

SINGLE-SUPPLY QUAD OPERATIONAL AMPLIFIER

■ GENERAL DESCRIPTION

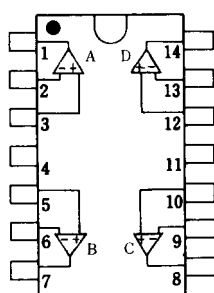
The NJM324 consists of four independent, high gain, internally frequency compensated operational amplifiers which were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

Application areas include transducer amplifiers, DC gain blocks and all the conventional op amp circuits which now can be more easily implemented in single power supply systems. For example, the NJM324 can be directly operated off of the standard $+5V_{DC}$ power supply voltage which is used in digital systems and will easily provide the required interface electronics without requiring the additional $\pm 15V_{DC}$ power supplies.

■ FEATURES

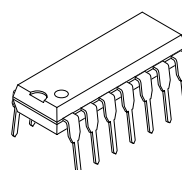
- Single Supply Operation
- Operating Voltage ($+3V \sim +32V$)
- Low Operating Current ($0.7mA$ typ.)
- Package Outline DIP14,DMP14,SSOP14
- Bipolar Technology

■ PIN CONFIGURATION

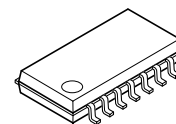


NJM324D
NJM324M
NJM324V

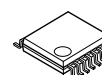
■ PACKAGE OUTLINE



NJM324D



NJM324M

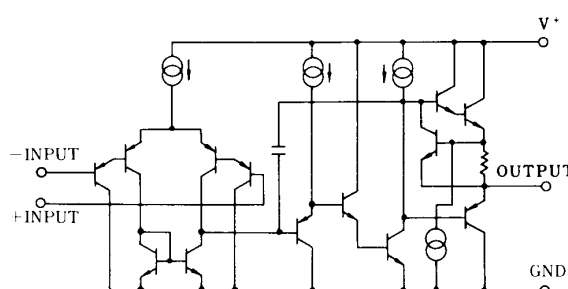


NJM324V

PIN FUNCTION

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

■ EQUIVALENT CIRCUIT (1/4 Shown)



■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+/V^-	32 (or ± 16)	V
Differential Input Voltage	V_{ID}	32	V
Input Voltage	V_{IC}	-0.3~+32 (note)	V
Power Dissipation	P_D	(DIP14) 570 (DMP14) 300 (SSOP14) 300	mW
Operating Temperature Range	T_{opr}	-40~+85	°C
Storage Temperature Range	T_{stg}	-40~+125	°C

(note) For supply voltage less than 32V, the absolute maximum input voltage is equal to the supply voltage.

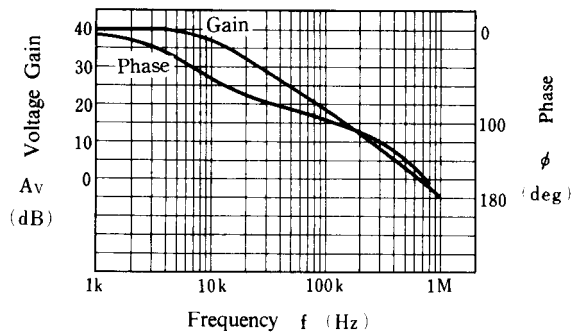
■ ELECTRICAL CHARACTERISTICS

(Ta=+25°C, $V^+=5V$)

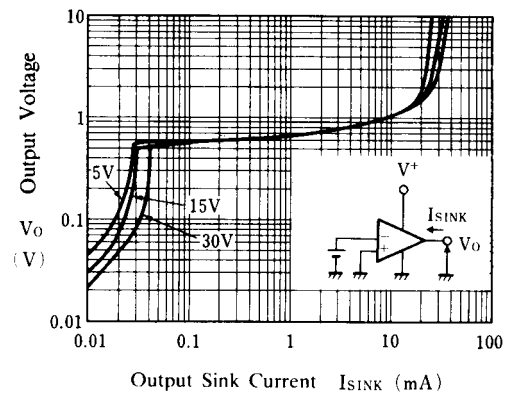
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V_{IO}	$R_S=0\Omega, V^+=5\sim 30V_{DC}$	-	2	7	mV
Input Offset Current	I_{IO}		-	5	50	nA
Input Bias Current	I_B		-	20	250	nA
Input Common Mode Voltage Range	V_{ICM}		0~3.5	-	-	V
Operating Current	I_{CC}	$R_L=\infty$	-	0.7	1.2	mA
Large-signal Voltage Gain	A_V	$R_L \geq 2k\Omega, V^+=15V$	88	100	-	dB
Maximum Peak-to-peak Output Voltage Swing	V_{OPP}	$R_L=2k\Omega$	3.5	-	-	V
Common Mode Rejection Ratio	CMR	DC	65	70	-	dB
Supply Voltage Rejection Ratio	SVR	DC	65	100	-	dB
Output Source Current	I_{SOURCE}	$V_{IN}^+/V_{IN}^-=1/0V, V^+=15V$	20	40	-	mA
Output Sink Current 1	I_{SINK1}	$V_{IN}^+/V_{IN}^-=0/1V, V^+=15V$	10	20	-	mA
Output Sink Current 2	I_{SINK2}	$V_{IN}^+/V_{IN}^-=0/1V, V_o=200mV$	12	20	-	μA
Channel Separation	CS	$f=1kHz\sim 20kHz$, Input Referred	-	120	-	dB

■ TYPICAL CHARACTERISTICS

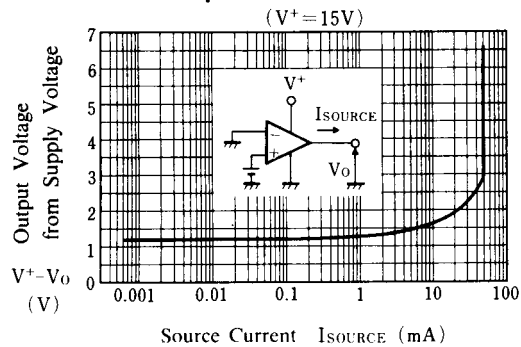
Voltage Gain, Phase vs. Frequency



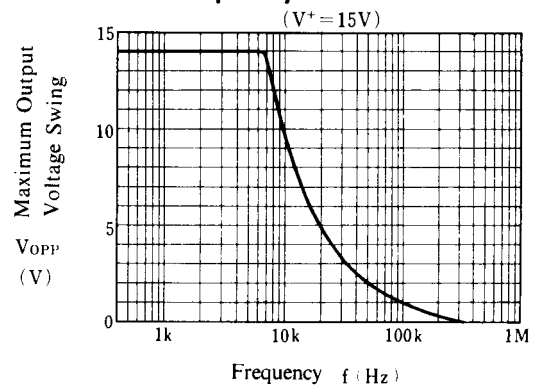
Output Sink Current



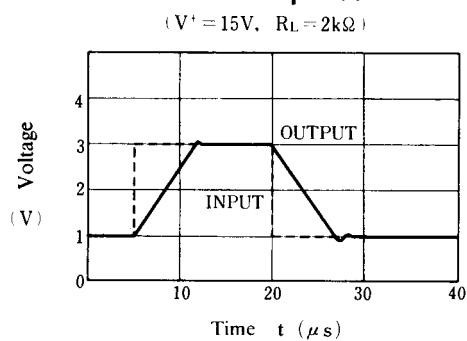
Output Source Current



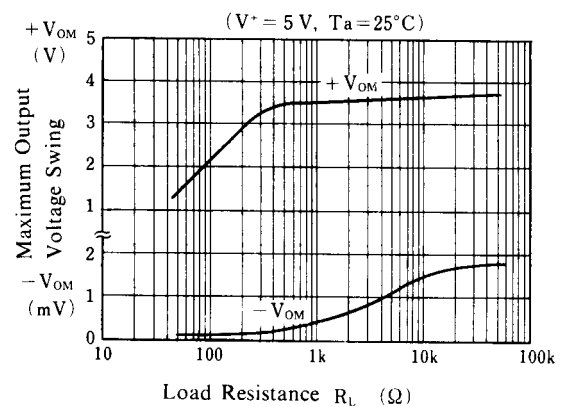
Maximum Output Voltage Swing vs. Frequency



Pulse Response

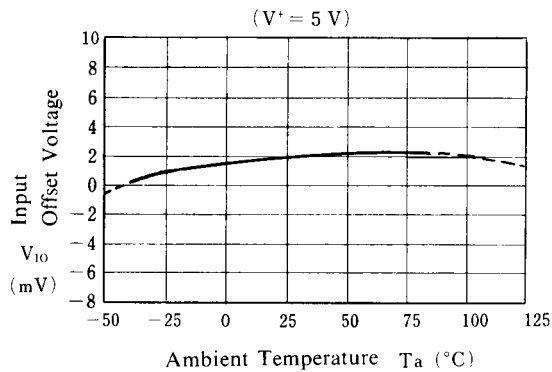


Maximum Output Voltage Swing vs. Load Resistance

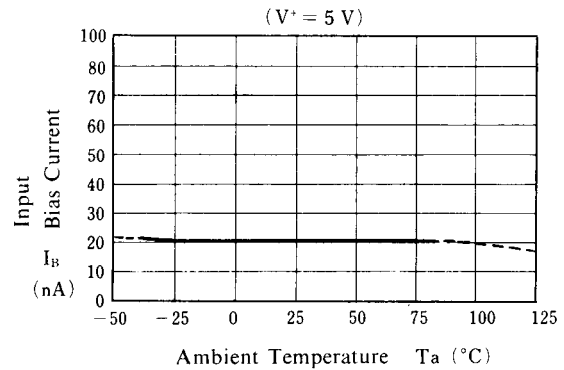


■ TYPICAL CHARACTERISTICS

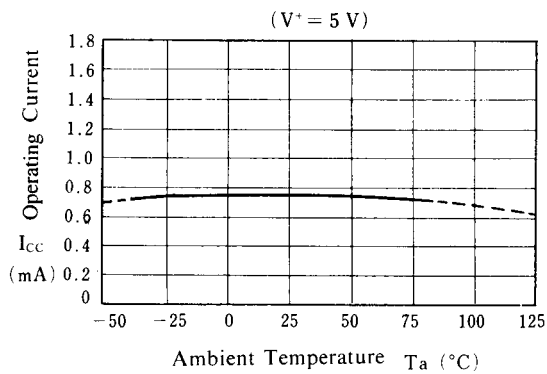
Input Offset Voltage vs. Temperature



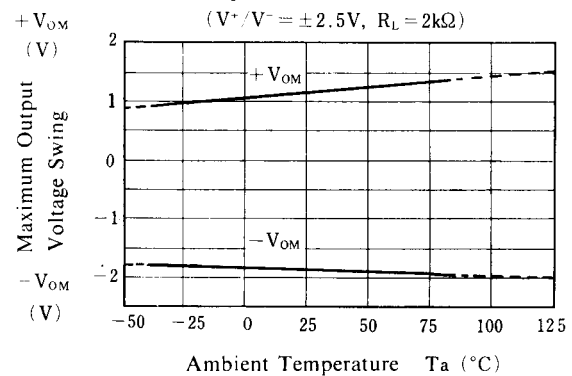
Input Bias Current vs. Temperature



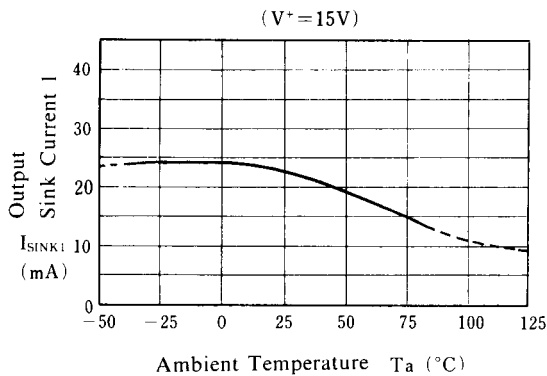
Operating Current vs. Temperature



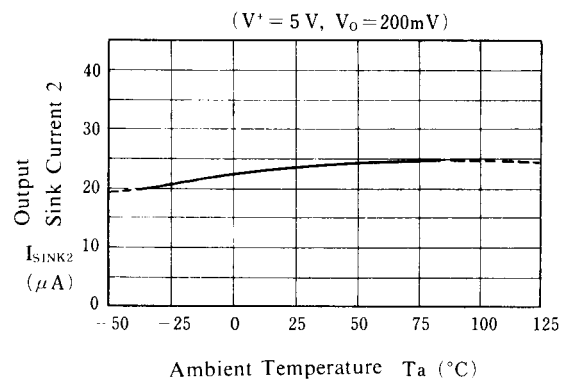
Maximum Output Voltage Swing vs. Temperature



Output Sink Current 1 vs. Temperature

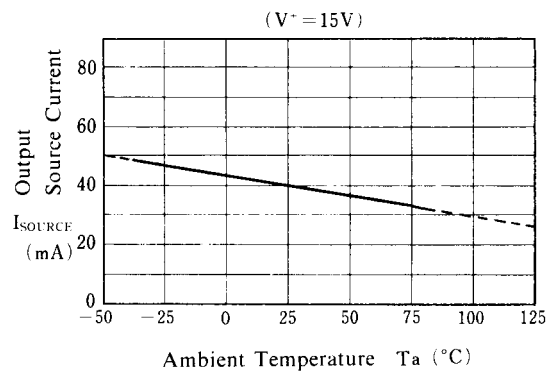


Output Sink Current 2 vs. Temperature

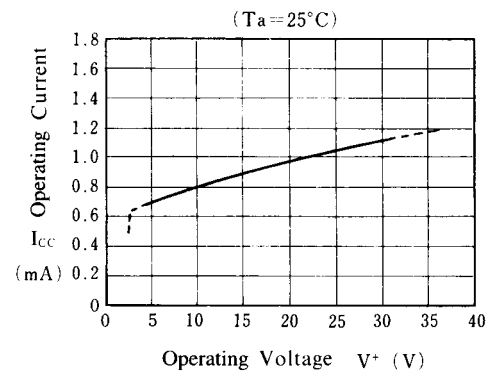


■ TYPICAL CHARACTERISTICS

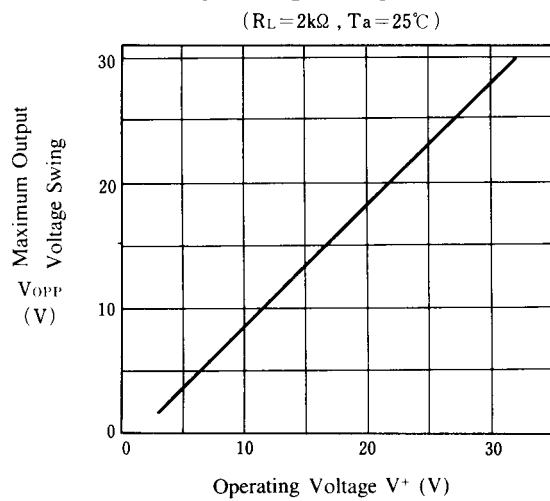
Output Source Current vs. Temperature



Operating Current vs. Operating Voltage



Maximum Output Voltage Swing vs. Operating Voltage



[CAUTION]

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