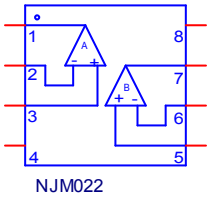
Device Modeling Report

COMPONENTS: OPERATIONAL AMPLIFIER
PART NUMBER:NJM022
MANUFACTURER: NEW JAPAN RADIO CO.,LTD

Bee Technologies Inc.

SPice Model

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*$
* PART NUMBER: NJM022
* MANUFACTURER: NEW JAPAN RADIO
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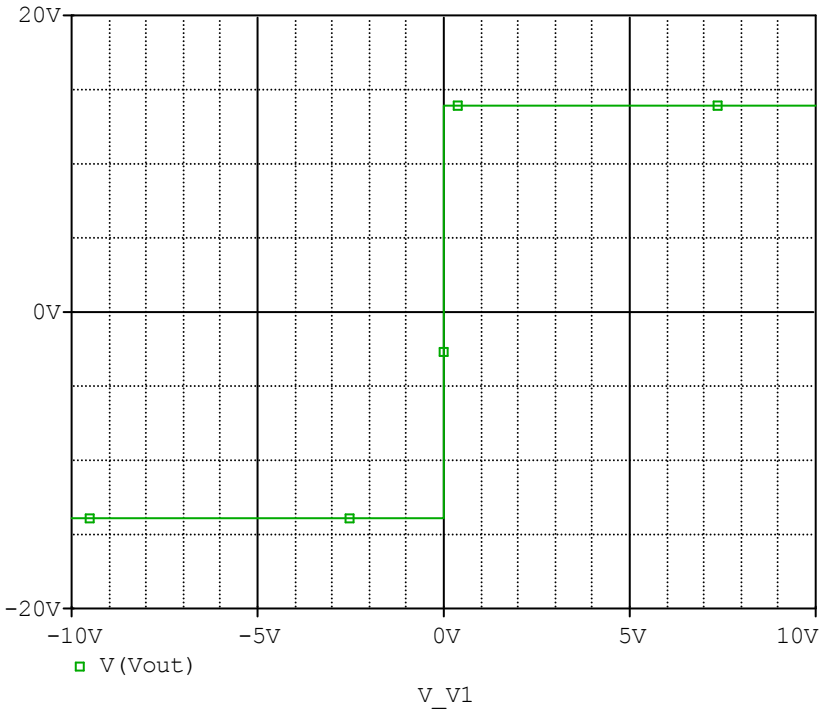
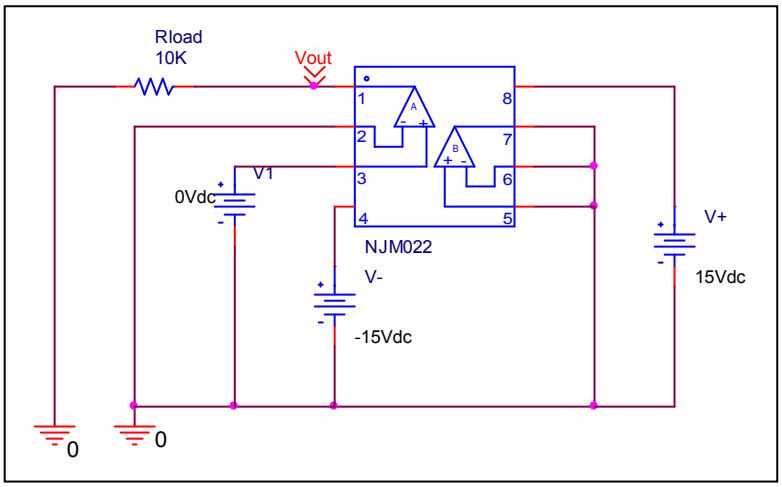
.Subckt NJM022 OUT1 -IN1 +IN1 VEE +IN2 -IN2 OUT2 VCC
X_U1     +IN1 -IN1 VCC VEE OUT1 NJM022_ME
X_U2     +IN2 -IN2 VCC VEE OUT2 NJM022_ME
.ends  NJM022
.subckt NJM022_ME   1 2 3 4 5
  c1   11 12 8.6603E-12
  c2    6  7 30.000E-12
  dc    5 53 dy
  de   54  5 dy
  dlp  90 91 dx
  dln  92 90 dx
  dp    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 4.7171E6 -1E3 1E3 4E6 -4E6
  ga    6  0 11 12 213.00E-6
  gcm   0  6 10 99 6.7356E-9
  iee   3 10 dc 15.030E-6
  hlim 90  0 vlim 1K
  q1   11  2 13 qx1
  q2   12  1 14 qx2
  r2    6  9 100.00E3
  rc1   4 11 4.6948E3
  rc2   4 12 4.6948E3
  re1  13 10 1.2438E3
  re2  14 10 1.2438E3
  ree  10 99 13.307E6
  ro1   8  5 50
  ro2   7 99 25
  rp    3  4 1.8016E3
  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 5.6000
  vln   0 92 dc 5.6000
.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=451.81)
.model qx2 PNP(Is=970.6100E-18 Bf=559.70)
.ends
*$
```

Output Voltage Swing

Simulation result



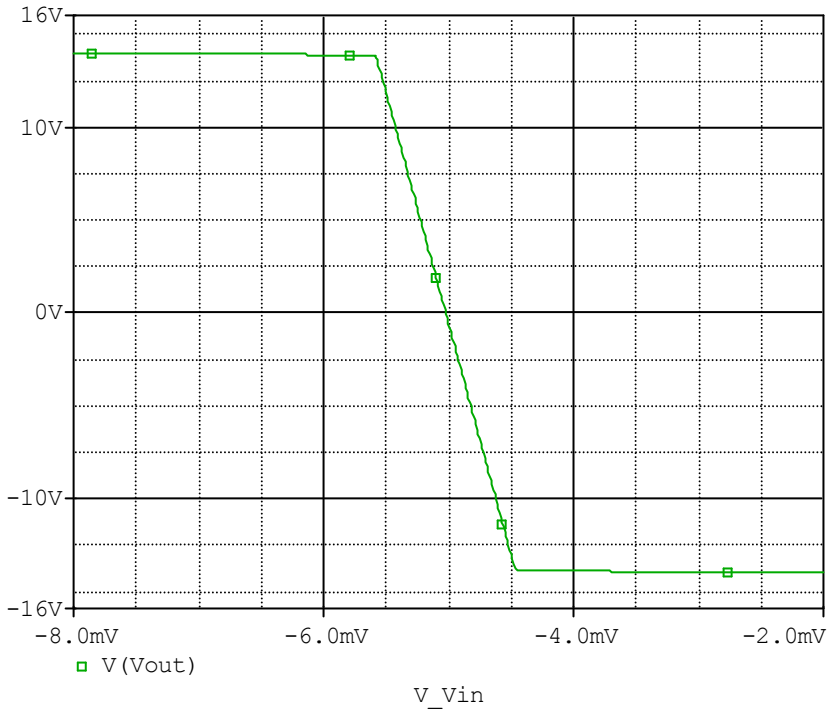
Evaluation circuit



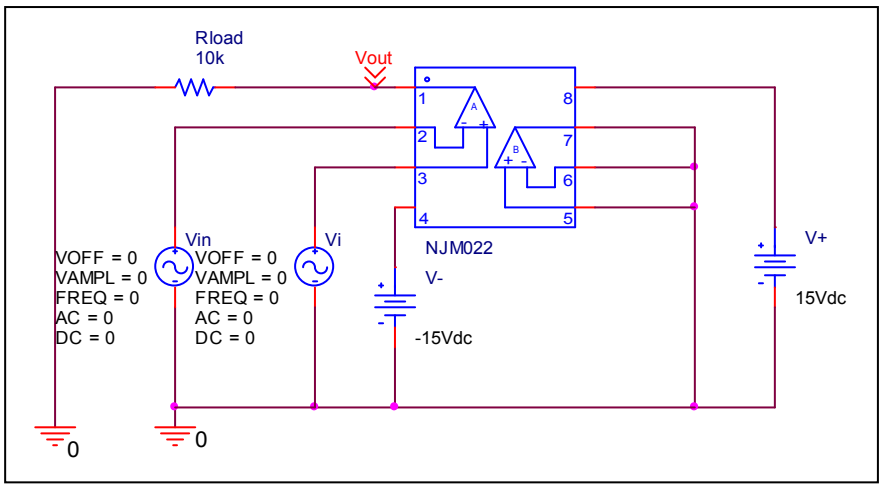
Output Voltage Swing	Data sheet	Simulation	%Error
+Vout(V)	+14.000	+13.963	0.264
-Vout(V)	-14.000	-13.963	0.264

Input Offset Voltage

Simulation result



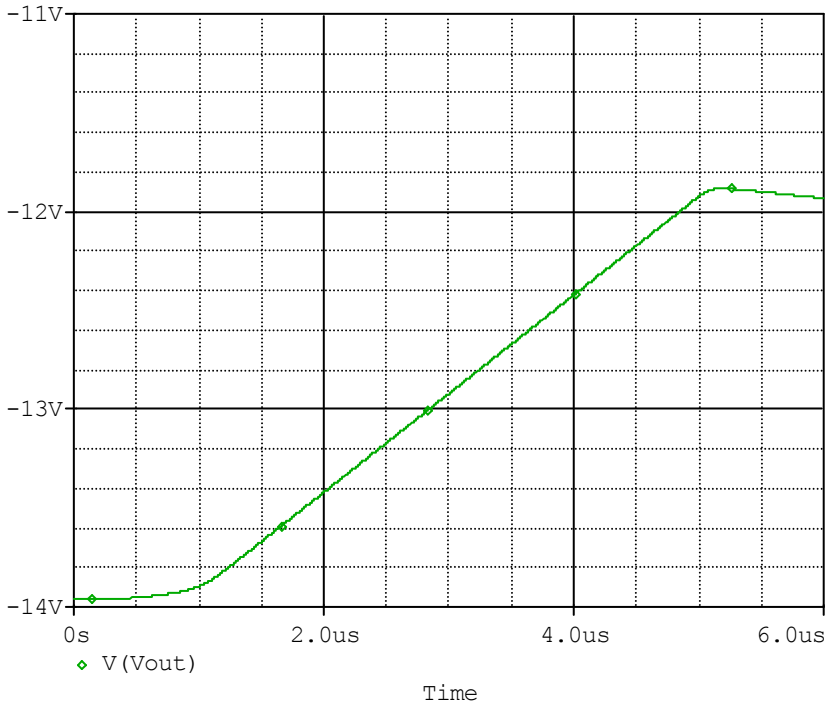
Evaluation circuit



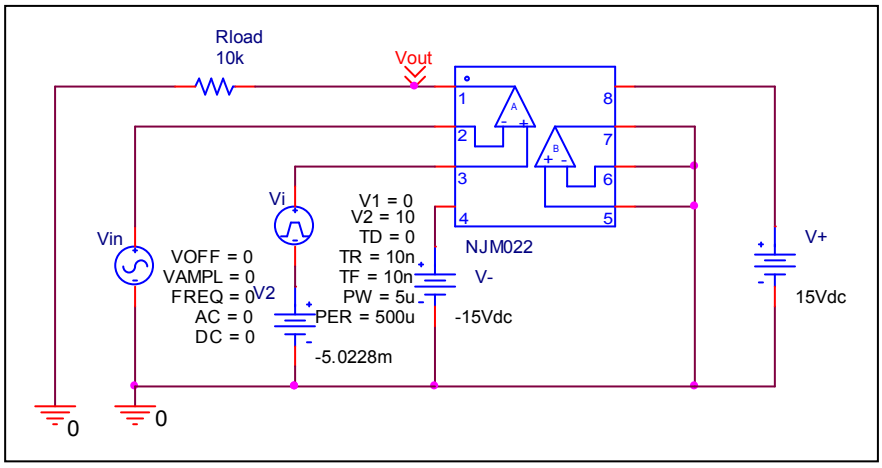
Vos	Measurement		Simulation		Error	
	5.000	mV	**5.0228**	mV	**0.456**	%

Slew Rate

Simulation result



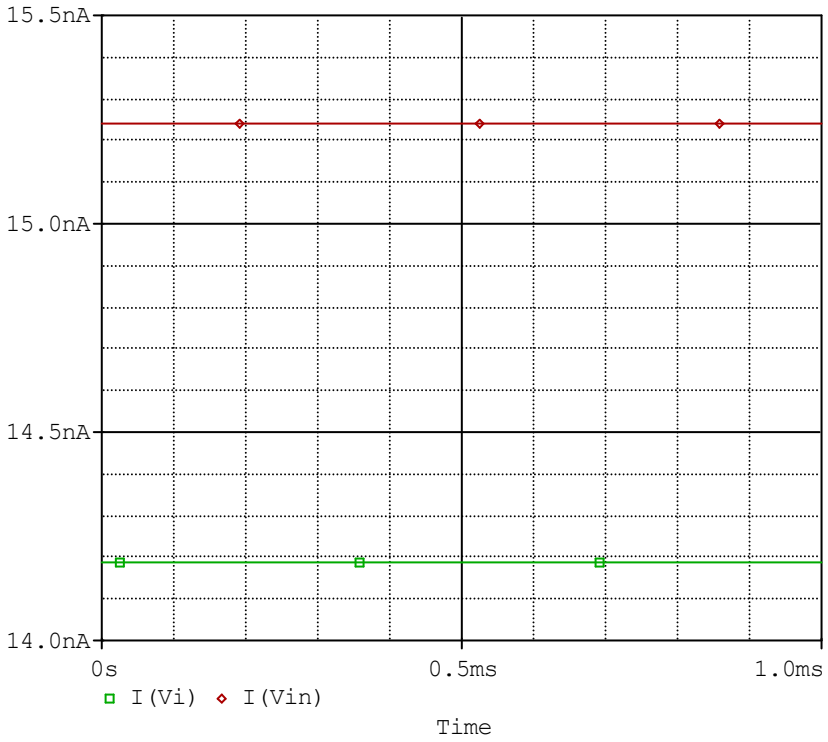
Evaluation circuit



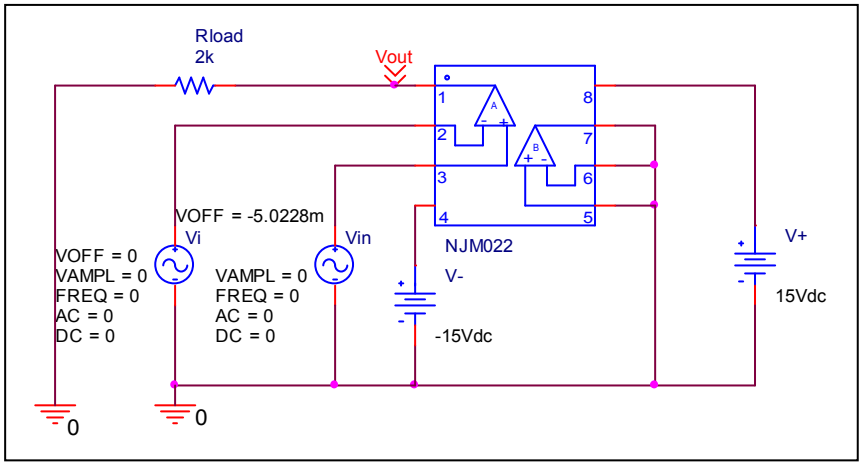
Slew Rate(v/us)	Data sheet	Simulation	%Error
	0.500	0.495	1.000

Input current

Simulation result



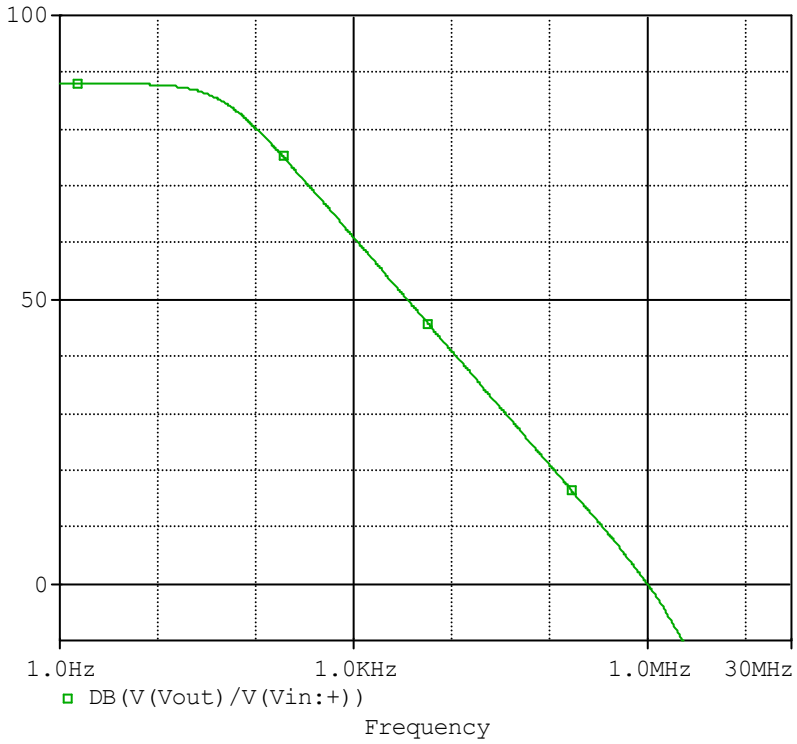
Evaluation circuit



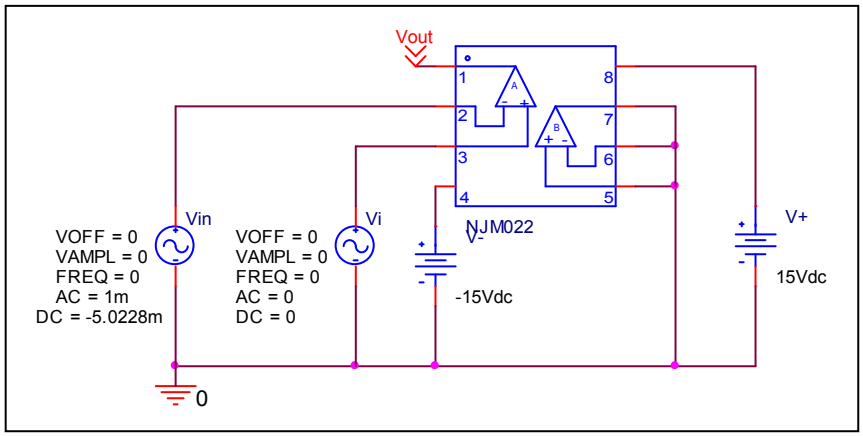
	Data sheet	Simulation	%Error
Ib(nA)	15.000	14.714	1.900
Ibos(nA)	1.000	1.050	5.000

Open Loop Voltage Gain vs. Frequency

Simulation result



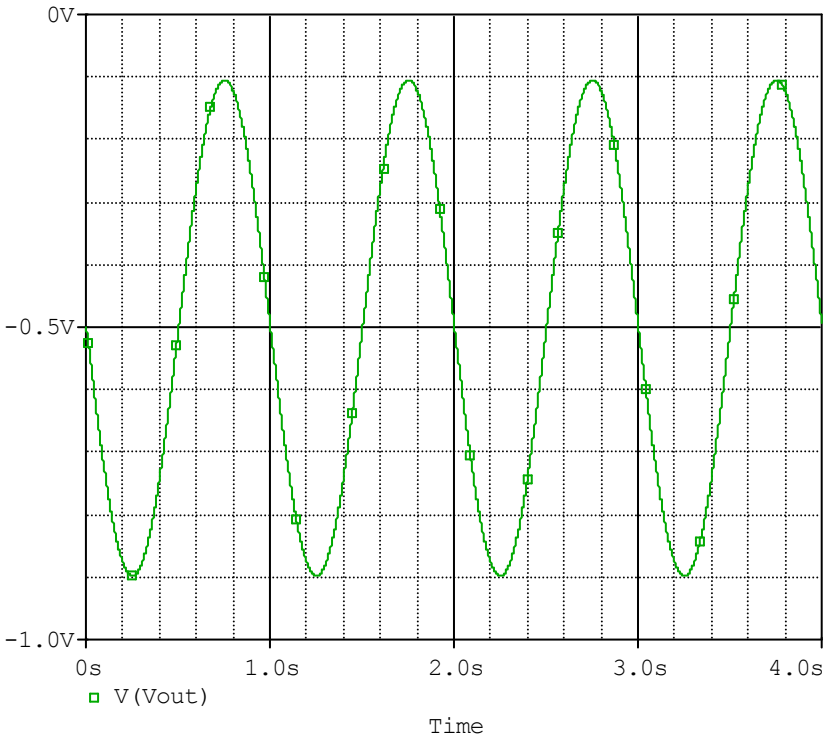
Evaluation circuit



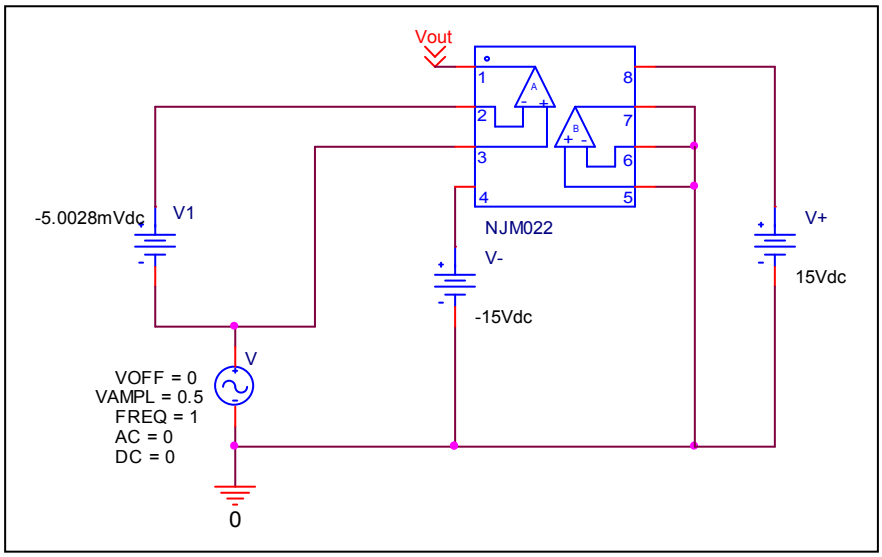
	Data sheet	Simulation	%Error
f-0dB(MHz)	**1.000**	**0.992**	**0.800**
Av-dc	**88.000**	**87.970**	**0.034**

Common-Mode Rejection Voltage gain

Simulation result



Evaluation circuit



Common Mode Reject Ratio=25032/0.79432=31566

CMRR	Data sheet	Simulation	%Error
	90.000	89.980	0.017