



## SINGLE-SUPPLY DUAL OPERATIONAL AMPLIFIER

### ■ GENERAL DESCRIPTION

The NJM3404A is high performance single supply dual operational amplifier. The NJM3404A is a half type of the NJM3403A, quad operational amplifier.

The NJM3404A is improved version of the NJM2904 on slew rate & cross-over distortion.

### ■ FEATURES

- Single Supply
- Operating Voltage (+4V~+36V)
- Low Operating Current (2.0mA typ.)
- Slew Rate (1.2V/μs typ.)
- Package Outline DIP8, DMP8, SIP8, SSOP8
- Bipolar Technology

### ■ PACKAGE OUTLINE



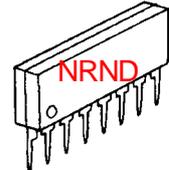
NJM3404AD



NJM3404AM

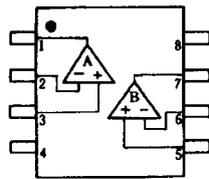


NJM3404AV

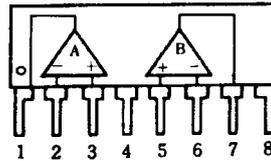


NJM3404AL

### ■ PIN CONFIGURATION



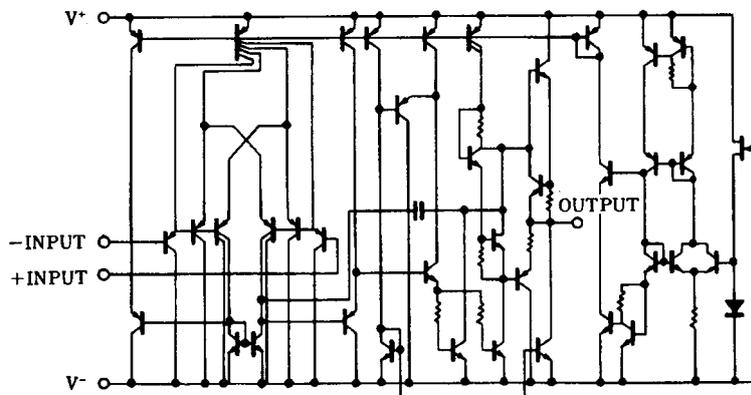
NJM3404AD  
NJM3404AM  
NJM3404AV



NJM3404AL

- PIN FUNCTION**
- 1.A OUTPUT
  - 2.A -INPUT
  - 3.A +INPUT
  - 4.V<sup>-</sup>
  - 5.B +INPUT
  - 6.B -INPUT
  - 7.B OUTPUT
  - 8.V<sup>+</sup>

### ■ EQUIVALENT CIRCUIT (1/2 Shown)



## ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sup>+</sup> (V <sup>+</sup> /V <sup>-</sup> )	36V ( or ±18 )	V
Differential Input Voltage	V <sub>ID</sub>	36	V
Input Voltage	V <sub>IC</sub>	-0.3~36	V
Power Dissipation	P <sub>D</sub>	( DIP8 ) 500 ( DMP8 ) 300 ( SSOP8 ) 250 ( SIP8 ) 800	mW
Operating Temperature Range	T <sub>opr</sub>	-40~+85	°C
Storage Temperature Range	T <sub>stg</sub>	-40~+125	°C

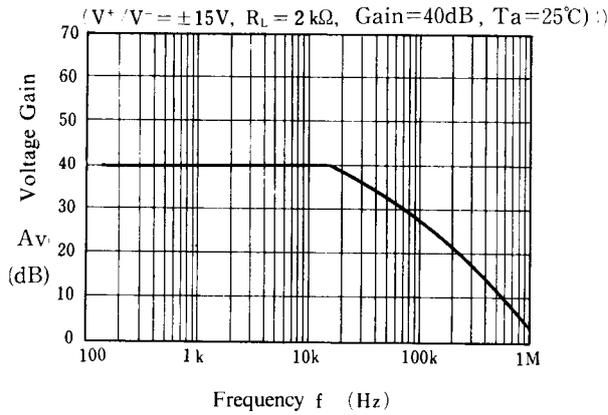
## ■ ELECTRICAL CHARACTERISTICS

(Ta=25°C, V<sup>+</sup>/V<sup>-</sup>=±15V)

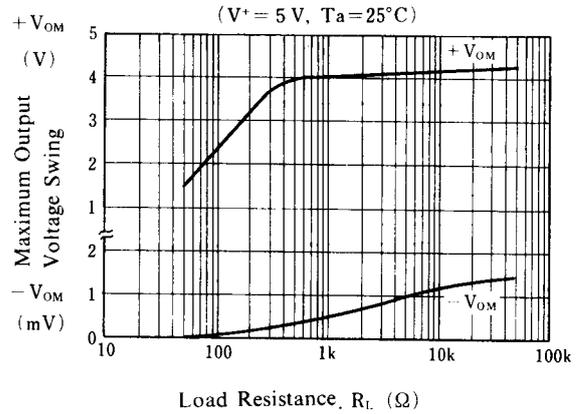
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V <sub>IO</sub>	R <sub>S</sub> =0Ω	-	2	5	mV
Input Offset Current	I <sub>IO</sub>		-	5	50	nA
Input Bias Current	I <sub>B</sub>		-	70	200	nA
Large Signal Voltage Gain	A <sub>V</sub>	R <sub>L</sub> >2kΩ	88	100	-	dB
Maximum Output Voltage Swing	V <sub>OM</sub>	R <sub>L</sub> =2kΩ	± 13	± 14	-	V
Input Common Mode Voltage Range	V <sub>ICM</sub>		-15~+13	-	-	V
Common Mode Rejection Ratio	CMR	DC	70	90	-	dB
Supply Voltage Rejection Ratio	SVR		80	94	-	dB
Operating Current	I <sub>CC</sub>	R <sub>L</sub> =∞	-	2.0	3.5	mA
Output Source Current	I <sub>SOURCE</sub>	V <sub>IN</sub> <sup>+</sup> =1V, V <sub>IN</sub> <sup>-</sup> =0V	20	30	-	mA
Output Sink Current	I <sub>SINK</sub>	V <sub>IN</sub> <sup>+</sup> =0V, V <sub>IN</sub> <sup>-</sup> =1V	10	20	-	mA
Slew Rate	SR		-	1.2	-	V/μs
Unity Gain Bandwidth	f <sub>T</sub>	-	-	1.2	-	MHz

■ TYPICAL CHARACTERISTICS

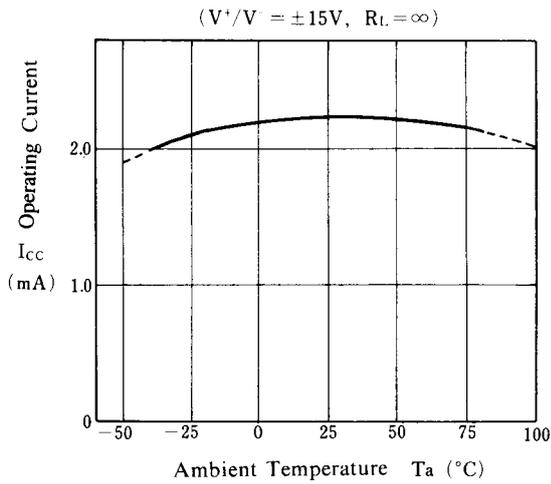
Voltage Gain vs. Frequency



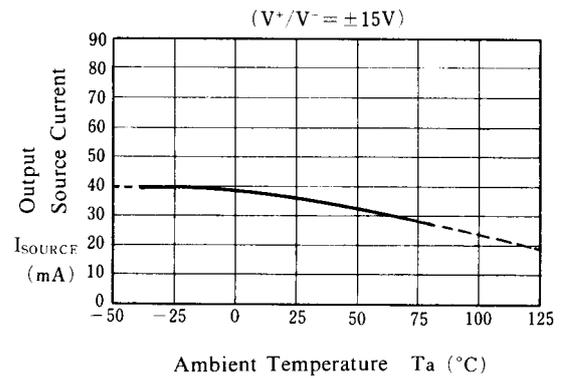
Maximum Output Voltage Swing vs. Load Resistance



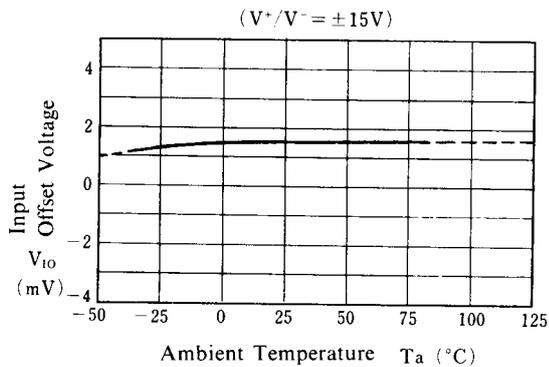
Operating Current vs. Temperature



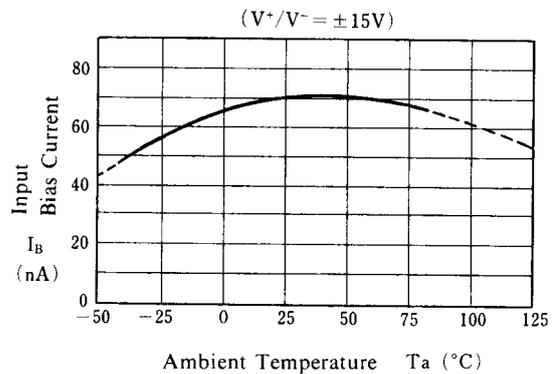
Output Source Current vs. Temperature



Input Offset Voltage vs. Temperature

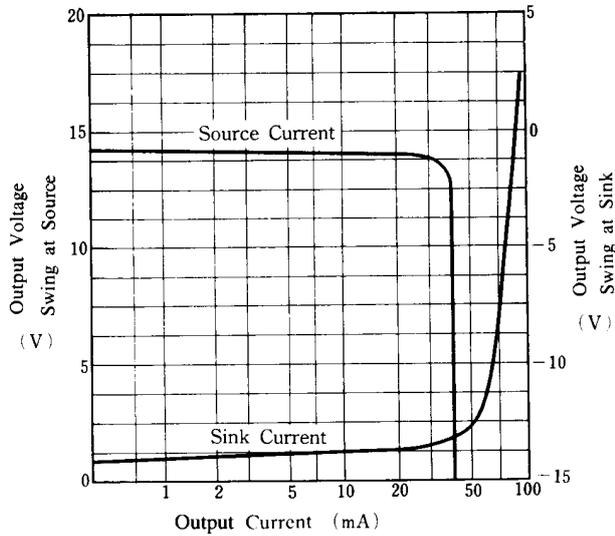


Input Bias Current vs. Temperature

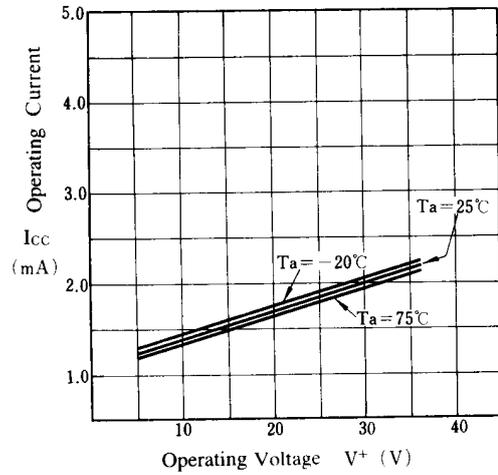


■ TYPICAL CHARACTERISTICS

Output Source Current  
Output Sink Current  
vs. Output Voltage Swing  
( $V^+/V^- = \pm 15V$ ,  $T_a = 25^\circ C$ )

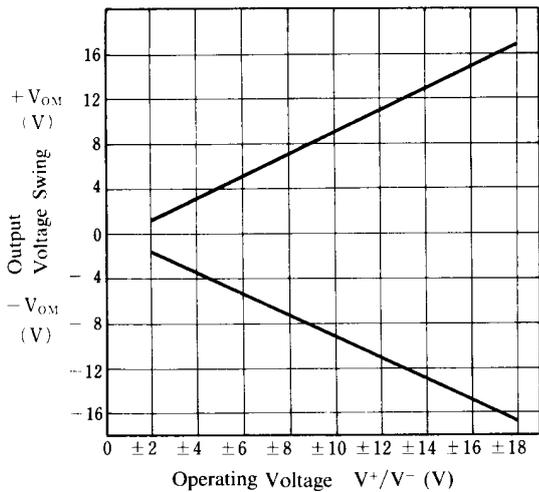


Operating Current  
vs. Operating Voltage



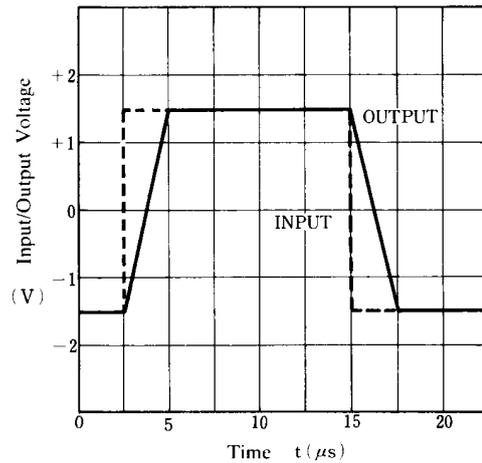
Output Voltage Swing vs. Operating Voltage

( $R_L = 2k\Omega$ ,  $T_a = 25^\circ C$ )



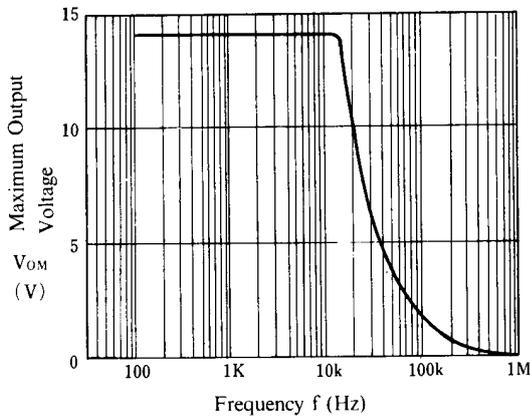
Pulse Response

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



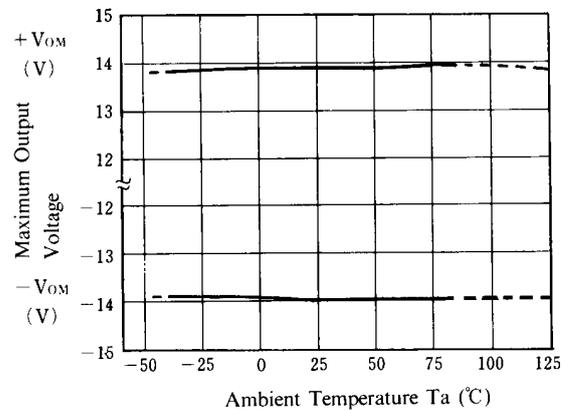
Maximum Output Voltage vs. Frequency

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



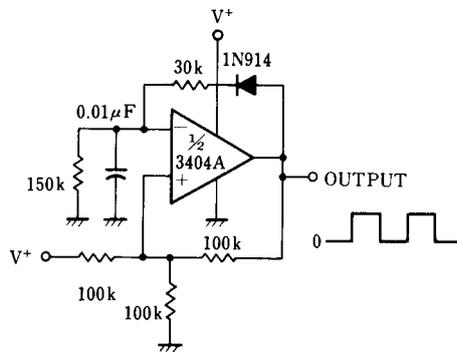
Maximum Output Voltage vs. Temperature

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

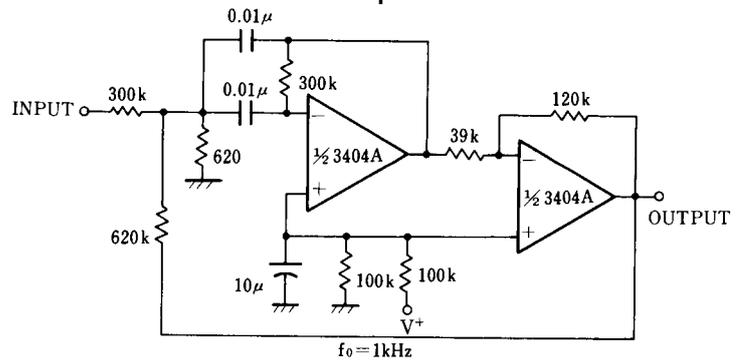


## ■ TYPICAL APPLICATIONS

Square Wave Oscillator



Bandpass Filter



**[CAUTION]**

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