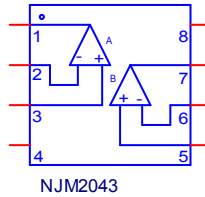# Device Modeling Report

COMPONENTS: OPERATIONAL AMPLIFIER
PART NUMBER:NJM2043
MANUFACTURER: NEW JAPAN RADIO CO.,LTD

**Bee Technologies Inc.**

Spice Model

NJM2043

```
*$
* PART NUMBER: NJM2043
* MANUFACTURER: NEW JAPAN RADIO
* All Rights Reserved Copyright (c) Bee Technologies Inc. 2006
.Subckt NJM2043 OUT1 -IN1 +IN1 V- +IN2 -IN2 OUT2 V+
X_U1    +IN1 -IN1 V+ V- OUT1 NJM2043_ME
X_U2    +IN2 -IN2 V+ V- OUT2 NJM2043_ME
.ends  NJM2043
*$
.subckt NJM2043_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 1.3263E6 -1E3 1E3 1E6 -1E6
 ga    6  0 11 12 3.0159E-3
 gcm   0  6 10 99 30.159E-9
 iee   3 10 dc 180.80E-6
 hlim 90  0 vlim 1K
 q1   11  2 13 qx1
 q2   12  1 14 qx2
 r2    6  9 100.00E3
 rc1   4 11 331.57
 rc2   4 12 331.57
 re1  13 10 43.997
 re2  14 10 43.997
 ree  10 99 1.1062E6
 ro1   8  5 50
 ro2   7 99 25
 rp    3  4 1.8197E3
 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 PNP(Is=800.00E-18 Bf=219.46)
.model qx2 PNP(Is=809.3333E-18 Bf=229.65)
.ends
*$
```
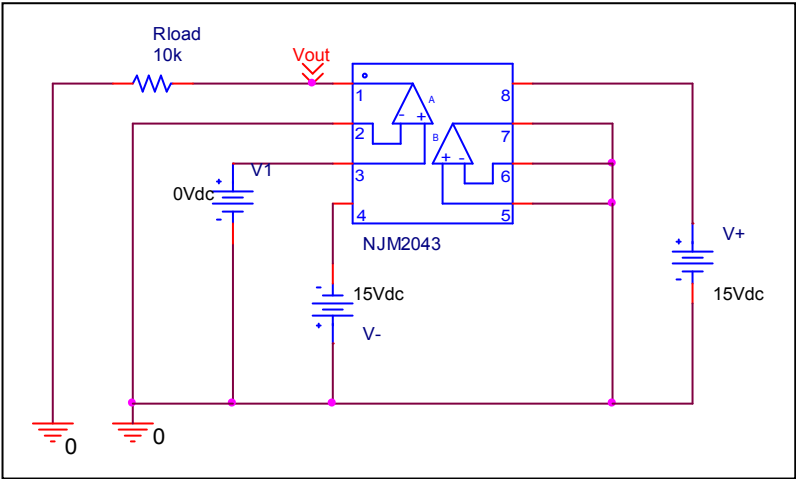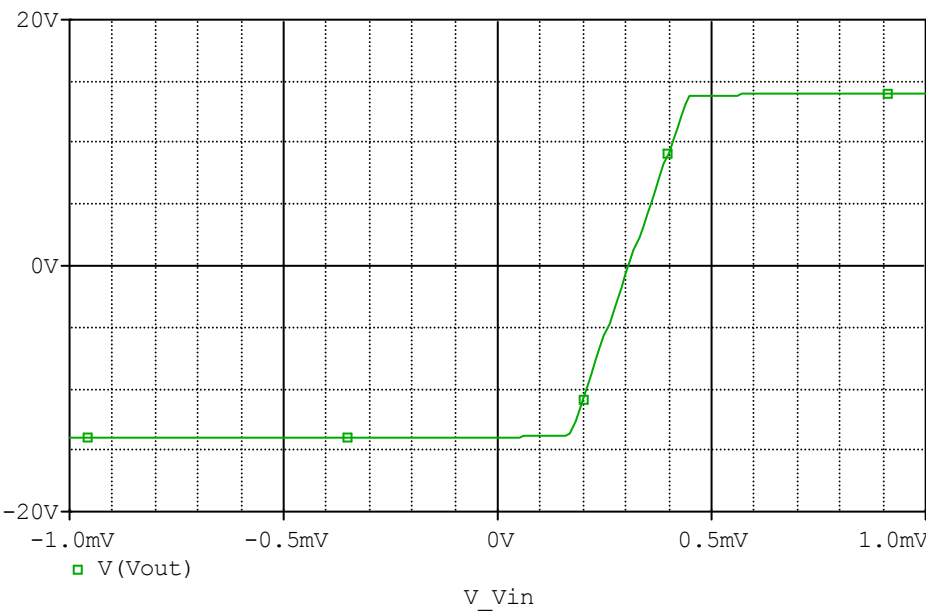
Output Voltage Swing

V_V1
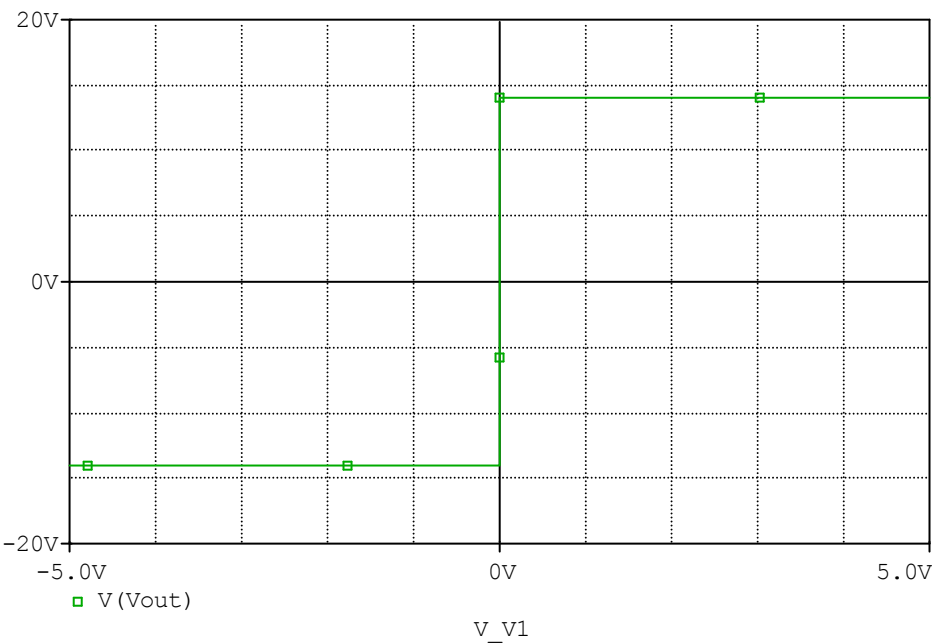
Evaluation circuit

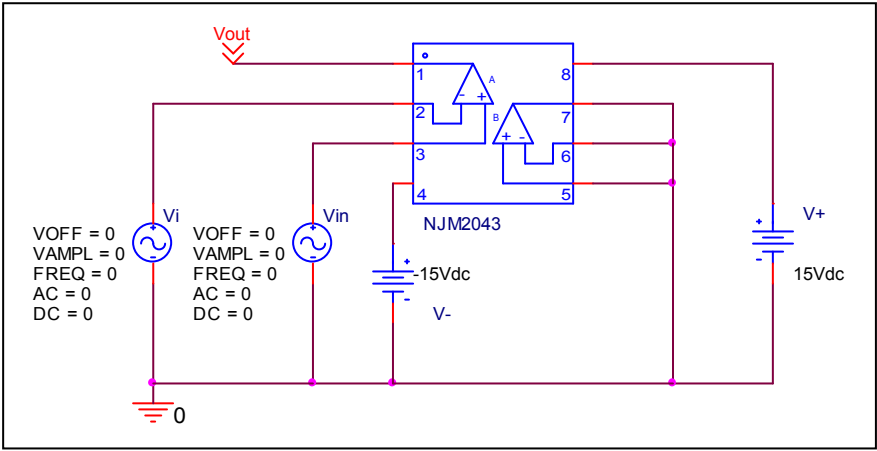| Output Voltage Swing	Data sheet	Simulation	%Error
+Vout(V)	+14.000	+14.000	0.000
-Vout(V)	-14.000	-14.000	0.000

Input Offset Voltage

Simulation result

V(Vout)

V_Vin

Evaluation circuit

Vos	Measurement		Simulation		Error	
	0.300	mV	0.307	mV	2.333	%

Slew Rate
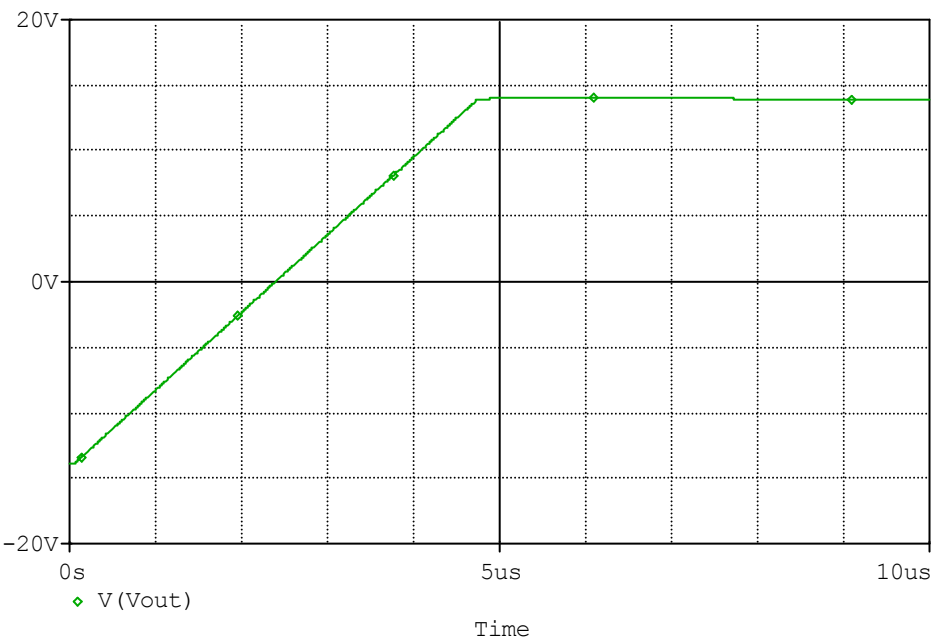
Evaluation circuit
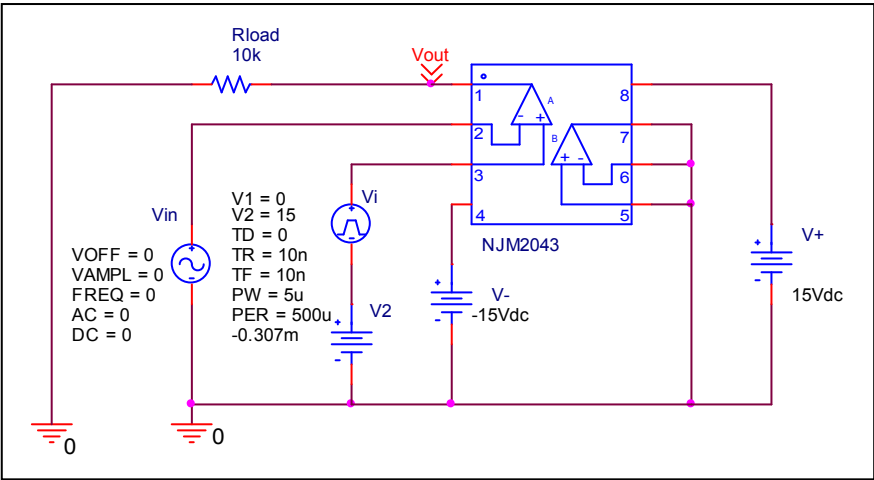
Slew Rate(v/us)	Data sheet	Simulation	%Error
	6.000V/us	5.935V/us	-1.083

Input current
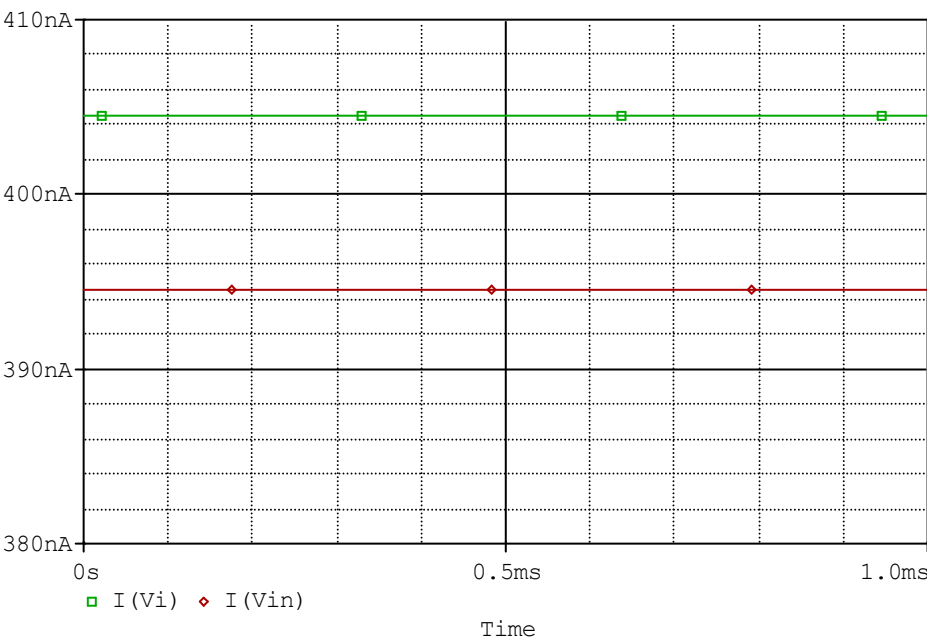
Evaluation circuit

	Data sheet	Simulation	%Error
Ib(nA)	400.000	399.561	-0.110
Ibos(nA)	10.000	9.993	-0.070

Open Loop Voltage Gain vs. Frequency

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

Frequency
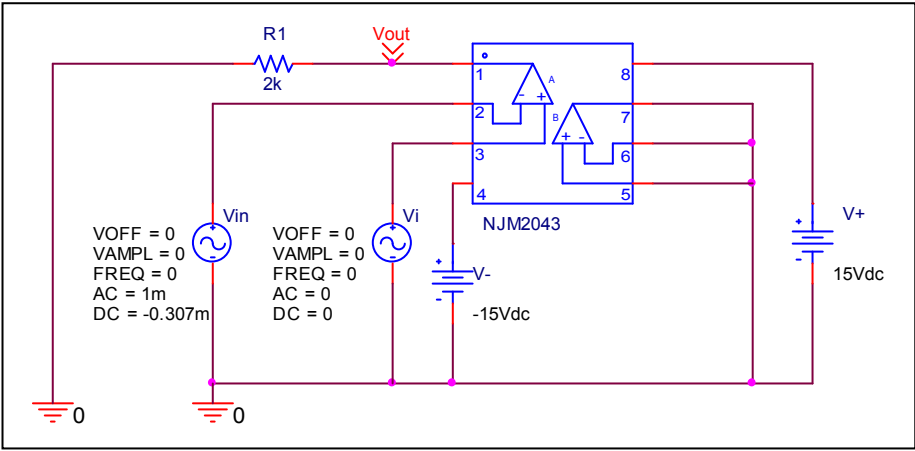
	Data sheet	Simulation	%Error
f-0dB(MHz)	14.000	13.895	-0.750
Av-dc	100.000	99.655	-0.345

Common-Mode Rejection Voltage gain

V(Vout)

Time
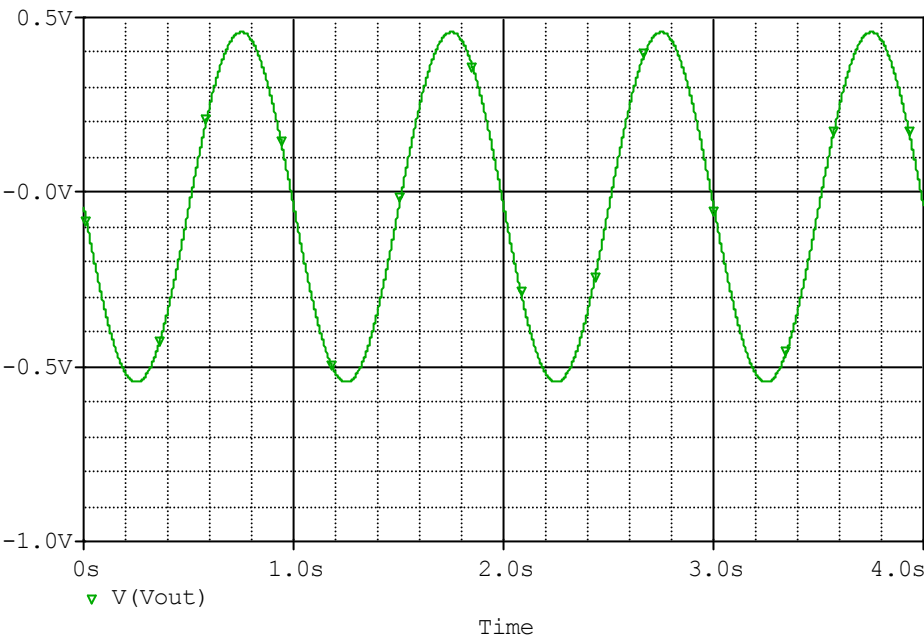
Evaluation circuit
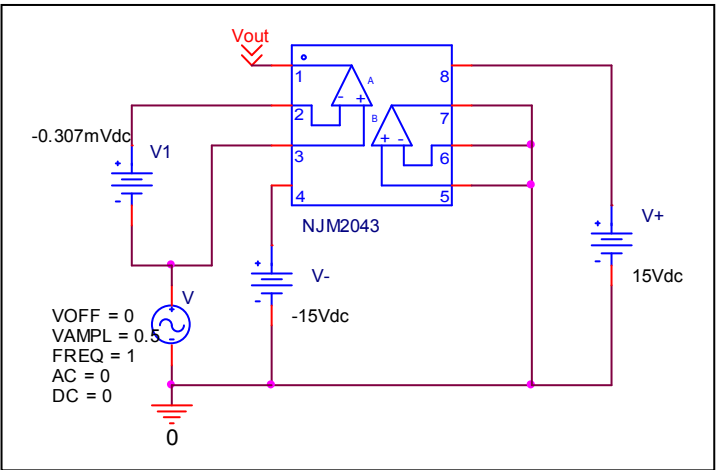
Common Mode Reject Ratio=96105.888/1.001=96009.879

CMRR	Data sheet	Simulation	%Error
	100.000	99.646	-0.354