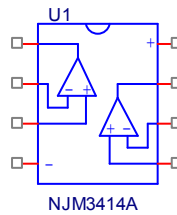# Device Modeling Report

COMPONENTS: OPERATIONAL AMPLIFIER
PART NUMBER:NJM3414A
MANUFACTURER: NEW JAPAN RADIO CO.,LTD

**Bee Technologies Inc.**

Spice Model

NJM3414A

```
*$
*PART NUMBER: NJM3414A
*MANUFACTURER: NEW JAPAN RADIO
*OPAMP
*All Rights Reserved Copyright (c) Bee Technologies Inc. 2007
.Subckt NJM3414A OUT1 -IN1 +IN1 V- +IN2 -IN2 OUT2 V+
X_U1    +IN1 -IN1 V+ V- OUT1 NJM3414A_S
X_U2    +IN2 -IN2 V+ V- OUT2 NJM3414A_S
.ends njm3414A
.subckt njm3414A_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 14.854E6 -1E3 1E3 15E6 -15E6
 ga    6  0 11 12 282.74E-6
 gcm   0  6 10 99 7.9689E-9
 iee   3 10 dc 30.196E-6
 hlim 90  0 vlim 1K
 q1   11  2 13 qx1
 q2   12  1 14 qx2
 r2    6  9 100.00E3
 rc1   4 11 3.5368E3
 rc2   4 12 3.5368E3
 re1  13 10 1.8007E3
 re2  14 10 1.8007E3
 ree  10 99 6.6233E6
 ro1   8  5 50
 ro2   7 99 25
 rp    3  4 148
 vb    9  0 dc 0
 vc    3 53 dc 2.3291
 ve   54  4 dc .83009
 vlim  7  8 dc 0
 vlp  91  0 dc 69.4
 vln   0 92 dc 69.4
.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=154.64)
.model qx2 PNP(Is=869.3434E-18 Bf=153.06)
.ends
*$
```
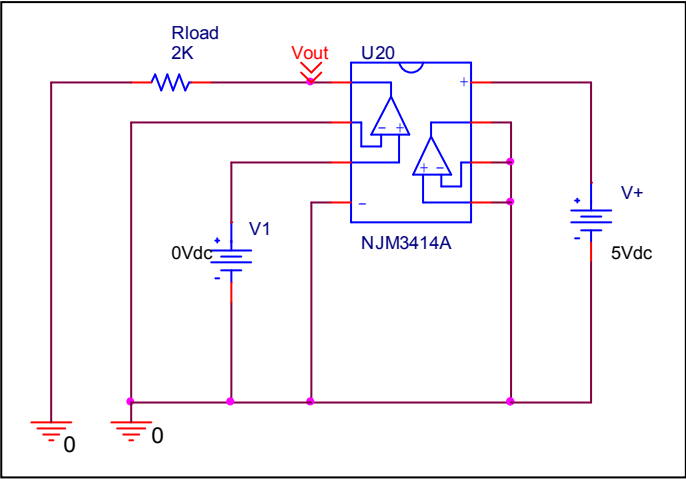
Output Voltage Swing(V_{OM1})

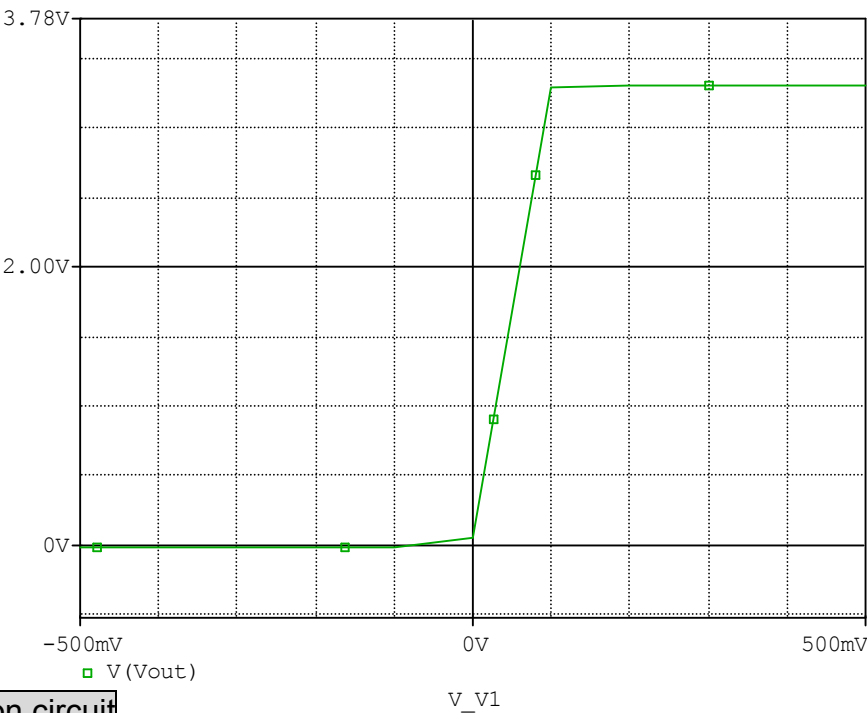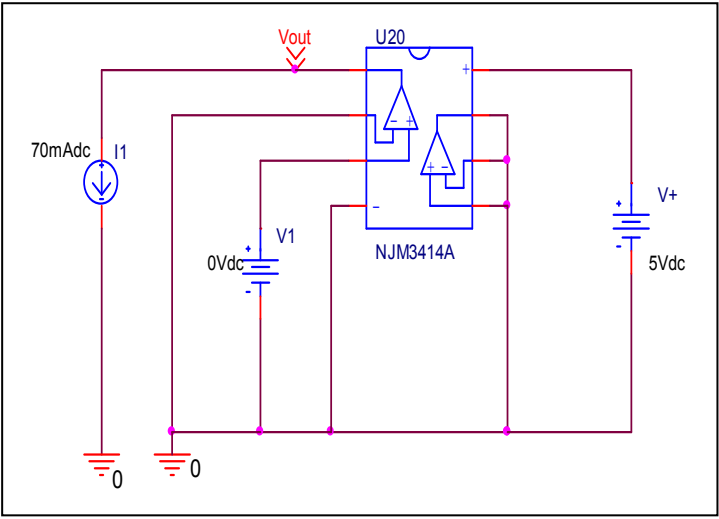Simulation result
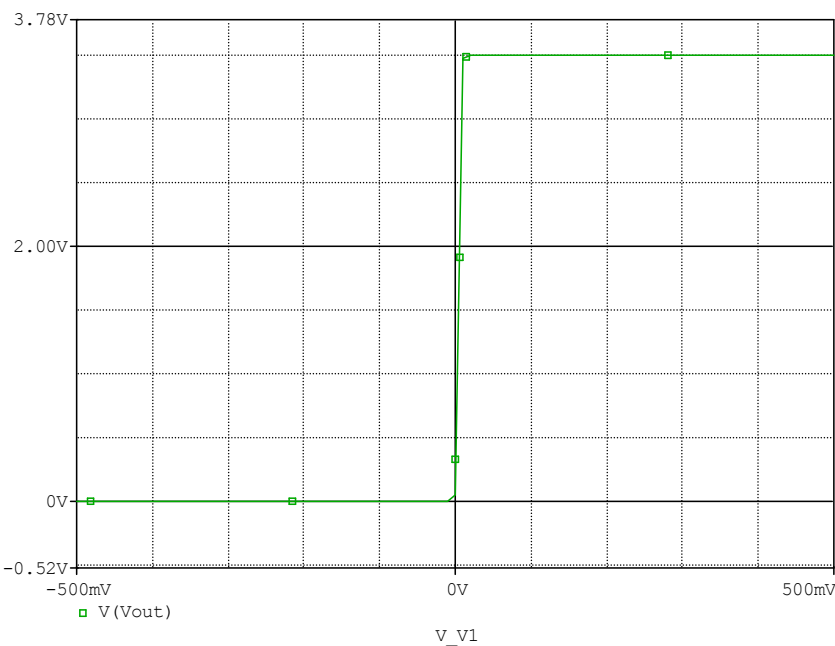
Evaluation circuit

Comparison table

Output Voltage Swing	Data sheet	Simulation	%Error
V_{OM1} (V)	3.5	3.500	0

Output Voltage Swing(V_{OM2})

Simulation result

Evaluation circuit

Comparison table

Output Voltage Swing	Data sheet	Simulation	%Error
V$_{OM2}$ (V)	3.2	3.300	3.125

Input Offset Voltage

- V(Vout)

V_Vin

Rload
2k

Vout

U15

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

Vin

NJM3414A

V+

8.6Vdc

0   0
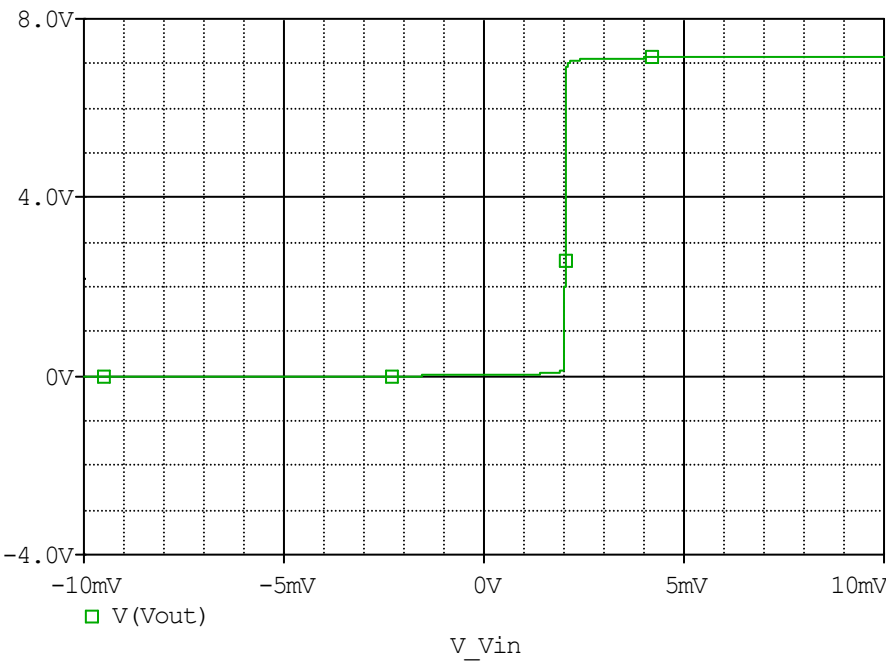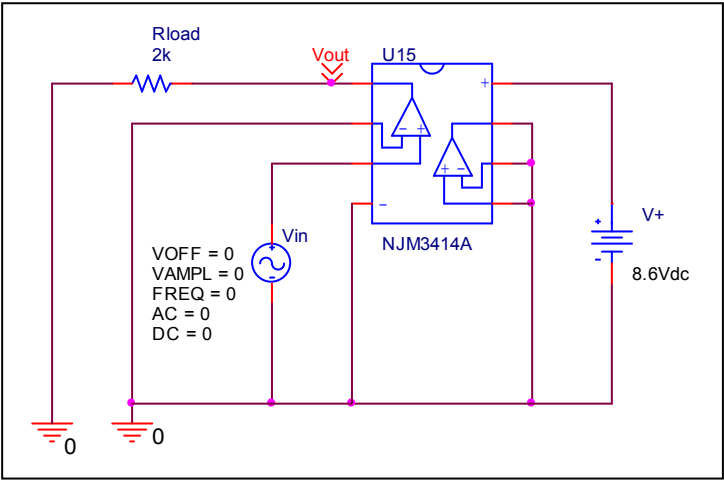
Vio	Measurement		Simulation		Error	
	2	mV	2.04	mV	2	%

Slew Rate

Simulation result
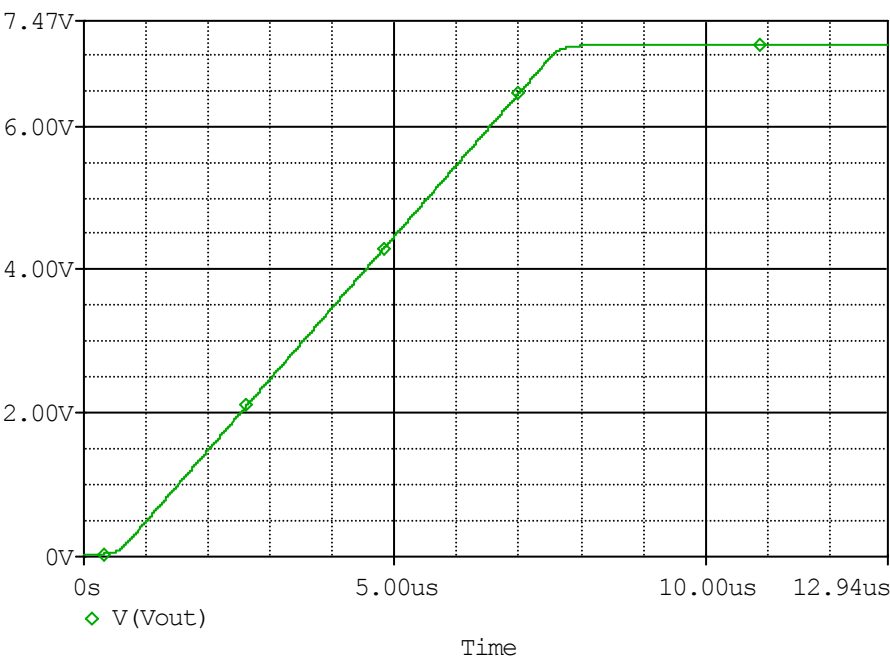
Evaluation circuit
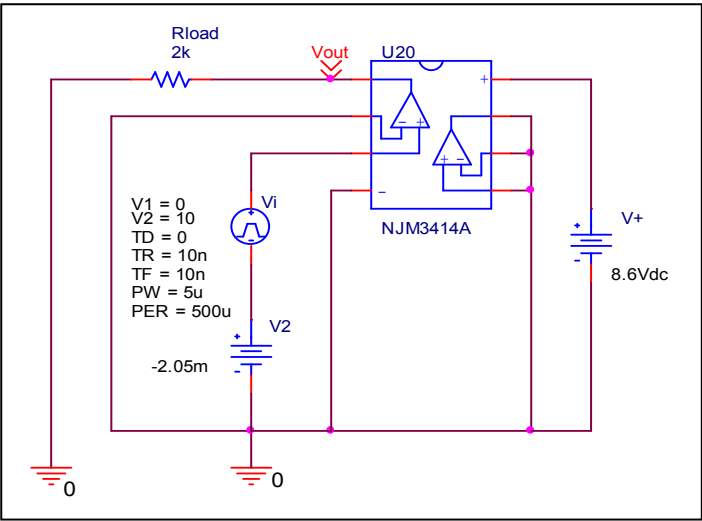
Comparison table

Slew Rate(v/us)	Data sheet	Simulation	%Error
	1	0.9939	-0.610

Input current

	Data sheet	Simulation	%Error
Ib(nA)	100	99.298	-0.702
Iio(nA)	5	5.002	0.040

Open Loop Voltage Gain vs. Frequency
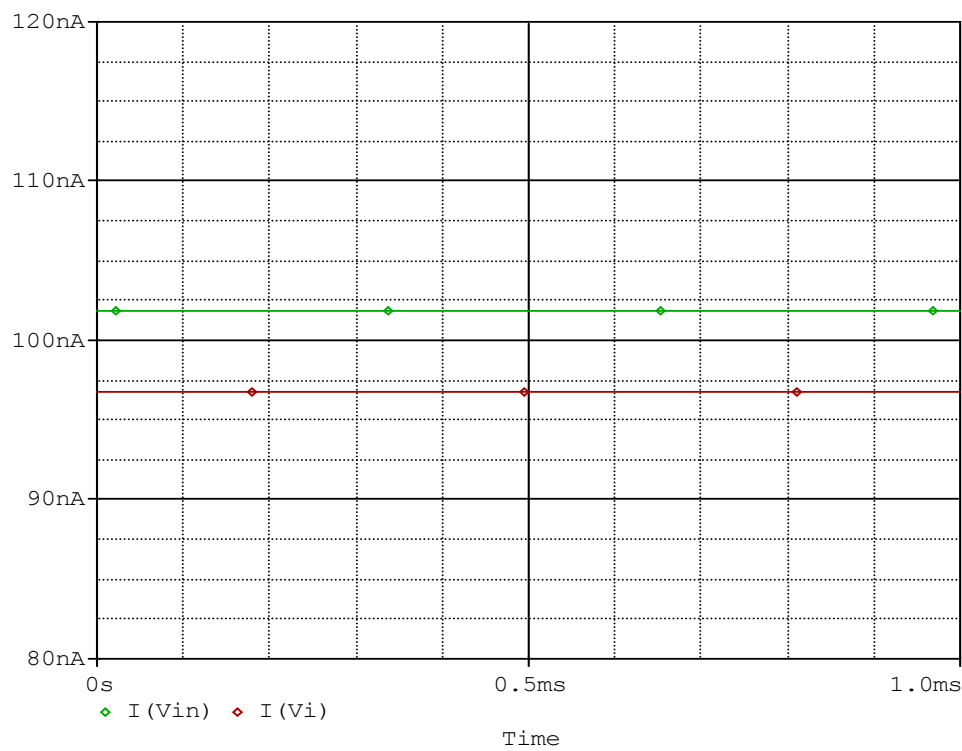
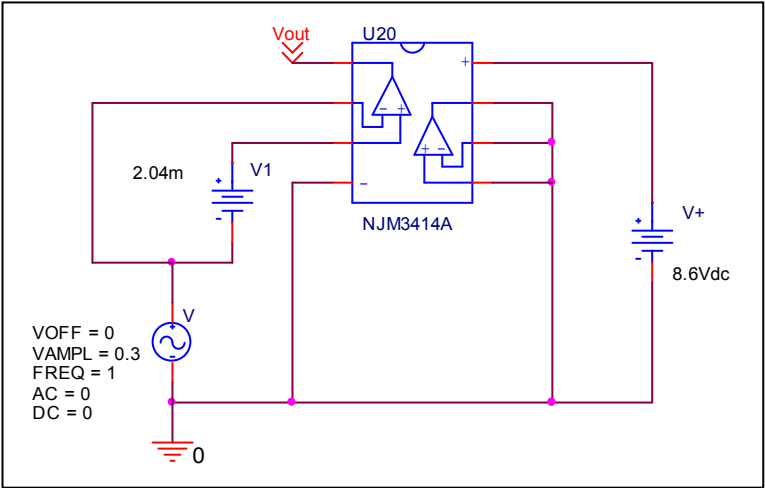Simulation result
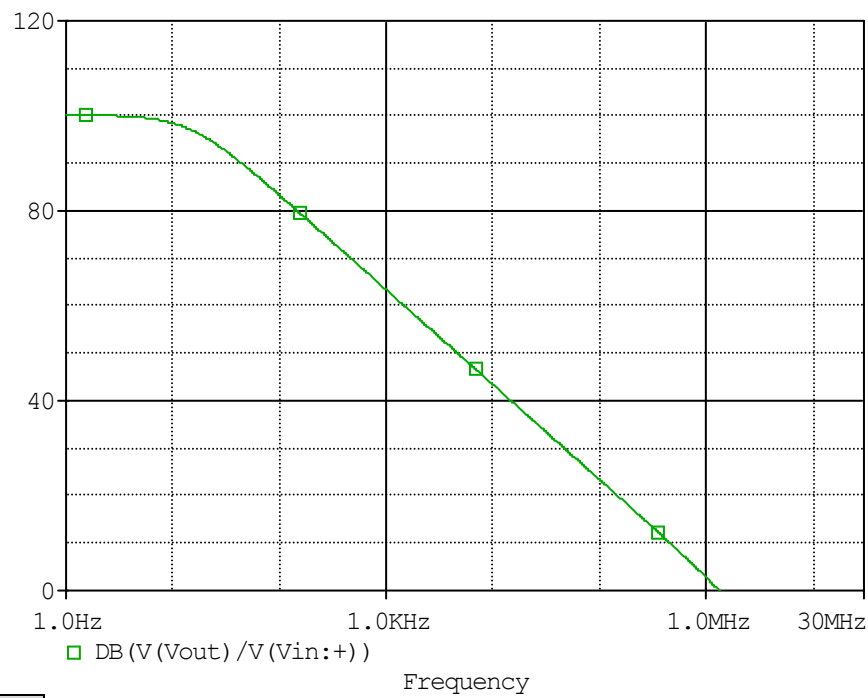
Evaluation circuit
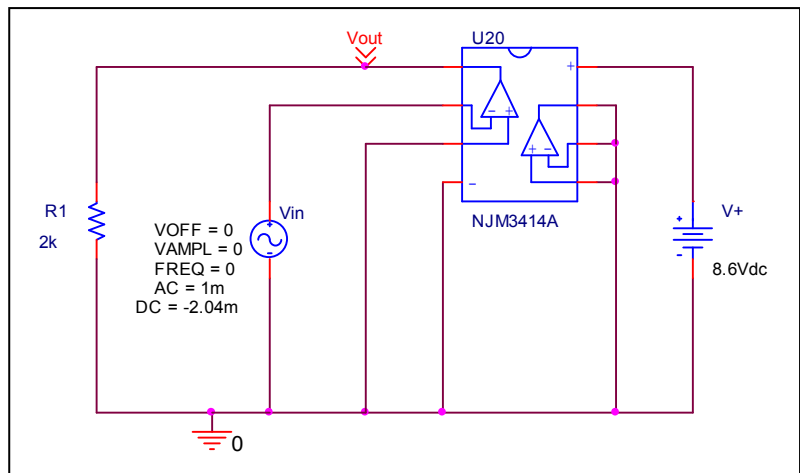
Comparison table

	Data sheet	Simulation	%Error
f-0dB(MHz)	1.3	1.3168	1.292
Av-dc	100	100.160	0.160

Common-Mode Rejection Voltage gain

V(Vout)
Time
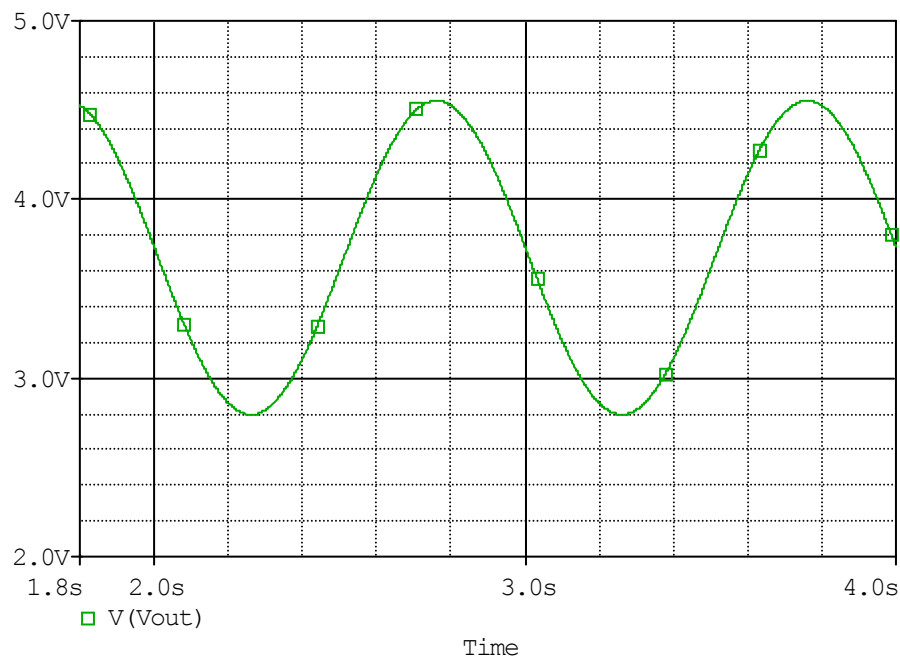
Evaluation circuit

Common Mode Reject Ratio=101859.1388/(1.7579/0.6) = 34766.188
= 90.823dB

Comparison table

CMRR(dB)	Data sheet	Simulation	%Error
	90	90.823	0.914