



LOW-NOISE DUAL OPERATIONAL AMPLIFIER

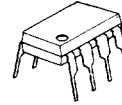
■ GENERAL DESCRIPTION

The NJM2068 is a high performance, low noise dual operational amplifier. This amplifier features popular pin-out, superior noise performance, and superior total harmonic distortion. This amplifier also features guaranteed noise performance with substantially higher gain-bandwidth product and slew rate which far exceeds that of the 4558 type amplifier. The specially designed low noise input transistors allow the NJM2068 to be used in very low noise signal processing applications such as audio preamplifiers and servo error amplifier.

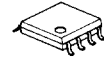
■ FEATURES

- Operating Voltage (±4V ~ ±18V)
- Low Total Harmonic Distortion (0.001% typ.)
- Low Noise Voltage (FLAT+JISA, 0.56 μV typ.)
- High Slew Rate (6V/μs typ.)
- Unity Gain Bandwidth (27MHz @f=10kHz)
- Package Outline DIP8, DMP8, SIP8, SSOP8
- Bipolar Technology

■ PACKAGE OUTLINE



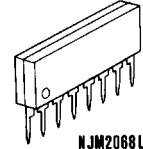
NJM2068D



NJM2068M

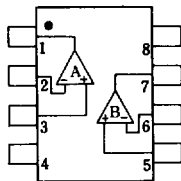


NJM2068V

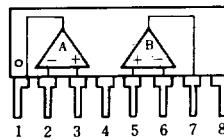


NJM2068L

■ PIN CONFIGURATION



NJM2068D
NJM2068M
NJM2068V

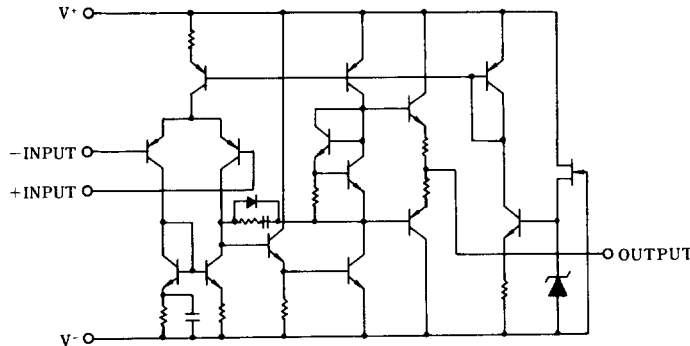


NJM2068L

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 ⁺ /V ⁻ | ±18 | V |
| Input Voltage | V _{ic} | ±15 (note) | V |
| Differential Input Voltage | V _{id} | ±30 | V |
| Power Dissipation | P _b | (DIP8) 500 | mW |
| | | (DMP8) 300 | mW |
| | | (SSOP8) 250 | mW |
| | | (SIP8) 800 | mW |
| Operating Temperature Range | T _{opr} | -20 ~ +75 | °C |
| Storage Temperature Range | T _{stg} | -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⁺/V⁻=±15V)

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|----------------------------------|-------------------|---|------|-------|------|------|
| Input Offset Voltage | V _{IO} | R _S ≤ 10kΩ | — | 0.3 | 3 | mV |
| Input Offset Current | I _{IO} | | — | 5 | 200 | nA |
| Input Bias Current | I _B | | — | 150 | 1000 | nA |
| Input Resistance | R _{IN} | | 50 | 300 | — | kΩ |
| Large Signal Voltage Gain | A _V | R _L ≥ 2kΩ, V _O = ±10V | 90 | 120 | — | dB |
| Maximum Output Voltage Swing | V _{OM} | R _L ≥ 2kΩ | ±12 | ±13.5 | — | V |
| Input Common Mode Voltage Range | V _{ICM} | | ±12 | ±13.5 | — | V |
| Common Mode Rejection Ratio | CMR | R _S ≤ 10kΩ | 80 | 110 | — | dB |
| Supply Voltage Rejection Ratio | SVR | R _S ≤ 10kΩ | 80 | 120 | — | dB |
| Slew Rate | SR | R _L ≤ 2kΩ | — | 6 | — | V/μs |
| Gain Bandwidth Product 1 | GB1 | f=10kHz | — | 27 | — | MHz |
| Gain Bandwidth Product 2 | GB2 | f=100kHz | — | 19 | — | MHz |
| Unity Gain Bandwidth | f _T | A _V =1 | — | 5.5 | — | MHz |
| Total Harmonic Distortion | THD | A _V =20dB, V _O =5V, R _L =2kΩ, f=1kHz | — | 0.001 | — | % |
| Equivalent Input Noise Voltage 1 | V _{NI} 1 | FLAT+JISA, R _S =300Ω | — | 0.44 | 0.56 | μV |
| Operating Current | I _{CC} | | — | 5.0 | 8.0 | mA |

(note 1) Oscillation might be caused when capacitor type load were connected. It is recommendable to insert series resistor (about 50Ω) at the output for preventing oscillation.

(note 2) In regard to Noise Standard, NJRC is preparing for special D rank type products (R_S = 2.2kΩ, RIAA, V_{NI} = 1.4mV Max.)

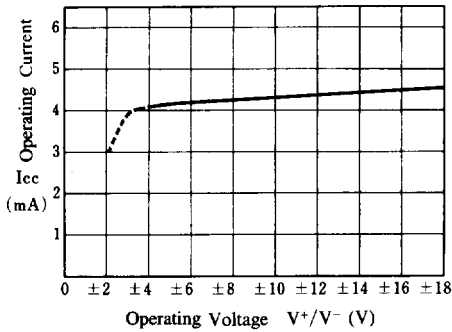
4



■ TYPICAL CHARACTERISTICS

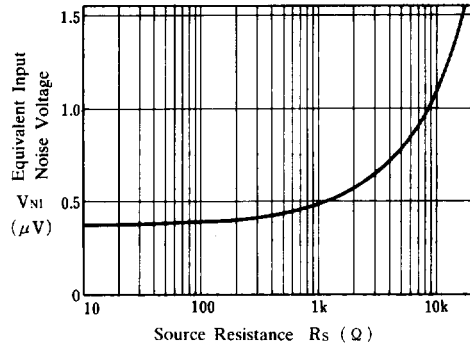
Operating Current vs. Operating Voltage

(No Input Signal, $R_L = \infty$, $T_a = 25^\circ\text{C}$)



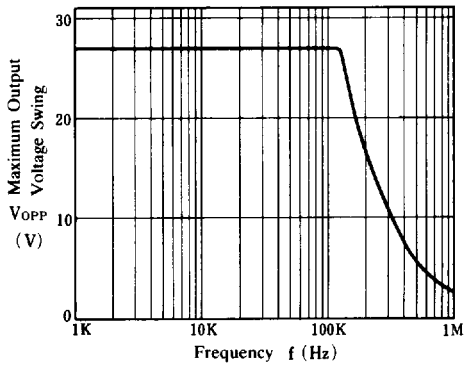
Equivalent Input Noise Voltage vs. Source Resistance

($V^+/V^- = \pm 15\text{V}$, JIS A, $T_a = 25^\circ\text{C}$)



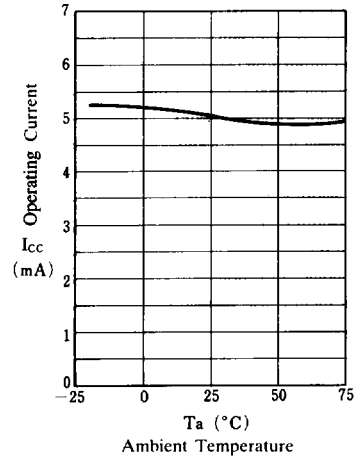
Maximum Output Voltage Swing vs. Frequency

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



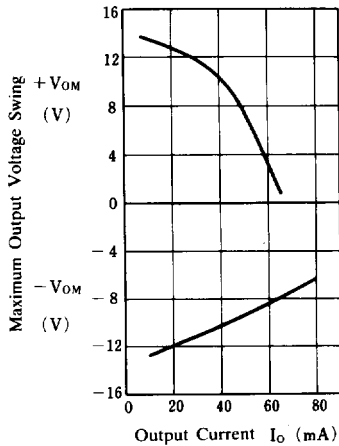
Operating Current vs. Temperature

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



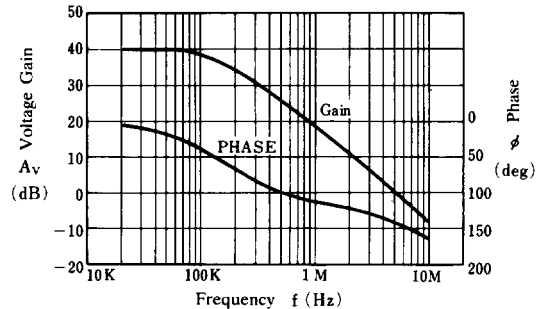
Maximum Output Voltage Swing

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



Voltage Gain, Phase vs. Frequency

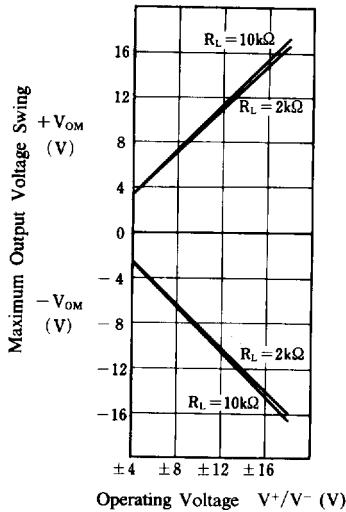
($V^+/V^- = \pm 15\text{V}$, $R_L = 2\text{k}\Omega$, $C_L = 100\text{pF}$, 40dB Amp, $T_a = 25^\circ\text{C}$)



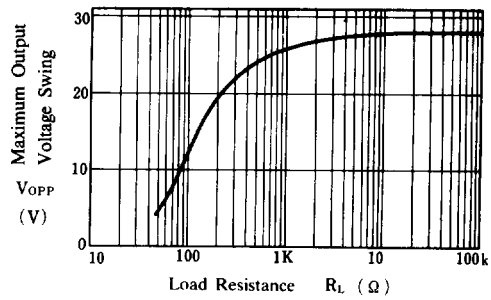


■ TYPICAL CHARACTERISTICS

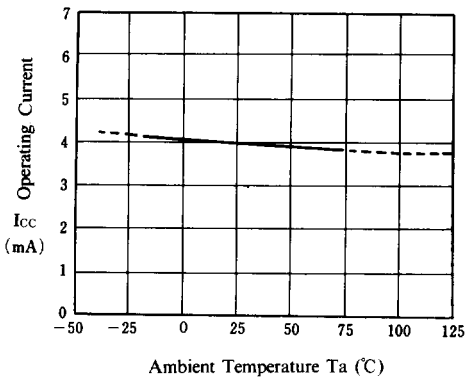
Maximum Output Voltage Swing vs. Operating Voltage
($T_a = 25^\circ\text{C}$)



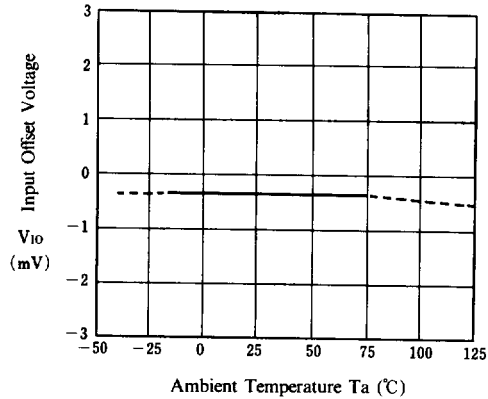
Maximum Output Voltage Swing vs. Load Resistance
($V^+/V^- = \pm 15\text{V}$, $T_a = 25^\circ\text{C}$)



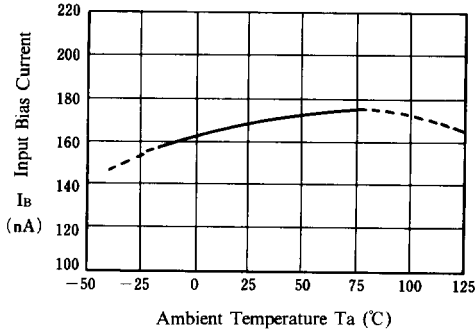
Operating Current vs. Temperature
($V^+/V^- = \pm 15\text{V}$)



Input Offset Voltage vs. Temperature
($V^+/V^- = \pm 15\text{V}$)



Input Bias Current vs. Temperature
($V^+/V^- = \pm 15\text{V}$)



Maximum Output Voltage vs. Temperature
($V^+/V^- = \pm 15\text{V}$, $R_L = 2\text{k}\Omega$)

