

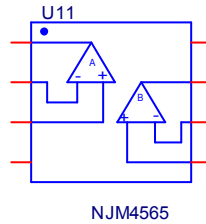
Device Modeling Report

COMPONENTS:MOSFET: OPERATIONAL AMPLIFIER
PART NUMBER:NJM4565
MANUFACTURER: NEW JAPAN RADIO CO.,LTD



Bee Technologies Inc.

Spice Model



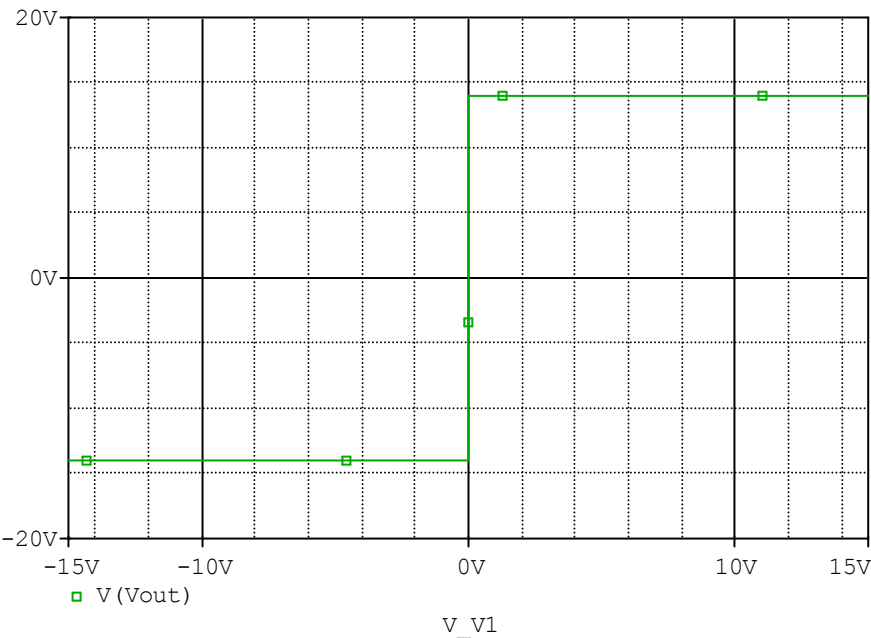
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*$
* PART NUMBER:NJM4565
* MANUFACTURER: NEW JAPAN RADIO
* All Rights Reserved Copyright (c) Bee Technologies Inc. 2007
.Subckt NJM4565 OUT1 -IN1 +IN1 VEE +IN2 -IN2 OUT2 VCC
X_U1  +IN1 -IN1 VCC VEE OUT1 NJM4565_ME
X_U2  +IN2 -IN2 VCC VEE OUT2 NJM4565_ME
.ends  NJM4565
.subckt NJM4565_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 2.1221E6 -1E3 1E3 2E6 -2E6
ga   6  0 11 12 1.9754E-3
gcm  0  6 10 99 62.467E-9
iee  3 10 dc 120.10E-6
hlim 90 0 vlim 1K
q1   11  2 13 qx1
q2   12  1 14 qx2
r2    6  9 100.00E3
rc1   4 11 530.52
rc2   4 12 530.52
re1   13 10 99.364
re2   14 10 99.364
ree   10 99 1.6653E6
ro1   8  5 50
ro2   7 99 25
rp    3  4 1.8131E3
vb    9  0 dc 0
vc    3 53 dc 1.7563
ve   54  4 dc 1.7563
vlim  7  8 dc 0
vlp   91  0 dc 3.9000
vln   0 92 dc 3.9000
.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=1.1173E3)
.model qx2 PNP(Is=898.3900E-18 Bf=1.2959E3)
.ends
*$

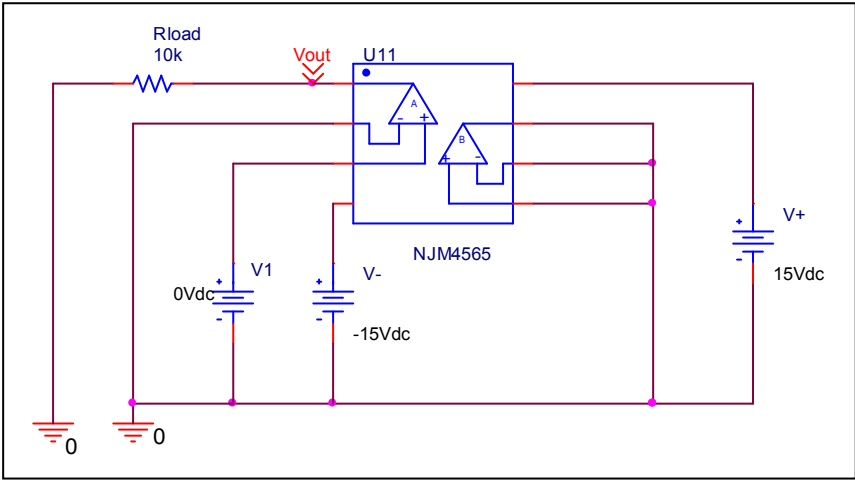
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Output Voltage Swing

Simulation result



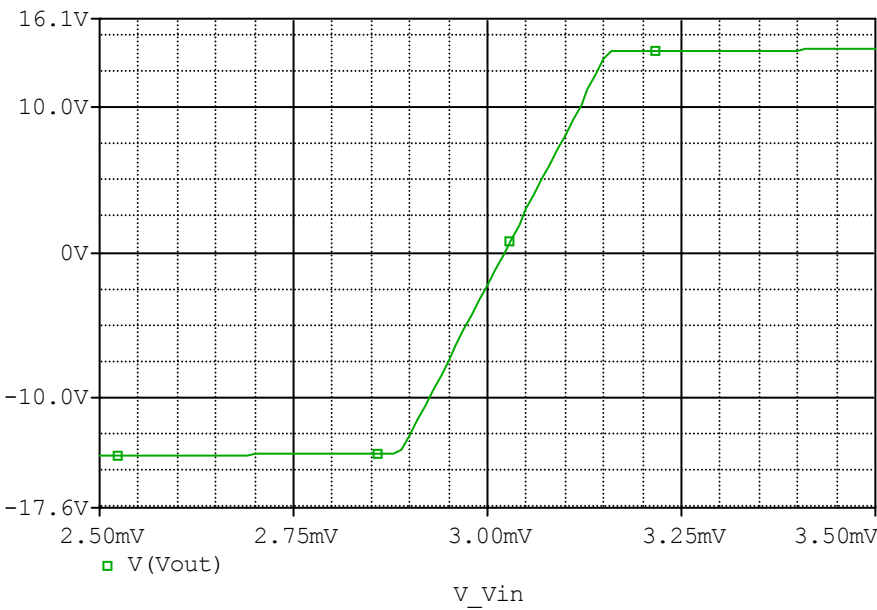
Evaluation circuit



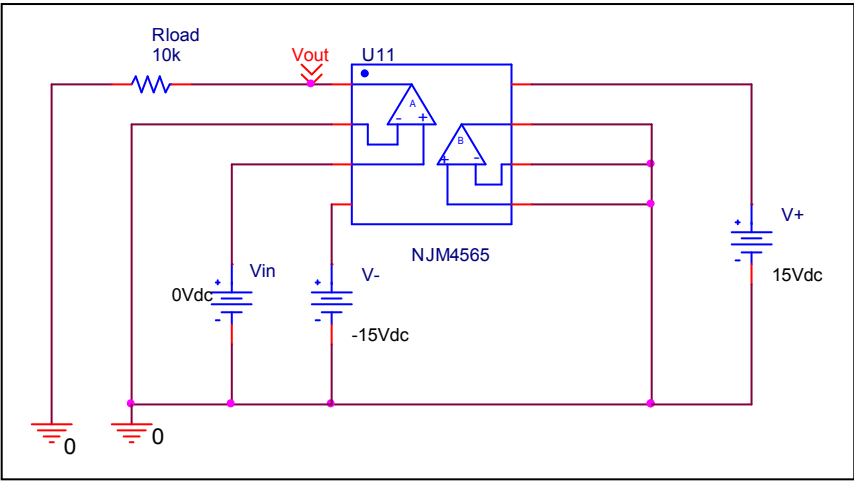
Output Voltage Swing	Data sheet	Simulation	%Error
+Vout(V)	+14.000	+13.995	-0.035
-Vout(V)	-14.000	-13.995	-0.035

Input Offset Voltage

Simulation result



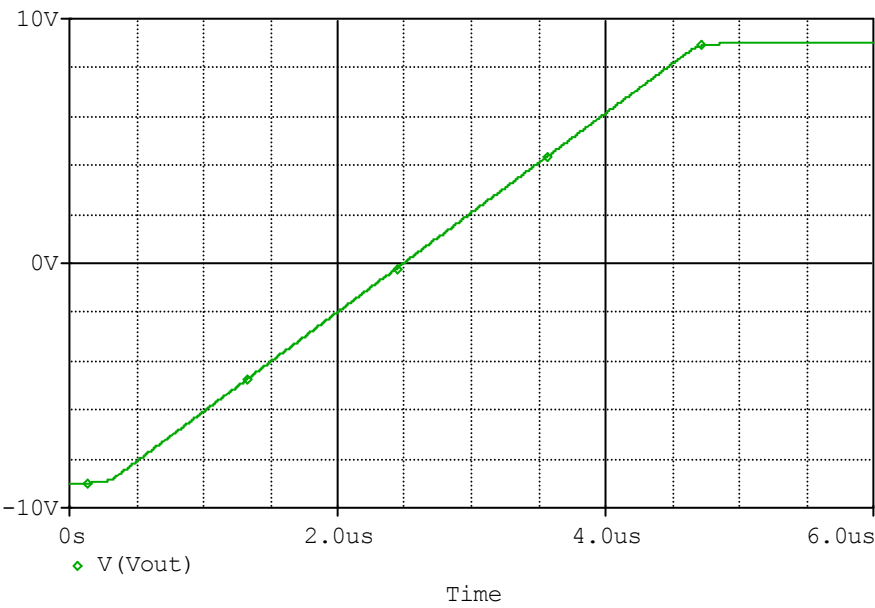
Evaluation circuit



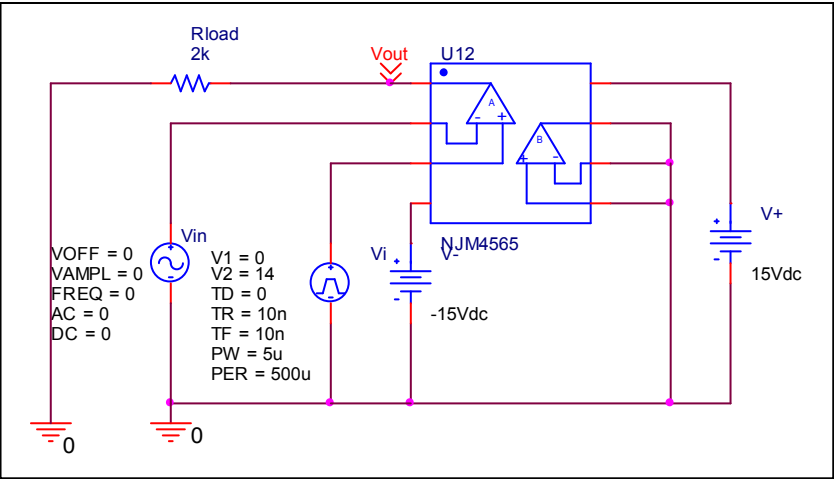
Vos	Measurement		Simulation		Error	
	3.000	mV	3.0215	mV	0.716	%

Slew Rate

Simulation result



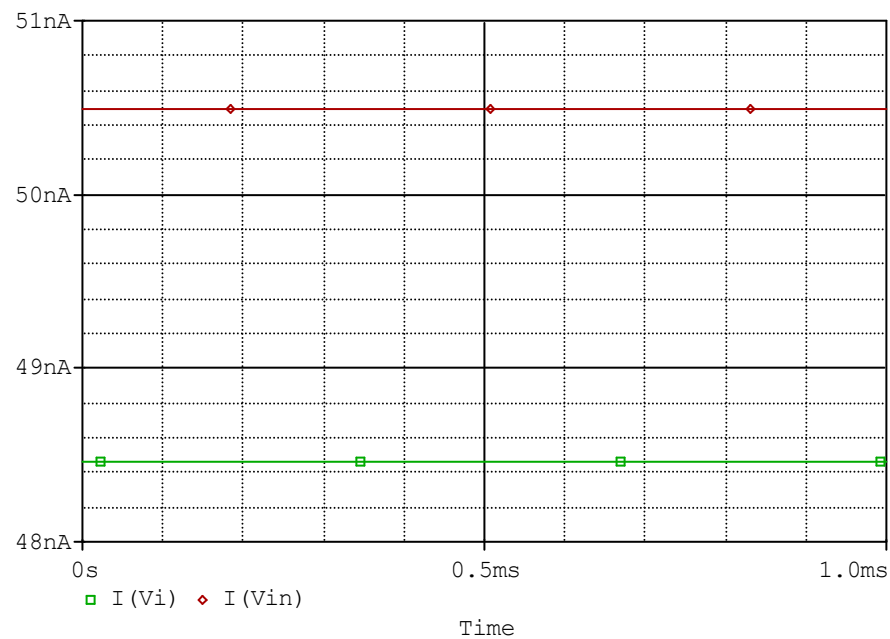
Evaluation circuit



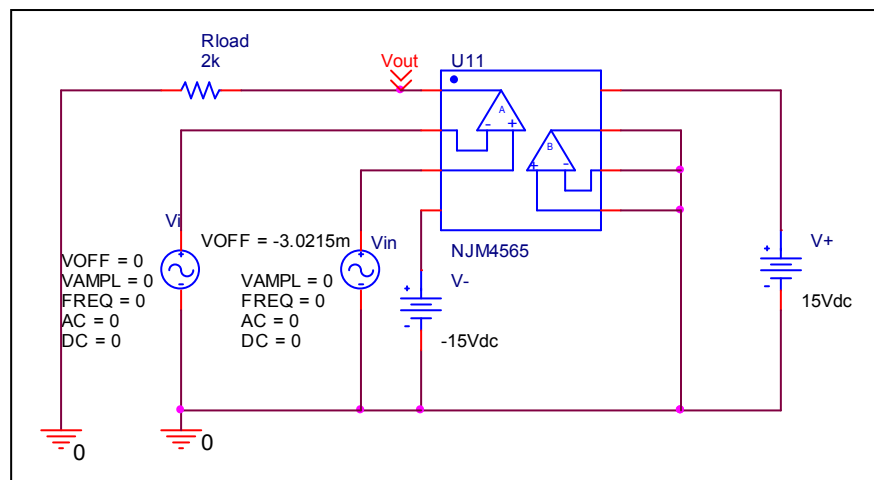
Slew Rate(v/us)	Data sheet	Simulation	%Error
	4.00	4.069	1.725

Input current

Simulation result



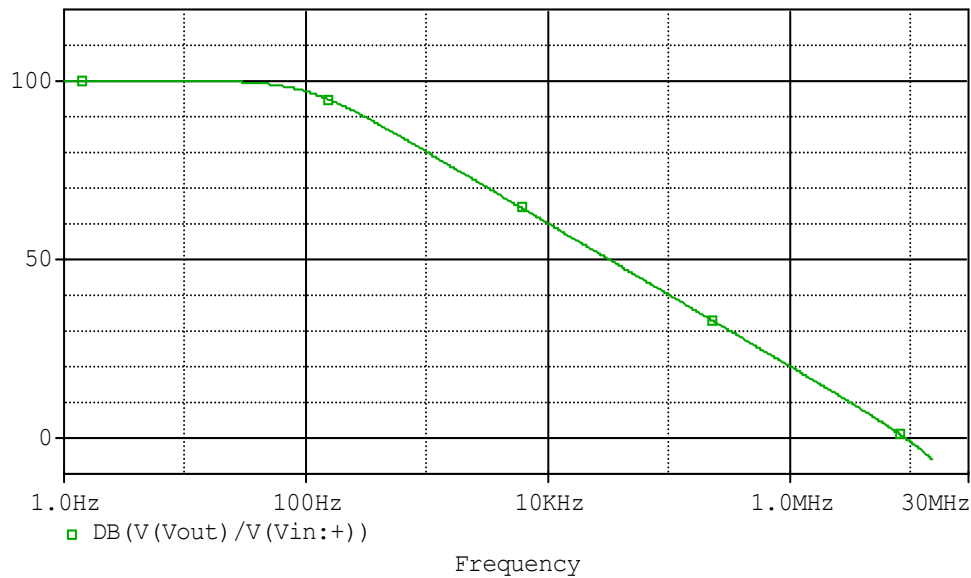
Evaluation circuit



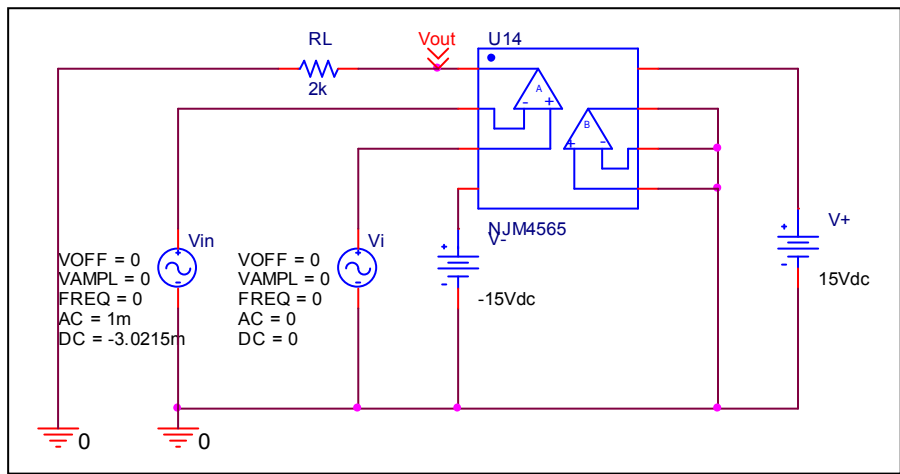
	Data sheet	Simulation	%Error
I_b(nA)	50.000	49.47	-1.060
I_{bos}(nA)	2.000	2.035	1.750

Open Loop Voltage Gain vs. Frequency

Simulation result



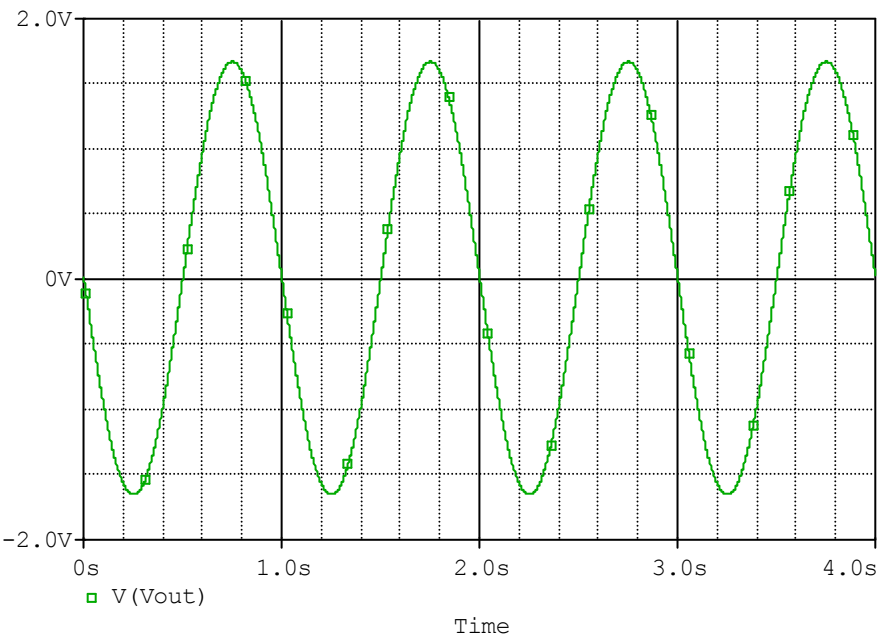
Evaluation circuit



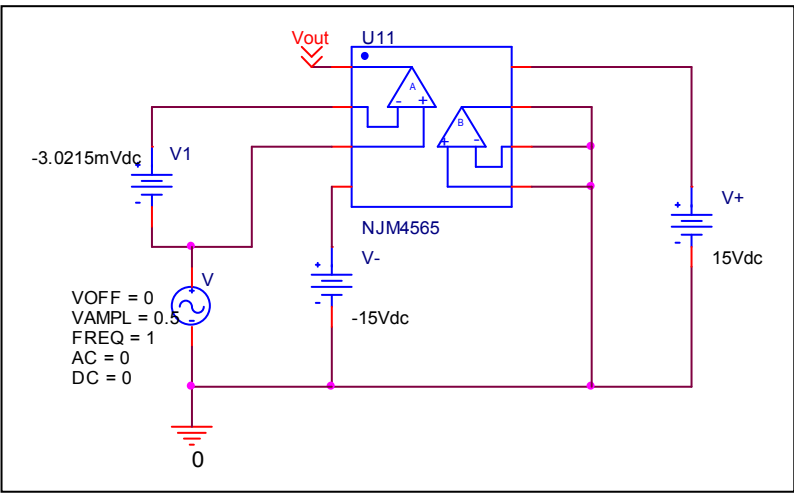
	Data sheet	Simulation	%Error
f-0dB(MHz)	10.000	10.600	4.000
Av-dc	100.000	100.064	0.064

Common-Mode Rejection Voltage gain

Simulation result



Evaluation circuit



Common Mode Reject Ratio= $103514/3.3218=31162.02$

CMRR	Data sheet	Simulation	%Error
	90.000	89.872	0.1422