

## DUAL OPERATIONAL AMPLIFIER

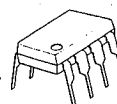
## ■ GENERAL DESCRIPTION

NJM 2115 is a low operating Voltage ( $\pm 1.0$  V min.) and low saturation output voltage ( $\pm 2.0$  V p-p at supply voltage  $\pm 2.5$  V) operational amplifier. It is applicable to HANDY TYPE CD, RADIO CASSETE CD, and PORTABLE DAT, that are digital audio apparatus which require the 5V single supply operation and high output voltage. The NJM2115 is improved version of the NJM2100 about BIAS-CIRCUIT. So, NJM2115 is low saturation compared to the NJM2100 under the condition of low supply voltage ( $< \pm 2.5$  V). The NJM2115 is stable about the oscillation compared to the NJM2100 under the condition of  $V^+/V^- > 2.5$  V.

## ■ FEATURES

- Operating Voltage ( $\pm 1$  V  $\sim \pm 7$  V)
- Low Saturation Output Voltage ( $\pm 2.0$  V<sub>P-P</sub> @  $V^+ = \pm 2.5$  V)
- Slew Rate (4 V/ $\mu$ s typ.)
- Unity Gain Bandwidth (12 MHz typ.)
- Package Outline DIP8, DMP8, SIP8, SSOP8
- Bipolar Technology

## ■ PACKAGE OUTLINE



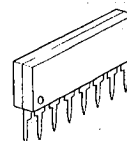
NJM2115D



NJM2115M

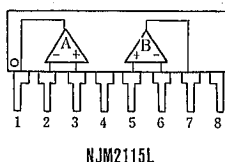
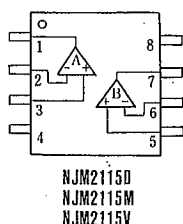


NJM2115V



NJM2115L

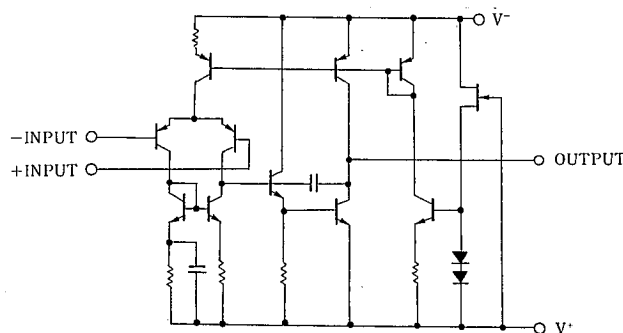
## ■ PIN CONFIGURATION



## PIN FUNCTION

1. A OUTPUT
2. A -INPUT
3. A +INPUT
4.  $V^-$
5. B +INPUT
6. B -INPUT
7. B OUTPUT
8.  $V^+$

## ■ EQUIVALENT CIRCUIT (1/2 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>                 | (DIP8) 500  | mW   |
|                             |                                | (DIM8) 300  | mW   |
|                             |                                | (SIP8) 800  | mW   |
|                             |                                | (SSOP8) 250 | 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> =∞   | —    | 3.5  | 5    | mA   |
| Slew Rate                       | SR               | A <sub>U</sub> =1, V <sub>IN</sub> =±1V | —    | 4    | —    | V/μs |
| Gain Bandwidth product          | GB               | f=10kHz                                 | —    | 12   | —    | MHz  |

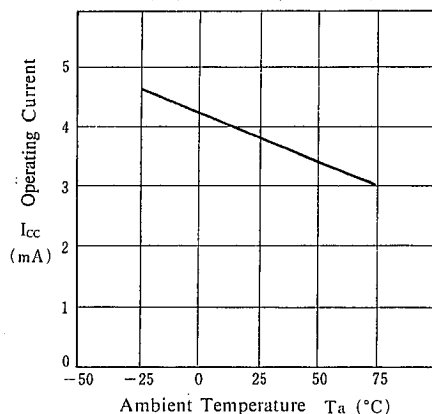
(note 1) Applied circuit voltage gain is desired to be operated within the range of 3 dB to 30 dB.

(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

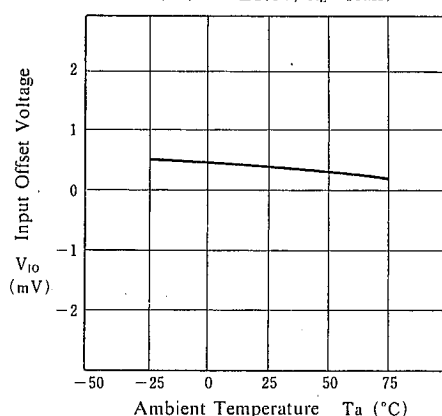
Operating Current vs. Temperature

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



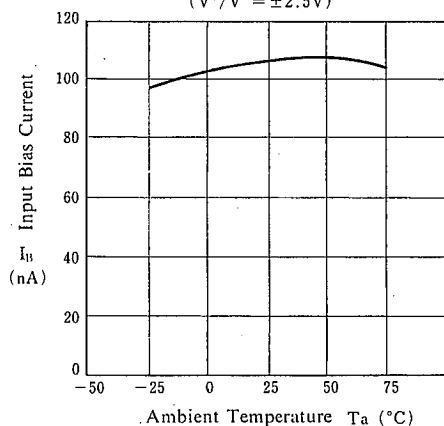
Input Offset Voltage vs. Temperature

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



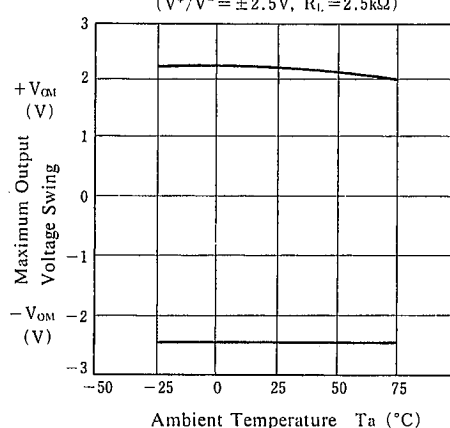
Input Bias Current vs. Temperature

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



Maximum Output Voltage Swing vs. Temperature

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

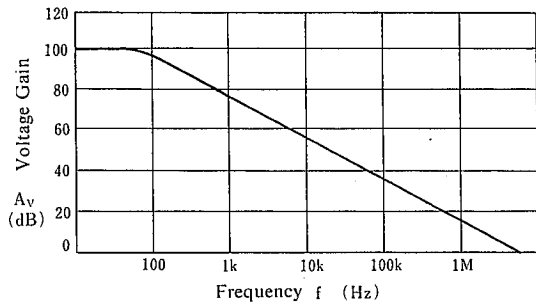


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## TYPICAL CHARACTERISTICS

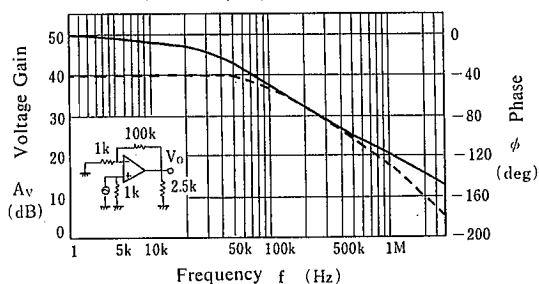
### Voltage Gain vs. Frequency

( $V^+/V^- = \pm 12.5V$ ,  $T_a = 25^\circ C$ )



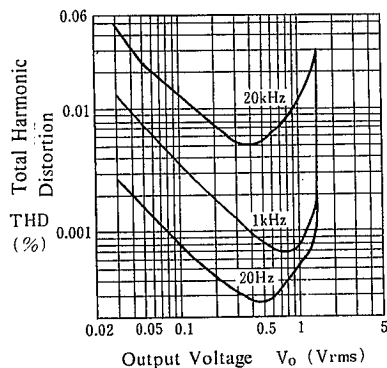
### Voltage Gain, Phase vs. Frequency

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



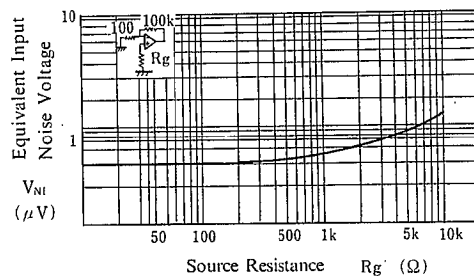
### Total Harmonic Distortion vs. Output Voltage

( $V^+/V^- = \pm 3V$ ,  $R_L = 2.4k\Omega$ ,  $Gain = 10dB$ ,  $T_a = 25^\circ C$ )



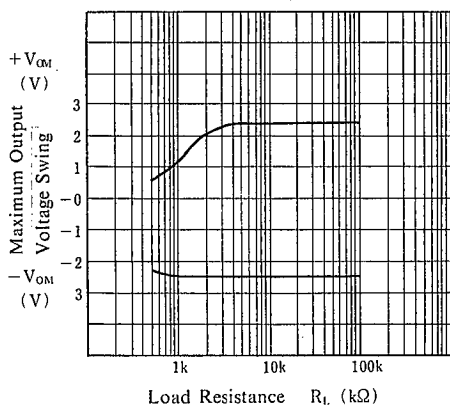
### Equivalent Input Noise Voltage vs. Source Resistance

( $V^+/V^- = \pm 3V$ ,  $T_a = 25^\circ C$ )



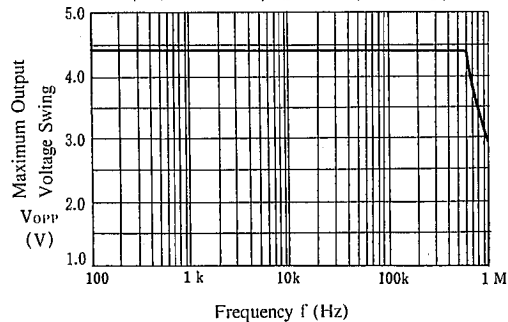
### Maximum Output Voltage Swing vs. Load Resistance

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



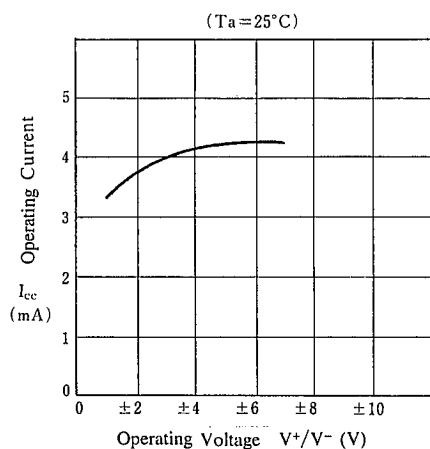
### Maximum Output Voltage Swing vs. Frequency

( $V^+/V^- = \pm 2.5V$ ,  $R_L = 2.5k\Omega$ ,  $T_a = 25^\circ C$ )

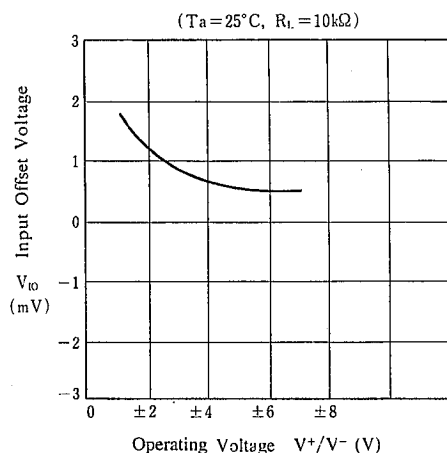


■ TYPICAL CHARACTERISTICS

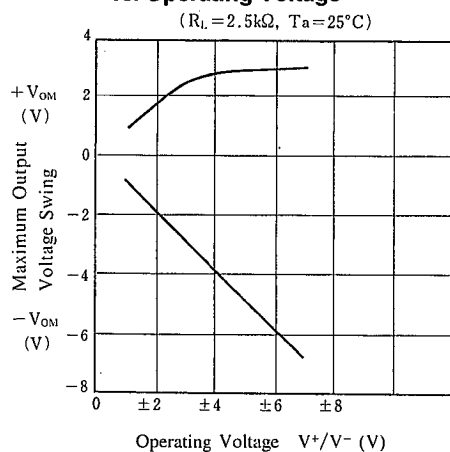
Operating Current vs. Operating Voltage



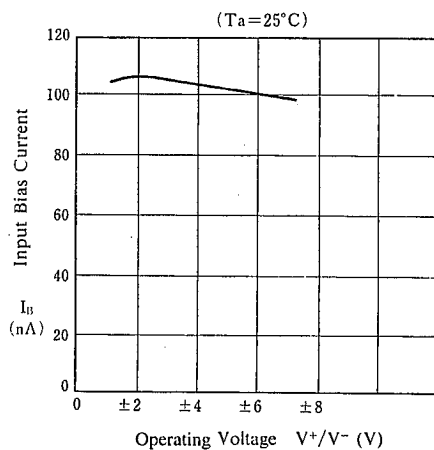
Input Offset Voltage vs. Operating Voltage



Maximum Output Voltage Swing vs. Operating Voltage



Input Bias Current vs. Operating Voltage



## MEMO

**[CAUTION]**

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