LOW-POWER TINY SINGLE C-MOS OPERATIONAL AMPLIFIER

■ GENERAL DESCRIPTION

The NJU7011,12 and 13 are single C-MOS operational amplifiers operated on a single-power-supply, low voltage and low operating current.

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

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

Furthermore, this series is packaged with very small SOT−23−5, therefore it can be especially applied to portable items.

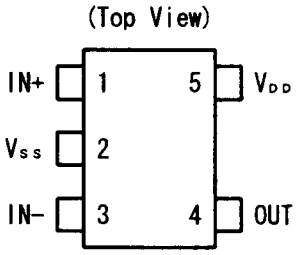
■ PACKAGE OUTLINE

NJU701XF

■ FEATURES

- Single-Power-Supply
- Wide Operating Voltage (V_{DD}=1~5.5V)
- Wide Output Swing Range (V_{OM}=2.9V min. @ 3.0V)
- Low Operating Current
- Low Bias Current (I_{IB}=1pA typ.)
- Internal Compensation Capacitor
- Package Outline SOT−23−5
- C-MOS Technology

■ PIN CONFIGURATION

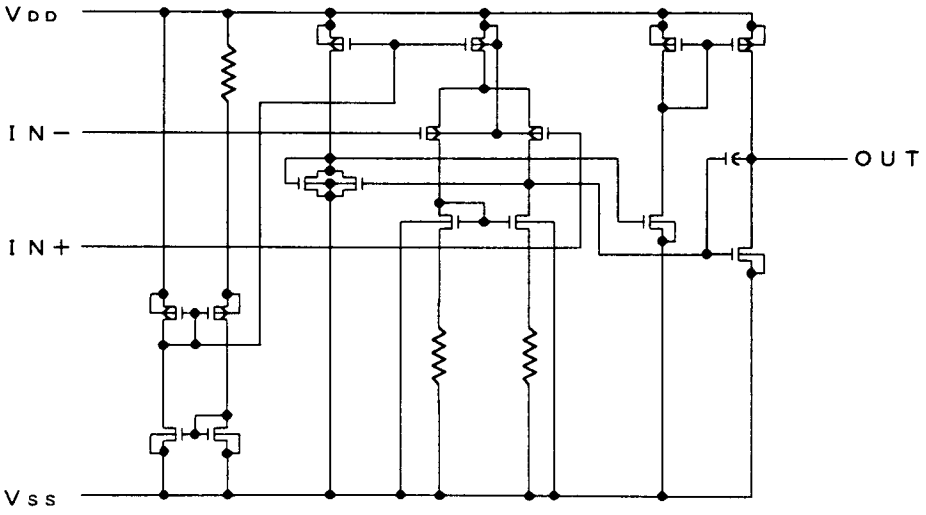


■ LINE-UP

(Ta=25°C,V_{DD}=3.0V)

PARAMETER	NJU7011	NJU7012	NJU7013	UNIT
Operating Current	15	80	200	μA (typ)
Slew Rate	0.1	1.0	2.4	V/μs (typ)
Unity Gain Bandwidth	0.2	1.0	1.0	MHz (typ)

■ EQUIVALENT CIRCUIT



■ ABSOLUTE MAXIMUM RATINGS

(Ta=25˚C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{DD}	6.5	V
Differential Input Voltage	V_{ID}	± 6.5 (note1)	V
Common Mode Input Voltage	V_{IC}	-0.3~6.5	V
Power Dissipation	P_D	200	mW
Operating Temperature Range	T_{opr}	-40~+85	˚C
Storage Temperature Range	T_{stg}	-55~+125	˚C

(note1) If the supply voltage (V_{DD}) is less than 6.5V, the input voltage must not over the V_{DD} level though 6.5V 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

NJU7011 (Ta=25˚C, V_{DD}=3.0V, R_L=∞)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V_{IO}	V_{IN}=1/2V_{DD}	-	-	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_{VD}		60	70	-	dB
Input Common Mode Voltage Range	V_{ICM}		0~2.5	-	-	V
Maximum Output Swing Voltage	V_{OM1}	R_L=1MΩ	V_{DD}-0.1	-	-	V
	V_{OM2}	R_L=1MΩ	-	-	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}=1.5~5.5V	60	70	-	dB
Operating Current	I_{DD}		-	15	25	μA
Slew Rate	SR		-	0.1	-	V/μs
Unity Gain Bandwidth	F_t	A_V=40dB, C_L=10pF	-	0.2	-	MHz

(note3) The source current is less than 2.9μA (at V_{OM}/R_L=2.9V/1MΩ).

NJU7012 (Ta=25˚C,V_{DD}=3.0V,R_L=∞)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V_{IO}	V_{IN}=1/2V_{DD}	-	-	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_{VD}		60	70	-	dB
Input Common Mode Voltage Range	V_{ICM}		0~2.5	-	-	V
Maximum Output Swing Voltage	V_{OM1}	R_L=100kΩ	V_{DD}-0.1	-	-	V
	V_{OM2}	R_L=100kΩ	-	-	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}=1.5~5.5V	60	70	-	dB
Operating Current	I_{DD}		-	80	160	μA
Slew Rate	SR		-	1.0	-	V/μs
Unity Gain Bandwidth	F_t	A_V=40dB,C_L=10pF	-	1.0	-	MHz

(note4) The source current is less than 29μA (at V_{OM}/R_L=2.9V/100kΩ).

NJU7013 (Ta=25˚C,V_{DD}=3.0V,R_L=∞)

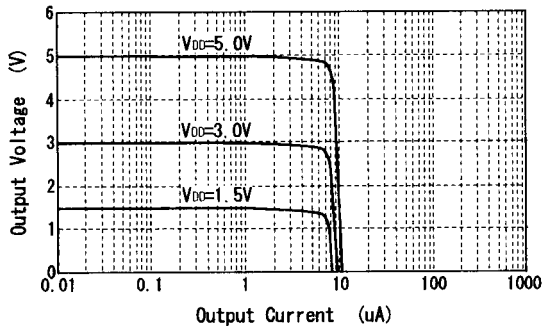
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V_{IO}	V_{IN}=1/2V_{DD}	-	-	10	mV
Input Offset Current	I_{IO}		-	1	-	pA
Input Bias Current	I_{IB}		-	1	-	pA
Input Impedance	R_{IN}		-	1	-	TΩ
Large Signal Voltage Gain	A_{VD}		60	70	-	dB
Input Common Mode Voltage Range	V_{ICM}		0~2.5	-	-	V
Maximum Output Swing Voltage	V_{OM1}	R_L=50kΩ	V_{DD}-0.1	-	-	V
	V_{OM2}	R_L=50kΩ	-	-	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}=1.5~5.5V	60	70	-	dB
Operating Current	I_{DD}		-	200	400	μA
Slew Rate	SR		-	1.0	-	V/μs
Unity Gain Bandwidth	F_t	A_V=40dB,C_L=10pF	-	1.0	-	MHz

(note5) The source current is less than 58μA (at V_{OM}/R_L=2.9V/50kΩ).

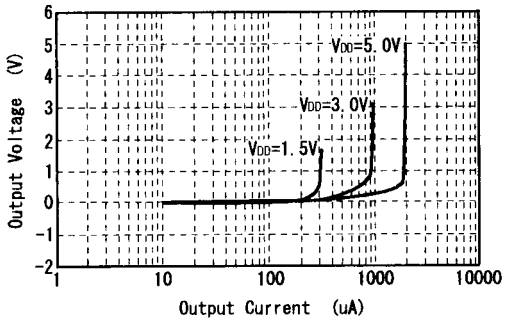
■ TYPICAL CHARACTERISTICS

(1) NJU7011

Output Voltage vs. Output Current (SOURCE)

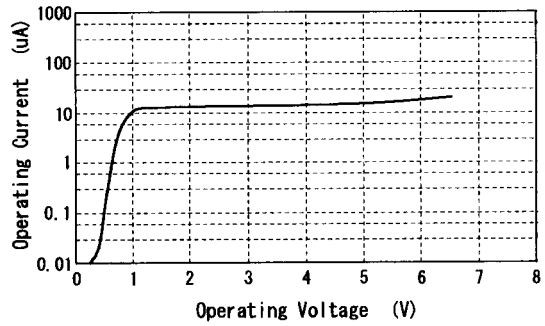


Output Voltage vs. Output Current (SINK)



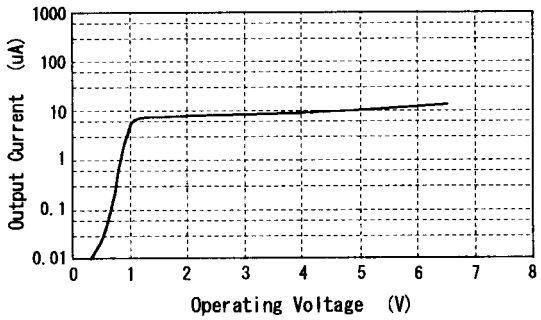
Operating Current vs. Operating Voltaga

VIN=0.1V

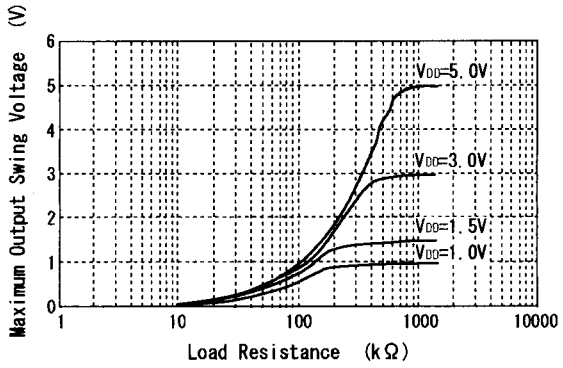


Output Current vs. Operating Voltage

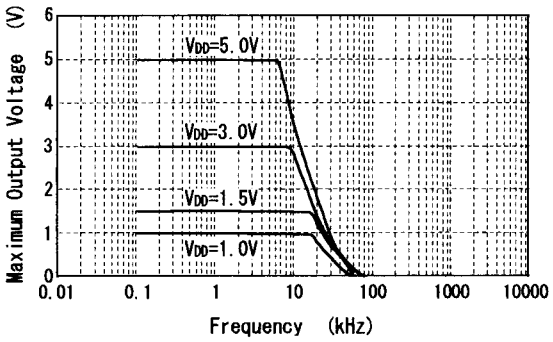
VIN=0.1V



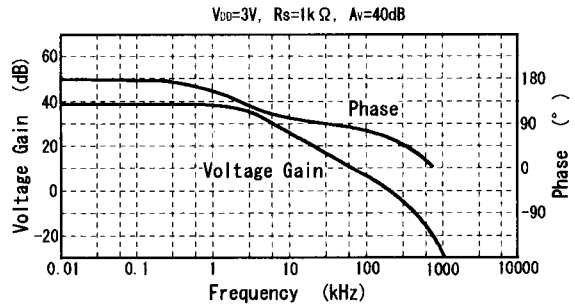
Maximum Output Swing Voltage vs. Load Resistance



Maximum Output Swing Voltage vs. Frequency

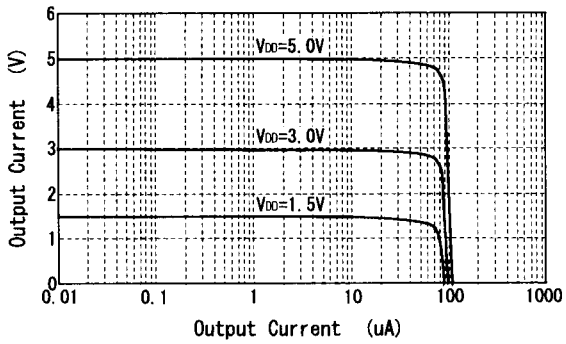


Voltage Gain·Phase vs. Frequency

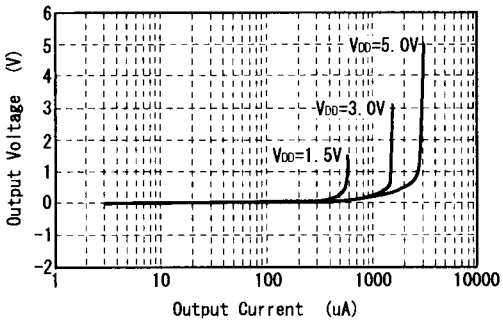


(2) NJU7012

Output Voltage vs. Output Current (SOURCE)

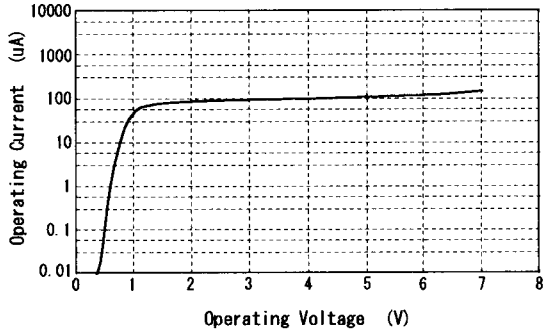


Output Voltage vs. Output Current (SINK)



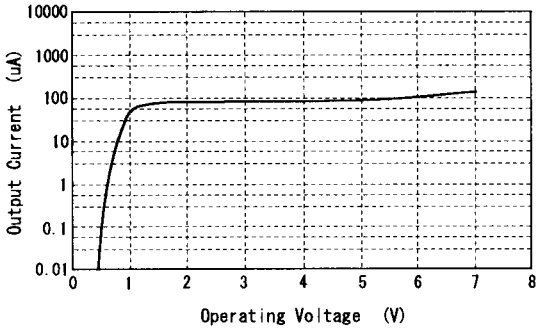
Operating Current vs. Operating Voltage

VIN=0.1V

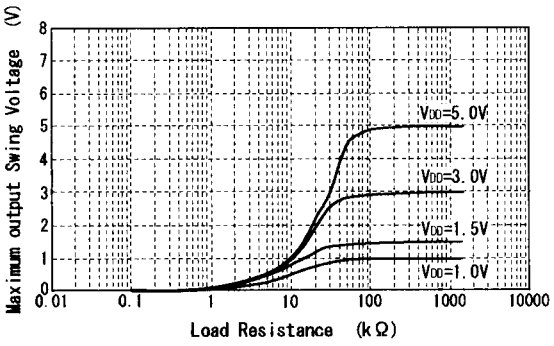


Output Current vs. Operating Voltage

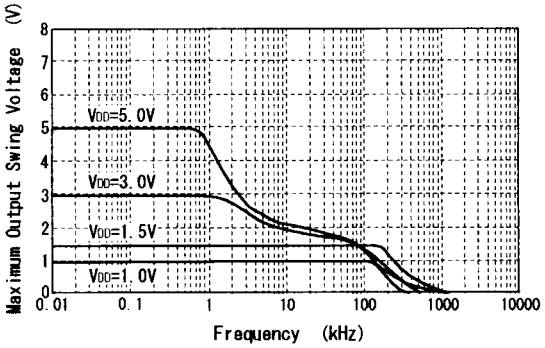
VIN=0.1V



Maximum Output Swing Voltage vs. Load Resistance

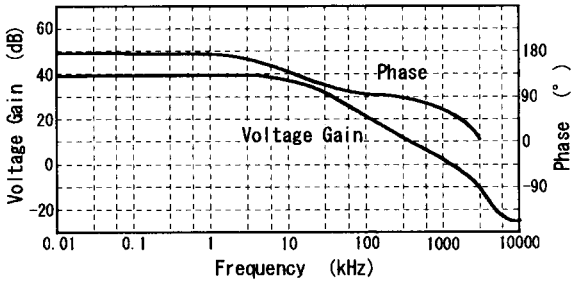


Maximum Output Swing Voltage vs. Frequency



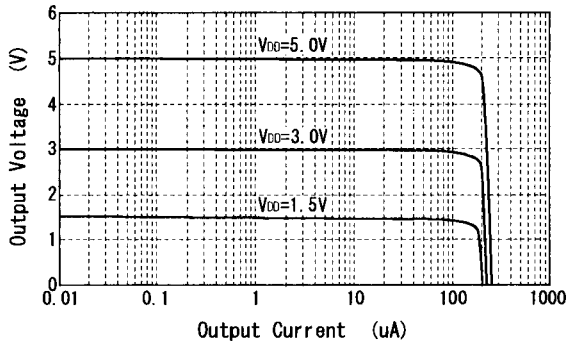
Voltage Gain·Phase vs. Frequency

VDD=3V, Rs=1kΩ, Av=40dB

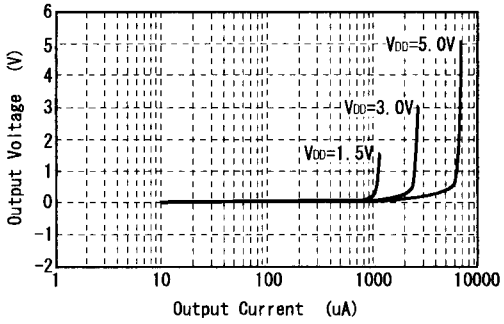


(3) NJU7013

Output Voltage vs. Output Current (SOURCE)

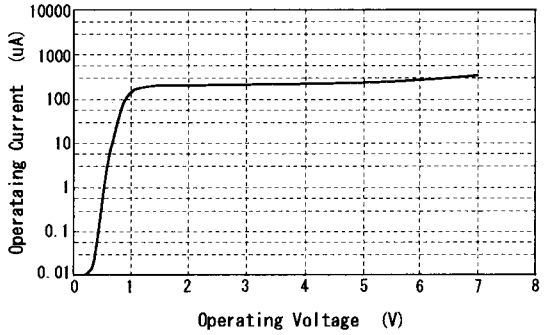


Output Voltage vs. Output Current (SINK)



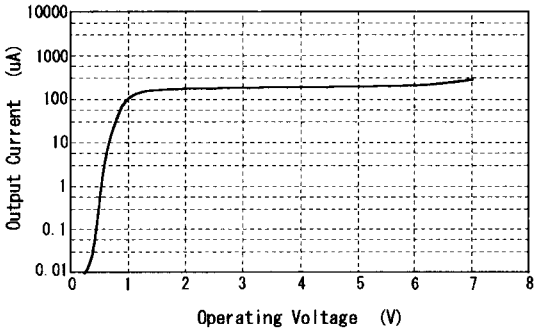
Operating Current vs. Operating Voltage

VIN=0.1V

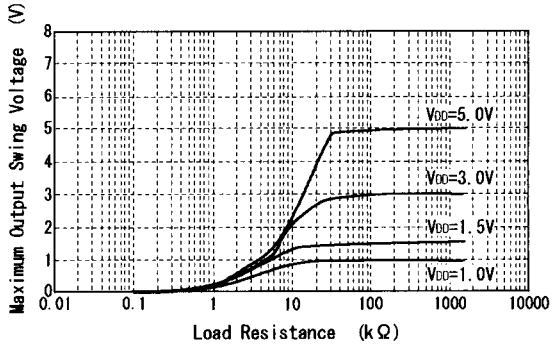


Output Current vs. Operating Voltage

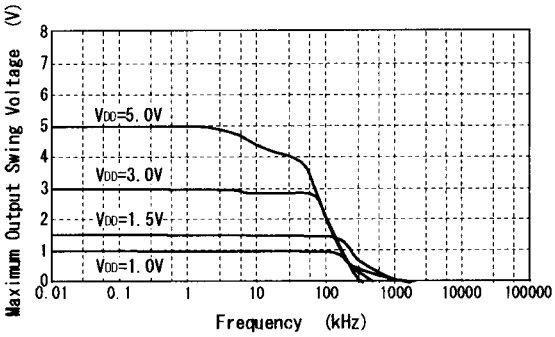
VIN=0.1V



Maximum Output Swing Voltage vs. Load Resistance

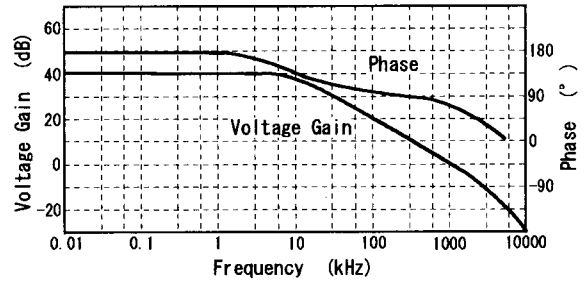


Maximum Output Swing Voltage vs. Frequency



Voltage Gain·Phase vs. Frequency

VDD=3V, Rs=1kΩ, AV=40dB



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