

LOW VOLTAGE C-MOS OPERATIONAL AMPLIFIER

■ GENERAL DESCRIPTION

The NJU7021,22 and 24 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.

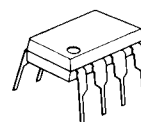
The input bias current is as low as less than 1pA, consequently the very small signal around the ground level can be amplified.

Furthermore, the operating current is also as low as 150μA (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 (150μA/circuit)
- Low Bias Current ($I_B=1pA$ typ.)
- Internal Compensation Capacitor
- External Offset Null Adjustment (Only NJU7021)
- Package Outline
 - DMP/SSOP8 (NJU7021)
 - DIP/DMP8 (NJU7022)
 - DIP/DMP/SSOP14 (NJU7024)
- C-MOS Technology

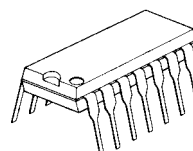
■ PACKAGE OUTLINE



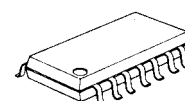
NJU7022D



NJU7021M
NJU7022M



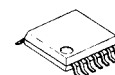
NJU7024D



NJU7024M

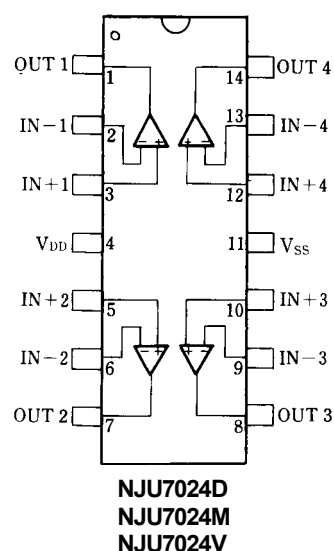
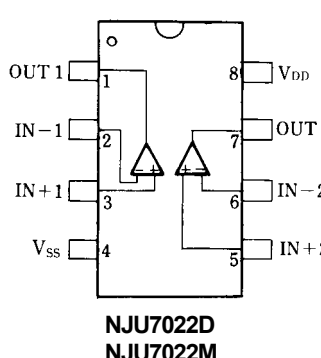
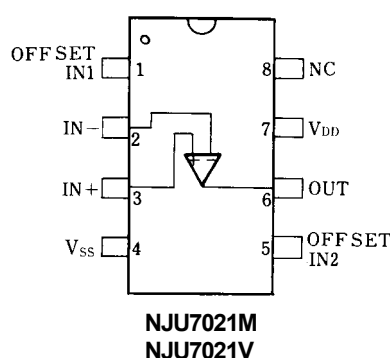


NJU7021V

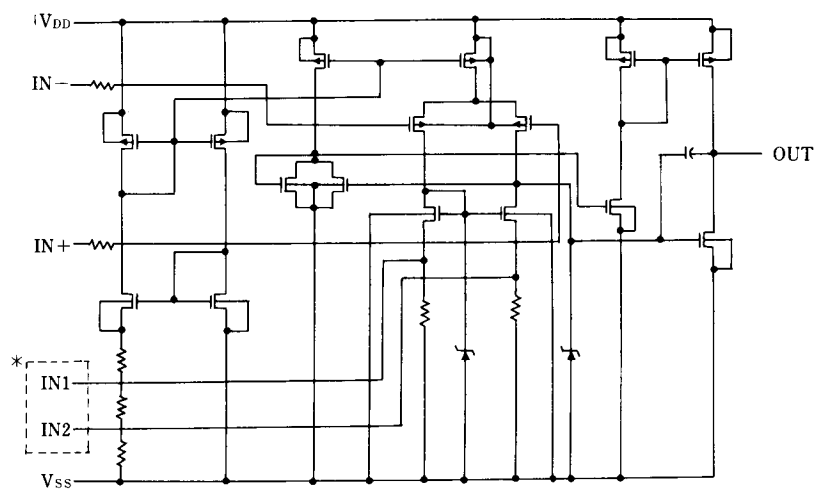


NJU7024V

■ PIN CONFIGURATION



■ EQUIVALENT CIRCUIT



* $IN1, IN2$ are only for NJU7021 (NJU7022/24 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}	± 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}	-20~+75	°C
Storage Temperature Range	T_{stg}	-40~+125	°C

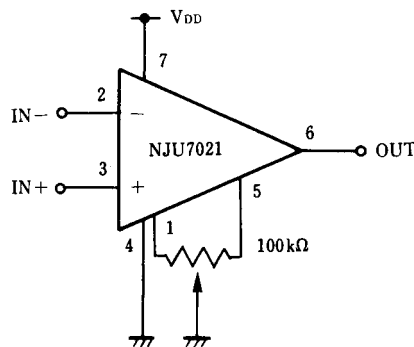
(note1) For supply voltage less than 18V, the absolute maximum input voltage is equal to the supply voltage.

■ 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}		-	150	300	μA
Slew Rate	SR		-	0.40	-	V/μs
Unity Gain Bandwidth	F_t	$A_V=40dB, C_L=10pF$	-	0.4	-	MHz

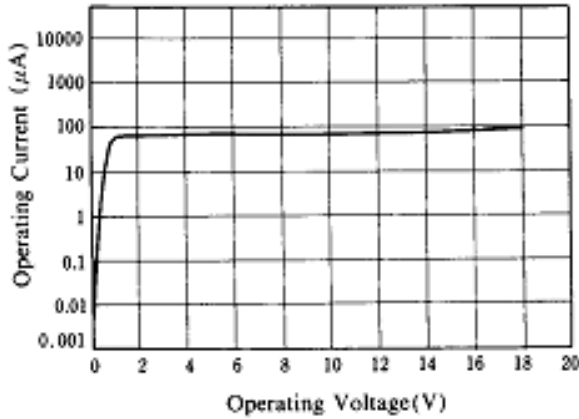
■ OFFSET ADJUSTMENT CIRCUIT (Only For NJU7021)



■ TYPICAL CHARACTERISTICS

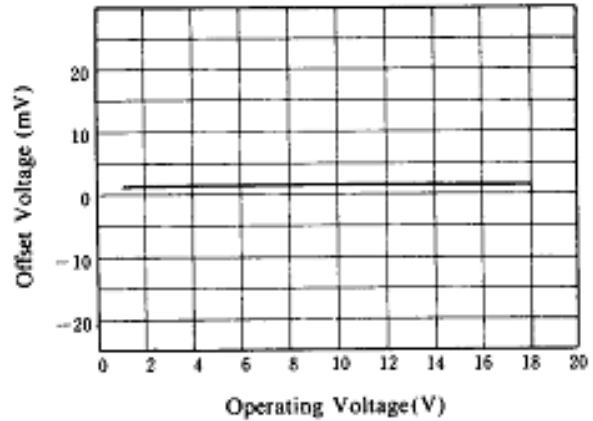
Operating Current vs. Operating Voltage

$V_{IN}=0.1V$



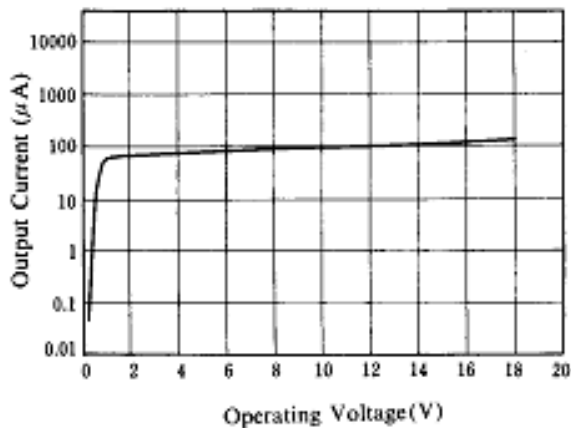
Offset Voltage vs. Operating Voltage

$V_{IN}=0.1V$

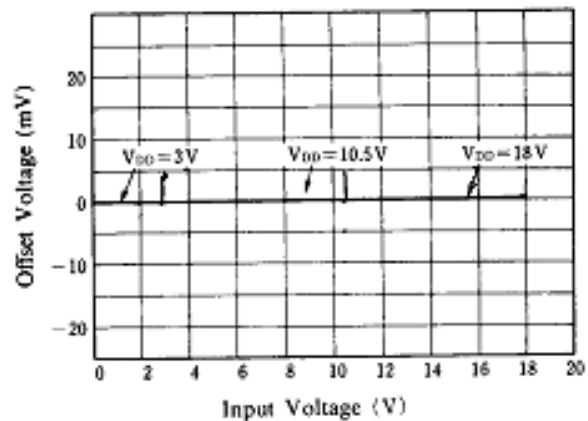


Output Current vs. Operating Voltage

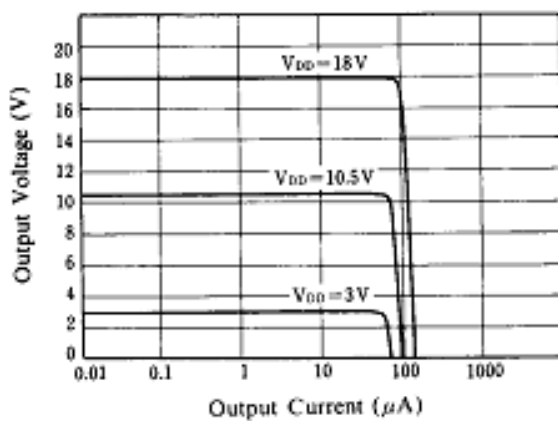
$V_{IN}=0.1V$



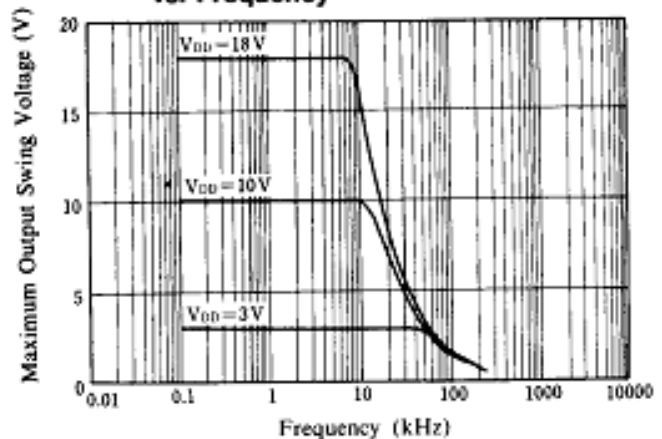
Offset Voltage vs. Input Voltage



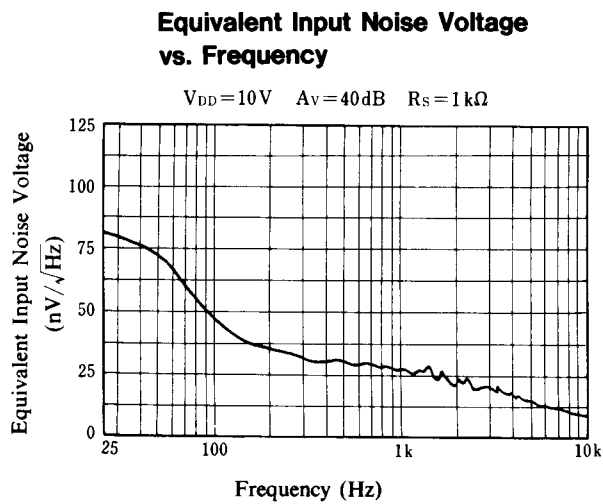
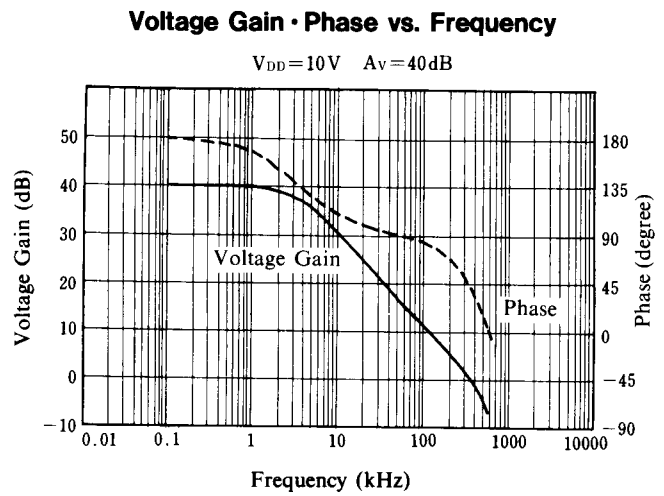
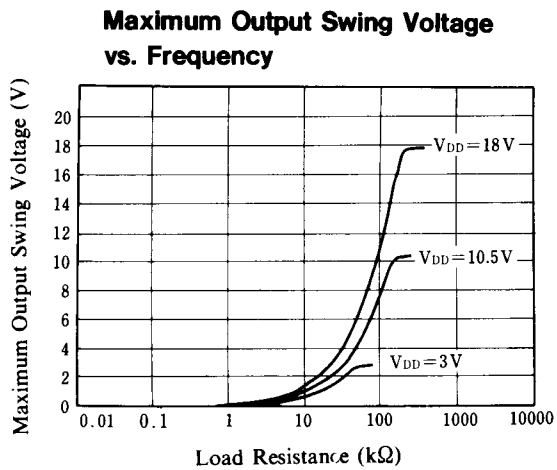
Output Voltage vs. Output Current



Maximum Output Swing Voltage vs. Frequency



■ TYPICAL CHARACTERISTICS



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