

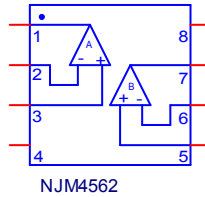
Device Modeling Report

COMPONENTS: OPERATIONAL AMPLIFIER
PART NUMBER: NJM4562
MANUFACTURER: NEW JAPAN RADIO CO., LTD



Bee Technologies Inc.

SPice Model



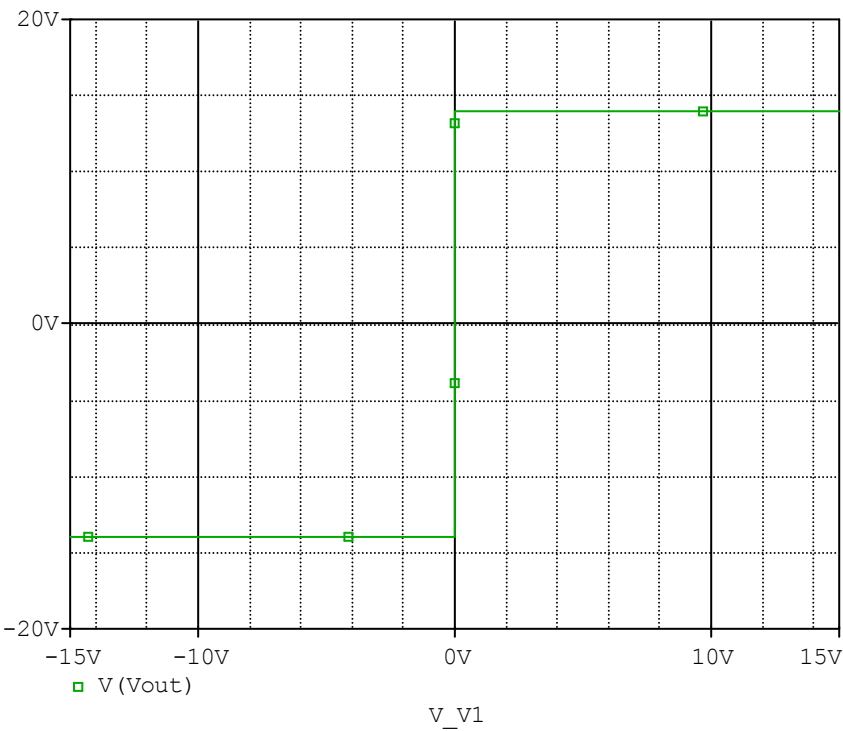
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*$
* PART NUMBER: NJM4562
* MANUFACTURER: NEW JAPAN RADIO
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.Subckt NJM4562 OUT1 -IN1 +IN1 V- +IN2 -IN2 OUT2 V+
X_U1  +IN1 -IN1 V+ V- OUT1 NJM4562_ME
X_U2  +IN2 -IN2 V+ V- OUT2 NJM4562_ME
.ends NJM4562
.subckt NJM4562_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 9.5866E6 -1E3 1E3 9E6 -9E6
ga  6 0 11 12 1.5815E-3
gcm 0 6 10 99 50.011E-9
iee 3 10 dc 78.208E-6
hlim 90 0 vlim 1K
q1  11 2 13 qx1
q2  12 1 14 qx2
r2  6 9 100.00E3
rc1 4 11 757.88
rc2 4 12 757.88
re1 13 10 94.452
re2 14 10 94.452
ree 10 99 2.5573E6
ro1 8 5 50
ro2 7 99 25
rp  3 4 1.8085E3
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 2.9300
vln 0 92 dc 2.9300
.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=318.63)
.model qx2 PNP(Is=1.008900E-15 Bf=455.61)
.ends
*$

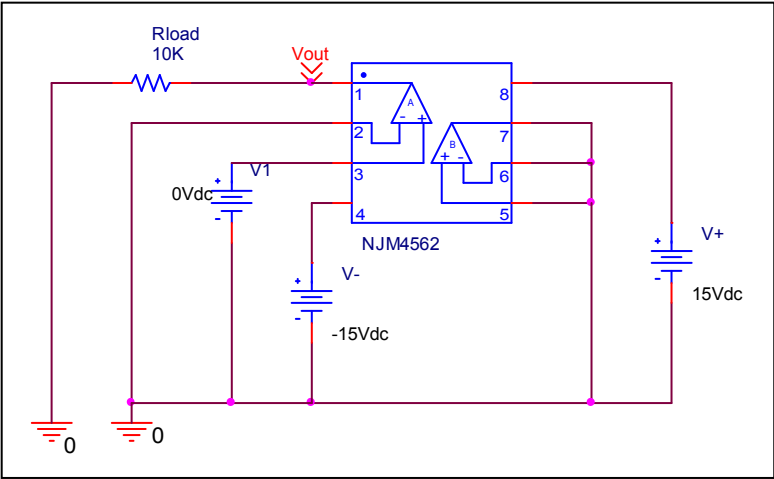
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Output Voltage Swing

Simulation result



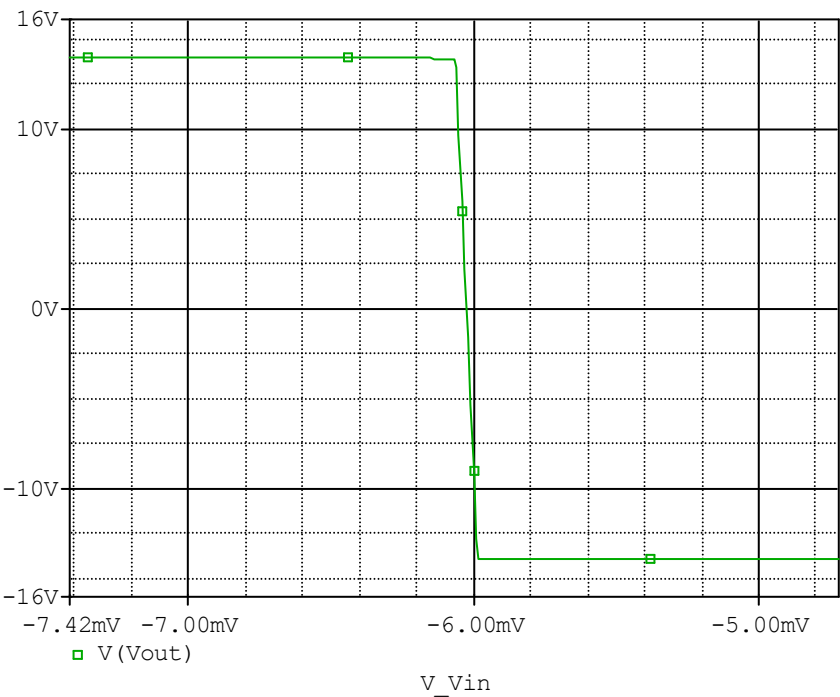
Evaluation circuit



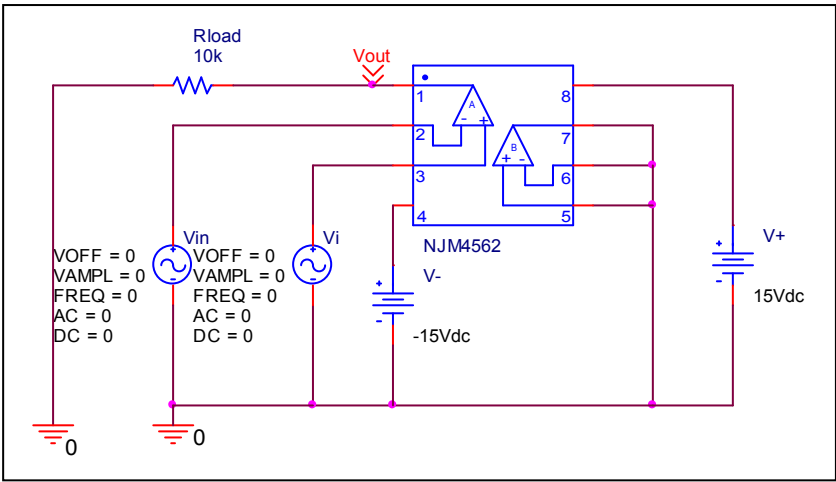
Output Voltage Swing	Data sheet	Simulation	%Error
+ $V_{out}(V)$	14.000	13.943	-0.407
- $V_{out}(V)$	14.000	13.943	-0.407

Input Offset Voltage

Simulation result



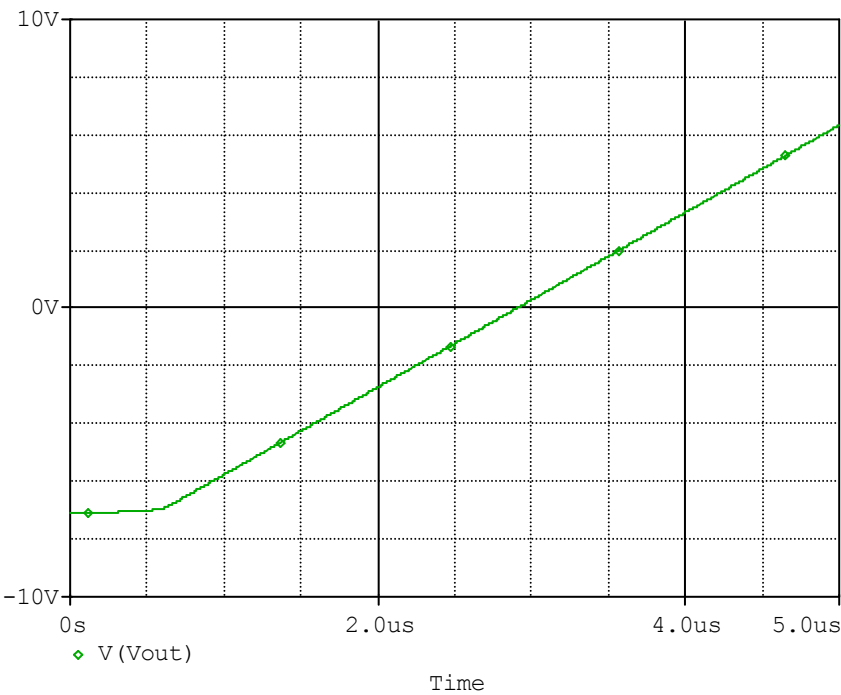
Evaluation circuit



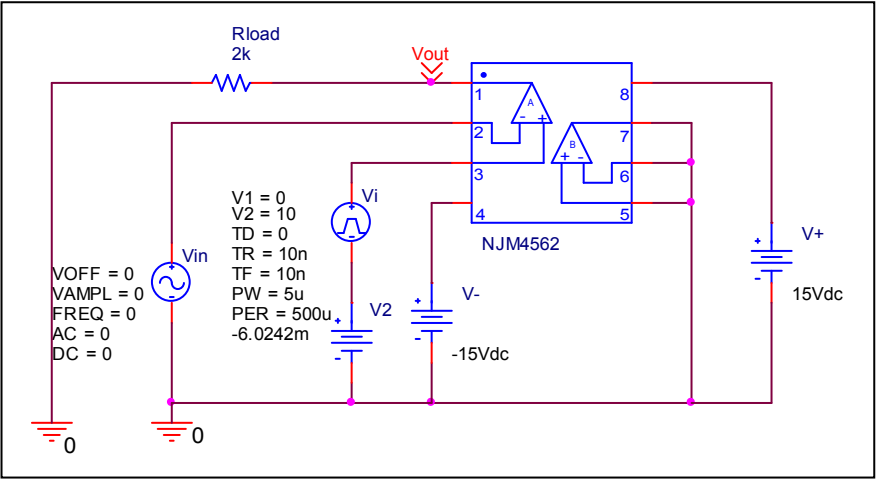
Vos	Measurement		Simulation		Error	
	6.000	mV	6.0242	mV	0.403	%

Slew Rate

Simulation result



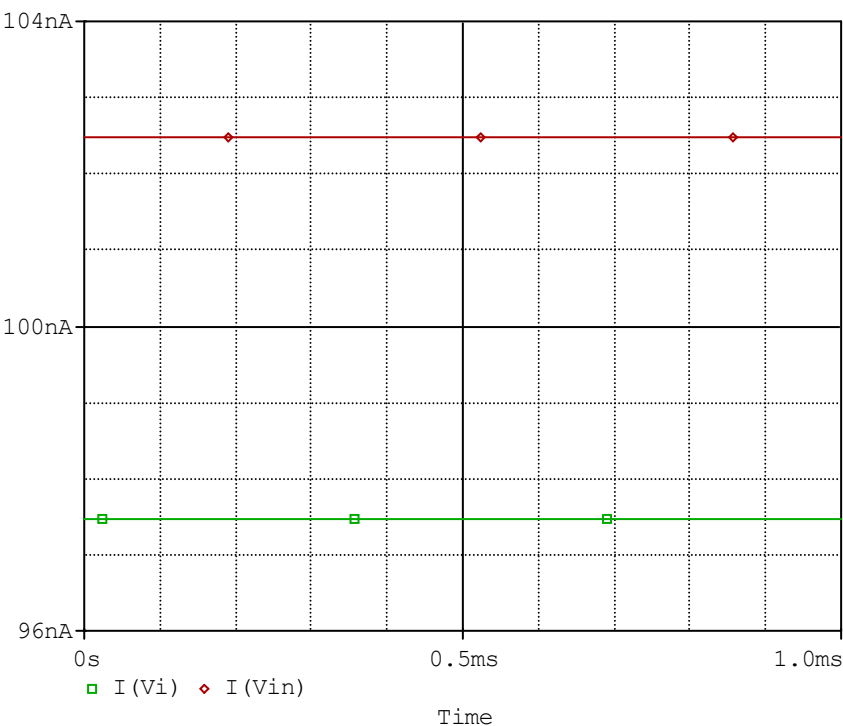
Evaluation circuit



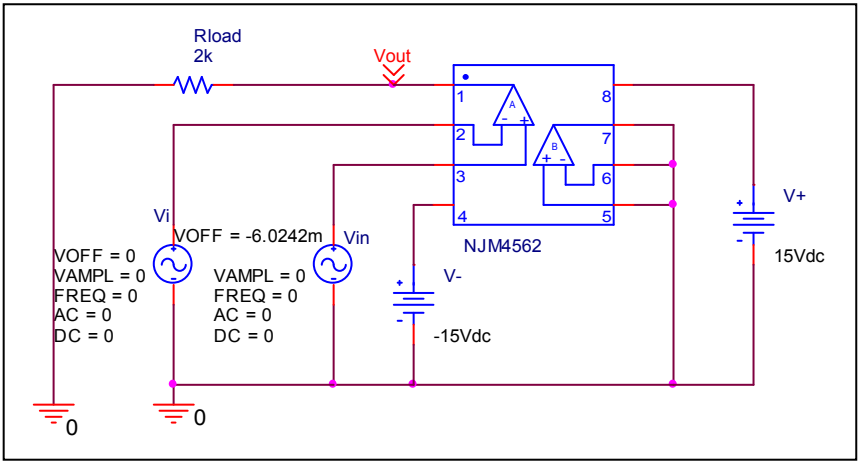
Slew Rate(v/us)	Data sheet	Simulation	%Error
	3.000	2.995	-0.167

Input current

Simulation result



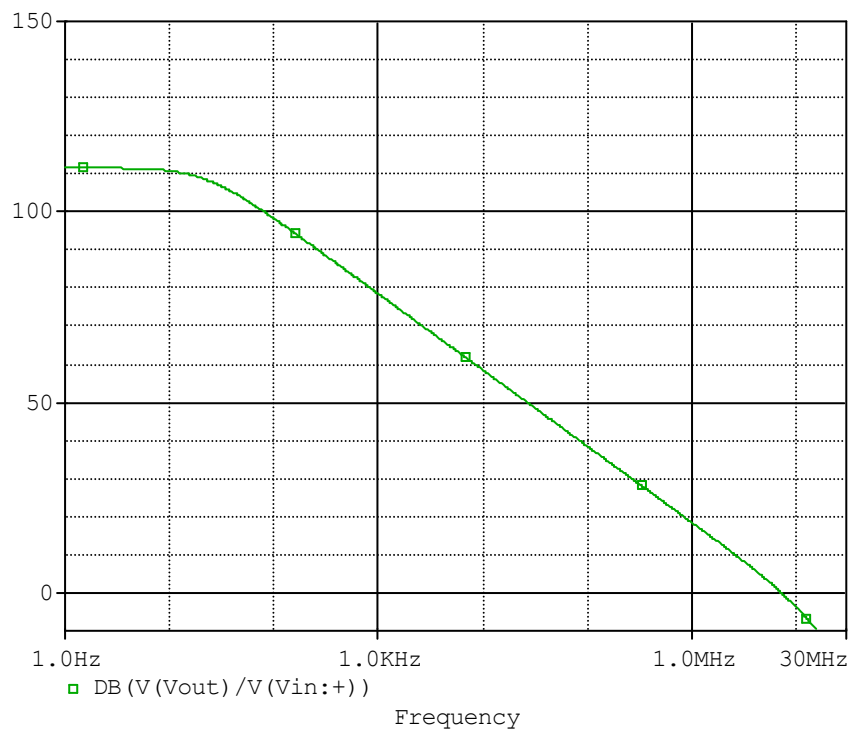
Evaluation circuit



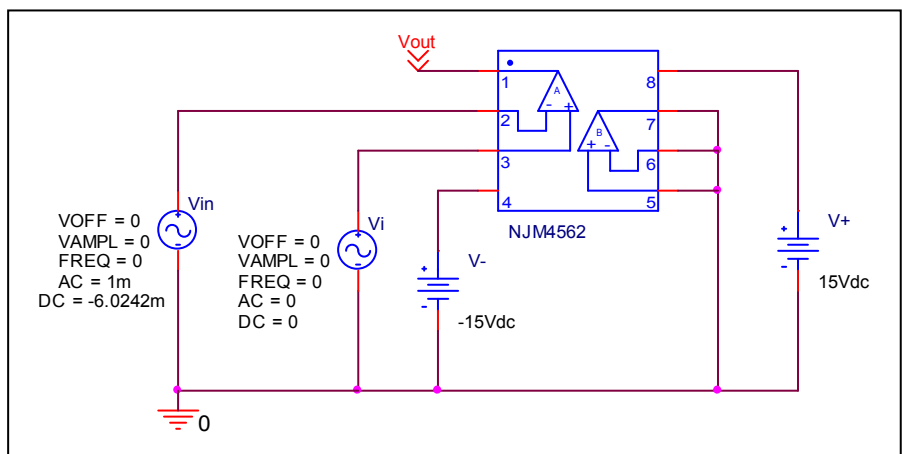
	Data sheet	Simulation	%Error
Ib(nA)	100.000	99.970	-0.030
Ibos(nA)	5.000	5.017	1.420

Open Loop Voltage Gain vs. Frequency

Simulation result



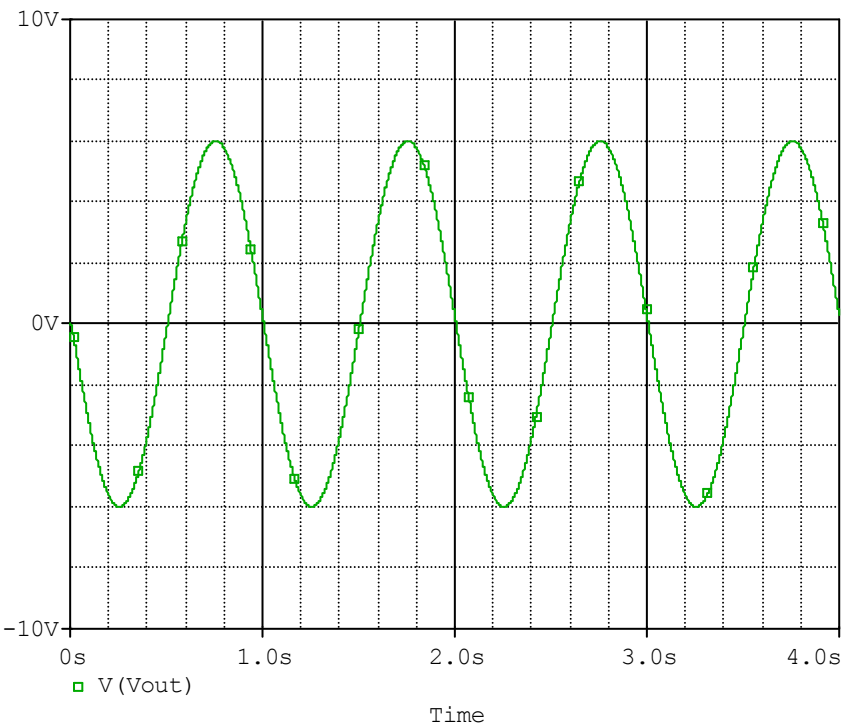
Evaluation circuit



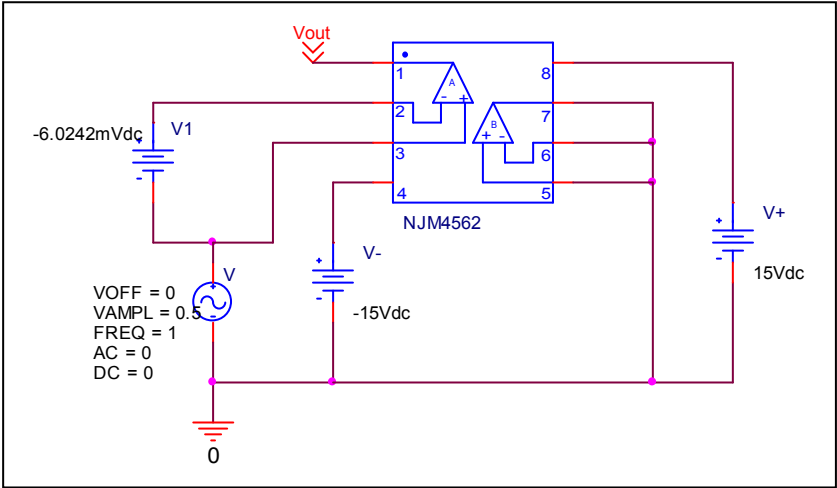
	Data sheet	Simulation	%Error
f-0dB(MHz)	7.000	7.008	0.114
Av-dc(dB)	110.000	110.022	0.020

Common-Mode Rejection Voltage gain

Simulation result



Evaluation circuit



Common Mode Reject Ratio= $317029/11.992=26436.707$

CMRR	Data sheet	Simulation	%Error
	90.000	88.444	-1.729