

## J-FET INPUT OPERATIONAL AMPLIFIER

## ■ GENERAL DESCRIPTION

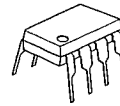
The NJM2162/64 combines feature of the NJM062/064 as well as and providing the capability of wider bandwidth and higher slew rate.

It is suitable for telecom application (active filters etc.).

## ■ FEATURES

- Operating Voltage ( $\pm 2V \sim \pm 18V$ )
- High Input Resistance ( $10^{12} \Omega$  typ.)
- Low Operating Current (1.2mA typ.)
- High Slew Rate ( $10V/\mu s$  typ.)
- J-FET Input
- Wide Unity Gain Bandwidth (3MHz typ.)
- Bipolar Technology
- Package Outline DIP8/14, DMP8/14, SIP8, SSOP8/14

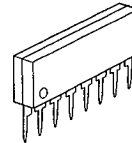
## ■ PACKAGE OUTLINE



NJM2162D



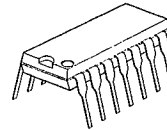
NJM2162M



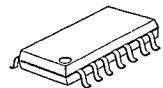
NJM2162L



NJM2162V



NJM2164D

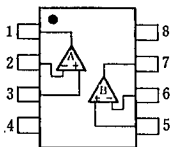


NJM2164M

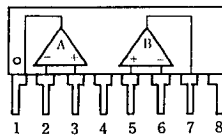


NJM2164V

## ■ PIN CONFIGURATION



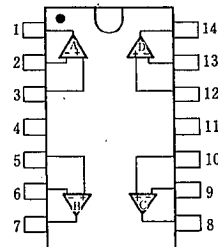
NJM2162D  
NJM2162M  
NJM2162V



NJM2162L

## PIN FUNCTION

- |                   |                   |
|-------------------|-------------------|
| 1. A OUTPUT       | 5. B+INPUT        |
| 2. A-INPUT        | 6. B-INPUT        |
| 3. A+INPUT        | 7. B OUTPUT       |
| 4. V <sup>-</sup> | 8. V <sup>+</sup> |



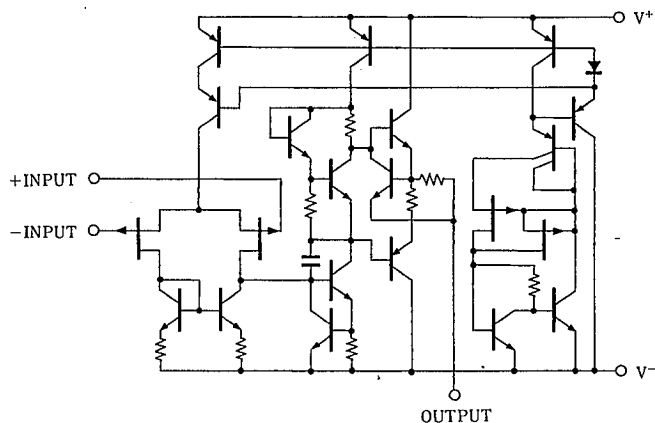
NJM2164D  
NJM2164M  
NJM2164V

## PIN FUNCTION

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

## ■ EQUIVALENT CIRCUIT

(2162 is 1/2 Shown, 2164 is 1/4 Shown)



■ 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 1)        | V    |
| Power Dissipation           | P <sub>D</sub>                 | (DIP8) 500          | mW   |
|                             |                                | (DMP) 300           | mW   |
|                             |                                | (SIP8) 800          | mW   |
|                             |                                | (SSOP8) 250         | mW   |
|                             |                                | (DIP14) 700         | mW   |
|                             |                                | (DMP14) 700 (note2) | mW   |
|                             |                                | (SSOP14) 300        | mW   |
| Operating Temperature Range | T <sub>opr</sub>               | -20~+75             | °C   |
| Storage Temperature Range   | T <sub>stg</sub>               | -40~+125            | °C   |

(note 1) For supply voltage less than ±15V, the absolute maximum input voltage is equal to the supply voltage.

(note 2) at on PC board

■ ELECTRICAL CHARACTERISTICS

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

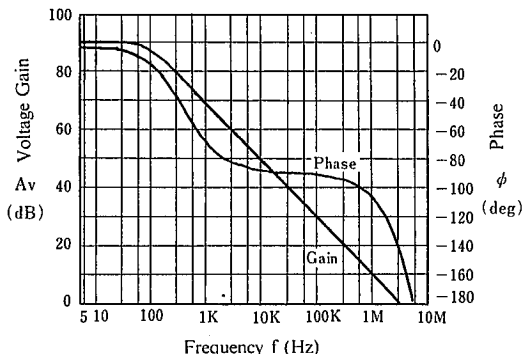
| PARAMETER                       | SYMBOL                         | TEST CONDITION                               | MIN. | TYP.             | MAX. | UNIT   |
|---------------------------------|--------------------------------|----------------------------------------------|------|------------------|------|--------|
| Operating Voltage               | V <sup>+</sup> /V <sup>-</sup> |                                              | ±2   | —                | ±18  | V      |
| Input Offset Voltage            | V <sub>IO</sub>                | R <sub>s</sub> = 50Ω                         | —    | 5                | 15   | mV     |
| Input Offset Current            | I <sub>IO</sub>                |                                              | —    | 1                | 200  | pA     |
| Input Bias Current              | I <sub>B</sub>                 |                                              | —    | 2                | 400  | pA     |
| Input Common Mode voltage Range | V <sub>ICM</sub>               |                                              | ±13  | +15              | —    | V      |
|                                 |                                |                                              |      | -13.5            |      |        |
| Maximum Output Voltage Swing    | V <sub>OM</sub>                | R <sub>L</sub> = 10Ω                         | ±13  | +14              | —    | V      |
|                                 |                                |                                              |      | -14.0            |      |        |
| Large signal Voltage Gain       | A <sub>v</sub>                 | R <sub>L</sub> ≥ 10kΩ, V <sub>O</sub> = ±10V | 70   | 80               | —    | dB     |
| Unity Gain Bandwidth            | f <sub>r</sub>                 | R <sub>L</sub> = 10Ω                         | —    | 3                | —    | MHz    |
| Input Resistance                | R <sub>IN</sub>                |                                              | —    | 10 <sup>12</sup> | —    | Ω      |
| Common Mode Rejection Ratio     | CMR                            | R <sub>s</sub> ≤ 10kΩ                        | 70   | 90               | —    | dB     |
| Supply voltage Rejection Ratio  | SVR                            | R <sub>s</sub> ≤ 10kΩ                        | 70   | 100              | —    | dB     |
| Operating Current               | I <sub>CC</sub>                | R <sub>L</sub> = ∞ (1 circuit)               | —    | 0.3              | 0.45 | mA     |
| Slew Rate                       | SR                             | R <sub>L</sub> = 10kΩ                        | —    | 10               | —    | V/μs   |
| Equivalent Input Noise Voltage  | e <sub>n</sub>                 | R <sub>S</sub> = 100Ω, f = 1kHz              | —    | 40               | —    | nV/√Hz |

(Note) The NJM 2162/64 is the produc in which the AC feature have been made much higher comparing to NJM062/64. Therefore special care being required for the oscillation due to the capacitive load when operation on voltage follower.

## TYPICAL CHARACTERISTICS

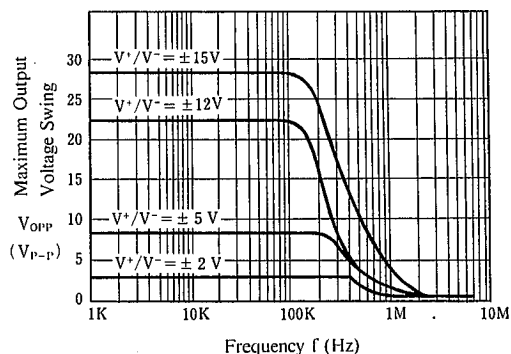
**Voltage Gain, Phase Shift vs. Frequency**

( $V^+/V^- = \pm 15V$ ,  $Z_L = 10k\Omega // 100pF$ ,  $T_a = 25^\circ C$ )



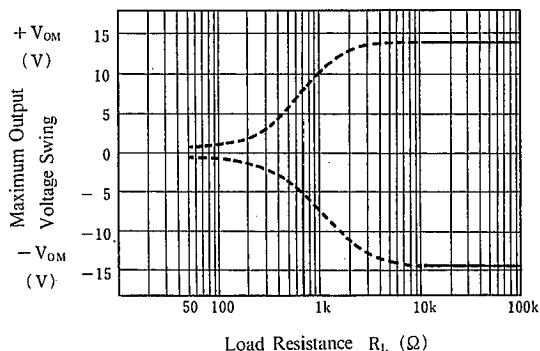
**Maximum Output Voltage Swing vs. Frequency**

( $R_L = 10k\Omega$ ,  $T_a = 25^\circ C$ )



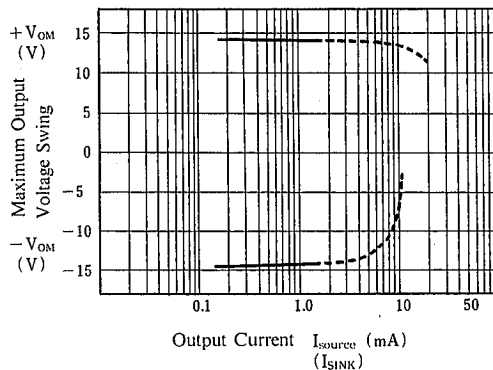
**Maximum Output Voltage Swing vs. Load Resistance**

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



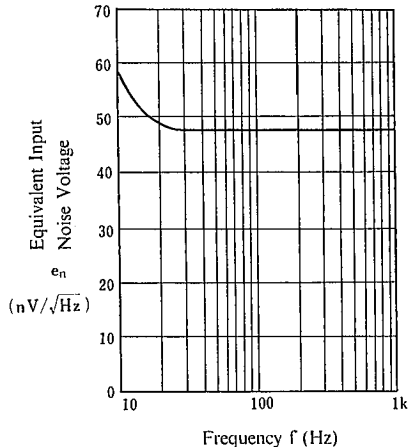
**Maximum Output Voltage Swing vs. Output Current**

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



**Equivalent Input Noise Voltage vs. Frequency**

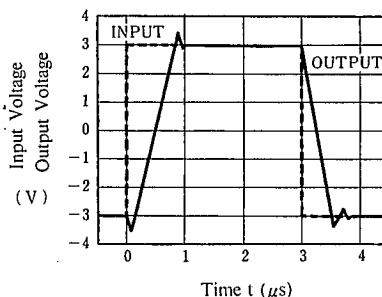
( $V^+/V^- = \pm 15V$ ,  $R_s = 100\Omega$ ,  $T_a = 25^\circ C$ )



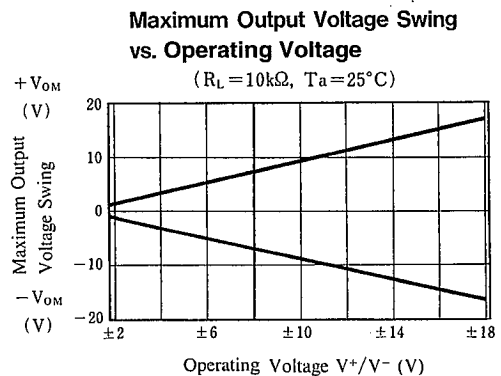
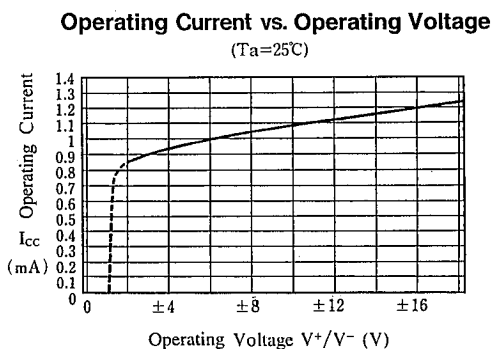
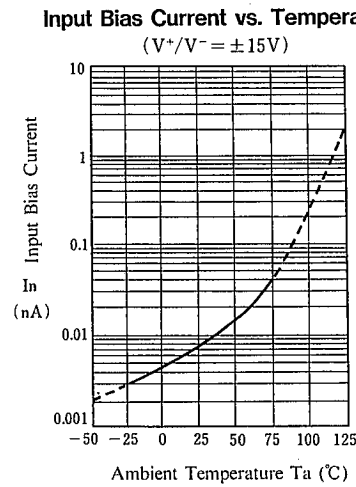
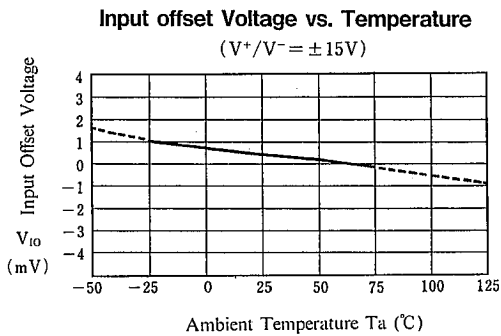
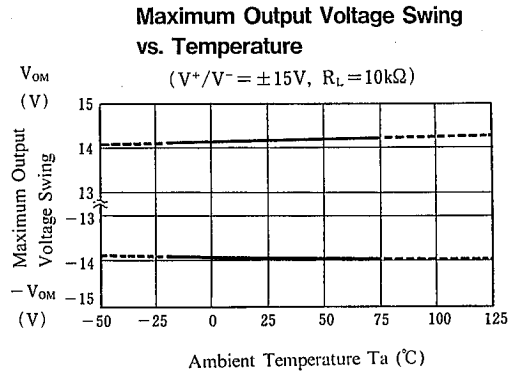
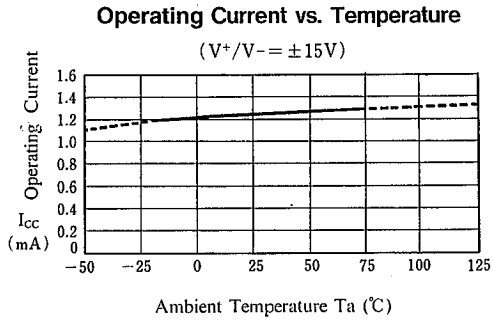
**Voltage Follower**

**Large Signal Pulse Response**

( $V^+/V^- = \pm 15V$ ,  $R_L = 10k\Omega$ ,  $C_L = 100pF$ ,  $T_a = 25^\circ C$ )



■ TYPICAL CHARACTERISTICS



## MEMO

**[CAUTION]**

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