LOW VOLTAGE C-MOS OPERATIONAL AMPLIFIER

■ GENERAL DESCRIPTION

The NJU7031/32/34 are single, dual and quad single supply, low offset, output full swing C-MOS Operational Amplifiers.

The wide operating voltage 3V to 16V, High slew rate 3.5V/μs and output full swing are suitable for fast signal processing amplifiers. Additionally, low input bias current 1pA, and single supply operation offer amplification of the very small signal around the ground level.

The NJU7031 has external offset null function.

■ FEATURES

● High Slew Rate   3.5V/μs
● Wide Operating Voltage   +3V to +16V
● Output Voltage with full Swing V_{OM}=9.98V typ. (@V_{DD}=10V)
● Input Common Mode Voltage Range
                               V_{ICM}=0V to 9V (@V_{DD}=10V)
● Low Bias Current I_{IB}=1pA typ.
● Input Common Mode Voltage range includes ground.
● External Offset Null Adjustment (Only NJU7031)
● C-MOS Technology
● Package Outline   NJU7031 (single) DIP8, DMP8, SSOP8
                      NJU7032 (dual) DIP8, DMP8
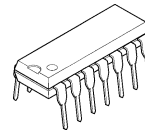   NJU7034 (quad) DIP14, DMP14, SSOP14
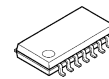
■ PACKAGE OUTLINE
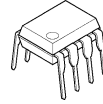
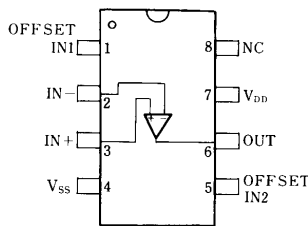NJU7031D   NJU7031M   NJU7031V
NJU7032D   NJU7032M
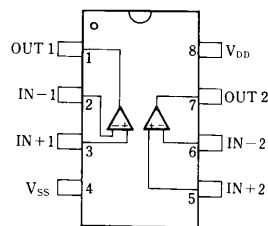
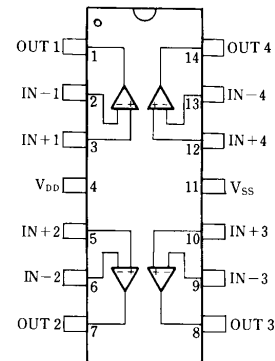NJU7034D   NJU7034M   NJU7034V

■ PIN CONFIGURATION

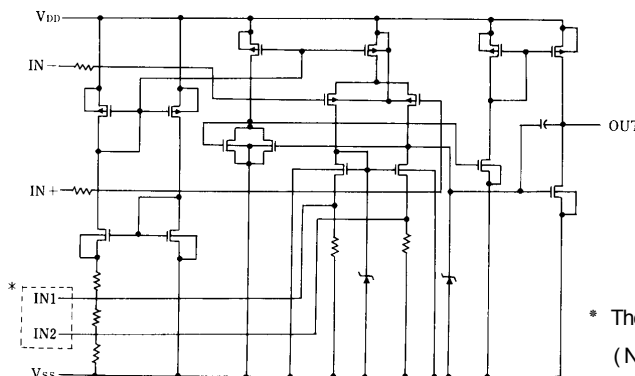NJU7031D
NJU7031M
NJU7031V

NJU7032D
NJU7032M

NJU7034D
NJU7034M
NJU7034V

■ EQUIVALENT CIRCUIT

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

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NJU7031/32/34

■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

| PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{DD}	18	V
Differential Input Voltage	V_{ID}	± 18　(note1)	V
Common Mode Input Voltage	V_{IC}	-0.3~18	V
Power Dissipation	P_D	(DIP14) 700 (DIP8) 500 (DMP8,14) 300 (SSOP14) 300 (SSOP8) 250	mW
Operating Temperature Range	T_{opr}	-40~+85	°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=∞)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V_{IO}	R_S=50Ω	-	-	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=1MΩ	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/μs
Unity Gain Bandwidth	F_t	A_V=40dB,C_L=10pF	-	1.5	-	MHz

■ OFFSET ADJUSTMENT CIRCUIT　(Only For NJU7031)
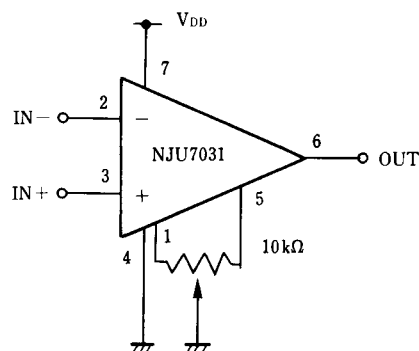
■ TYPICAL CHARACTERISTICS
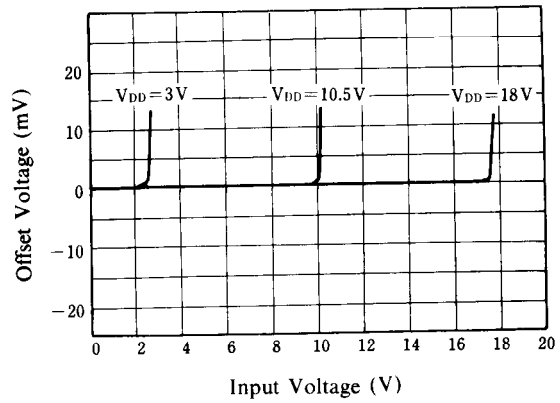
Current Consumption vs. Operating Voltage

$V_{IN} = 0.1V$

Current Consumption (μA) vs. Operating Voltage (V)
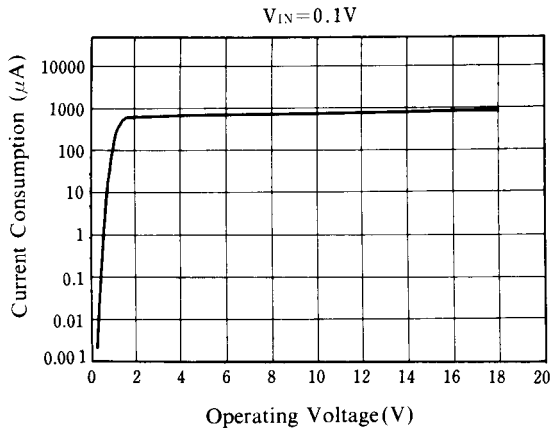
Offset Voltage vs. Operating Voltage

$V_{IN} = 0.1V$

Offset Voltage (mV) vs. Operating Voltage (V)
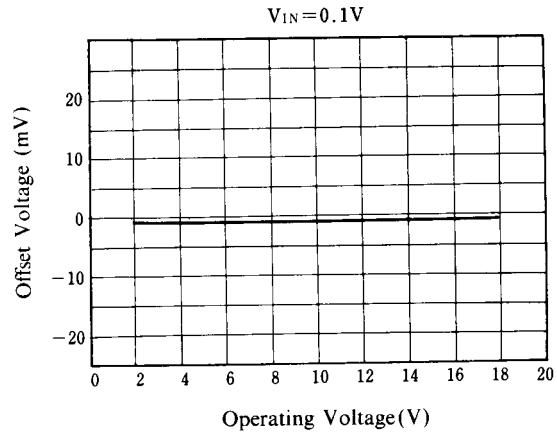
Output Current vs. Operating Voltage

$V_{IN} = 0.1V$

Output Current (μA) vs. Operating Voltage (V)
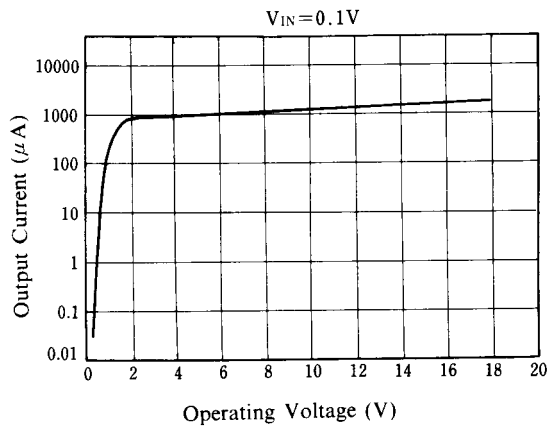
Offset Voltage vs. Input Voltage

$V_{DD} = 3V$ $V_{DD} = 10.5V$ $V_{DD} = 18V$

Offset Voltage (mV) vs. Input Voltage (V)

Output Voltage vs. Output Current
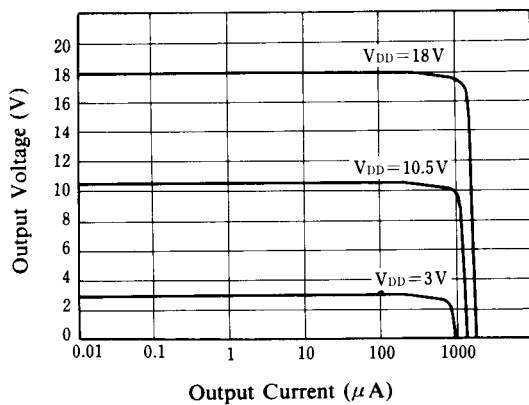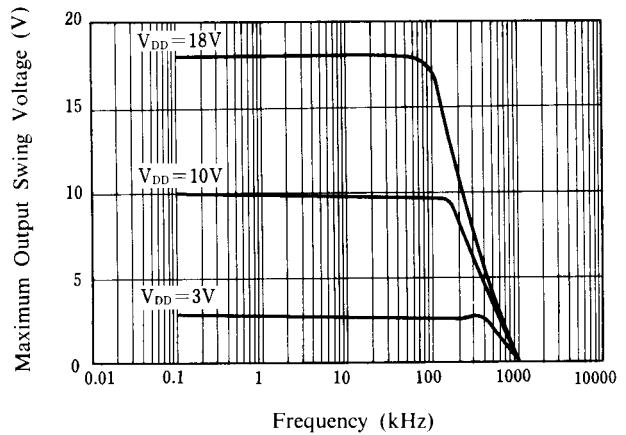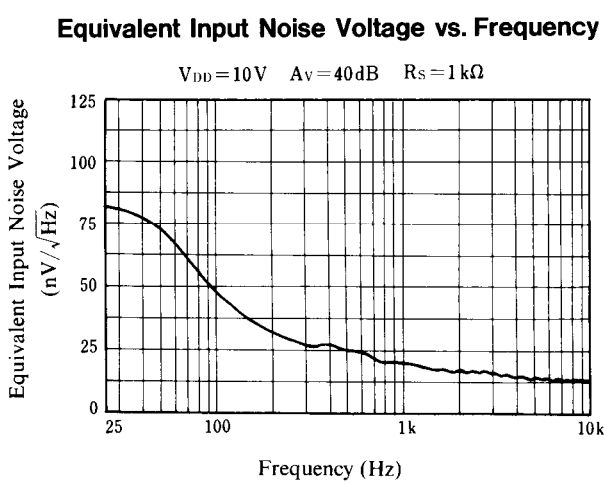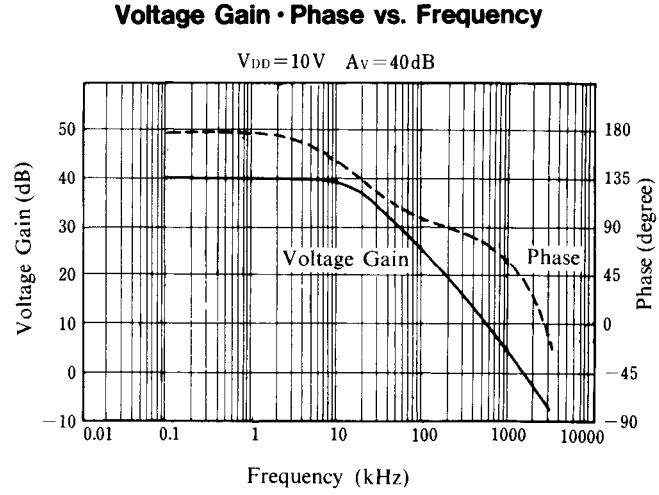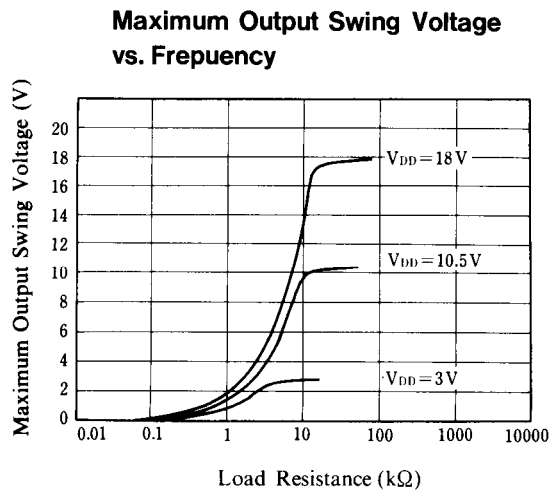
$V_{DD} = 18V$
$V_{DD} = 10.5V$
$V_{DD} = 3V$

Output Voltage (V) vs. Output Current (μA)

Maximum Output Swing Voltage vs. Frequency

$V_{DD} = 18V$
$V_{DD} = 10V$
$V_{DD} = 3V$

Maximum Output Swing Voltage (V) vs. Frequency (kHz)

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■ TYPICAL CHARACTERISTICS

Maximum Output Swing Voltage vs. Frepuency

Maximum Output Swing Voltage (V)

20
18
16
14
12
10
8
6
4
2
0

$V_{DD} = 18V$

$V_{DD} = 10.5V$

$V_{DD} = 3V$

0.01 0.1 1 10 100 1000 10000

Load Resistance (kΩ)

Voltage Gain・Phase vs. Frequency

$V_{DD} = 10V$ $A_V = 40dB$

Voltage Gain (dB)

50
40
30
20
10
0
−10

Phase (degree)

180
135
90
45
0
−45
−90

Voltage Gain Phase

0.01 0.1 1 10 100 1000 10000

Frequency (kHz)

Equivalent Input Noise Voltage vs. Frequency

$V_{DD} = 10V$ $A_V = 40dB$ $R_S = 1k\Omega$

Equivalent Input Noise Voltage ($nV/\sqrt{Hz}$)

125
100
75
50
25
0

25 100 1k 10k

Frequency (Hz)

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