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New Japan Radio Co.,Ltd.

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## DUAL LOW VOLTAGE POWER AMPLIFIER

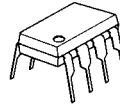
### ■ GENERAL DESCRIPTION

The NJM2076 is a dual power amplifier, which operates with 1.0V minimum supply voltage. The NJM2076 is suitable to small radio and head-phone of stereo and single BTL application.

### ■ FEATURES

- BTL operation  $P_o=90mW$  type.
- Minimum external components
- Headphone stereo Amp. with external transistors
- Low Operation Voltage (1.0V MIN.)
- Low Operating Current (4.7mA TYP.)
- Package Outline DIP8, DMP8
- Bipolar Technology

### ■ PACKAGE OUTLINE

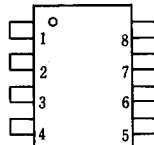


NJM2076D



NJM2076M

### ■ PIN CONFIGURATION



NJM2076D  
NJM2076M

#### PIN FUNCTION

1. Inverting Amp. Input (A)
2. Non-Inverting Amp. Input(B)
3.  $V^+$
4. Base(B)
5. (B) Output
6. GND
7. (A) Output
8. Base (A)

## ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V*	4.5	V
Maximum Input Signal	V <sub>IN</sub>	200	mVrms
Power Dissipation	P <sub>D</sub>	(DIP 8) 500 (DMP 8) 500	mW
Operating Temperature Range	T <sub>opr</sub>	-20~+75	°C
Storage Temperature Range	T <sub>stg</sub>	-40~+125	°C

## ■ ELECTRICAL CHARACTERISTICS

(Ta=25°C, V\*=1.5V)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Current	I <sub>cc</sub>	Input: Open	—	4.7	7.0	mA

(I) Stereo Configuration (Test Circuit 1, R<sub>L</sub>=16Ω)

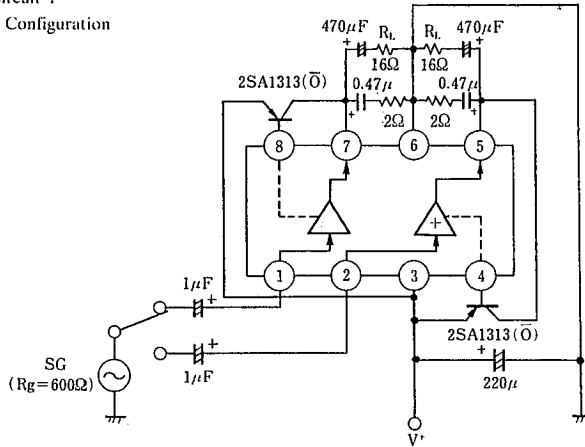
Voltage Gain	A <sub>v</sub>	V <sub>IN</sub> =10mVrms	26.5	28.0	29.5	dB
Max. Output Power	P <sub>O1</sub>	THD=10%(D, M-Type)	15	17.5	—	mW
	P <sub>O2</sub>	THD=10%, V*=1.0V	—	3	—	mW
Total Harmonic Distortion	THD <sub>1</sub>	P <sub>O</sub> =1mW (126mVrms/16Ω)	—	0.4	0.8	%
Output Noise Voltage	V <sub>NO1</sub>	Rg=0, A Curve	—	50	150	μV
Ripple Rejection Ratio	RR <sub>1</sub>	Rg=0, f <sub>R</sub> =1kHz, V <sub>R</sub> =30mvrms	25	35	—	dB
Input Resistance	R <sub>IN</sub>		25	33	43	kΩ
Output Pin Voltage	V <sub>O</sub> (DC)		0.62	0.70	0.77	V

(II) BTL Configuration (Test Circuit 2, R<sub>L</sub>=8Ω)

Max. Output power	P <sub>O3</sub>	THD=10% (D,M-Type)	75	90	—	mW
	P <sub>O4</sub>	THD=10%, V*=1.0V(D, M-Type)	—	20	—	mW
Total Harmonic Distortion	THD <sub>2</sub>	P <sub>O</sub> =10mW(283mVrms/8Ω)	—	1.5	4.5	%
Output Noise Voltage	V <sub>NO2</sub>	Rg=0, A Curve	—	85	250	μV
Ripple Rejection Ratio	RR <sub>2</sub>	Rg=0, f <sub>R</sub> =1kHz, V <sub>R</sub> =30mVrms	20	25	—	dB
Voltage Difference between Two Output Pins	ΔV <sub>O</sub> (DC)		—	—	50	mV

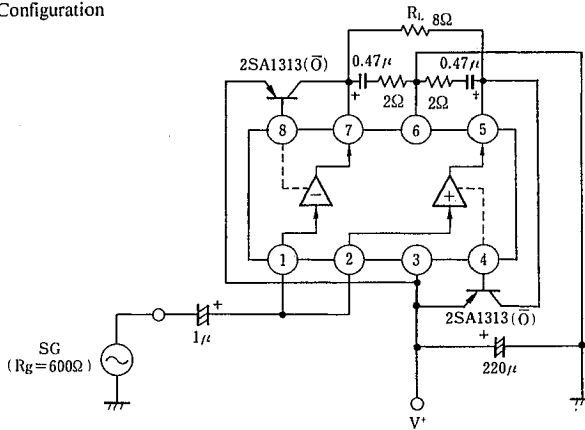
## ■ TEST CIRCUIT

· Test Circuit 1  
Stereo Configuration



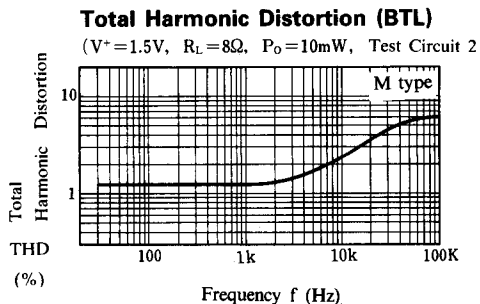
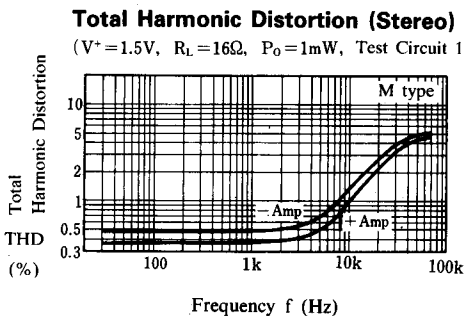
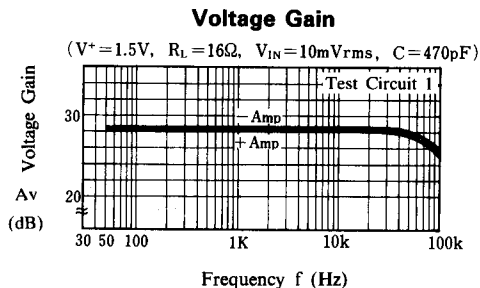
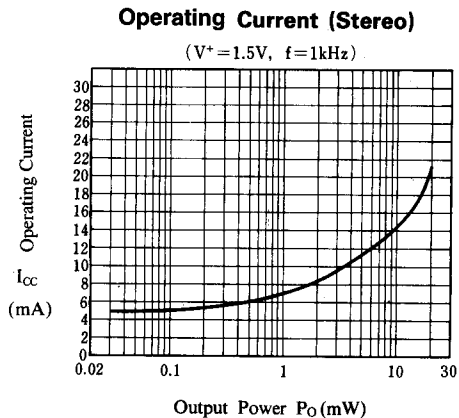
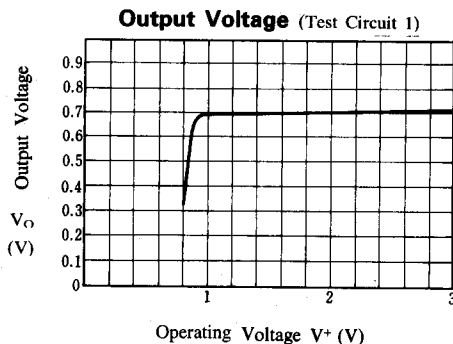
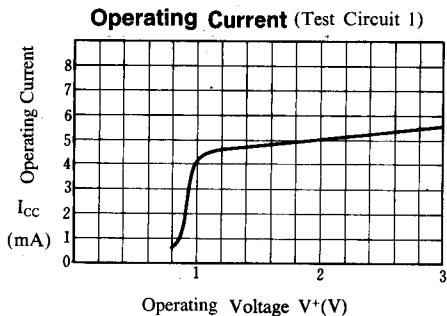
2SA1313(O):  $h_{FE}=115\sim 125$   
( $I_c=100\text{mA}$ )

· Test Circuit 2  
BTL Configuration



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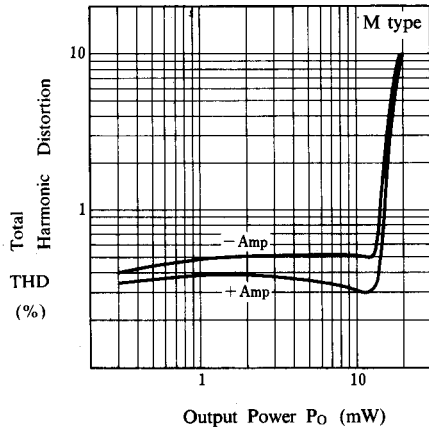
## TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS

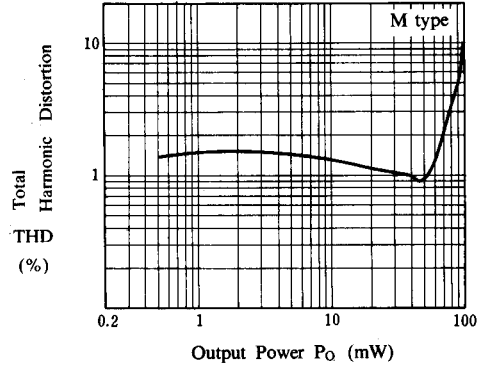
**Total Harmonic Distortion (Stereo)**

( $V^+ = 1.5V$ ,  $R_L = 16\Omega$ ,  $f = 1kHz$ , Test Circuit 1)



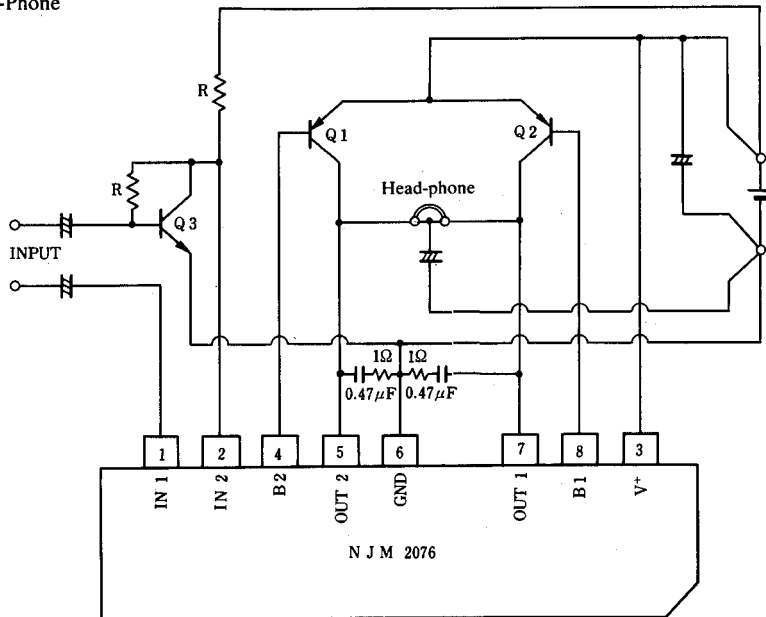
**Total Harmonic Distortion (BTL)**

( $V^+ = 1.5V$ ,  $R_L = 8\Omega$ ,  $f = 1kHz$ , Test Circuit 2)

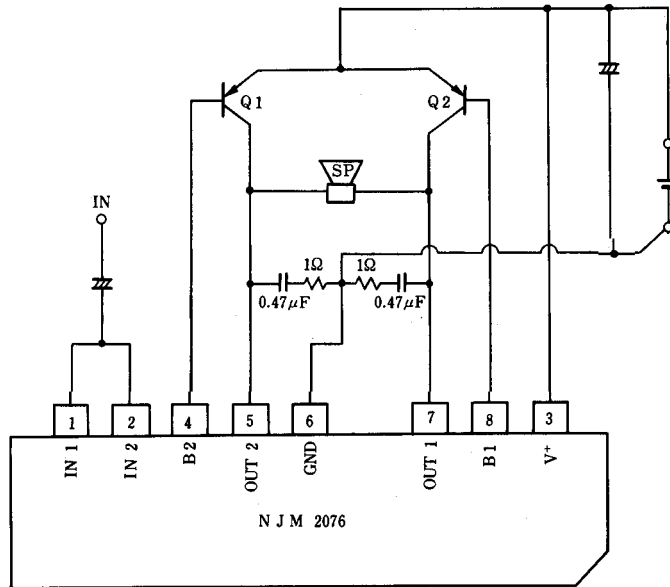


## ■ TYPICAL APPLICATION

### 1. For Stereo Head-Phone



### 2. BTL Amp. for Speaker



**■ NOTICE****(1) External PNP Transistor**

Maximum output power becomes large with low saturation voltage transistor, and so select transistor of low saturation.  
Saturation Voltage: less than 0.1V ( $I_c=100\text{mA}$ ,  $I_B=10\text{mA}$ ).  $h_{FE}: 120$

**(2) External Frequency Compensation**

Recommend tantalum capacitor with low  $\tan\delta$  (less than 0.25 at  $f=10\text{kHz}$ ) and  $1\Omega$  resistor. Stable with large capacitor of less high frequency distortion and worse  $\tan\delta$ . For example:  $1\mu\text{F}$ ,  $\tan\delta \leq 0.6$

**(3) Layout on PCB**

Be careful to get maximum output power and low distortion set.

DIP/DMP: Signal ground has to be close to IC ground pin. Impedance of ground line must be low.



## MEMO

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