

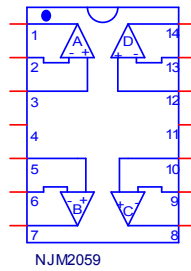
Device Modeling Report

COMPONENTS: OPERATIONAL AMPLIFIER
PART NUMBER: NJM2059
MANUFACTURER: NEW JAPAN RADIO CO., LTD



Bee Technologies Inc.

Spice Model



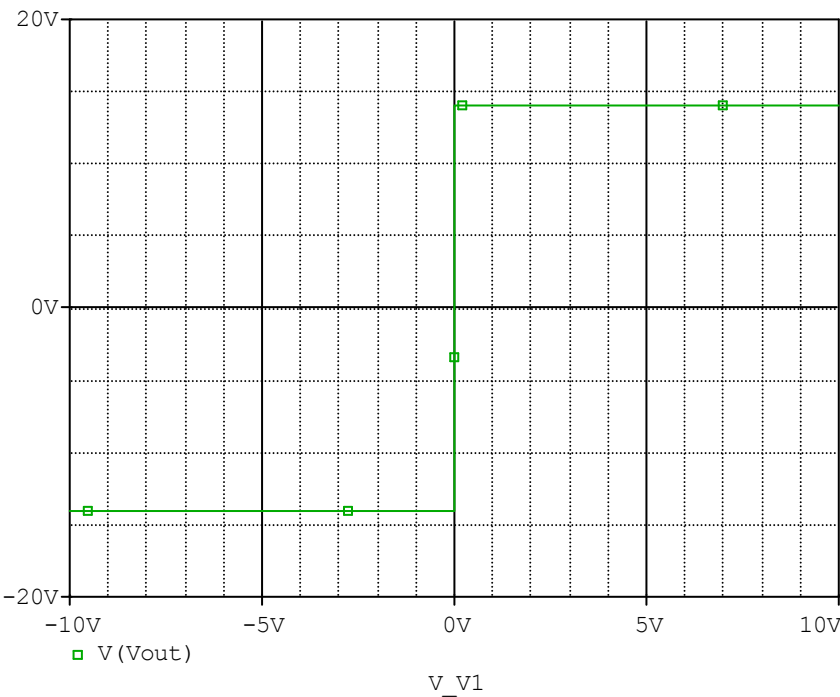
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*$
* PART NUMBER: NJM2059
* MANUFACTURER: NEW JAPAN RADIO
* All Rights Reserved Copyright (c) Bee Technologies Inc. 2006
.Subckt NJM2059 OUT1 -IN1 +IN1 V+ +IN2 -IN2 OUT2 OUT3 -IN3 +IN3 V-
+ +IN4 -IN4 OUT4
X_U1  +IN1 -IN1 V+ V- OUT1 NJM2059_ME
X_U2  +IN2 -IN2 V+ V- OUT2 NJM2059_ME
X_U3  +IN3 -IN3 V+ V- OUT3 NJM2059_ME
X_U4  +IN4 -IN4 V+ V- OUT4 NJM2059_ME
.ends  NJM2059
.subckt NJM2059_ME 1 2 3 4 5
c1  11 12 8.0829E-12
c2  6 7 28.000E-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 3.4505E6 -1E3 1E3 3E6 -3E6
ga  6 0 11 12 1.1592E-3
gcm 0 6 10 99 36.658E-9
iee 3 10 dc 60.042E-6
hlim 90 0 vlim 1K
q1  11 2 13 qx1
q2  12 1 14 qx2
r2  6 9 100.00E3
rc1 4 11 862.63
rc2 4 12 862.63
re1 13 10 .48853
re2 14 10 .48853
ree 10 99 3.3310E6
ro1 8 5 50
ro2 7 99 25
rp  3 4 1.2890E3
vb  9 0 dc 0
vc  3 53 dc 1.7708
ve  54 4 dc 1.7708
vlim 7 8 dc 0
vlp 91 0 dc 6.5000
vln 0 92 dc 6.5000
.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=1.2931E3)
.model qx2 PNP(Is=1.008900E-15 Bf=1.5957E3)
.ends
*$

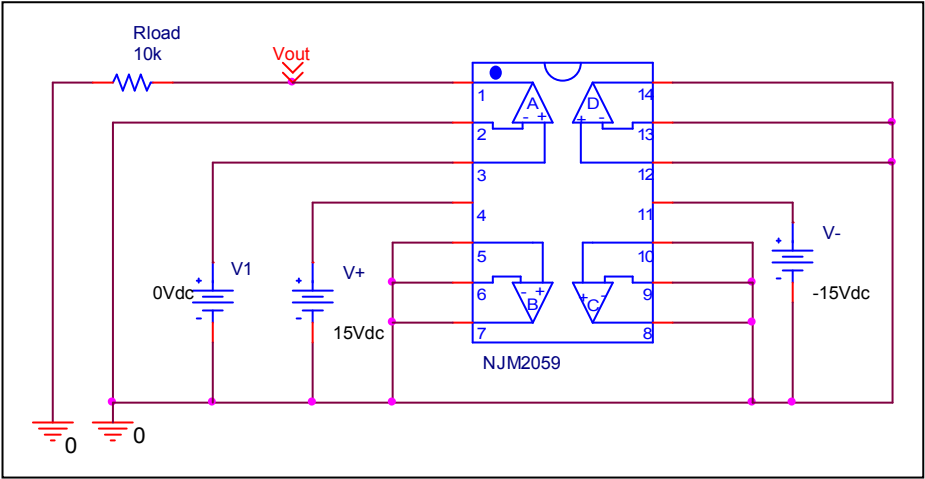
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Output Voltage Swing

Simulation result



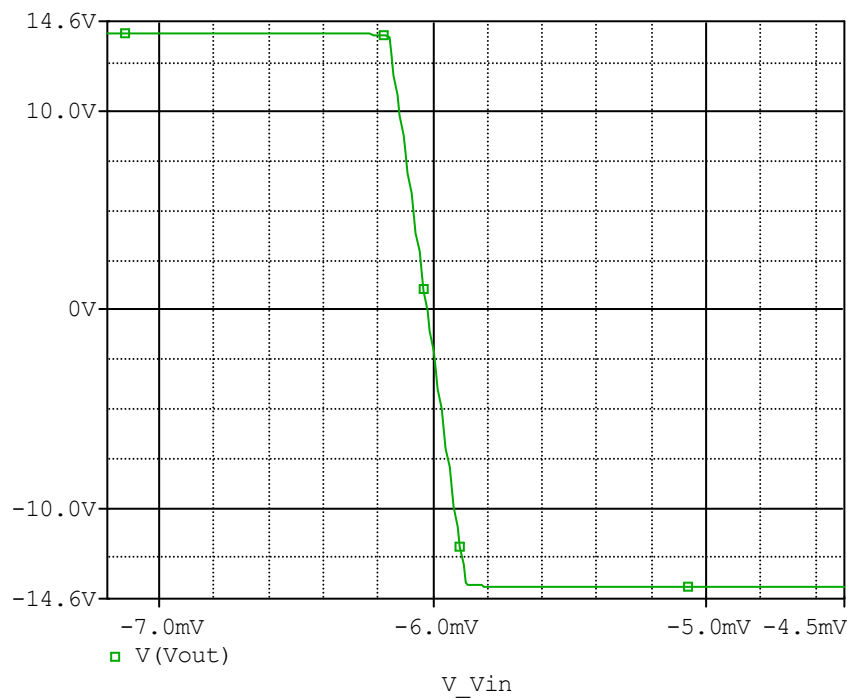
Evaluation circuit



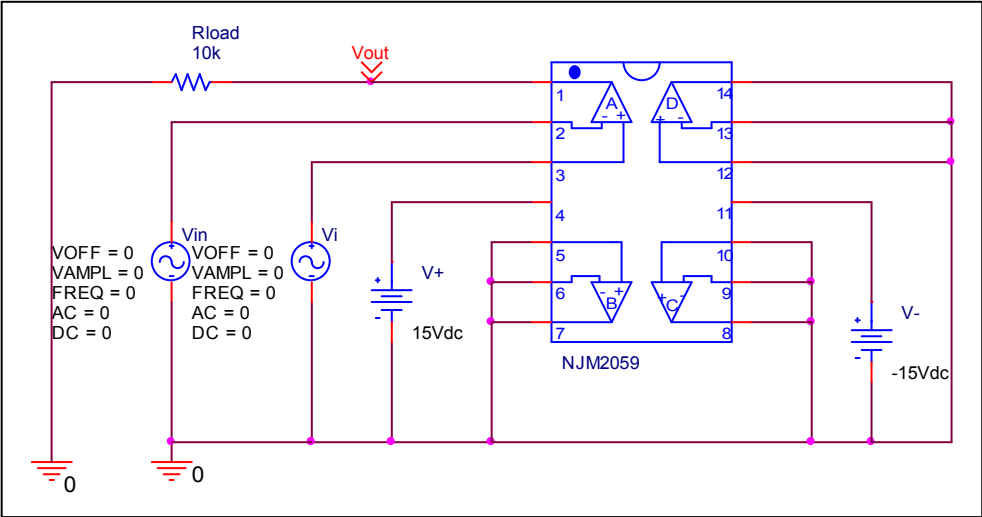
Output Voltage Swing	Data sheet	Simulation	%Error
+Vout(V)	+14.000	13.995	0.035
-Vout(V)	-14.000	-13.995	0.035

Input Offset Voltage

Simulation result



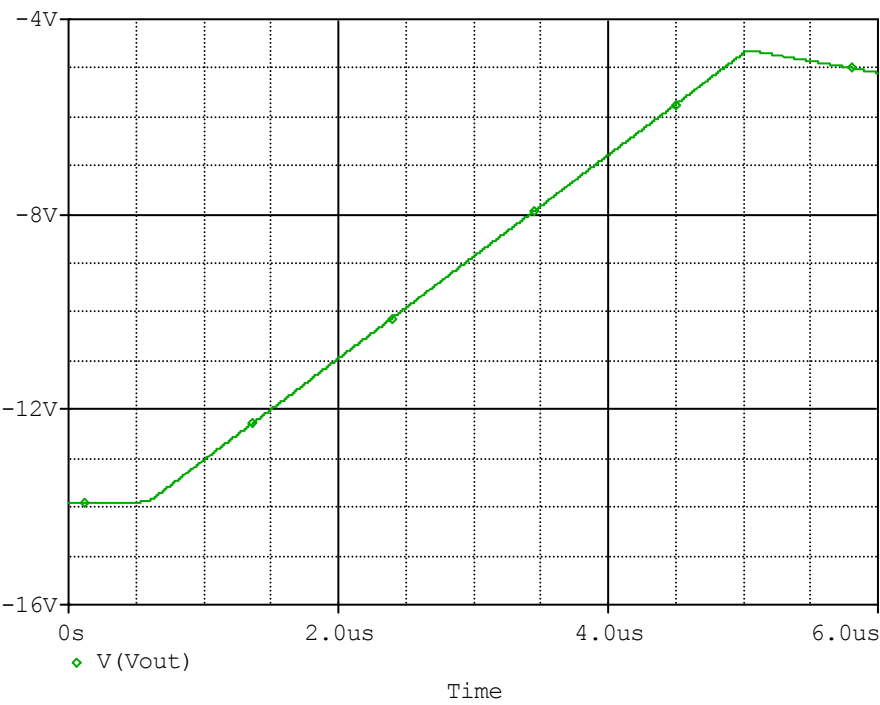
Evaluation circuit



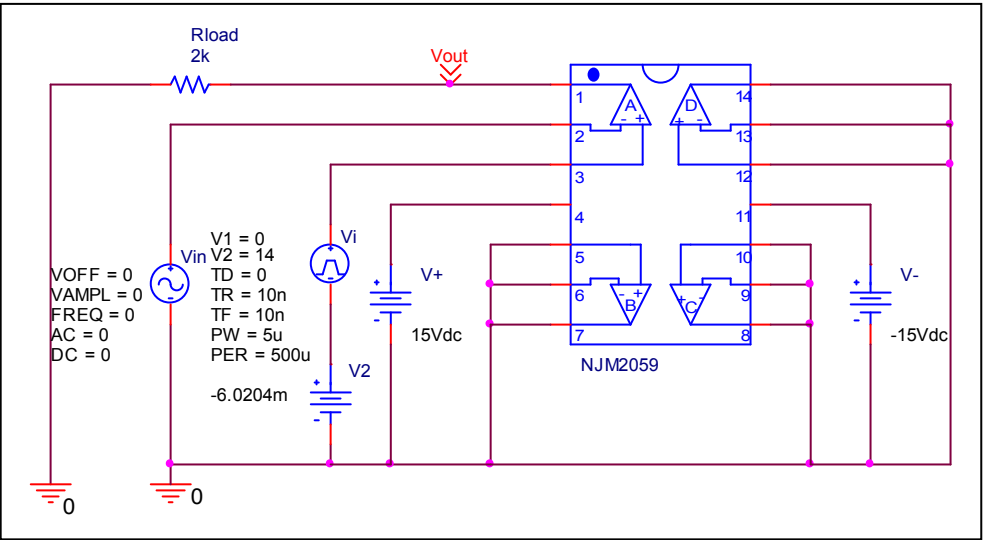
Vos	Measurement		Simulation		Error	
	6	mV	6.0204	mV	0.34	%

Slew Rate

Simulation result



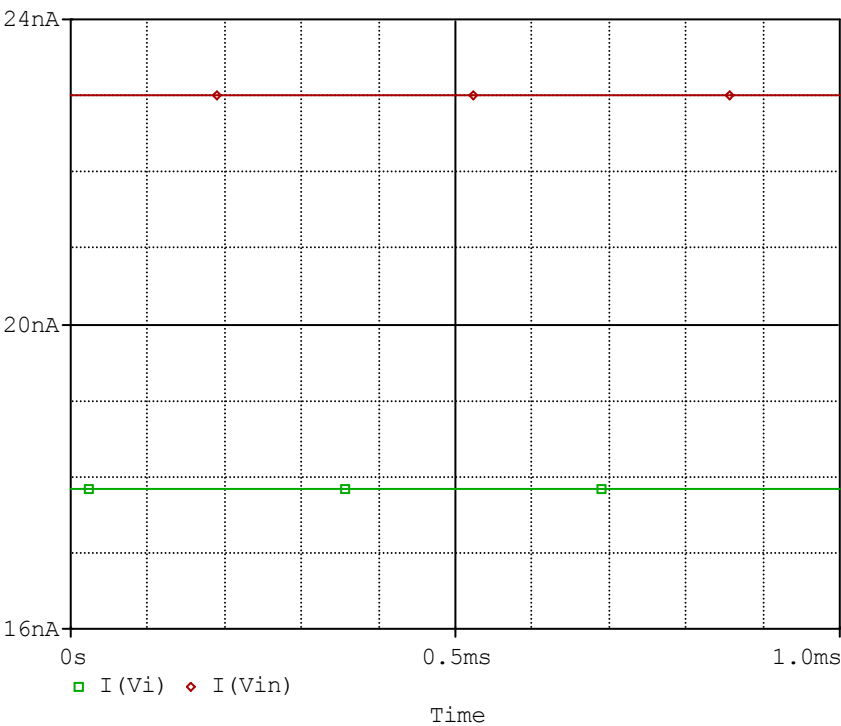
Evaluation circuit



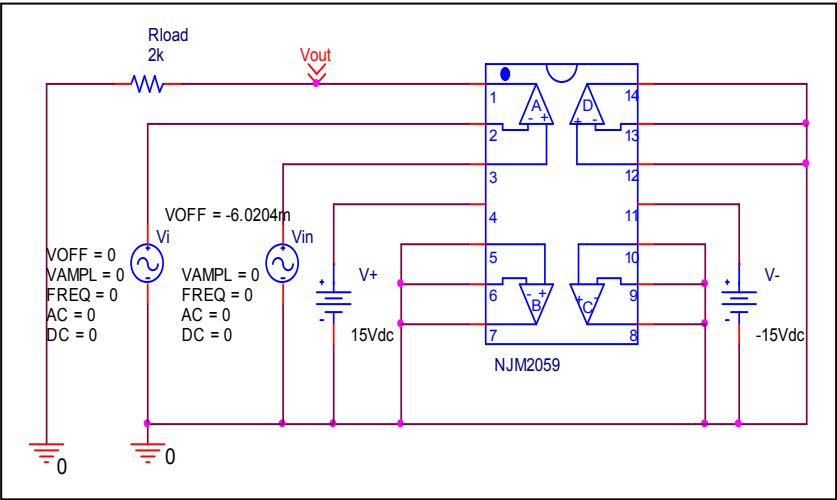
Slew Rate(v/us)	Data sheet	Simulation	%Error
	2.000	2.081	4.050

Input current

Simulation result



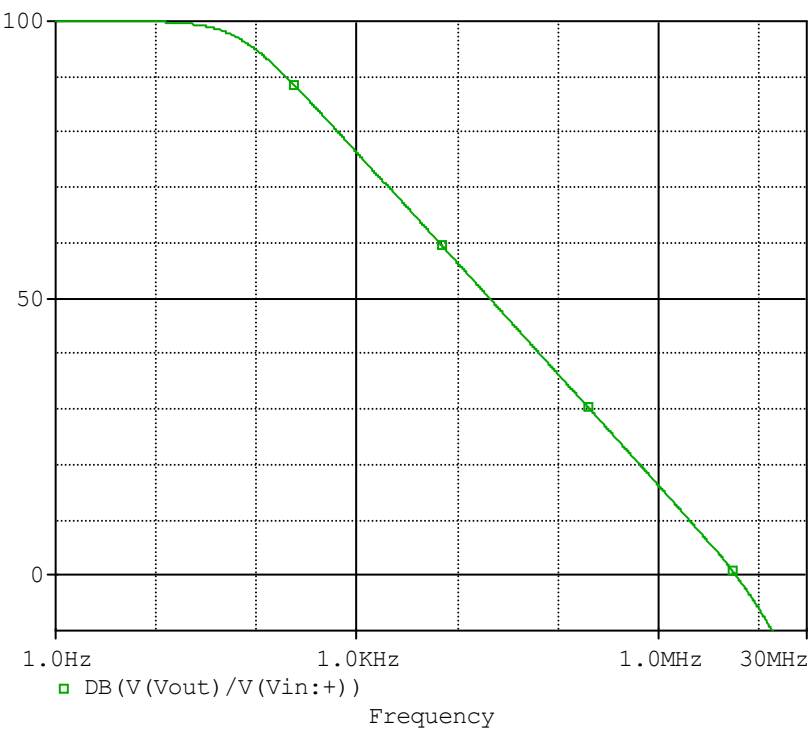
Evaluation circuit



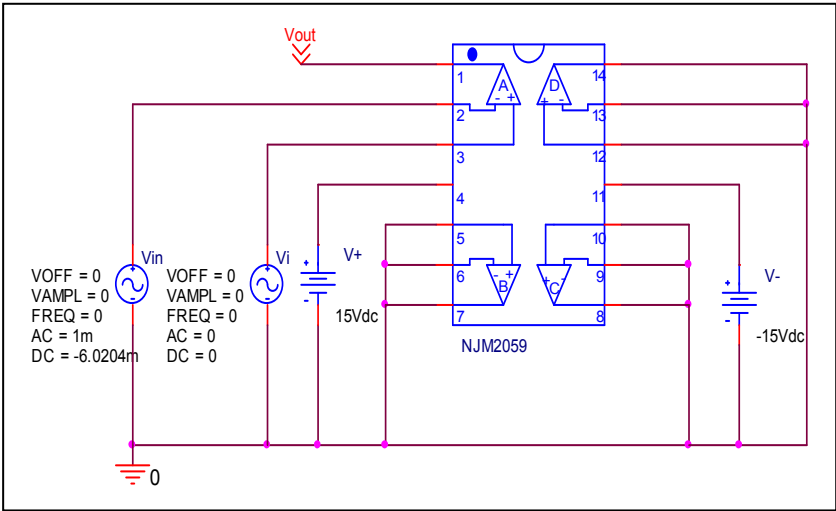
	Data sheet	Simulation	%Error
Ib(nA)	20.000	20.418	2.090
Ibos(nA)	5.000	5.170	3.400

Open Loop Voltage Gain vs. Frequency

Simulation result



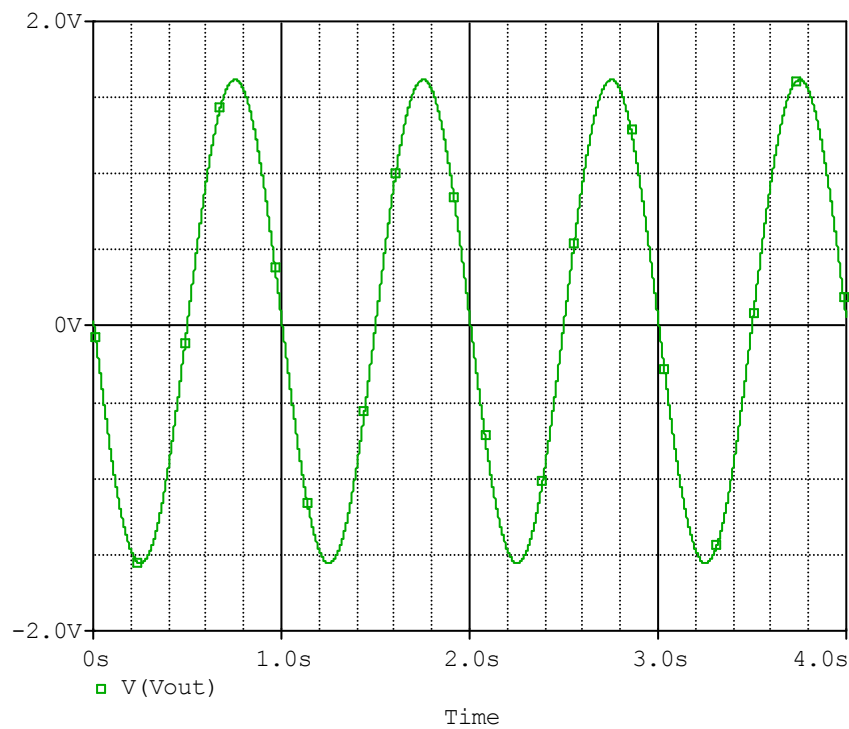
Evaluation circuit



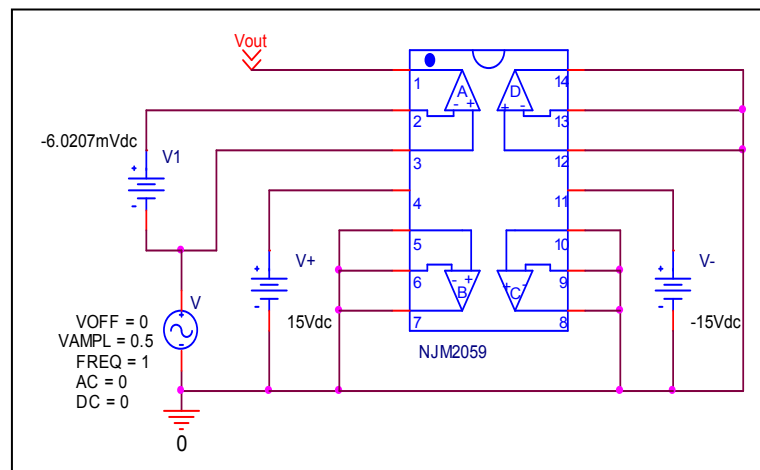
	Data sheet	Simulation	%Error
f-0dB(MHz)	6.000	5.944	0.933
Av-dc(dB)	100.000	99.972	0.028

Common-Mode Rejection Voltage gain

Simulation result



Evaluation circuit



Common Mode Rejection Ratio=99678/3.171=31434.247

CMRR	Data sheet	Simulation	%Error
	90	89.948	-0.057