

## QUAD OPERATIONAL AMPLIFIER

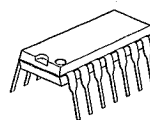
## ■ GENERAL DESCRIPTION

NJM 2112 is low operating voltage ( $\pm 1.0$  V min.) and low saturation output voltage ( $\pm 2.0$  V p-p at operating voltage  $\pm 25$  V) operational amplifier. It is applicable to HANDY TYPE CD, RADIO CASSETTE CD, and PORTABLE DAT, that are digital audio apparatus which require the 5 V single supply operation and high output voltage. The NJM2112 is quad operational amplifier. Each amplifier of the NJM2112 has the same electrical characteristic of the NJM2115.

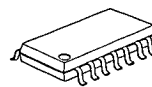
## ■ FEATURES

- Operating Voltage ( $\pm 1.0$  V  $\sim \pm 7.0$  V)
- Low Saturation Output Voltage ( $\pm 2.0$  V<sub>p-p</sub> @  $V^+ = \pm 2.5$  V)
- Package Outline DIP14, DMP14, SSOP14
- Bipolar Technology

## ■ PACKAGE OUTLINE



NJM2112D

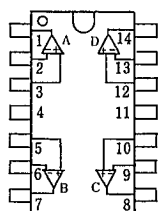


NJM2112M



NJM2112V

## ■ PIN CONFIGURATION

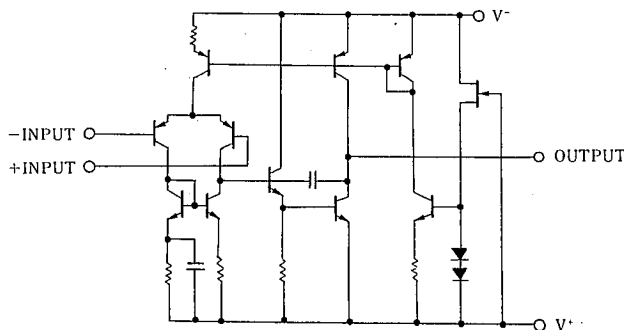


NJM2112D  
NJM2112M  
NJM2112V

## PIN FUNCTION

- |                   |                    |
|-------------------|--------------------|
| 1. A OUTPUT       | 8. C OUTPUT        |
| 2. A -INPUT       | 9. C -INPUT        |
| 3. A +INPUT       | 10. C +INPUT       |
| 4. V <sup>+</sup> | 11. V <sup>-</sup> |
| 5. B +INPUT       | 12. D +INPUT       |
| 6. B -INPUT       | 13. D -INPUT       |
| 7. B OUTPUT       | 14. D OUTPUT       |

## ■ EQUIVALENT CIRCUIT (1/4 Shown)



## ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

| PARAMETER                   | SYMBOL                         | RATINGS      | UNIT |
|-----------------------------|--------------------------------|--------------|------|
| Supply Voltage              | V <sup>+</sup> /V <sup>-</sup> | ±7.0         | V    |
| Differential Input Voltage  | V <sub>ID</sub>                | ±14          | V    |
| Power Dissipation           | P <sub>D</sub>                 | (DIP14) 500  | mW   |
|                             |                                | (DIM14) 300  | mW   |
|                             |                                | (SSOP14) 300 | mW   |
| Operating Temperature Range | T <sub>opr</sub>               | -40 ~ +85    | °C   |
| Storage Temperature Range   | T <sub>stg</sub>               | -40 ~ +125   | °C   |

## ■ ELECTRICAL CHARACTERISTICS

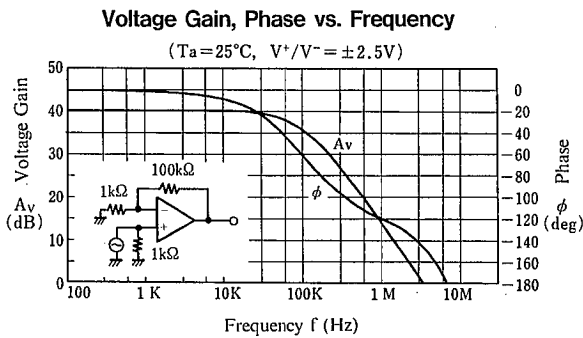
(V<sup>+</sup>/V<sup>-</sup>=±2.5V, Ta=25°C)

| PARAMETER                       | SYMBOL           | TEST CONDITION                          | MIN. | TYP. | MAX. | UNIT |
|---------------------------------|------------------|-----------------------------------------|------|------|------|------|
| Input Offset Voltage            | V <sub>IO</sub>  | R <sub>S</sub> ≤ 10kΩ                   | —    | 1    | 6    | mV   |
| Input Bias Current              | I <sub>B</sub>   |                                         | —    | 100  | 300  | nA   |
| Large Signal Voltage Gain       | A <sub>V</sub>   | R <sub>L</sub> ≥ 10kΩ                   | 60   | 80   | —    | dB   |
| Maximum Output Voltage Swing    | V <sub>OM</sub>  | R <sub>L</sub> ≥ 2.5kΩ                  | ±2   | ±2.2 | —    | V    |
| Input Common Mode Voltage Range | V <sub>ICM</sub> |                                         | ±1.5 | —    | —    | V    |
| Common Mode Rejection Ratio     | CMR              |                                         | 60   | 74   | —    | dB   |
| Supply Voltage Rejection Ratio  | SVR              |                                         | 60   | 80   | —    | dB   |
| Operating Current               | I <sub>CC</sub>  | V <sub>IN</sub> =0, R <sub>L</sub> =∞   | —    | 8    | 11   | mA   |
| Slew Rate                       | SR               | A <sub>U</sub> =1, V <sub>IN</sub> =±1V | —    | 3.2  | —    | V/μs |
| Gain Bandwidth product          | GB               | f=10kHz                                 | —    | 9    | —    | MHz  |

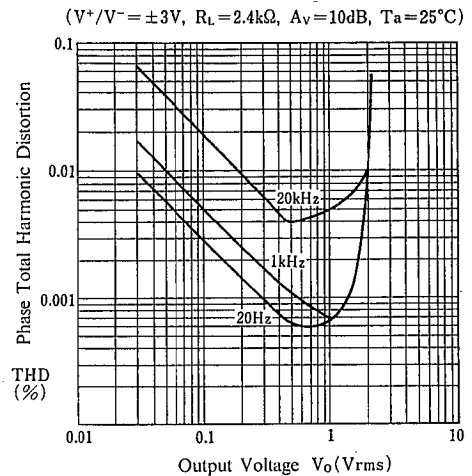
(note 1) Applied circuit voltage gain is desired to be operated within the range of 3 dB to 30 dB.

(note 2) Special care being required for input common mode voltage range and the oscillation due to the capacitive load when operating follower.

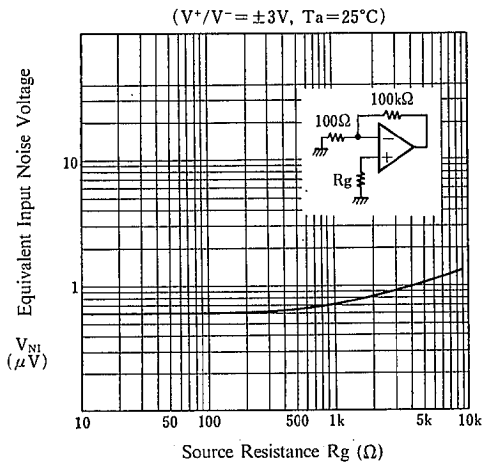
■ TYPICAL CHARACTERISTICS



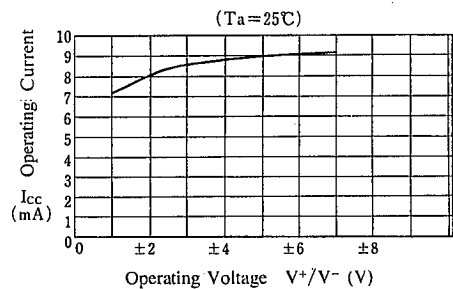
**Total Harmonic Distortion vs. Output Voltage**



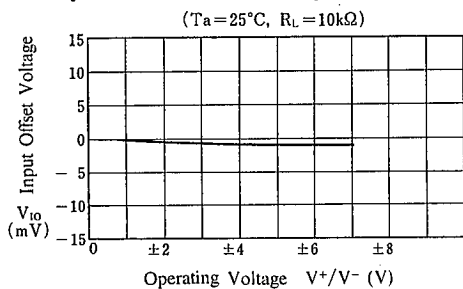
**Equivalent Input Noise Voltage vs. Source Resistance**



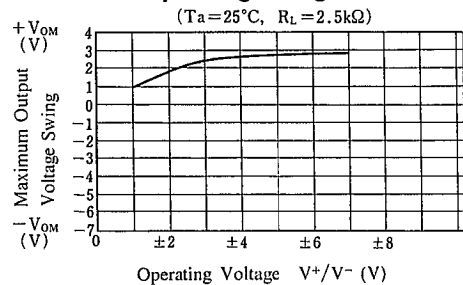
**Operating Current vs. Operating Voltage**



**Input Offset Voltage vs. Operating Voltage**

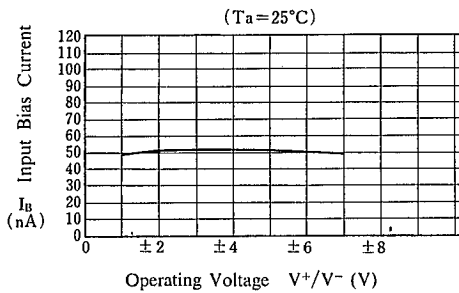


**Maximum Output Voltage Swing vs. Operating Voltage**



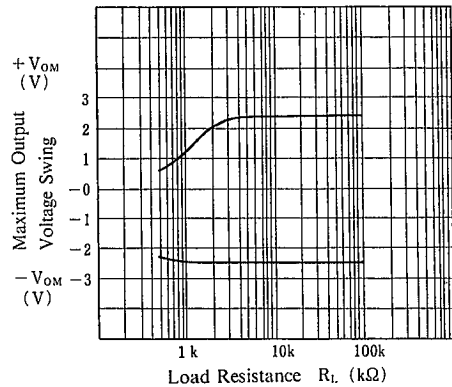
## TYPICAL CHARACTERISTICS

Input Bias Current vs. Operating Voltage



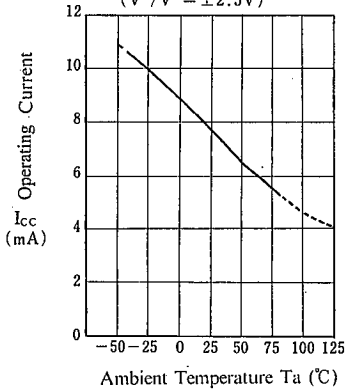
Maximum Output Voltage Swing vs. Load Resistance

( $V^+/V^- = \pm 2.5\text{V}$ ,  $T_a = 25^\circ\text{C}$ )



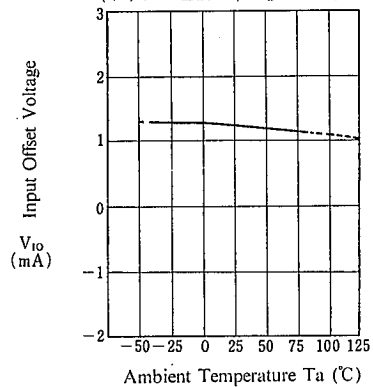
Operating Current vs. Temperature

( $V^+/V^- = \pm 2.5\text{V}$ )



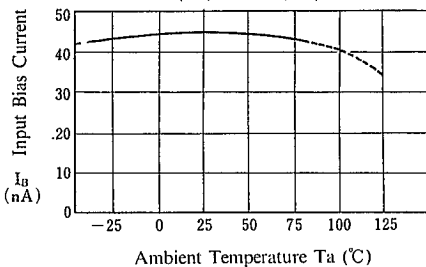
Input Offset Voltage vs. Temperature

( $V^+/V^- = \pm 2.5\text{V}$ ,  $R_L = 10\text{k}\Omega$ )



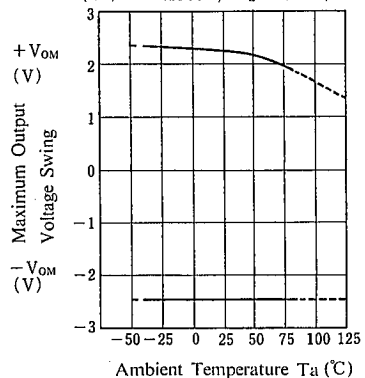
Input Bias Current vs. Temperature

( $V^+/V^- = \pm 2.5\text{V}$ )



Maximum Output Voltage Swing vs. Temperature

( $V^+/V^- = \pm 2.5\text{V}$ ,  $R_L = 2.5\text{k}\Omega$ )



## MEMO

**[CAUTION]**

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