

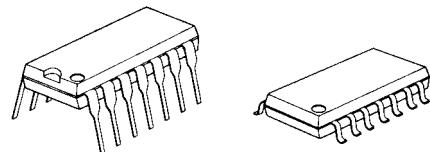
SINGLE-SUPPLY QUAD OPERATIONAL AMPLIFIER

■ GENERAL DESCRIPTION

The NJM3403A is high performance ground sensing quad operational amplifier featuring the high slew rate and no crossover distortion.

The NJM3403A is improved version of the NJM2902.

■ PACKAGE OUTLINE



NJM3403AD

NJM3403AM

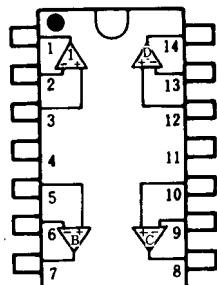


NJM3403AV

■ FEATURES

- Single Supply
- Operating Voltage (+4V~+36V)
- Low Operating Current (3mA typ.)
- Slew Rate (1.2V/ μ s typ.)
- Package Outline DIP14,DMP14,SSOP14
- Bipolar Technology

■ PIN CONFIGURATION

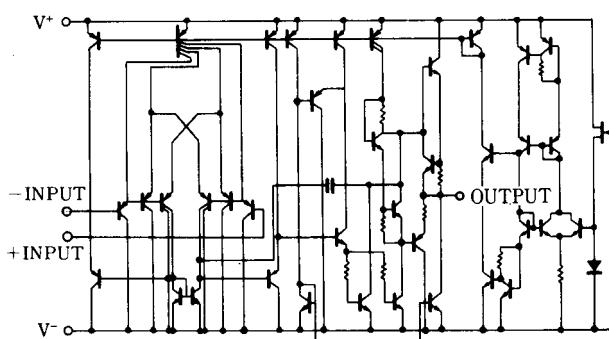


NJM3403AD
NJM3403AM
NJM3403AV

PIN FUNCTION

1.A OUTPUT	8.C OUTPUT
2.A -INPUT	9.C -INPUT
3.A +INPUT	10.C +INPUT
4.V ⁺	11.V
5.B +INPUT	12.D +INPUT
6.B -INPUT	13.D -INPUT
7.B OUTPUT	14.D OUTPUT

■ EQUIVALENT CIRCUIT (1/4 Shown)



NJM3403A

■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V ⁺ (V ⁺ /V)	36 (or ± 18)	V
Differential Input Voltage	V _{ID}	36	V
Input Voltage	V _{IC}	-0.3~+36	V
Power Dissipation	P _D	(DIP14) 500 (DMP14) 300 (SSOP14) 300	mW
Operating Temperature Range	T _{opr}	-40~+85	°C
Storage Temperature Range	T _{stg}	-40~+125	°C

■ ELECTRICAL CHARACTERISTICS

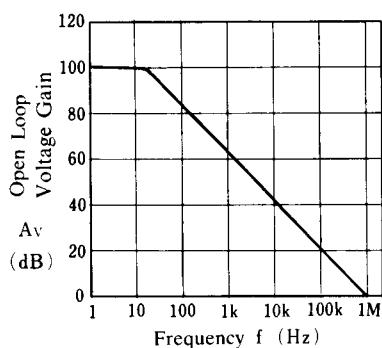
(Ta=25°C, V⁺/V=±15V)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V _{IO}	R _S =0Ω	-	2	5	mV
Input Offset Current	I _{IO}		-	5	50	nA
Input Bias Current	I _B		-	70	200	nA
Large Signal Voltage Gain	A _V	R _L >2kΩ	88	100	-	dB
Maximum Output Voltage Swing	V _{OM}	R _L =2kΩ	± 13	± 14	-	V
Input Common Mode Voltage Range	V _{ICM}		-15~+13	-	-	V
Common Mode Rejection Ratio	CMR	DC	70	90	-	dB
Supply Voltage Rejection Ratio	SVR		80	94	-	dB
Output Source Current	I _{SOURCE}	V _{IN} ⁺ =1V, V _{IN} ⁻ =0V	20	30	-	mA
Output Sink Current	I _{SINK}	V _{IN} ⁺ =0V, V _{IN} ⁻ =1V	10	20	-	mA
Channel Separation	CS	f=1k~20kHz Input Referred	-	120	-	dB
Operating Current	I _{CC}	R _L =∞	-	3	5	mA
Slew Rate	SR		-	1.2	-	V/us
Unity Gain Bandwidth	f _T		-	1.2	-	MHz
Total Harmonic Distortion	THD	f=20kHz, V _O =10V _{PP}	-	1	-	%

■ TYPICAL CHARACTERISTICS

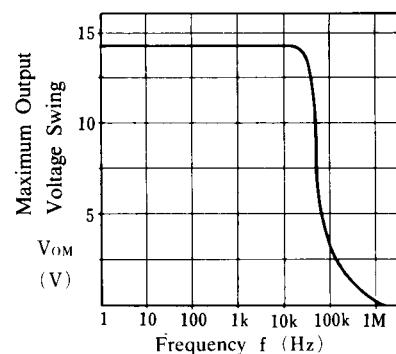
Open Loop Voltage Gain vs. Frequency

($V^+/V^- = \pm 15V$, $R_L = 2k\Omega$, $T_a = 25^\circ C$)



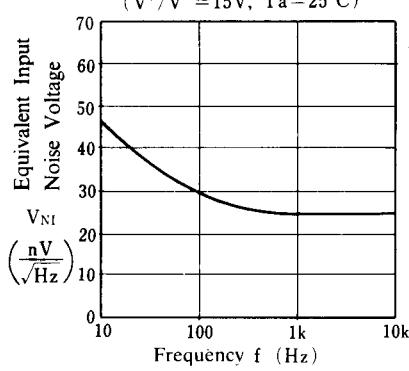
Maximum Output Voltage Swing vs. Frequency

($V^+/V^- = \pm 15V$, $R_L = 2k\Omega$, $T_a = 25^\circ C$)



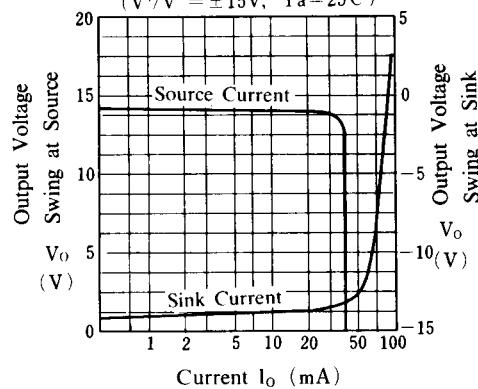
Equivalent Input Noise Voltage vs. Frequency

($V^+/V^- = 15V$, $T_a = 25^\circ C$)



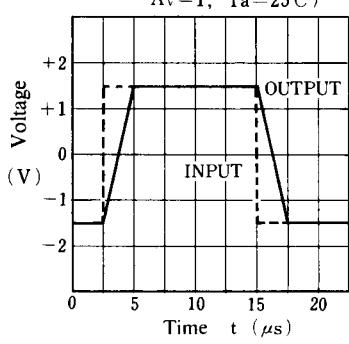
Output Source Current Output Sink Current vs. Output Voltage Swing

($V^+/V^- = \pm 15V$, $T_a = 25^\circ C$)



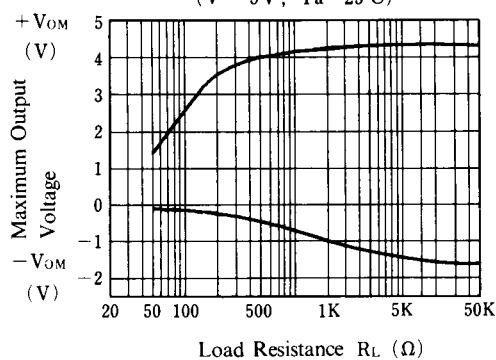
Square Wave Response

($V^+/V^- = \pm 15V$, $R_L = 2k\Omega$, $A_v = 1$, $T_a = 25^\circ C$)



Maximum Output Voltage vs. Load Resistance

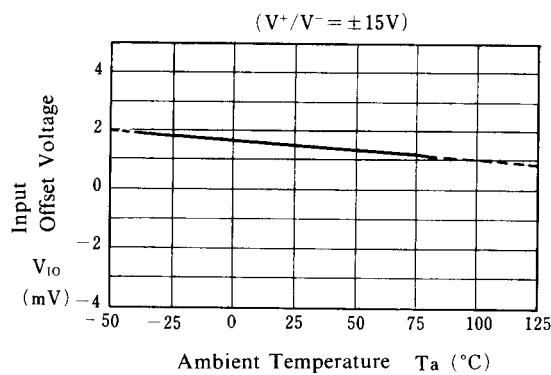
($V^+ = 5V$, $T_a = 25^\circ C$)



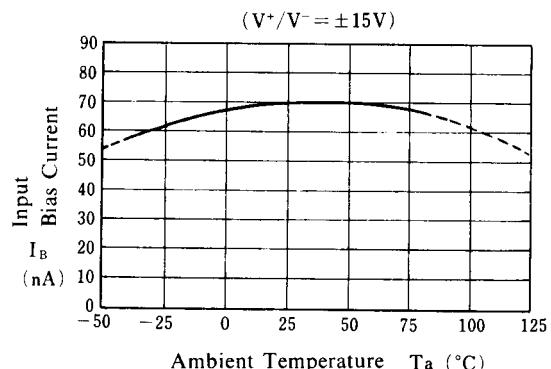
NJM3403A

■ TYPICAL CHARACTERISTICS

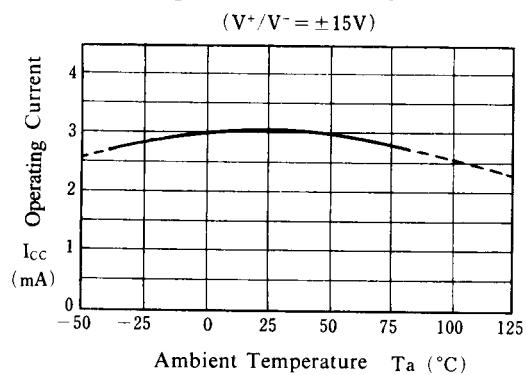
Input offset Voltage vs. Temperature



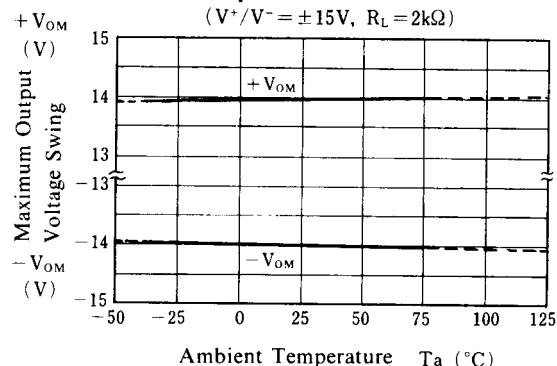
Input Bias Current vs. Temperature



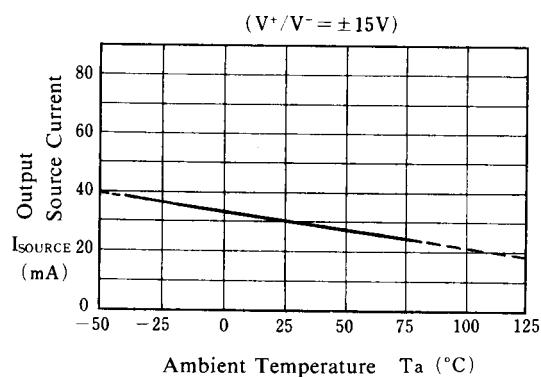
Operating Current vs. Temperature



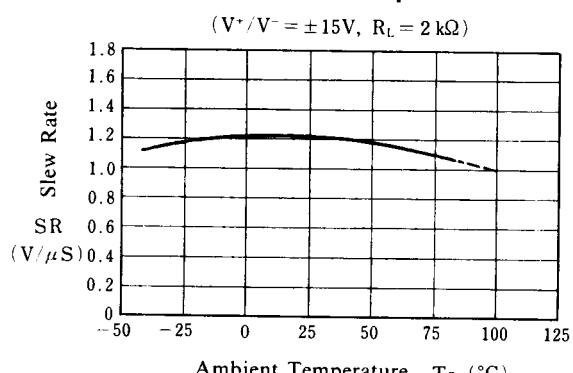
Maximum Output Voltage Swing vs. Temperature



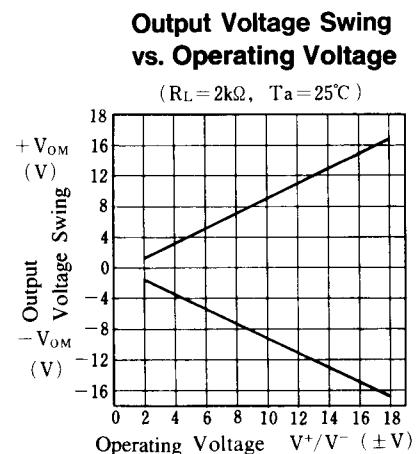
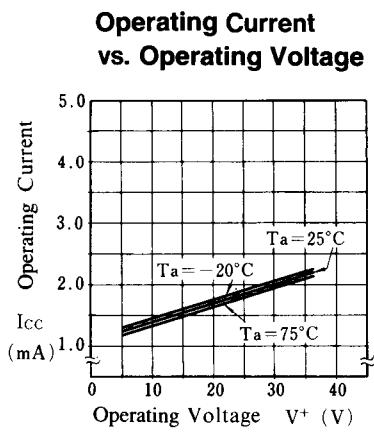
Output Source Current vs. Temperature



Slew Rate vs. Temperature

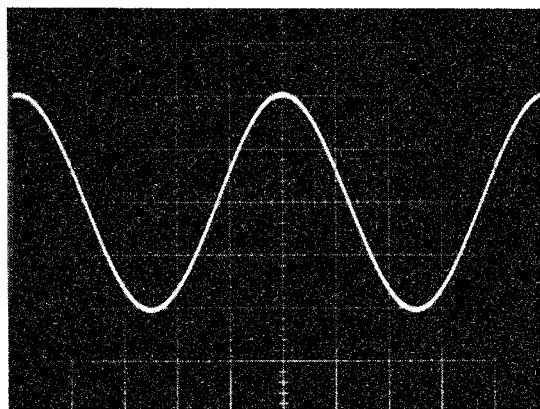


■ TYPICAL CHARACTERISTICS

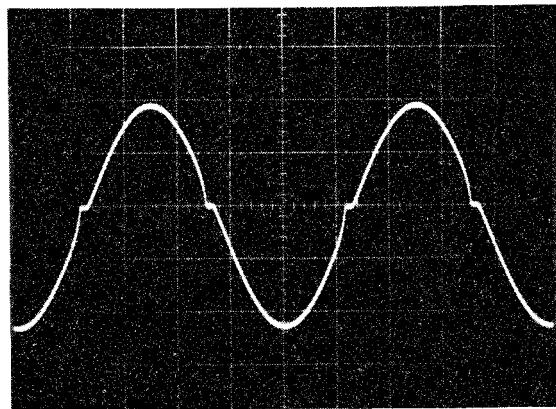


■ Crossover Distortion

Photos (1) and (2) show the output waveforms of NJM3403A and operational amplifier having crossover distortion. The NJM3403A eliminates the crossover distortion through the A,B class output stage as shown in the photo. NJM3403A IC has realized a wide band and a high slew rate in addition to the low distortion.



(1) NJM3403A Output Waveform



(2) Crossover Distortion Example

f = 1kHz, R_L = 2kΩ, Vertical Axis: 2V/div

[CAUTION]
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