

# Device Modeling Report

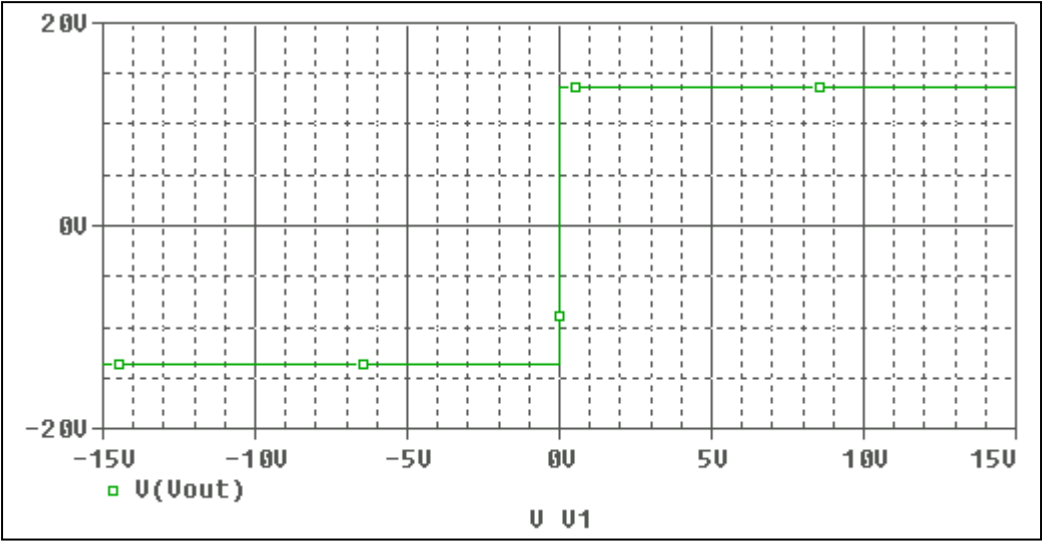
COMPONENTS:MOSFET: OPERATIONAL AMPLIFIER  
PART NUMBER:NJM4741  
MANUFACTURER: NEW JAPAN RADIO CO.,LTD



Bee Technologies Inc.

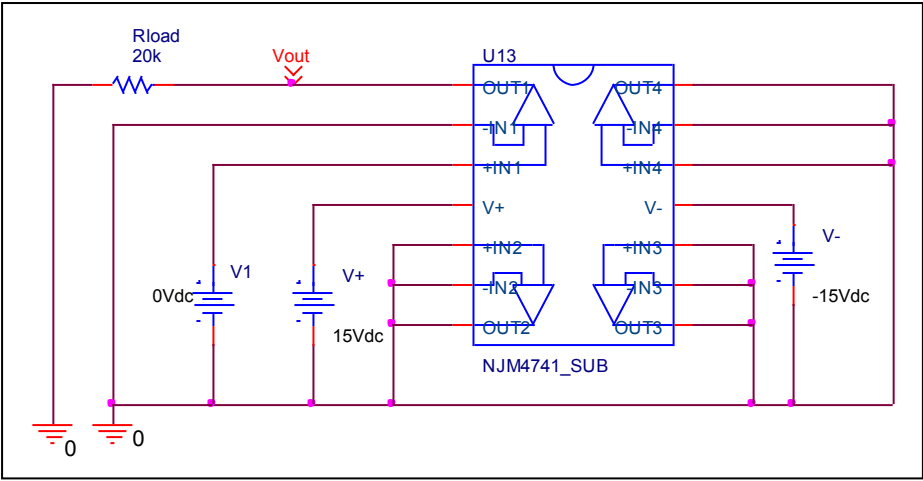
# Output Voltage Swing, +Vout and -Vout

## Simulation result



These simulation results are compared with  $\pm V_{out}$

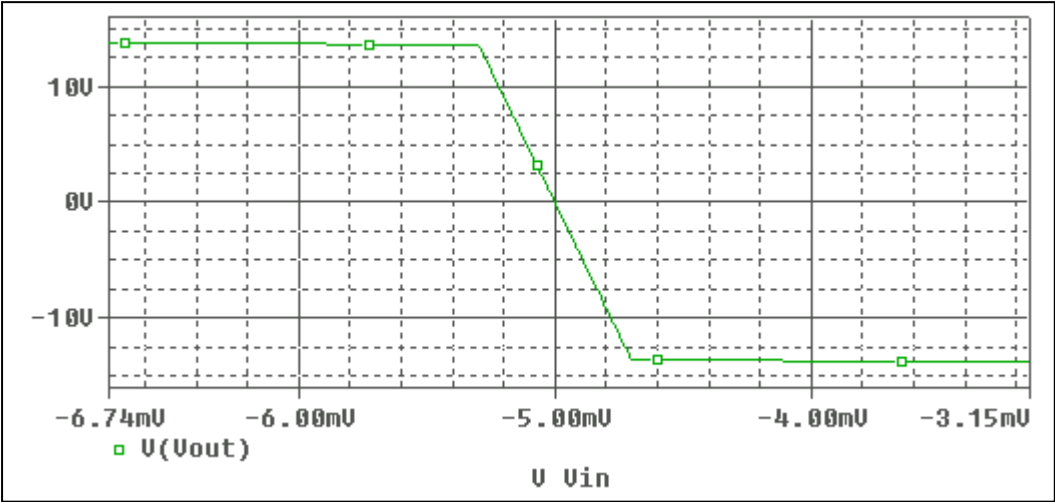
## Evaluation circuit



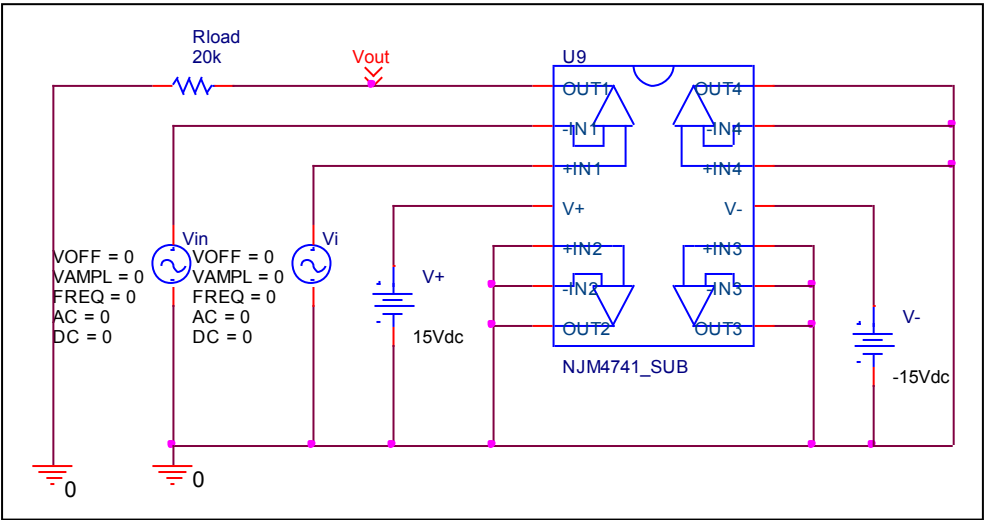
| Output Voltage Swing | Data sheet | Simulation | %Error |
|----------------------|------------|------------|--------|
| +Vout(V)             | +13.7      | 13.699     | 0.007  |
| -Vout(V)             | -13.7      | -13.699    | 0.007  |

# Input Offset Voltage

## Simulation result



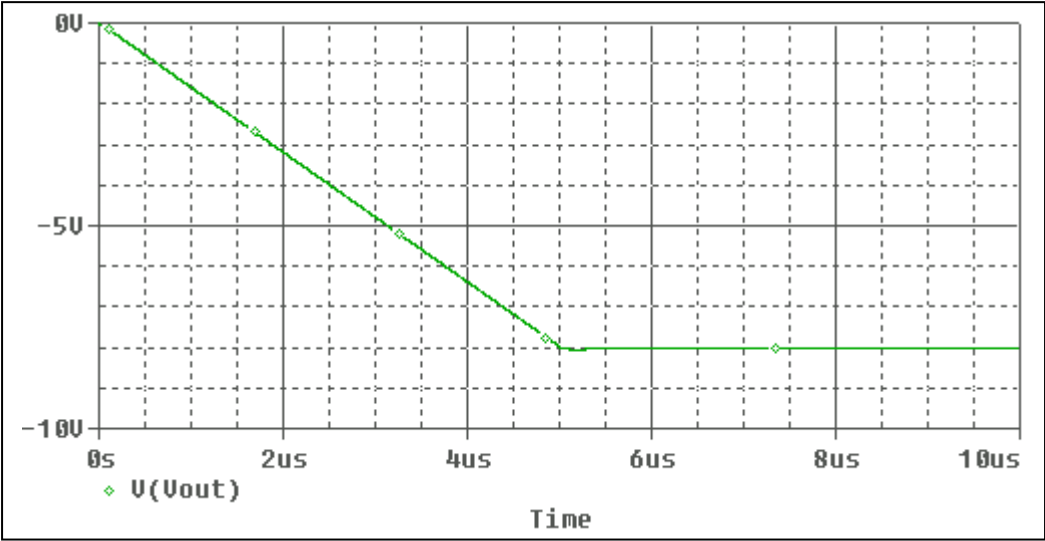
## Evaluation circuit



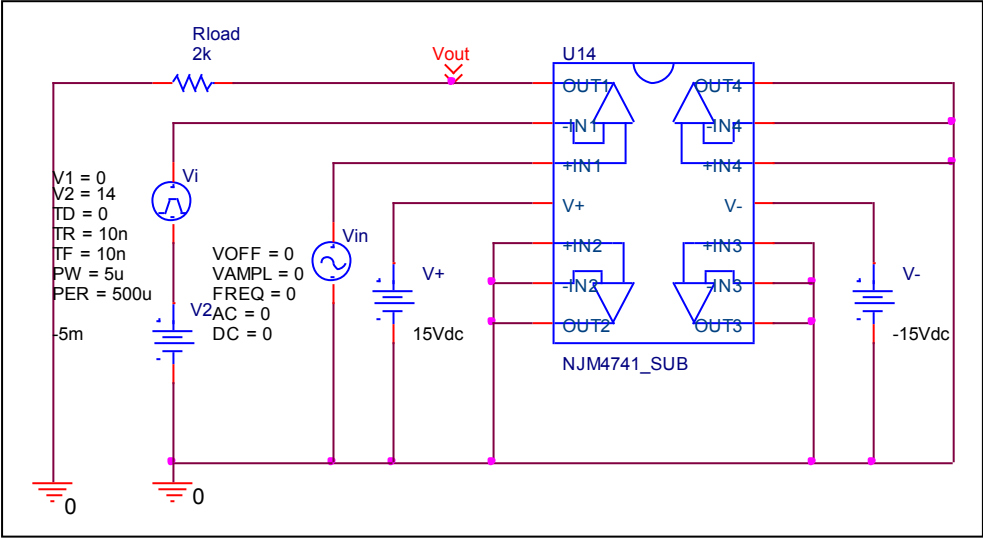
| Vos | Measurement |    | Simulation |    | Error |   |
|-----|-------------|----|------------|----|-------|---|
|     | 5           | mV | 5          | mV | 0     | % |

Slew Rate, +SR, -SR

Simulation result



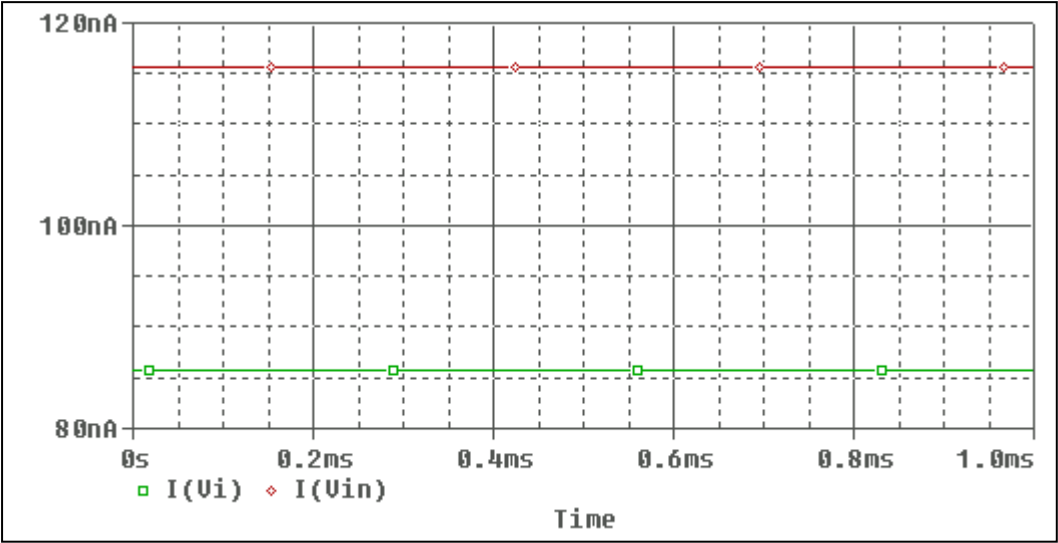
Evaluation circuit



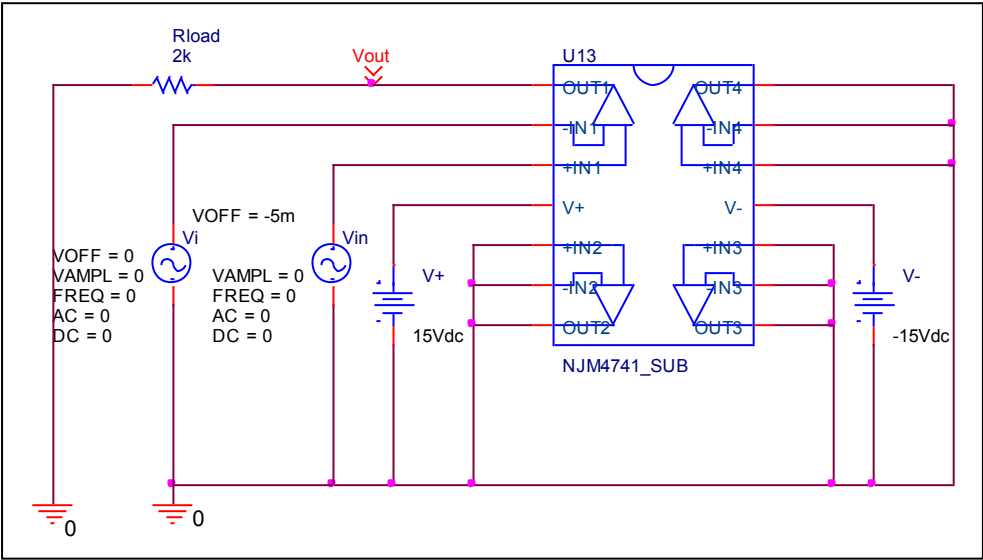
| Slew Rate(v/us) | Data sheet | Simulation | %Error |
|-----------------|------------|------------|--------|
|                 | 1.6V/us    | 1.58V/us   | 1.25   |

# Input current Ib, Ibos

## Simulation result



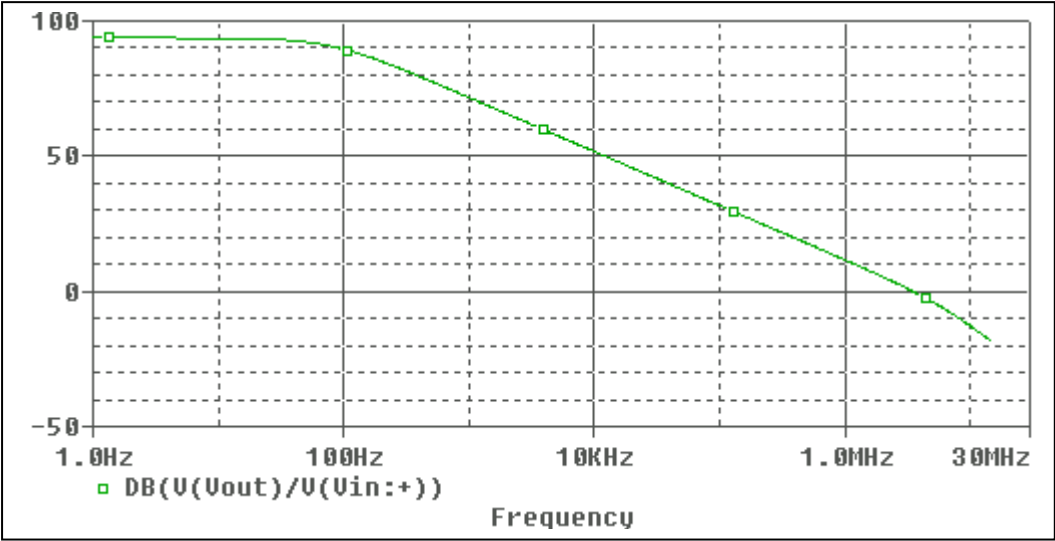
## Evaluation circuit



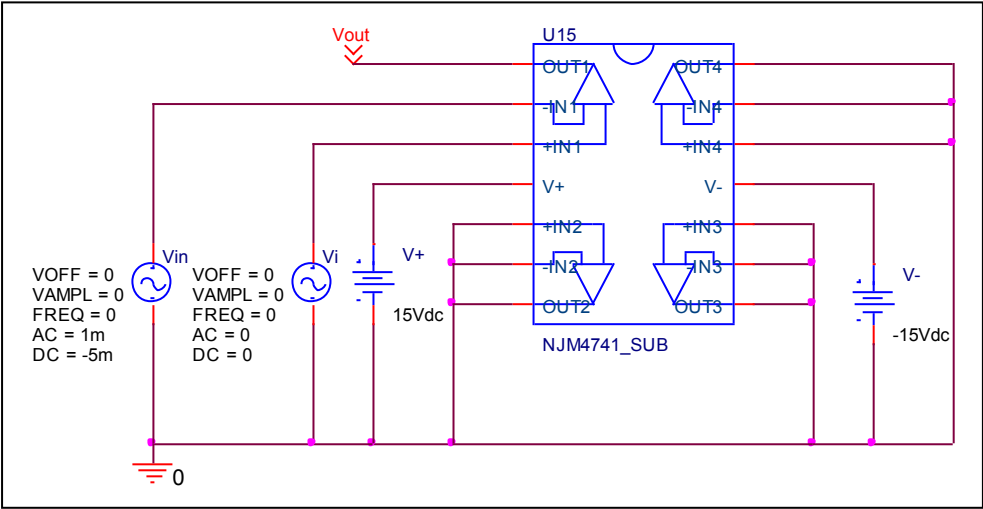
|          | Data sheet | Simulation | %Error |
|----------|------------|------------|--------|
| Ib(nA)   | 100        | 100.6      | 0.6    |
| Ibos(nA) | 30         | 29.87      | 0.433  |

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

## Simulation result



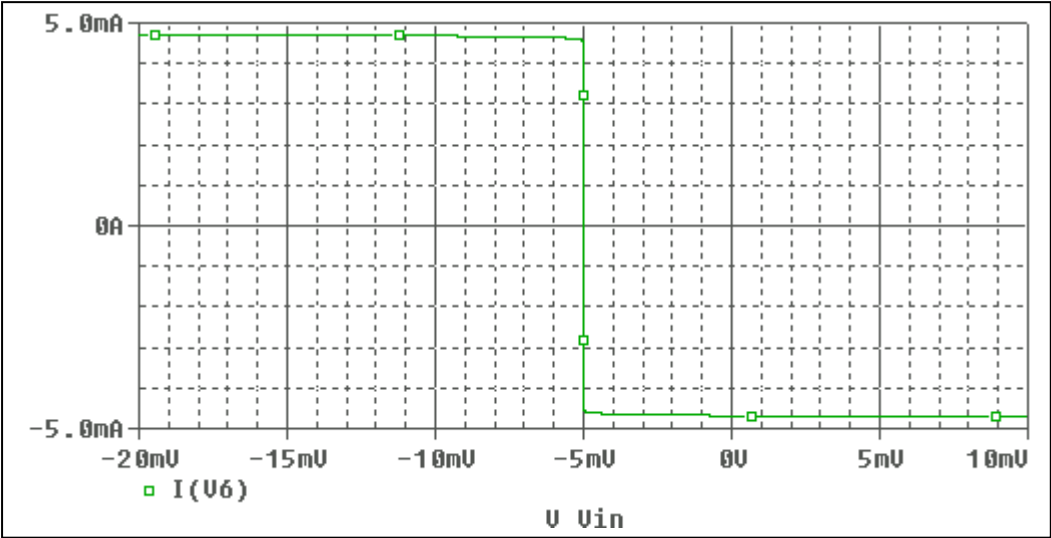
## Evaluation circuit



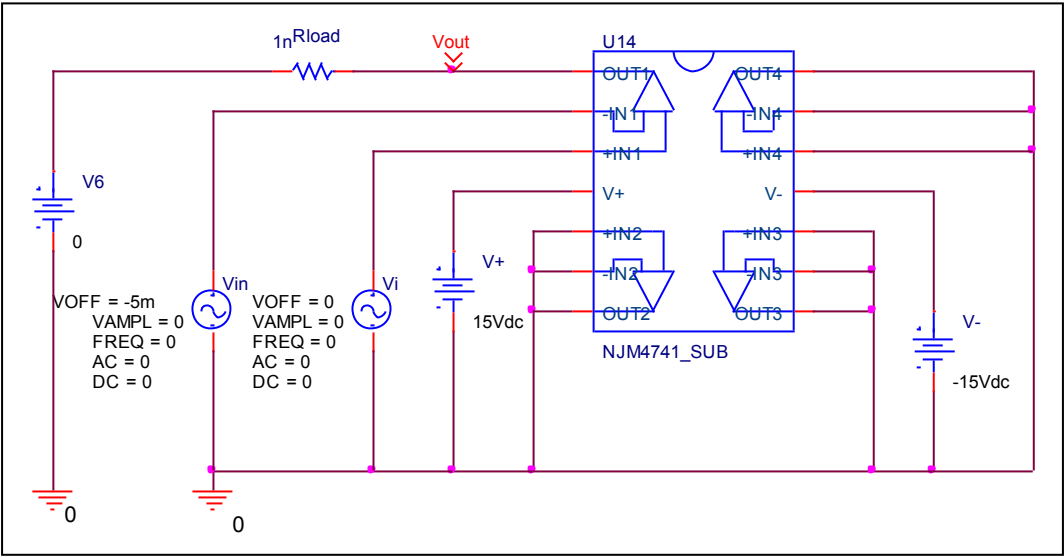
|            | Data sheet | Simulation | %Error |
|------------|------------|------------|--------|
| f-0dB(MHz) | 3.5        | 3.487      | 0.371  |
| Av-dc(dB)  | 94         | 93.7       | 0.319  |

# Output Short Circuit Current - Ios

Simulation result



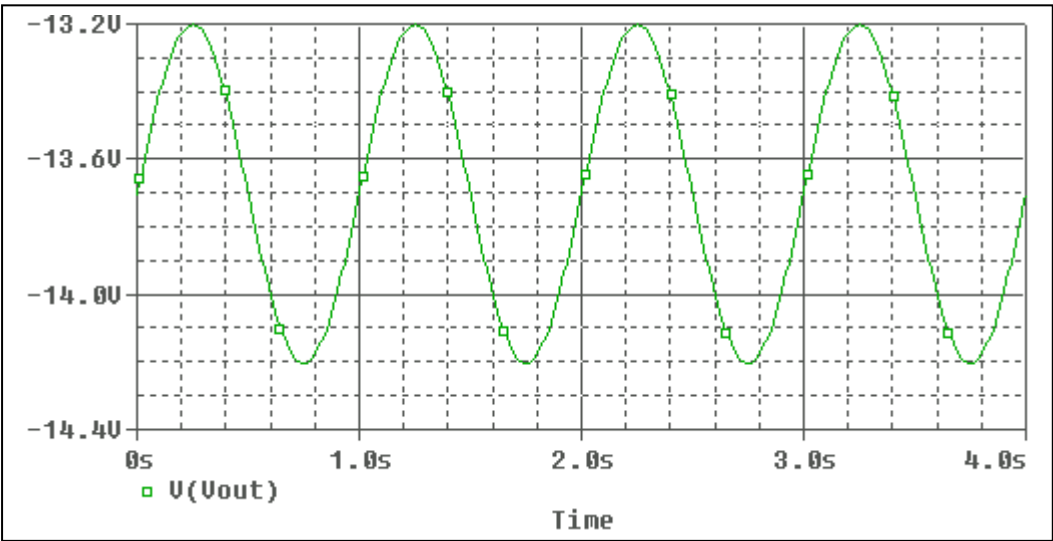
Evaluation circuit



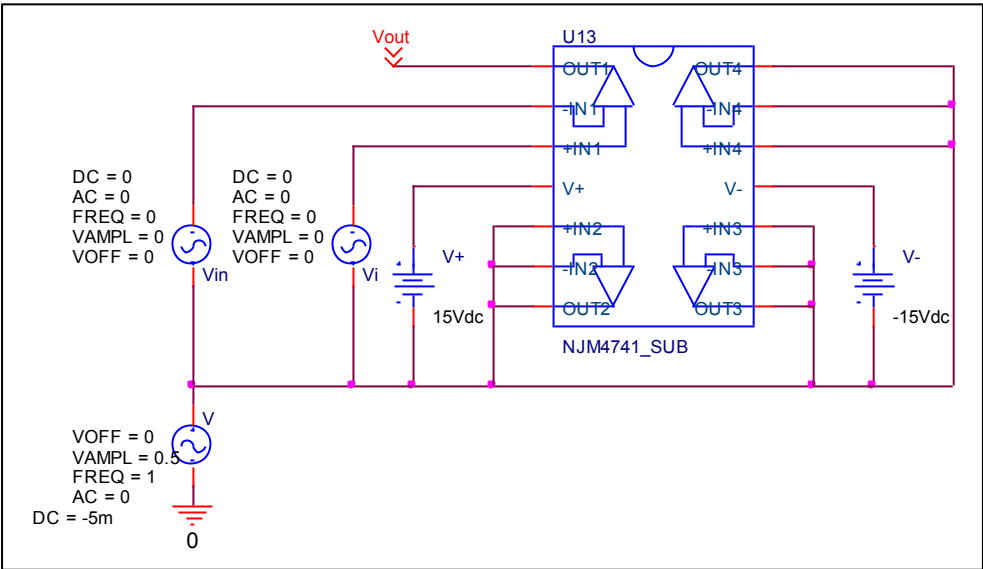
|                       | Data sheet | Simulation | %Error |
|-----------------------|------------|------------|--------|
| Short Circuit Current | 4.7mA      | 4.71mA     | 0.212  |

# Common-Mode Rejection Voltage gain

## Simulation result



## Evaluation circuit



Common mode gain=0.050118/1  
Common Mode Reject Ratio=48417/0.050118=966060

| CMRR | Data sheet | Simulation | %Error |
|------|------------|------------|--------|
|      | 1000000    | 966060     | 3.394  |