

# Device Modeling Report

COMPONENTS : BIPOLAR OPERATIONAL AMPLIFIER

PART NUMBER : NJM4558C

MANUFACTURER : NEW JAPAN RADIO CO.,LTD

Version : 1



新日本無線株式會社



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Q2  12  1 14 PNP2
R2   6  9 100.00E3
RC1  4 11 {RC1}
RC2  4 12 {RC2}
RE1 13 10 {RE1}
RE2 14 10 {RE2}
REE 10 99 {REE}
RO1  8  5 {RO1}
RO2  7 99 {RO2}
RP   3  4 {RP}
VB   9  0 dc 0
VC   3 53 dc {VC}
VE  54  4 dc {VE}
VLIM 7  8 dc 0
VLP 91  0 dc {VLP}
VLN  0 92 dc {VLN}

.MODEL DMOD1 D (T_MEASURED = 25 IS = 8.00E-16)
.MODEL DMOD2 D (T_MEASURED = 25 IS = 8.00E-16 RS = 1m CJO = 10p)

.MODEL PNP1 PNP (T_MEASURED = 25 IS = 8.00E-16 BF = 28181.81818)
.MODEL PNP2 PNP (T_MEASURED = 25 IS = {ISM2} BF = {BFM2})

.PARAM
+ C1 = 5.00E-10
+ C2 = 1.00E-09
+ GCM = 4.13E-07
+ GA = 2.32E-02
+ IEE = 1.55E-03
+ RC1 = 43.01
+ RC2 = 43.01
+ RE1 = 9.86
+ RE2 = 9.86
+ REE = 1.29E+05
+ RO1 = 50
+ RO2 = 25
+ RP = 1.76E+03
+ VC = 1.785
+ VE = 1.785
+ VLP = 17
+ VLN = 17
+ ISM2 = 8.152107E-16
+ BFM2 = 34444.44444

.ends njm4558C_s
*$

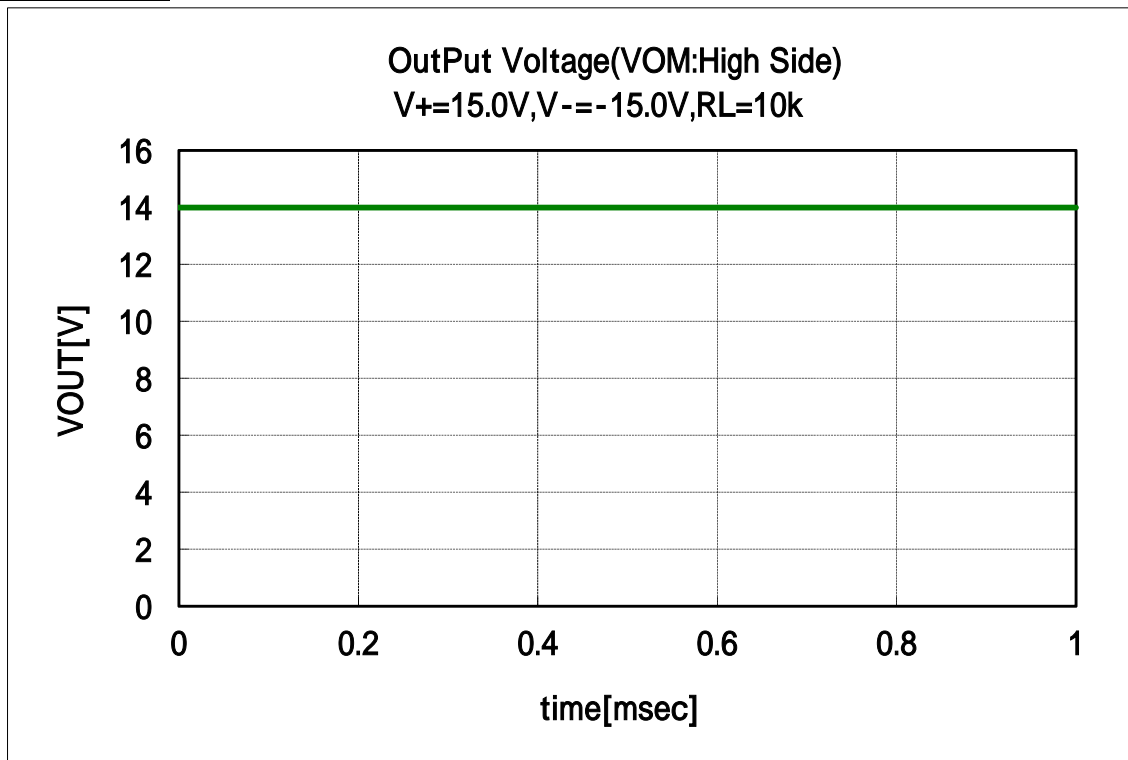
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## BIPOLAR MODEL

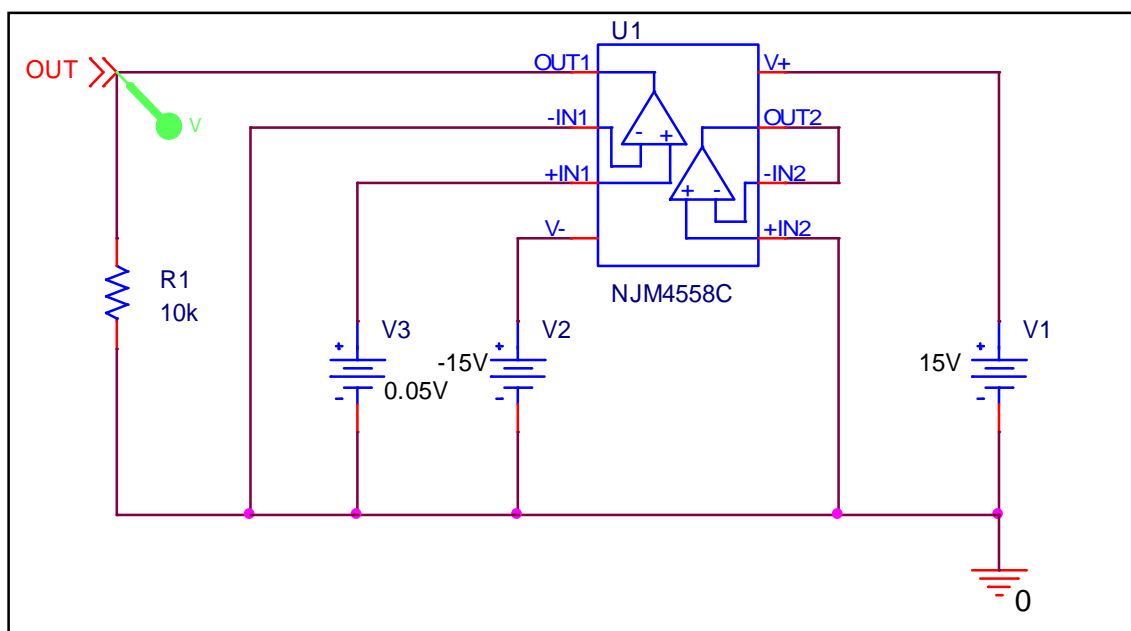
Pspice model parameter	Model description
T_MEASURED	Measured temperature
IS	saturation current
BF	ideal maximum forward beta
U0	Surface Mobility

## Output Voltage Swing ( VOM : High Side )

### Simulation result



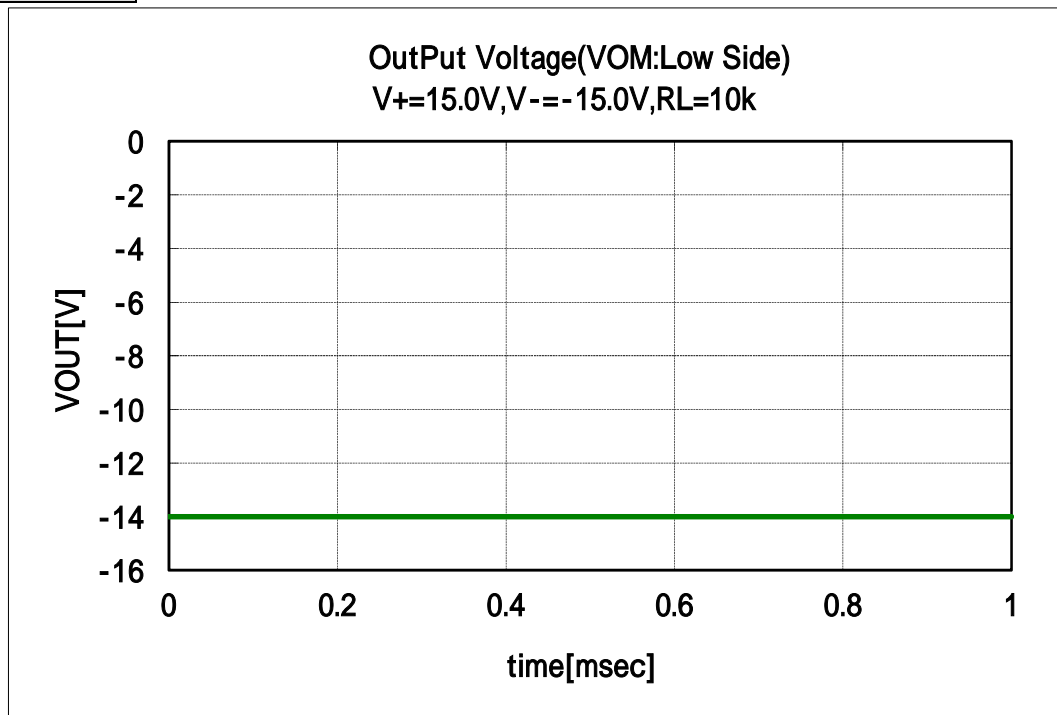
### Evaluation circuit



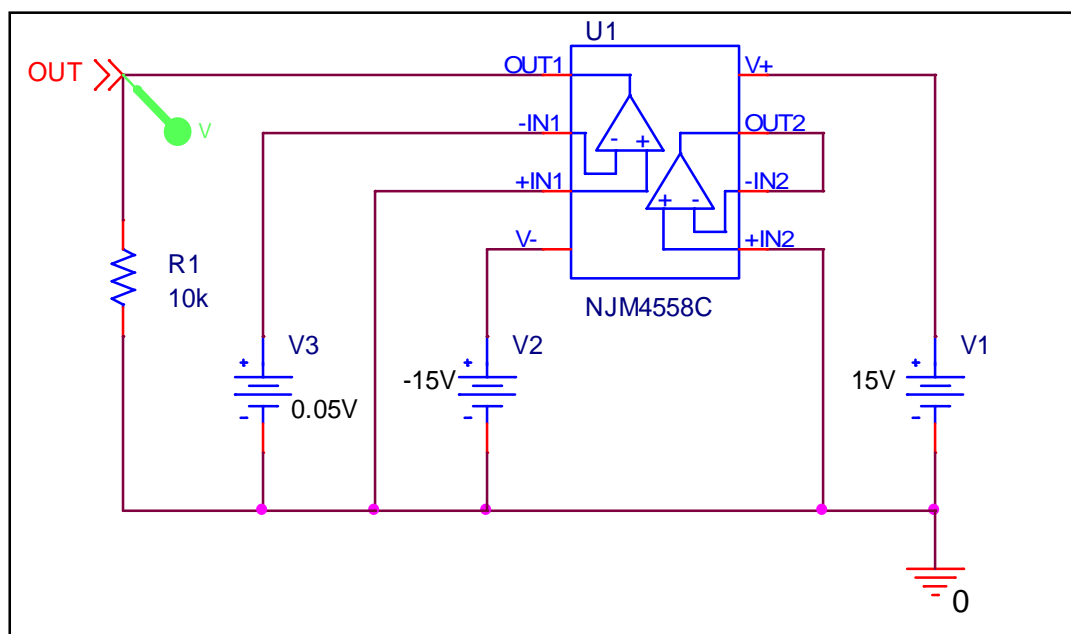
VOM(V)	Data sheet	Simulation	%Error
	14	14	0.0

## Output Voltage Swing ( VOM : Low Side )

### Simulation result



### Evaluation circuit

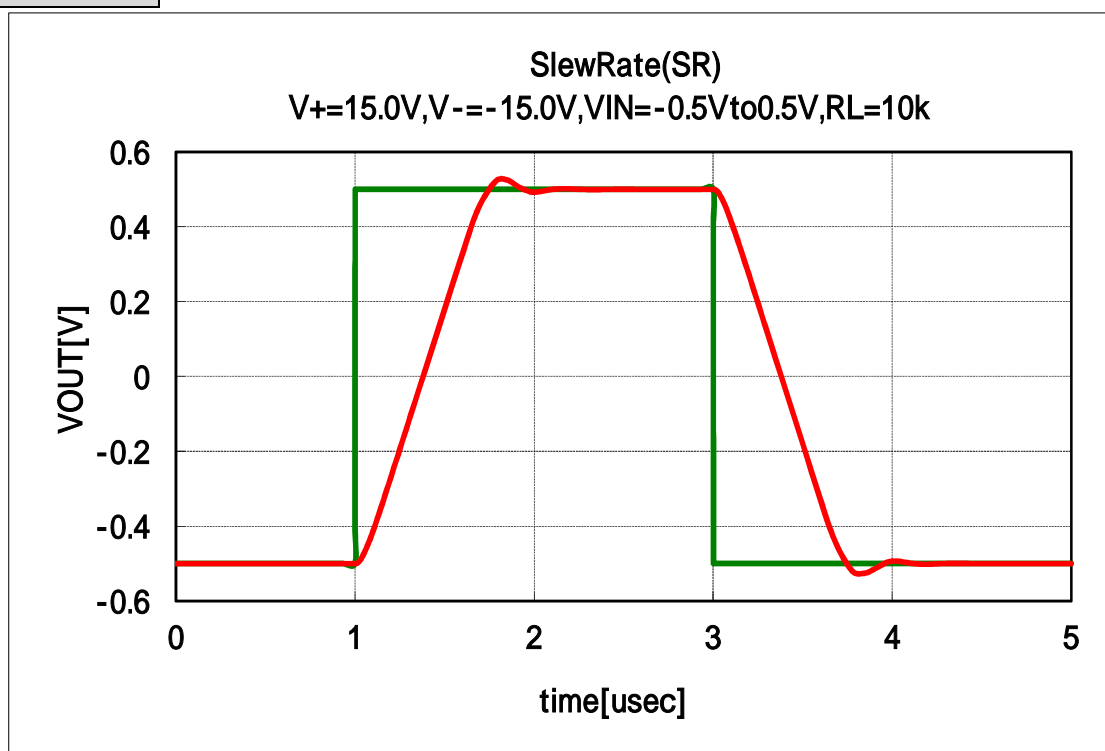


VOM(V)	Data sheet	Simulation	%Error
	-14	-14	0.0

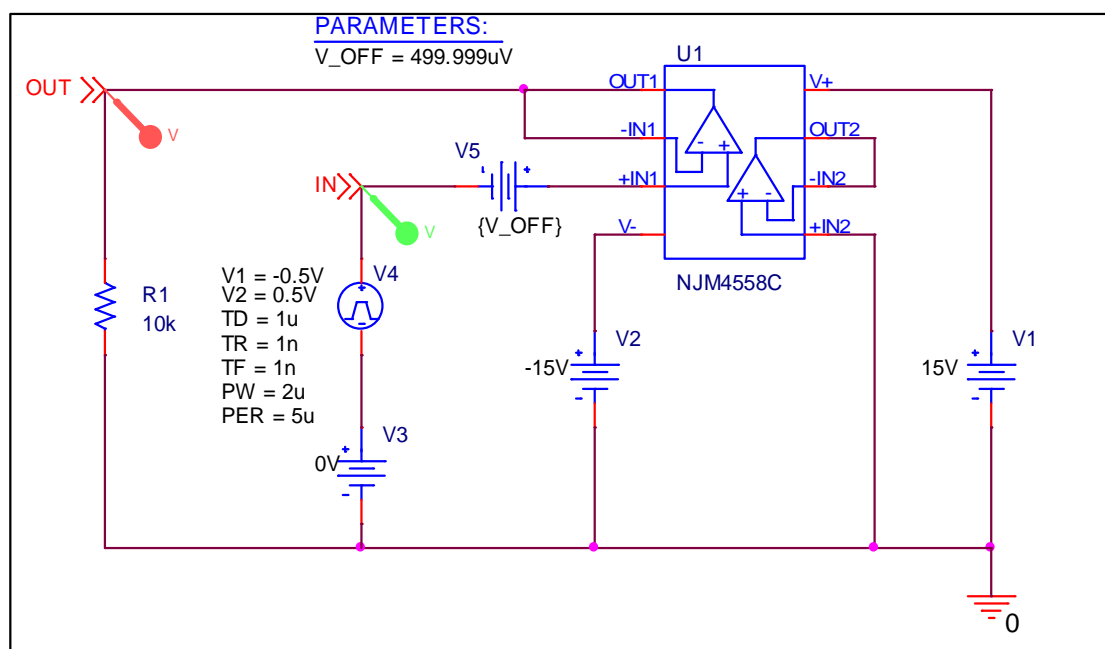


## Slew Rate ( +SR, -SR )

### Simulation result



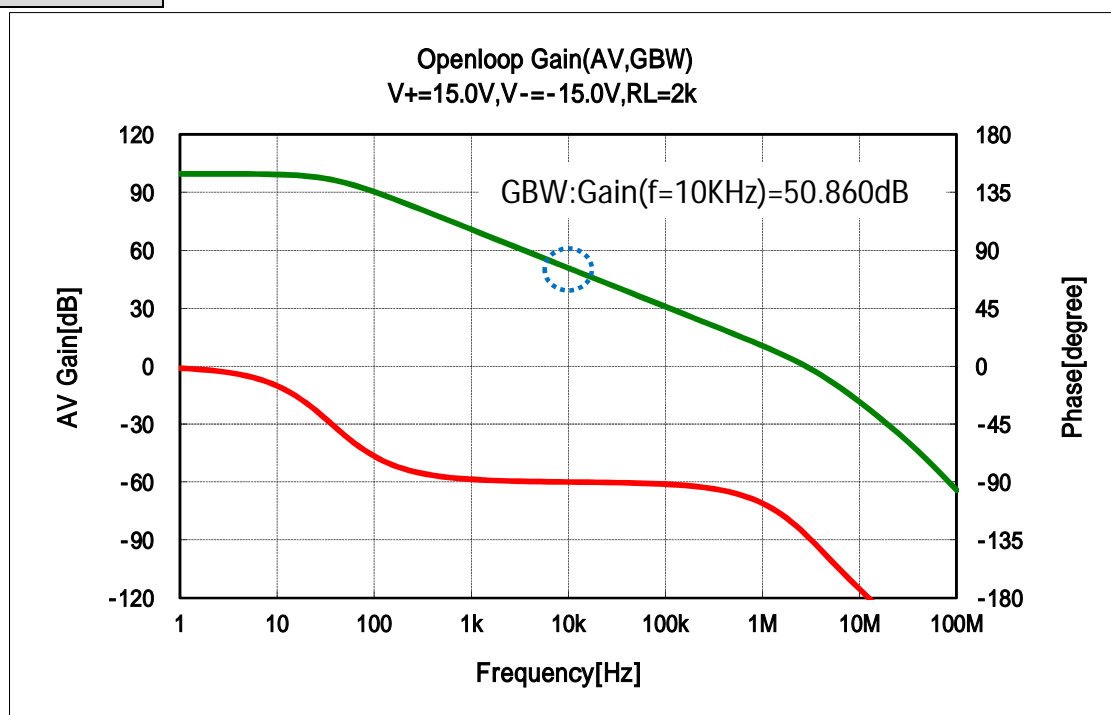
### Evaluation circuit



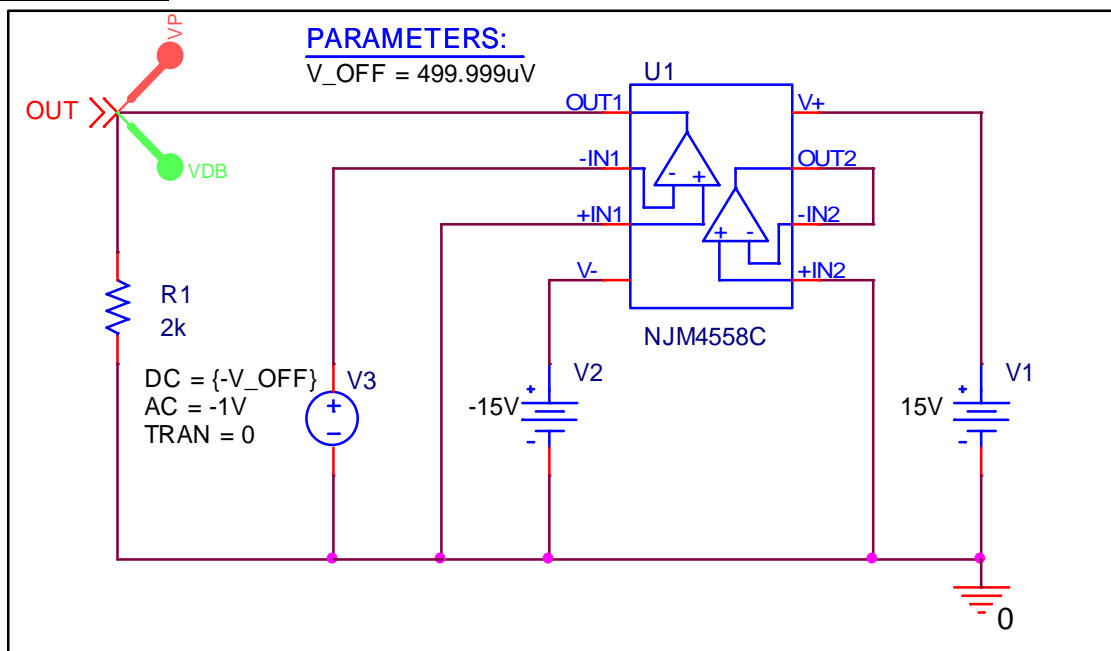
Slew Rate	Data sheet	Simulation	%Error
+SR(V/usec)	1.5	1.498	0.133
-SR(V/usec)	-1.5	-1.503	0.200

## Open Loop Voltage Gain ( Av, GBW )

### Simulation result



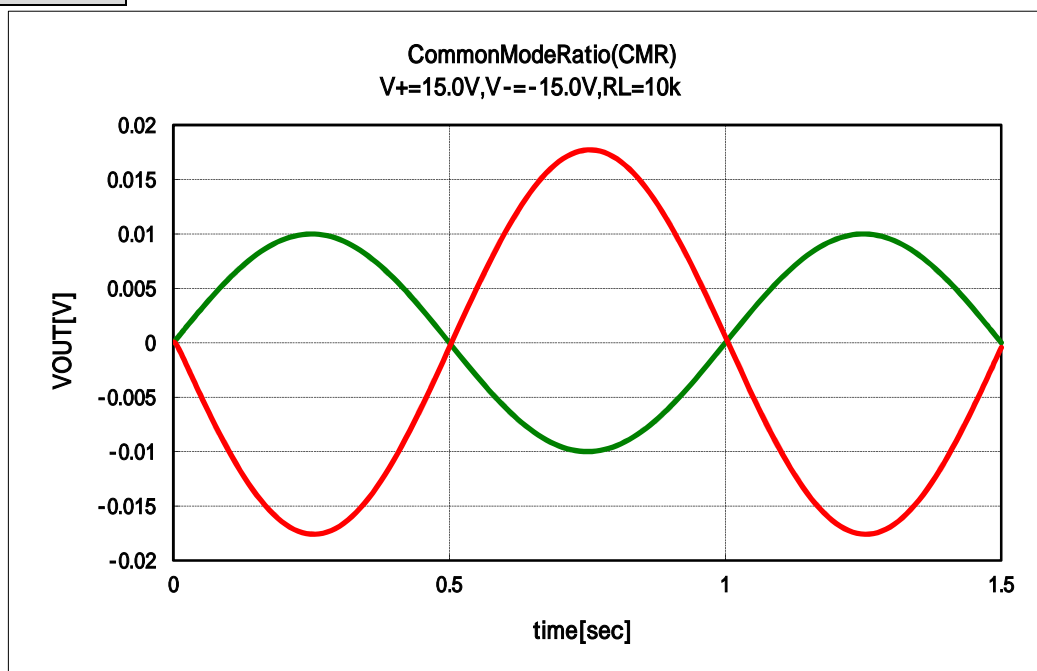
### Evaluation circuit



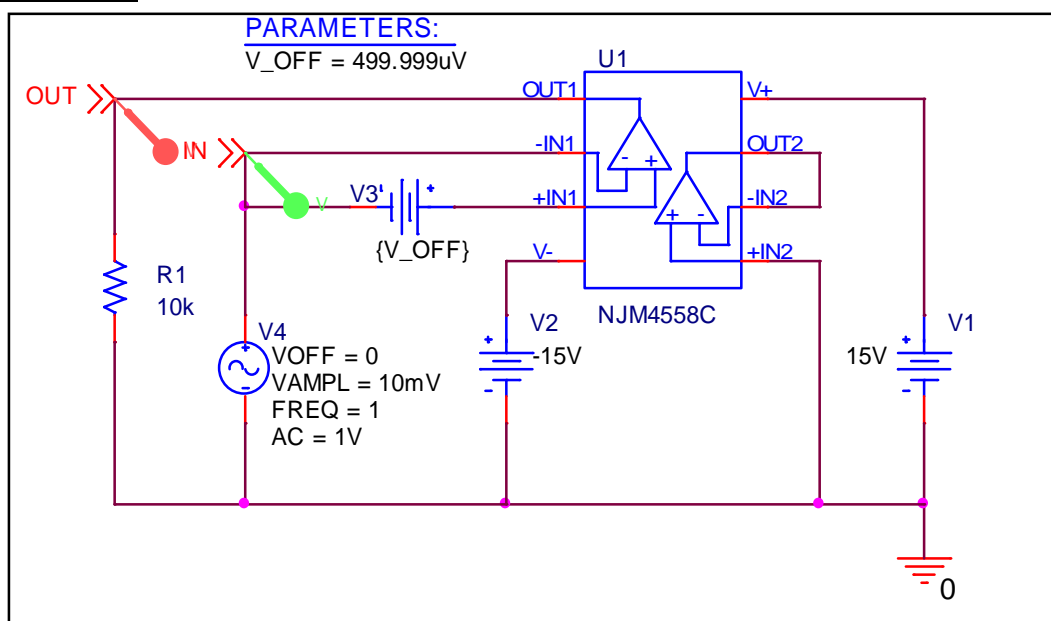
	Data sheet	Simulation	%Error
Av (dB)	100	99.587	0.413
GBW(MHz)	3.5	3.491	0.257
PM(deg)* Reference value	-	49.238	-

## Common-Mode Rejection Voltage gain

### Simulation result



### Evaluation circuit



$$A_{CM} = \frac{V_{pp}(V_{out})}{V_{pp}(V_{inm})} = 1.76565 = 4.938[dB],$$

$$CMR = \left| \frac{A_{VD}}{A_{CM}} \right| = 99.587 - 4.938 = 94.649[dB]$$

CMR(dB)	Data sheet	Simulation	%Error
	95	94.649	0.369