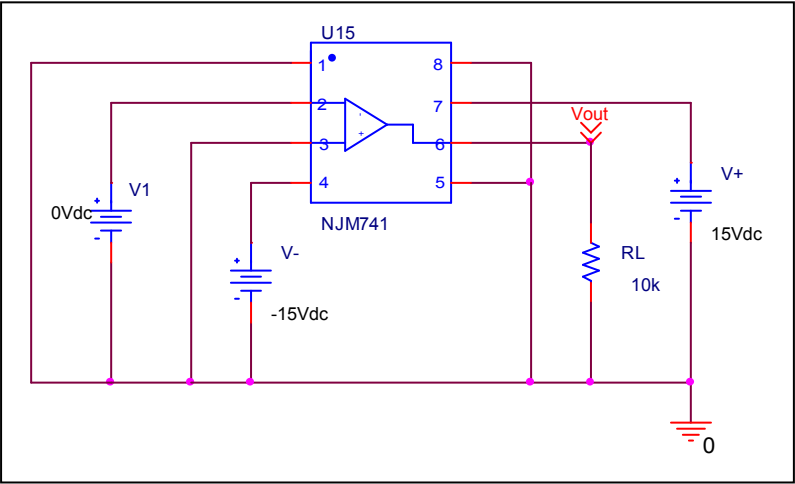
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Output Voltage Swing

Simulation result



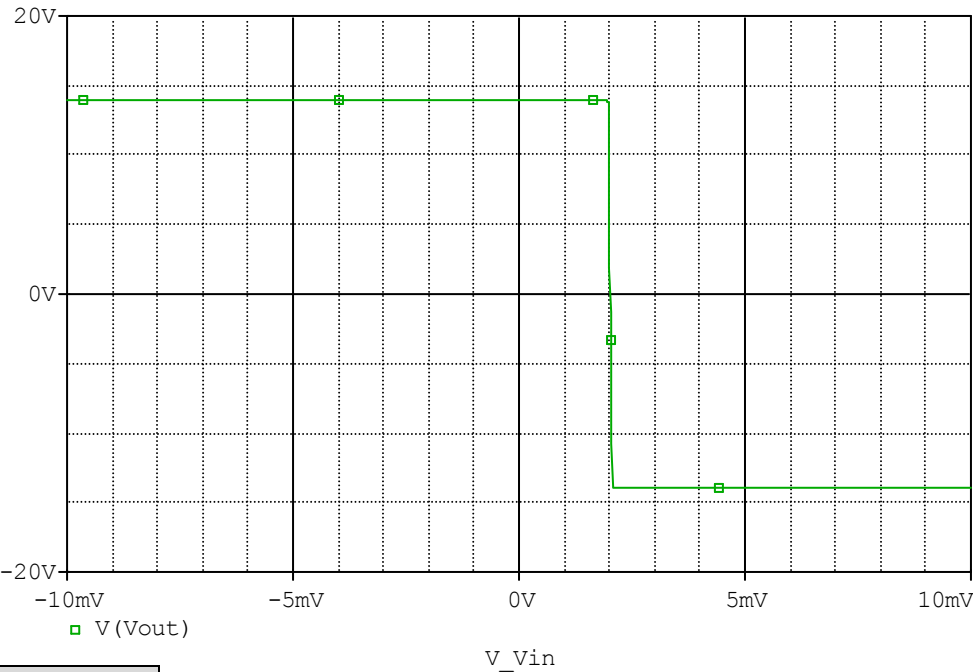
Evaluation circuit



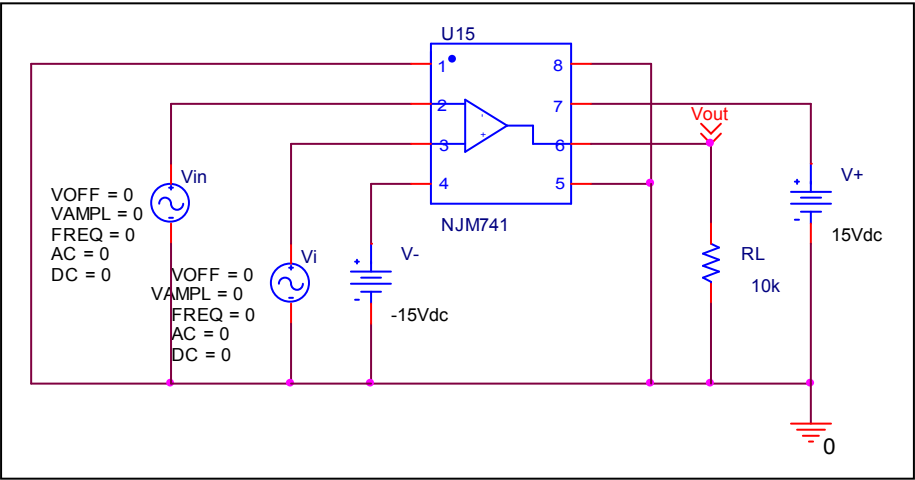
Output Voltage Swing	Data sheet	Simulation	%Error
+Vout(V)	14.000	13.999	-0.007
-Vout(V)	14.000	13.999	-0.007

Input Offset Voltage

Simulation result



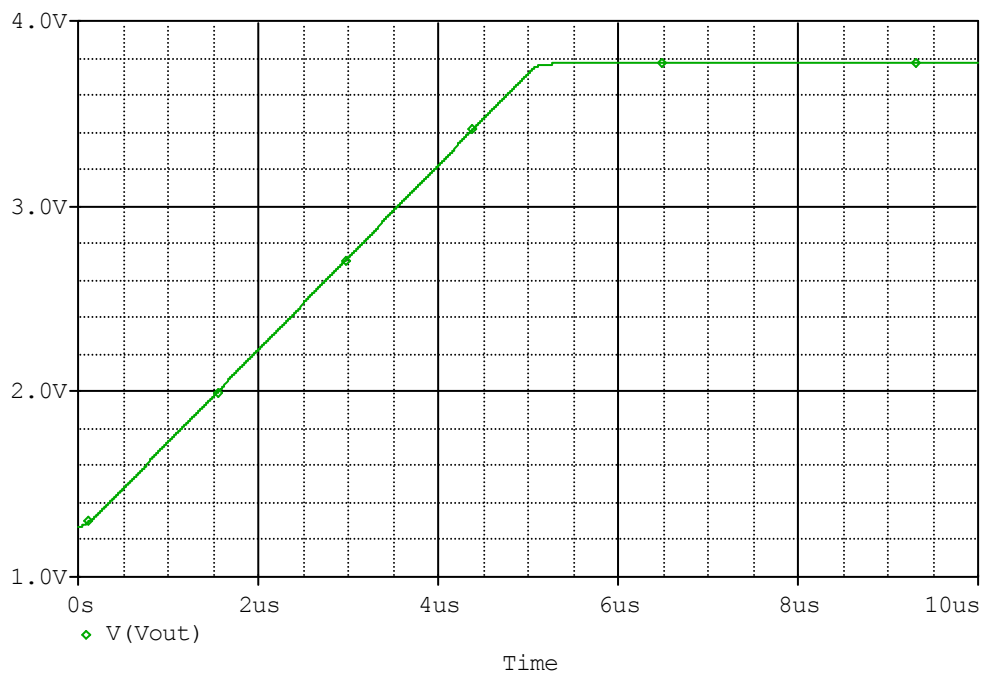
Evaluation circuit



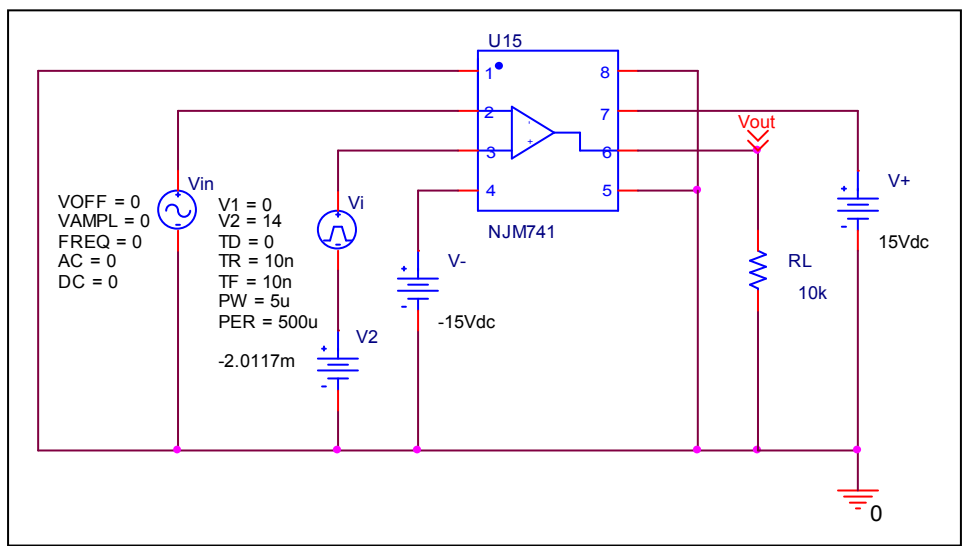
Vos	Measurement		Simulation		Error	
	2.000	mV	2.011	mV	-0.550	%

Slew Rate

Simulation result



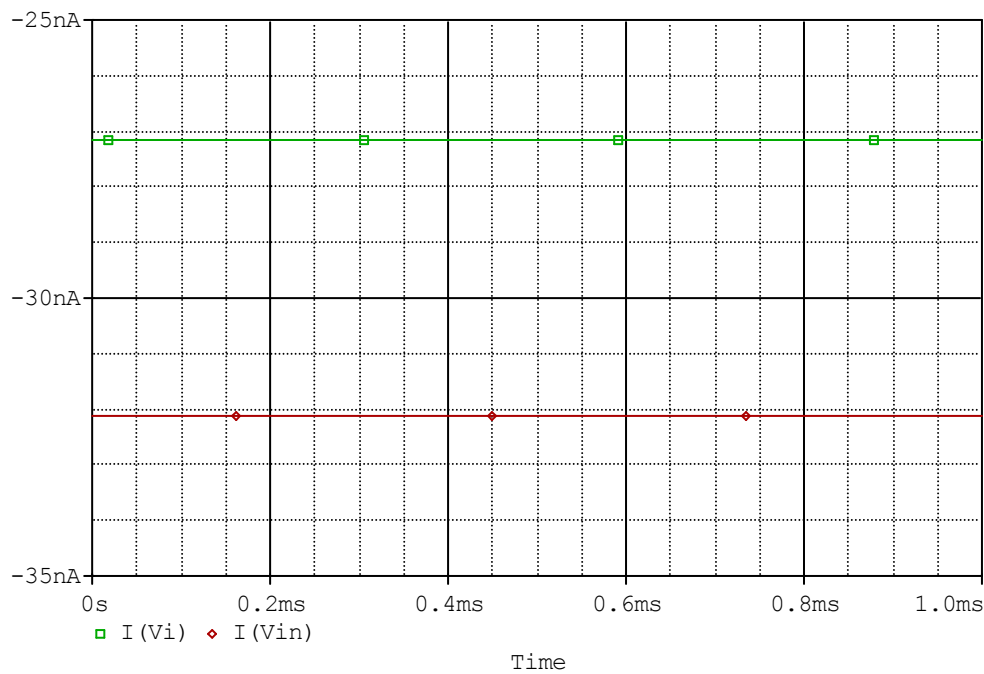
Evaluation circuit



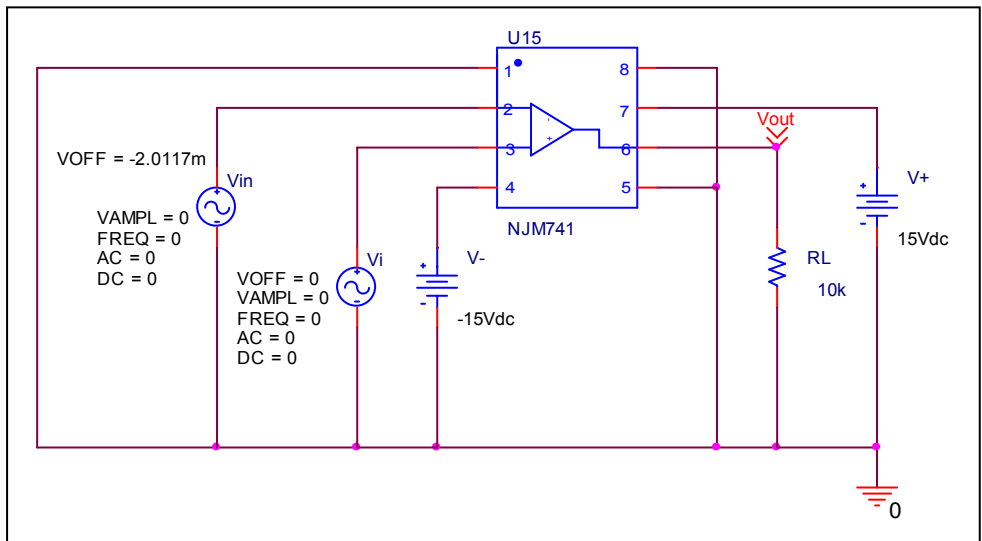
Slew Rate(v/us)	Data sheet	Simulation	%Error
	0.5V/us	0.503V/us	0.600

Input current Ib, Ibos

Simulation result



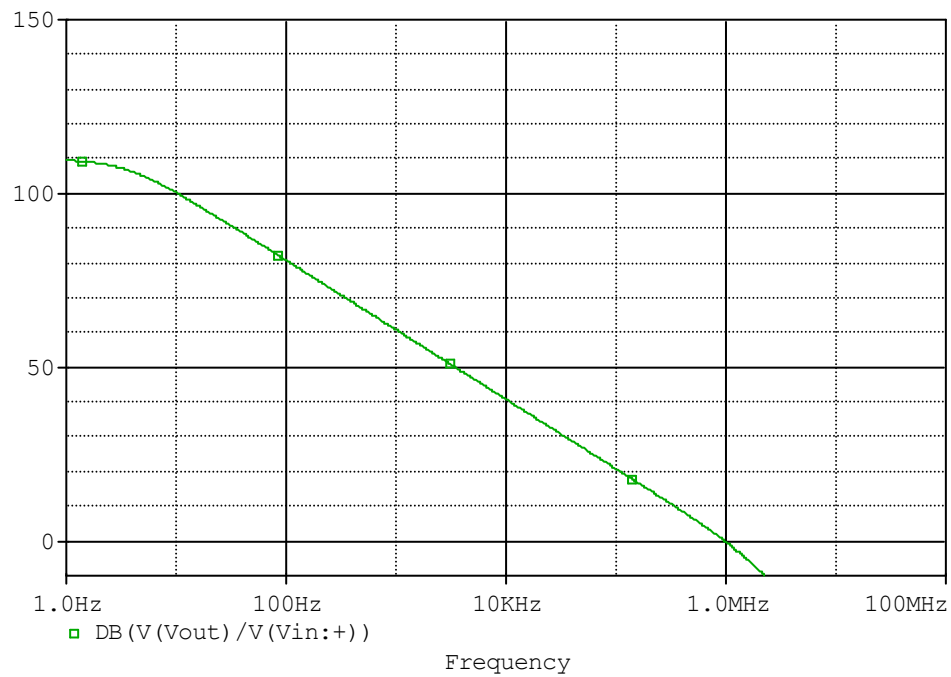
Evaluation circuit



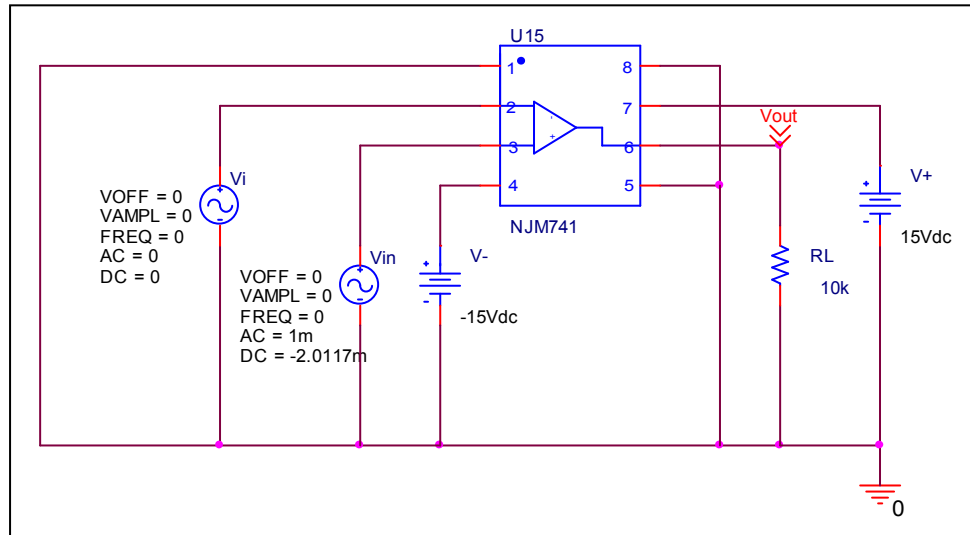
	Data sheet	Simulation	%Error
Ib(nA)	30.000	29.645	-1.183
Ibos(nA)	5.000	4.938	1.240

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

Simulation result



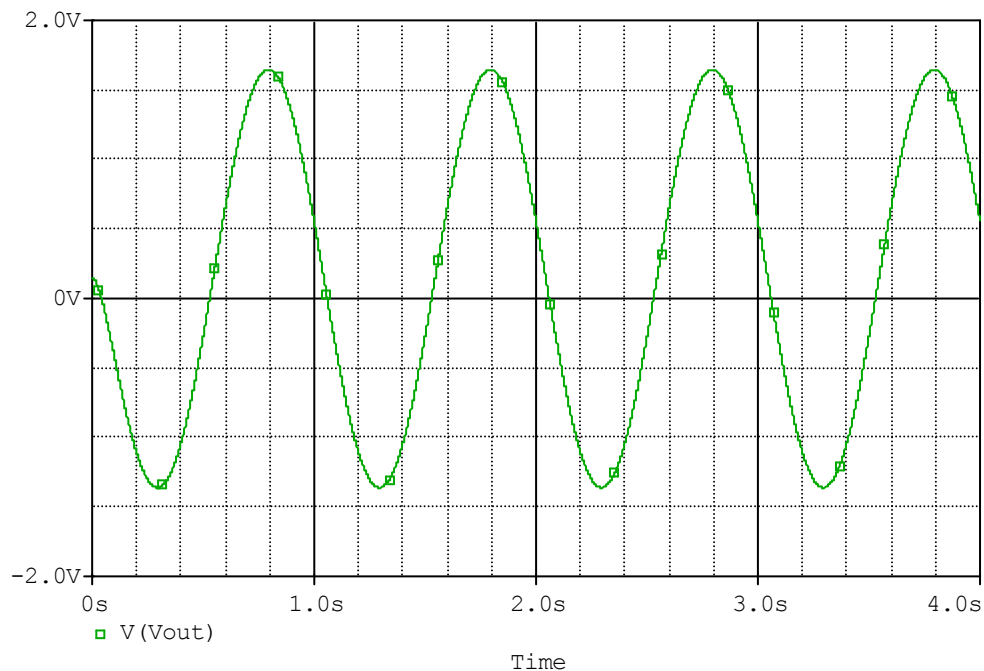
Evaluation circuit



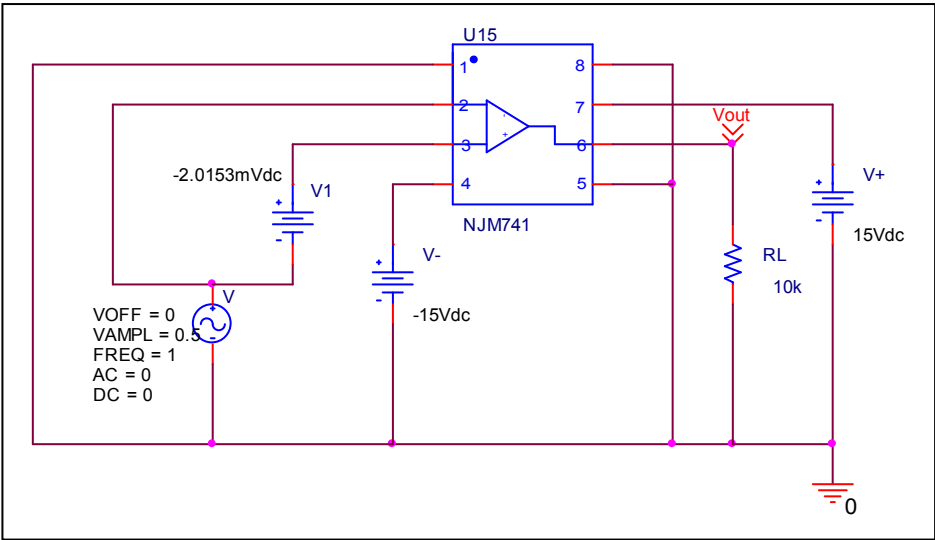
	Data sheet	Simulation	%Error
f-0dB(MHz)	1.000	0.992	-0.800
Av-dc(dB)	110.000	109.572	-0.389

Common-Mode Rejection Voltage gain

Simulation result



Evaluation circuit



Common Mode Reject Ratio= $301,023/3.0073 = 100,097$

CMRR (dB)	Data sheet	Simulation	%Error
	100.000	100.008	0.008