LOW VOLTAGE AUDIO POWER AMPLIFIER

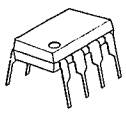
■ GENERAL DESCRIPTION

The NJM386B is wider operating voltage and higher output power version of NJM386. The maximum operating voltage is 18V, and the maximum output power is up to 1W.

■ FEATURES

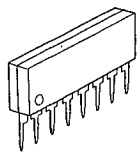
- Operating Voltage (4V~18V)
- Minimum External Components
- Low Operating Current (5mA)
- Voltage Gain (20~200)
- Single Supply Operation
- Self-centering of Output Offset Voltage
- Package Outline DIP8, SIP8, DMP8
- Bipolar Technology

■ PACKAGE OUTLINE



NJM386BD

NJM386BM

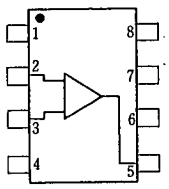


NJM386BL

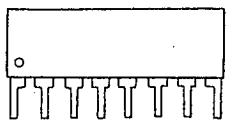
■ APPLICATIONS

- AM-FM radio amplifiers
- Portable tape player amplifiers
- Intercoms
- TV sound systems
- Line drivers
- Ultra-sonic Drivers
- Small servo drivers
- Power converters

■ PIN CONFIGURATION



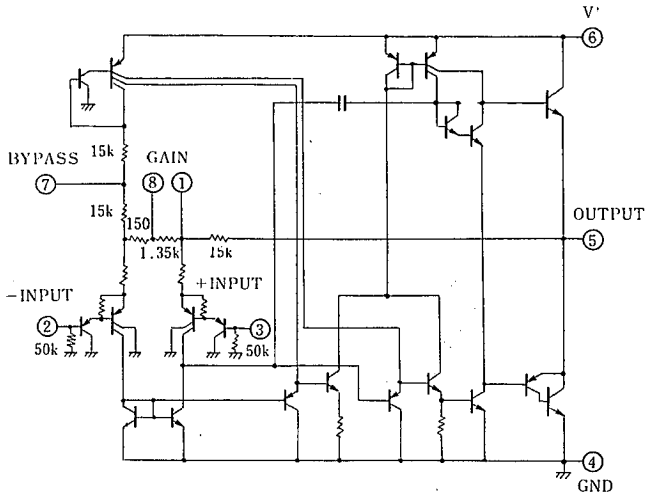
NJM386BD
NJM386BM



NJM386BL

PIN FUNCTION
1. GAIN
2. −INPUT
3. +INPUT
4. GND
5. OUTPUT
6. V^+
7. BY PASS
8. GAIN

■ EQUIVALENT CIRCUIT



■ ABSOLUTE MAXIMUM RATINGS

(Ta=25℃)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+	22	V
Power Dissipation	P_D	(DIP-8) 700	mW
		(SIP-8) 800	mW
		(DMP-8) 300	mW
Input Voltage Range	V_{IN}	±0.4	V
Operating Temperature Range	T_{opr}	−40～+85	℃
Storage Temperature Range	T_{stg}	−40～+125	℃

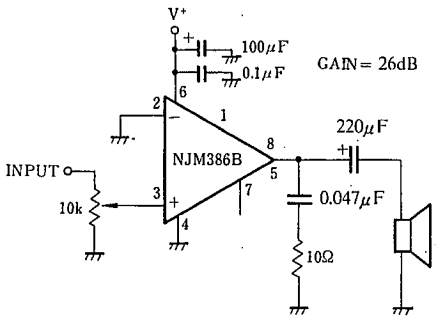
■ ELECTRICAL CHARACTERISTICS

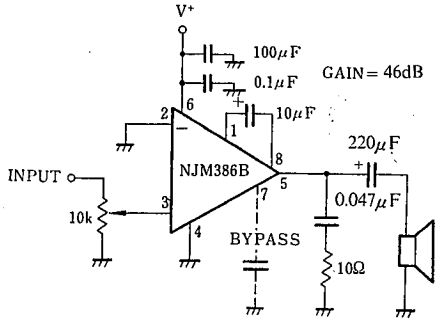
(Ta=25℃)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V^+		4	—	18	V
Operating Current	I_{CC}	V^+=6V, V_{IN}=0	—	5	8	mA
Output Power	P_O	V^+=6V, R_L=8Ω, THD=10%	250	325	—	mW
		V^+=9V, R_L=8Ω, THD=10% (note 2)	500	850	—	mW
		V^+=16V, R_L=32Ω, THD=10% (note 1)	700	1000	—	mW
Voltage Gain	A_V	V_S=6V, f=1kHz	24	26	28	dB
		10μF from Pin 1 to 8	43	46	49	dB
Bandwidth	BW	V^+=6V, Pins 1 and 8 Open		600	—	kHz
Total Harmonic Distortion	THD	V^+=6V, R_L=8Ω, P_{OUT}=125mV f=1kHz, Pins 1 and 8 Open	—	0.1	—	%
Power supply Rejection Ratio	SVR	V^+=6V, f=1kHz, C_{BYPASS}=10μF Pins 1 and 8 Open	—	50	—	dB
Input Resistance	R_{IN}		—	50	—	kΩ
Input Bias Current	I_B	V^+=6V, Pins 2 and 3 Open	—	100	—	nA

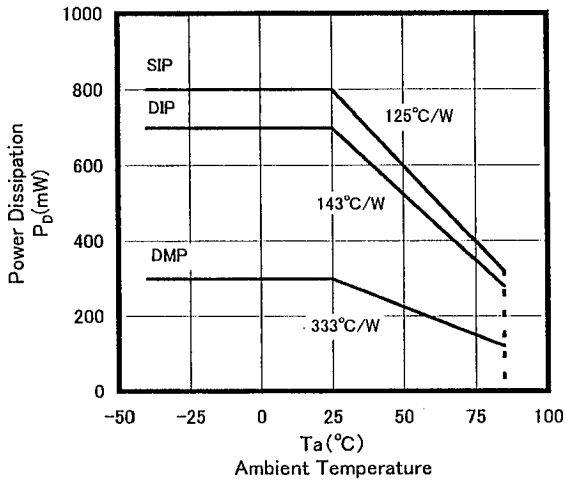
(note 1) NJM386BM: At on Board
(note 2) NJM386BS: At on Board

■ TYPICAL APPLICATION





■ POWER DISSIPATION VS. AMBIENT TEMPERATURE



■ NOTICE WHEN APPLICATION

- **Prevention of Oscillation**

It is recommended to insert capacitors at around the supply source and the GND pins with the value of 0.1μF and more than 100μF which are featuring higher frequency efficiency.

When the speaker load condition, it is recommendable to insert the resisitor of 10Ω and the capacitor of 0.047μF between the output and the GND pins.

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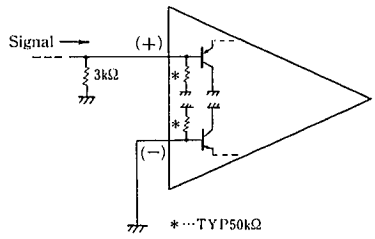
- **How to use the Input Resistor** (TYP. 50kΩ)

The input resistors have much deviation in value generally, so that it is recommended not to use them as the constant of the circuit. The countermeasure to be recommended is to apply the resistor of higher in value, which is so higher to be able to ignore the input deviation (3kΩ approximately) in parallel application.



- **Maintenance of Output Offset Voltage**

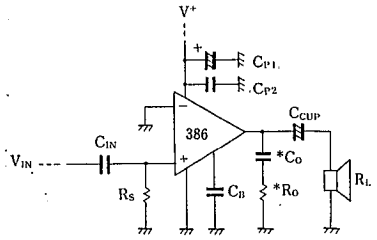
By making connection of both input pins with low value (below 10kΩ approximately) to GND, the output offset voltage is automatically set in the medium range value of the supply source. However, the DC Gain of NJM386 is approximately at 20 times in value, so that when keeping one side input pin open, and the other side to GND on DC condition. The voltage drop caused by input resistor × input bias current, that is, (input resistor × input bias current)× 20 times voltage is to be sheared, which in the result, no distortion output Oscillation range shall be decreeased.

In regard to dealing with the input pin, it is recommendable to put the input pin into the GND at first, and the other side of signal input pin, to be connected into GND with the resisitor of less than about 10kΩ on DC condition.

- **The Application Purpose and Recommended Value of the External Parts.**

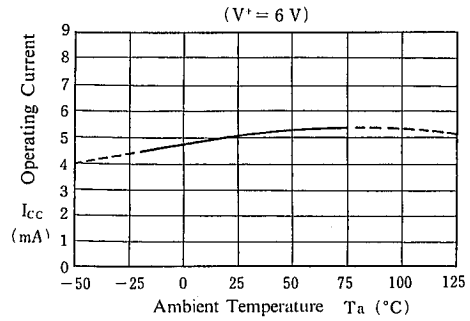
EXTERNAL PARTS	APPLICATION PURPOSE	RECOMMENED VALUE	REMARKS
R_S	Current like noise reduction V_{OQ} stabilization	Below 10kΩ	The noise becomes high when the input pin opend.
C_{IN}	V_{OQ} stabilization	1μF	It is not required in case when there is no DC offset in the input signal.
C_{P1}	V^+ stabilization	≅ C_{cup}.	It can be decreased in value when the output impedance source is low.
C_{P2}	Oscitallation prevention	0.1μF	Insert near around the supply source and GND pins.
C_V	Ripple rejection to V_O by way of V^+	47μF	It is not required when the V^+ is stabilized.
*C_O	Oscillation preventon	0.047μF	To be decided in value according to load condition.
*R_O	Oscillation prevention	10Ω	To be decided in value according to load condition.
C_{CUP}	Output DC decoupling	470μF when R_L =4Ω 220μF when R_L =8Ω	Low band cutoff frequency (f_L) shall be decided by C_{CUP} R_L. When C_{CUP} is less in value, f_L is to be increassed.

NJM386B Recommended Circuit

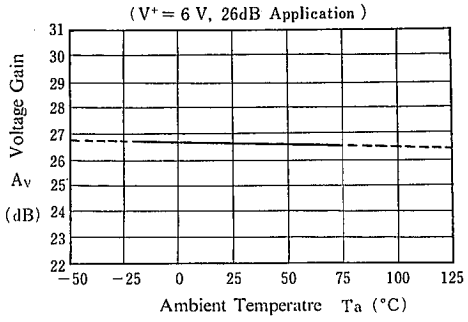


■ TYPICAL CHARACTERISTICS

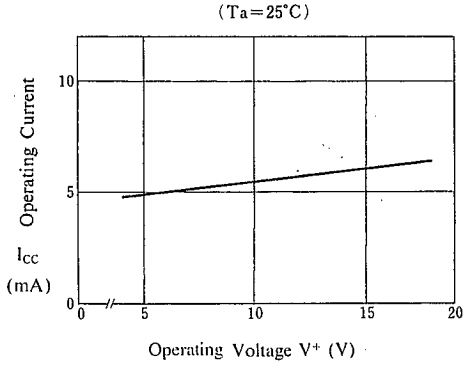
Operating Current vs. Temperature



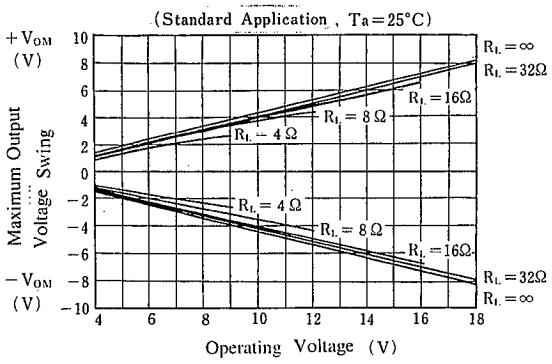
Voltage Gain vs. Temperature



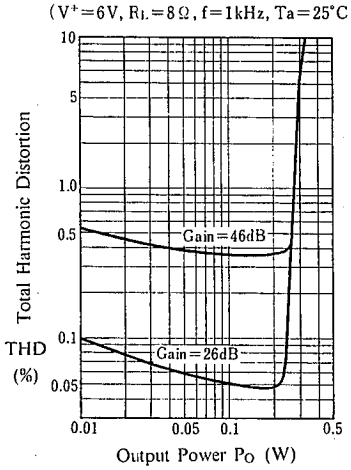
Operating Current vs. Operating Voltage



Maximum Output Voltage Swing vs. Operating Voltage



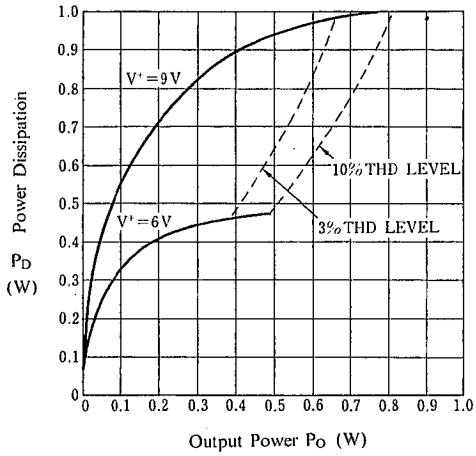
Total Harmonic Distortion vs. Output Power



■ TYPICAL CHARACTERISTICS

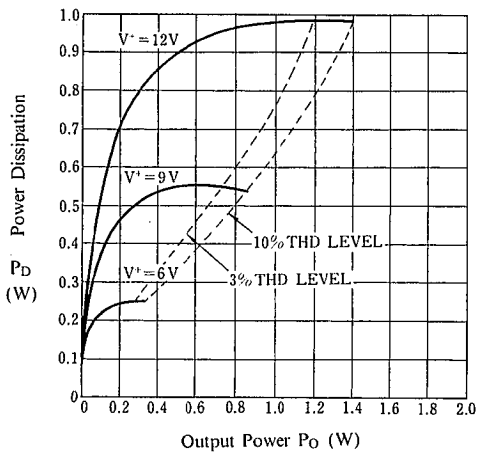
Power Dissipation vs. Output Power

(R_L=4Ω, Ta=25°C)



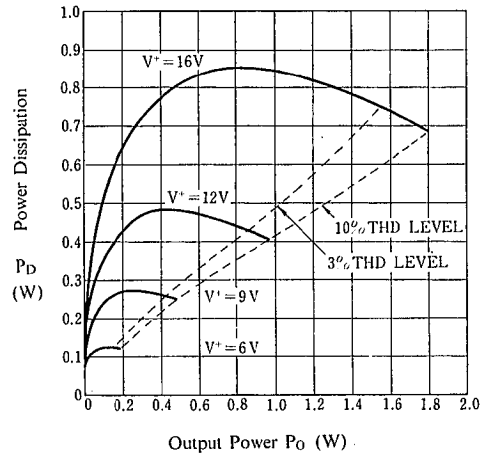
Power Dissipation vs. Output Power

(R_L=8Ω, Ta=25°C)



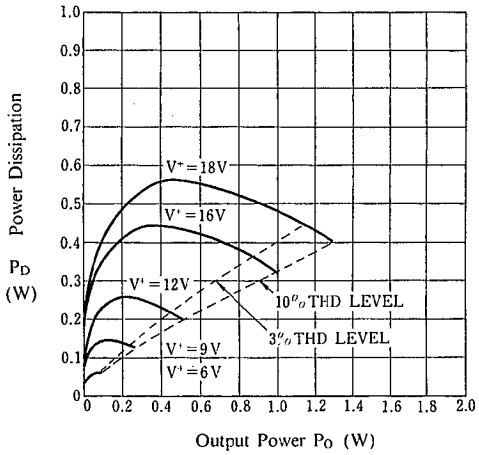
Power Dissipation vs. Output Power

(R_L=16Ω, Ta=25°C)



Power Dissipation vs. Output Power

(R_L=32Ω, Ta=25°C)



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