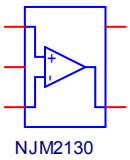
Device Modeling Report

COMPONENTS:OPERATIONAL AMPLIFIER
PART NUMBER:NJM2130
MANUFACTURER: NEW JAPAN RADIO CO.,LTD

Bee Technologies Inc.

Spice Model

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*$
* PART NUMBER: NJM2130
* MANUFACTURER: NEW JAPAN RADIO
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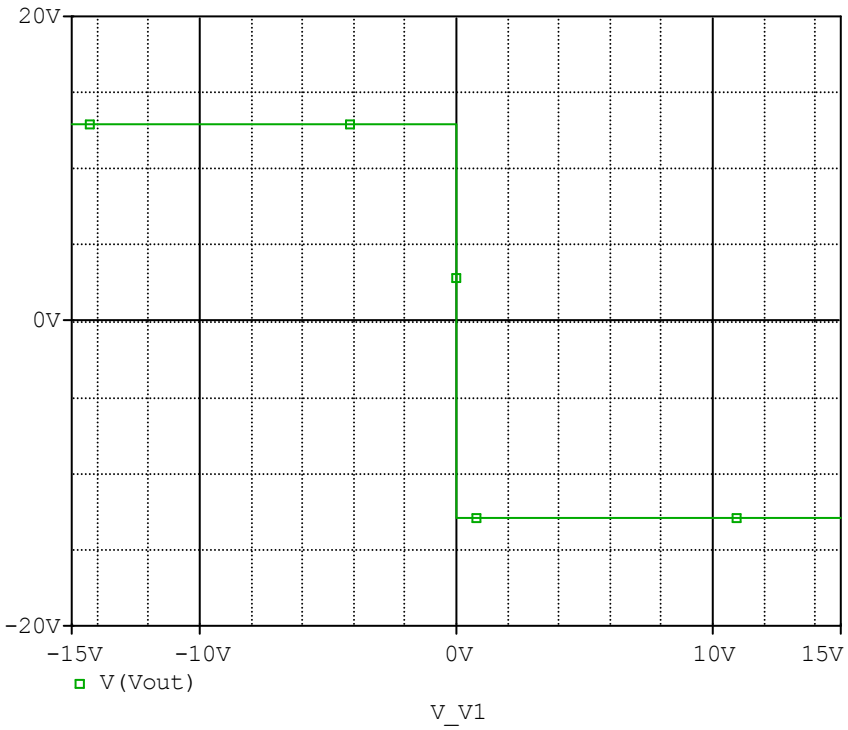
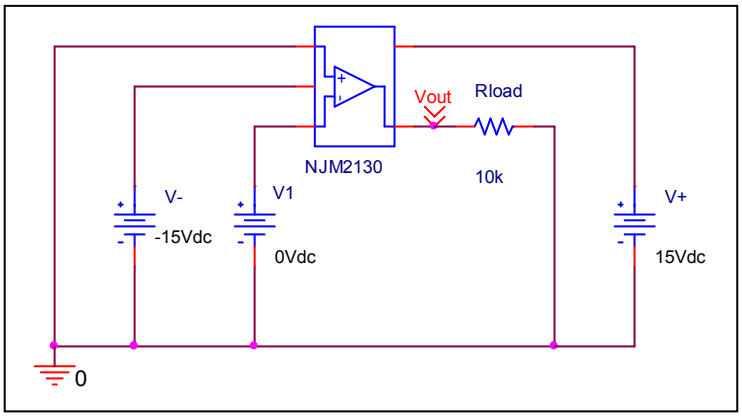
.Subckt NJM2130 +IN V- -IN OUT V+
X_U1     +IN -IN V+ V- OUT NJM2130_ME
.ends  NJM2130
.subckt NJM2130_ME  1 2 3 4 5
  c1   11 12 8.0829E-12
  c2    6  7 28.000E-12
  dc    5 53 dy
  de   54  5 dy
  dlp  90 91 dx
  dln  92 90 dx
  dp    4  3 dx
  egnd 99  0 poly(2) (3,0) (4,0) 0 .5 .5
  fb    7 99 poly(5) vb vc ve vlp vln 0 5.3304E6 -1E3 1E3 5E6 -5E6
  ga    6  0 11 12 190.07E-6
  gcm   0  6 10 99 6.0105E-9
  iee   3 10 dc 17.340E-6
  hlim 90  0 vlim 1K
  q1   11  2 13 qx1
  q2   12  1 14 qx2
  r2    6  9 100.00E3
  rc1   4 11 4.4210E3
  rc2   4 12 4.4210E3
  re1  13 10 1.4301E3
  re2  14 10 1.4301E3
  ree  10 99 11.534E6
  ro1   8  5 50
  ro2   7 99 25
  rp    3  4 4.5117E3
  vb    9  0 dc 0
  vc    3 53 dc 2.7979
  ve   54  4 dc 2.7979
  vlim  7  8 dc 0
  vlp  91  0 dc 5.5000
  vln   0 92 dc 5.5000
.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=522.96)
.model qx2 PNP(Is=970.6144E-18 Bf=634.07)
.ends
*$
```

Output Voltage Swing

Simulation result



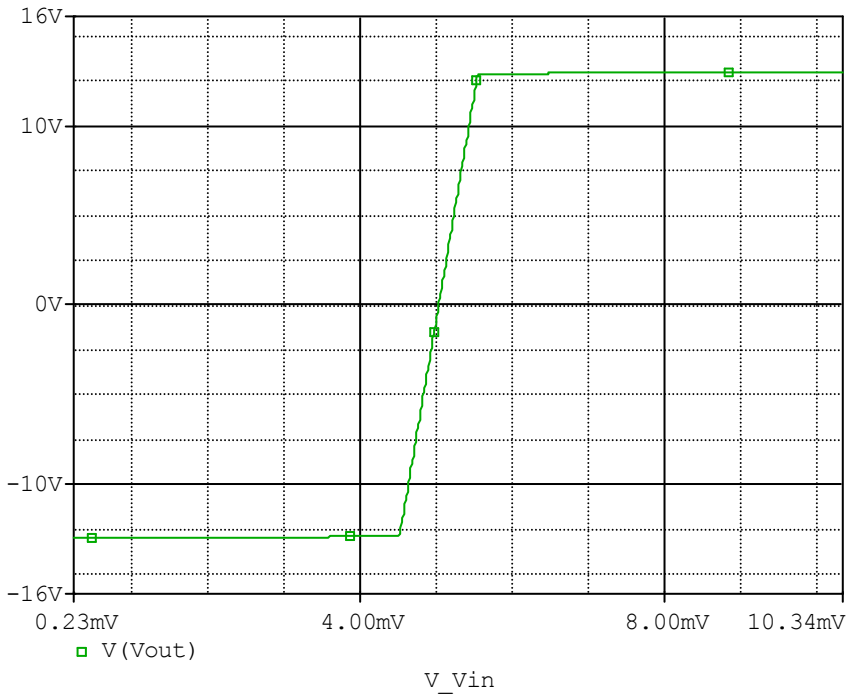
Evaluation circuit



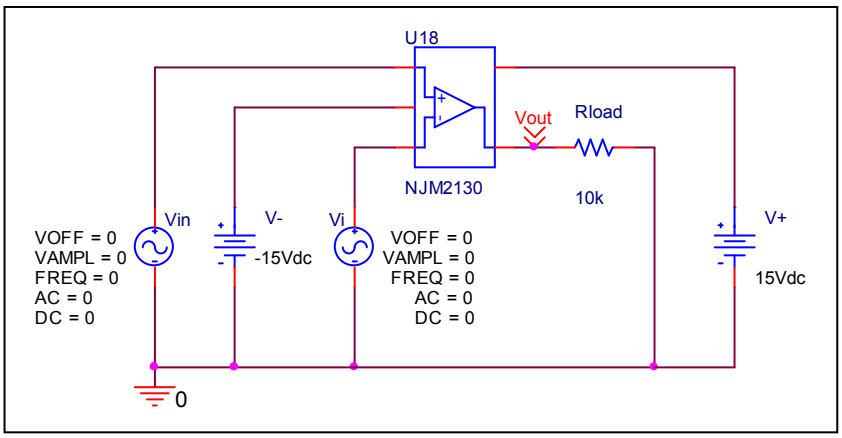
Output Voltage Swing	Data sheet	Simulation	%Error
+Vout(V)	13.000	12.963	0.284
-Vout(V)	13.000	12.963	0.284

Input Offset Voltage

Simulation result



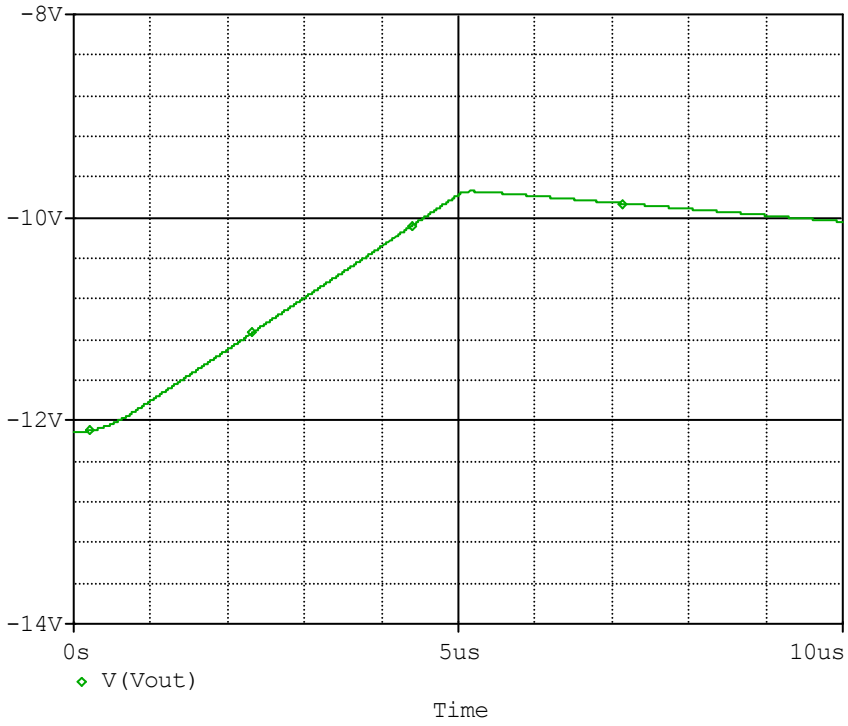
Evaluation circuit



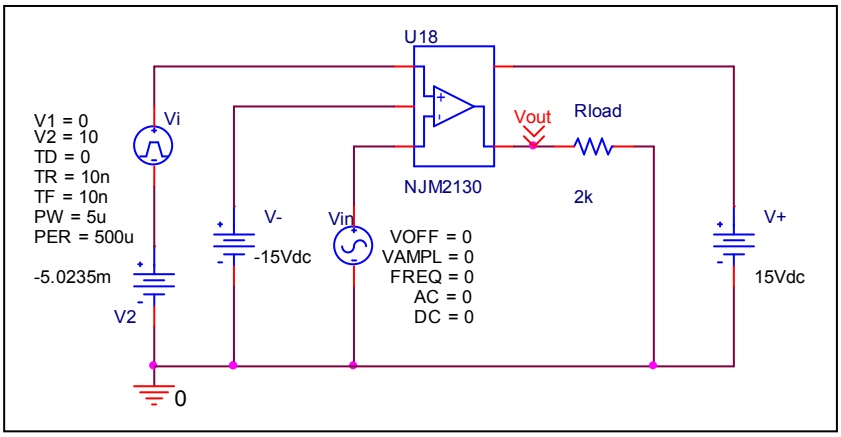
Vos	Measurement		Simulation		Error	
	5.000	mV	5.0235	mV	0.460	%

Slew Rate

Simulation result



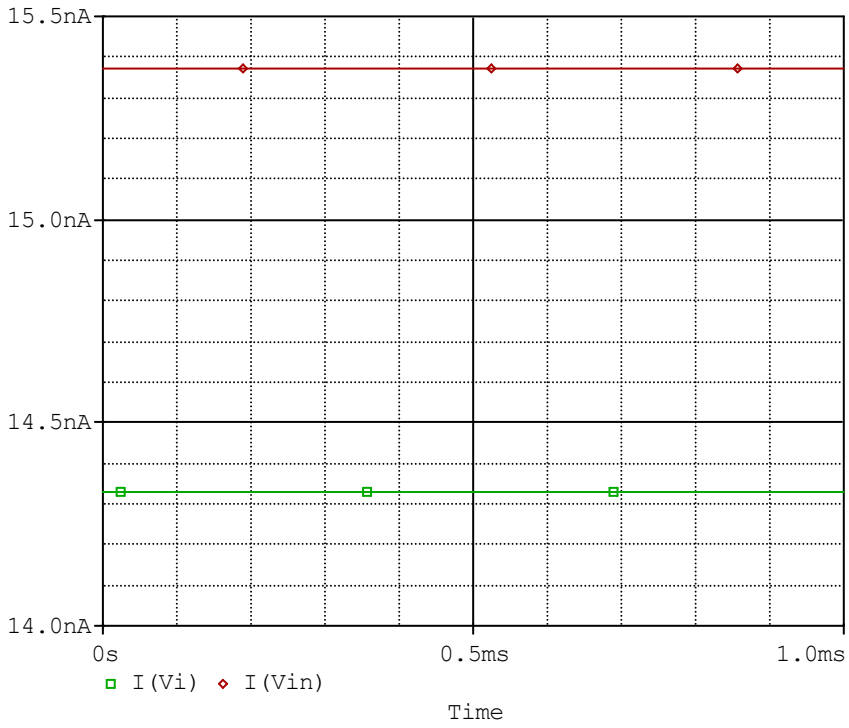
Evaluation circuit



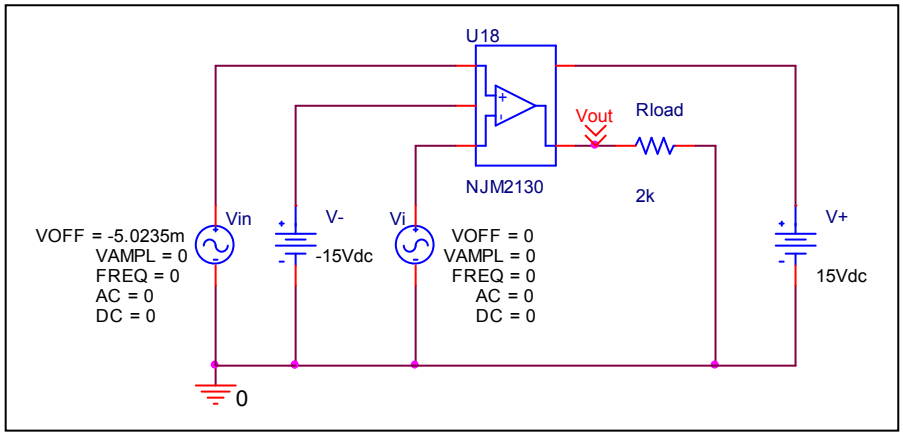
Slew Rate(v/us)	Data sheet	Simulation	%Error
	0.500	0.507	1.400

Input current

Simulation result



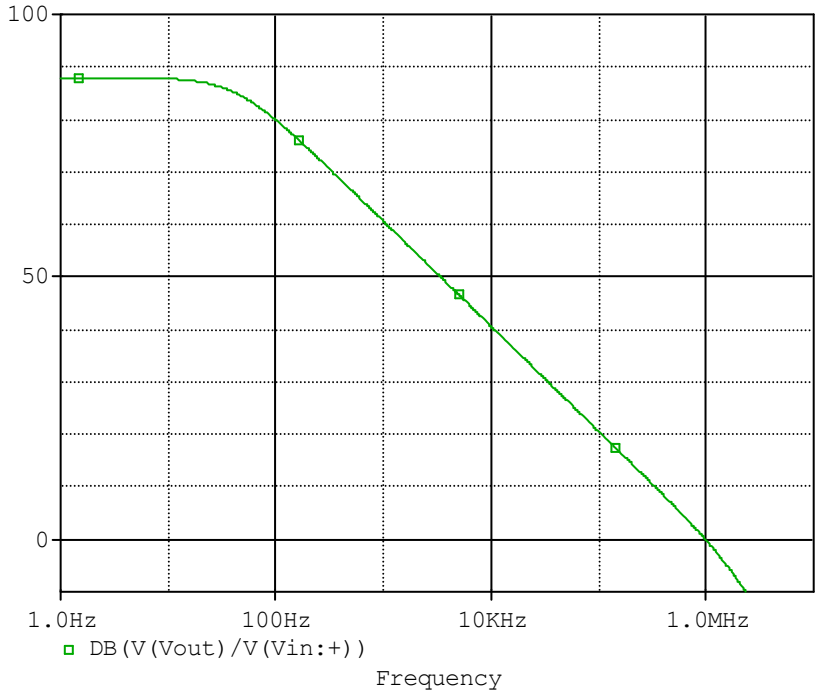
Evaluation circuit



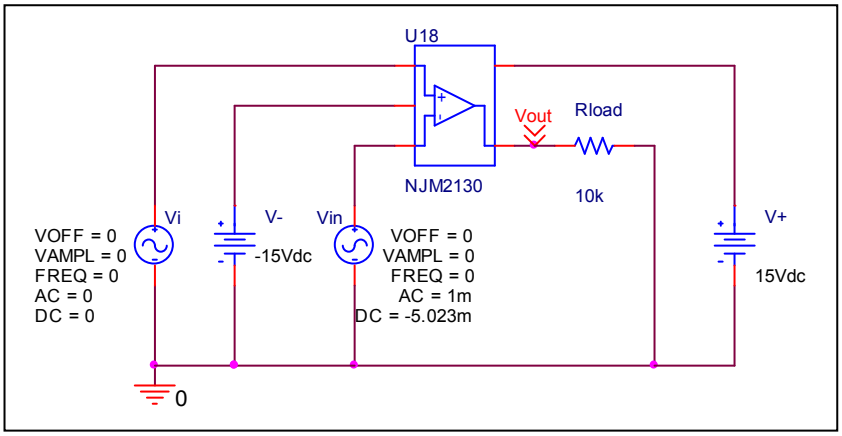
	Data sheet	Simulation	%Error
Ib(nA)	15.000	14.850	1.000
Ibos(nA)	1.000	1.042	4.200

Open Loop Voltage Gain vs. Frequency

Simulation result



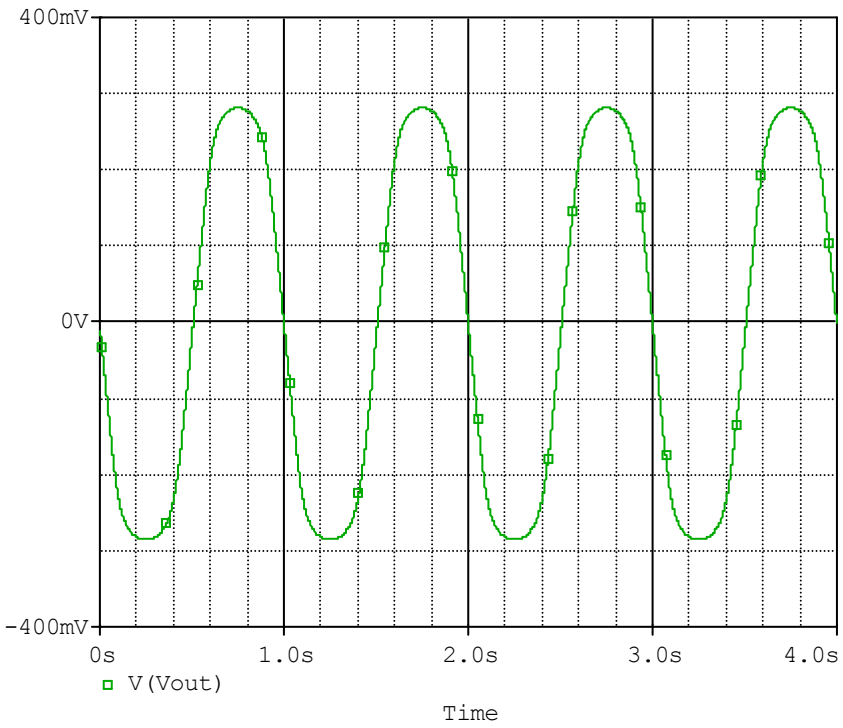
Evaluation circuit



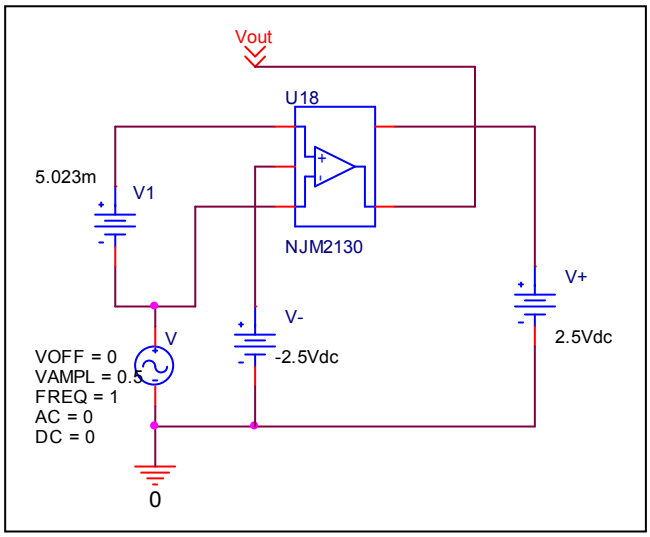
	Data sheet	Simulation	%Error
f-0dB(MHz)	1.000	0.979	2.100
Av-dc(dB)	88.000	87.965	0.039

Common-Mode Rejection Voltage gain

Simulation result



Evaluation circuit



Common Mode Reject Ratio=25017/0.567=44121.693

CMRR	Data sheet	Simulation	%Error
	90.000	92.893	3.214