NJM2904

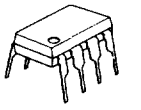
The NJM2904 consists of two independent, high gain, internally frequency compensated operation amplifiers which were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is 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 NJM2904 can be directly operated off of the standard +5V power supply voltage which is used in digital systems and will easily provide the required interface electronics without requiring the additional ±15V power supplies.

■ Absolute Maximum Ratings (Ta=25°C)

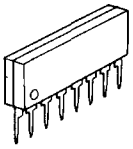
Supply Voltage	V^+ (V^+/V^-)	32V (or ±16V)
Differential Input Voltage	V_{ID}	32V
Input Voltage	V_I	−0.3~+32V
Power Dissipation	P_D (D-Type)	500mW
	(M, V-Type)	300mW
	(L-Type)	800mW
Operating Temperature Range	T_{opr}	−40~+85°C
Storage Temperature Range	T_{stg}	−50~+125°C

■ Package Outline



NJM2904D

NJM2904M
NJM2904E



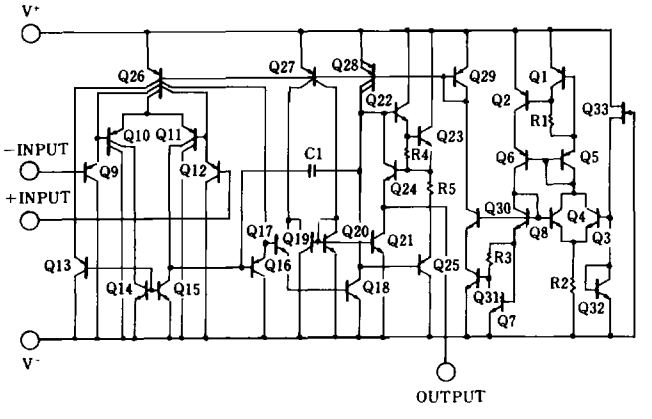
NJM2904L

NJM2904V

■ Electrical Characteristics (Ta=25°C, V^+=5V)

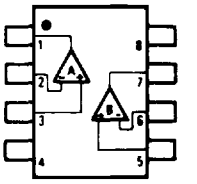
Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input Offset Voltage	V_{IO}	R_S=0Ω	—	2	7	mV
Input Offset Current	I_{IO}		—	5	50	nA
Input Bias Current	I_B		—	25	250	nA
Large Signal Voltage Gain	A_V	R_L≧2kΩ	—	100	—	dB
Maximum Output Voltage Swing	V_{OPP}	R_L=2kΩ	3.5	—	—	V
Input Common Mode Voltage Range	V_{ICM}		0~3.5	—	—	V
Common Mode Rejection Ratio	CMR		—	85	—	dB
Supply Voltage Rejection Ratio	SVR		—	100	—	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	8	20	—	mA
Channel Separation	CS	f=1k~20kHz, Input Referred	—	120	—	dB
Supply Current	I_{CC}	R_L=∞	—	0.7	1.2	mA
Slew Rate	SR		—	0.5	—	V/μs
Gain Bandwidth Product	GB		—	0.2	—	MHz

■ Equivalent Circuit (½ Shown)



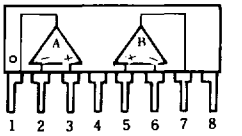
■ Connection Diagrams

D,M,V-Type
(Top View)



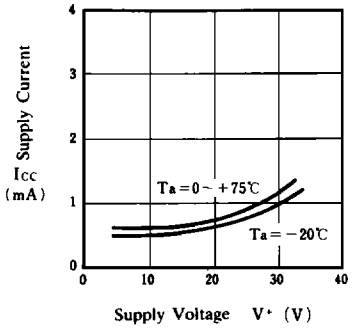
PIN FUNCTION
1. A OUTPUT
2. A−INPUT
3. A+INPUT
4. GND
5. B+INPUT
6. B−INPUT
7. B OUTPUT
8. V+

L-Type



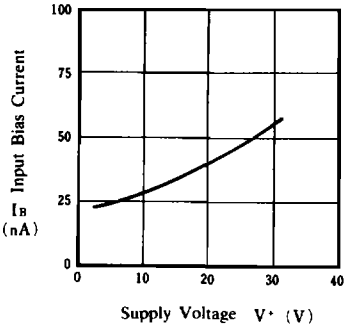
■ Typical Characteristics

Supply Current vs. Supply Voltage



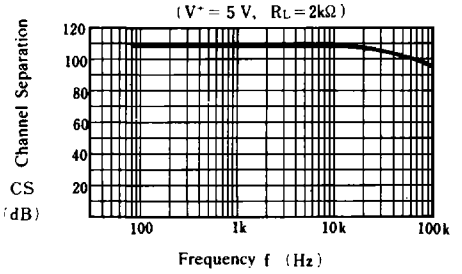
Input Bias Current vs. Supply Voltage

(Ta=25℃)



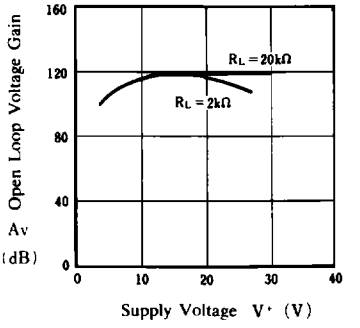
Channel Separation vs. Frequency

(V+=5 V, RL=2kΩ)



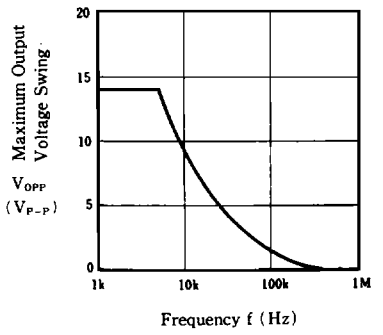
Voltage Gain vs. Supply Voltage

(Ta=25℃)



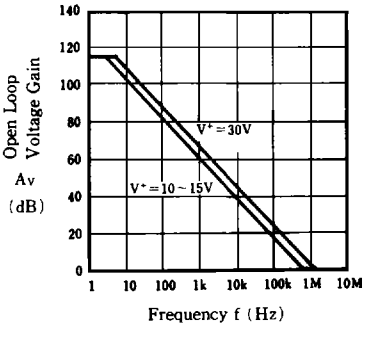
Maximum Output Voltage Swing vs. Frequency

(V+=15V, Ta=25℃)



Open Loop Voltage Gain vs. Frequency

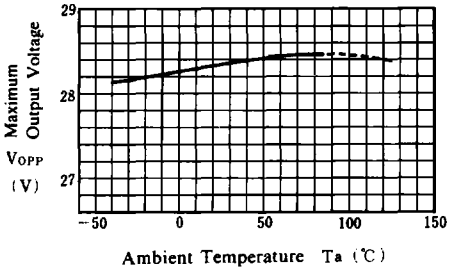
(RL=∞, Ta=25℃)



■ **Typical Characteristics**

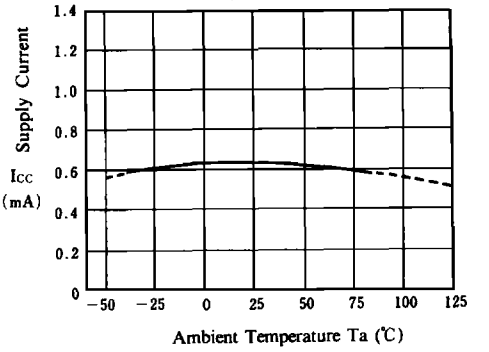
Maximum Output Voltage Swing vs. Temperatute

(V^+=30V, R_L=2kΩ)



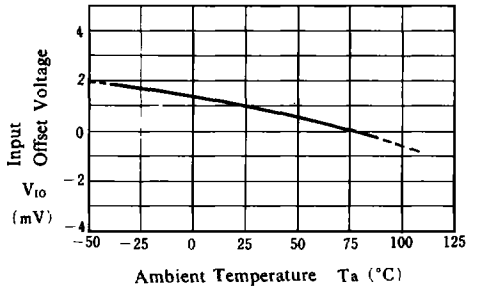
Supply Current vs. Temperature

(V^+=5V)



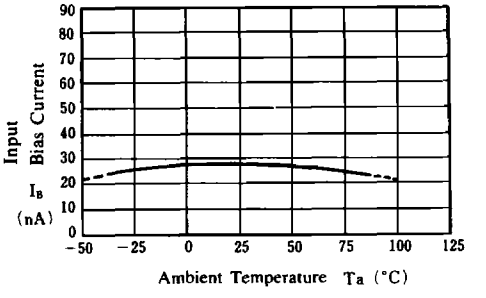
Input Offset Voltage vs. Temperature

(V^+ = 5 V)



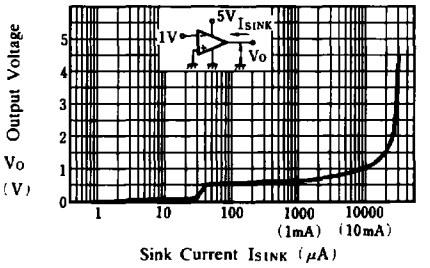
Input Bias Current vs. Temperature

(V^+ = 5 V)



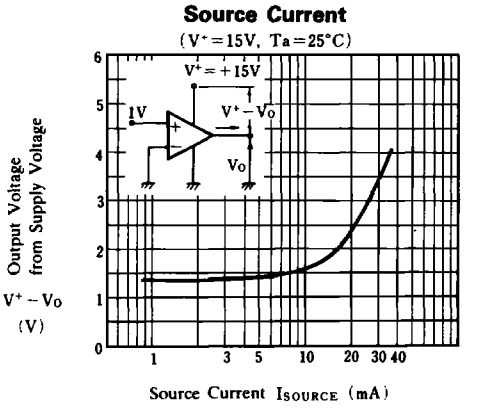
Output Voltage vs. Sink Current

(V^+=5V, Ta=25℃)



Source Current

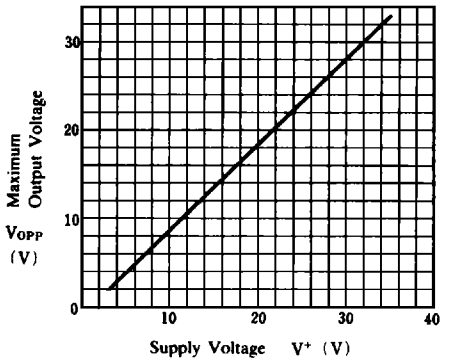
(V^+=15V, Ta=25°C)



■ **Typical Characteristics**

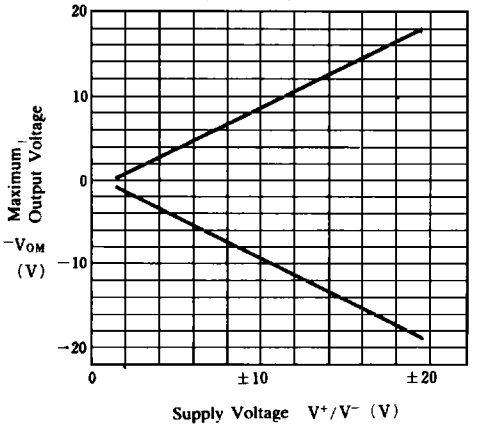
Maximum Output Voltage

(R_L = 2kΩ, Ta = 25°C)



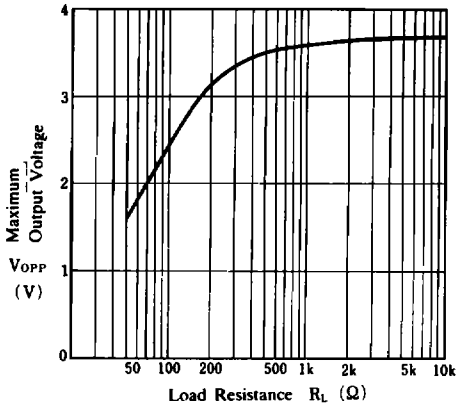
Maximum Output Voltage vs. Supply Voltage

(R_L = 2kΩ, Ta = 25°C)



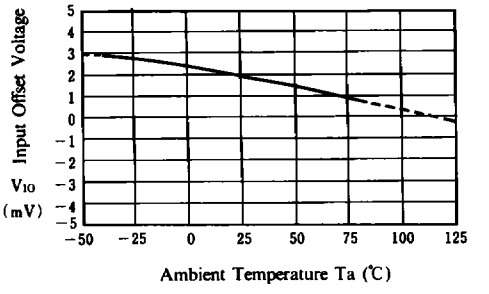
Maximum Output Voltage Swing vs. Load resistance

(V^+ = 5V, Ta = 25°C)



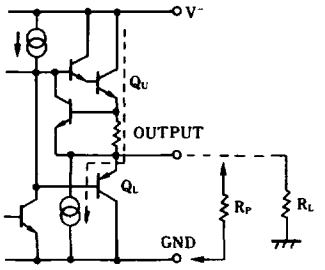
Input Offset Voltage vs. Temperature

(V^+ = 5V)



■ Application

• Improvement of Cross-over Distortion
Equivalent circuit at the output stage

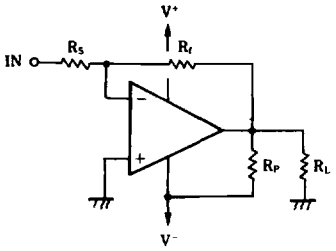


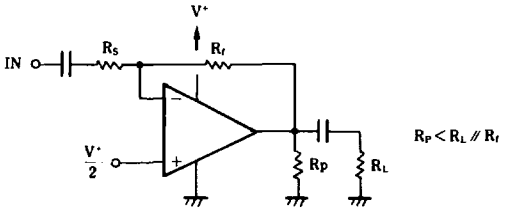
NJM2904, in its static state (No in and output condition) when design, Q_U being biassed by constant current (breake down beam) yet, Q_L stays OFF.

While using with both power soure mode, the cross-over distortion might occure instantly when Q_L ON.

There might be cases when application for amplifier of audio signals, not only distortion but also the apparent frequency bandwidth being narrowed remarkably.

It is aduisable especially when using both power soure mode, constantly to use with higher current on Q_U than the load current (including feedback current), and then connect the pull-down resister RP at the part between output and GND pins.





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