# DUAL OPERATIONAL AMPLIFIER

## ■ GENERAL DESCRIPTION

The NJM4558/4559 integrated circuit is a dual high-gain operational amplifier internally compensated and constructed on a single silicon chip using an advanced epitaxial process.

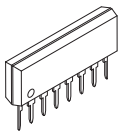
Combining the features of the NJM741 with the close parameter matching and tracking of a dual device on a monolithic chip results in unique performance characteristics.Excellent channel separation allow the use of the dual device in single NJM741 operational amplifier applications providing density.It is especially well suited for applications in differential-in,defferential-out as well as in potentiometric amplifiers and where gain and phase matched channels are mandatory.

## ■ PACKAGE OUTLINE

**NJM4558D**
**NJM4559D**

**NJM4558M**
**NJM4559M**

**NJM4558V**

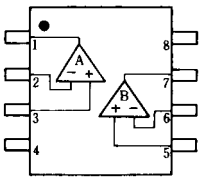


**NJM4558L**
**NJM4559L**

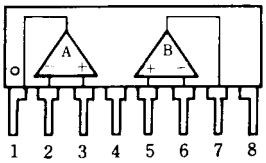
## ■ FEATURES

- Operating Voltage ( ±4V~±18V )
- High Voltage Gain ( 100dB typ. )
- High Input Resistance ( 5MΩ typ. )
- Package Outline DIP8,DMP8,SIP8,SSOP8
- Bipolar Technology

## ■ PIN CONFIGURATION



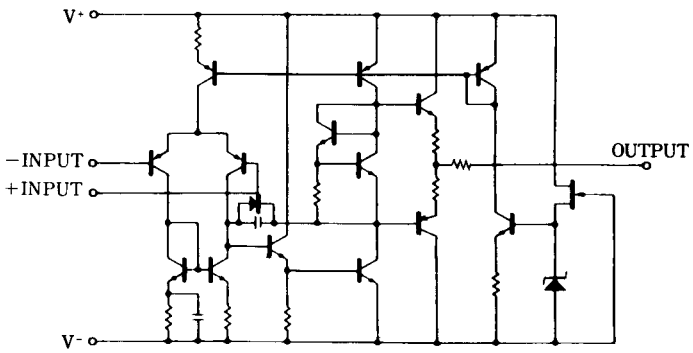

**NJM4558D, NJM4558M, NJM4558V**
**NJM4559D, NJM4559M**




**NJM4558L**
**NJM4559L**

**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 |
| Differential Input Voltage | $V_{ID}$ | ± 30 | V |
| Input Voltage | $V_{IC}$ | ± 15 ( note ) | V |
| Power Dissipation | $P_D$ | ( DIP8 ) 500<br>( DMP8 ) 300<br>( SSOP8 ) 250<br>( SIP8 ) 800 | mW |
| Operating Temperature Range | $T_{opr}$ | -40~+85 | ˚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

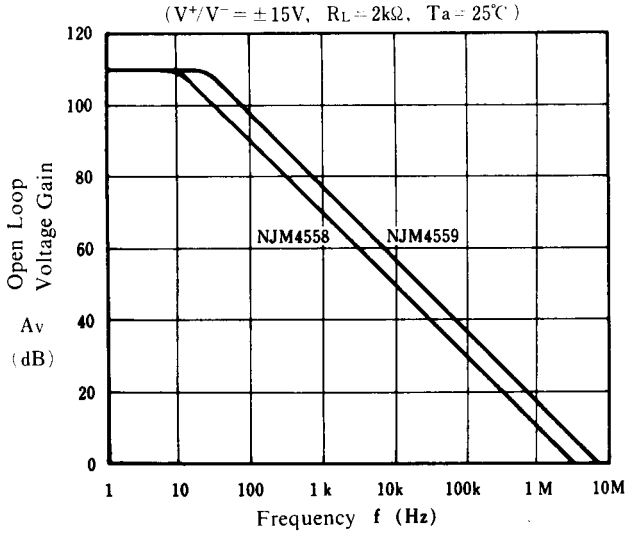
( $V^+/V^-$=±15V,Ta=25˚C )

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Input Offset Voltage | $V_{IO}$ | $R_S$≦10kΩ | - | 0.5 | 6 | mV |
| Input Offset Current | $I_{IO}$ | | - | 5 | 200 | nA |
| Input Bias Current | $I_B$ | | - | 25 | 500 | nA |
| Input Resistance | $R_{IN}$ | | 0.3 | 5 | - | MΩ |
| Large Signal Voltage Gain | $A_V$ | $R_L$≧2kΩ,$V_O$=±10V | 86 | 100 | - | dB |
| Maximum Output Voltage Swing 1 | $V_{OM1}$ | $R_L$≧10kΩ | ± 12 | ± 14 | - | V |
| Maximum Output Voltage Swing 2 | $V_{OM2}$ | $R_L$≧2kΩ | ± 10 | ± 13 | - | V |
| Input Common Mode Voltage Range | $V_{ICM}$ | | ± 12 | 14 | - | V |
| Common Mode Rejection Ratio | CMR | $R_S$≦10kΩ | 70 | 90 | - | dB |
| Supply Voltage Rejection Ratio | SVR | $R_S$≦10kΩ | 76.5 | 90 | - | dB |
| Operating Current | $I_{CC}$ | | - | 3.5 | 5.7 | mA |
| Slew Rate | | | | | | |
| NJM4558 | SR | | - | 1 | - | V/μs |
| NJM4559 | SR | | - | 2 | - | V/μs |
| Equivalent Input Noise Voltage | $V_{NI}$ | RIAA,$R_S$=2.2kΩ,30kHz LPF | - | 1.4 | - | μVrms |
| Gain Bandwidth Product | GB | | | | | |
| NJM4558 | | | | 3 | | MHz |
| NJM4559 | | | | 6 | | MHz |

## ■ TYPICAL CHARACTERISTICS

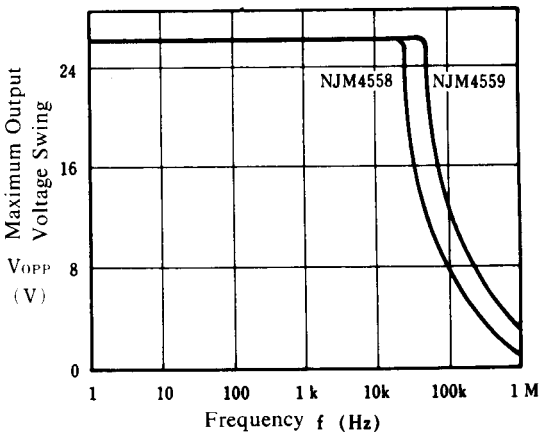
### Open Loop Voltage Gain vs. Frequency

($V^+/V^-=\pm15V$, $R_L=2k\Omega$, $Ta=25℃$)



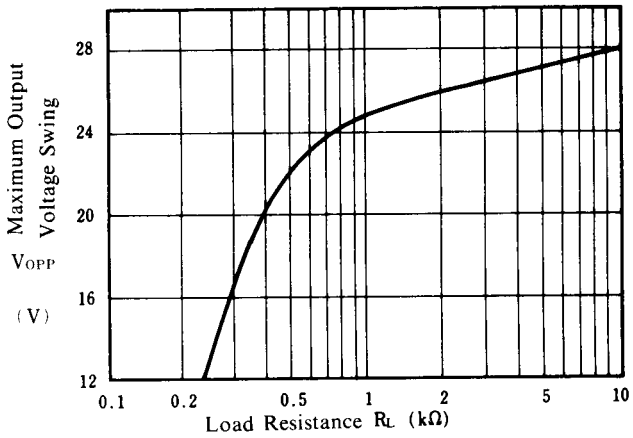

### Maximum Output Voltage Swing vs. Frequency

($V^+/V^-=\pm15V$, $R_L=2k\Omega$, $Ta=25℃$)



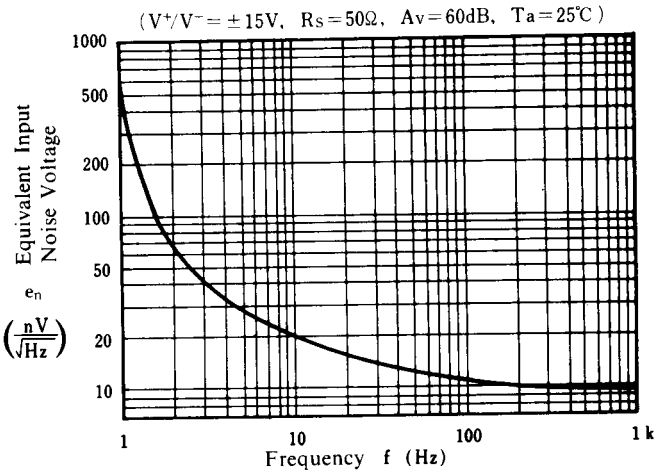

### Maximum Output Voltage Swing vs. Load Resistance

($V^+/V^-=\pm15V$, $Ta=25℃$)



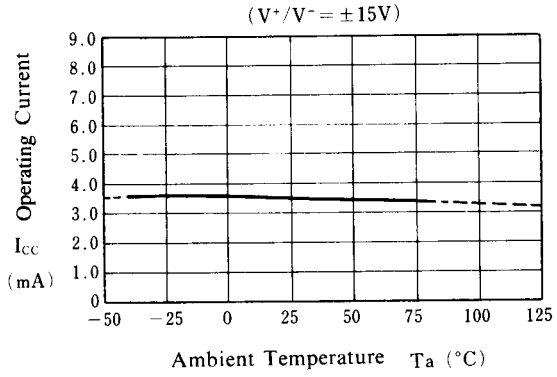

### Equivalent Input Noise Voltage vs. Frequency

($V^+/V^-=\pm15V$, $R_S=50\Omega$, $Av=60dB$, $Ta=25℃$)



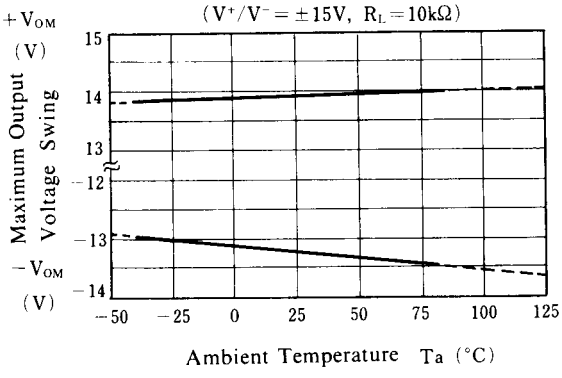

### Operating Current vs. Temperature

($V^+/V^-=\pm15V$)



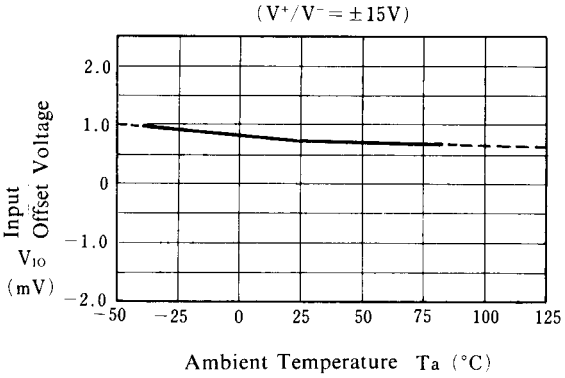

### Maximum Output Voltage Swing vs. Temperature

($V^+/V^-=\pm15V$, $R_L=10k\Omega$)

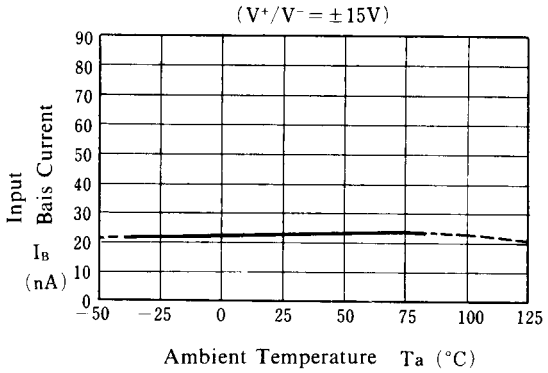


## ■ TYPICAL CHARACTERISTICS

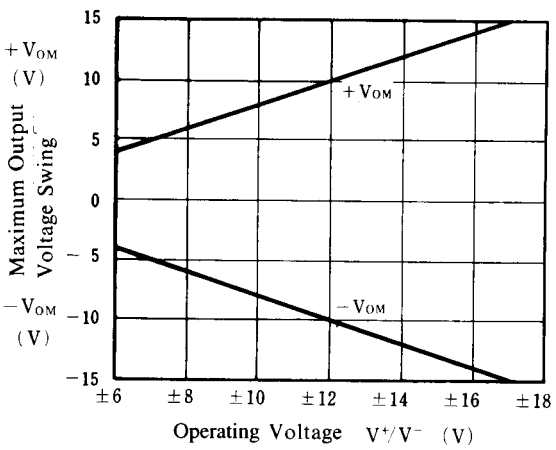
**Input Offset Voltage vs. Temperature**




**Input Bias Current vs. Temperature**




**Maximum Output Voltage Swing vs. Operating Voltage**




**Operating Current vs. Operating Voltage**