# LOW POWER AND LOW OFFSET VOLTAGE SUPER SMALL-SIZED SINGLE C-MOS OPERATIONAL AMPLIFIER

## ■GENERAL DESCRIPTION

The **NJU7007/08** are super small-sized package single C-MOS operational amplifiers operated on a single-power-supply, low power, low offset voltage and low operating current.

The input offset voltage is lower than 4mV, and the input bias current is as low as than 1pA, consequently very small signal around the ground level can be amplified.

The minimum operating voltage is 1V and the output stage permits output signal to swing between both of the supply rails.

Furthermore, The **NJU7007/08** are packaged with super small-sized SC88A, therefore it can be especially applied to portable items.

## ■PACKAGE INFORMATION

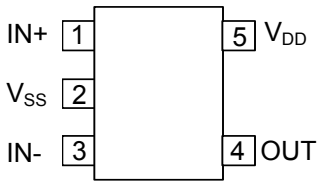
NJU7007F3
/NJU7008F3

## ■FEATURES

- ●Low Offset Voltage $V_{IO}$=4mV max
- ●Single Low Power Supply $V_{DD}$=1.0~5.5V
- ●Wide Output Swing Range $V_{OM}$=2.9V min @ $V_{DD}$=3.0V
- ●Low Operating Current (See Line-up)
- ●Low Bias Current $I_{IB}$=1pA typ
- ●Compensation Capacitor Incorporated
- ●Package Outline SC88A
- ●C-MOS Technology

## ■PIN CONFIGURATION

(Top View)

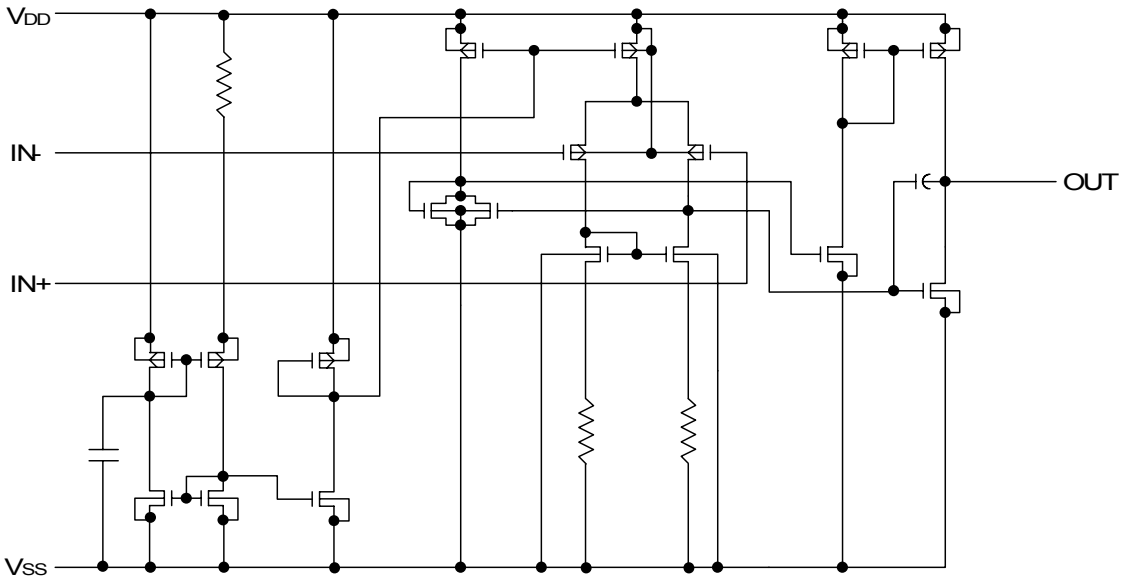



## ■LINE-UP

($V_{DD}$=3.0V,Ta=25°C)

| PARAMETER | NJU7007 | NJU7008 | UNIT |
|---|---|---|---|
| Operating Current | 15 | 200 | uA(typ) |
| Slew Rate | 0.1 | 2.4 | V/us(typ) |
| Unity Gain Bandwidth | 0.2 | 1.0 | MHz(typ) |

## ■EQUIVALENT CIRCUIT



■ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

| PARAMETER | SYMBOL | RATING | UNIT |
|---|---|---|---|
| Supply Voltage | $V_{DD}$ | 7.0 | V |
| Differential Input Voltage | $V_{ID}$ | ±7.0 (Note1) | V |
| Common Mode Input Voltage | $V_{IC}$ | -0.3~7.0 | V |
| Power Dissipation | $P_D$ | 250 (Note2) | mW |
| Operating Temperature | Topr | -40~+85 | °C |
| Storage Temperature | Tstg | -55~+125 | °C |

Note1) If the supply voltage ($V_{DD}$) is less than 7.0V, the input voltage must not over the $V_{DD}$ level though 7.0V is limit specified.

Note2) The power dissipation is value mounted on a glass epoxy board in size of 50x50x1.6 millimater.

Note3) Decoupling capacitor should be connected between $V_{DD}$ and $V_{SS}$ due to the stabilized operation for the circuit.

■ELECTRICAL CHARACTERISTICS

NJU7007

($V_{DD}$=3.0V,$R_L$=∞,Ta=25°C)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Input Offset Voltage | $V_{IO}$ | $V_{IN}$=$V_{DD}$/2 | - | - | 4 | mV |
| Input Offset Current | $I_{IO}$ | | - | 1 | - | pA |
| Input Bias Current | $I_{IB}$ | | - | 1 | - | pA |
| Input Impedance | $R_{IN}$ | | - | 1 | - | TΩ |
| Large Signal Voltage Gain | $A_{VD}$ | | 60 | 70 | - | dB |
| Input Common Mode Voltage Range | $V_{ICM}$ | | 0~2.5 | - | - | V |
| Maximum Output Swing Voltage | $V_{OM1}$ | $R_L$=1MΩ | $V_{DD}$-0.1 | - | - | V |
| | $V_{OM2}$ | $R_L$=1MΩ | - | - | $V_{SS}$+0.1 | V |
| Output Source Current | $I_{OH}$ | $V_O$=$V_{DD}$/2 | 7 | 12 | | uA |
| Common Mode Rejection Ratio | CMR | $V_{IN}$=$V_{DD}$/2 | 55 | 65 | - | dB |
| Supply Voltage Rejection Ratio | SVR | $V_{DD}$=1.5~5.5V | 60 | 70 | - | dB |
| Operating Current | $I_{DD}$ | | - | 15 | 25 | uA |
| Slew Rate | SR | | - | 0.1 | - | V/us |
| Unity Gain Bandwidth | Ft | $A_V$=40dB,$C_L$=10pF | - | 0.2 | - | MHz |

NJU7008

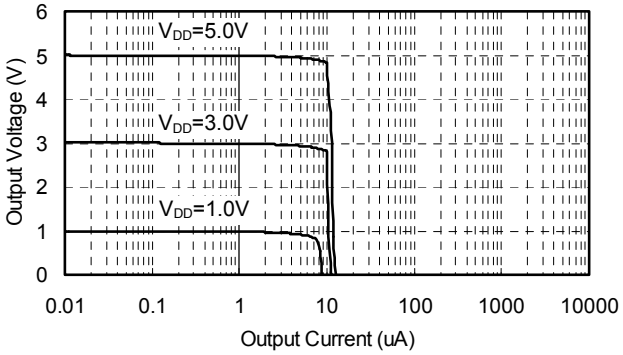
($V_{DD}$=3.0V,$R_L$=∞,Ta=25°C)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Input Offset Voltage | $V_{IO}$ | $V_{IN}$=$V_{DD}$/2 | - | - | 4 | mA |
| Input Offset Current | $I_{IO}$ | | - | 1 | - | pA |
| Input Bias Current | $I_{IB}$ | | - | 1 | - | pA |
| Input Impedance | $R_{IN}$ | | - | 1 | - | TΩ |
| Large Signal Voltage Gain | $A_{VD}$ | | 60 | 70 | - | dB |
| Input Common Mode Voltage Range | $V_{ICM}$ | | 0~2.5 | - | - | V |
| Maximum Output Swing Voltage | $V_{OM1}$ | $R_L$=50kΩ | $V_{DD}$-0.1 | - | - | V |
| | $V_{OM2}$ | $R_L$=50kΩ | - | - | $V_{SS}$+0.1 | V |
| Output Source Current | $I_{OH}$ | $V_O$=$V_{DD}$/2 | 100 | 200 | - | uA |
| Common Mode Rejection Ratio | CMR | $V_{IN}$=$V_{DD}$/2 | 55 | 65 | - | dB |
| Supply Voltage Rejection Ratio | SVR | $V_{DD}$=1.5~5.5V | 60 | 70 | - | dB |
| Operating Current | $I_{DD}$ | | - | 200 | 400 | uA |
| Slew Rate | SR | | - | 2.4 | - | V/us |
| Unity Gain Bandwidth | Ft | $A_V$=40dB,$C_L$=10pF | - | 1.0 | - | MHz |

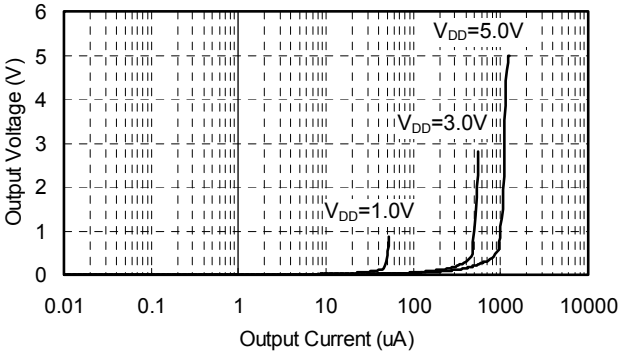
■TYPICAL CHARACTERISTICS

(1)NJU7007

Output Voltage vs. Output Current (SOURCE)

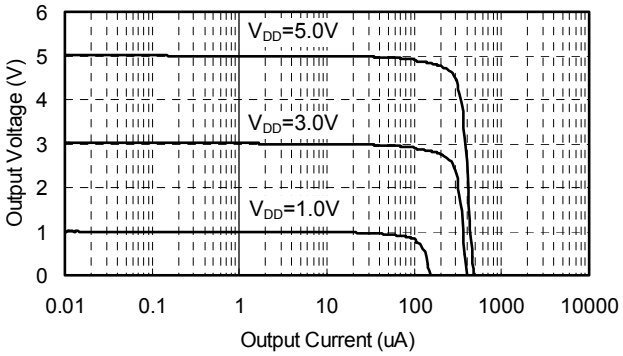



Output Voltage vs. Output Current (SINK)




(2)NJU7008

Output Voltage vs.OutputCurrent (SOURCE)




Output Voltage vs. Output Current (SINK)