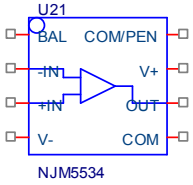
Device Modeling Report

COMPONENTS: OPERATIONAL AMPLIFIER
PART NUMBER:NJM5534
MANUFACTURER: NEW JAPAN RADIO CO.,LTD

Bee Technologies Inc.

Spice Model




```
*$
*PART NUMBER: NJM5534
*MANUFACTURER: NEW JAPAN RADIO
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.Subckt NJM5534 -IN +IN V- OUT V+
X_U1     +IN -IN V+ V- OUT NJM5534_S
.ends  NJM5534
.subckt NJM5534_S  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 1.8137E6 -1E3 1E3 1E6 -1E6
  ga    6  0 11 12 2.2054E-3
  gcm   0  6 10 99 20.049E-9
  iee  10  4 dc 391.00E-6
  hlim 90  0 vlim 1K
  q1   11  2 13 qx1
  q2   12  1 14 qx2
  r2    6  9 100.00E3
  rc1   3 11 453.43
  rc2   3 12 453.43
  re1  13 10 319.98
  re2  14 10 319.98
  ree  10 99 511.51E3
  ro1   8  5 50
  ro2   7 99 25
  rp    3  4 1.8432E3
  vb    9  0 dc 0
  vc    3 53 dc 2.8395
  ve   54  4 dc 2.8395
  vlim  7  8 dc 0
  vlp  91  0 dc 100
  vln   0 92 dc 100
.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=381.29)
.model qx2 NPN(Is=814.9854E-18 Bf=399.12)
.ends NJM5534_S
*$
```
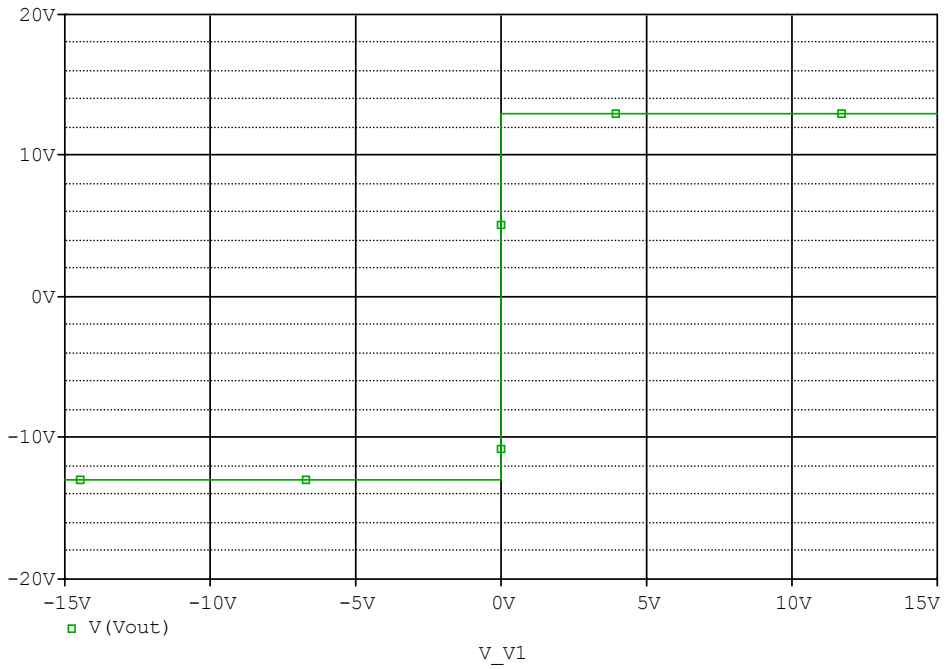
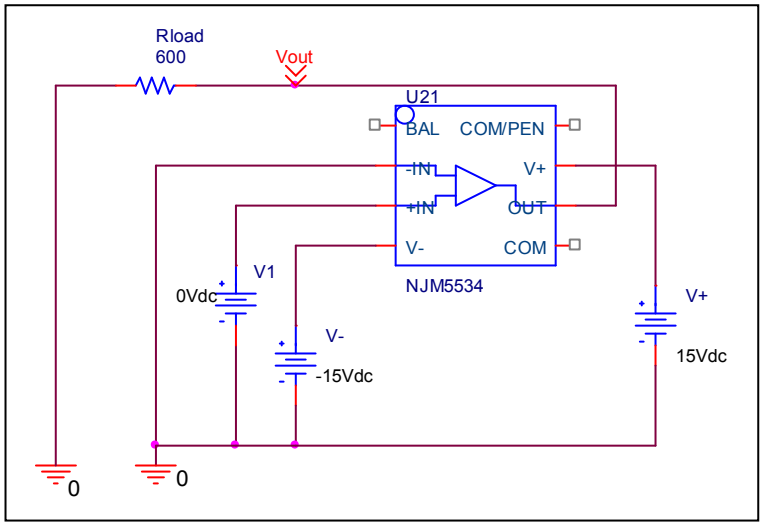

Output Voltage Swing

Simulation result



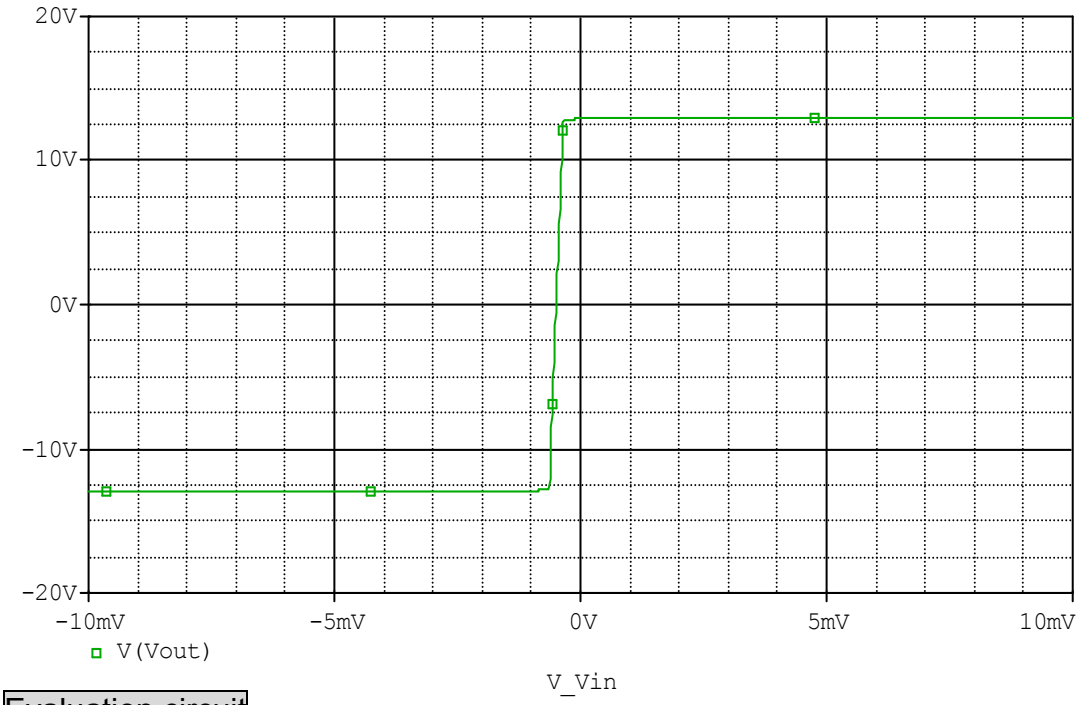
Evaluation circuit



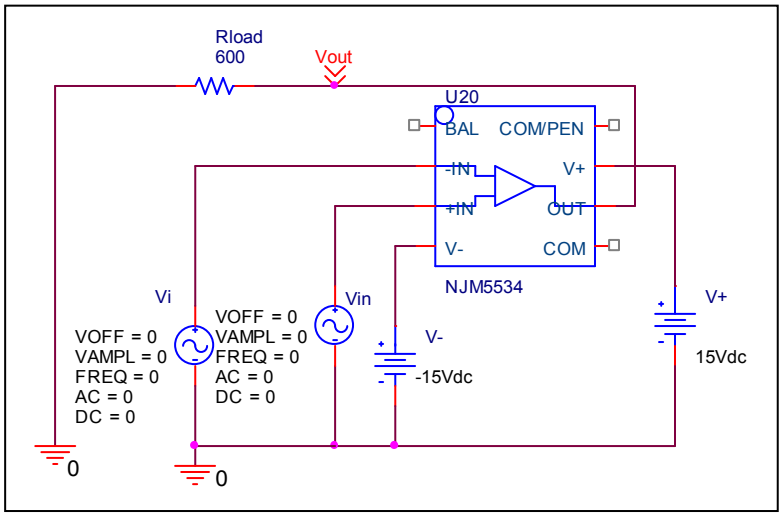
Output Voltage Swing	Measurement	Simulation	%Error
+Vout(V)	13	12.994	-0.046
-Vout(V)	13	12.994	-0.046

Input Offset Voltage

Simulation result



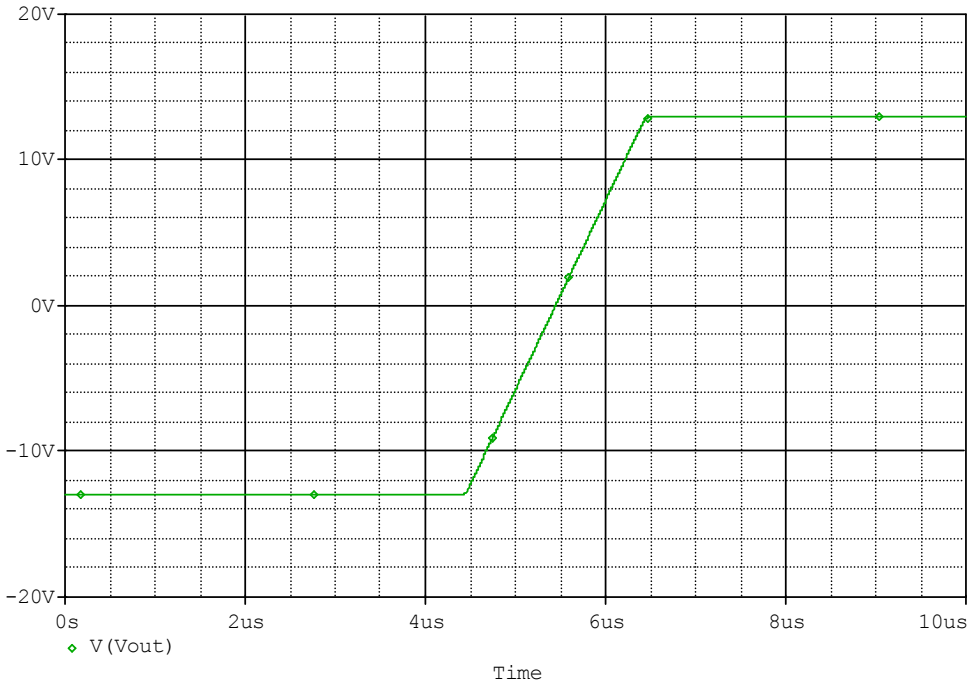
Evaluation circuit



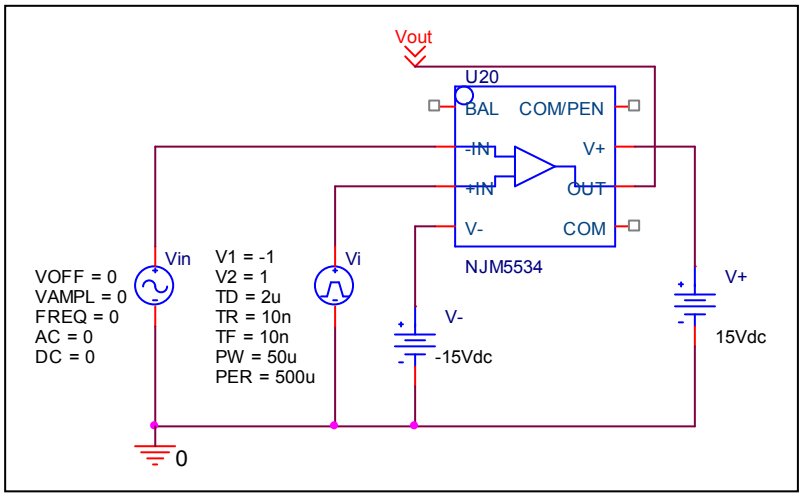
Vos(mA)	Measurement	Simulation	Error
	0.5	0.5	0

Slew Rate

Simulation result



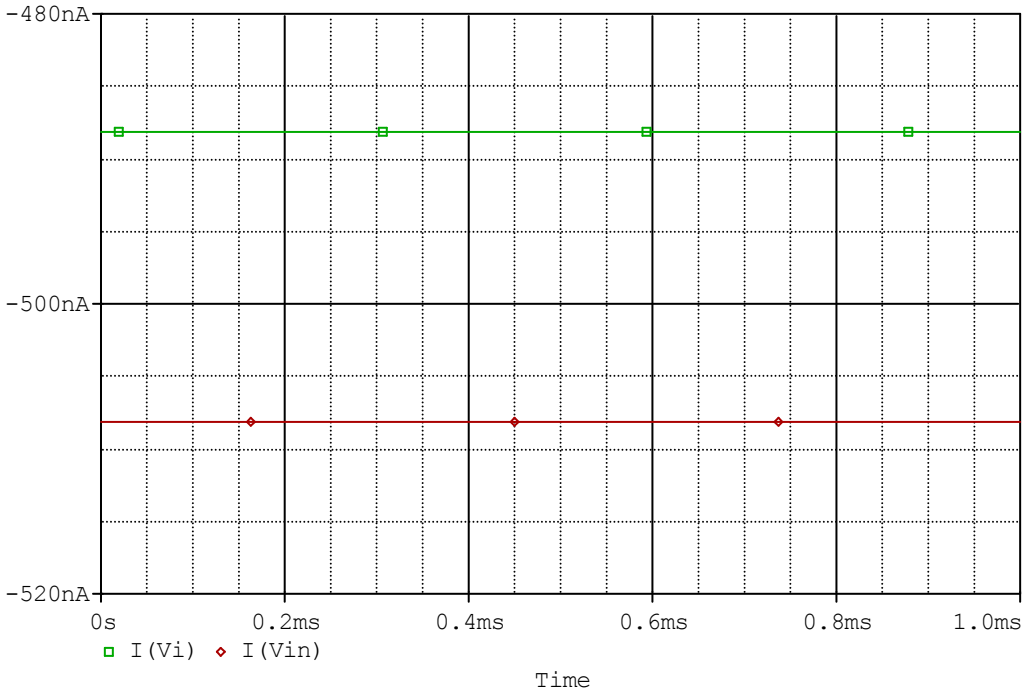
Evaluation circuit



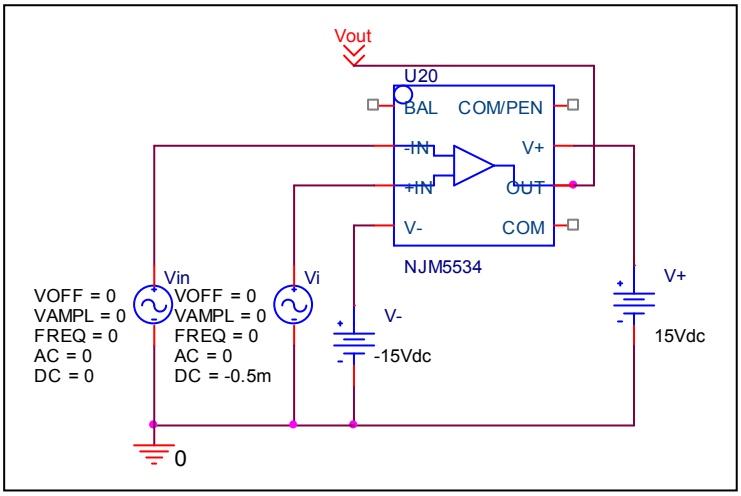
Slew Rate(v/us)	Measurement	Simulation	%Error
	13	13.137	1.054

Input current

Simulation result



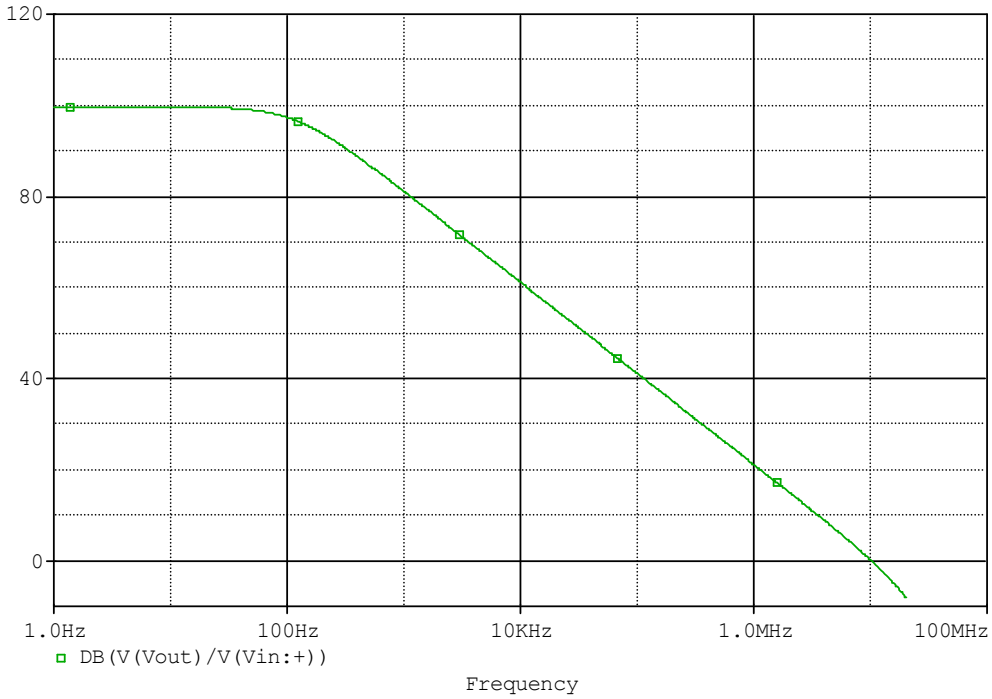
Evaluation circuit



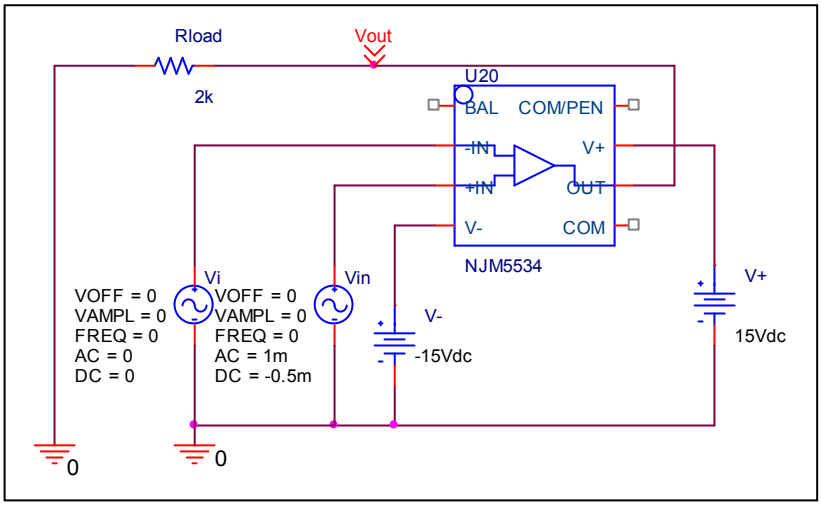
	Measurement	Simulation	%Error
Ib(nA)	500	499.47	0.106
Ibos(nA)	20	19.966	0.17

Open Loop Voltage Gain vs. Frequency

Simulation result



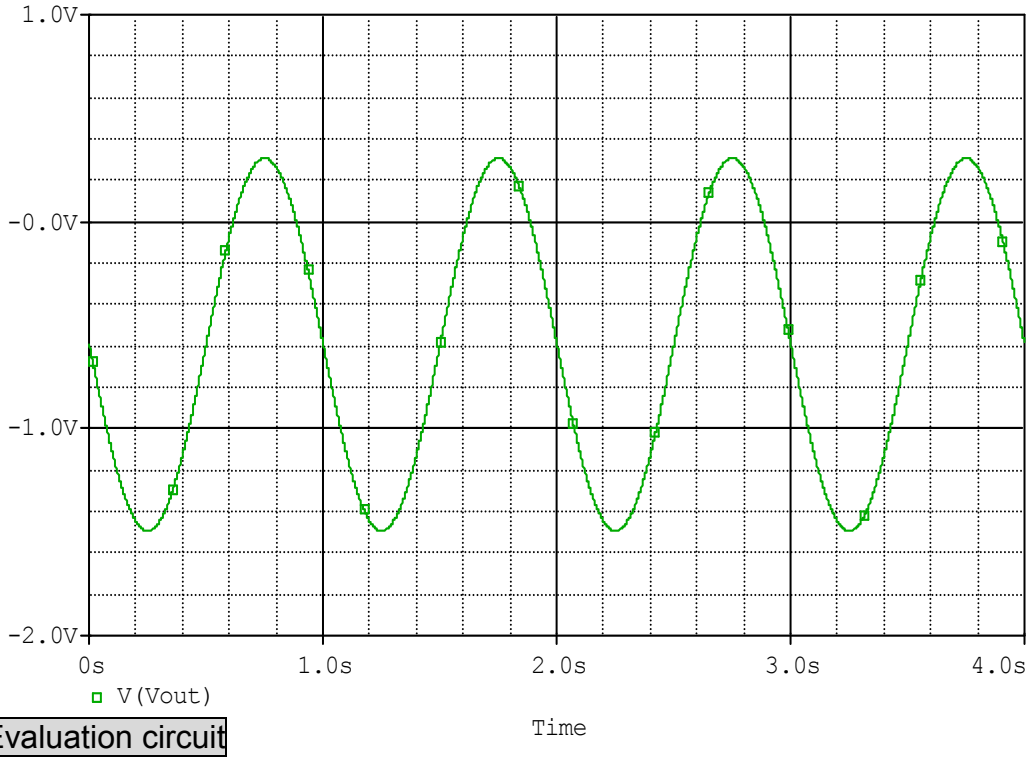
Evaluation circuit



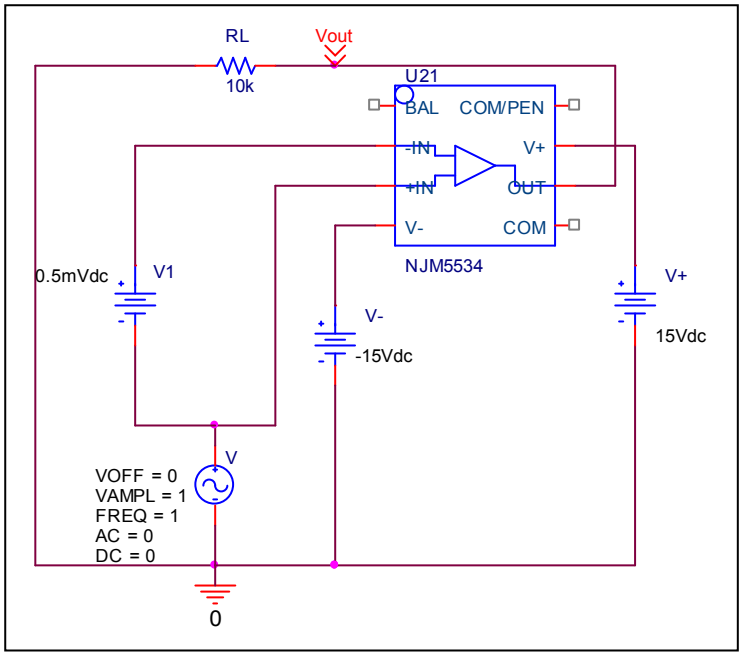
	Measurement	Simulation	%Error
f-0dB(MHz)	10.000	10.471	4.710
Av-dc	100.000	99.649	-0.351

Common-Mode Rejection Voltage gain

Simulation result



Evaluation circuit

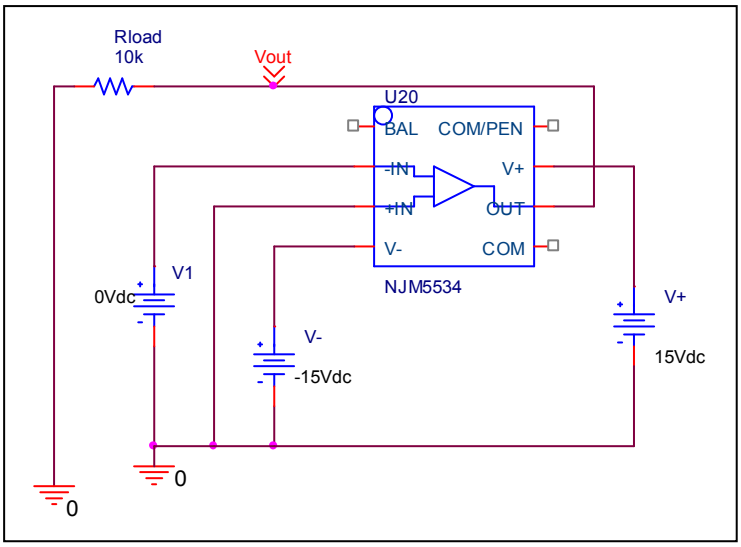


Common Mode Reject Ratio=96039.524/0.895=107306.731

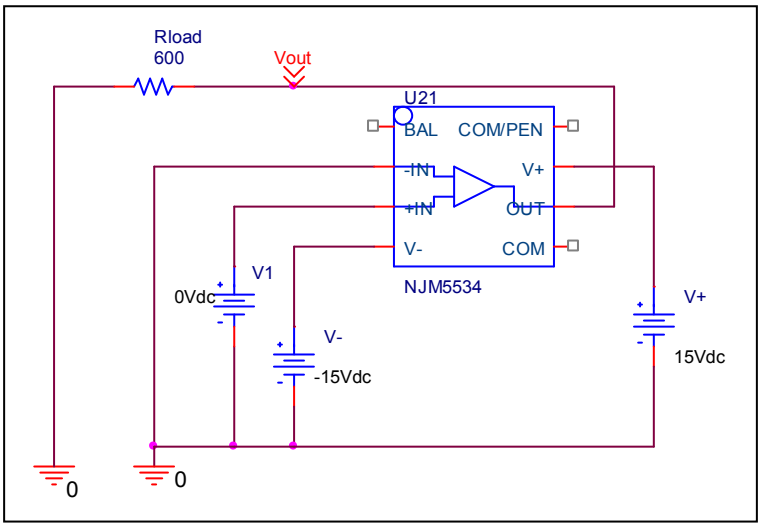
CMRR	Measurement	Simulation	%Error
	100	100.612	0.612

Remark Output Voltage Swing

Before

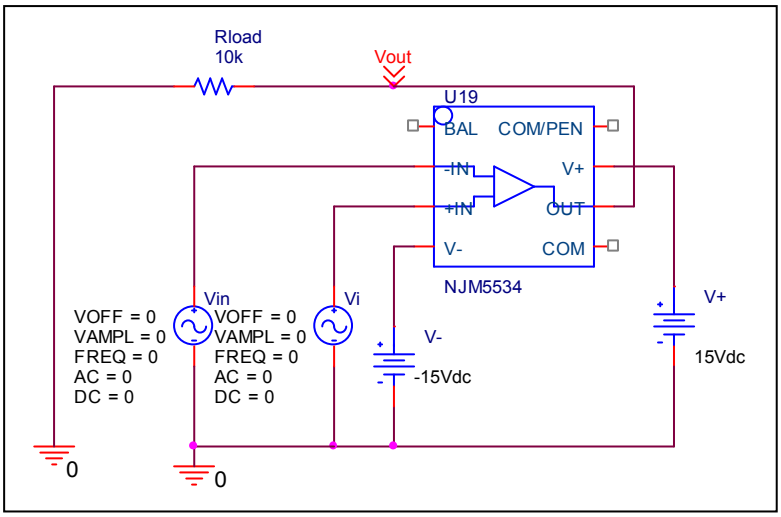


After

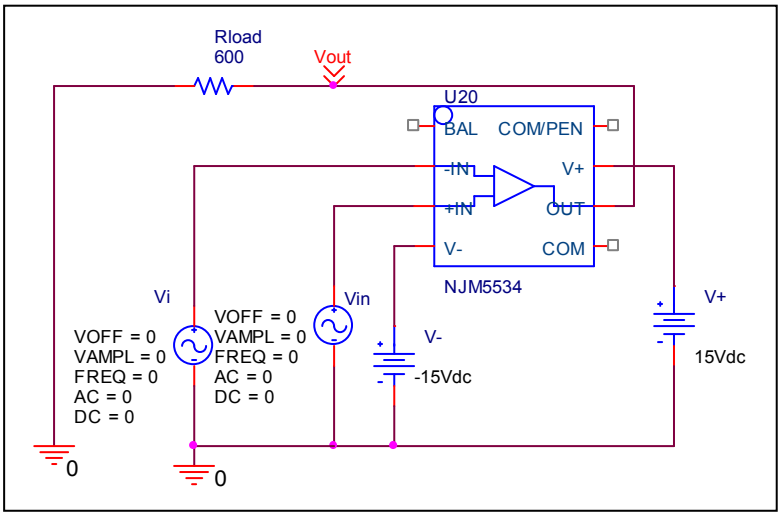


Remark Offset Voltage

Before

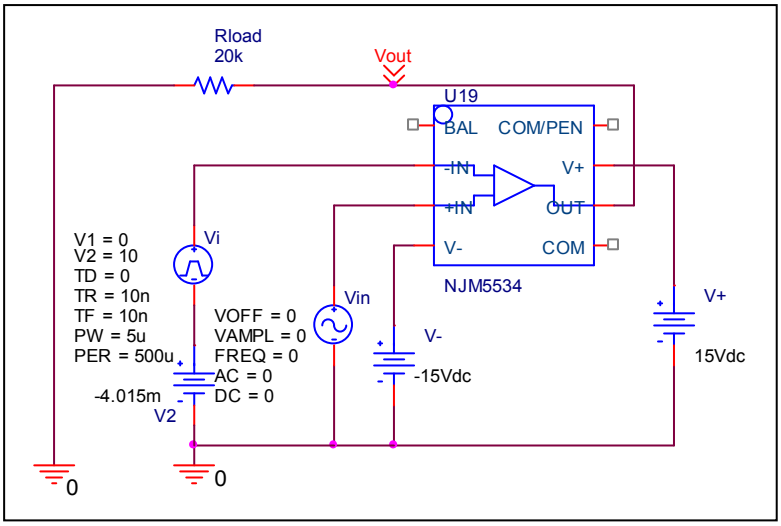


After

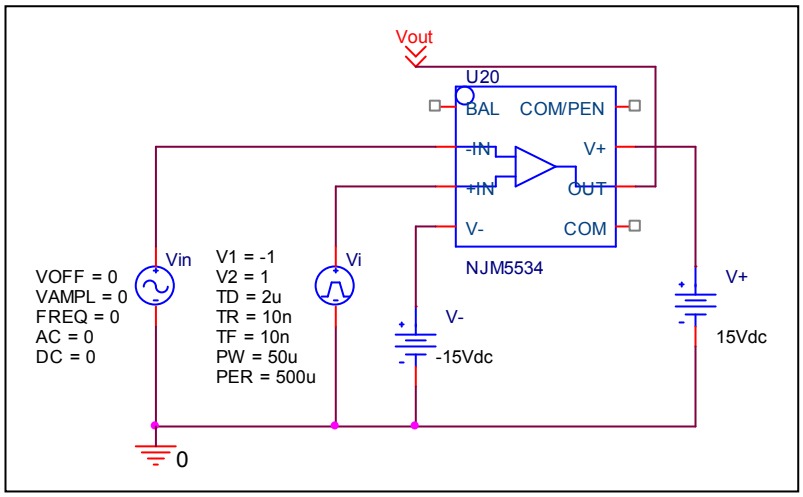


Remark Slew Rate

Before

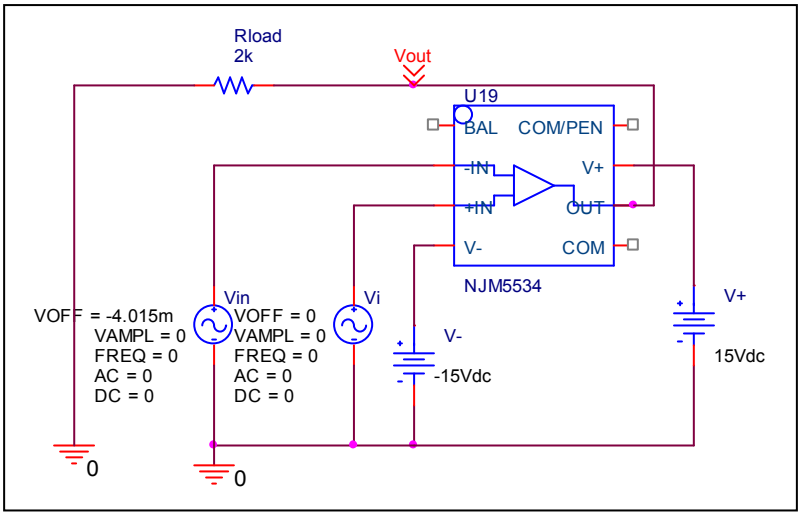


After

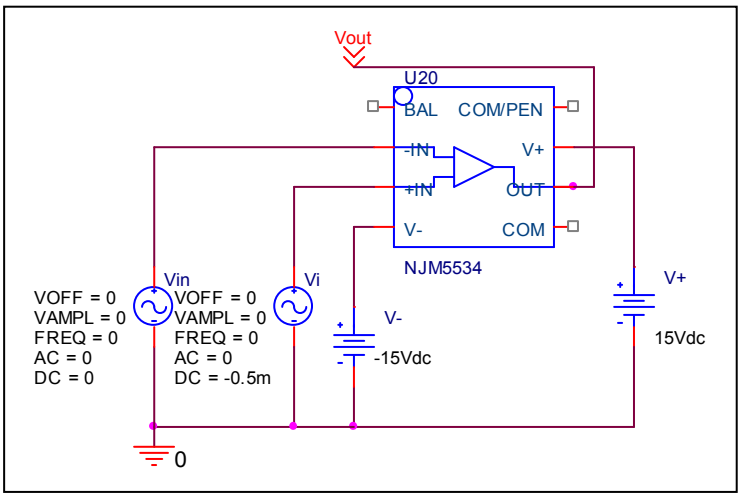


Remark Input current

Before

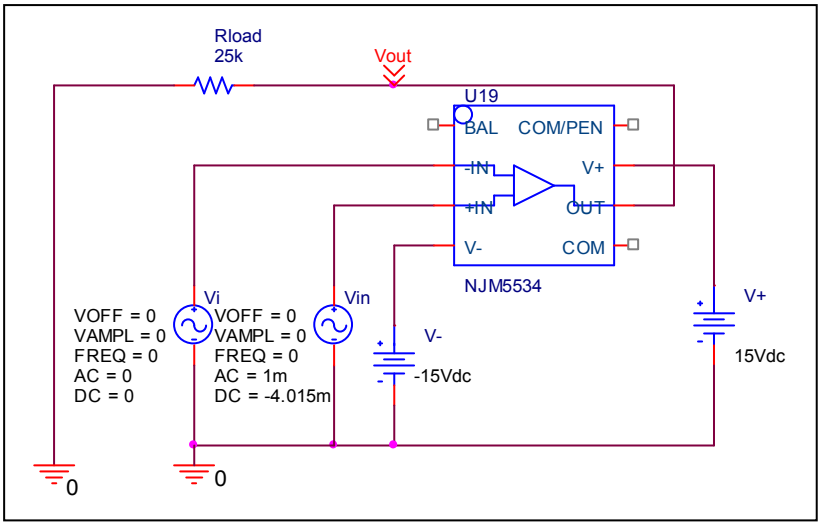


After

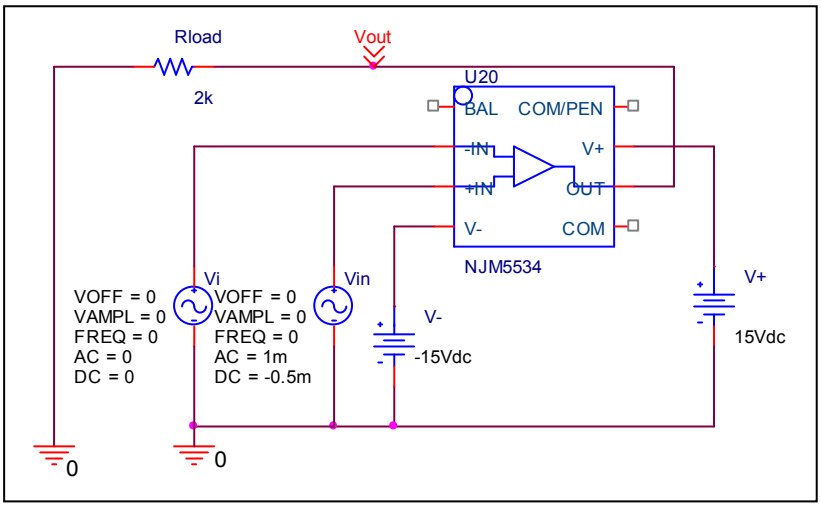


Remark Open Loop Voltage Gain vs. Frequency

Before

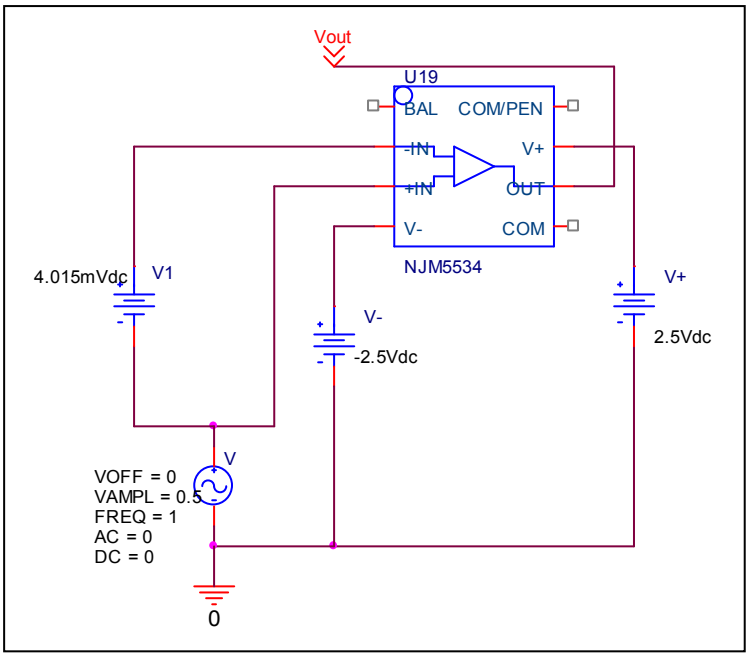


After



Remark Common-Mode Rejection Voltage gain

Before



After