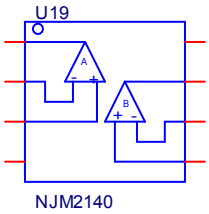
Device Modeling Report

COMPONENTS:MOSFET: OPERATIONAL AMPLIFIER
PART NUMBER:NJM2140
MANUFACTURER: NEW JAPAN RADIO CO.,LTD

Bee Technologies Inc.

Spice Model

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*$
* PART NUMBER:NJM2140
* MANUFACTURER: NEW JAPAN RADIO
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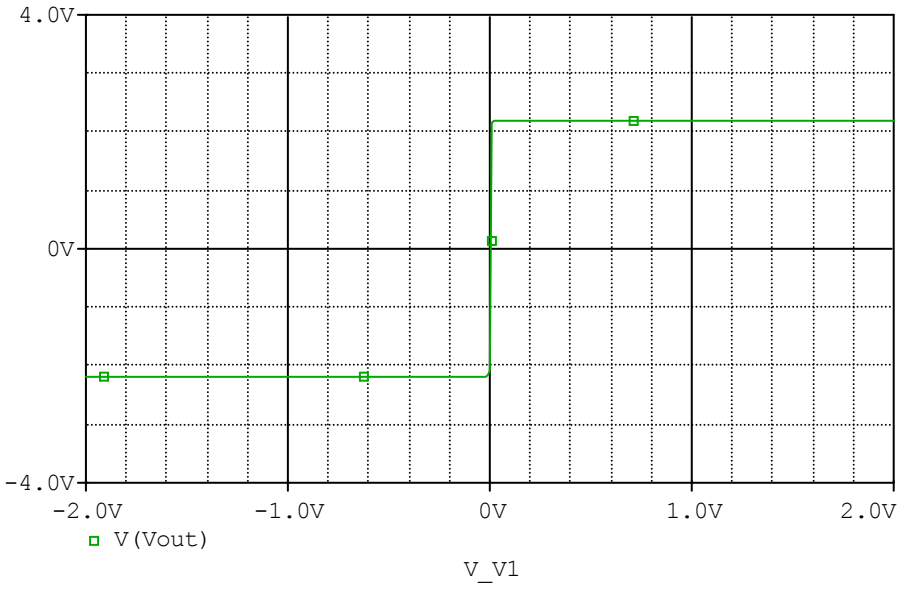
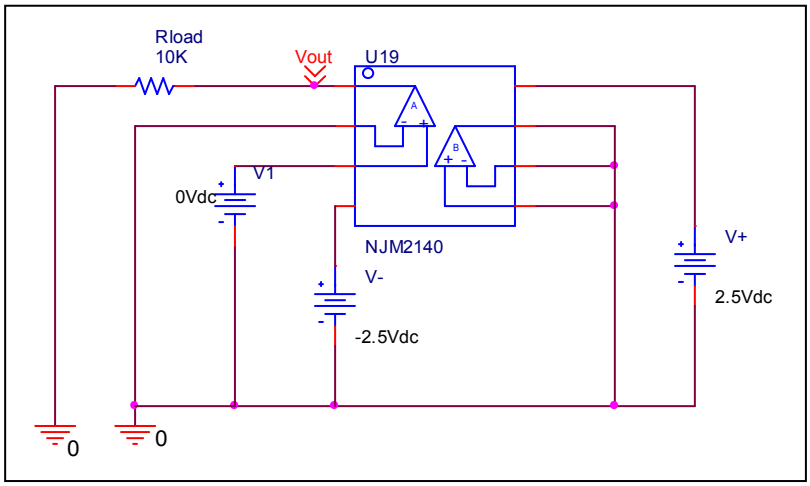
.Subckt NJM2140 OUT1 -IN1 +IN1 V- +IN2 -IN2 OUT2 V+
X_U1     +IN1 -IN1 V+ V- OUT1 NJM2140_ME
X_U2     +IN2 -IN2 V+ V- OUT2 NJM2140_ME
.ends  NJM2140
*$
.subckt NJM2140_ME 1 2 3 4 5
  c1   11 12 1.0000E-12
  c2    6  7 27.500E-12
  dc    5 53 dy
  de   54  5 dy
  dlp  90 91 dx
  dln  92 90 dx
  dp    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 0 173.94E3 -1E3 1E3 170E3 -170E3
  ga    6  0 11 12 2.2996E-3
  gcm   0  6 10 99 458.84E-9
  iee   3 10 dc 120.20E-6
  hlim 90  0 vlim 1K
  q1   11  2 13 qx1
  q2   12  1 14 qx2
  r2    6  9 100.00E3
  rc1   4 11 434.85
  rc2   4 12 434.85
  re1  13 10 3.7735
  re2  14 10 3.7735
  ree  10 99 1.6639E6
  ro1   8  5 50
  ro2   7 99 25
  rp    3  4 78.272
  vb    9  0 dc 0
  vc    3 53 dc 1.0979
  ve   54  4 dc 1.0979
  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=546.95)
.model qx2 PNP(Is=828.3277E-18 Bf=650.05)
.ends
*$
```

Output Voltage Swing, +Vout and –Vout

Simulation result



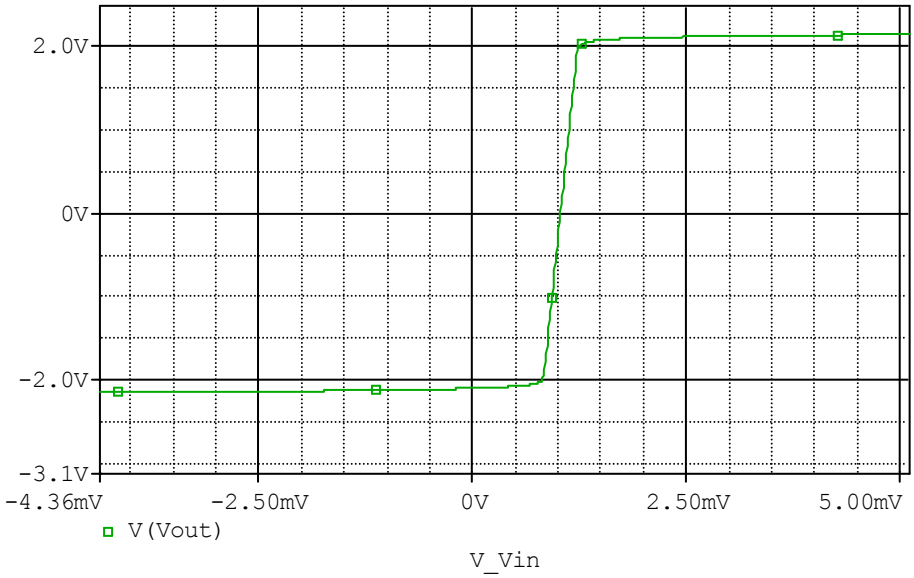
Evaluation circuit



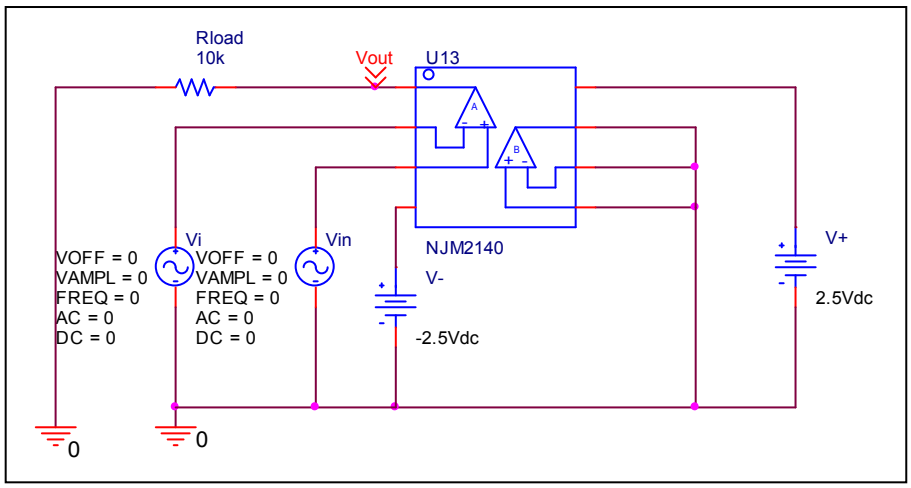
Output Voltage Swing	Data sheet	Simulation	%Error
+Vout(V)	2.200	2.200	0.000
-Vout(V)	-2.200	2.200	0.000

Input Offset Voltage

Simulation result



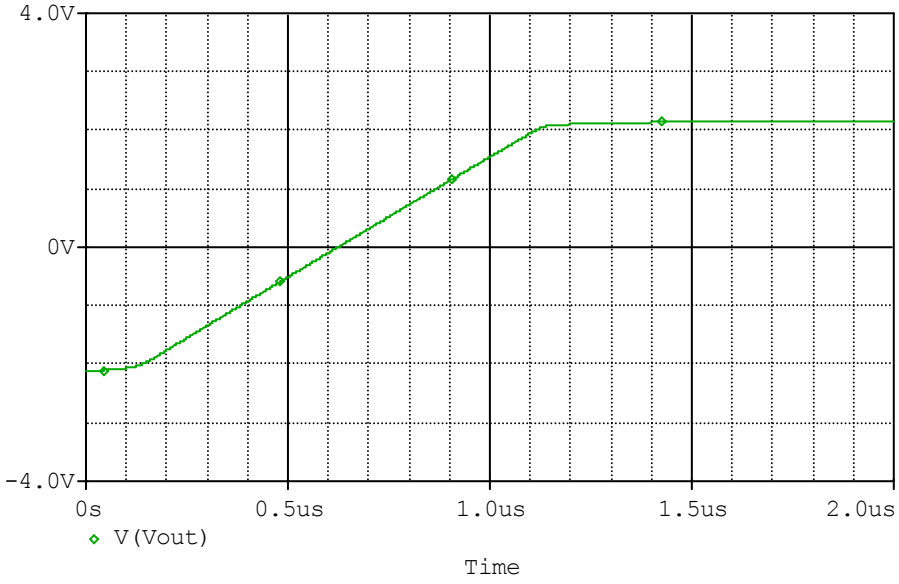
Evaluation circuit



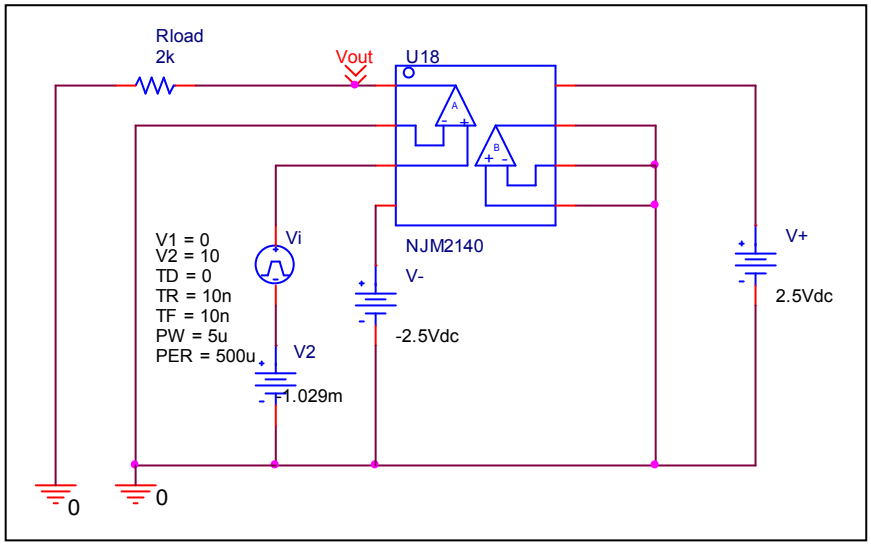
Vos	Measurement		Simulation		Error	
	1	mV	1.029	mV	2.900	%

Slew Rate, +SR, -SR

Simulation result



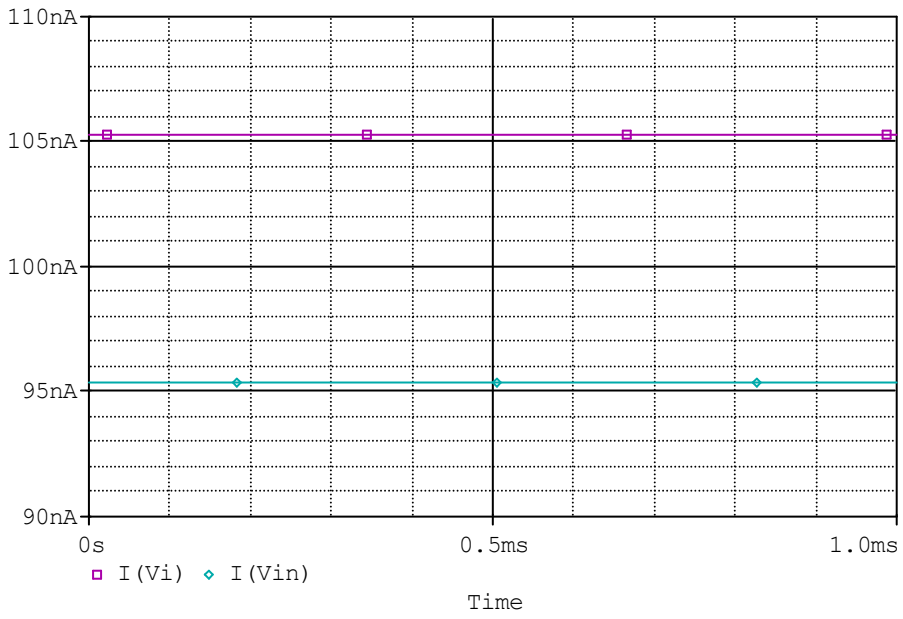
Evaluation circuit



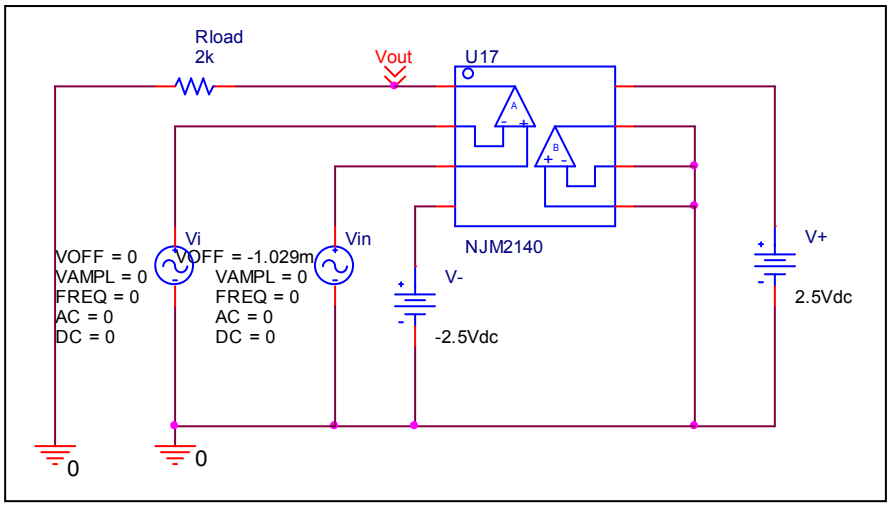
Slew Rate(v/us)	Data sheet	Simulation	%Error
	4V/us	4.070V/us	1.750

Input current Ib, Ibos

Simulation result



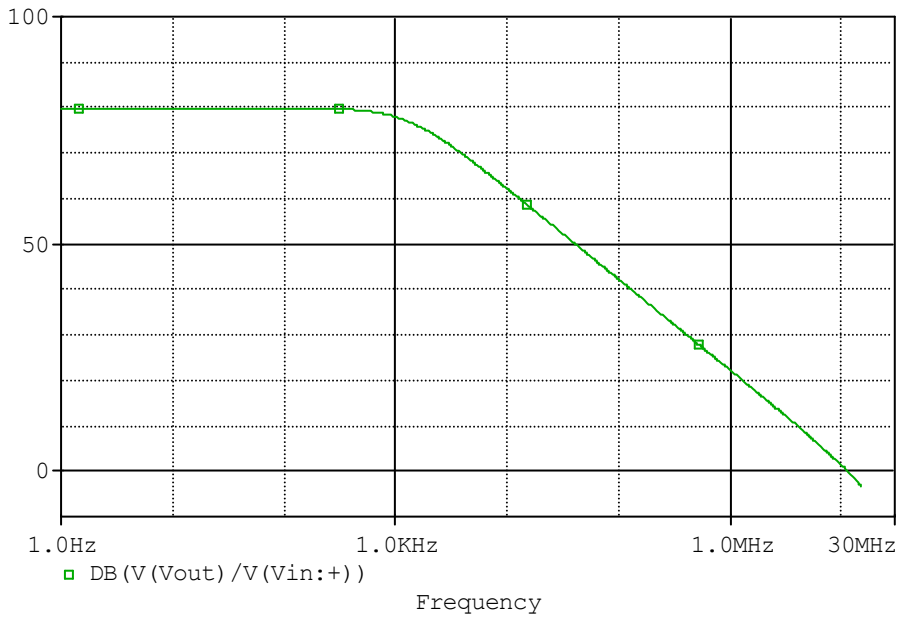
Evaluation circuit



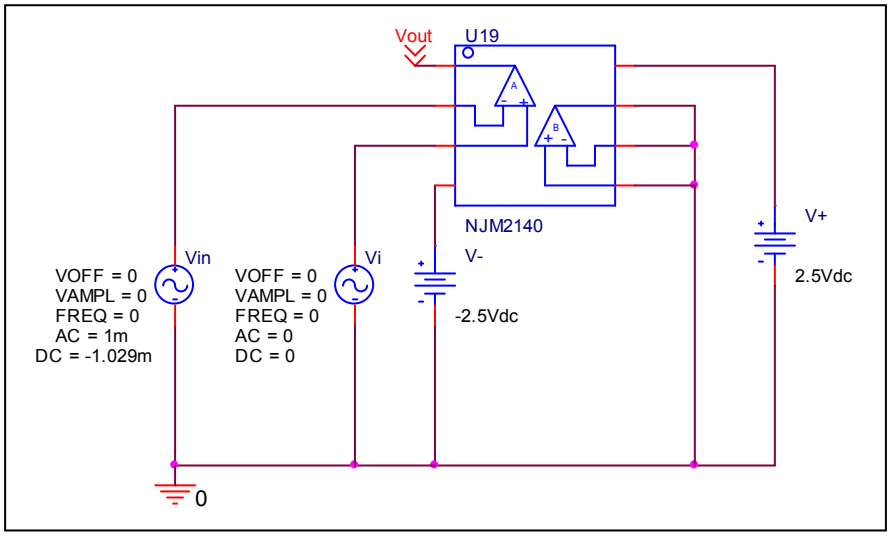
	Data sheet	Simulation	%Error
Ib(nA)	100.000	100.349	0.349
Ibos(nA)	10.000	9.902	-0.980

Open Loop Voltage Gain vs. Frequency , Av-dc, f-0dB

Simulation result



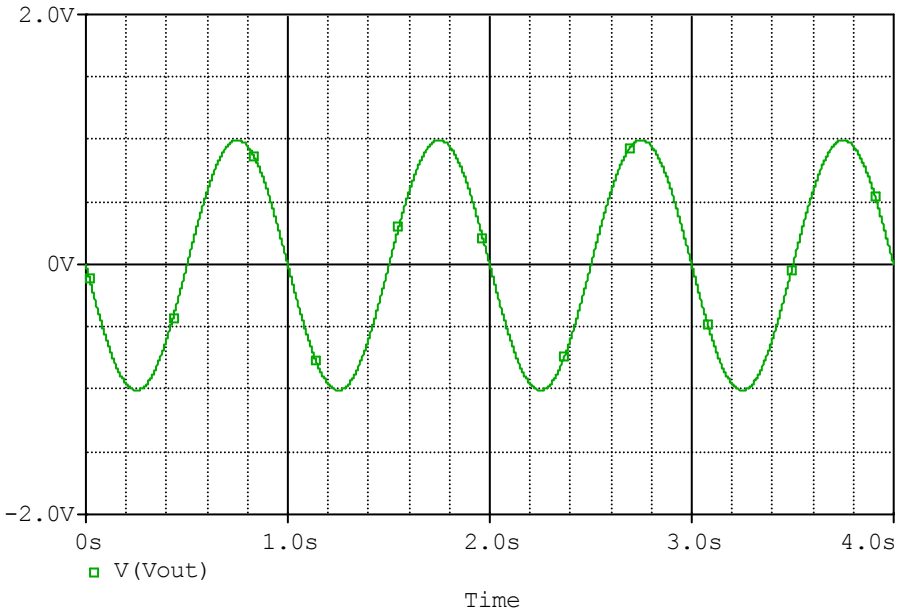
Evaluation circuit



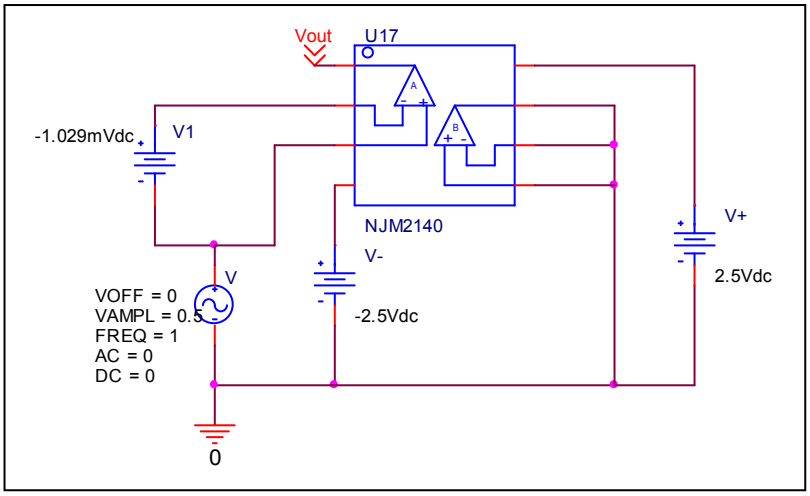
	Data sheet	Simulation	%Error
f-0dB(MHz)	12	11.533	-3.892
Av-dc(dB)	80	79.973	-0.034

Common-Mode Rejection Voltage gain

Simulation result



Evaluation circuit



Common Mode Reject Ratio=9927.73/2.001=4961.384

CMRR	Data sheet	Simulation	%Error
	74.000	73.912	-0.119