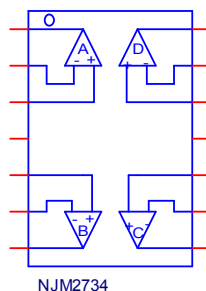# Device Modeling Report

COMPONENTS: OPERATIONAL AMPLIFIER
PART NUMBER:NJM2734
MANUFACTURER: NEW JAPAN RADIO CO.,LTD

**Bee Technologies Inc.**

SPice Model

NJM2734

```
*$
*PART NUMBER: NJM2734
*MANUFACTURER: NEW JAPAN RADIO
*All Rights Reserved Copyright (c) Bee Technologies Inc. 2006
.Subckt NJM2734 OUT1 -IN1 +IN1 V+ +IN2 -IN2 OUT2 OUT3 -IN3 +IN3 V-
+ +IN4 -IN4 OUT4
X_U1    +IN1 -IN1 V+ V- OUT1 NJM2734_ME
X_U2    +IN2 -IN2 V+ V- OUT2 NJM2734_ME
X_U3    +IN3 -IN3 V+ V- OUT3 NJM2734_ME
X_U4    +IN4 -IN4 V+ V- OUT4 NJM2734_ME
.ends njm2734
.subckt njm2734_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 3.7737E6 -1E3 1E3 3E6 -3E6
 ga    6  0 11 12 215.19E-6
 gcm   0  6 10 99 71.529E-9
 iee   3 10 dc 12.100E-6
 hlim 90  0 vlim 1K
 q1   11  2 13 qx1
 q2   12  1 14 qx2
 r2    6  9 100.00E3
 rc1   4 11 4.4210E3
 rc2   4 12 4.4210E3
 re1  13 10 109.37
 re2  14 10 109.37
 ree  10 99 16.529E6
 ro1   8  5 50
 ro2   7 99 25
 rp    3  4 125.04
 vb    9  0 dc 0
 vc    3 53 dc .81877
 ve   54  4 dc .8193
 vlim  7  8 dc 0
 vlp  91  0 dc 6
 vln   0 92 dc 6
.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=109.19)
.model qx2 PNP(Is=851.0521E-18 Bf=133.19)
.ends
*$
```
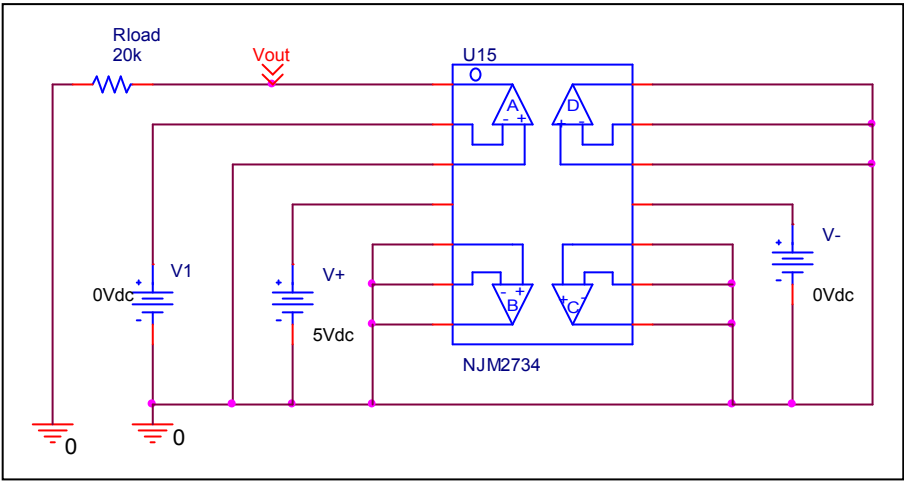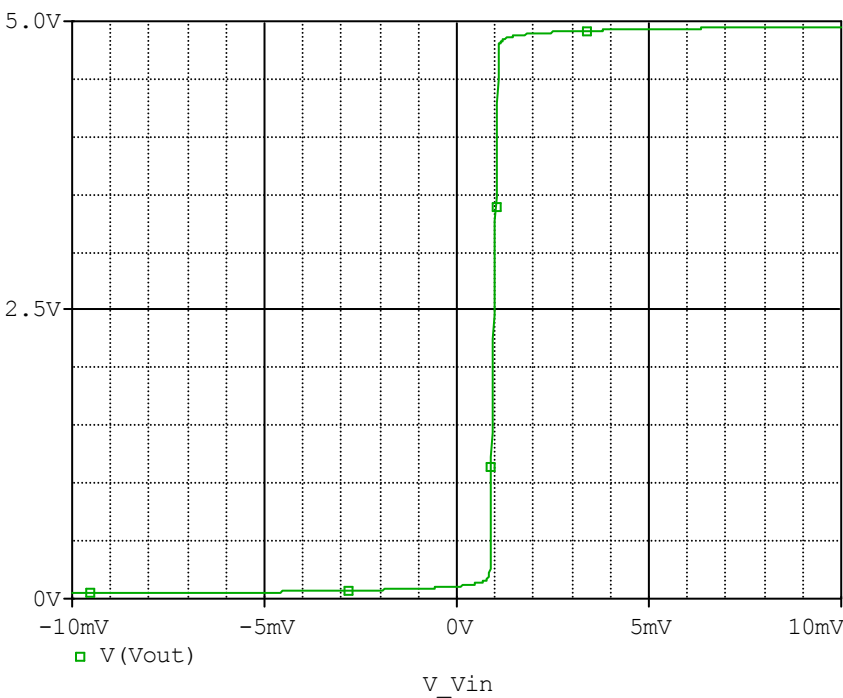
Output Voltage Swing
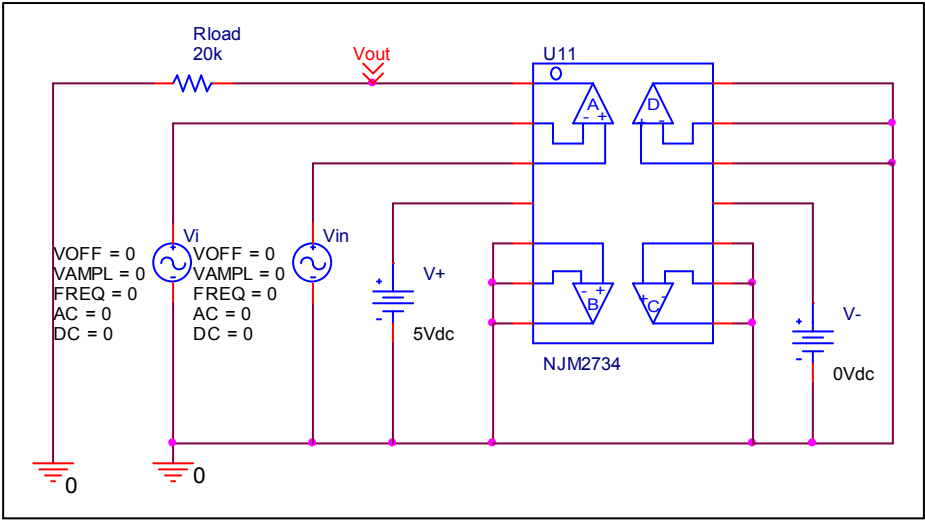
V(Vout)

V_V1
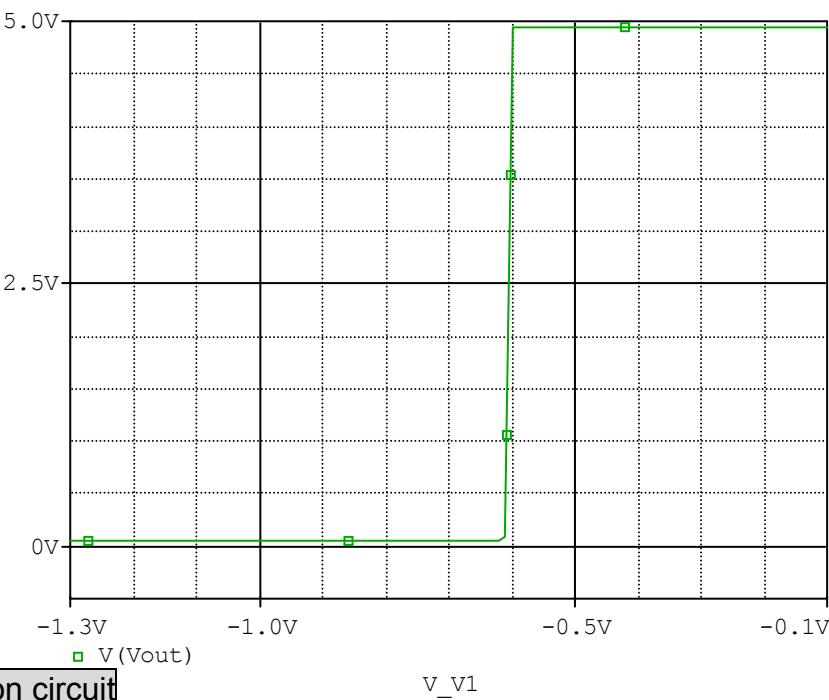
Evaluation circuit

Comparison table

Output Voltage Swing	Data sheet	Simulation	%Error
VOH	4.950	4.949	-0.020
VOL	0.050	0.050	0.000

Input Offset Voltage

Simulation result

Evaluation circuit

Comparison table

Vio	Measurement		Simulation		Error	
	1.000	mV	1.000	mV	0.000	%

Slew Rate

◇ V(Vout)

Time

Evaluation circuit


```
Rload
10k
Vout          U16
              O
              A     D

V1 = 0    Vi
V2 = 10
TD = 0
TR = 10n
TF = 10n      V+    B     C
PW = 5u
PER = 500u  5Vdc
          V2        NJM2734
-1.00m

0    0
```
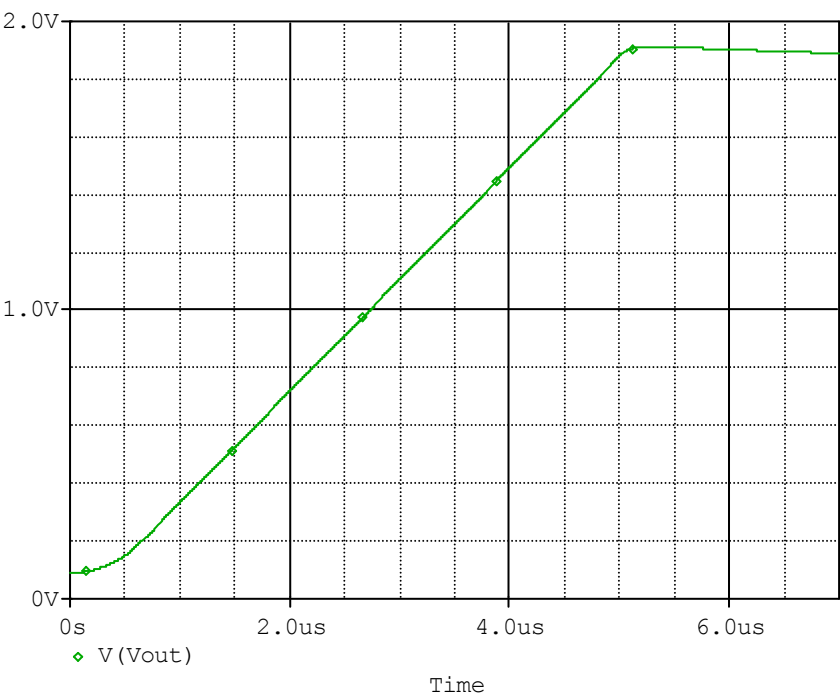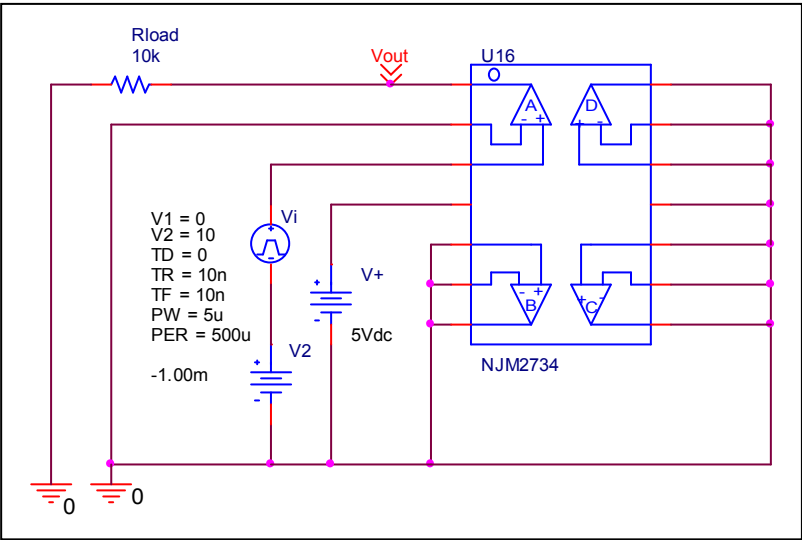
Comparison table

Slew Rate(v/us)	Data sheet	Simulation	%Error
	0.400	0.388	-3.000

Input current

Simulation result

Time

◇ I(Vi) ▽ I(Vin)
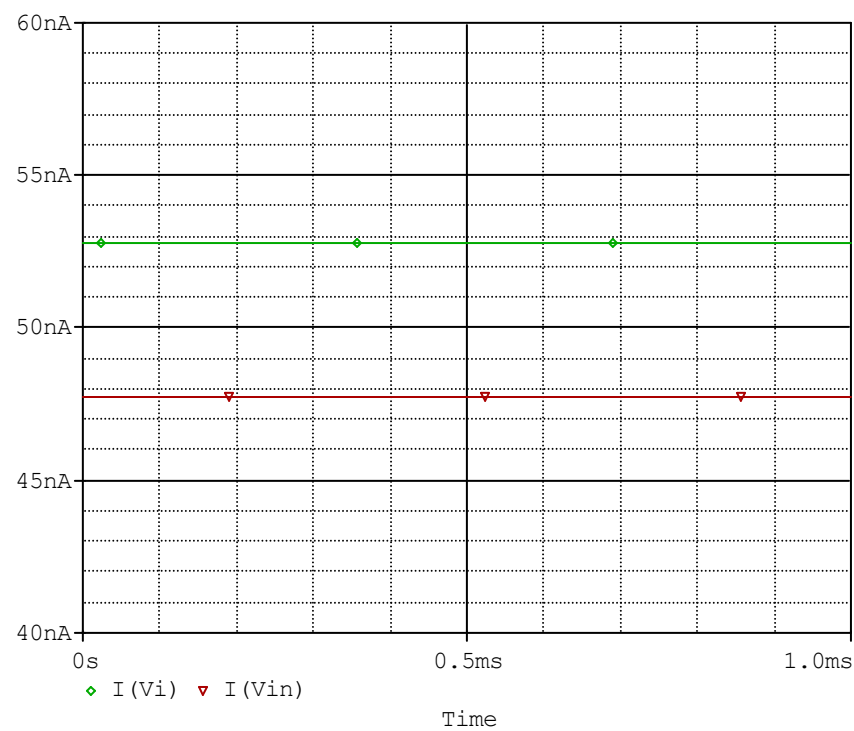
Evaluation circuit
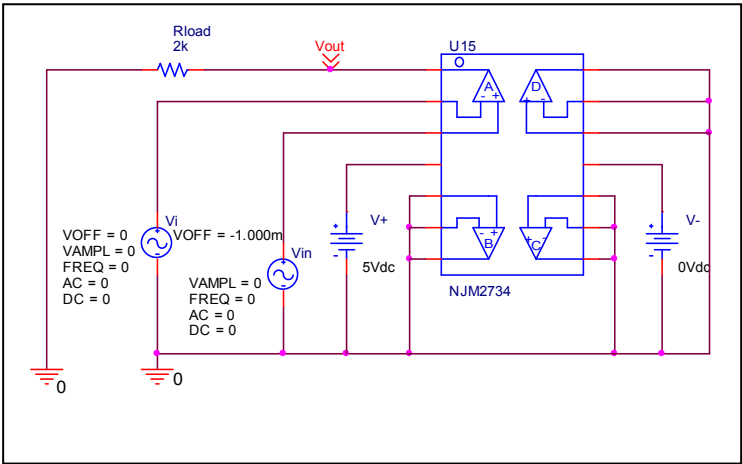
Comparison table

	Data sheet	Simulation	%Error
Ib(nA)	50.000	50.235	0.470
Iio(nA)	5.000	5.051	1.020

Open Loop Voltage Gain vs. Frequency

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

Frequency
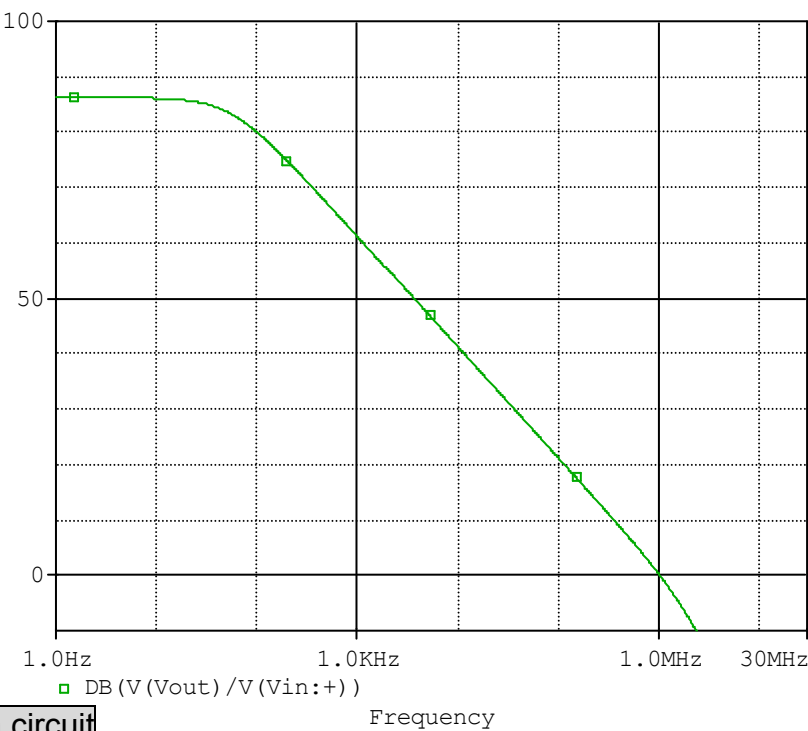
Evaluation circuit

Comparison table

	Data sheet	Simulation	%Error
f-0dB(MHz)	1.000	1.028	2.800
Av-dc	85.000	86.231	1.448

Common-Mode Rejection Voltage gain

Simulation result

□ V(Vout)

Time
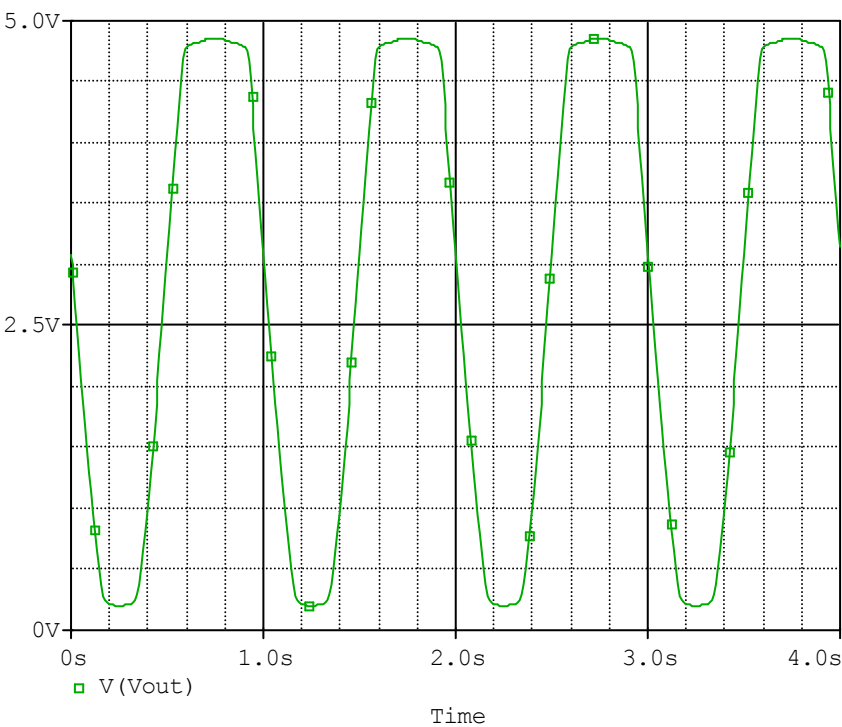
Evaluation circuit

Common Mode Reject Ratio=20490.379/4.654 = 4402.745= 72.874dB

Comparison table

CMRR(dB)	Data sheet	Simulation	%Error
	70.000	72..950	4.105