

SINGLE-SUPPLY DUAL OPERATIONAL AMPLIFIER

■ GENERAL DESCRIPTION

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.

■ FEATURES

- Single Supply
- Operating Voltage (+3V~+32V)
 Low Operating Current (0.7mA typ.)
 Slew Rate (0.5V/µs typ.)
- Bipolar Technology
- Package Outline
 DIP8, DMP8, EMP8, SSOP8, TVSP8, SIP8

■ PACKAGE OUTLINE







NJM2904M



NJM2904E



NJM2904V



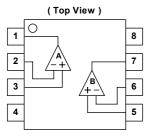




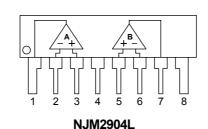
NJM2904L

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■ PIN CONFIGURATION



NJM2904D, NJM2904M NJM2904E, NJM2904V NJM2904RB1



PIN FUNCTION

1. A OUTPUT

2. A -INPUT

3. A +INPUT

4. GND

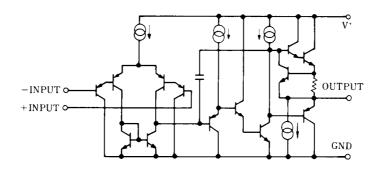
5. B +INPUT

6. B -INPUT

7. B OUTPUT

8. V⁺

■ EQUIVALENT CIRCUIT (1/2 Shown)



NJM2904

■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	MBOL RATINGS		
Supply Voltage	V ⁺ (V ⁺ /V′)	32 (or ±16)	V	
Differential Input Voltage	V _{ID}	32	V	
Input Voltage	V _{IC}	-0.3~+32	V	
Power Dissipation Operating Temperature Range	P _D	(DIP8) 500 (DMP8) 300 (EMP8) 300 (SSOP8) 300 (TVSP8) 320	mW °C	
	Topr	(SIP8)800 -40~+85		
Storage Temperature Range	T _{stg}	-50~+125	°C	

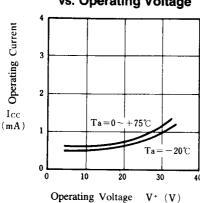
■ ELECTRICAL CHARACTERISTICS

(<u>Ta=25°C,V</u>+=5V)

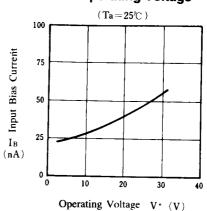
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V _{IO}	$R_S=0\Omega$	-	2	7	mV
Input Offset Current	I _{IO}		-	5	50	nA
Input Bias Current	I_{B}		-	25	250	nA
Large Signal Voltage Gain	A_{V}	R _L ≥2kΩ	-	100	-	dB
Maximum Output Voltage Swing	V_{OM}	R _L =2kΩ	3.5	-	-	V
Input Common 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
Operating Current	Icc	R _L =∞	-	0.7	1.2	mA
Slew Rate	SR	V ⁺ /√=±15V	-	0.5	-	V/µs
Unity Gain Bandwidth	f_{T}	V ⁺ /√=±15V	-	0.6	-	MHz

■ TYPICAL CHARACTERISTICS

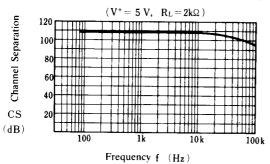
Operating Current vs. Operating Voltage



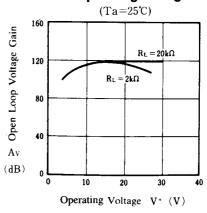
Input Bias Current vs. Operating Voltage



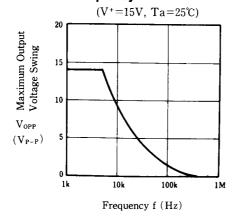
Channel Separation vs. Frequency



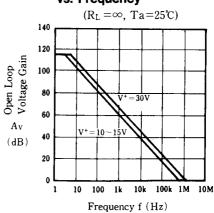
Voltage Gain vs. Operating Voltage



Maximum Output Voltage Swing vs. Frequency



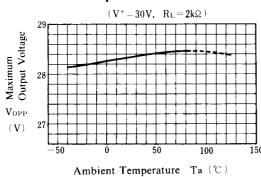
Open Loop Voltage Gain vs. Frequency



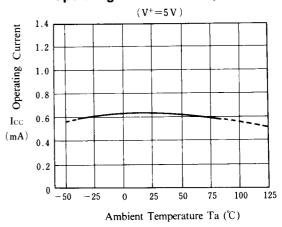
New Japan Radio Co., Ltd. —

■ TYPICAL CHARACTERISTICS

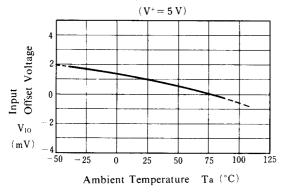
Maximum Output Voltage Swing vs. Temperatute



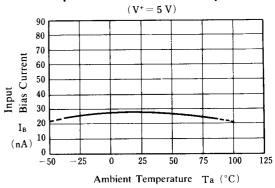
Operating Current vs. Temperature



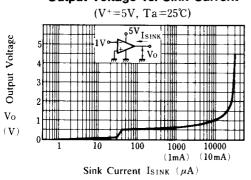
Input Offset Voltage vs. Temperature



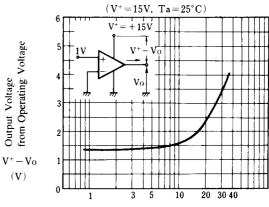
Input Bias Current vs. Temperature



Output Voltage vs. Sink Current



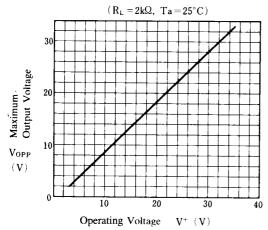
Source Current



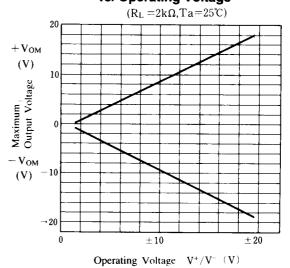
Source Current Isource (mA)

■ TYPICAL CHARACTERISTICS

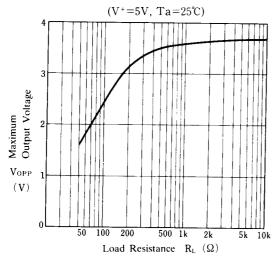
Maximum Output Voltage



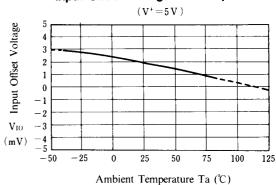
Maximum Output Voltage vs. Operating Voltage



Maximum Output Voltage Swing vs. Load resistance

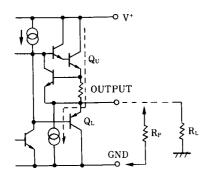


Input Offset Voltage vs. Temperature



■ APPLICATION

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

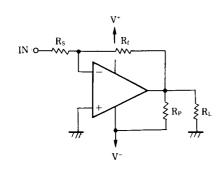


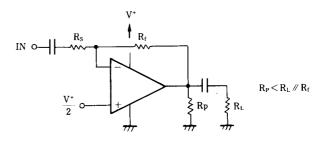
NJM2904,in its static state (No in and output condition) when design, Q_{U} being biassed by constant current (break down beam) yet, Q_{L} stays OFF.

While using with both power source mode, the cross-over distortion might occur 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 adjustable especially when using both power source mode, constantly to use with higher current on Q_U than the load current (including feedback current), and then connect the pull-down resister R_P at the part between output and GND pins.





[CAUTION]

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