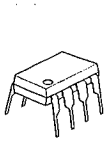
# HIGH PERFORMANCE LOW-NOISE DUAL OPERATIONAL AMPLIFIER

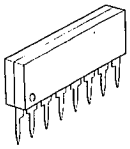
## ■ GENERAL DESCRIPTION

NJM 2114 is a high performance dual low noise operational amplifier which could be replaced in application with NJM5532. Comparing to NJM5532, it has superior specifications on Slew Rate, Bandwidth and Offset Voltage. Furthermore lower noise and distortion are achieved, it is applicable for Hi-Fi audio equipments.

## ■ PACKAGE OUTLINE



NJM2114D



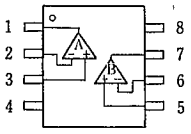
NJM2114L

NJM2114M

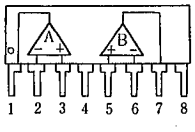
## ■ FEATURES

- Operating Voltage (±3.0V～±22.0V)
- High Slew Rate (15V/ $\mu$s typ.)
- Wide Unity Gain Bandwidth (15MHz typ.)
- Low Noise Voltage (0.9 $\mu$Vnms typ.)
- High Output Current (60mA typ.)
- Package Outline DIP8, DMP8, SIP8
- Bipolar Technology

## ■ PIN CONFIGURATION



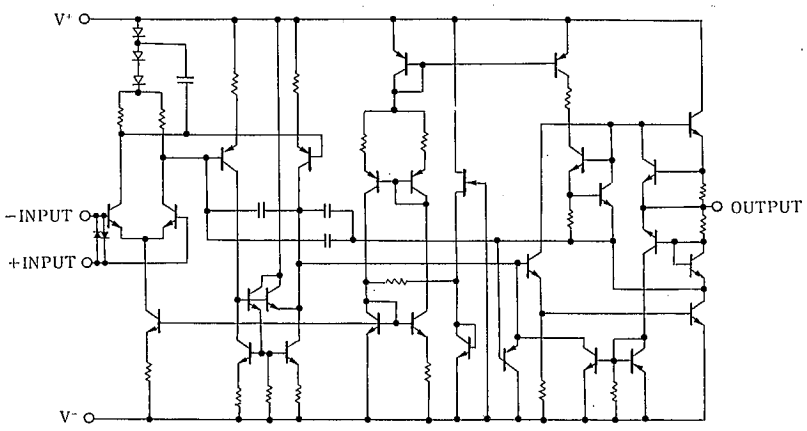

NJM2114D
NJM2114M




NJM2114L

1. A OUTPUT
2. A −INPUT
3. A +INPUT
4. V⁻
5. B +INPUT
6. B −INPUT
7. B OUTPUT
8. V⁺

## ■ EQUIVALENT CIRCUIT



## ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25℃)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Supply Voltage | $V^+/V^-$ | ±22 | V |
| Input Voltage | $V_{IC}$ | $V^+/V^-$ | V |
| Differential Input Voltage | $V_{ID}$ | ±0.5 | V |
| Power Dissipation | $P_D$ | (DIP8) 800 | mW |
| | | (SIP8) 800 | mW |
| | | (DMP8) 600(note) | mW |
| Operating Temperature Range | $T_{opr}$ | −20～+75 | ℃ |
| Storage Temperature Range | $T_{stg}$ | −40～+125 | ℃ |

(note 2) At on PC board

## ■ ELECTRICAL CHARACTERISTICS

($V^+/V^-$=±15V, Ta=25°C)

Direct Current Characteristics

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Operating Current | $I_{CC}$ | | — | 9 | 16 | mA |
| Input Offset Voltage | $V_{IO}$ | | — | 0.2 | 3 | mV |
| Input Offset Current | $I_{IO}$ | | — | 0.01 | 0.3 | μA |
| Input Bias Current | $I_B$ | | — | 0.5 | 1.8 | μA |
| Maximum Peak To Peak Output Voltage Swing | $V_{OM}$ | | ±12 | ±13 | — | V |
| Common Mode Rejection Ratio | CMR | $V_{ICM}$ =12V | 70 | 100 | — | dB |
| Supply Voltage Rejection Ratio | SVR | $V^+/V^-$=±22 → ±11V | 80 | 100 | — | dB |
| Large Swing Voltage Gain 1 | $A_{V1}$ | RL≧2K. $V_O$=±10V | 88 | 110 | — | dB |
| Large Swing Voltage Gain 2 | $A_{V2}$ | RL≧600. $V_O$=±10V | 83 | 104 | — | dB |
| Maximum Output Voltage Swing 1 | $V_{OH1}$ | RL≧600 | ±12 | 14/−13 | — | V |
| Maximum Output Voltage Swing 2 | $V_{OH2}$ | RL≧600. $V^+/V^-$=±18V | ±15 | 17/−16 | — | V |
| Input Resistance | $R_{IN}$ | | — | 100 | — | KΩ |
| Maximum Output Current Swing | $I_{OH}$ | | — | 60 | — | mA |

## ■ ELECTRICAL CHARACTERISTICS

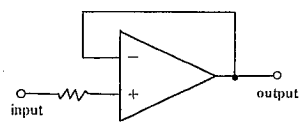
Alternating Current Characteristics

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Slew Rate | SR | $G_V$=20dB. RL=2K | — | 15 | — | V/μS |
| Gain bandwidth product | GB | | — | 13 | — | MHz |
| Equivalent input noise voltage | $V_{NI}$ | 20Hz～20kHz | — | 0.9 | — | uVrms |
| Equivalent input noise voltage | $V_{NI}$ | fo=30Hz | — | 5.5 | — | nV/√Hz |
| Equivalent input noise voltage | $V_{NI}$ | fo=1kHz | — | 3.3 | — | nV/√Hz |
| Equivalent input noise current | $I_{NI}$ | fo=30Hz | — | 1.5 | — | pA/√Hz |
| Equivalent input noise current | $I_{NI}$ | fo=1kHz | — | 0.4 | — | pA/√Hz |
| Total Harmonic Distotion | THD | f=1kHz,$V_O$=5V | — | 0.0005 | — | % |

## ■ NOTE

In the application as a voltage follower, there might be the case the inputs are damaged especially the moment the supply voltage is switched on.

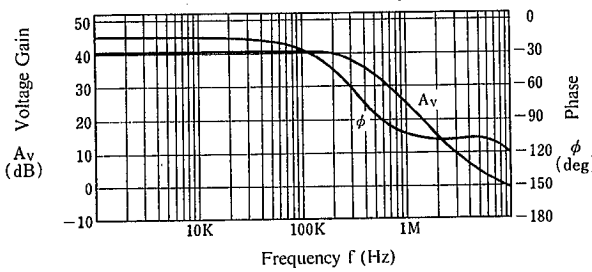
That's why we recommend you to put the current limiting resistor at the input pin.



## ■ TYPICAL CHARACTERISTICS

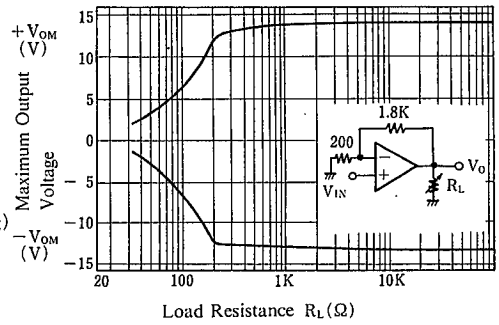
### Voltage Gain, Phase vs. Frequency

($V^+/V^-=\pm15V$, $R_L=2K\Omega$, 40dBAmp, Ta=25°C)



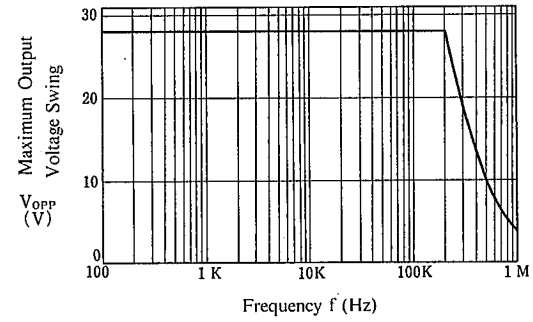

### Maximum Output Voltage vs. Load Resistance

($V^+/V^-=\pm15V$, Ta=25°C)



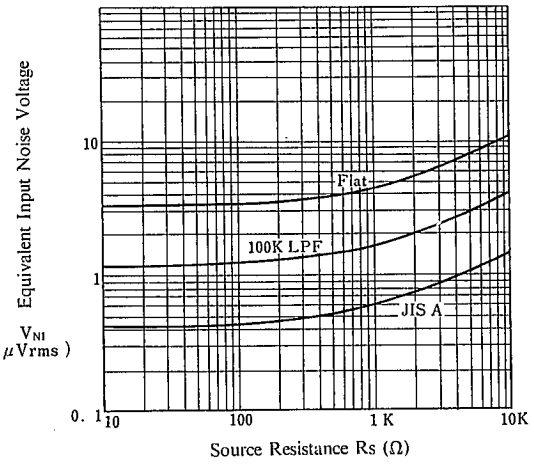

### Maximum Output Voltage Swing vs. Frequency

($V^+/V^-=\pm15V$, Ta=25°C)



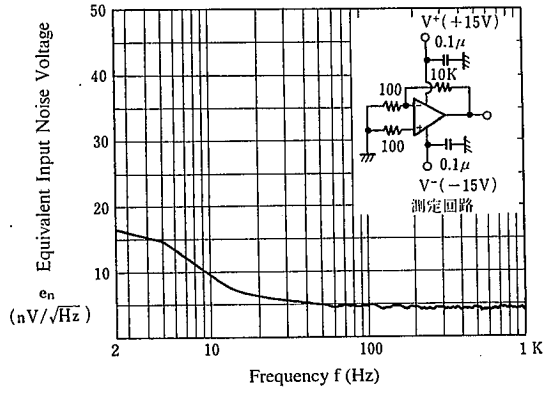

### Equivalent Input Noise Voltage vs. Source Resistance

($V^+/V^-=\pm15V$, Ta=25°C)



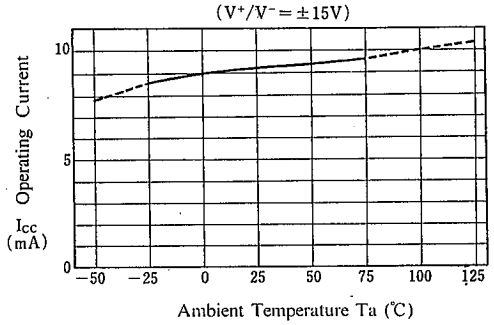

### Equivalent Input Noise Voltage vs. Frequency

($V^+/V^-=\pm15V$, $A_V=40dB$)




### Operating Current vs. Temperature

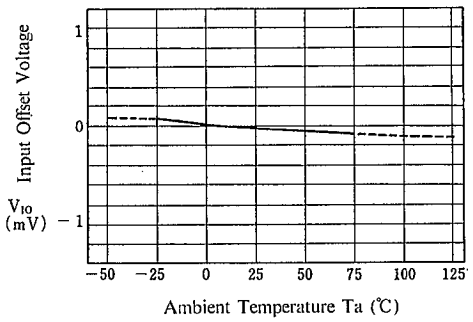
($V^+/V^-=\pm15V$)



## ■ TYPICAL CHARACTERISTICS

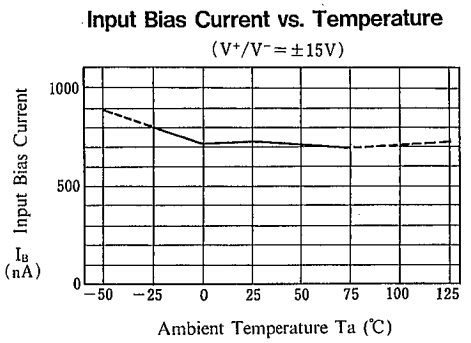
### Input Offset Voltage vs. Temperature

($V^+/V^-=\pm15V$)



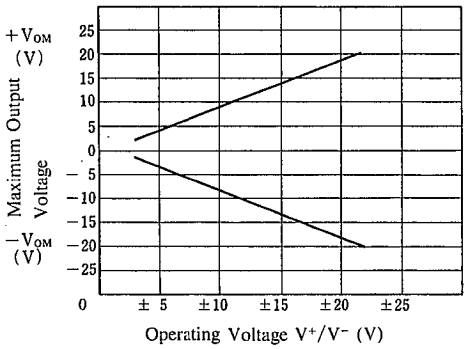

### Input Bias Current vs. Temperature

($V^+/V^-=\pm15V$)



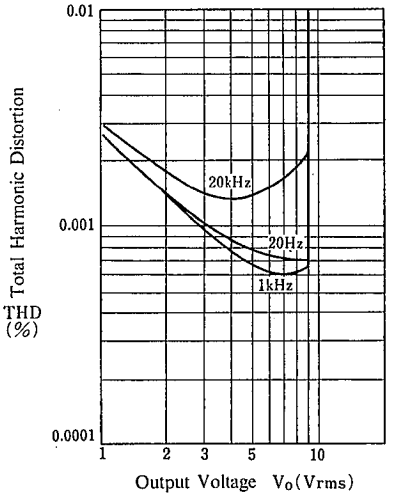

### Maximum Output Voltage vs. Operating Voltage

($R_L=600\Omega$, Ta=25°C)



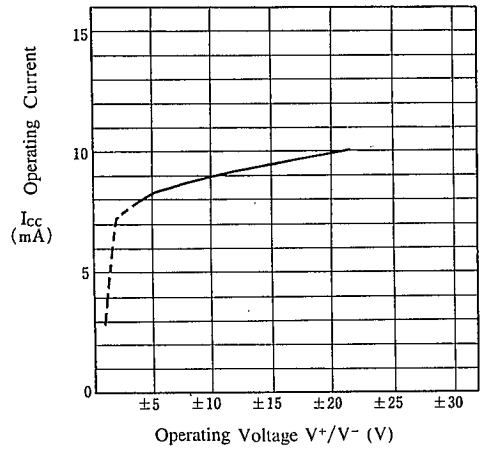

### Total Harmonic distortion vs. Output Voltage

($V^+/V^-=\pm15V$, $R_L=10k\Omega$, Gain=20dB, Ta=25°C)




### Operating Current vs. Operating Voltage

(Ta=25°C)



MEMO

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