



# NJM4565

## DUAL OPERATIONAL AMPLIFIER

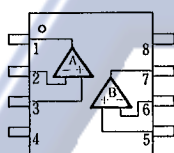
### ■ GENERAL DESCRIPTION

The NJM4565 integrated circuit is a high-gain, wide-bandwidth, dual low noise operational amplifier capable of driving 20V peak-to-peak into 400Ω load. The NJM4565 is good characteristics compared to the NJM4560.

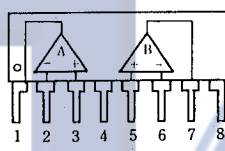
### ■ FEATURES

- Operating Voltage  $(\pm 4V \sim \pm 18V)$
- Wide Gain Bandwidth Product  $(4MHz \text{ typ.})$
- Slew Rate  $(4V/\mu s \text{ typ.})$
- Package Outline DIP8, DMP8, SSOP8, SIP8
- Bipolar Technology

### ■ PIN CONFIGURATION



NJM4565D  
NJM4565M  
NJM4565V

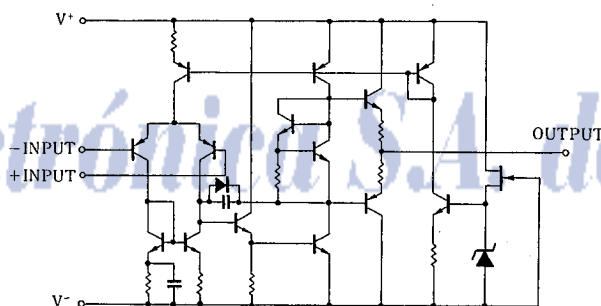


NJM4565L

### 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)



NJM4565

■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

| PARAMETER                   | SYMBOL                         | RATINGS     | UNIT |
|-----------------------------|--------------------------------|-------------|------|
| Supply Voltage              | V <sup>+</sup> /V <sup>-</sup> | ± 18        | V    |
| Differential Input Voltage  | V <sub>ID</sub>                | ± 30        | V    |
| Input Voltage               | V <sub>IC</sub>                | ± 15 (note) | V    |
| Power Dissipation           | P <sub>D</sub>                 | (DIP8) 500  | mW   |
|                             |                                | (DMP8) 300  | mW   |
|                             |                                | (SSOP8) 250 | mW   |
|                             |                                | (SIP8) 800  | mW   |
| Operating Temperature Range | T <sub>opr</sub>               | -20~+75     | °C   |
| Storage Temperature Range   | T <sub>stg</sub>               | -40~+125    | °C   |

(note) For supply voltage less than ±15V, the absolute maximum input voltage is equal to the supply voltage.

■ ELECTRICAL CHARACTERISTICS

(Ta=25°C, V<sup>+</sup>/V<sup>-</sup>=±15V)

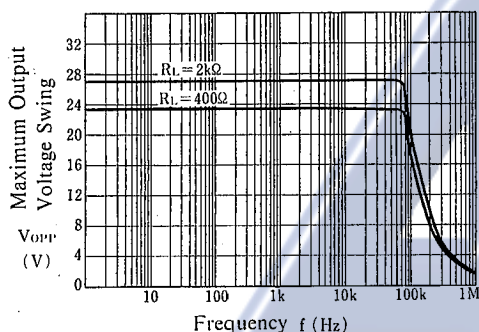
| PARAMETER                       | SYMBOL           | TEST CONDITION                            | MIN. | TYP.  | MAX. | UNIT  |
|---------------------------------|------------------|-------------------------------------------|------|-------|------|-------|
| Input Offset Voltage            | V <sub>IO</sub>  | R <sub>S</sub> ≤10kΩ                      | —    | 0.5   | 3.0  | mV    |
| Input Offset Current            | I <sub>IO</sub>  |                                           | —    | 2     | 50   | nA    |
| Input Bias Current              | I <sub>B</sub>   |                                           | —    | 50    | 200  | nA    |
| Input Resistance                | R <sub>IN</sub>  |                                           | 0.3  | 5     | —    | MΩ    |
| Large Signal Voltage Gain       | A <sub>V</sub>   | R <sub>L</sub> ≥2kΩ, V <sub>O</sub> =±10V | 86   | 100   | —    | dB    |
| Maximum Output Voltage Swing 1  | V <sub>OM1</sub> | R <sub>L</sub> ≥2kΩ                       | ±12  | ±14   | —    | V     |
| Maximum Output Voltage Swing 2  | V <sub>OM2</sub> | I <sub>O</sub> =25mA                      | ±10  | ±11.5 | —    | V     |
| Input Common Mode Voltage Range | V <sub>ICM</sub> |                                           | ±12  | ±14   | —    | V     |
| Common Mode Rejection Ratio     | CMR              | R <sub>S</sub> ≤10kΩ                      | 70   | 90    | —    | dB    |
| Supply Voltage Rejection Ratio  | SVR              | R <sub>S</sub> ≤10kΩ                      | 76.5 | 90    | —    | dB    |
| Operating Current               | I <sub>CC</sub>  |                                           | —    | 4.5   | 7    | mA    |
| Slew Rate                       | SR               |                                           | —    | 4     | —    | V/μs  |
| Gain Bandwidth Product          | GB               |                                           | —    | 10    | —    | MHz   |
| Equivalent Input Noise Voltage  | V <sub>NI</sub>  | RIAA, R <sub>S</sub> =2.2kΩ, 30kHz LPF    | —    | 1.2   | —    | μVrms |

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## ■ TYPICAL CHARACTERISTICS

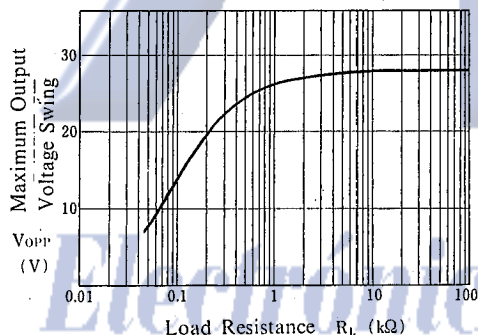
**Maximum Output Voltage Swing vs. Frequency**

( $V^+/V^- = \pm 15V$ ,  $T_a = 25^\circ C$ )



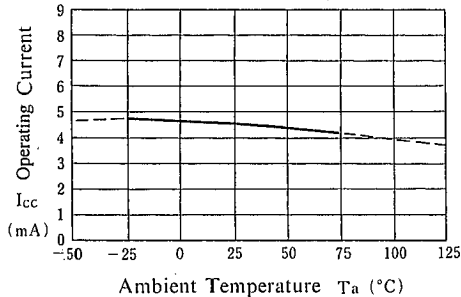
**Maximum Output Voltage Swing vs. Load Resistance**

( $V^+/V^- = \pm 15V$ ,  $T_a = 25^\circ C$ )



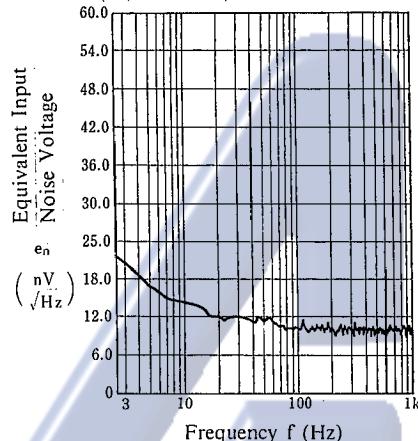
**Operating Current vs. Temperature**

( $V^+/V^- = \pm 15V$ )



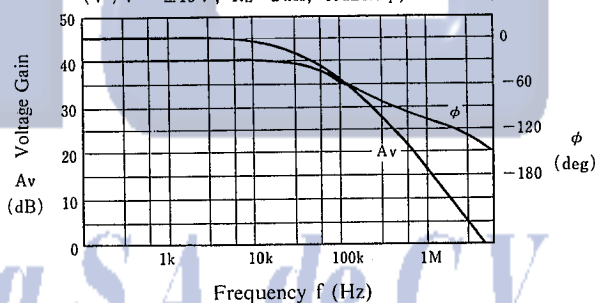
**Equivalent Input Noise Voltage vs. Frequency**

( $V^+/V^- = \pm 15V$ ,  $R_s = 1k\Omega$ ,  $T_a = 25^\circ C$ )



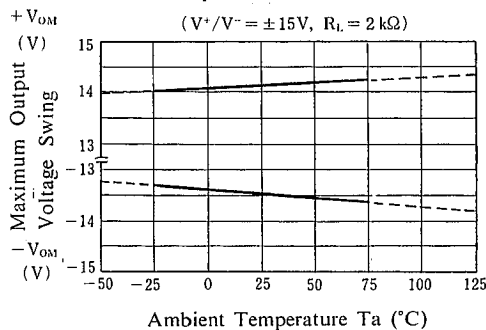
**Voltage Gain Phase vs. Frequency**

( $V^+/V^- = \pm 15V$ ,  $R_L = 2k\Omega$ , 40dBamp,  $T_a = 25^\circ C$ )



**Maximum Output Voltage Swing vs. Temperature**

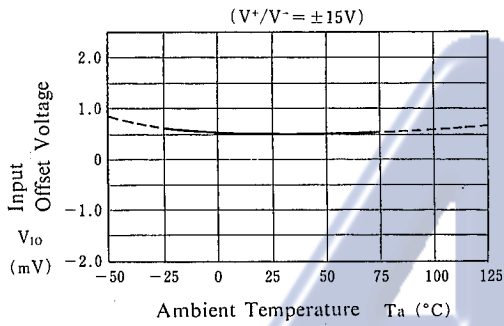
( $V^+/V^- = \pm 15V$ ,  $R_L = 2k\Omega$ )



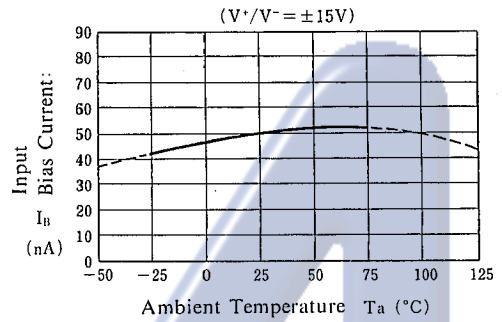
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## TYPICAL CHARACTERISTICS

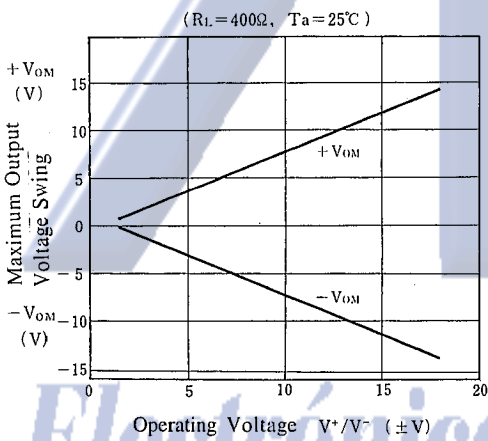
Input Offset Voltage vs. Temperature



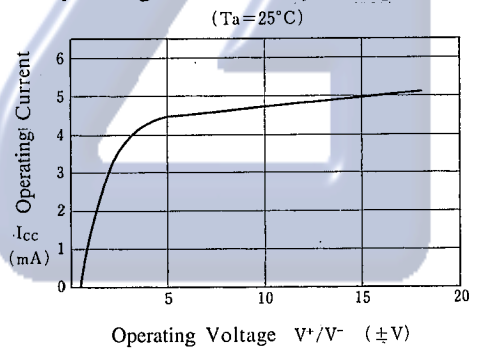
Input Bias Current vs. Temperature



Maximum Output Voltage Swing vs. Operating Voltage



Operating Current vs. Operating Voltage



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## MEMO

# AG

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**[CAUTION]**

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*New Japan Radio Co., Ltd.*

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