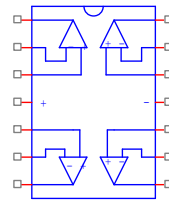# Device Modeling Report

COMPONENTS: OPERATIONAL AMPLIFIER
PART NUMBER:NJM084
MANUFACTURER: NEW JAPAN RADIO CO.,LTD

Bee Technologies Inc.

Spice Model


```
*$
* PART NUMBER:NJM084
* MANUFACTURER: NEW JAPAN RADIO
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.Subckt NJM084 OUT1 -IN1 +IN1 V+ +IN2 -IN2 OUT2 OUT3 -IN3 +IN3 V-
+ +IN4 -IN4 OUT4
X_U1     +IN1 -IN1 V+ V- OUT1 NJM084_S
X_U2     +IN2 -IN2 V+ V- OUT2 NJM084_S
X_U3     +IN3 -IN3 V+ V- OUT3 NJM084_S
X_U4     +IN4 -IN4 V+ V- OUT4 NJM084_S
.ends  NJM084
.subckt NJM084_S  1 2 3 4 5
 c1   11 12 2.8868E-12
 c2    6  7 10.000E-12
 css 10 99 1.0000E-30
 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 50.810E6 -1E3 1E3 51E6 -51E6
 ga    6  0 11 12 157.08E-6
 gcm   0  6 10 99 20.095E-9
 iss   3 10 dc 130.00E-6
 hlim 90  0 vlim 1K
 j1   11  2 10 jx1
 j2   12  1 10 jx2
 r2    6  9 100.00E3
 rd1   4 11 6.3662E3
 rd2   4 12 6.3662E3
 ro1   8  5 50
 ro2   7 99 25
 rp    3  4 1.8000E3
 rss  10 99 1.5385E6
 vb    9  0 dc 0
 vc    3 53 dc 2.2147
 ve   54  4 dc 2.2147
 vlim  7  8 dc 0
 vlp  91  0 dc .8
 vln   0 92 dc .8
.model dx D(Is=800.00E-18)
.model dy D(Is=800.00E-18 Rs=1m Cjo=10p)
.model jx1 PJF(Is=8.7500E-12 Beta=189.80E-6 Vto=-.9975)
.model jx2 PJF(Is=6.2500E-12 Beta=189.80E-6 Vto=-1.002500)
.ends
*$
```
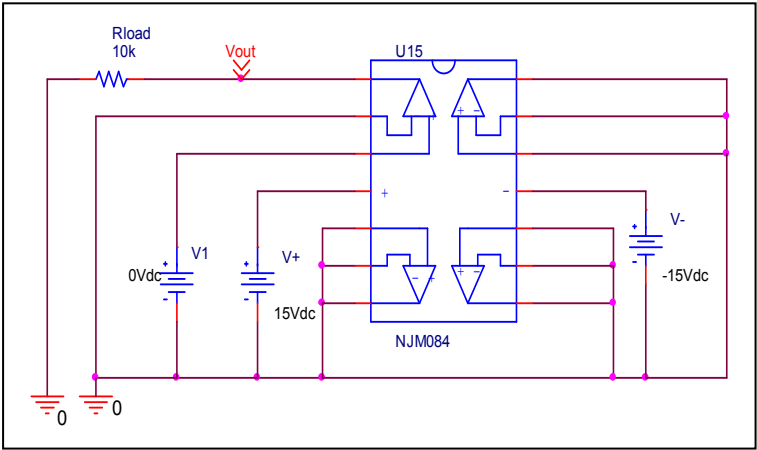
Output Voltage Swing

V(Vout)

V_V1
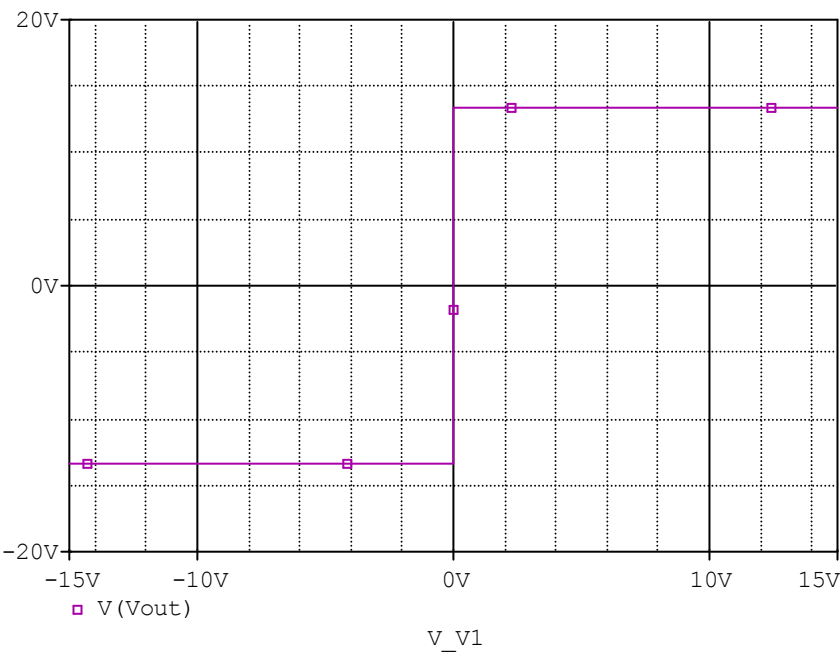
Evaluation circuit

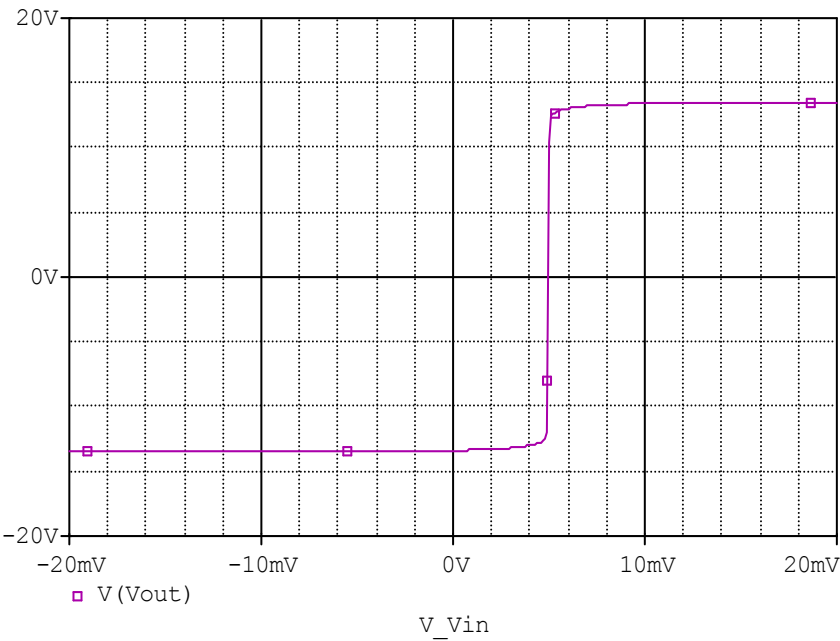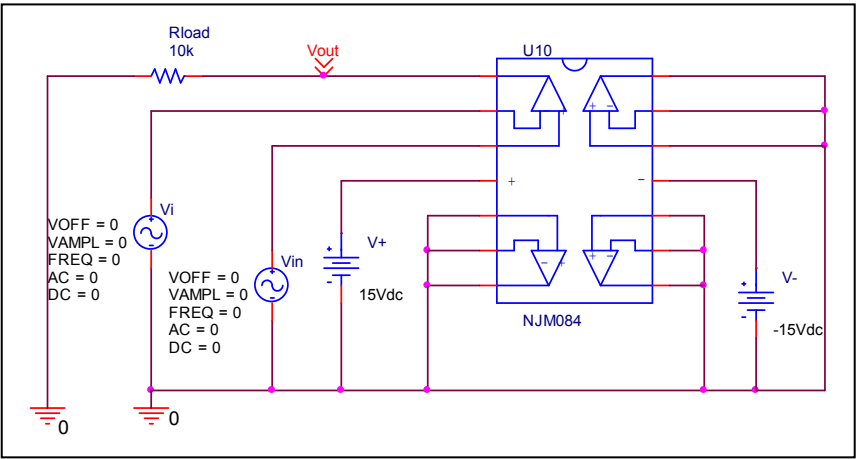Comparison table

Output Voltage Swing	Data sheet	Simulation	%Error
Vopp	27	26.894	-0.392

Input Offset Voltage

Simulation result

Evaluation circuit

Comparison table

Vos	Measurement		Simulation		Error	
	5	mV	4.954	mV	-0.92	%

Slew Rate

Simulation result

◇ V(Vout)

Time
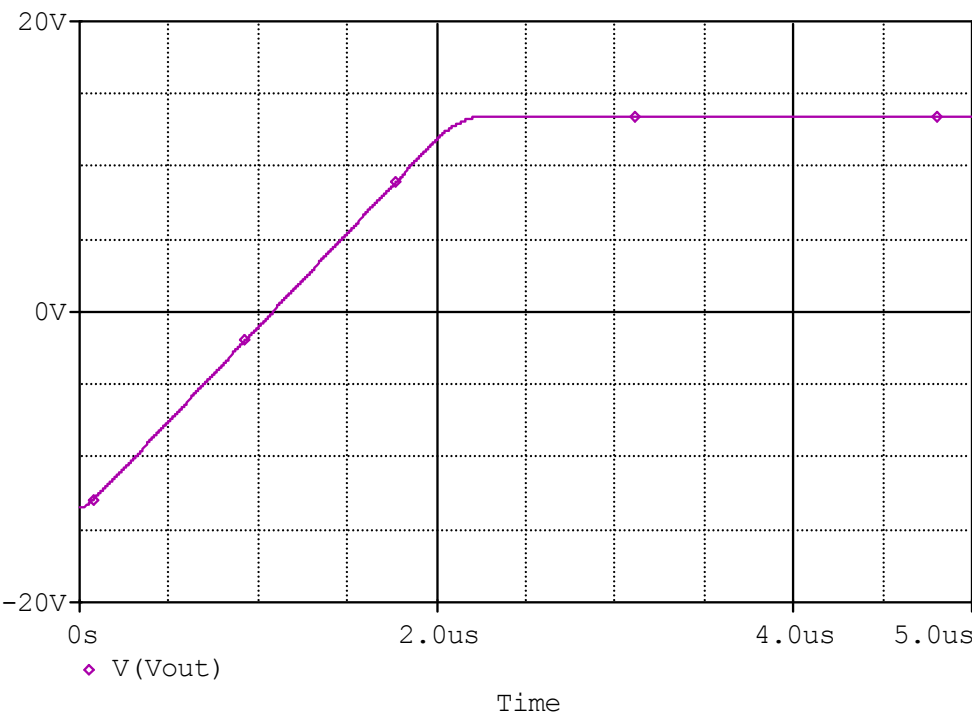
Evaluation circuit
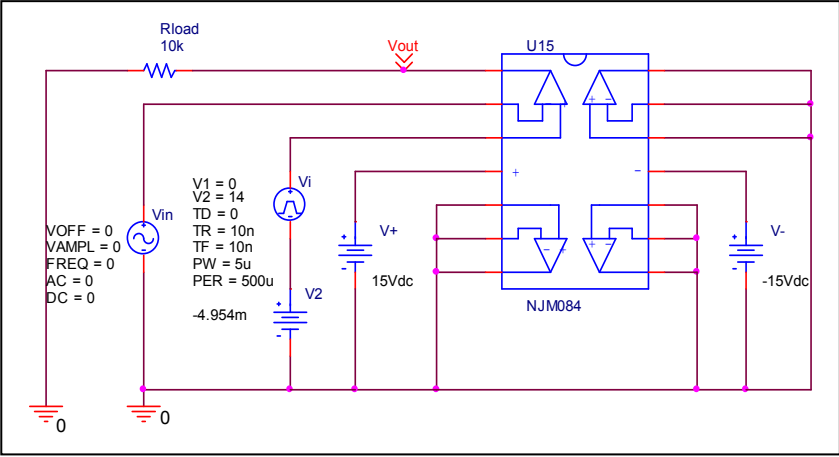
Comparison table

Slew Rate(v/us)	Data sheet	Simulation	%Error
	13	12.946	-0.415

Input current

	Data sheet	Simulation	%Error
Ib(nA)	30	29.997	-0.01
Ibos(nA)	5	5.024	0.48

Open Loop Voltage Gain vs. Frequency

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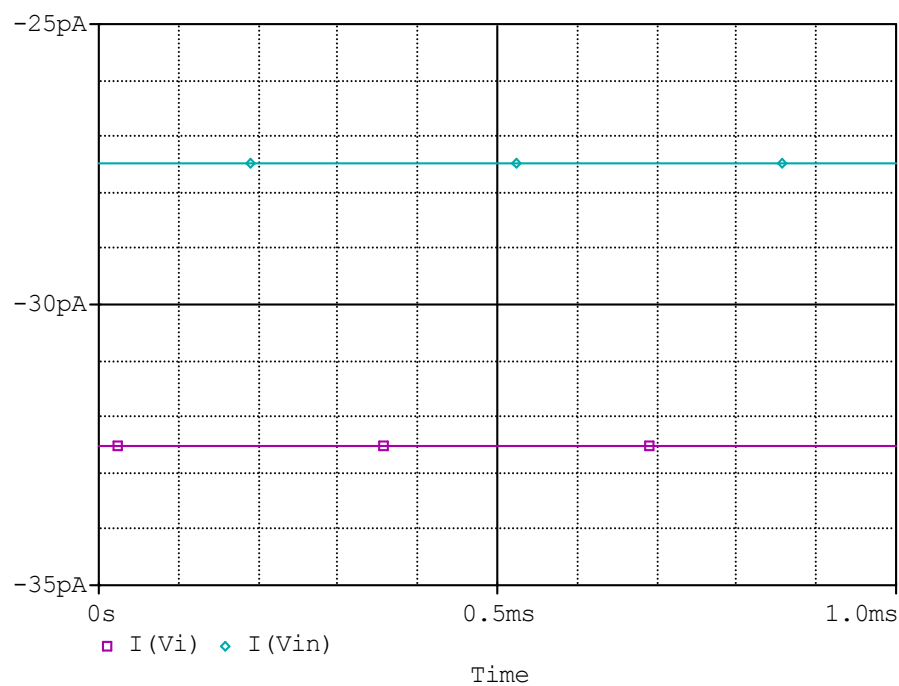
Frequency
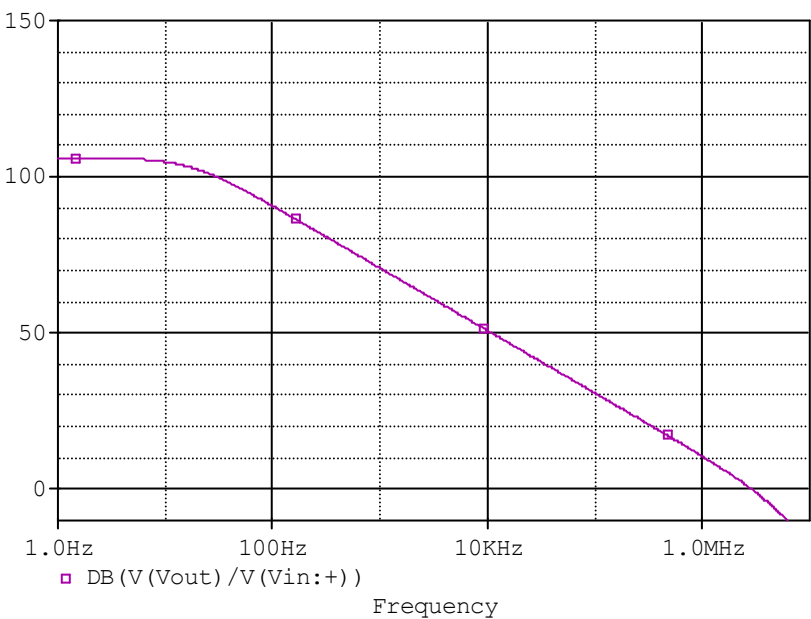
Evaluation circuit
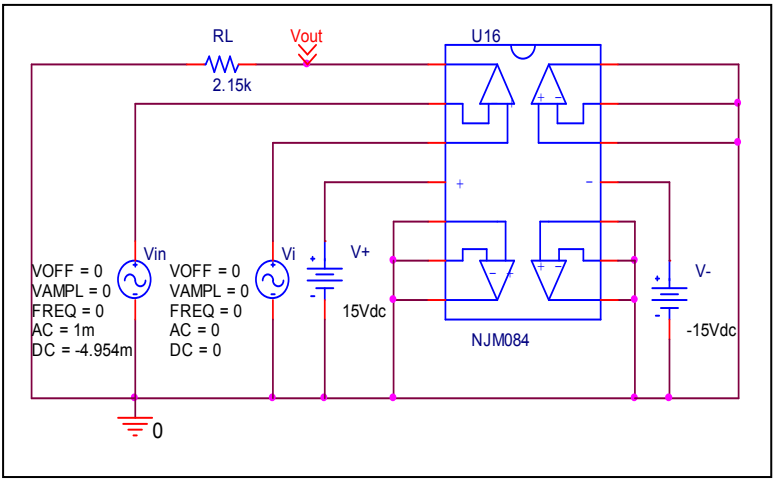
Comparison table

	Data sheet	Simulation	%Error
f-0dB(MHz)	3	2.884	-3.866
Av-dc	106	106.066	0.062

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Common-Mode Rejection Voltage gain

V(Vout)
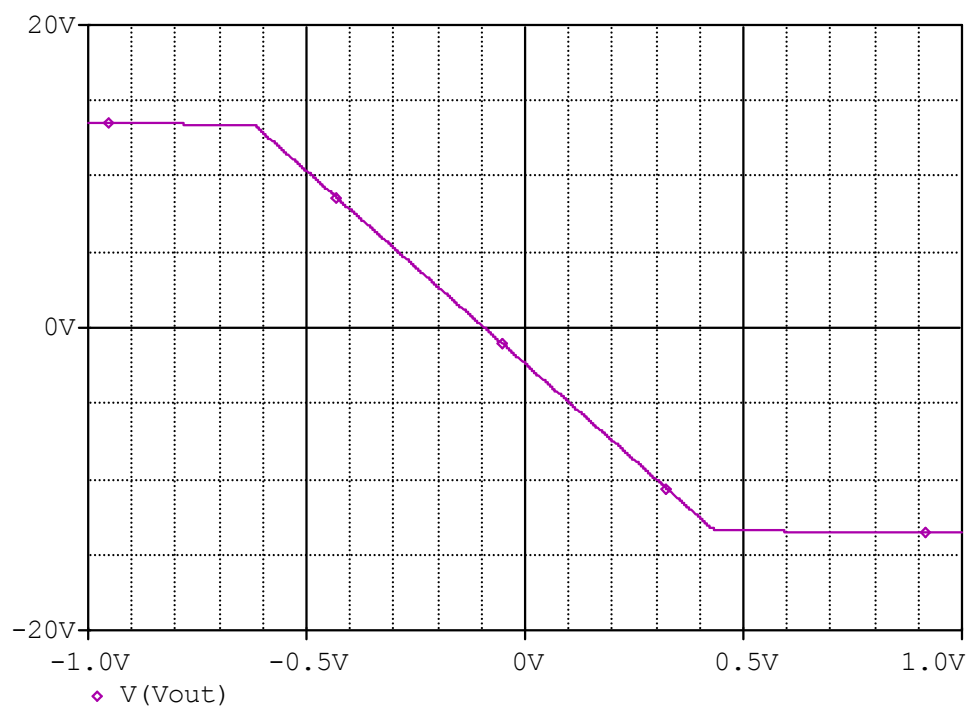
Evaluation circuit

Common Mode Reject Ratio=201048/25.484 = 7888.958 = 77.94dB

Comparison table

CMRR(dB)	Data sheet	Simulation	%Error
	76	77.94	-2.552

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