

**FUJITSU**

# DUAL LOW NOISE PRE-AMPLIFIER

**MB3106**October 1987  
Edition 1.0

## DUAL LOW NOISE PRE-AMPLIFIER

The Fujitsu MB3106 is a dual low noise pre-amplifier housed in a single in-line package for high density mounting on printed circuit boards for automotive audio stereo systems.

The MB3106 has a power supply stabilization circuit for low power supply voltage, and is designed to improve power efficiency at the output stage. Therefore, the MB3106 provides a wide output range, and can stably operate in a wide power supply voltage range and in a wide temperature range.

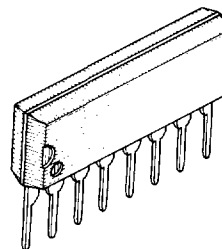
The MB3106 provides high gain in a low frequency range, because the feedback resistor operates in a wide tolerance condition.

- High open loop gain : 90 dB typical
- Input noise voltage : 1  $\mu$ V typical
- Protection circuit against over voltage at input stage
- On-chip power supply stabilizer
- Wide power supply range and high ripple rejection
- Package : 8-pin plastic SIP package
- Minimized number of external parts, due to on-chip bias circuit.

### ABSOLUTE MAXIMUM RATINGS (see NOTE)

Rating	Symbol	Value	Unit
Power Supply Voltage	$V_{CC}$	18	V
Power Dissipation	$P_D$	200 ( $T_A \leq 75^\circ\text{C}$ )	mW
Operating Temperature	$T_A$	-20 to +75	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55 to +125	$^\circ\text{C}$

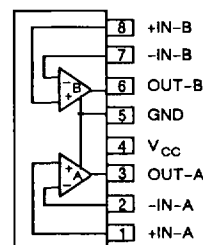
**NOTE:** Permanent device damage may occur if the above Absolute Maximum Ratings are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



PLASTIC PACKAGE  
SIP-08P-M03

### PIN ASSIGNMENT

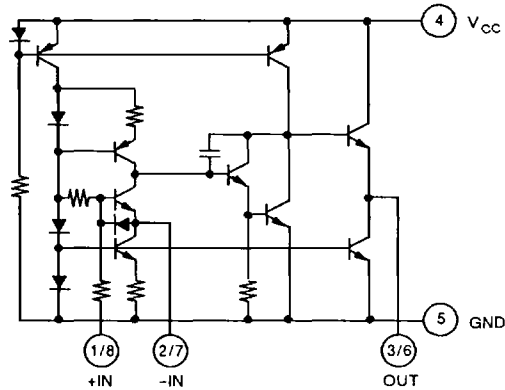
(Front View)



This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.

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Fig. 1 — EQUIVALENT CIRCUIT (ONE CHANNEL)



**RECOMMENDED OPERATING CONDITIONS**

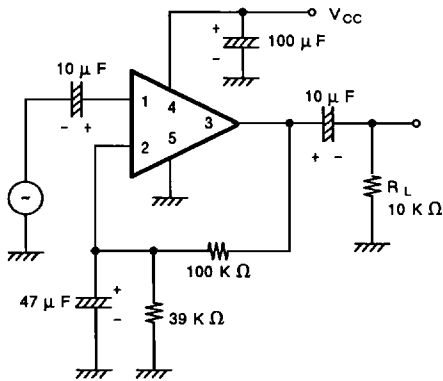
Parameter	Symbol	Value	Unit
Power Supply Voltage	$V_{CC}$	6 to 16	V
Temperature	$T_A$	-20 to +75	°C

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$ ,  $V_{CC} = 6\text{V}$ ,  $f = 1\text{kHz}$ ,  $R_L = 10\text{k}\Omega$ )

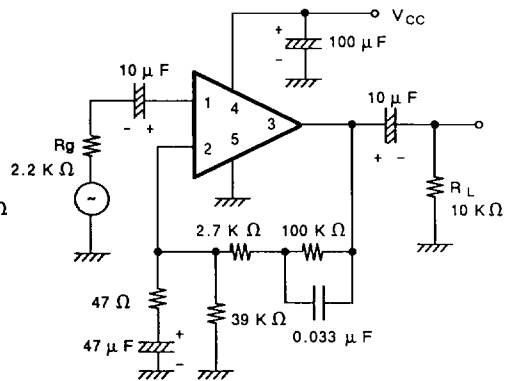
Parameter	Symbol	Conditions	Values			Unit
			Min	Typ	Max	
Power Supply Current	$I_{CC}$	—	—	3	4	mA
Open Loop Voltage Gain	$A_{VO}$	$V_O = 0.8\text{ V}$	75	90	—	dB
Closed Loop Voltage Gain	$A_V$	$V_O = 0.8\text{ V}$ , NAB	—	42	—	dB
Maximum Output Voltage	$V_{OM}$	THD = 1%, NAB	1.0	1.6	—	V
Total Harmonic Distortion	THD	$V_O = 0.8\text{ V}$ , NAB	—	0.05	0.3	%
Output Noise Voltage	$V_{NO}$	$R_g = 2.2\text{ k}\Omega$ , NAB	—	120	200	$\mu\text{V}$
Input Resistance	$R_{IN}$	NAB	50	150	—	$\text{k}\Omega$
Channel Separation	—	$V_O = 0.8\text{ V}$ , $f = 10\text{ kHz}$ , NAB	—	65	—	dB
Ripple Rejection Ratio	—	$f = 100\text{ Hz}$ , $R_g = 2.2\text{ k}\Omega$ , NAB	—	45	—	dB

Fig. 2 — MEASUREMENT CIRCUITS  
(Only one channel is illustrated)

1.  $I_{CC}$ ,  $A_{VO}$



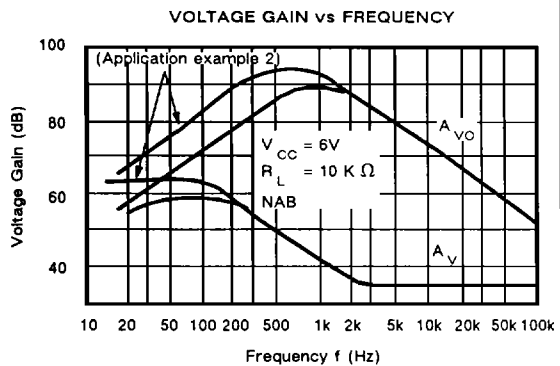
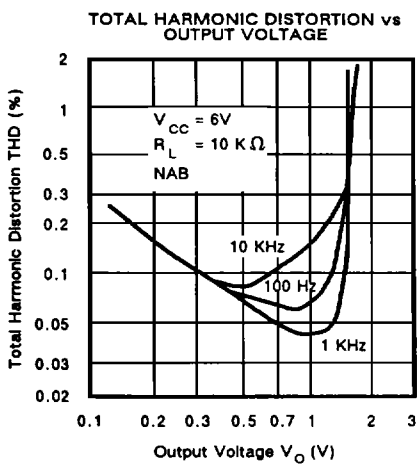
2.  $A_V$ ,  $V_{OM}$ , THD,  $V_{NO}$ ,  $R_{IN}$



Note:  $V_{NO}$  is measured with the Bandpass filter of 30Hz to 30KHz.

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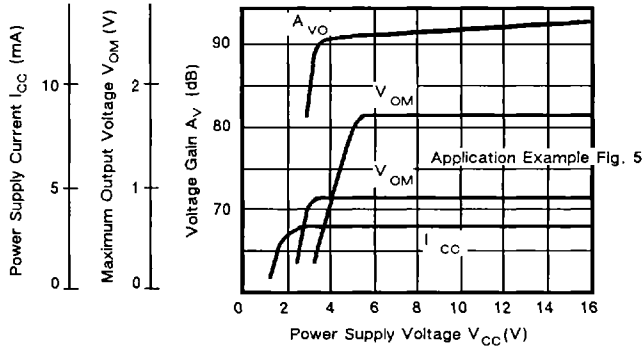
## TYPICAL PERFORMANCE CHARACTERISTICS



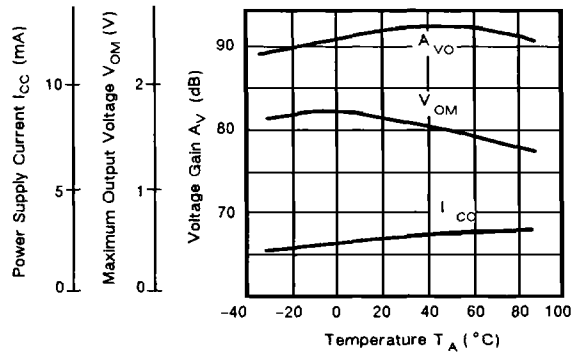
**TYPICAL PERFORMANCE CHARACTERISTICS (Continued)**

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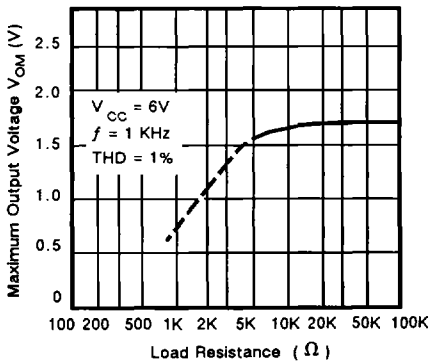
POWER SUPPLY CURRENT, MAXIMUM OUTPUT VOLTAGE, VOLTAGE GAIN vs POWER SUPPLY VOLTAGE



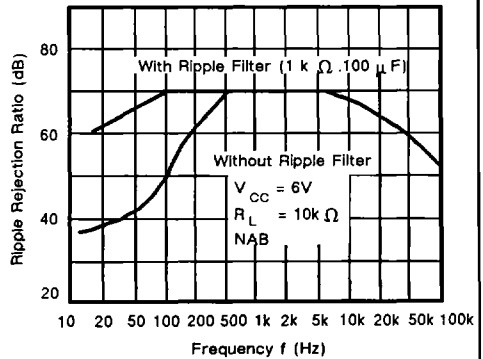
POWER SUPPLY CURRENT, MAXIMUM OUTPUT VOLTAGE, VOLTAGE GAIN vs TEMPERATURE



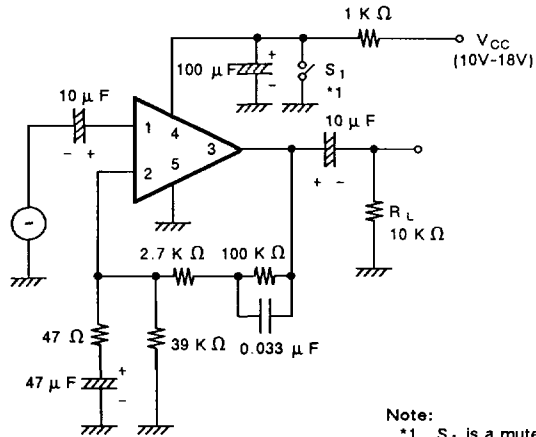
MAXIMUM OUTPUT VOLTAGE vs LOAD RESISTANCE



RIPPLE REJECTION RATIO vs FREQUENCY

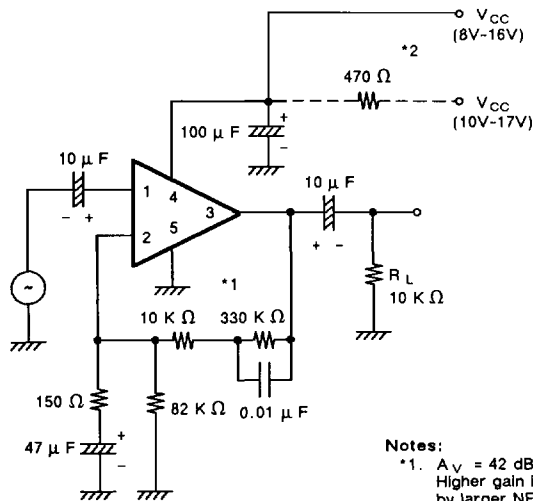


**Fig. 3 — TYPICAL APPLICATION CIRCUIT**  
(Only one channel is illustrated)



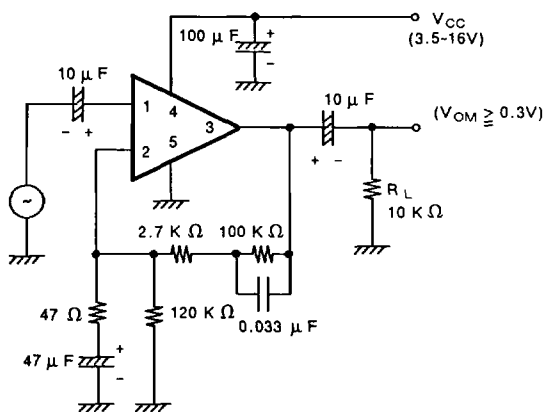
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**Fig. 4 — HIGH GAIN CIRCUIT**  
(Only one channel is illustrated)

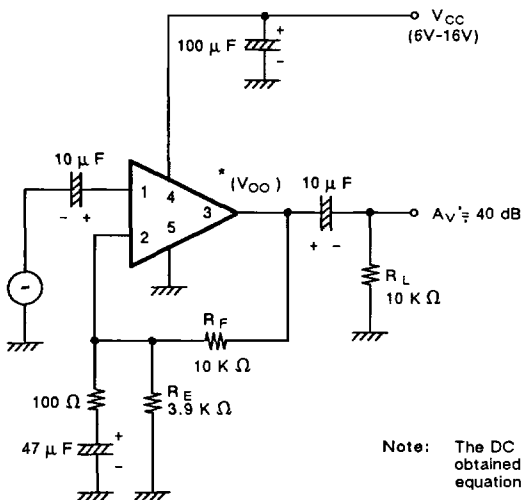


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**Fig. 5 — FOR LOW VOLTAGE POWER SUPPLY**  
(Only one channel is illustrated)



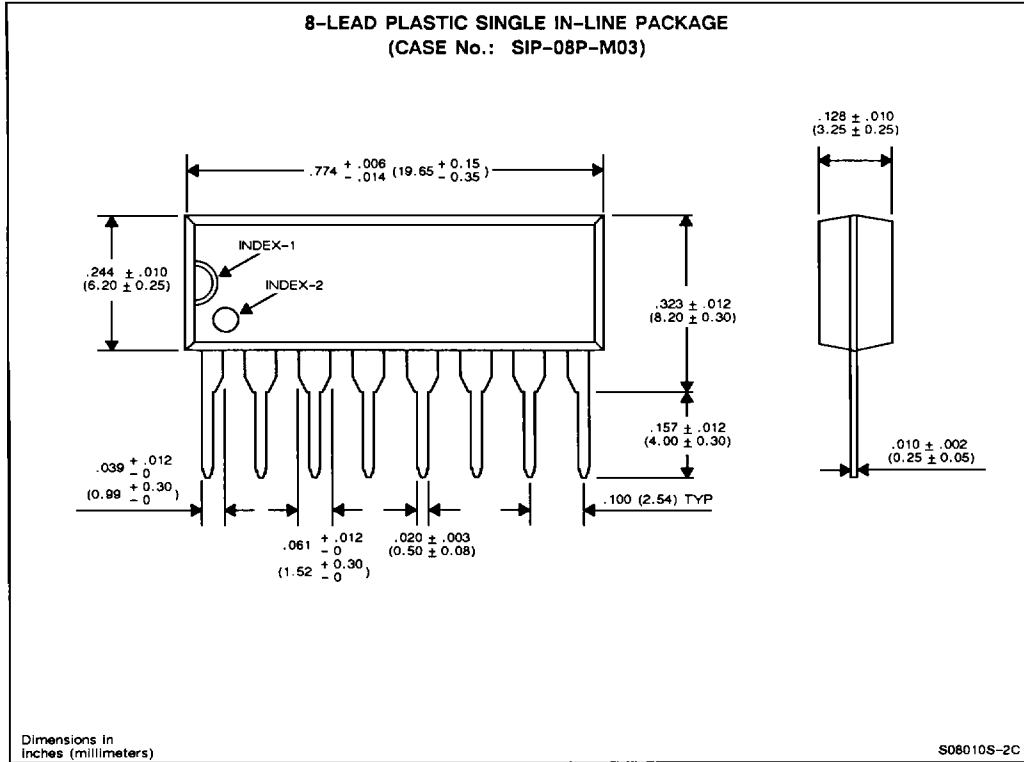
**Fig. 6 — FLAT AMPLIFIER CIRCUIT**  
(Only one channel is illustrated)



**Note:** The DC Output Voltage  $V_{OO}$  is obtained roughly from the following equation.

$$V_{OO} \approx 0.75 \left( 1 + \frac{R_F}{R_E} \right)$$

# PACKAGE DIMENSIONS



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