Device Modeling Report
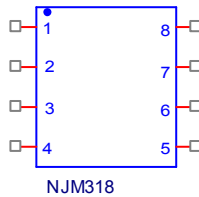
COMPONENTS:MOSFET: OPERATIONAL AMPLIFIER
PART NUMBER:NJM318
MANUFACTURER: NEW JAPAN RADIO CO.,LTD

Bee Technologies Inc.

Spice Model

NJM318

```
*$
* PART NUMBER: NJM318
* MANUFACTURER: NEW JAPAN RADIO
* All Rights Reserved Copyright (c) Bee Technologies Inc. 2007
.Subckt NJM318 BAL1 -IN +IN V- BAL2 OUT V+ COMP2
X_U1   +IN -IN V+ V- OUT NJM318_ME
.ends  NJM318
.subckt NJM318_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 2.4907E6 -1E3 1E3 2E6 -2E6
  ga    6  0 11 12 3.2044E-3
  gcm   0  6 10 99 32.044E-9
  iee  10  4 dc 1.9803E-3
  hlim 90  0 vlim 1K
  q1   11  2 13 qx1
  q2   12  1 14 qx2
  r2    6  9 100.00E3
  rc1   3 11 312.07
  rc2   3 12 312.07
  re1  13 10 285.90
  re2  14 10 285.90
  ree  10 99 100.99E3
  ro1   8  5 50
  ro2   7 99 25
  rp    3  4 2.0427E3
  vb    9  0 dc 0
  vc    3 53 dc 2.7979
  ve   54  4 dc 2.7979
  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=5.8929E3)
.model qx2 NPN(Is=933.8032E-18 Bf=7.2881E3)
.ends
*$
```
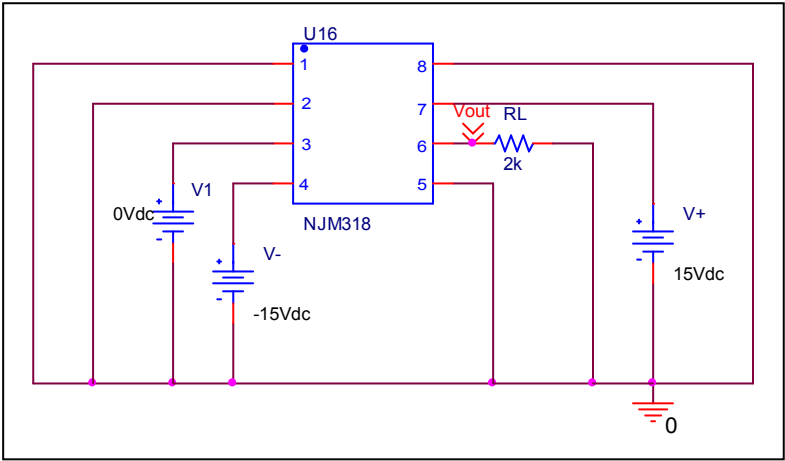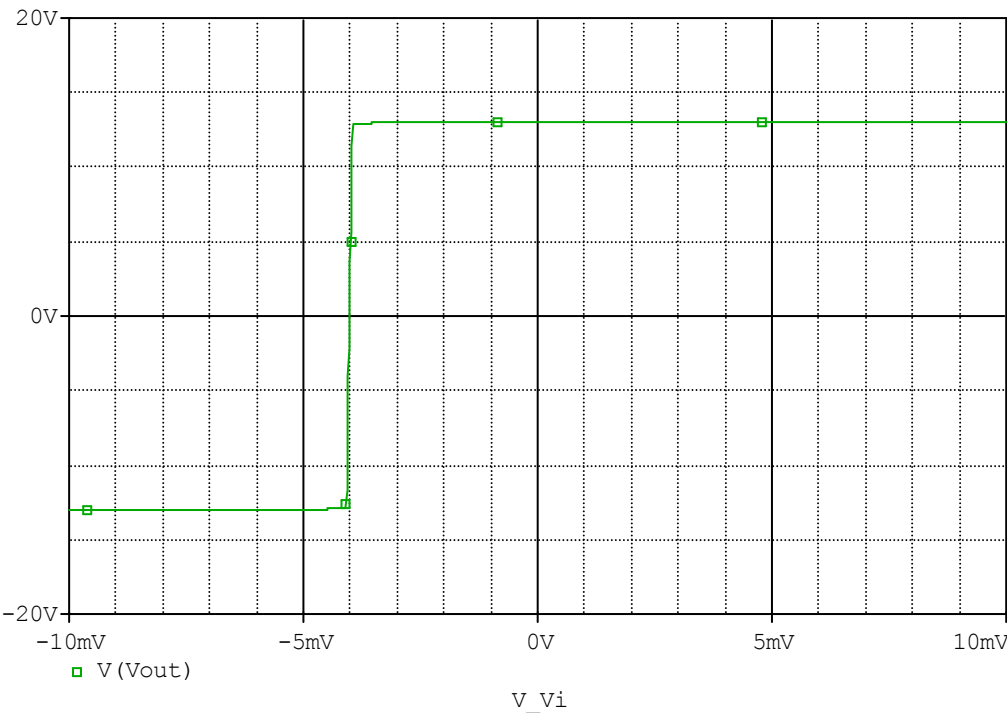
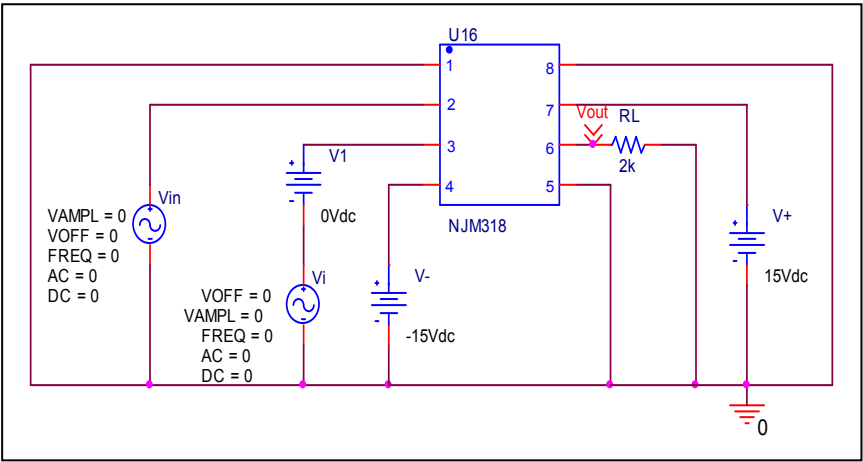# Output Voltage Swing

□ V(Vout)

V_V1
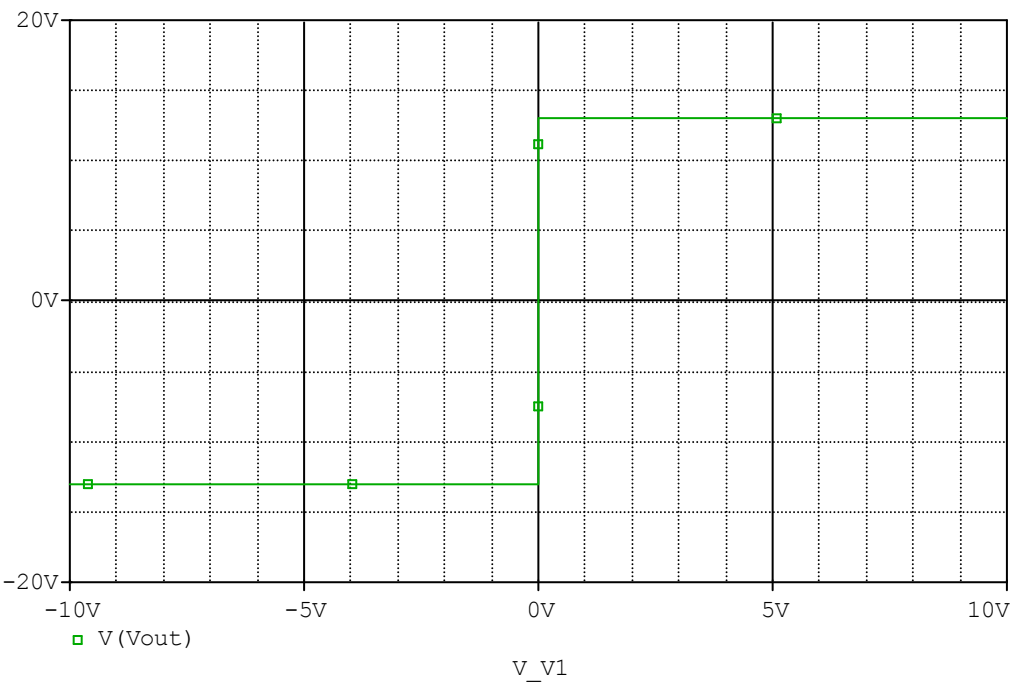
Evaluation circuit

Output Voltage Swing	Measurement	Simulation	%Error
+Vout(V)	13.000	12.991	-0.069
-Vout(V)	13.000	12.991	-0.069

Input Offset Voltage

V_Vi

Vos	Measurement		Simulation		Error	
	4.000	mV	4.019	mV	0.475	%

Slew Rate

V(Vout)

Time
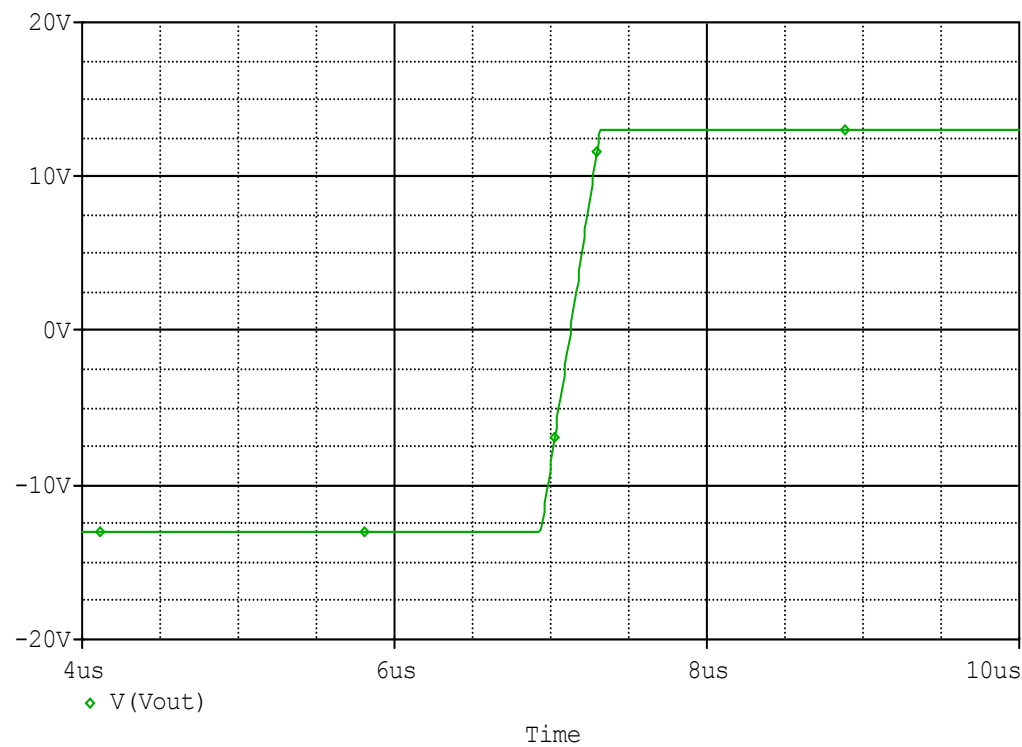
Evaluation circuit

Slew Rate(v/us)	Measurement	Simulation	%Error
	70.000	67.450	-3.643

Input current Ib, Ibos

	Measurement	Simulation	%Error
Ib(nA)	150.000	151.039	0.693
Ibos(nA)	30.000	30.030	0.100

Open Loop Voltage Gain vs. Frequency , Av-dc, f-0dB
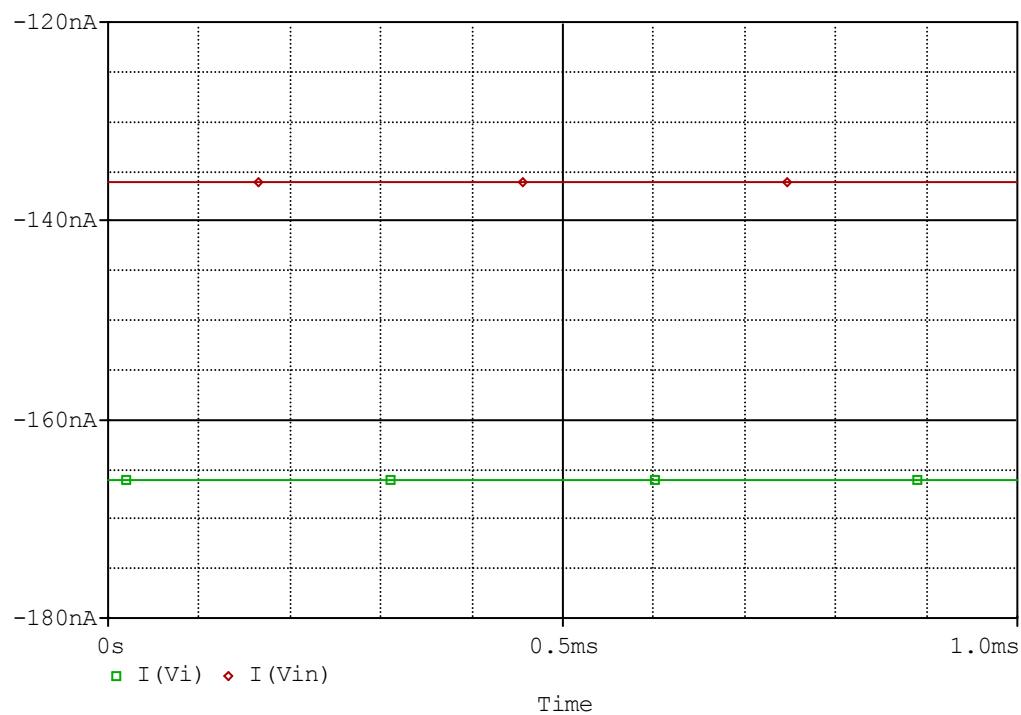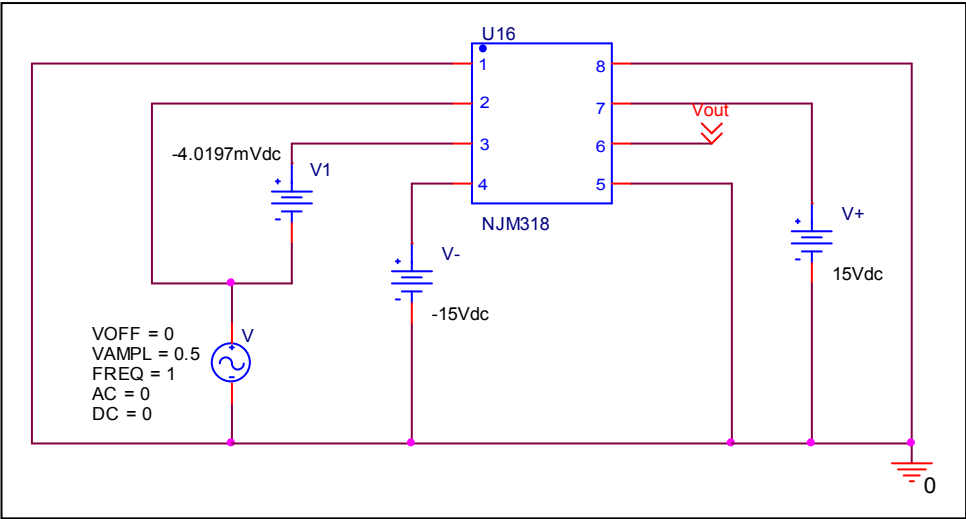
Simulation result
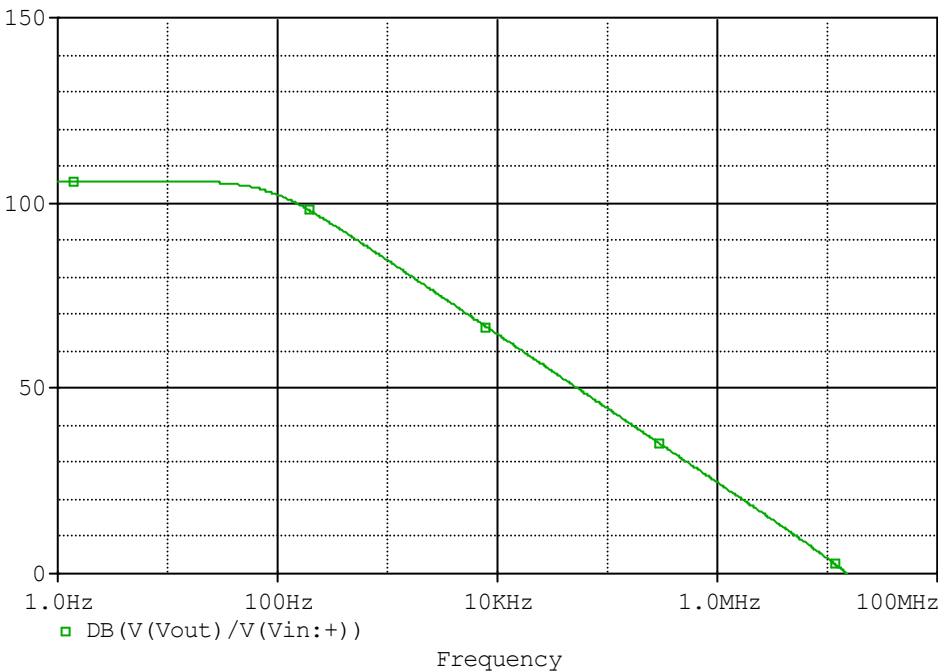
Evaluation circuit
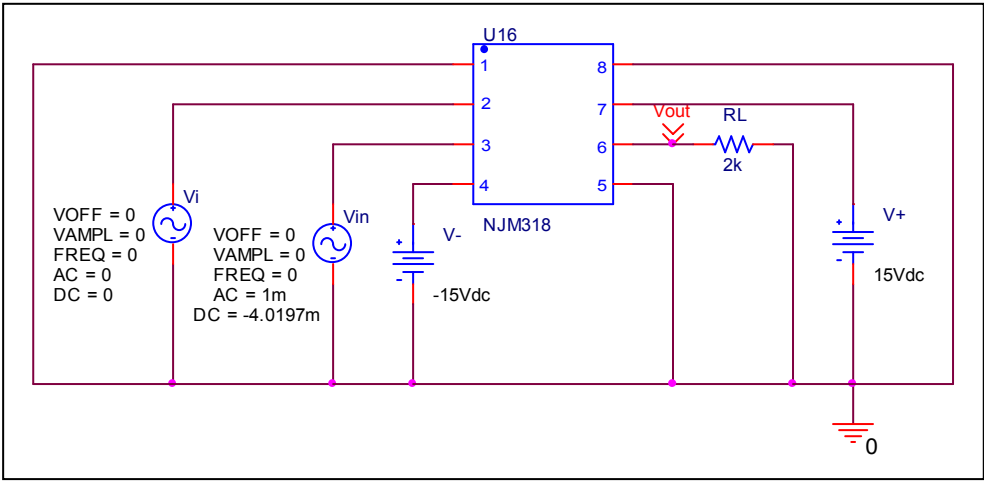
	Measurement	Simulation	%Error
f-0dB(MHz)	15.000	14.777	-1.487
Av-dc(dB)	106.000	105.676	-0.306

Common-Mode Rejection Voltage gain

Simulation result


```
V(Vout)
```

Time
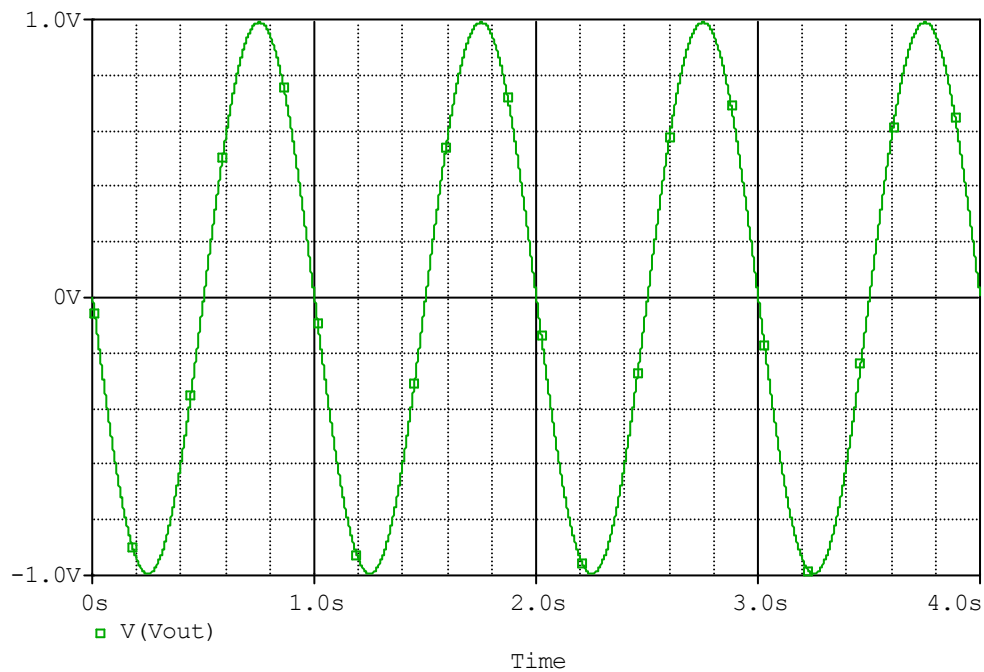
Evaluation circuit

Common Mode Reject Ratio=199,434/1.9837 =100,536

CMRR (dB)	Measurement	Simulation	%Error
	100.000	100.046	0.046

Remark   Output Voltage Swing

Before
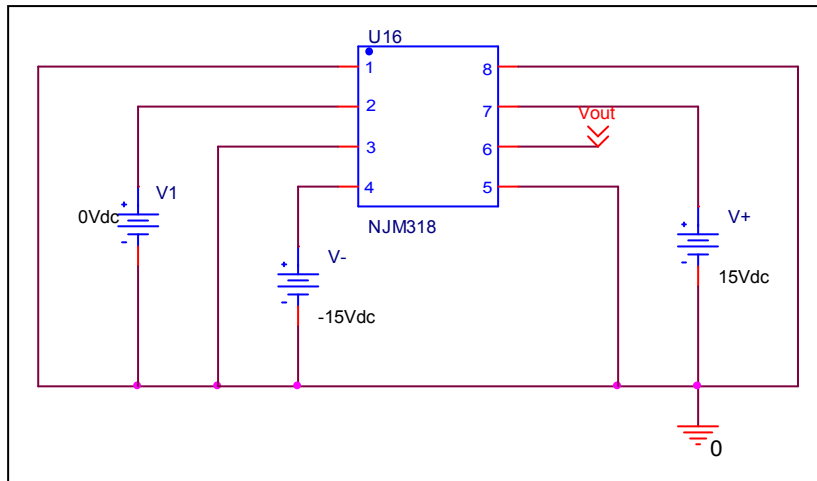
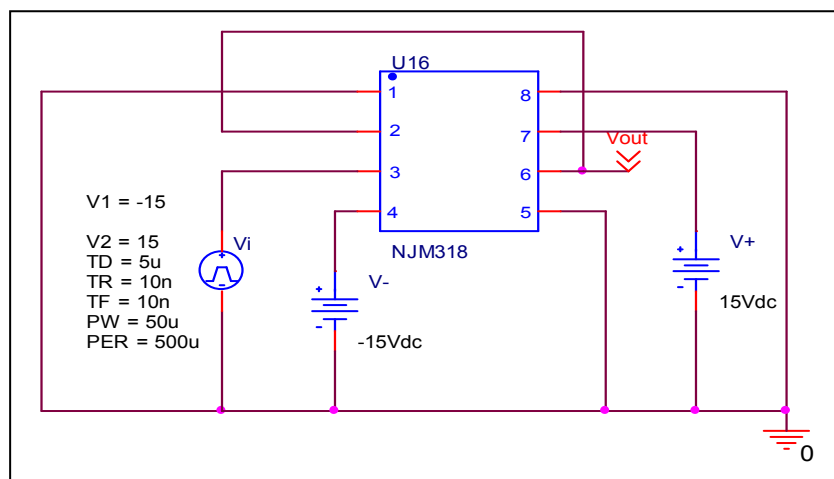

After
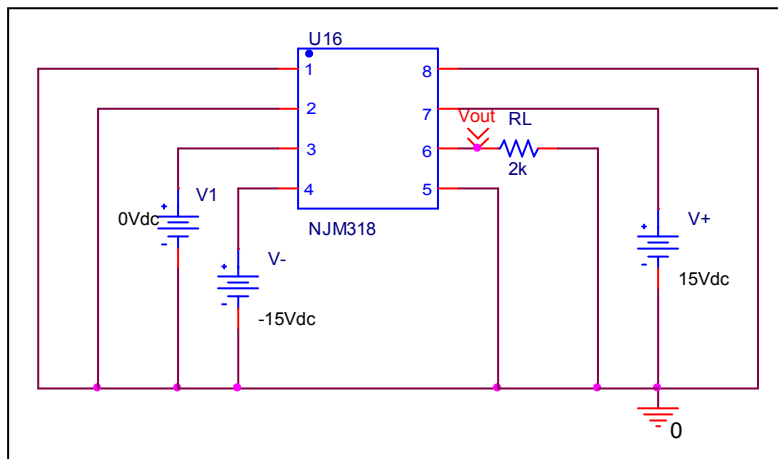
Remark   Input Offset Voltage

Before
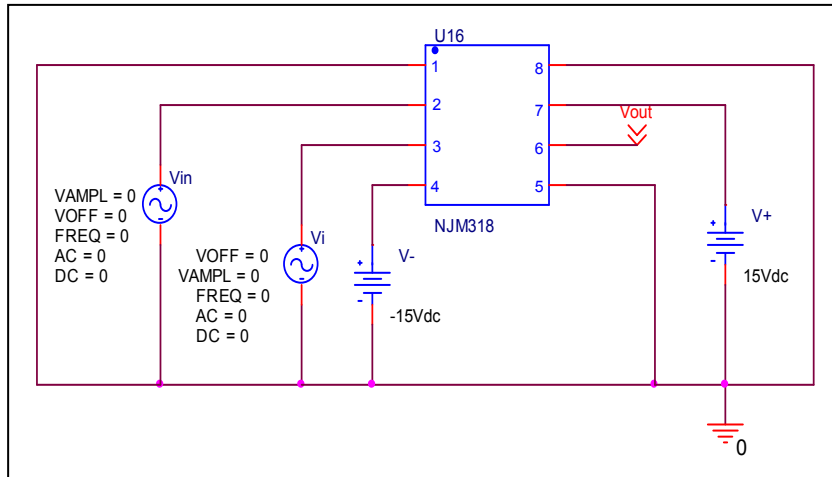
After

Remark   Slew Rate

Before

VOFF = 0
VAMPL = 0
FREQ = 0
AC = 0
DC = 0

Vin

V1 = 0
V2 = 14
TD = 0
TR = 10n
TF = 10n
PW = 5u
PER = 500u

Vi

U16

Vout

NJM318

V-

-15Vdc

V+

15Vdc

-4.0197m

V2

0

After

V1 = -15

V2 = 15
TD = 5u
TR = 10n
TF = 10n
PW = 50u
PER = 500u

Vi

U16

Vout

NJM318

V-

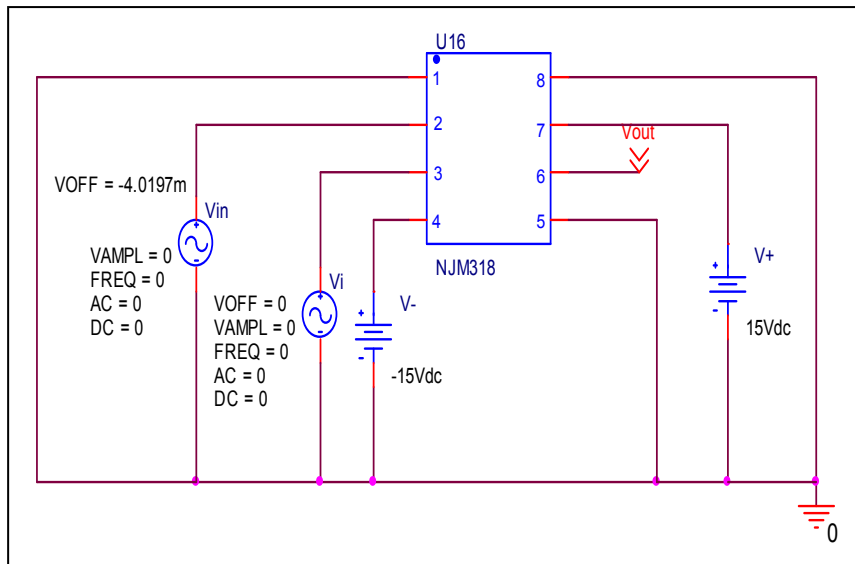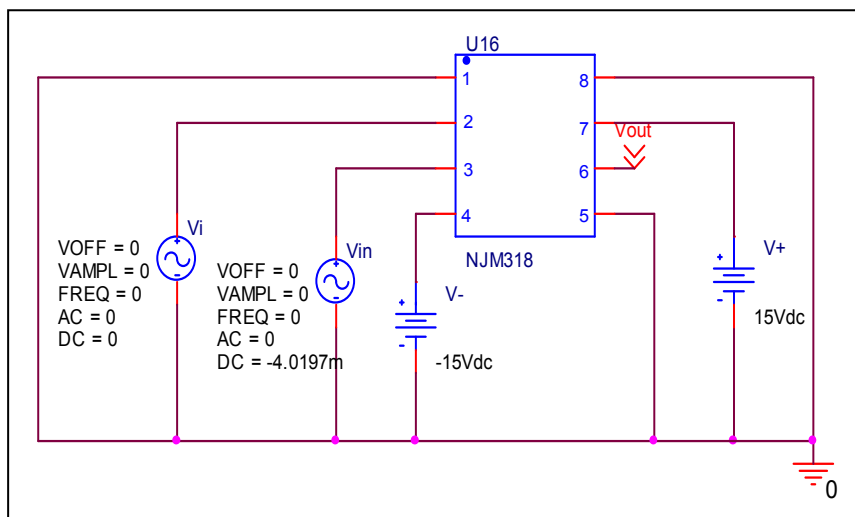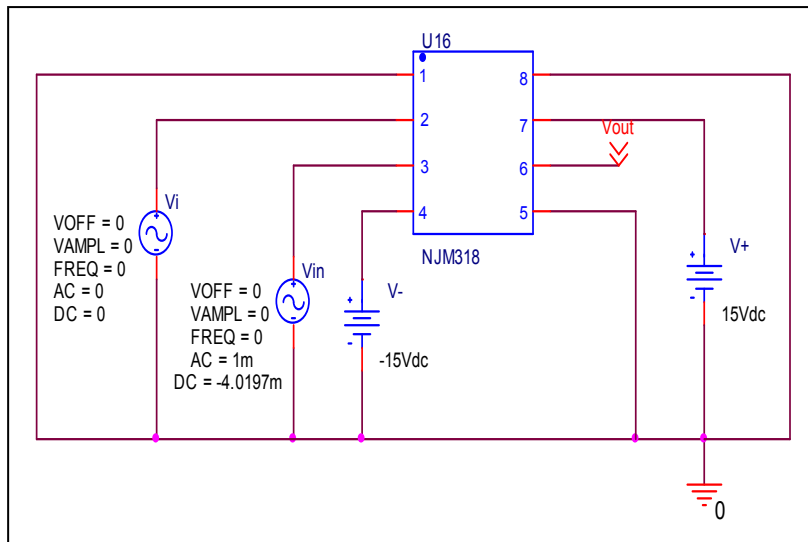-15Vdc

V+

15Vdc

0
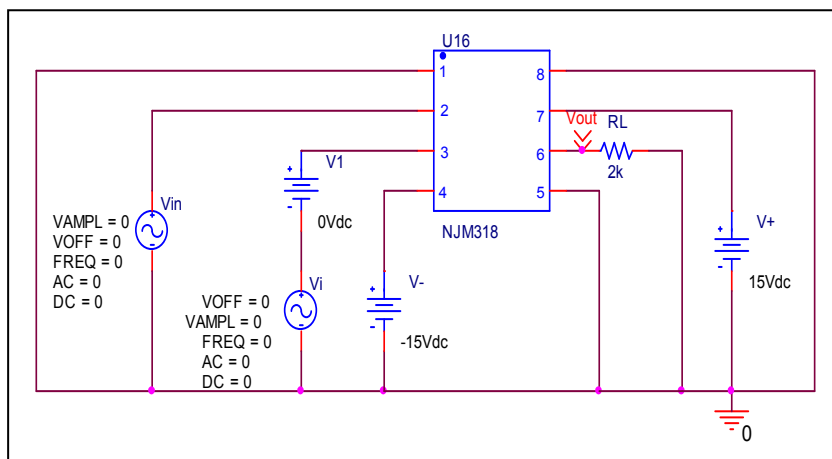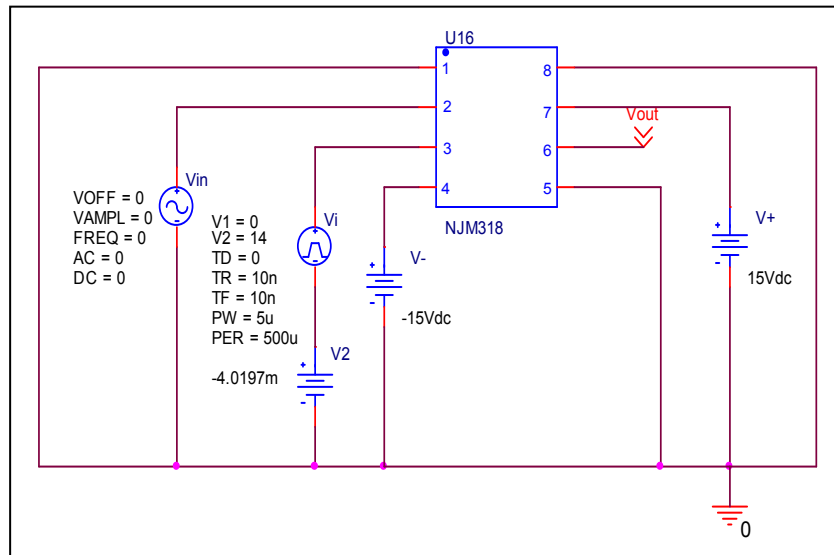
Remark   Input current

Before

After

Remark   Open Loop Voltage Gain vs. Frequency

Before

U16

VOFF = 0
VAMPL = 0
FREQ = 0
AC = 0
DC = 0

Vi

VOFF = 0
VAMPL = 0
FREQ = 0
AC = 1m
DC = -4.0197m

Vin

V-

-15Vdc

NJM318

Vout

V+

15Vdc

0

After

U16

VOFF = 0
VAMPL = 0
FREQ = 0
AC = 0
DC = 0

Vi

VOFF = 0
VAMPL = 0
FREQ = 0
AC = 1m
DC = -4.0197m

Vin

Vout   RL

2k

NJM318

V-

-15Vdc

V+

15Vdc

0