

LOW-NOISE DUAL OPERATIONAL AMPLIFIER

■ GENERAL DESCRIPTION

The NJM2068 is a high performance, low noise dual operational amplifier. This amplifier features popular pin-out, superior noise performance, and superior total harmonic distortion. This amplifier also features guaranteed noise performance with substantially higher gain-bandwidth product and slew rate, which far exceeds that of the 4558 type amplifier.

The specially designed low noise input transistors allow the NJM2068 to be used in very low noise signal processing applications such as audio preamplifiers and servo error amplifier.

The D-Rank type products (NJM2068DD/LD/MD) have specified maximum limits for equivalent input noise voltage.

■ PACKAGE OUTLINE



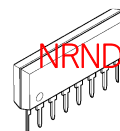
NJM2068D
(DIP8)



NJM2068M
(DMP8)



NJM2068V
(SSOP8)

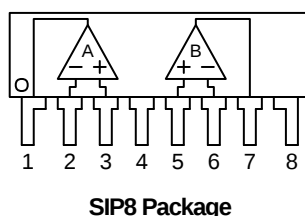
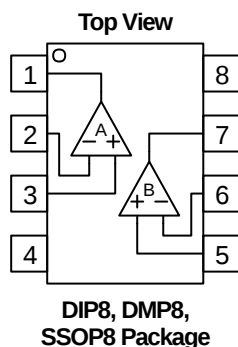


NJM2068L
(SIP8)

■ FEATURES

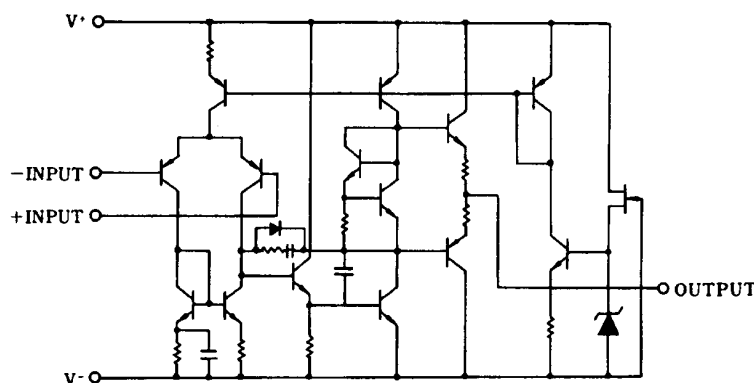
- Operating Voltage $\pm 4V \sim \pm 18V$
- Low Total Harmonic Distortion 0.001%
- Low Noise Voltage $0.56\mu V$ (FLAT+JISA)
- High Slew Rate $6V/\mu s$
- Unity Gain Bandwidth 27MHz ($f=10kHz$)
- Bipolar Technology
- Package Outline DIP8, DMP8, SIP8, SSOP8

■ PIN CONFIGURATION



PIN FUNCTION
 1.A OUTPUT
 2.A -INPUT
 3.A +INPUT
 4.V-
 5.B +INPUT
 6.B -INPUT
 7.B OUTPUT
 8.V+

■ EQUIVALENT CIRCUIT (1/2 Shown)



■ ABSOLUTE MAXIMUM RATINGS($T_a=25^{\circ}\text{C}$)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V^+ / V^-	± 18	V
Differential Input Voltage Range	V_{ID}	± 30	V
Common Mode Input Voltage Range	V_{IC}	± 15 (Note1)	V
Power Dissipation	P_D	DIP8: 500 DMP8: 300 SSOP8: 250 SIP8: 800	mW
Operating Temperature Range	T_{opr}	$-20 \sim +75$	$^{\circ}\text{C}$
Storage Temperature Range	T_{stg}	$-40 \sim +125$	$^{\circ}\text{C}$

(Note1) For supply voltage less than $\pm 15\text{V}$, the absolute maximum input voltage is equal to supply voltage.■ RECOMMENDED OPERATING VOLTAGE($T_a=25^{\circ}\text{C}$)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V^+ / V^-		± 4	-	± 18	V

■ ELECTRICAL CHARACTERISTICS($V^+ / V^- = \pm 15\text{V}$, $T_a=25^{\circ}\text{C}$, unless otherwise noted.)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V_{IO}	$R_S \leq 10\text{k}\Omega$	-	0.3	3	mV
Input Offset Current	I_{IO}		-	5	200	nA
Input Bias Current	I_B		-	150	1000	nA
Input Resistance	R_{IN}		50	300	-	$\text{k}\Omega$
Voltage Gain	A_V	$R_L \geq 2\text{k}\Omega$, $V_O = \pm 10\text{V}$	90	120	-	dB
Maximum Output Voltage	V_{OM}	$R_L \geq 2\text{k}\Omega$	± 12	± 13.5	-	V
Common Mode Input Voltage	V_{ICM}		± 12	± 13.5	-	V
Common Mode Rejection Ratio	CMR	$R_S \leq 10\text{k}\Omega$	80	110	-	dB
Supply Voltage Rejection Ratio	SVR	$R_S \leq 10\text{k}\Omega$	80	120	-	dB
Slew Rate	SR	$R_L \geq 2\text{k}\Omega$	-	6	-	$\text{V}/\mu\text{s}$
Gain Bandwidth Product1	GB_{1}	$f = 10\text{kHz}$	-	27	-	MHz
Gain Bandwidth Product2	GB_{2}	$f = 100\text{kHz}$	-	19	-	MHz
Unity Gain Frequency	f_T	$A_V = 1$	-	5.5	-	MHz
Total Harmonic Distortion	THD	$A_V = 20\text{dB}$, $V_O = 5\text{V}$, $R_L = 2\text{k}\Omega$, $f = 1\text{kHz}$	-	0.001	-	%
Equivalent Input Noise Voltage	V_{NI}	FLAT+JIS A, $R_S = 300\Omega$	-	0.44	0.56	μV
Supply Current	I_{CC}		-	5	8	mA

■ ELECTRICAL CHARACTERISTICS (D-Rank type(Note2), $V^+ / V^- = \pm 15\text{V}$, $T_a=25^{\circ}\text{C}$, unless otherwise noted.)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Equivalent Input Noise Voltage	V_{NI}	RIAA, $R_S = 2.2\text{k}\Omega$	-	-	1.4	μV

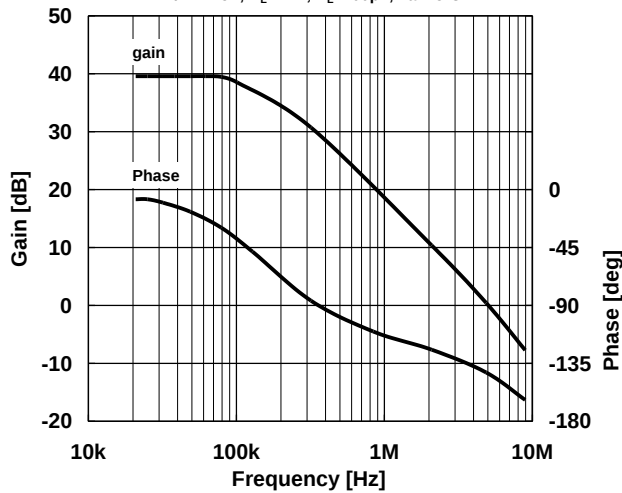
(Note2) D-rank type is a Equivalent Input Noise Voltage selected product. It is only DIP, DMP and SIP package.

■ NOTICE

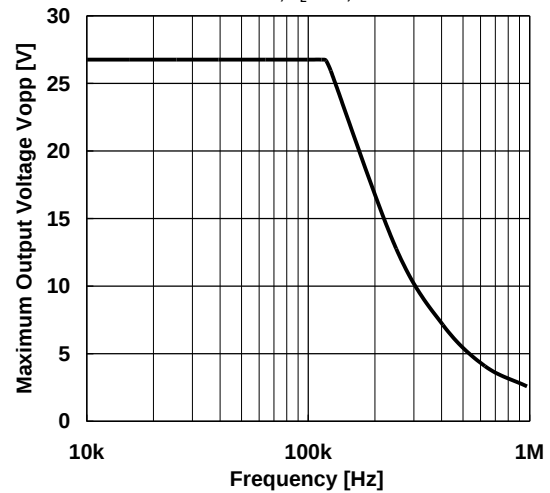
Oscillation might be caused when capacitor type load were connected. It is recommendable to insert series resistor (about 50Ω) at the output for preventing oscillation.

■ TYPICAL CHARACTERISTICS

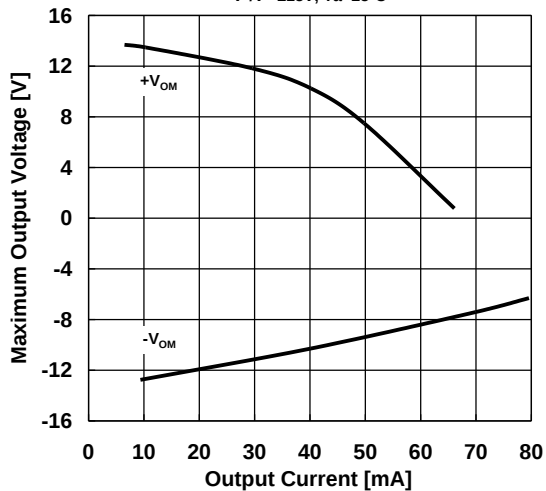
40dB Gain/Phase vs. Frequency

 $V^+/V^- = \pm 15V$, $R_L = 2k\Omega$, $C_L = 100pF$, $T_a = 25^\circ C$ 

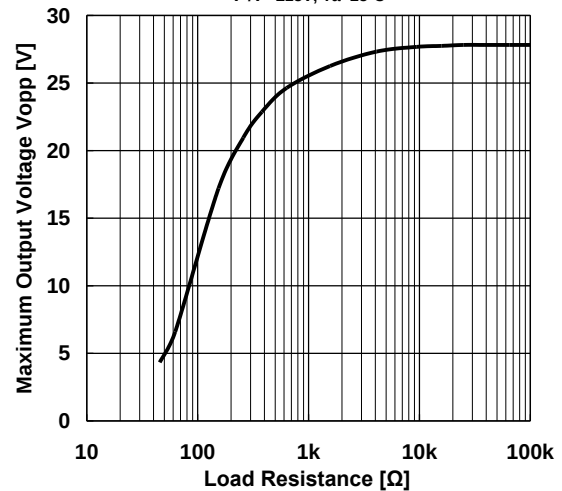
Maximum Output Voltage vs. Frequency

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

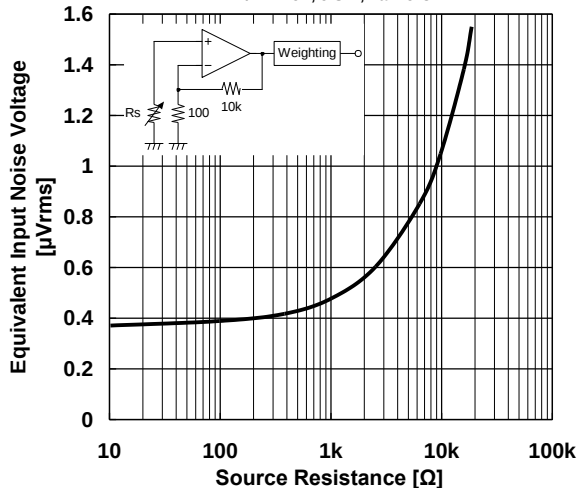
Maximum Output Voltage vs. Output Current

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

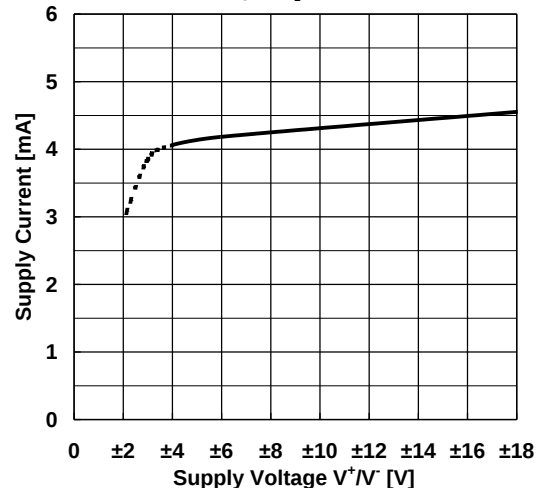
Maximum Output Voltage vs. Load Resistance

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

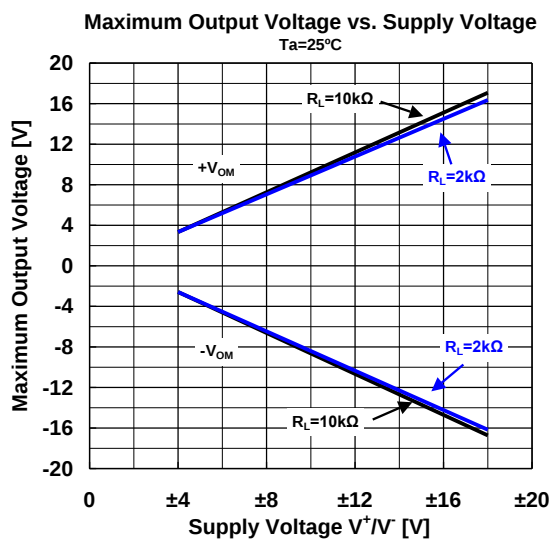
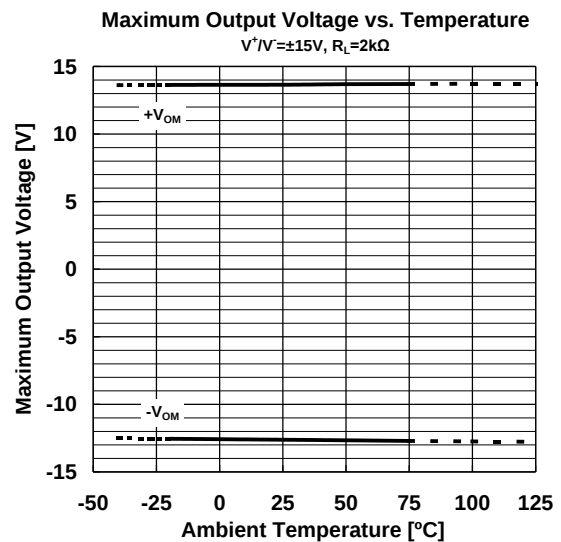
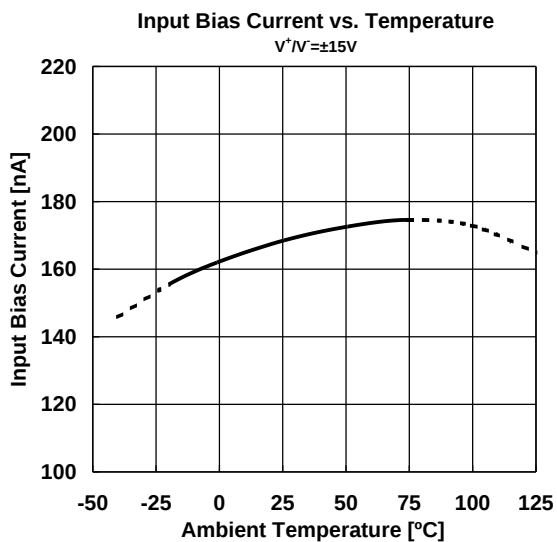
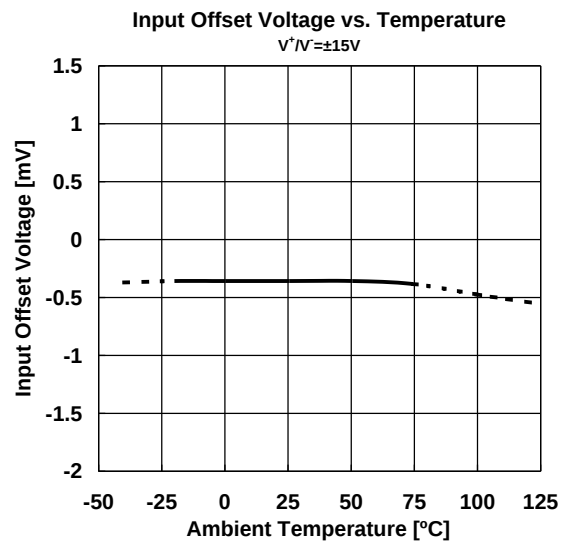
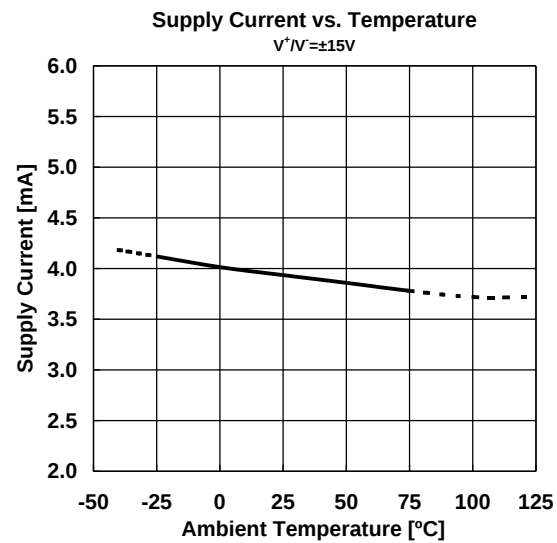
Voltage Noise vs. Source Resistance

 $V^+/V^- = \pm 15V$, JIS A, $T_a = 25^\circ C$ 

Supply Current vs. Supply Voltage

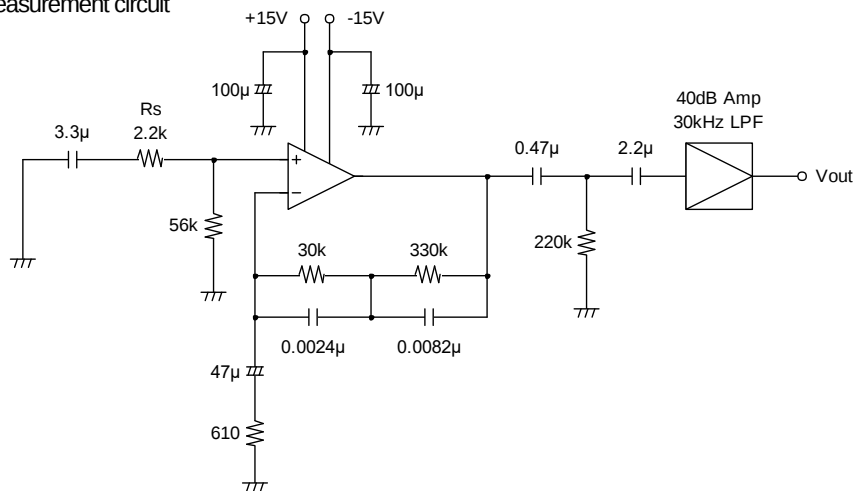
No Signal, $R_L = \infty$, $T_a = 25^\circ C$ 

■ TYPICAL CHARACTERISTICS



■ TEST CIRCUIT

Noise Voltage (RIAA) measurement circuit



[CAUTION]

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