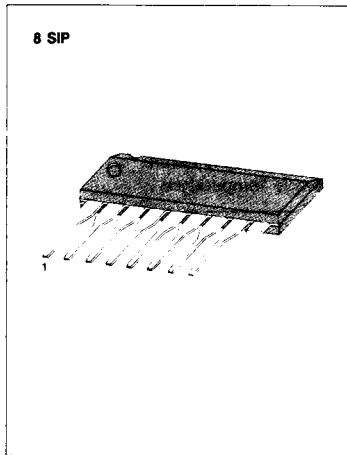


**DUAL LOW NOISE EQUALIZER AMPLIFIER**

The KA2221 is a monolithic integrated circuit consisting of 2-channel low noise amplifiers and regulated power supply for car stereos.

**FEATURES**

- Suitable for car stereos.
- Low noise amplifier.
- Voltage regulator included.
- Good ripple rejection.
- High channel separation (65dB Typ).
- Minimum number of external parts required.



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**ORDERING INFORMATION**

Device	Package	Operating Temperature
KA2221	8 SIP	- 20°C ~ + 70°C

**BLOCK DIAGRAM**

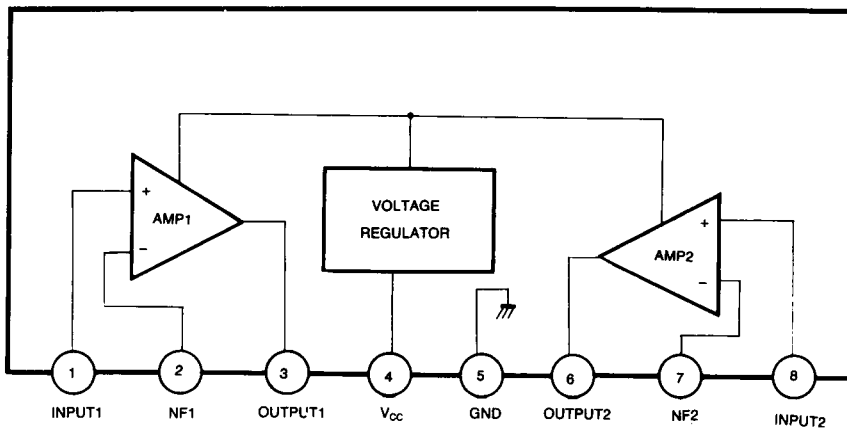


Fig. 1

ABSOLUTE MAXIMUM RATINGS (T<sub>a</sub> = 25°C)

Characteristic	Symbol	Value	Unit
Supply Voltage	V <sub>CC</sub>	18	V
Power Dissipation	P <sub>D</sub>	200	mW
Operating Temperature	T <sub>OPR</sub>	- 20 ~ + 70	°C
Storage Temperature	T <sub>STG</sub>	- 40 ~ + 125	°C

ELECTRICAL CHARACTERISTICS

(T<sub>a</sub> = 25°C, V<sub>CC</sub> = 12V, R<sub>L</sub> = 10KΩ, f = 1KHz, NAB, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Quiescent Circuit Current	I <sub>CCQ</sub>	V <sub>I</sub> = 0		6.0	9.0	mA
Open Loop Voltage Gain	G <sub>VO</sub>		65	80		dB
Closed Loop Voltage Gain	G <sub>VC</sub>	V <sub>O</sub> = 0.5V	33	35	37	dB
Output Voltage	V <sub>O</sub>	THD = 1%	0.6	1.0		V
Total Harmonic Distortion	THD	V <sub>O</sub> = 0.5V		0.1	0.3	%
Input Resistance	R <sub>I</sub>			150		KΩ
Equivalent Input Noise Voltage	V <sub>NI</sub>	R <sub>G</sub> = 2.2KΩ BW (- 3dB) = 15Hz ~ 30KHz		1.0	2.0	μV
Cross Talk	CT	R <sub>G</sub> = 2.2KΩ	50	65		dB

TEST CIRCUIT

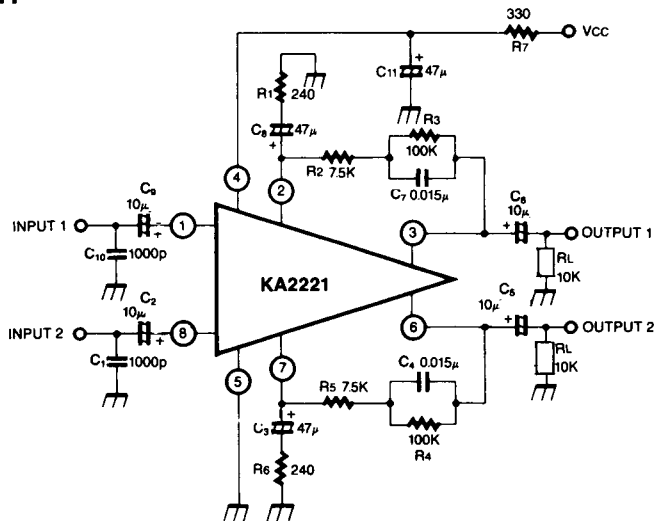
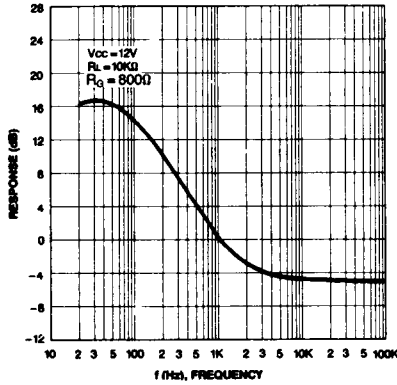
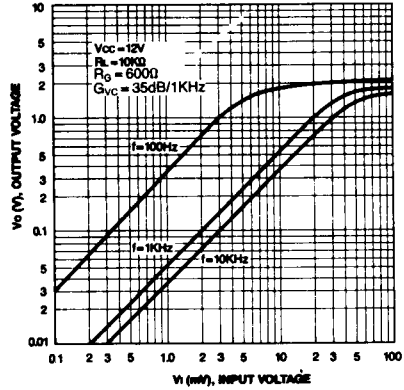


Fig. 2

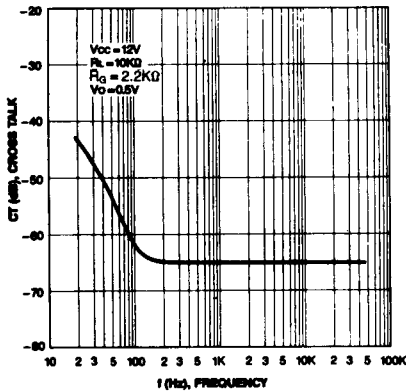
FREQUENCY RESPONSE



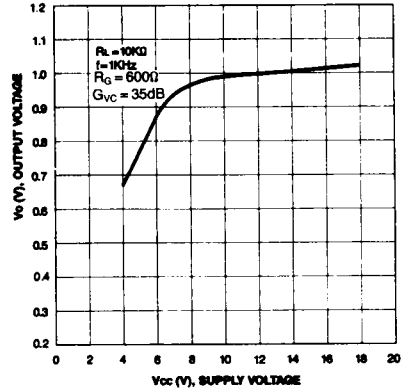
OUTPUT VOLTAGE-INPUT VOLTAGE



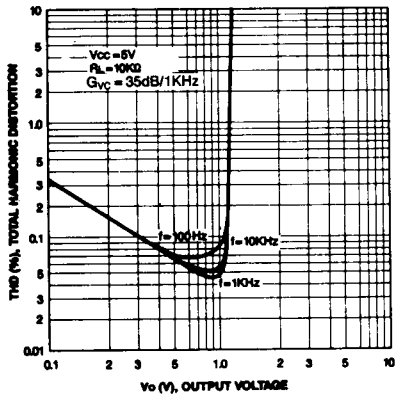
CROSS TALK-FREQUENCY



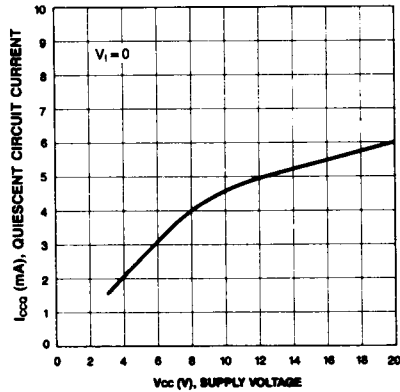
OUTPUT VOLTAGE-SUPPLY VOLTAGE



TOTAL HARMONIC DISTORTION-OUTPUT VOLTAGE



QUIESCENT CIRCUIT CURRENT-SUPPLY VOLTAGE



## APPLICATION INFORMATION

## External Components (Refer to test circuits)

$C_1$  ( $C_{10}$ ): Noise filter

These capacitors prevent radio interference in strong electric fields. The recommended value is 1000pF.

$C_2$  ( $C_9$ ): Input coupling capacitor

The recommended value is 10 $\mu$ F. If made too small, the low frequency characteristics will change for the worse, but too large a value will increase the rising time when power is applied.

$C_3$  ( $C_8$ ): Negative feedback capacitor

The lower cut-off frequency depends on the value of these capacitors and is determined as follows:

$$C_3 (C_8) = \frac{1}{2\pi f_L \cdot R_1 (R_6)}$$

$f_L$ : Low cut-off frequency

If the value of these capacitors is made larger, the starting time of amplifier is delayed further.

$C_5$  ( $C_6$ ): Output coupling capacitor

The recommended value is 10 $\mu$ F.

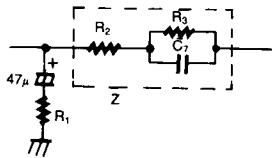
$R_2, R_3, C_7$  ( $R_4, R_5, C_4$ ): Equalizer network

The time constants of standard NAB characteristic are follow.

Tape speed	9.5cm/sec	4.75cm/sec
$C_7$ ( $R_2 + R_3$ )	3180 $\mu$ sec	1590 $\mu$ sec
$R_2, C_7$	90 $\mu$ sec	120 $\mu$ sec

$R_1$  ( $R_6$ ): Feedback component

The closed loop gain is determined approximately by the following relationship.



$$G_{VC} = 20 \log \frac{Z + R_1}{R_1} \quad (\text{dB})$$

$$Z = R_2 + R_3 // C_7$$

\* Choose  $R_2, R_3$ , (DC resistance of NAB element) as 100K $\Omega$  approximately.