Device Modeling Report
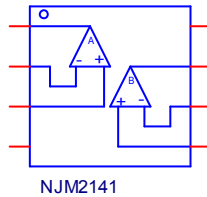
COMPONENTS:OPERATIONAL AMPLIFIER
PART NUMBER:NJM2141
MANUFACTURER: NEW JAPAN RADIO CO.,LTD

Bee Technologies Inc.

Spice Model

NJM2141

```
*$
* PART NUMBER: NJM2141
* MANUFACTURER: NEW JAPAN RADIO
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.Subckt NJM2141 OUT1 -IN1 +IN1 V- +IN2 -IN2 OUT2 V+
X_U1    +IN1 -IN1 V+ V- OUT1 NJM2141_ME
X_U2    +IN2 -IN2 V+ V- OUT2 NJM2141_ME
.ends  NJM2141
.subckt NJM2141_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 2.3319E6 -1E3 1E3 2E6 -2E6
 ga    6  0 11 12 1.7153E-3
 gcm   0  6 10 99 54.242E-9
 iee   3 10 dc 100.66E-6
 hlim 90  0 vlim 1K
 q1   11  2 13 qx1
 q2   12  1 14 qx2
 r2    6  9 100.00E3
 rc1   4 11 582.99
 rc2   4 12 582.99
 re1  13 10 68.166
 re2  14 10 68.166
 ree  10 99 1.9869E6
 ro1   8  5 50
 ro2   7 99 25
 rp    3  4 1.0183E3
 vb    9  0 dc 0
 vc    3 53 dc 3.8991
 ve   54  4 dc 4.3991
 vlim  7  8 dc 0
 vlp  91  0 dc 1.0000E3
 vln   0 92 dc 1.0000E3
.model dx D(Is=800.00E-18)
.model dy D(Is=800.00E-18 Rs=1m Cjo=10p)
.model qx1 PNP(Is=800.00E-18 Bf=600.57)
.model qx2 PNP(Is=814.9854E-18 Bf=649.81)
.ends
*$
```
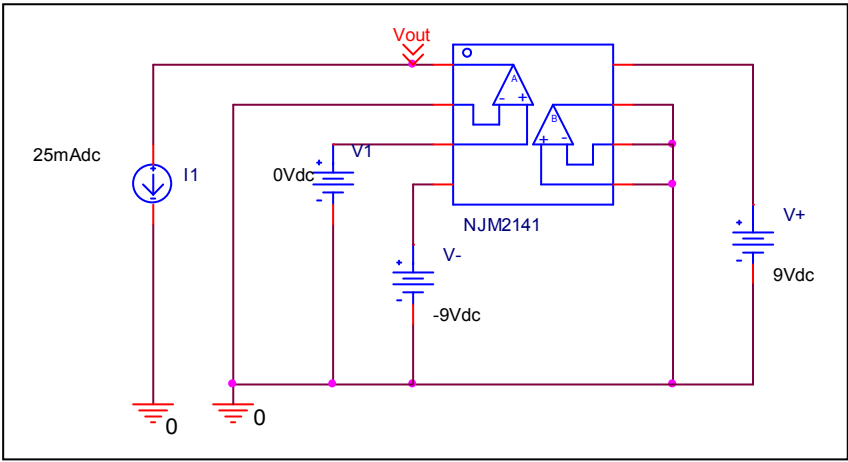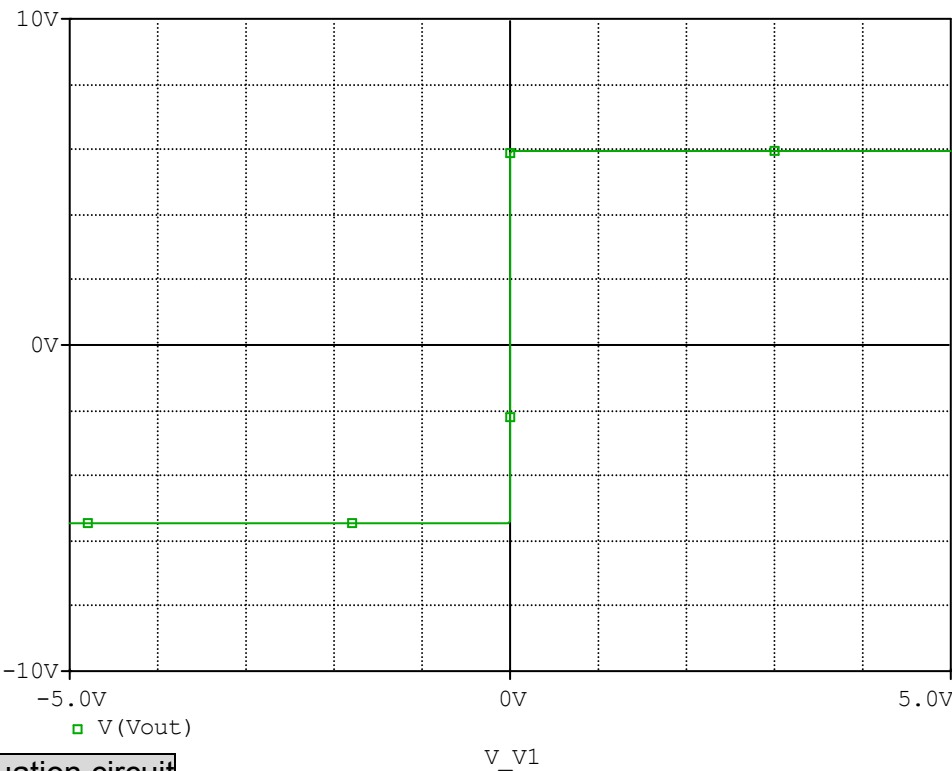
Output Voltage Swing,+Vout
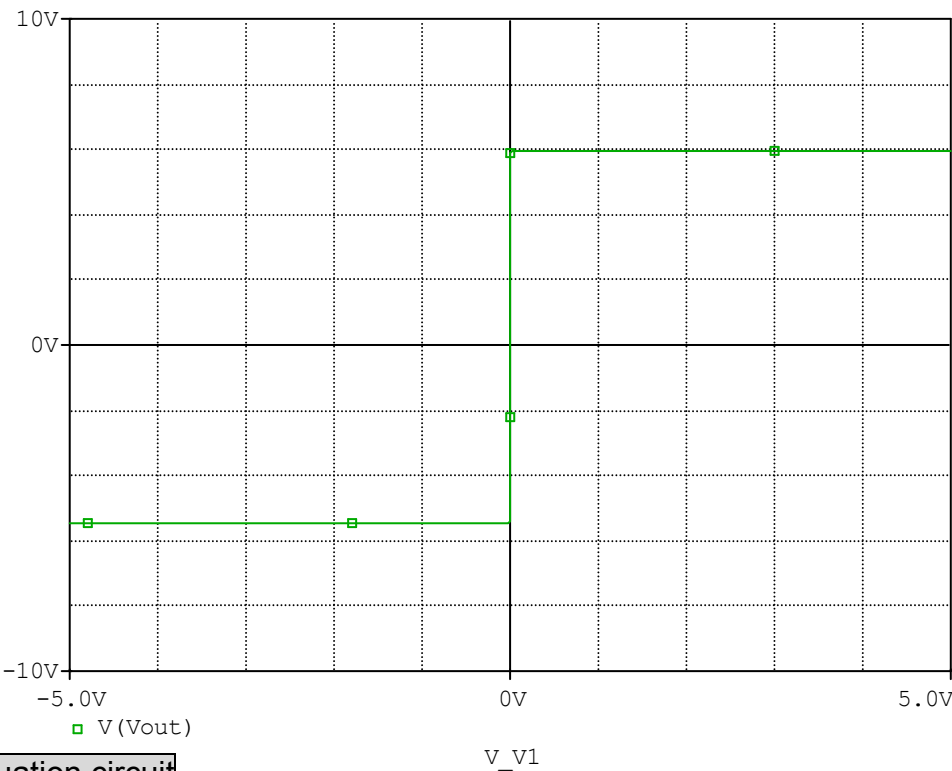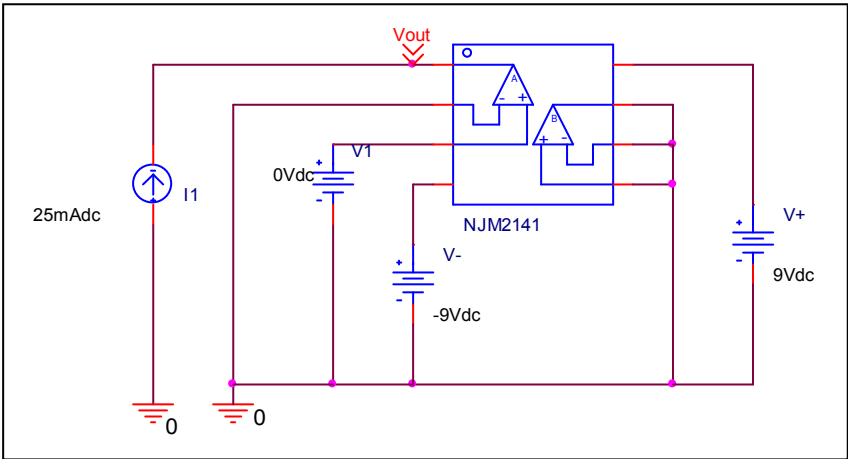
- □ V(Vout)

V_V1

Evaluation circuit

Output Voltage Swing	Measurement	Simulation	%Error
+Vout(V)	6.000	5.962	-0.633

Output Voltage Swing,-Vout

□ V(Vout)

V_V1

Evaluation circuit

Output Voltage Swing	Measurement	Simulation	%Error
-Vout(V)	5.5	5.463	-0.673

Input Offset Voltage

V(Vout)

V_Vi
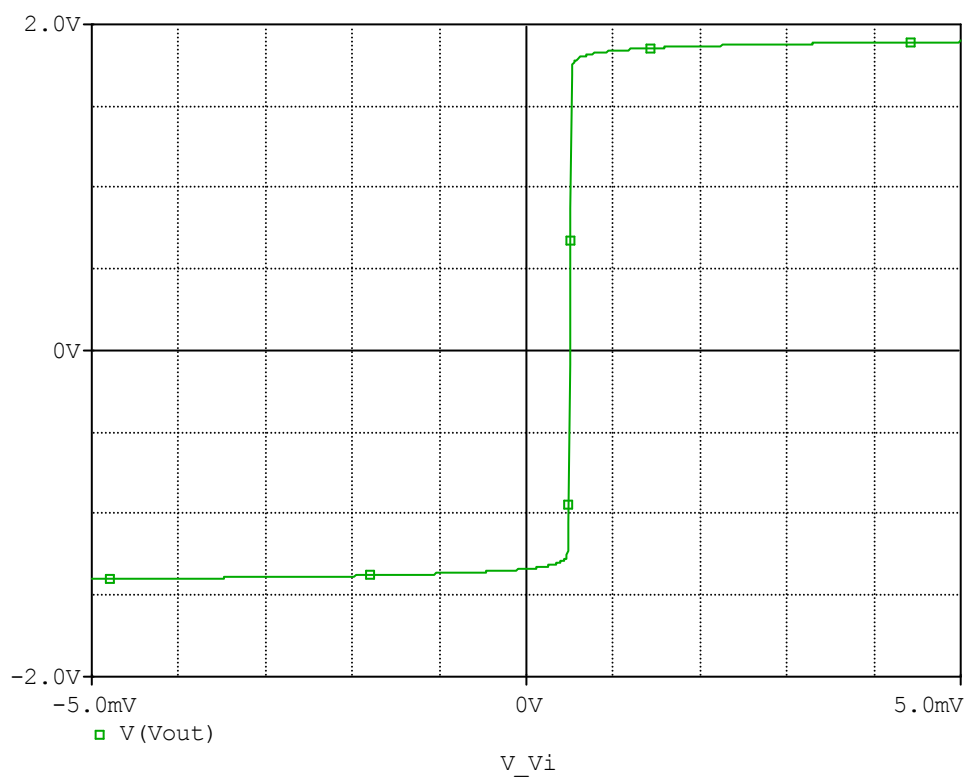
Evaluation circuit
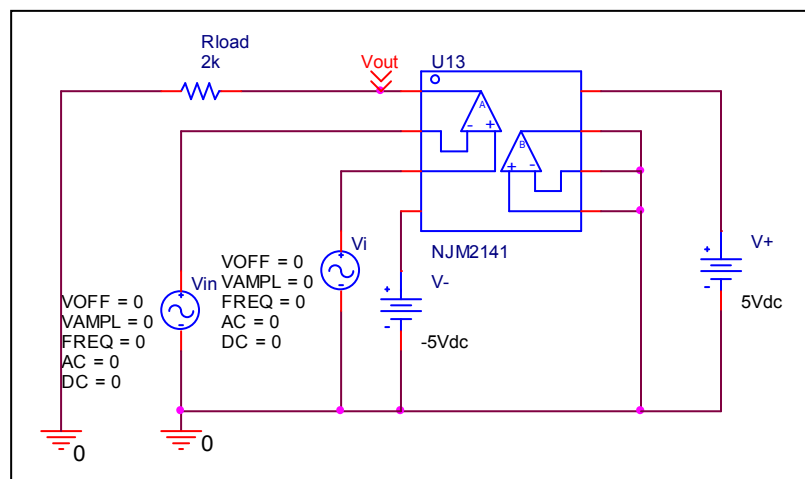
Vos(mV)	Measurement	Simulation	Error
	0.5	0.5	0

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Slew Rate

V(Vout)

Time

Evaluation circuit

	Vout	U18		

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

V1 = -1
V2 = 1
TD = 0
TR = 10n
TF = 10n
PW = 50u
PER = 500u

Vi

NJM2141

V-

-5Vdc

V+

5Vdc

0
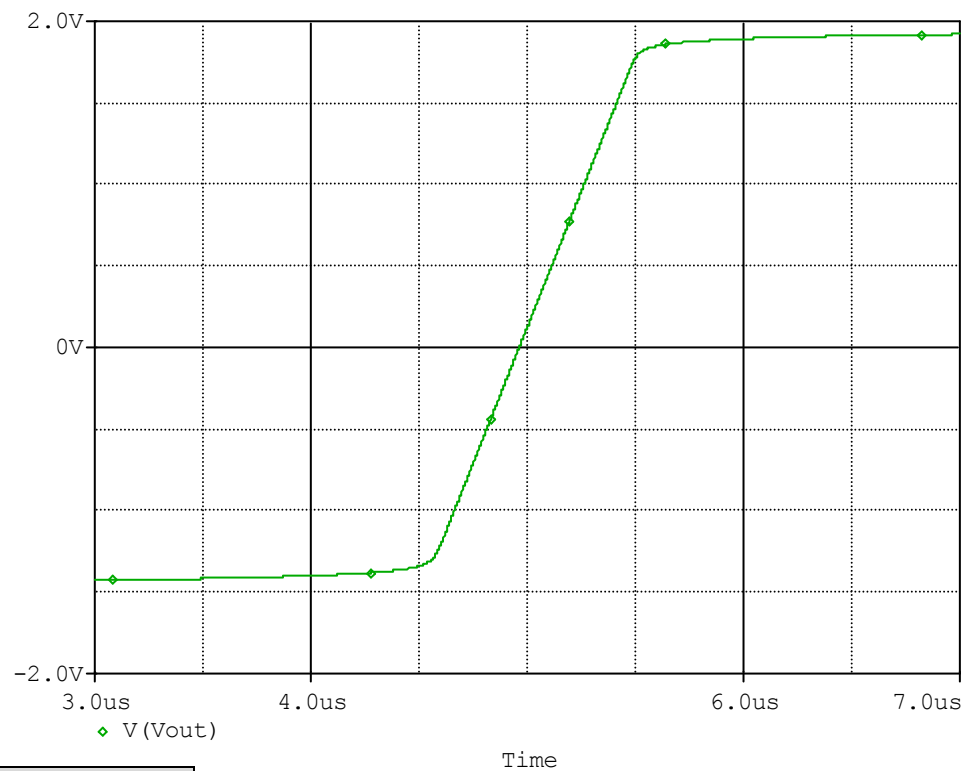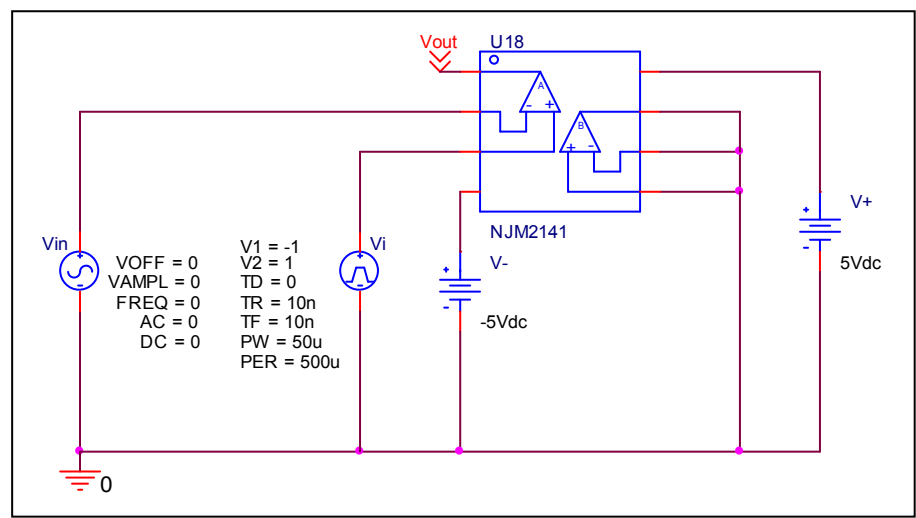
Slew Rate(v/us)	Measurement	Simulation	%Error
	3.000	3.139	4.633

Input current

- □ I(Vi) ◇ I(Vin)

Time
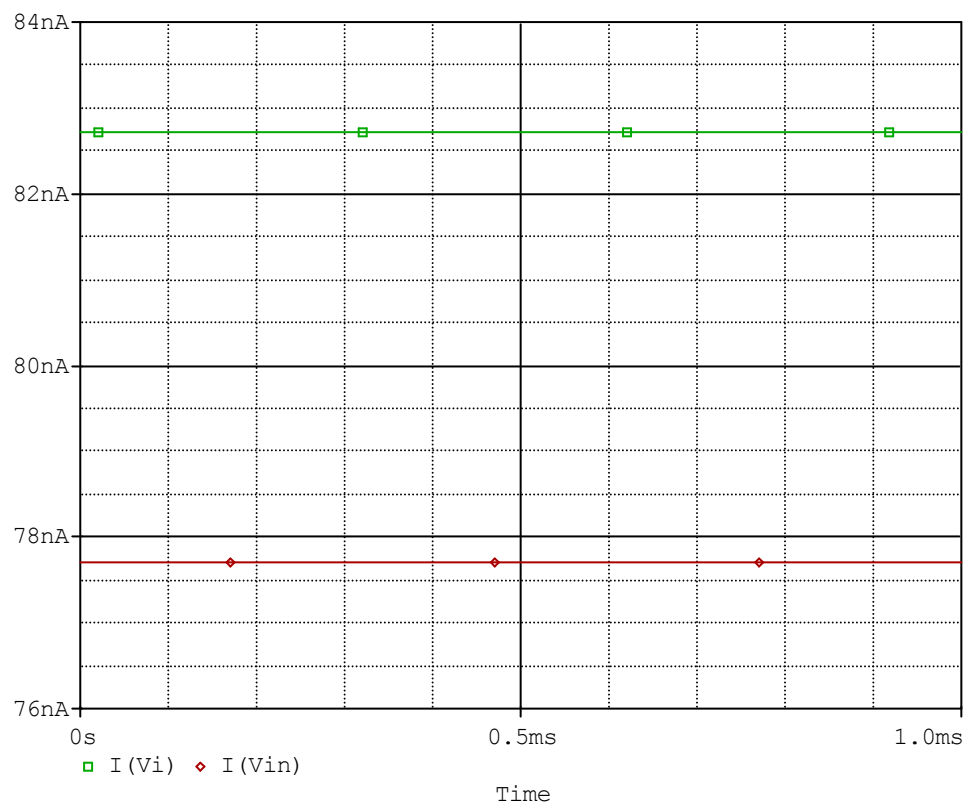
Evaluation circuit
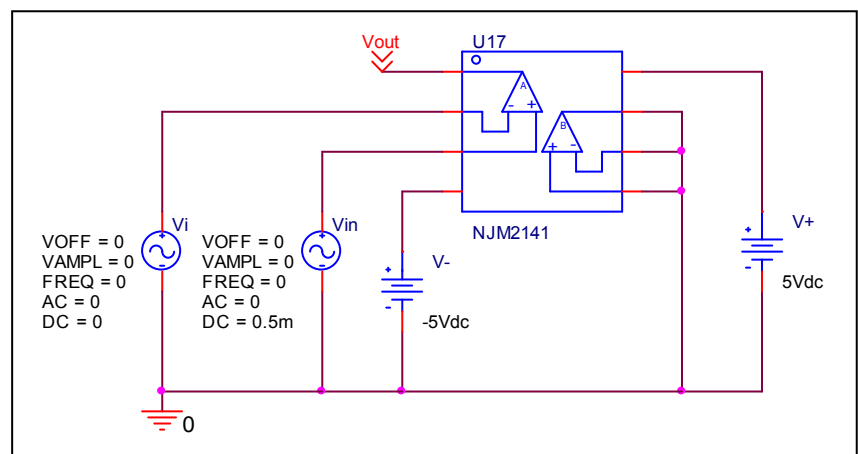
	Measurement	Simulation	%Error
Ib(nA)	80.000	80.208	0.260
Ibos(nA)	5.000	5.003	0.060

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Open Loop Voltage Gain vs. Frequency

DB(V(Vout)/V(Vin:+))

Frequency
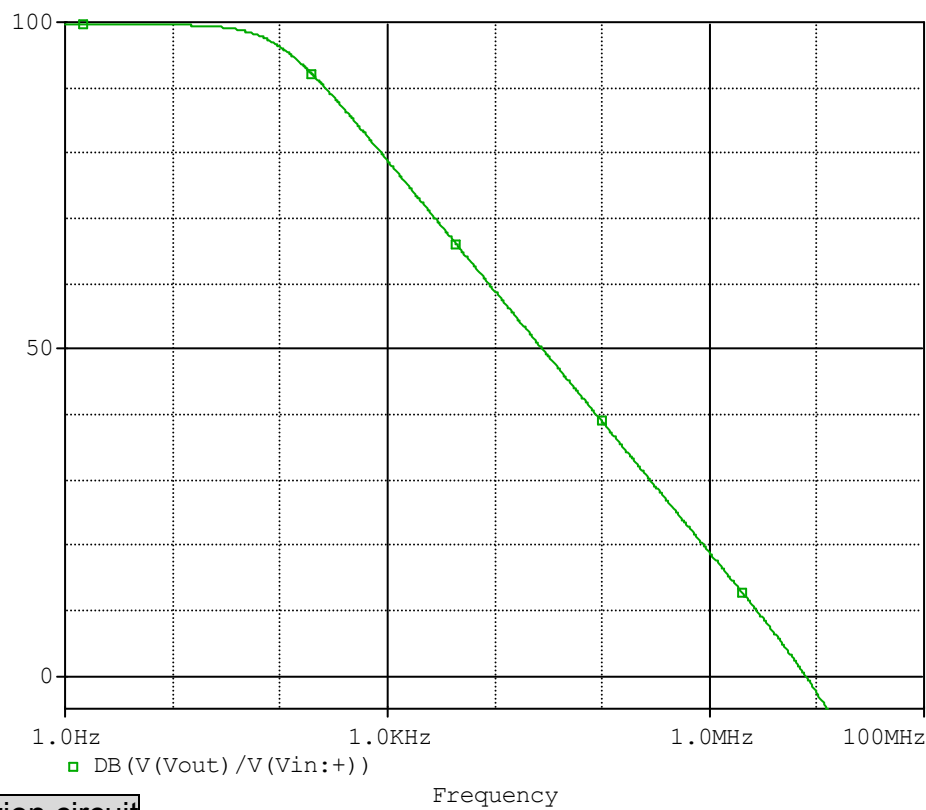
Evaluation circuit
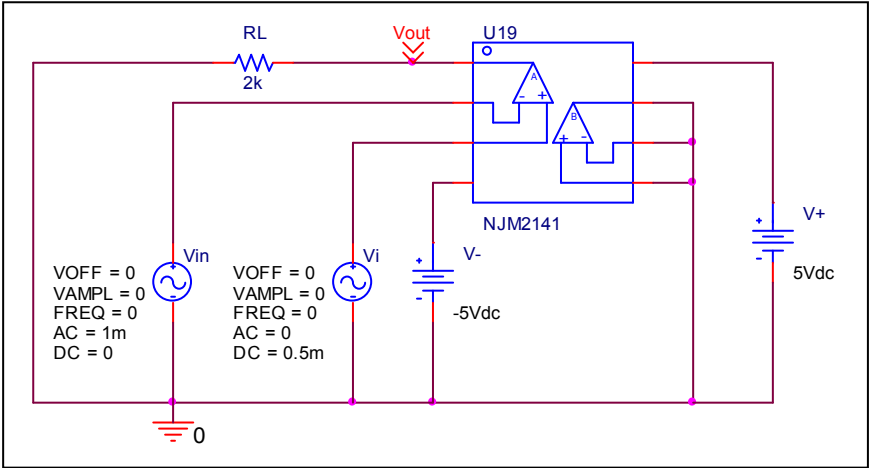
	Measurement	Simulation	%Error
f-0dB(MHz)	8.000	7.939	-0.762
Av-dc(dB)	100.000	99.610	-0.390

Common-Mode Rejection Voltage gain

V(Vout)

Time
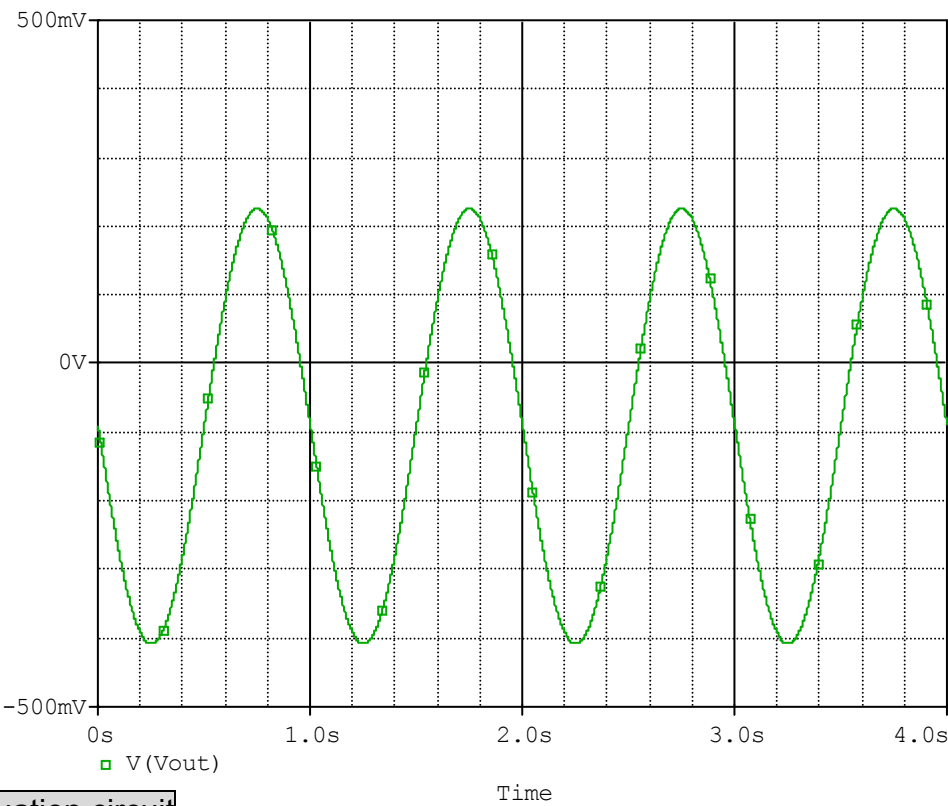
Evaluation circuit
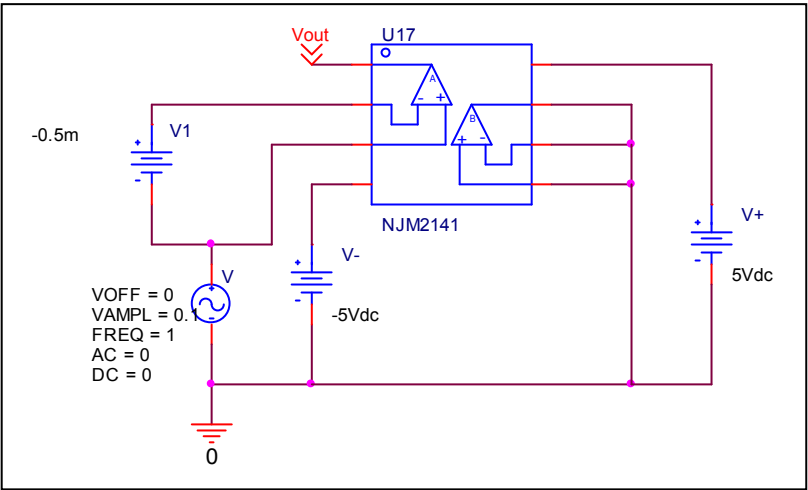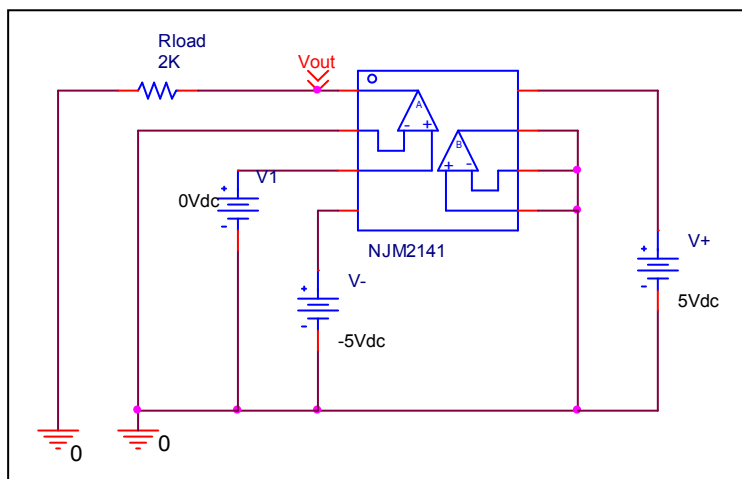

Common Mode Reject Ratio=95609/2.9671=32223

CMRR	Measurement	Simulation	%Error
	90.000	90.163	0.181

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Remark   Output Voltage Swing

Before
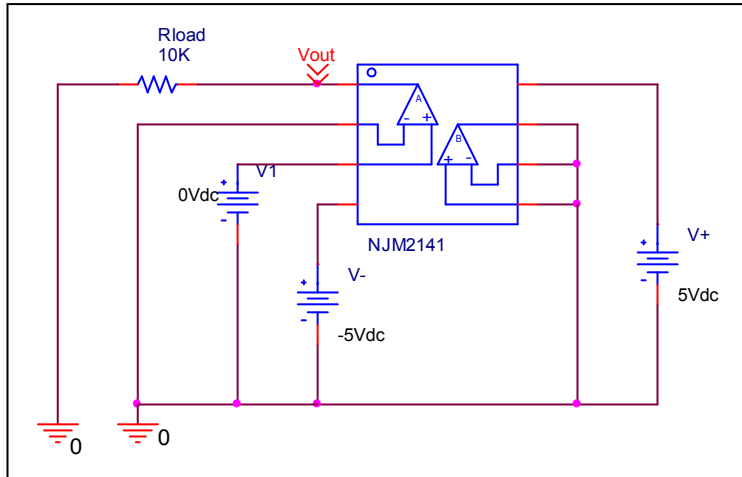
After

Remark   Slew Rate

Before

Rload
2k

Vout

U18

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

Vi

Vin

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

NJM2141

V-

-6.0229m

V2

-5Vdc

V+

5Vdc

0

0

After

Vout

U18

Vin

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

V1 = -1
V2 = 1
TD = 0
TR = 10n
TF = 10n
PW = 50u
PER = 500u

Vi

NJM2141

V-

-5Vdc

V+

5Vdc

0
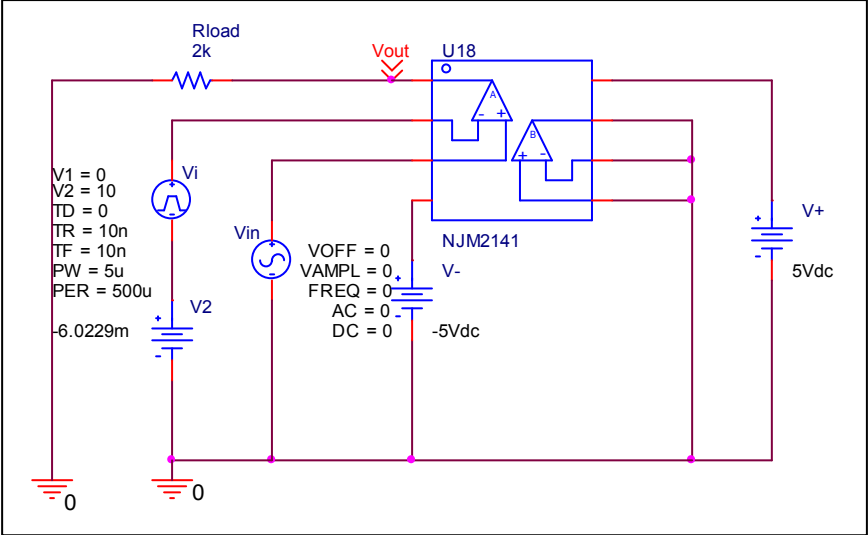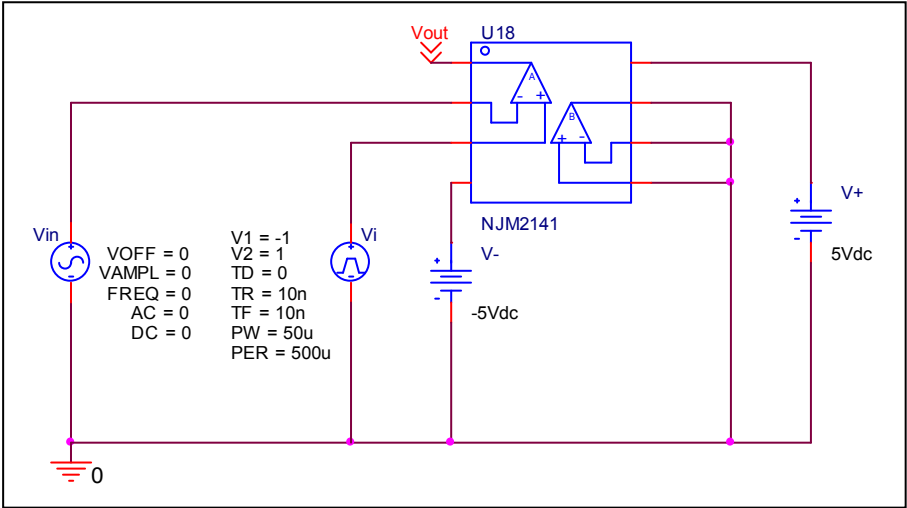
Remark   Input current

Before

Rload
2k

Vout

U17

NJM2141

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

VOFF = -6.0229m
VAMPL = 0
FREQ = 0
AC = 0
DC = 0

Vin

V-

-5Vdc

V+

5Vdc

0

0

After

Vout

U17

NJM2141

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

Vin
VOFF = 0
VAMPL = 0
FREQ = 0
AC = 0
DC = 6.0229m

V-

-5Vdc

V+

5Vdc

0
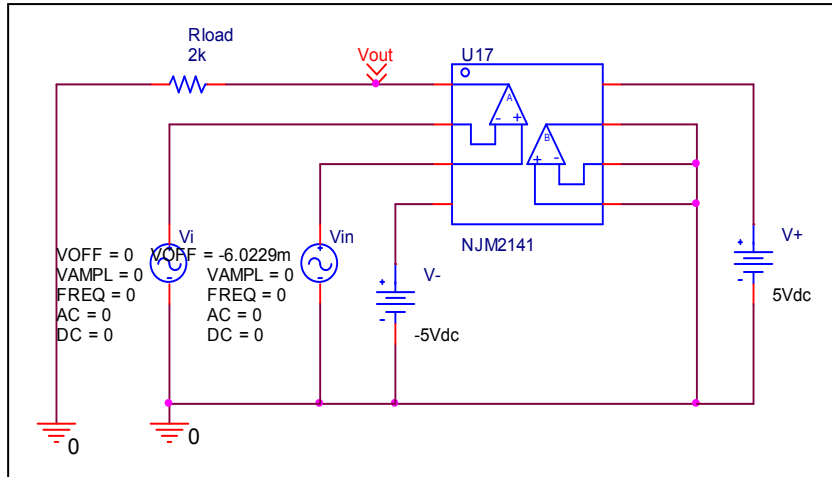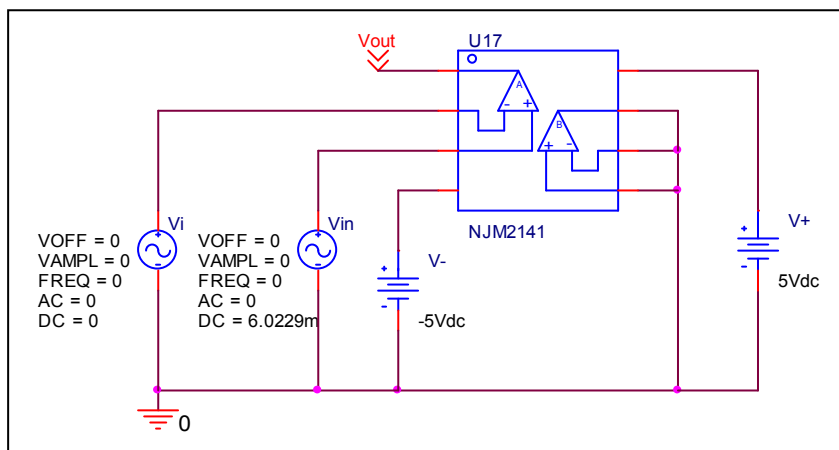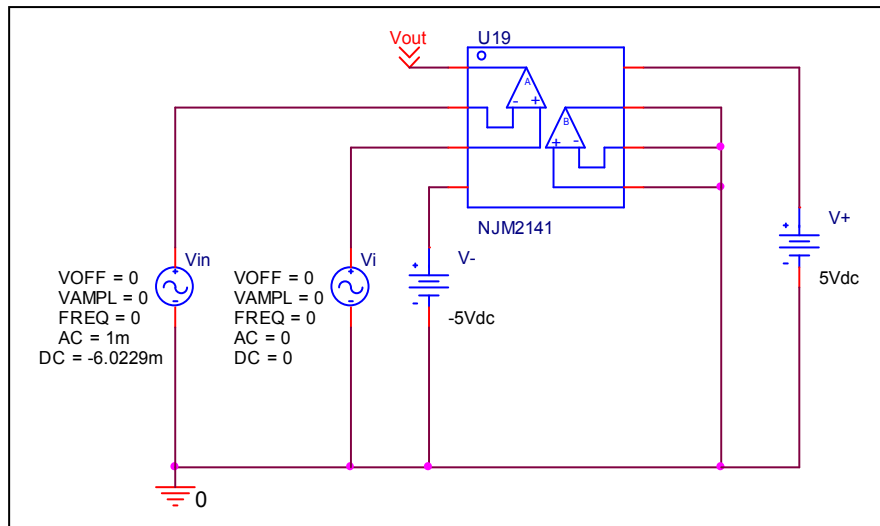
Remark   Open Loop Voltage Gain vs. Frequency

Before

After