

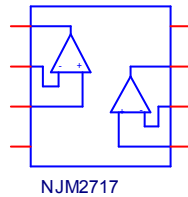
Device Modeling Report

COMPONENTS: OPERATIONAL AMPLIFIER
PART NUMBER: NJM2717
MANUFACTURER: NEW JAPAN RADIO CO., LTD



Bee Technologies Inc.

SPice Model



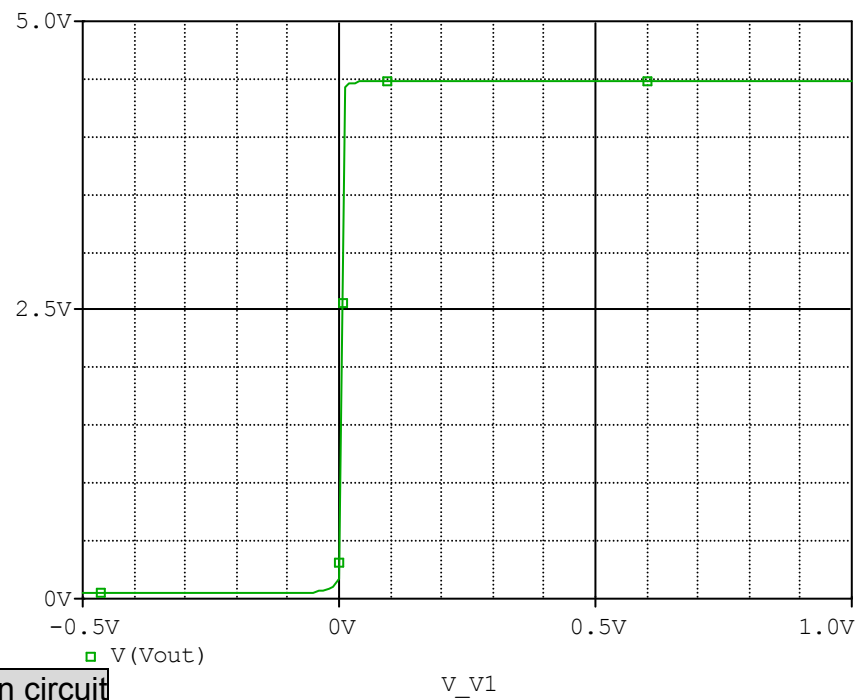
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*$
* PART NUMBER: NJM2717
* MANUFACTURER: NEW JAPAN RADIO
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.Subckt NJM2717 OUT1 -IN1 +IN1 V- +IN2 -IN2 OUT2 V+
X_U1  +IN1 -IN1 V+ V- OUT1 NJM2717_ME
X_U2  +IN2 -IN2 V+ V- OUT2 NJM2717_ME
.ends NJM2717
.subckt NJM2717_ME 1 2 3 4 5
c1  11 12 2.6600E-30
c2  6 7 9.4000E-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 13.900E3 -1E3 1E3 14E3 -14E3
ga  6 0 11 12 14.850E-3
gcm 0 6 10 99 1.8850E-6
iee 3 10 dc 1.2020E-3
hlim 90 0 vlim 1K
q1  11 2 13 qx1
q2  12 1 14 qx2
r2  6 9 100.00E3
rc1 4 11 53.052
rc2 4 12 53.052
re1 13 10 9.9283
re2 14 10 9.9283
ree 10 99 166.39E3
ro1 8 5 50
ro2 7 99 25
rp  3 4 128.87
vb  9 0 dc 0
vc  3 53 dc 1.2979
ve  54 4 dc .83691
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=274.84)
.model qx2 PNP(Is=840.5056E-18 Bf=305.16)
.ends
*$

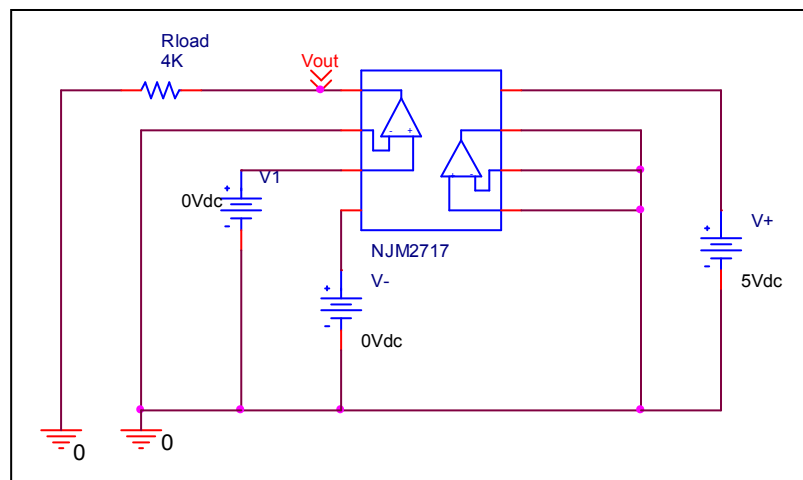
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Output Voltage Swing

Simulation result



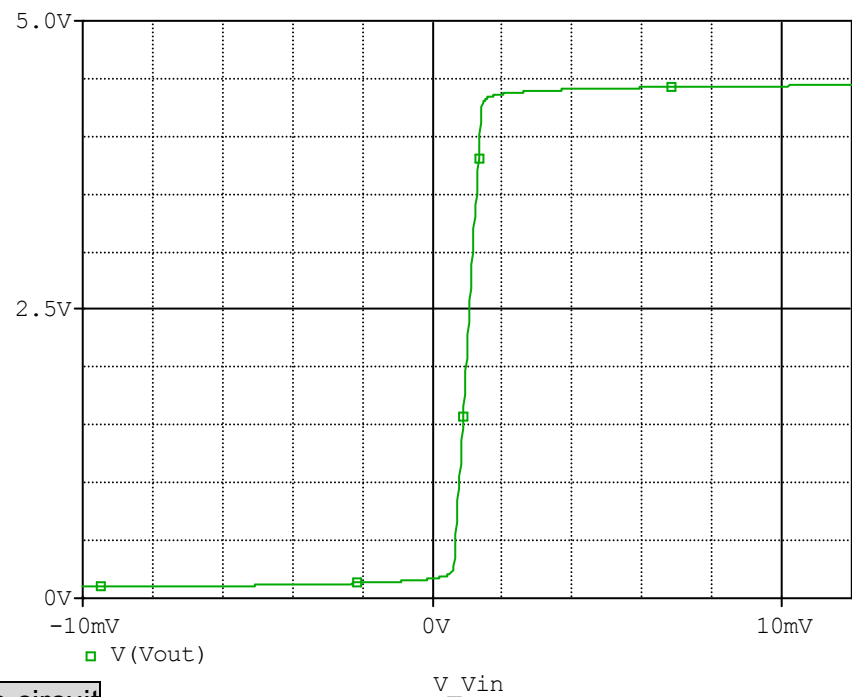
Evaluation circuit



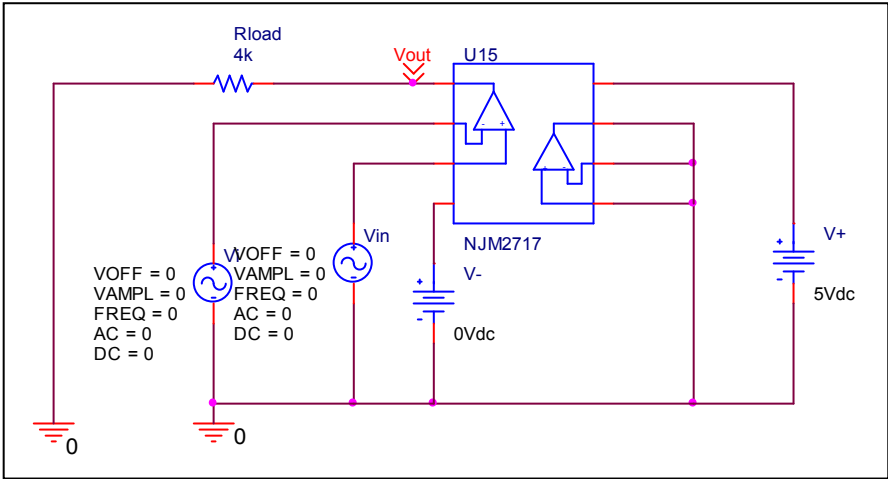
Output Voltage Swing	Data sheet	Simulation	%Error
$V_{OH}(V)$	4.500	4.489	-0.244
$V_{OL}(V)$	0.050	0.050	0.000

Input Offset Voltage

Simulation result



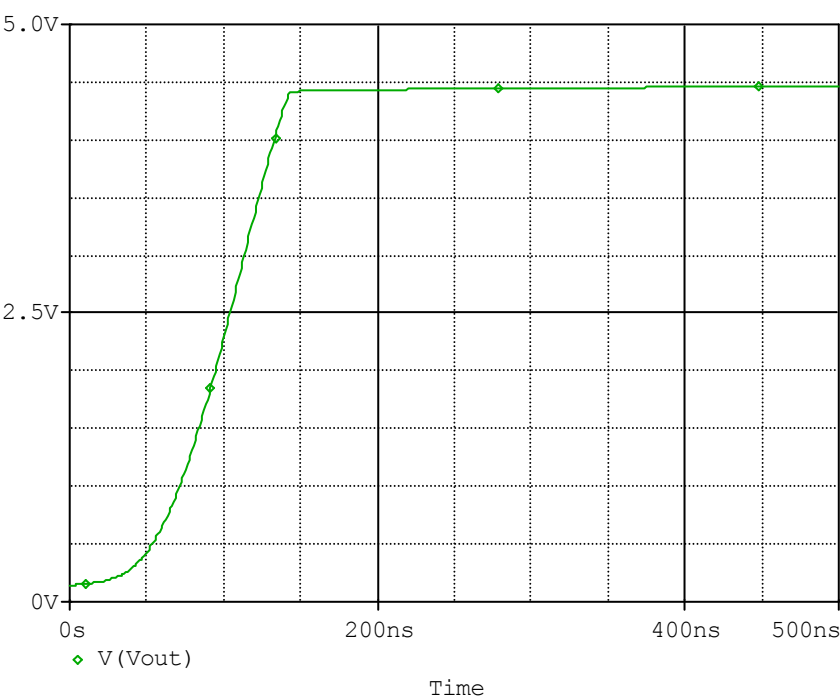
Evaluation circuit



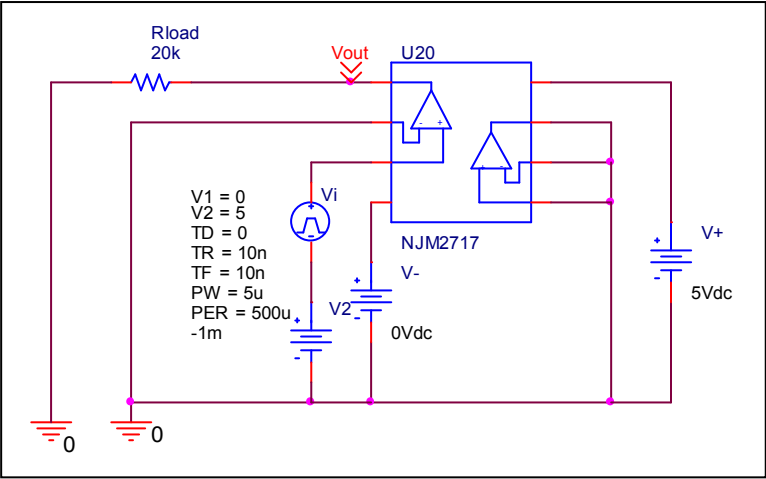
Vos	Measurement		Simulation		Error	
	1.000	mV	1.000	mV	0.000	%

Slew Rate

Simulation result



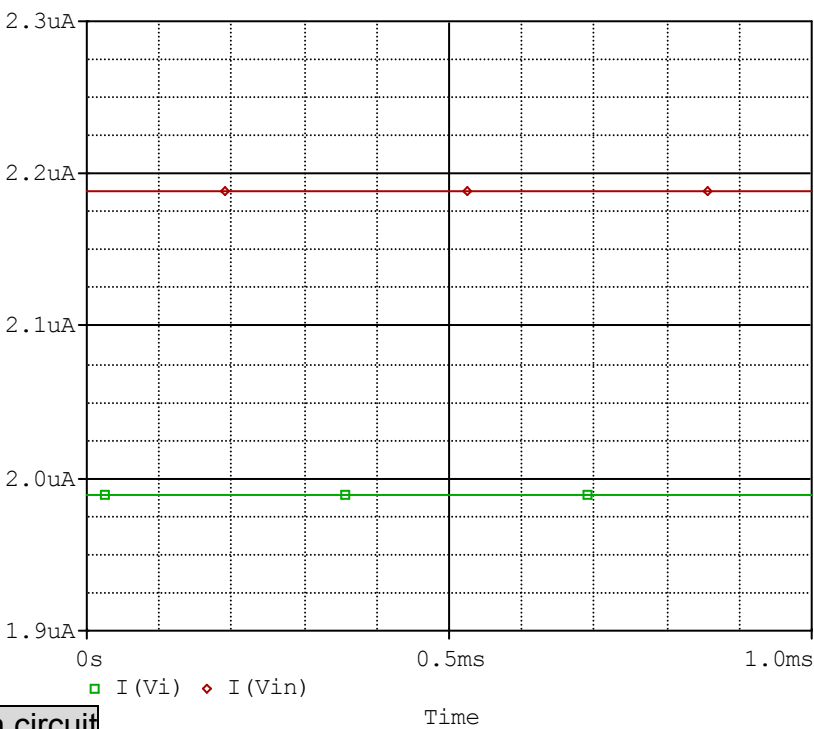
Evaluation circuit



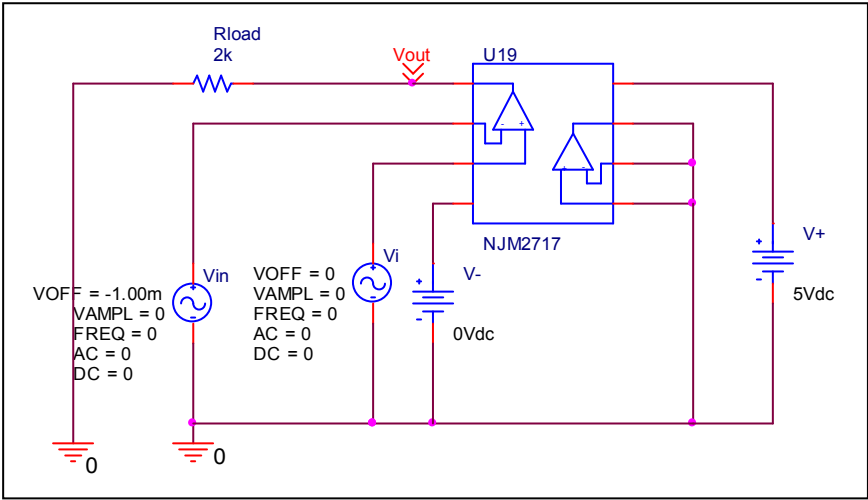
Slew Rate(v/us)	Data sheet	Simulation	%Error
	40.000	40.286	0.715

Input current

Simulation result



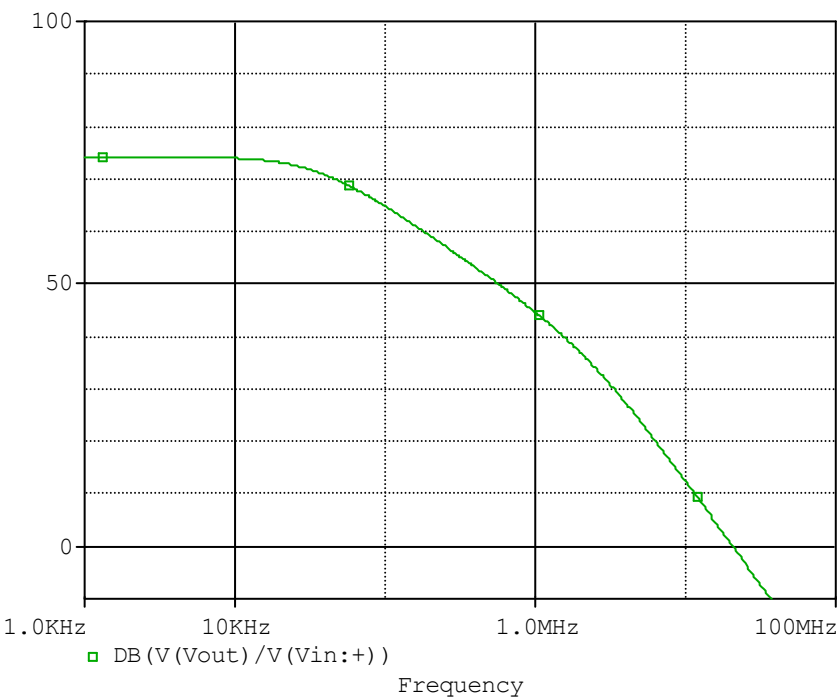
Evaluation circuit



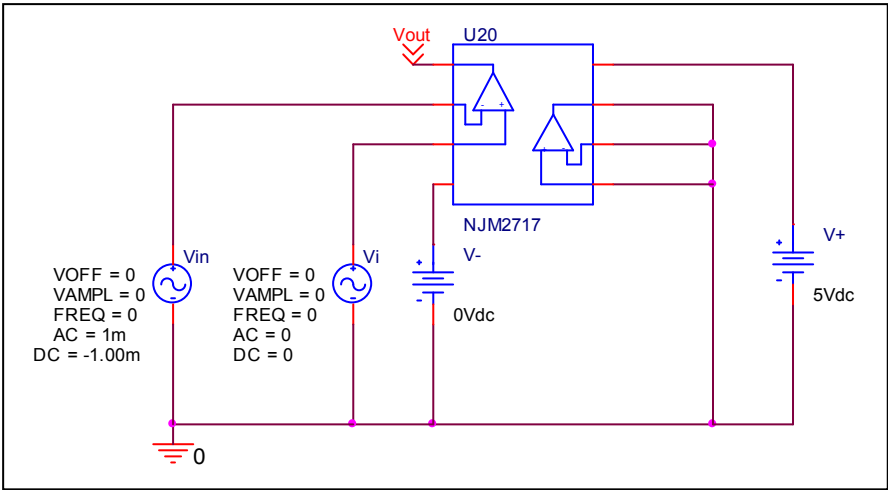
	Data sheet	Simulation	%Error
Ib(uA)	2.000	2.088	4.400
Ibos(uA)	0.200	0.200	0.000

Open Loop Voltage Gain vs. Frequency

Simulation result



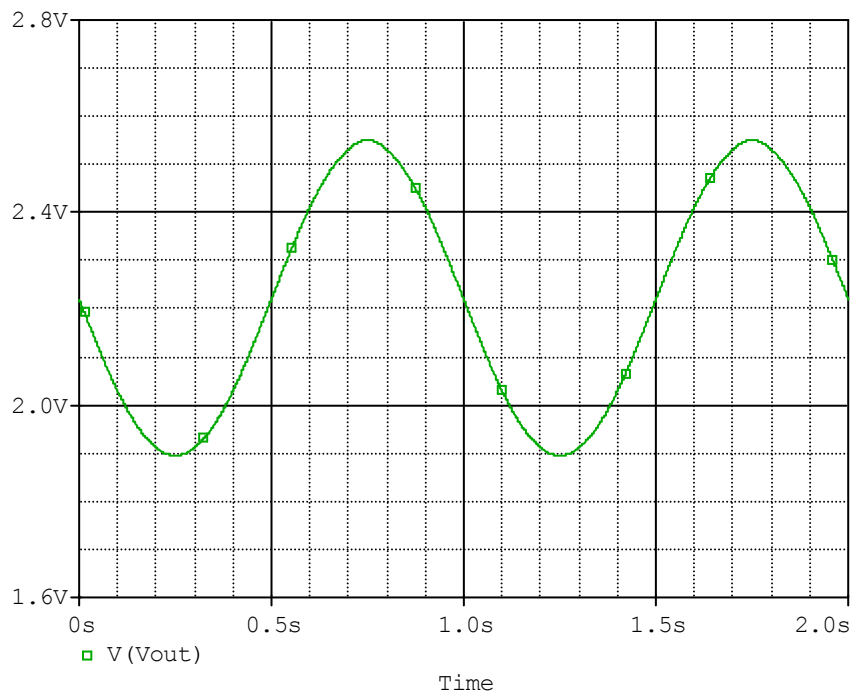
Evaluation circuit



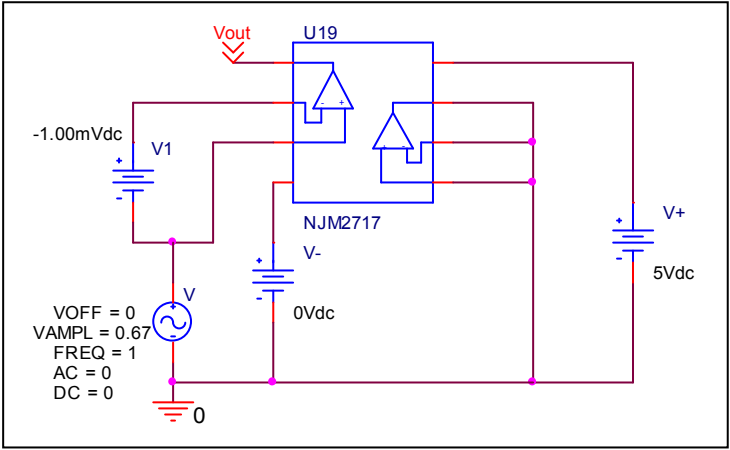
	Data sheet	Simulation	%Error
f-0dB(MHz)	20.000	20.877	4.385
Av-dc(dB)	75.000	74.118	-1.176

Common-Mode Rejection Voltage gain

Simulation result



Evaluation circuit



Common Mode Reject Ratio= $5080.424/0.655=7756.372$

CMRR	Data sheet	Simulation	%Error
	80.000	77.793	-2.759