

## LOW VOLTAGE C-MOS OPERATIONAL AMPLIFIER

### ■ GENERAL DESCRIPTION

The NJU7001, 02 and 04 are single, dual and quad C-MOS Operational Amplifiers operated on a single-power-supply, low voltage and low operating current.

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

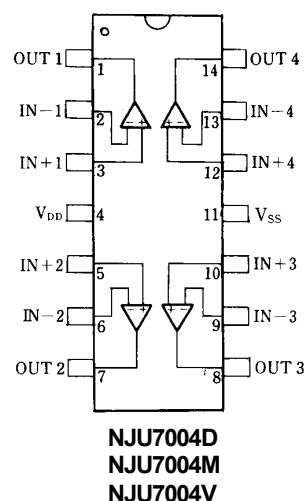
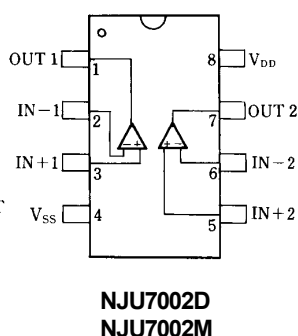
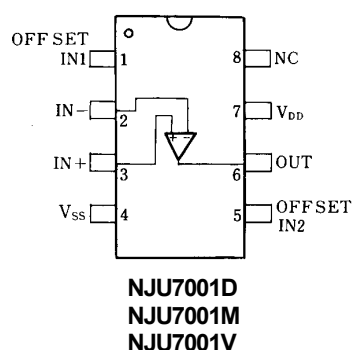
The input bias current is as low as less than 1pA, consequently the very small signal around the ground level can be amplified.

Furthermore, the operating current is also as low as 15μA (typ) per circuit, therefore it can be applied especially to battery-operated items.

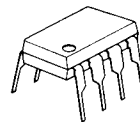
### ■ FEATURES

- Single-Power-Supply
- Wide Operating Voltage ( $V_{DD}=1\sim16V$ )
- Wide Output Swing Range ( $V_{OM}=2.94V$  typ. at  $V_{DD}=3V$ )
- Low Operating Current ( $15\mu A/circuit$ )
- Low Bias Current ( $I_B=1pA$ )
- Internal Compensation Capacitor
- External Offset Null Adjustment (Only NJU7001)
- Package Outline DIP/DMP/SSOP8 (NJU7001)
- Package Outline DIP/DMP8 (NJU7002)
- Package Outline DIP/DMP/SSOP14 (NJU7004)
- C-MOS Technology

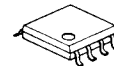
### ■ PIN CONFIGURATION



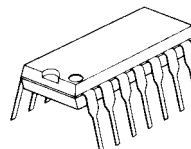
### ■ PACKAGE OUTLINE



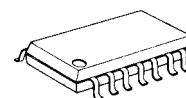
NJU7001U  
NJU7002U



NJU7001M  
NJU7002M



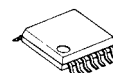
NJU7004D



NJU7004M

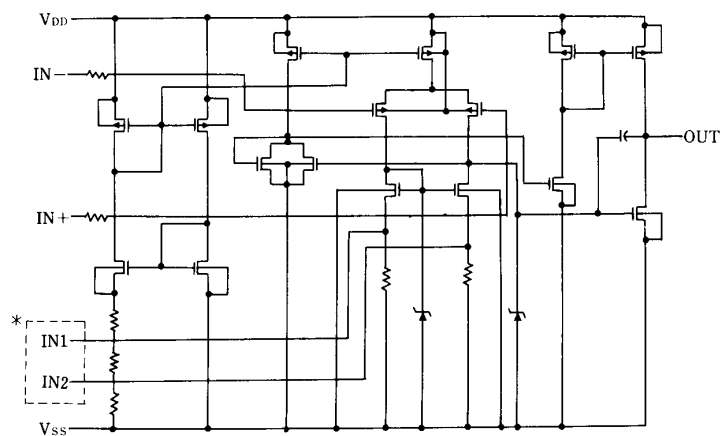


NJU7001V



NJU7004V

## ■ EQUIVALENT CIRCUIT



\*The terminals IN1, IN2 are only for NJU7001 ( NJU7002/7004 don't have these terminals ).

## ■ ABSOLUTE MAXIMUM RATINGS

( Ta=25°C )

| PARAMETER                   | SYMBOL    | RATINGS                                                              | UNIT |
|-----------------------------|-----------|----------------------------------------------------------------------|------|
| Supply Voltage              | $V_{DD}$  | 18                                                                   | V    |
| Differential Input Voltage  | $V_{ID}$  | $\pm 18$ ( note )                                                    | V    |
| Common Mode Input Voltage   | $V_{IC}$  | -0.3~+18                                                             | V    |
| Power Dissipation           | $P_D$     | ( DIP14 ) 700<br>( DIP8 ) 500<br>( DMP8,14 ) 300<br>( SSOP8,14 ) 300 | mW   |
| Operating Temperature Range | $T_{opr}$ | -20~+75                                                              | °C   |
| Storage Temperature Range   | $T_{stg}$ | -40~+125                                                             | °C   |

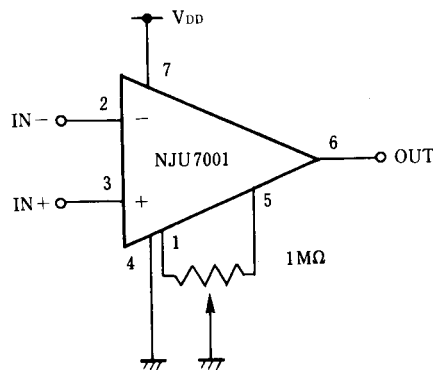
( note ) If the supply voltage (  $V_{DD}$  ) is less than 18V, the input voltage must not over the  $V_{DD}$  level though 18V is limit specified.

## ■ ELECTRICAL CHARACTERISTICS

( Ta=25°C,  $V_{DD}=3V, R_L=\infty$  )

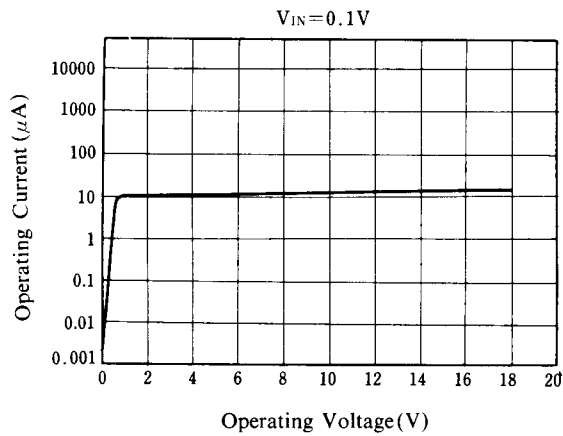
| PARAMETER                       | SYMBOL    | TEST CONDITION       | MIN. | TYP. | MAX. | UNIT |
|---------------------------------|-----------|----------------------|------|------|------|------|
| Input Offset Voltage            | $V_{IO}$  | $R_S=50\Omega$       | -    | -    | 10   | mV   |
| Input Offset Current            | $I_{IO}$  |                      | -    | 1    | -    | pA   |
| Input Bias Current              | $I_{IB}$  |                      | -    | 1    | -    | pA   |
| Input Impedance                 | $R_{IN}$  |                      | -    | 1    | -    | TΩ   |
| Large Signal Voltage Gain       | $A_V$     |                      | 80   | 90   | -    | dB   |
| Input Common Mode Voltage Range | $V_{ICM}$ |                      | 0~2  | -    | -    | V    |
| Maximum Output Swing Voltage    | $V_{OM}$  | $R_L=1M\Omega$       | 2.90 | 2.94 | -    | V    |
| Common Mode Rejection Ratio     | CMR       |                      | 60   | 70   | -    | dB   |
| Supply Voltage Rejection Ratio  | SVR       |                      | 60   | 70   | -    | dB   |
| Operating Current/Circuit       | $I_{DD}$  |                      | -    | 15   | 25   | μA   |
| Slew Rate                       | SR        |                      | -    | 0.05 | -    | V/μs |
| Unity Gain Bandwidth            | $F_t$     | $A_V=40dB, C_L=10pF$ | -    | 0.1  | -    | MHz  |

## ■ OFFSET ADJUSTMENT CIRCUIT ( Only for NJU7001 )

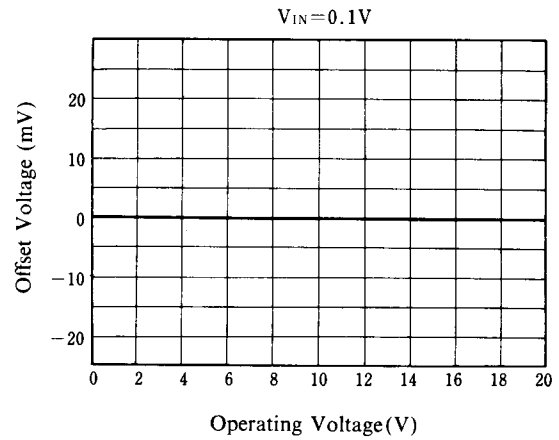


## ■ TYPICAL CHARACTERISTICS

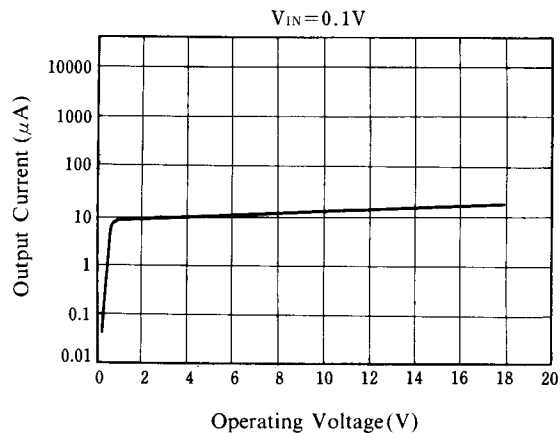
**Operating Current vs. Operating Voltage**



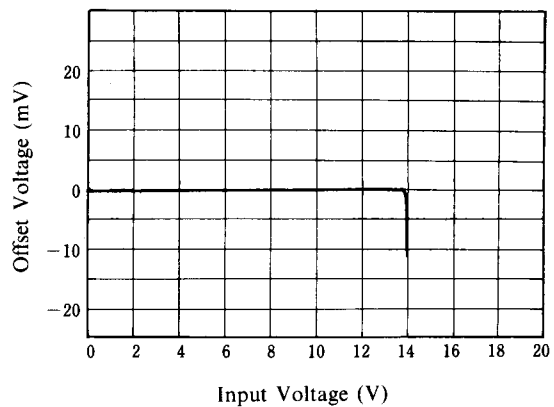
**Offset Voltage vs. Operating Voltage**



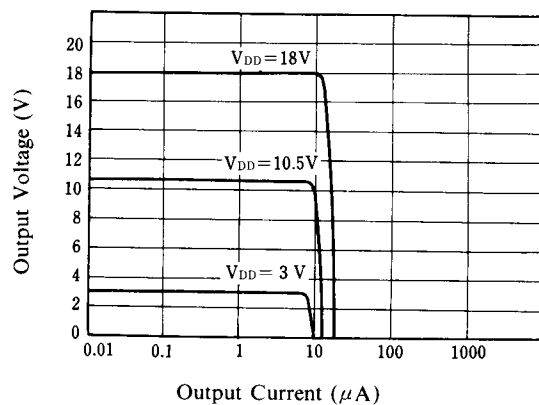
**Output Current vs. Operating Voltage**



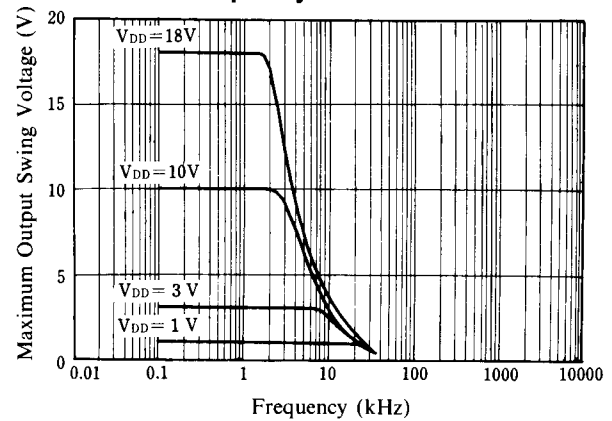
**Offset Voltage vs. Input Voltage**



**Output Voltage vs. Output Current**

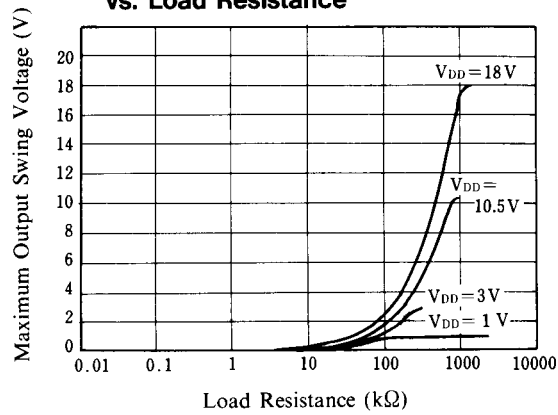


**Maximum Output Swing Voltage vs. Frequency**

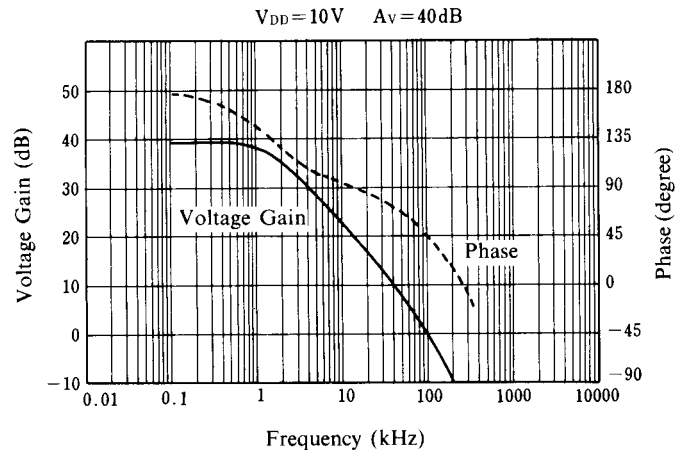


■ TYPICAL CHARACTERISTICS

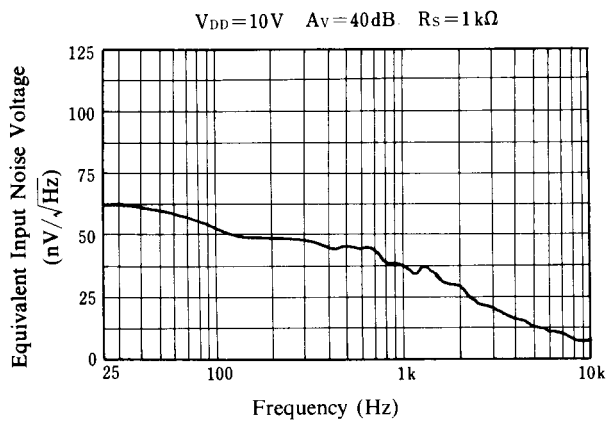
Maximum Output Swing Voltage  
vs. Load Resistance



Voltage Gain • Phase vs. Frequency



Equivalent Input Noise Voltage  
vs. Frequency



[CAUTION]  
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<http://moschip.ru/get-element>

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Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

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Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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