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## J-FET INPUT OPERATIONAL AMPLIFIER

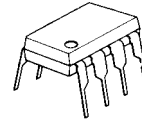
### ■ GENERAL DESCRIPTION

The NJM062/064 are J-FET input operational amplifiers which were designed as low-power versions of the NJM082. They feature high input impedance, wide bandwidth, high slew rate, and low input offset and bias current.

The NJM062 features the same terminal assignments as the NJM4558/2043/2904/3404/072 and NJM064 features the same terminal assignments as the NJM2902/3403/2058/2059/2060.

Each of these JFET-input operational amplifiers incorporates well-matched, high voltage JFET and bipolar transistors in a monolithic integrated circuit.

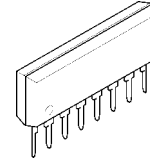
### ■ PACKAGE OUTLINE



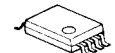
NJM062D



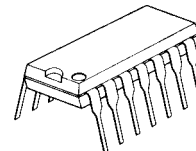
NJM062M



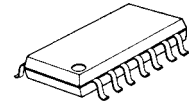
NJM062L



NJM062V



NJM064D



NJM064M

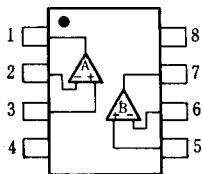


NJM064V

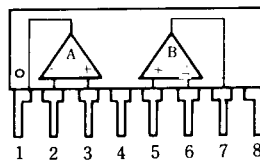
### ■ FEATURES

- Operating Voltage (  $\pm 2V \sim \pm 18V$  )
- J-FET Input
- High Input Resistance (  $10^{12}\Omega$  typ. )
- Low Operating Current (  $200\mu A/circuit$  typ. )
- High Slew Rate (  $3.5V/\mu s$  typ. )
- Wide Unity Gain Bandwidth (  $1MHz$  typ. )
- Package Outline DIP8/14, DMP8/14, SSOP8/14, SIP8
- Bipolar Technology

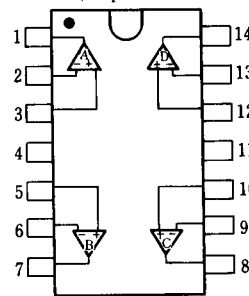
### ■ PIN CONFIGURATION



NJM062D  
NJM062M  
NJM062V



NJM062L



NJM064D  
NJM064M  
NJM064V

#### PIN FUNCTION

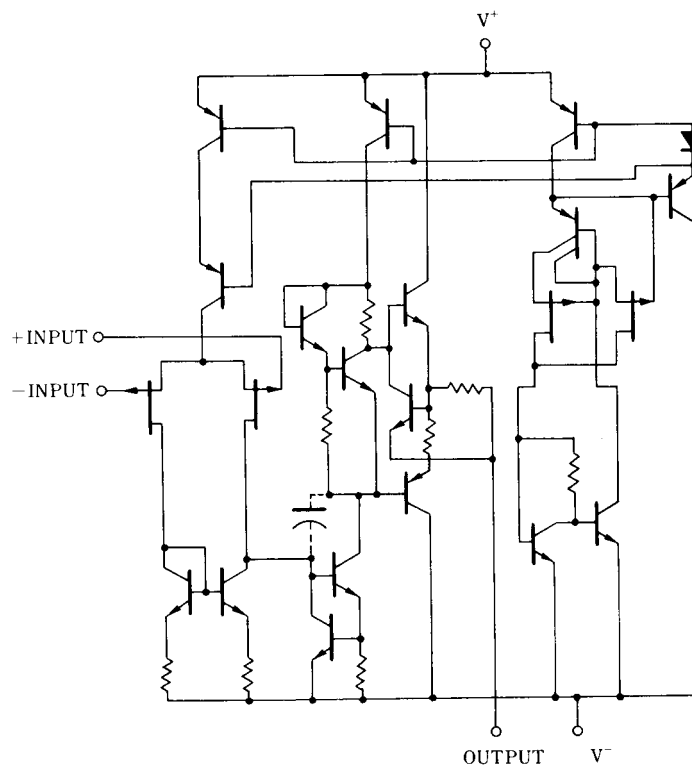
1. A OUTPUT
2. A -INPUT
3. A +INPUT
4.  $V^+$
5. B +INPUT
6. B -INPUT
7. B OUTPUT
8.  $V^+$

#### PIN FUNCTION

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

# NJM062/064

■ EQUIVALENT CIRCUIT (062 is 1/2 Shown.064 is 1/4 Shown.)



## ■ ABSOLUTE MAXIMUM RATINGS

( Ta=25°C )

| PARAMETER                   | SYMBOL      | RATINGS   | UNIT |
|-----------------------------|-------------|---|------|
| Supply Voltage              | $V^+ / V^-$ | $\pm 18$  | V    |
| Differential Input Voltage  | $V_{ID}$    | $\pm 30$  | V    |
| Input Voltage               | $V_{IC}$    | $\pm 15$  | V    |
| Power Dissipation           | $P_D$       | ( DIP8 ) 500<br>( DMP8 ) 300<br>( SIP8 ) 800<br>( SSOP8 ) 250<br>( DIP14 ) 700<br>( DMP14 ) 700 ( note2 )<br>( SSOP14 ) 300 | mW   |
| Operating Temperature Range | $T_{opr}$   | -40~+85   | °C   |
| Storage Temperature Range   | $T_{stg}$   | -40~+125  | °C   |

( note1 ) For supply voltage less than  $\pm 15V$ . The absolute maximum input voltage is equal to the supply voltage.

( note2 ) At on PC board

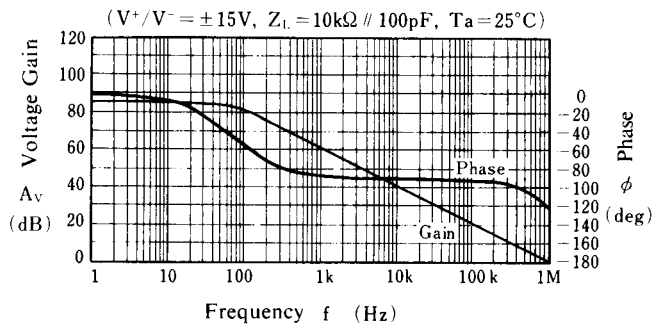
## ■ ELECTRICAL CHARACTERISTICS

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

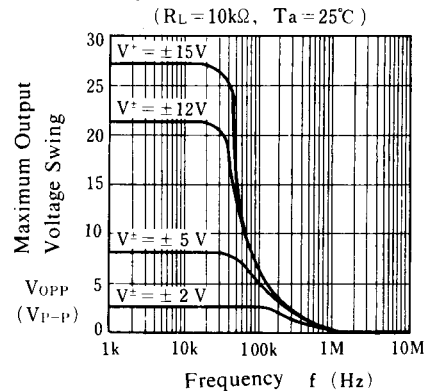
| PARAMETER                                 | SYMBOL      | TEST CONDITION                      | MIN.     | TYP.           | MAX.     | UNIT            |
|---|-------------|-------------------------------------|----------|----------------|----------|-----------------|
| Operating Supply Voltage                  | $V^+ / V^-$ |                                     | $\pm 2$  | -              | $\pm 18$ | V               |
| Input Offset Voltage                      | $V_{IO}$    | $R_S = 50\Omega$                    | -        | 3              | 15       | mV              |
| Input Offset Current                      | $I_{IO}$    |                                     | -        | 1              | 200      | pA              |
| Input Bias Current                        | $I_B$       |                                     | -        | 2              | 400      | pA              |
| Input Common Mode Voltage Range           | $V_{ICM}$   |                                     | $\pm 13$ | +15<br>-13.5   | -        | V               |
| Maximum Peak-to-peak Output Voltage Swing | $V_{OM}$    | $R_L = 10k\Omega$                   | $\pm 13$ | +14.2<br>-14.0 | -        | V               |
| Large-signal Voltage Gain                 | $A_V$       | $R_L \geq 10k\Omega, V_O = \pm 10V$ | 70       | 80             | -        | dB              |
| Unity Gain Bandwidth                      | $f_T$       | $R_L = 10k\Omega$                   | -        | 1              | -        | MHz             |
| Input Resistance                          | $R_{IN}$    |                                     | -        | $10^{12}$      | -        | $\Omega$        |
| Common Mode Rejection Ratio               | CMR         | $R_S \leq 10k\Omega$                | 70       | 90             | -        | dB              |
| Supply Voltage Rejection Ratio            | SVR         | $R_S \leq 10k\Omega$                | 70       | 100            | -        | dB              |
| Operating Current                         | $I_{CC}$    | $R_L = \infty$ each amplifier       | -        | 200            | 250      | $\mu A$         |
| Slew Rate                                 | SR          | $R_L = 10k\Omega$                   | -        | 3.5            | -        | V/ $\mu s$      |
| Equivalent Input Noise Voltage            | $e_n$       | $R_S = 100\Omega, f = 1kHz$         | -        | 35             | -        | nV/ $\sqrt{Hz}$ |

## ■ TYPICAL CHARACTERISTICS

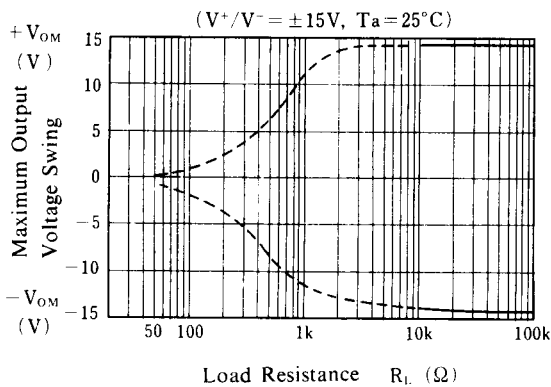
### Voltage Gain, Phase Shift vs. Frequency



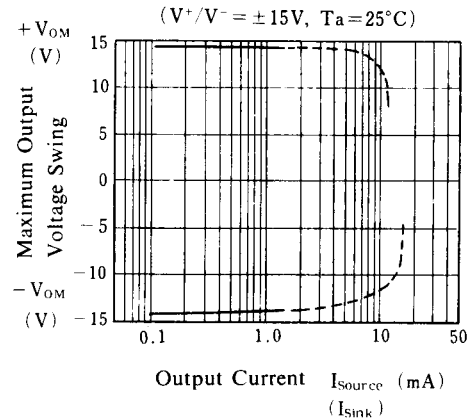
### Maximum Output Voltage Swing vs. Frequency



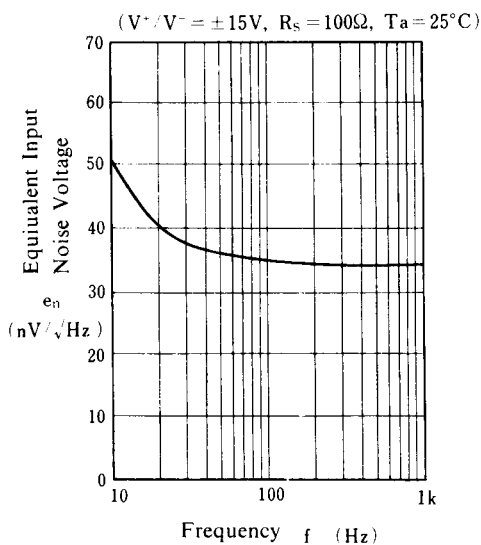
### Maximum Output Voltage Swing vs. Load Resistance



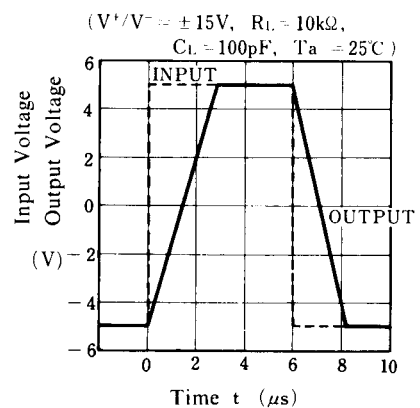
### Maximum Output Voltage Swing vs. Output Current



### Equivalent Input Noise Voltage vs. Frequency



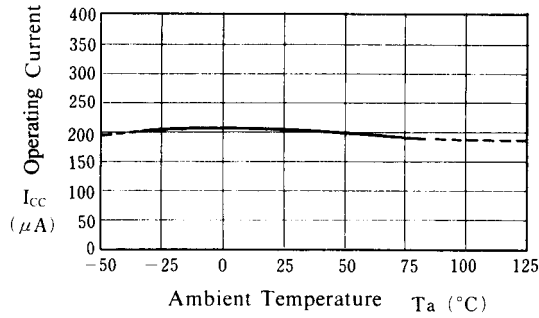
### Voltage Follower Large Signal Pulse Response



## ■ TYPICAL CHARACTERISTICS

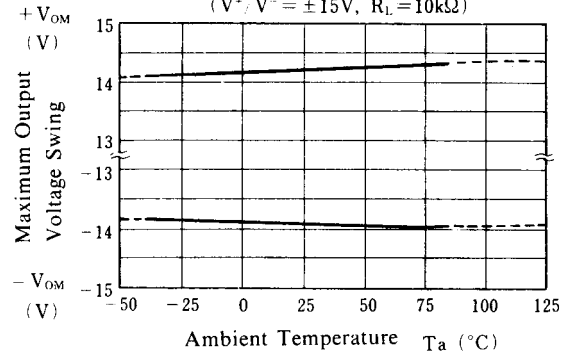
### Operating Current vs. Temperature

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



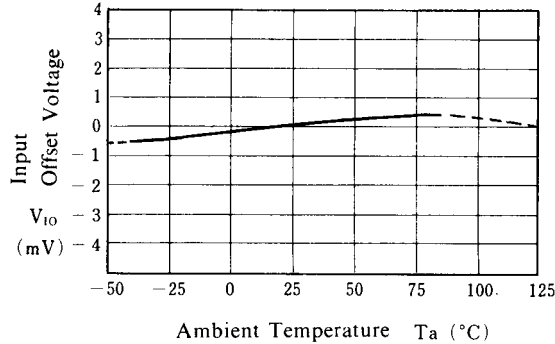
### Maximum Output Voltage Swing vs. Temperature

( $V^+/V^- = \pm 15V$ ,  $R_L = 10k\Omega$ )



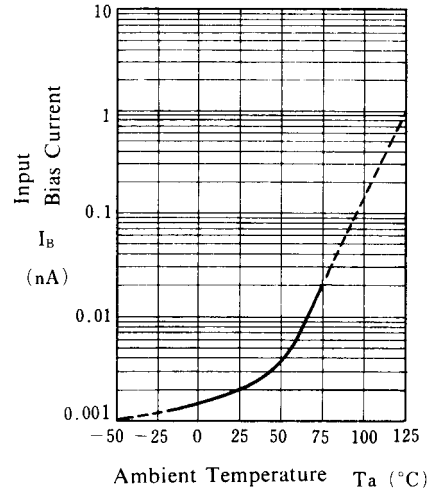
### Input Offset Voltage vs. Temperature

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



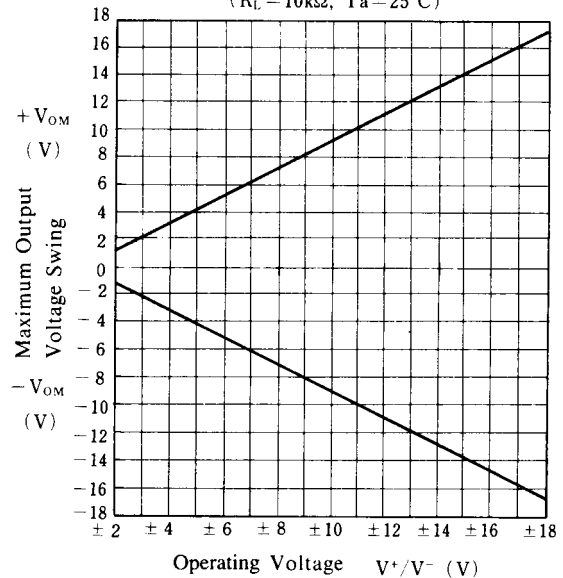
### Input Bias Current vs. Temperature

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



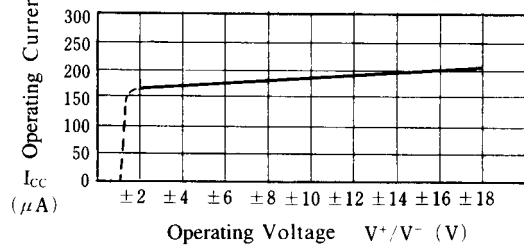
### Maximum Output Voltage Swing vs. Operating Voltage

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



### Operating Current vs. Operating Voltage

(each amplifier,  $T_a = 25^\circ C$ )



## MEMO

**[CAUTION]**

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