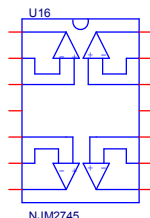# Device Modeling Report

COMPONENTS: OPERATIONAL AMPLIFIER
PART NUMBER:NJM2745
MANUFACTURER: NEW JAPAN RADIO CO.,LTD

Bee Technologies Inc.

Spice Model

U16

NJM2745

```
*$
* PART NUMBER:NJM2745
* MANUFACTURER: NEW JAPAN RADIO
* All Rights Reserved Copyright (c) Bee Technologies Inc. 2006
.Subckt NJM2745 OUT1 -IN1 +IN1 V+ +IN2 -IN2 OUT2 OUT3 -IN3 +IN3 V-
+ +IN4 -IN4 OUT4
X_U1    +IN1 -IN1 V+ V- OUT1 NJM2745_ME
X_U2    +IN2 -IN2 V+ V- OUT2 NJM2745_ME
X_U3    +IN3 -IN3 V+ V- OUT3 NJM2745_ME
X_U4    +IN4 -IN4 V+ V- OUT4 NJM2745_ME
.ends  NJM2745
.subckt NJM2745_ME 1 2 3 4 5
 c1   11 12 2.0000E-12
 c2    6  7 29.000E-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 4.4737E6 -1E3 1E3 4E6 -4E6
 ga    6  0 11 12 2.8274E-3
 gcm   0  6 10 99 8.9411E-9
 iee   3 10 dc 150.20E-6
 hlim 90  0 vlim 1K
 q1   11  2 13 qx1
 q2   12  1 14 qx2
 r2    6  9 100.00E3
 rc1   4 11 353.68
 rc2   4 12 353.68
 re1  13 10 8.8101
 re2  14 10 8.8101
 ree  10 99 1.3316E6
 ro1   8  5 50
 ro2   7 99 25
 rp    3  4 93.248
 vb    9  0 dc 0
 vc    3 53 dc 2.2979
 ve   54  4 dc 2.2979
 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=723.62)
.model qx2 PNP(Is=809.2676E-18 Bf=778.37)
.ends
*$
```
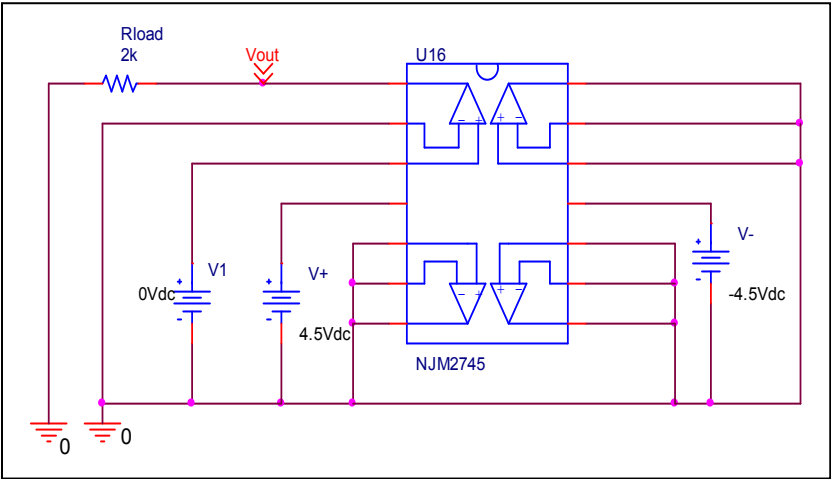
Output Voltage Swing
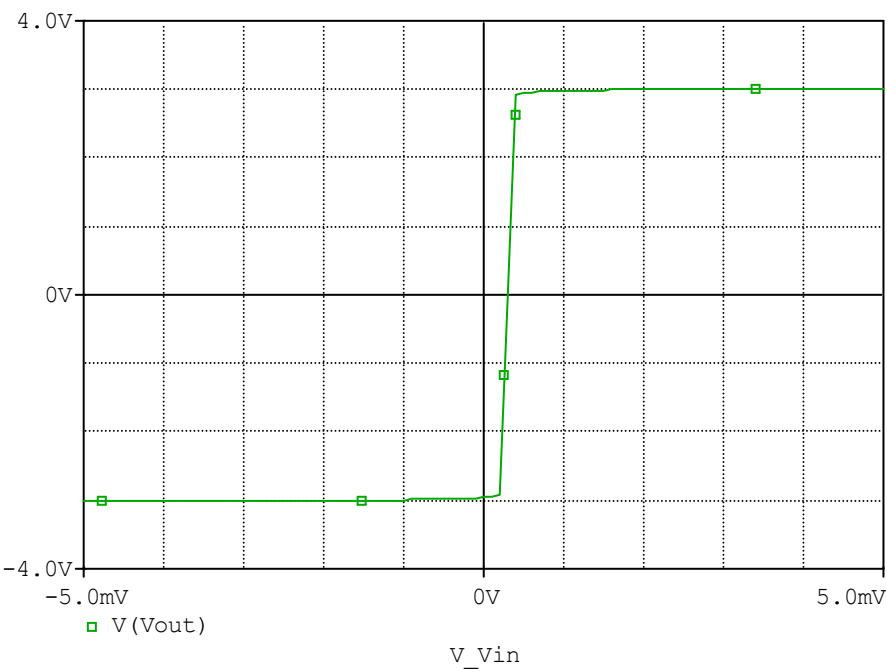
□ V(Vout)

V_V1
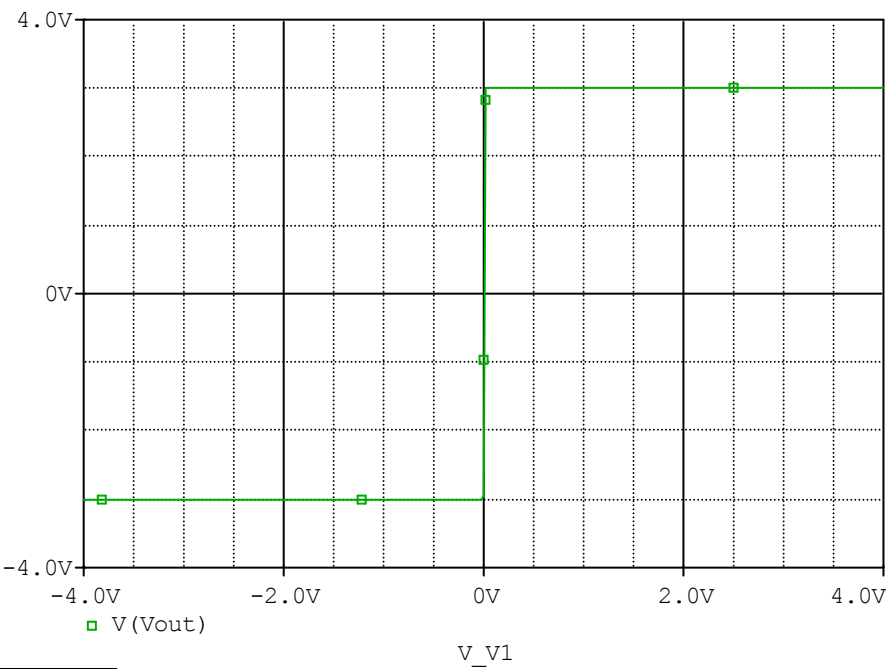
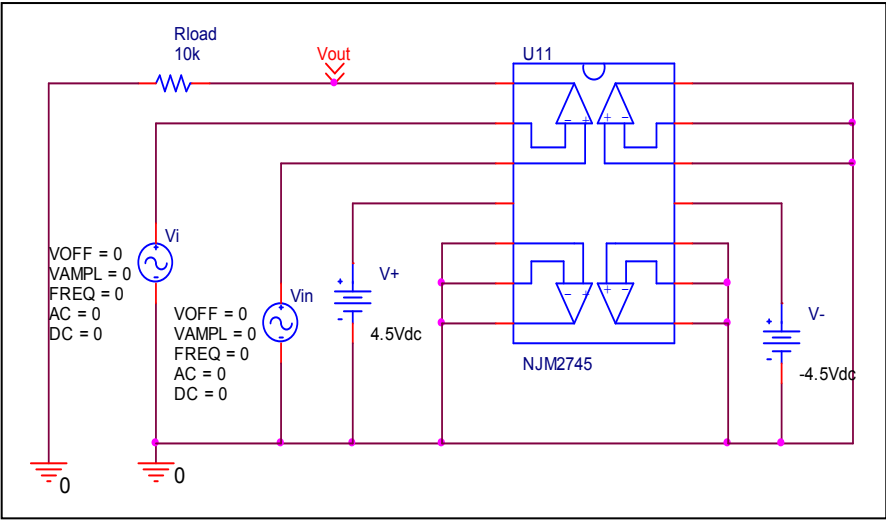## Evaluation circuit

Comparison table

Output Voltage Swing	Data sheet	Simulation	%Error
+Vom	3.000	3.000	0.000
-Vom	-3.000	-3.000	0.000

Input Offset Voltage

Simulation result

Evaluation circuit

Comparison table

Vos	Measurement		Simulation		Error	
	0.300	mV	0.300	mV	0.000	%

Slew Rate

Simulation result
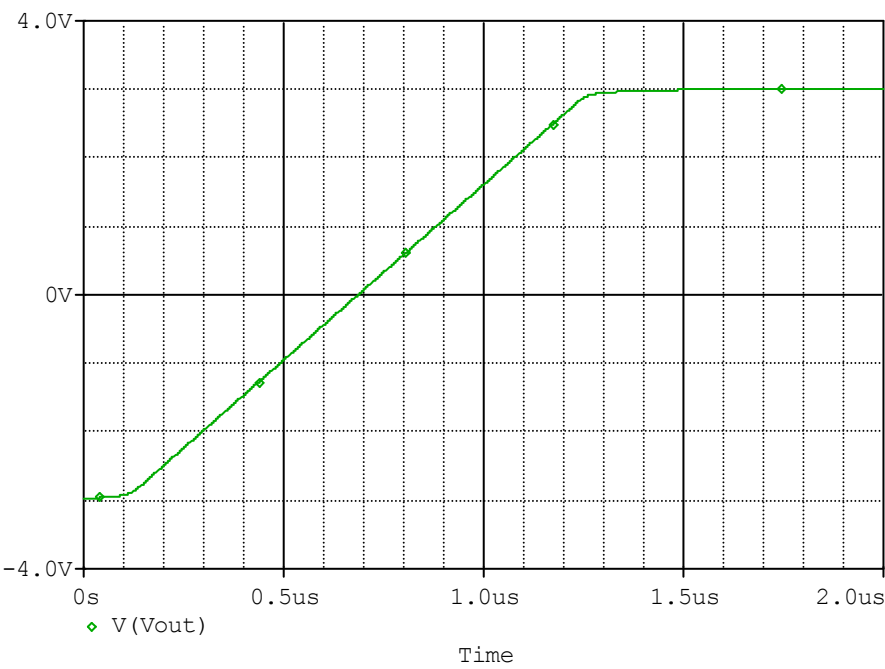
Evaluation circuit
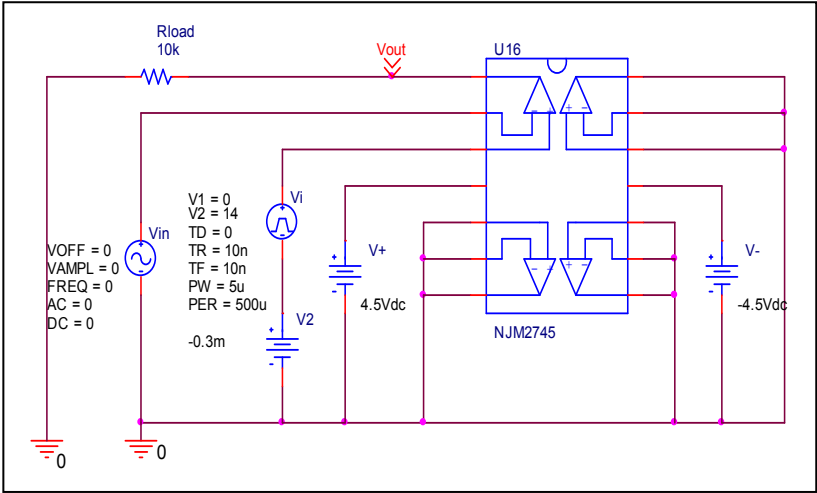
Comparison table

Slew Rate(v/us)	Data sheet	Simulation	%Error
	5.000	5.126	2.520

Input current

Simulation result
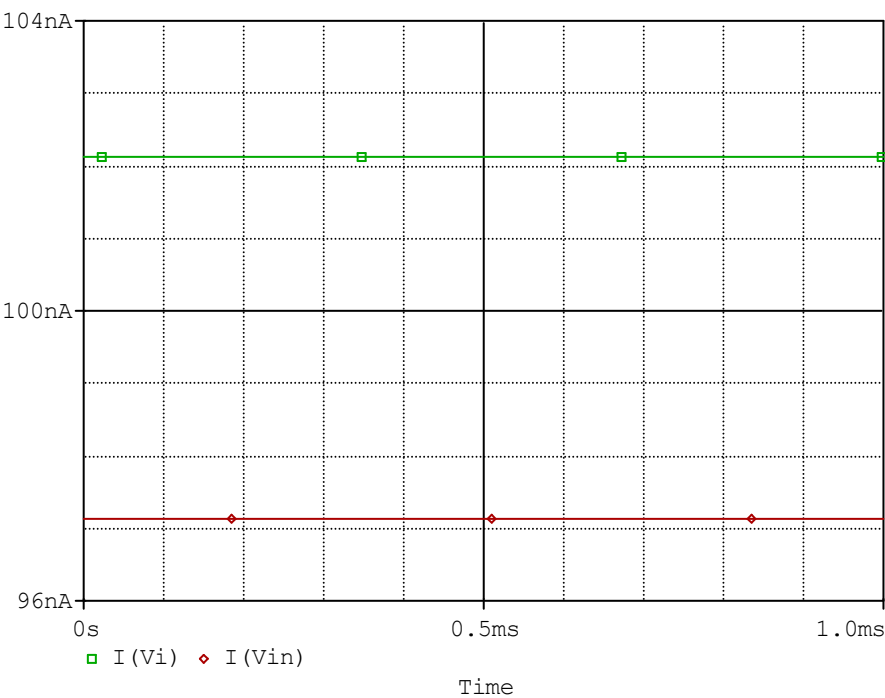
Evaluation circuit
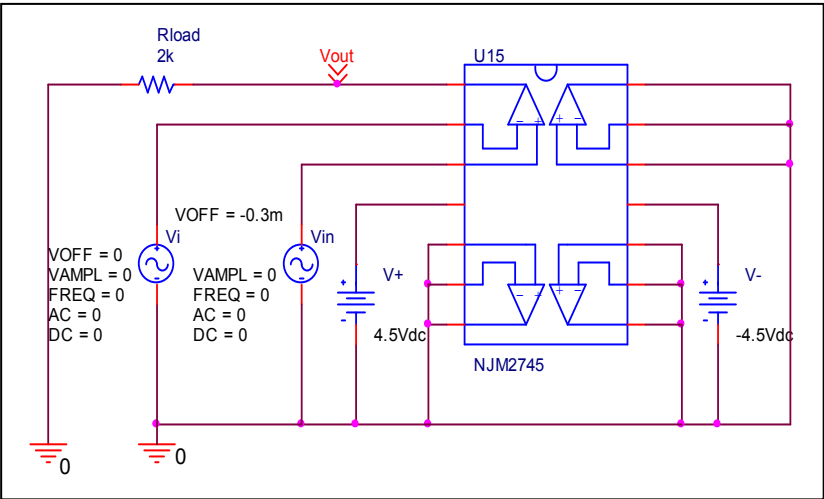
Comparison table

	Data sheet	Simulation	%Error
Ib(nA)	100.000	99.682	-0.318
Ibos(nA)	5.000	5.019	0.380

Open Loop Voltage Gain vs. Frequency

Simulation result

DB(V(Vout)/V(Vin:+))
Frequency
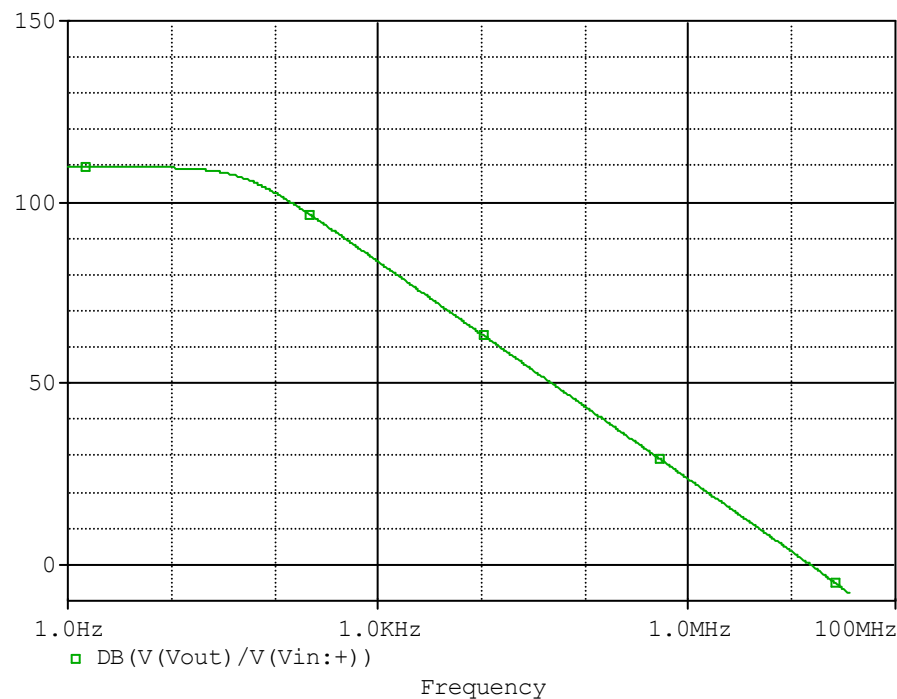
Evaluation circuit
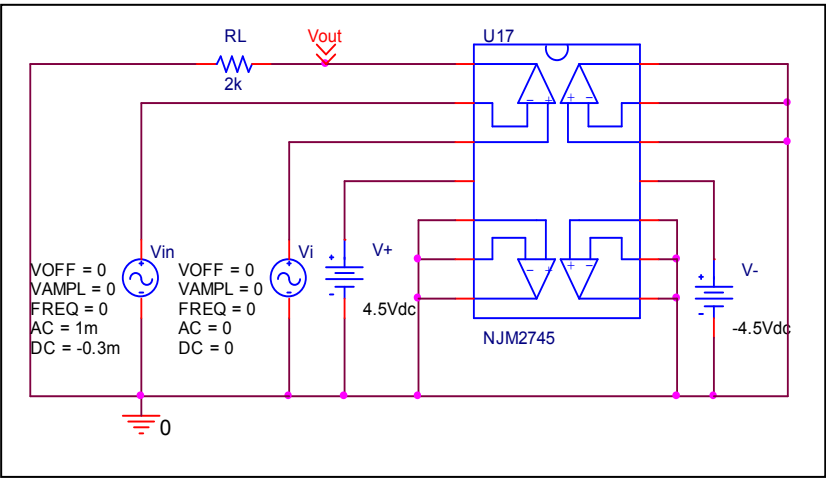
Comparison table

	Data sheet	Simulation	%Error
f-0dB(MHz)	15.000	15.031	0.207
Av-dc	110.000	109.651	-0.317

Common-Mode Rejection Voltage gain

Simulation result
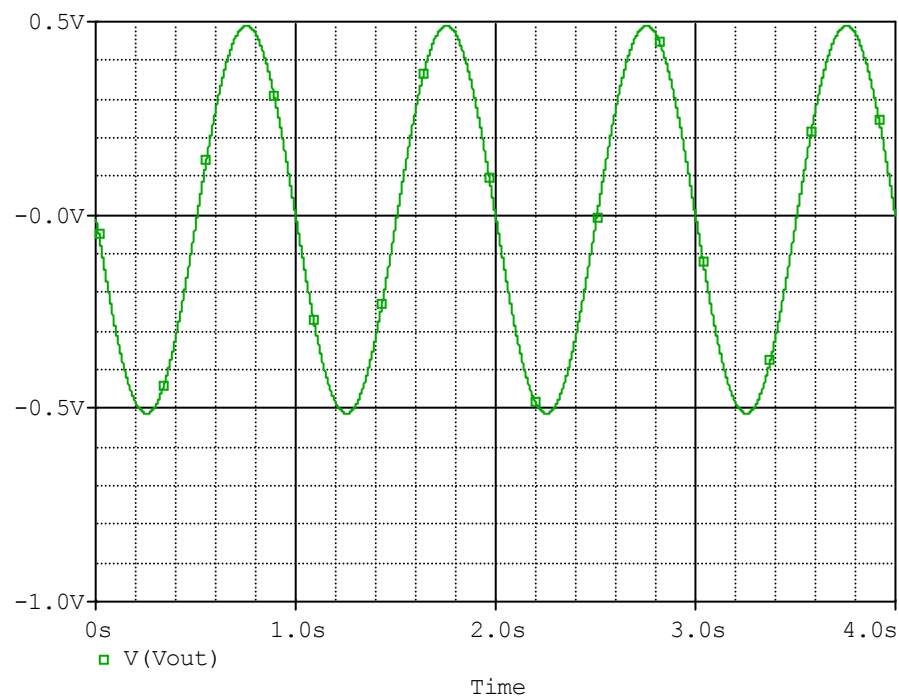
Evaluation circuit
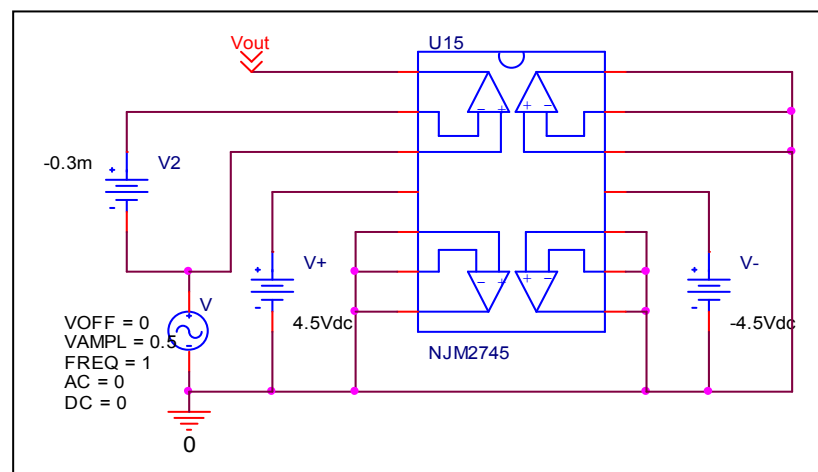
Common Mode Reject Ratio=303773.58/1.002 = 303167.245 = 109.633dB

Comparison table

CMRR(dB)	Data sheet	Simulation	%Error
	110.000	109.633	0.333