

## SUPER LOW OPERATING CURRENT AND LOW OFFSET VOLTAGE TINY SINGLE C-MOS OPERATIONAL AMPLIFIER

### ■ GENERAL DESCRIPTION

The NJU7006 is a super low operating current and low offset voltage tiny single C-MOS operational amplifier.

The input offset voltage is lower than 2mV(max) and the input bias current is as low as less than 1pA(typ), consequently the very small signal around the ground level can be amplified.

The operating current is 3uA(typ), and the output stage permits output signals to swing between both of the supply rails.

Furthermore, the NJU7006 is packaged with very small MTP-5, therefore it can be especially applied to battery operated portable items.

### ■ PACKAGE OUTLINE



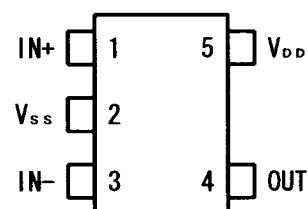
NJU7006F

### ■ FEATURES

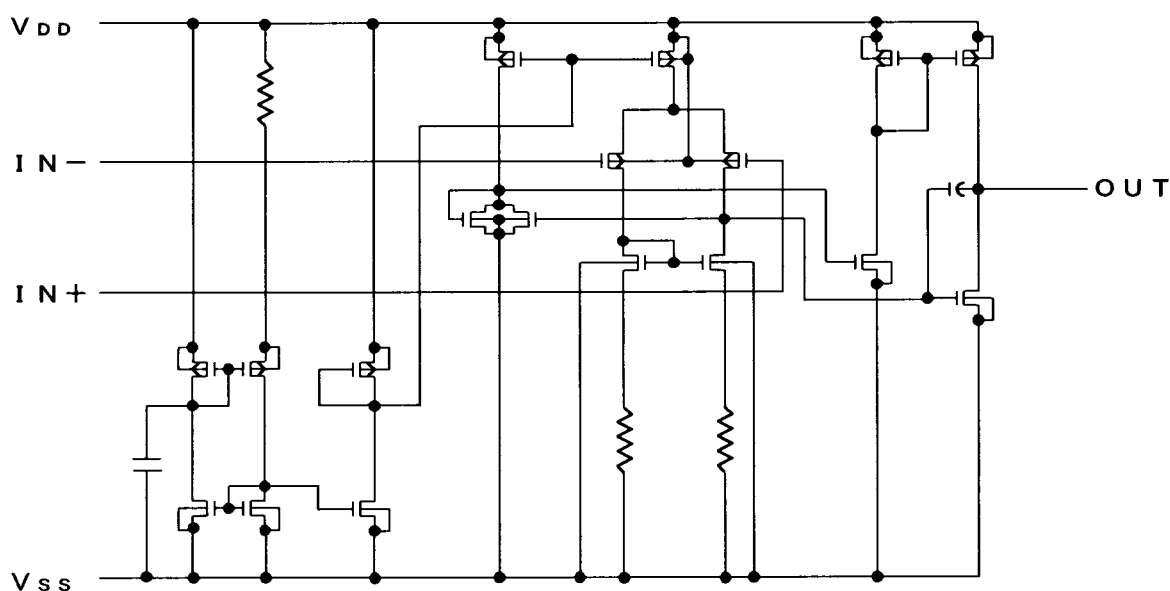
- Super Low Operating Current      $I_{DD}=3.0\mu A$  typ.
- Single Power Supply              $V_{DD}=1.8\sim 3.6V$
- Low Offset Voltage                 $V_{IO}=2mV$  max. @3.0V
- Wide Output Swing Range         $V_{OM}=2.9V$  min. @3.0V
- Low Bias Current                   $I_{IB}=1pA$  typ.
- Compensation Capacitor Incorporated
- Package Outline                    MTP-5
- C-MOS Technology

### ■ PIN CONFIGURATION

(Top View)



### ■ EQUIVALENT CIRCUIT



## ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

| P A R A M E T E R          | S Y M B O L | R A T I N G S | U N I T |
|----------------------------|-------------|---------------|---------|
| Supply Voltage             | $V_{IN}$    | 7             | V       |
| Differential Input Voltage | $V_{ID}$    | $\pm 7$ Note1 | V       |
| Common Mode Input Voltage  | $V_{IC}$    | - 0.3 ~ 7     | V       |
| Power Dissipation          | $P_D$       | 200           | mW      |
| Operating Temperature      | $T_{opr}$   | - 40 ~ + 85   | °C      |
| Storage Temperature        | $T_{stg}$   | - 55 ~ +125   | °C      |

Note1) If the supply voltage ( $V_{DD}$ ) is less than 7V, the input voltage must not over the  $V_{DD}$  level though 7V is limit specified.

Note2) Decoupling capacitor should be connected between  $V_{DD}$  and  $V_{SS}$  due to the stabilized operation for the circuit.

## ■ ELECTRICAL CHARACTERISTICS

(Ta=25°C,  $V_{DD}=3.0V$ ,  $R_L=\infty$ )

| P A R A M E T E R               | S Y M B O L | C O N D I T I O N S     | M I N        | T Y P | M A X        | U N I T |
|---------------------------------|-------------|-------------------------|--------------|-------|--------------|---------|
| Input Offset Voltage            | $V_{IO}$    | $V_{IN}=1/2V_{DD}$      | —            | —     | 2            | 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                  | $V_{OM1}$   | $R_L=10M\Omega$         | $V_{DD}-0.1$ | —     | —            | V       |
| Swing Voltage                   | $V_{OM2}$   | $R_L=10M\Omega$         | —            | —     | $V_{SS}+0.1$ | V       |
| Common Mode Rejection Ratio     | CMR         | $V_{IN}=1/2V_{DD}$      | 55           | 65    | —            | dB      |
| Supply Voltage Rejection Ratio  | SVR         | $V_{DD}=3.0\sim 3.6V$   | 60           | 70    | —            | dB      |
| Operating Current               | $I_{DD}$    |                         | —            | 3.0   | 4.5          | μA      |
| Slew Rate                       | SR          | $C_L=10pF$              | 0.02         | 0.04  | —            | V/μs    |
| Unity Gain Bandwidth            | Ft          | $A_V=40dB$ , $C_L=10pF$ | —            | 95    | —            | kHz     |

Note3) The source current is less than 0.29μA (at  $V_{OM}/R_L=2.9V/10M\Omega$ ).

Note4) The load capacitance( $C_L$ ) is less than 200pF.

## [CAUTION]

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