

## SINGLE-SUPPLY DUAL OPERATIONAL AMPLIFIER

### ■ GENERAL DESCRIPTION

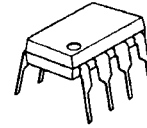
The NJM3404A is high performance single supply dual operational amplifier. The NJM3404A is a half type of the NJM3403A, quad operational amplifier.

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



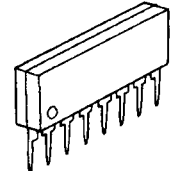
NJM3404AD



NJM3404AM

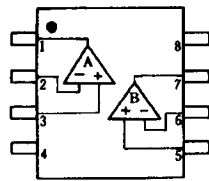


NJM3404AV

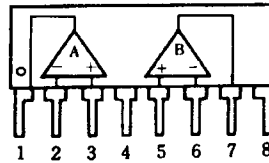


NJM3404AL

### ■ PIN CONFIGURATION



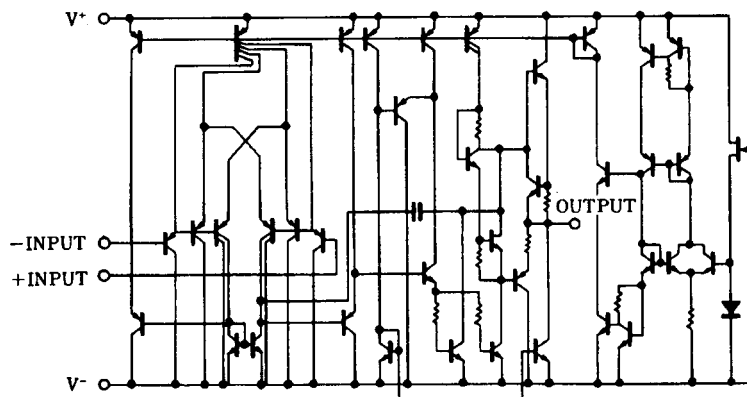
NJM3404AD  
NJM3404AM  
NJM3404AV



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 )



# NJM3404A

## ■ ABSOLUTE MAXIMUM RATINGS

( Ta=25°C )

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V^+(V^-/V)$	36V ( or $\pm 18$ )	V
Differential Input Voltage	$V_{ID}$	36	V
Input Voltage	$V_{IC}$	-0.3~36	V
Power Dissipation	$P_D$	( DIP8 ) 500 ( DMP8 ) 300 ( SSOP8 ) 250 ( SIP8 ) 800	mW
Operating Temperature Range	$T_{opr}$	-40~+85	°C
Storage Temperature Range	$T_{stg}$	-40~+125	°C

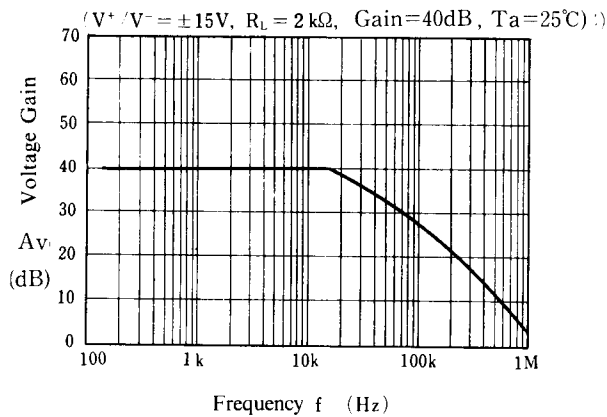
## ■ ELECTRICAL CHARACTERISTICS

( Ta=25°C,  $V^+/V^- = \pm 15V$  )

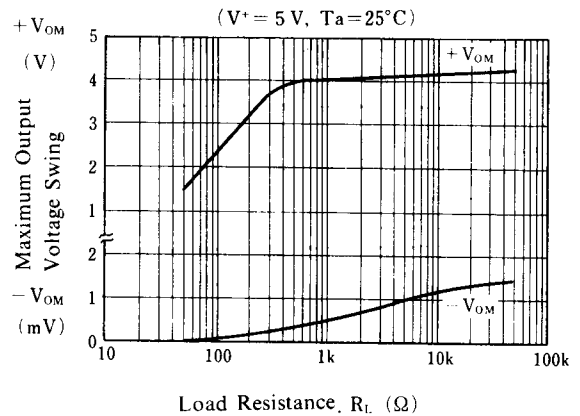
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	$V_{IO}$	$R_S=0\Omega$	-	2	5	mV
Input Offset Current	$I_{IO}$		-	5	50	nA
Input Bias Current	$I_B$		-	70	200	nA
Large Signal Voltage Gain	$A_V$	$R_L > 2k\Omega$	88	100	-	dB
Maximum Output Voltage Swing	$V_{OM}$	$R_L = 2k\Omega$	$\pm 13$	$\pm 14$	-	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
Operating Current	$I_{CC}$	$R_L = \infty$	-	2.0	3.5	mA
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
Slew Rate	SR		-	1.2	-	V/ $\mu s$
Unity Gain Bandwidth	$f_T$	-	-	1.2	-	MHz

## ■ TYPICAL CHARACTERISTICS

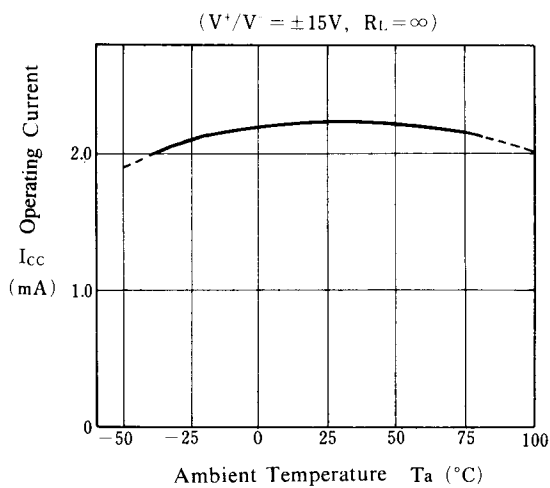
### Voltage Gain vs. Frequency



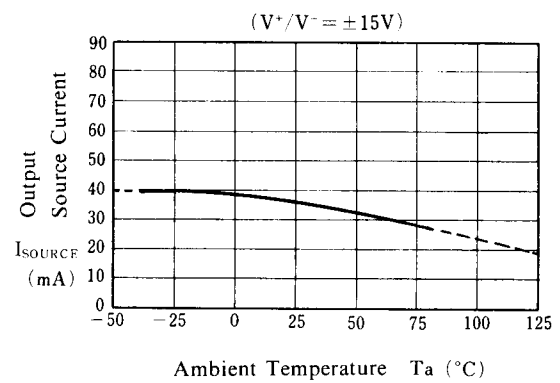
### Maximum Output Voltage Swing vs. Load Resistance



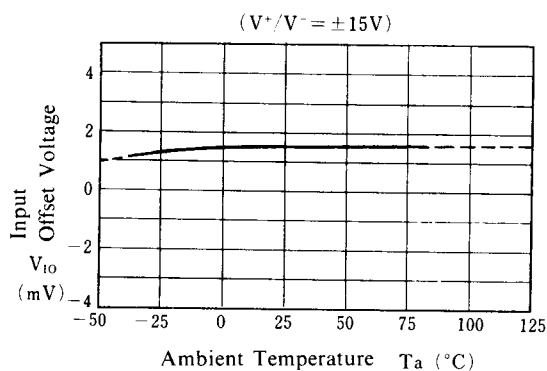
### Operating Current vs. Temperature



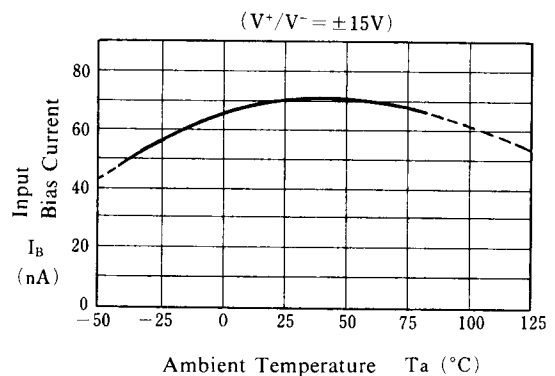
### Output Source Current vs. Temperature



### Input Offset Voltage vs. Temperature



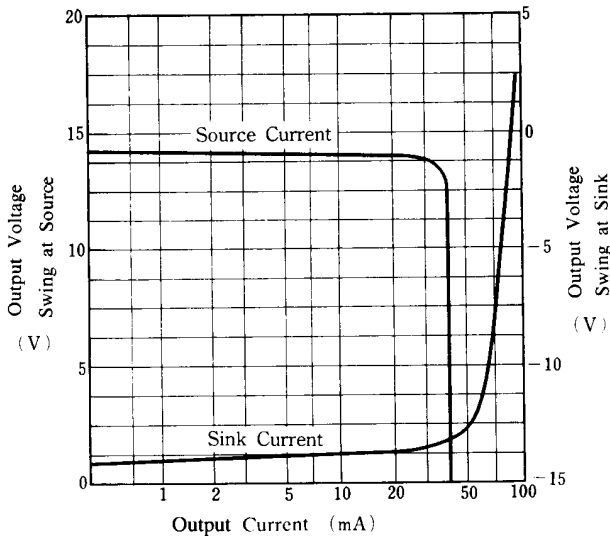
### Input Bias Current vs. Temperature



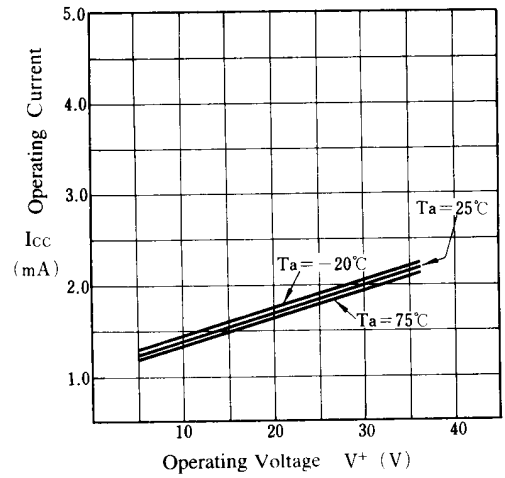
# NJM3404A

## ■ TYPICAL CHARACTERISTICS

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

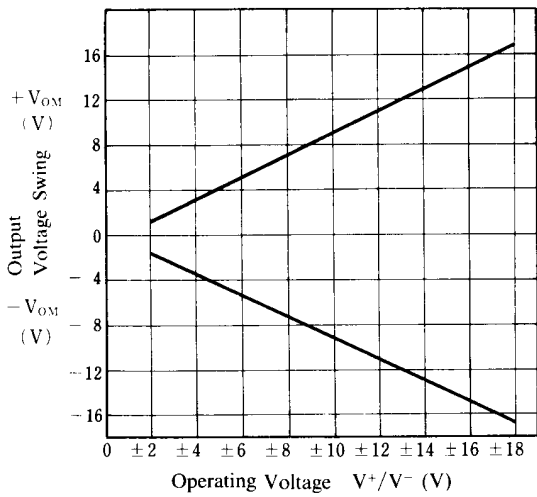


**Operating Current  
vs. Operating Voltage**



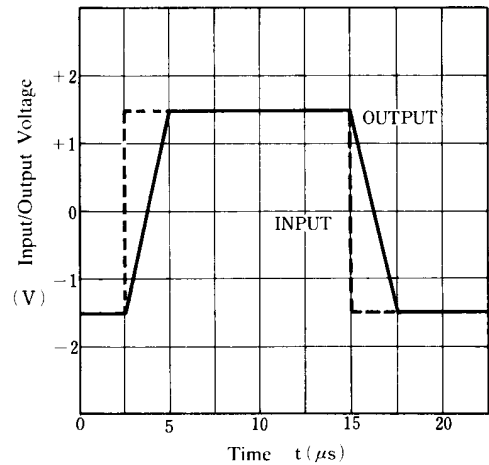
**Output Voltage Swing vs. Operating Voltage**

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



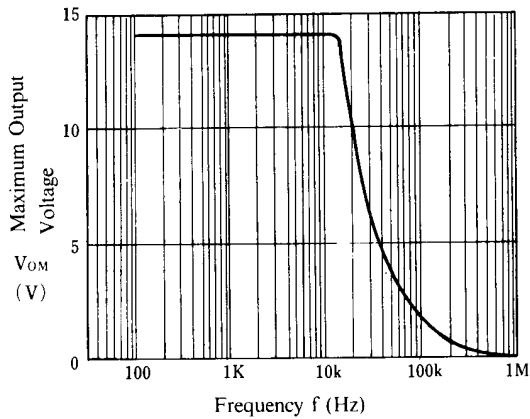
**Pulse Response**

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



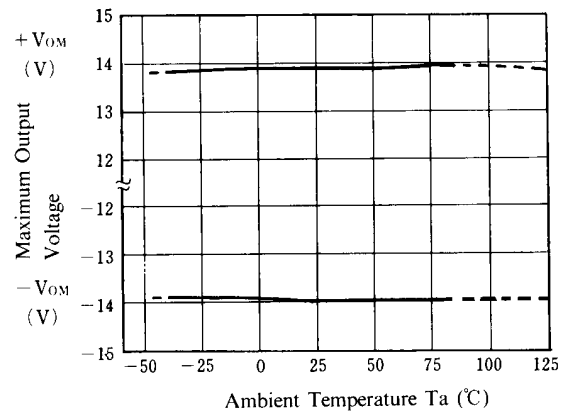
**Maximum Output Voltage vs. Frequency**

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



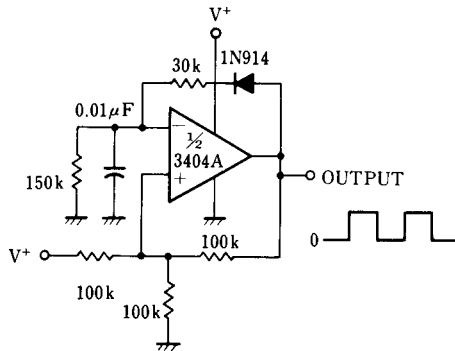
**Maximum Output Voltage vs. Temperature**

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

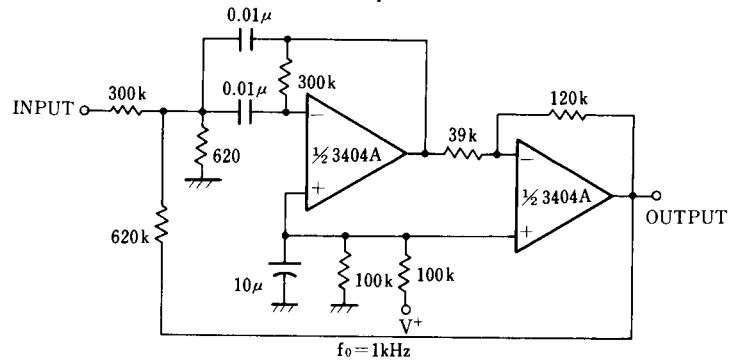


## ■ TYPICAL APPLICATIONS

### Square Wave Oscillator



### Bandpass Filter



**[CAUTION]**

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