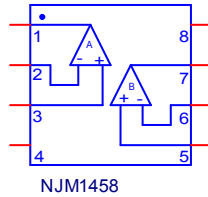# Device Modeling Report

COMPONENTS: OPERATIONAL AMPLIFIER
PART NUMBER:NJM1458
MANUFACTURER: NEW JAPAN RADIO CO.,LTD

**Bee Technologies Inc.**

SPice Model

NJM1458

```
*$
* PART NUMBER: NJM1458
* MANUFACTURER: NEW JAPAN RADIO
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.Subckt NJM1458 OUT1 -IN1 +IN1 VEE +IN2 -IN2 OUT2 VCC
X_U1    +IN1 -IN1 VCC VEE OUT1 NJM1458_ME
X_U2    +IN2 -IN2 VCC VEE OUT2 NJM1458_ME
.ends  NJM1458
.subckt NJM1458_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 42.342E6 -1E3 1E3 42E6 -42E6
  ga    6  0 11 12 207.35E-6
  gcm   0  6 10 99 6.5568E-9
  iee  10  4 dc 15.060E-6
  hlim 90  0 vlim 1K
  q1   11  2 13 qx1
  q2   12  1 14 qx2
  r2    6  9 100.00E3
  rc1   3 11 4.8229E3
  rc2   3 12 4.8229E3
  re1  13 10 1.3689E3
  re2  14 10 1.3689E3
  ree  10 99 13.280E6
  ro1   8  5 50
  ro2   7 99 25
  rp    3  4 1.8016E3
  vb    9  0 dc 0
  vc    3 53 dc 3.7471
  ve   54  4 dc 3.7471
  vlim  7  8 dc 0
  vlp  91  0 dc 2.8000
  vln   0 92 dc 2.8000
.model dx D(Is=800.00E-18)
.model dy D(Is=800.00E-18 Rs=1m Cjo=10p)
.model qx1 NPN(Is=800.00E-18 Bf=230.77)
.model qx2 NPN(Is=1.008877E-15 Bf=272.73)
.ends
*$
```
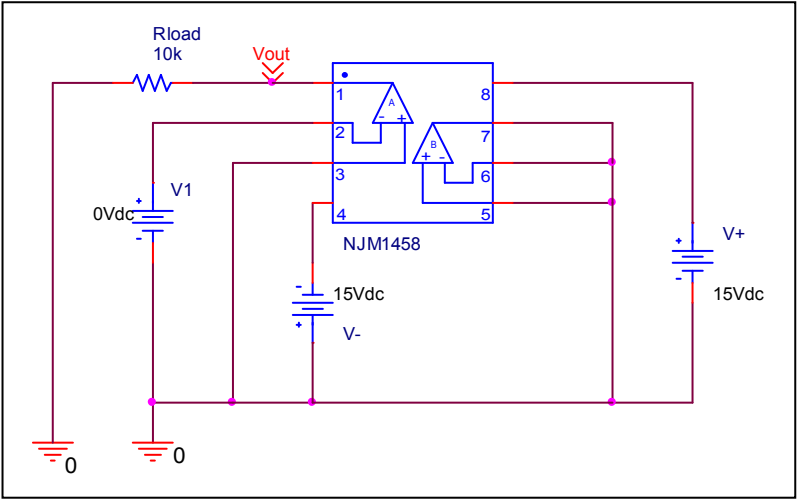
Output Voltage Swing

V(Vout)

V_V1
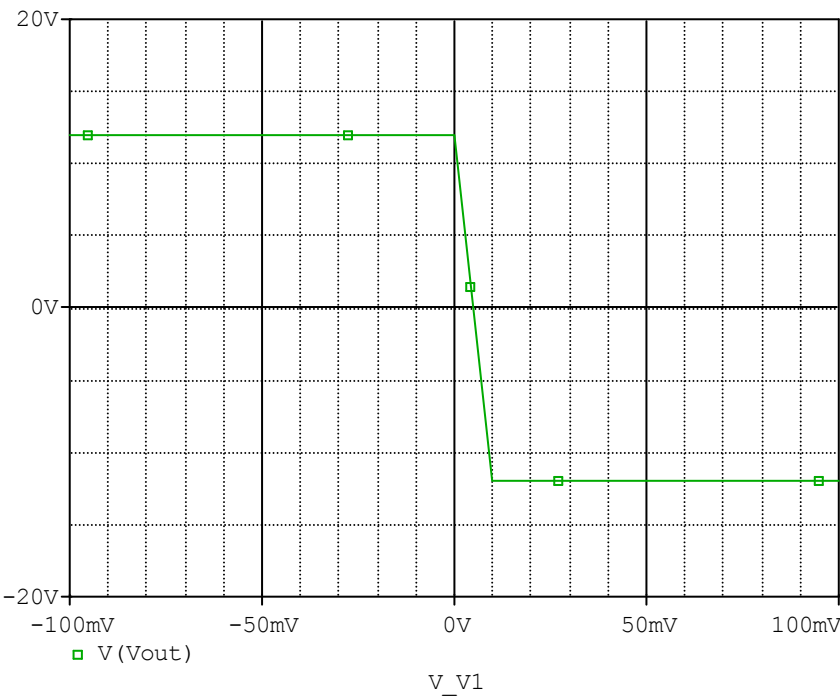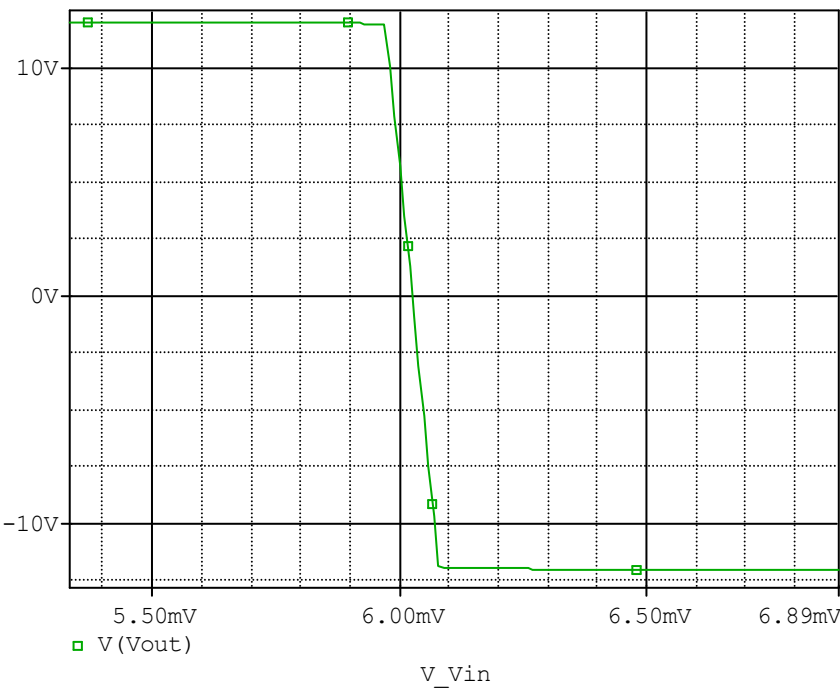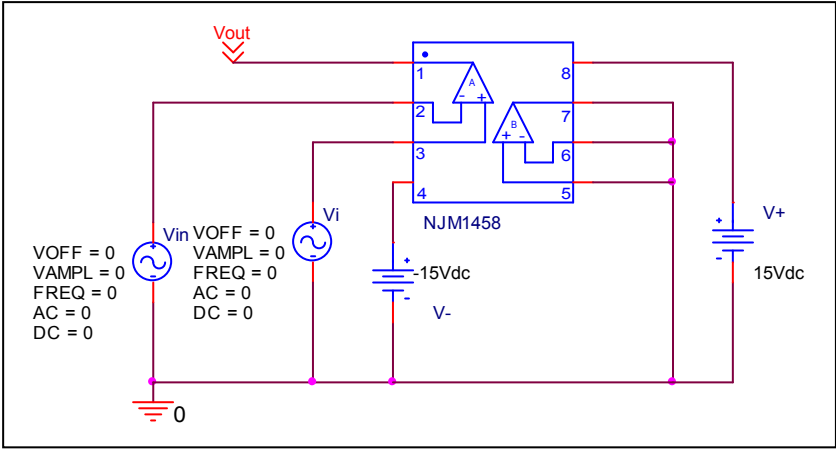
Evaluation circuit

Output Voltage Swing	Data sheet	Simulation	%Error
+Vout(V)	12.000	11.994	-0.050
-Vout(V)	12.000	11.994	-0.050

Input Offset Voltage

Simulation result

V(Vout)

V_Vin

Evaluation circuit

Vos	Measurement		Simulation		Error	
	6.000	mV	6.0259	mV	0.431	%

Slew Rate

V(Vout)

Time
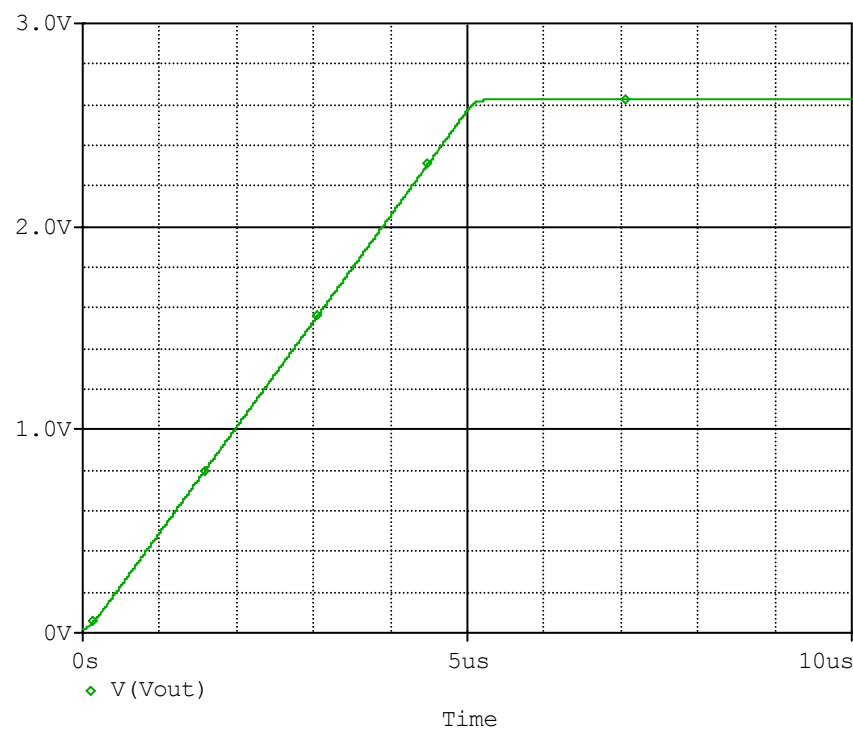
Evaluation circuit

Slew Rate(v/us)	Data sheet	Simulation	%Error
	0.500	0.524	4.800

Input current

Simulation result
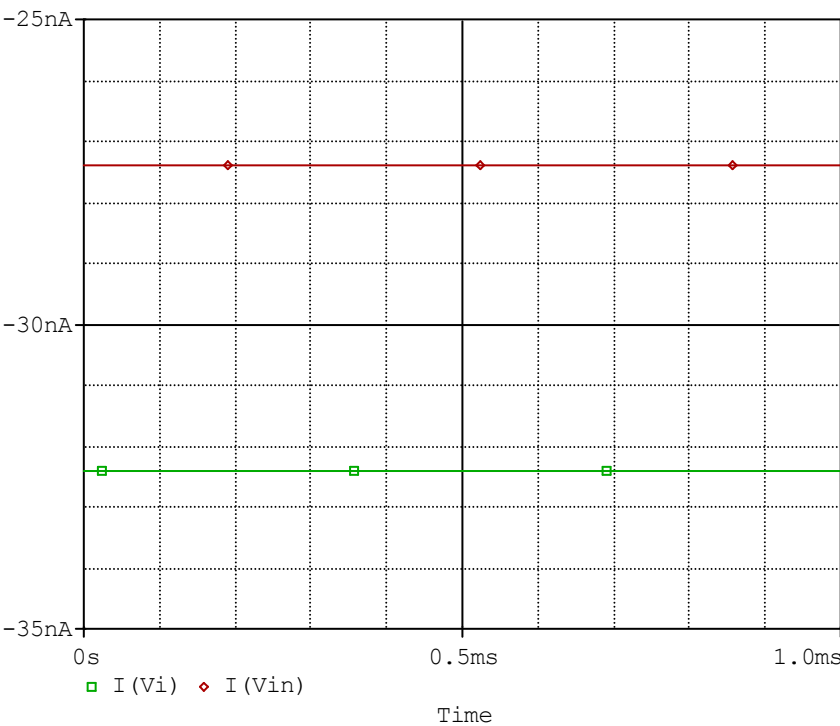
Evaluation circuit
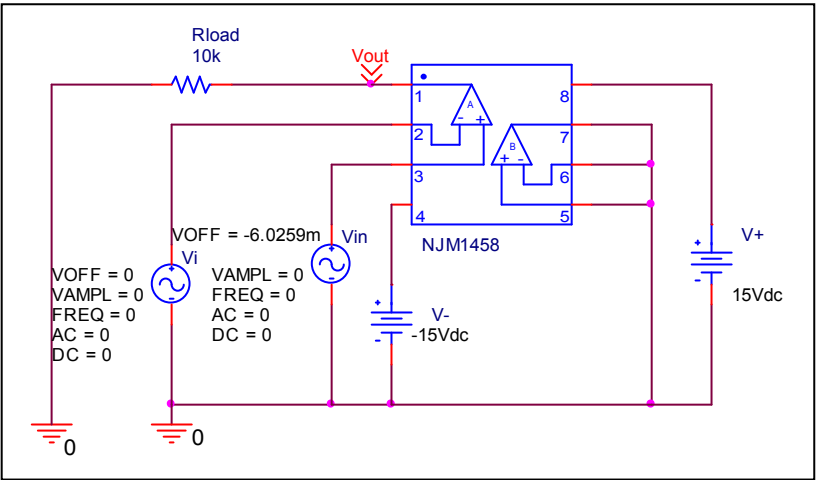
	Data sheet	Simulation	%Error
Ib(pA)	30.000	29.894	-0.353
Ibos(pA)	5.000	5.000	0.000

Open Loop Voltage Gain vs. Frequency

DB(V(Vout)/V(Vin:+))

Frequency
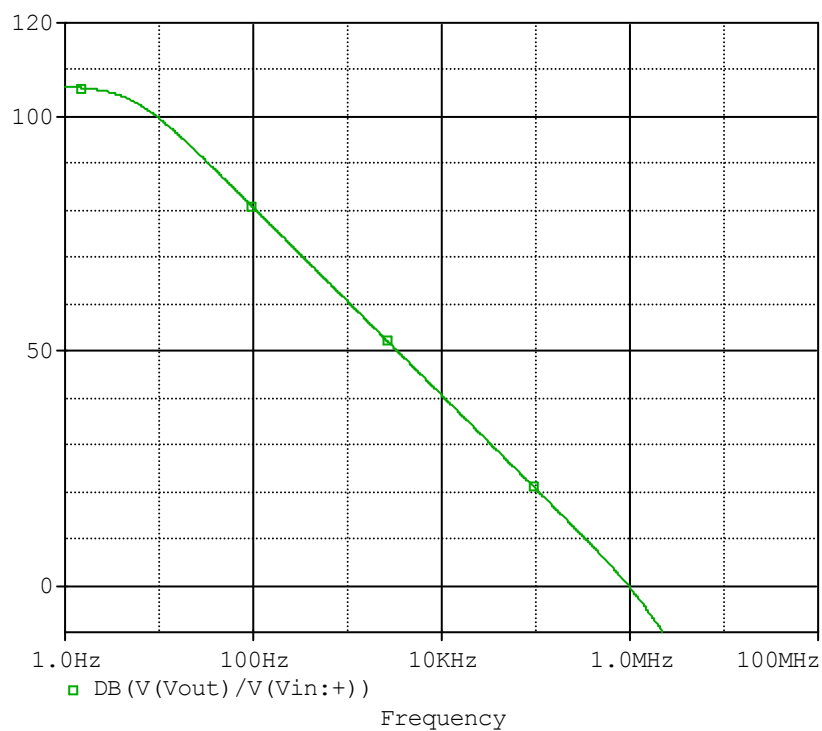
Evaluation circuit
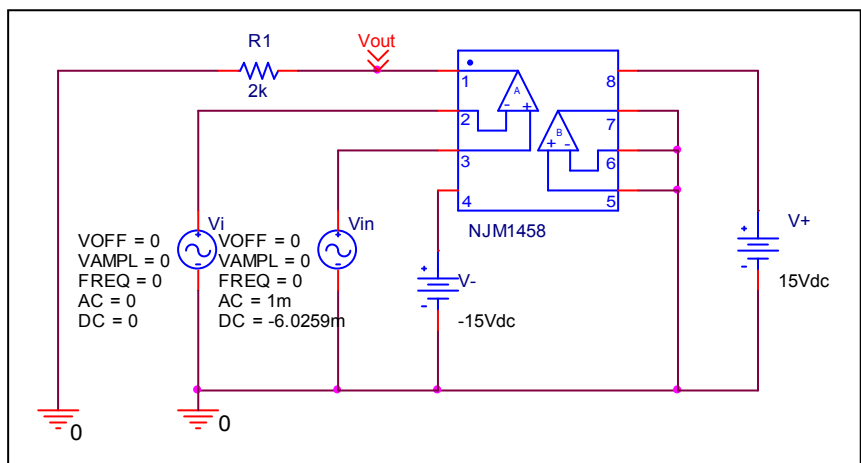
	Data sheet	Simulation	%Error
f-0dB(MHz)	1.000	0.982	-1.800
Av-dc	106.000	106.320	0.301

Common-Mode Rejection Voltage gain

▽ V(Vout)

Time
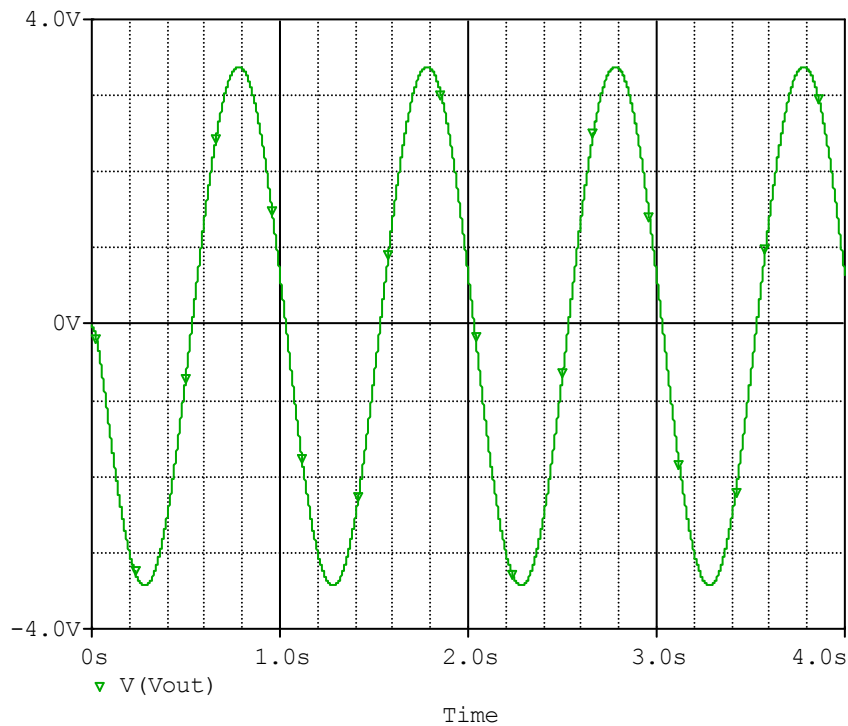
Evaluation circuit
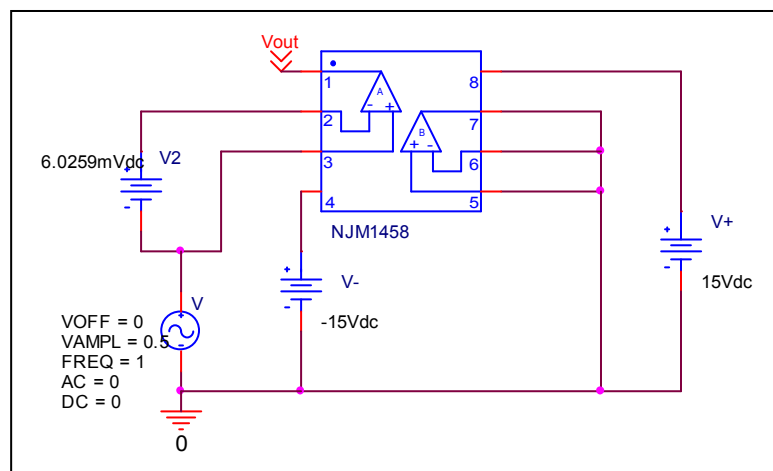
Common Mode Reject Ratio=206538/6.817=30297

CMRR	Data sheet	Simulation	%Error
	90.000	89.628	-0.413

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