

## LOW VOLTAGE C-MOS OPERATIONAL AMPLIFIER

### ■ GENERAL DESCRIPTION

The NJU7031,32 and 34 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 3V and the output stage permits output signals to swing between both of the supply rails.

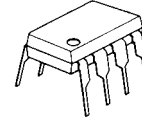
The input bias current is as low as less than 1pA, consequently the very small signal around the ground level can be amplified.

Furthermore, the operating current is also as low as 1mA ( typ ) per circuit, therefore it can be applied especially to battery-operated items.

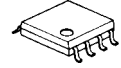
### ■ FEATURES

- Single-Power-Supply
- Wide Operating Voltage (  $V_{DD}=3\sim 16V$  )
- Wide Output Swing Range (  $V_{OM}=9.98V$  typ. @  $V_{DD}=10V$  )
- Low Operating Current ( 1mA/circuit )
- Low Bias Current (  $I_B=1pA$  typ. )
- Internal Compensation Capacitor
- External Offset Null Adjustment ( Only NJU7031 )
- Package Outline  
 DIP/DMP/SSOP8 ( NJU7031 )  
 DIP/DMP8 ( NJU7032 )  
 DIP/DMP/SSOP14 ( NJU7034 )
- C-MOS Technology

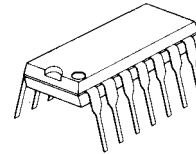
### ■ PACKAGE OUTLINE



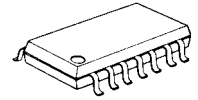
NJU7031D  
NJU7032D



NJU7031M  
NJU7032M



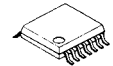
NJU7034D



NJU7034M

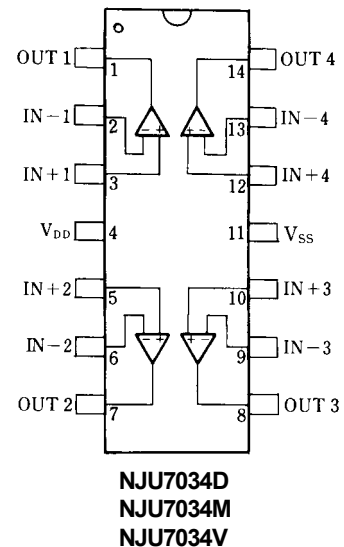
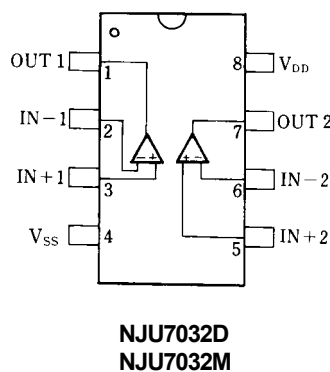
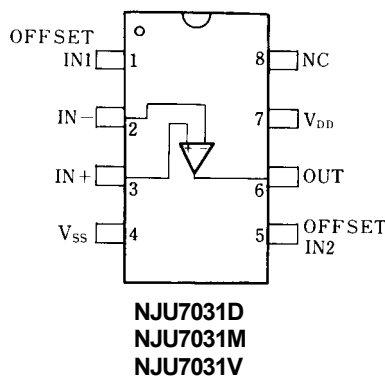


NJU7031V



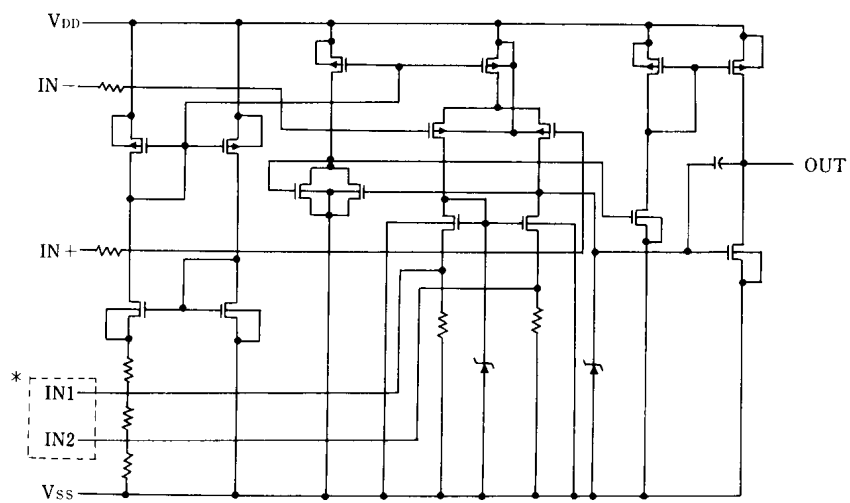
NJU7034V

### ■ PIN CONFIGURATION



# NJU7031/32/34

## ■ EQUIVALENT CIRCUIT



\* The terminals IN1, IN2 are only for NJU7031 ( NJU7032/34 don't have these terminals ).

## ■ ABSOLUTE MAXIMUM RATINGS

( Ta=25°C )

| PARAMETER                   | SYMBOL    | RATINGS  | UNIT |
|-----------------------------|-----------|--|------|
| Supply Voltage              | $V_{DD}$  | 18   | V    |
| Differential Input Voltage  | $V_{ID}$  | $\pm 18$ ( note1 )   | 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   |

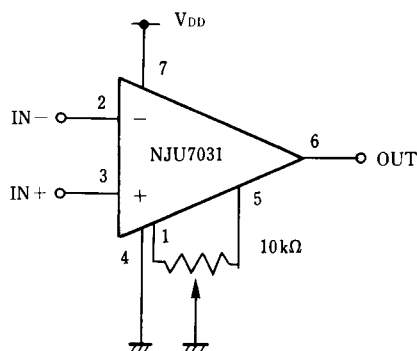
( note1 ) If the supply voltage ( $V_{DD}$ ) is less than 18V, the input voltage must not over the  $V_{DD}$  level though 18V is limit specified.

## ■ ELECTRICAL CHARACTERISTICS

( Ta=25°C,  $V_{DD}=10V, R_L=\infty$  )

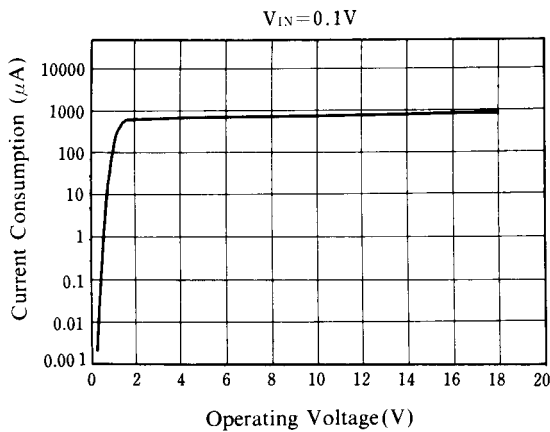
| PARAMETER                       | SYMBOL    | TEST CONDITION       | MIN. | TYP. | MAX. | UNIT       |
|---------------------------------|-----------|----------------------|------|------|------|------------|
| Input Offset Voltage            | $V_{IO}$  | $R_S=50\Omega$       | -    | -    | 10   | 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   | 95   | -    | dB         |
| Input Common Mode Voltage Range | $V_{ICM}$ |                      | 0~9  | -    | -    | V          |
| Maximum Output Swing Voltage    | $V_{OM}$  | $R_L=1M\Omega$       | 9.80 | 9.98 | -    | V          |
| Common Mode Rejection Ratio     | CMR       |                      | 60   | 75   | -    | dB         |
| Supply Voltage Rejection Ratio  | SVR       |                      | 60   | 75   | -    | dB         |
| Operating Current/Circuit       | $I_{DD}$  |                      | -    | 1    | 2    | mA/Cir     |
| Slew Rate                       | SR        |                      | -    | 3.5  | -    | V/ $\mu$ s |
| Unity Gain Bandwidth            | $F_t$     | $A_V=40dB, C_L=10pF$ | -    | 1.5  | -    | MHz        |

## ■ OFFSET ADJUSTMENT CIRCUIT ( Only For NJU7031 )

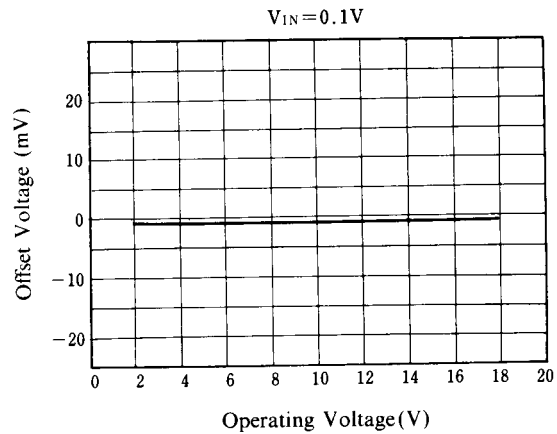


## ■ TYPICAL CHARACTERISTICS

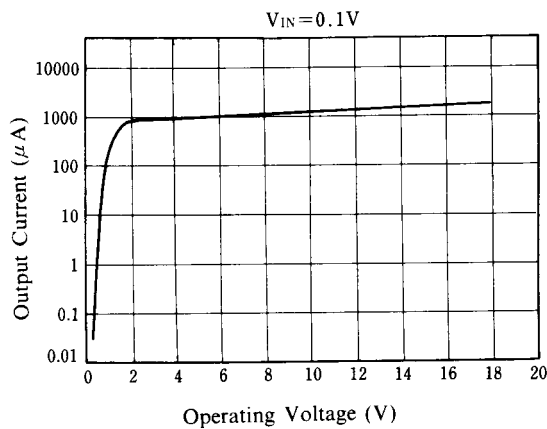
**Current Consumption vs. Operating Voltage**



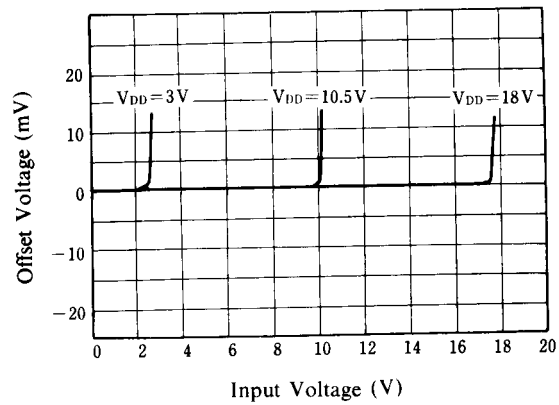
**Offset Voltage vs. Operating Voltage**



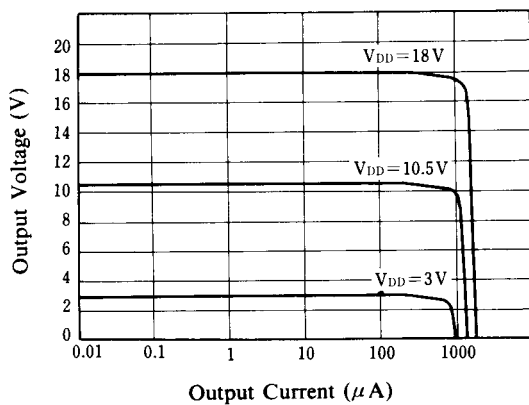
**Output Current vs. Operating Voltage**



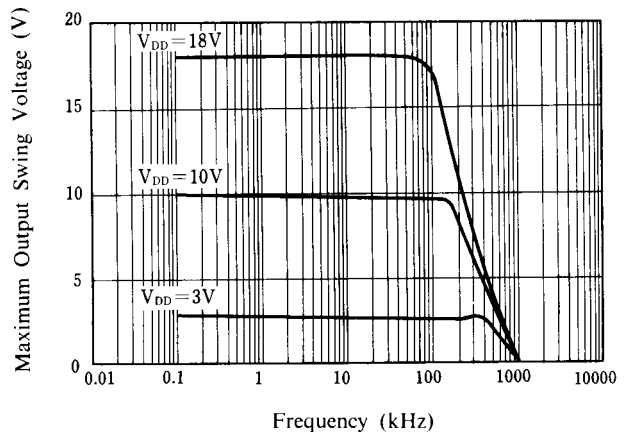
**Offset Voltage vs. Input Voltage**



**Output Voltage vs. Output Current**

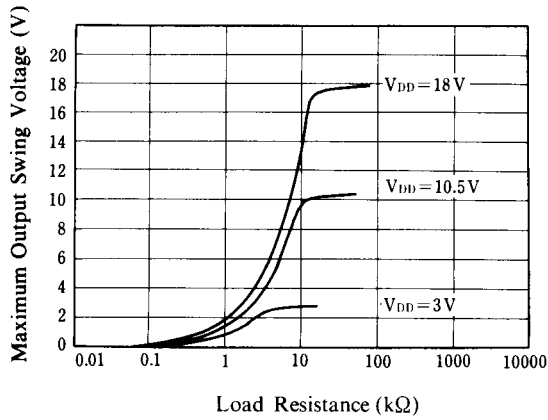


**Maximum Output Swing Voltage vs. Frequency**

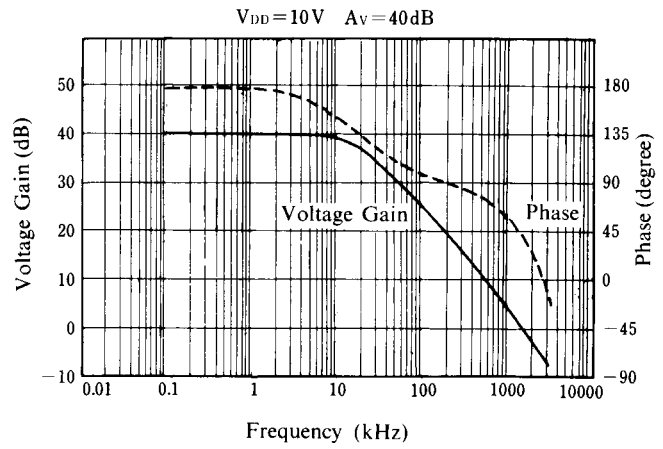


## ■ TYPICAL CHARACTERISTICS

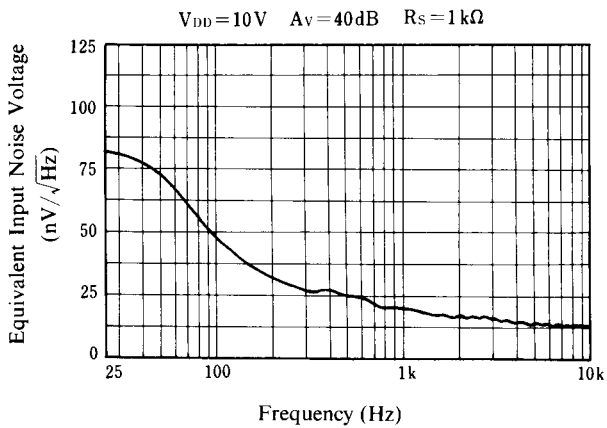
**Maximum Output Swing Voltage vs. Frequency**



**Voltage Gain · Phase vs. Frequency**



**Equivalent Input Noise Voltage vs. Frequency**



**[CAUTION]**  
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