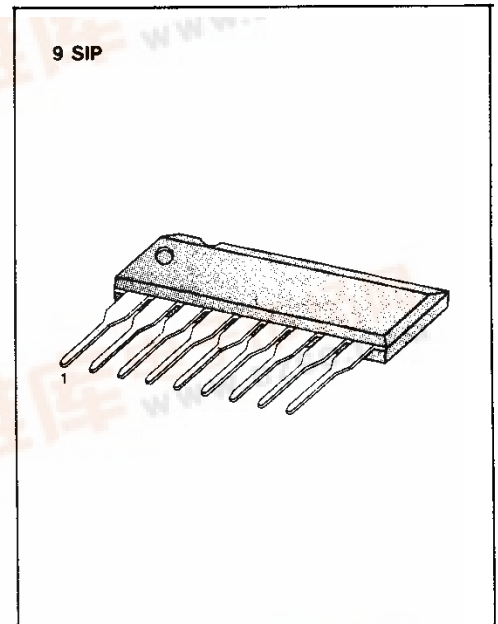


EQUALIZER AMPLIFIER WITH ALC

The KA2220 is a monolithic integrated circuit consisting of a preamplifier and ALC circuit for cassette tape recorders

FEATURES

- Low noise amplifier.
- Wide operating supply voltage range: $V_{CC} = 3.5V \sim 14V$
- High output voltage.
- Low distortion.
- Wide ALC range.
- KA2220 ST: Good ALC pair characteristic for stereo tape recorders



ORDERING INFORMATION

Device	Package	Operating Temperature
KA2220	9 SIP	-20°C ~ +70°C

BLOCK DIAGRAM

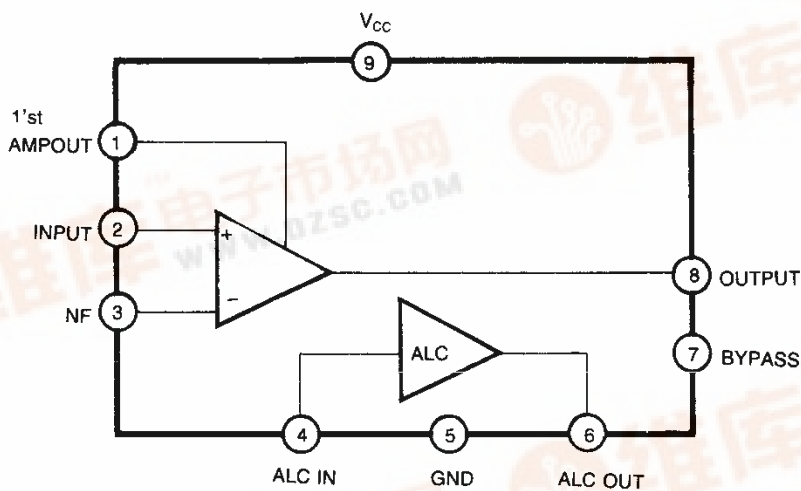


Fig. 1

ABSOLUTE MAXIMUM RATINGS (T_a = 25°C)

Characteristic	Symbol	Value	Unit
Supply Voltage	V _{CC}	15	V
Power Dissipation	P _D	200	mW
Operating Temperature	T _{OPR}	- 20 ~ + 70	°C
Storage Temperature	T _{STG}	- 40 ~ + 125	°C

ELECTRICAL CHARACTERISTICS

(T_a = 25°C, V_{CC} = 5V, R_L = 5.1KΩ, R_G = 600Ω, f = 1KHz, NAB, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Quiescent Circuit Current	I _{CCO}	V _I = 0, ALC OFF		1.4	2.0	mA
Open Loop Voltage Gain	G _{VO}		66	69		dB
Closed Loop Voltage Gain	G _{VC}	V _O = 0.7V	33	35	37	dB
Output Voltage	V _O	THD = 1%	0.7	1.0		V
Total Harmonic Distortion	THD	V _O = 0.2V		0.1		%
Input Resistance	R _I		60	100		KΩ
Equivalent Input Noise Voltage	V _{NI}	R _G = 2.2KΩ, NAB BW (- 3dB) = 15Hz ~ 30KHz		1.0		μV
ALC Transistor Saturation Voltage	V _{SAT}			75	100	mV

TEST CIRCUIT

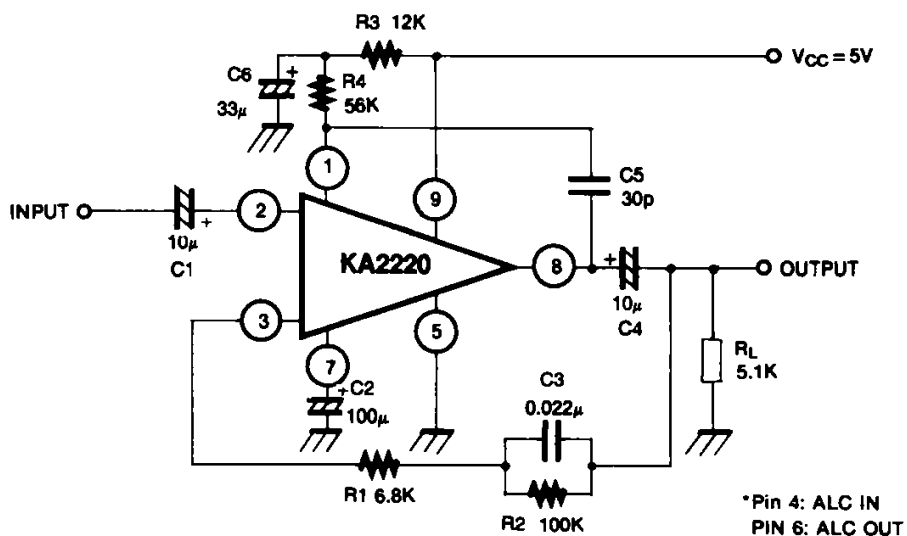
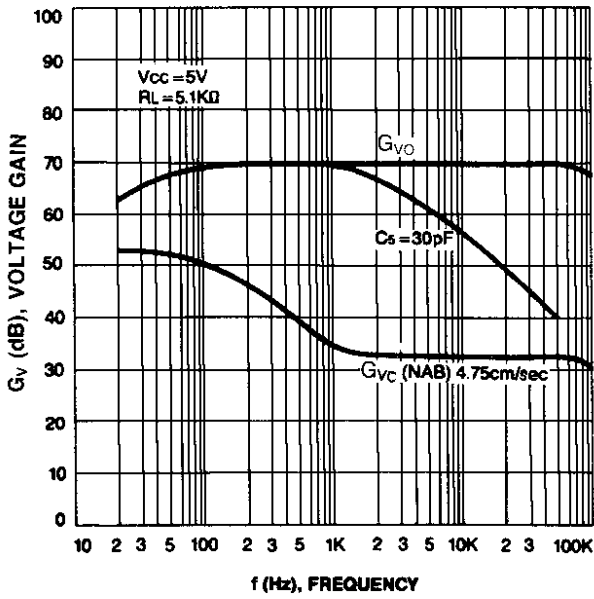
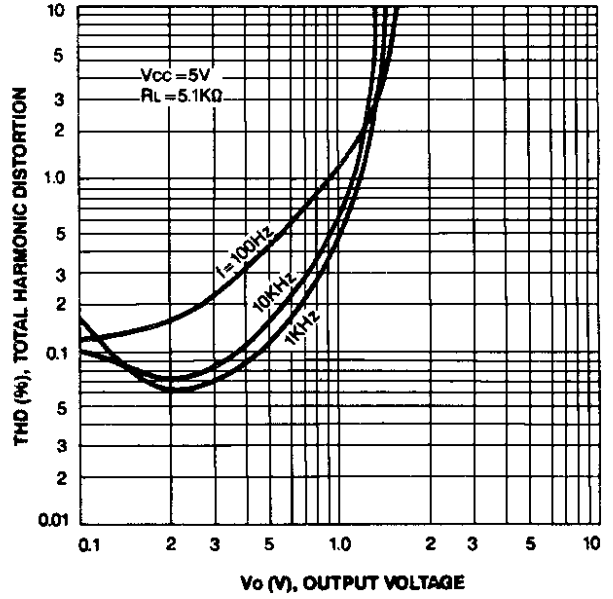


Fig. 2

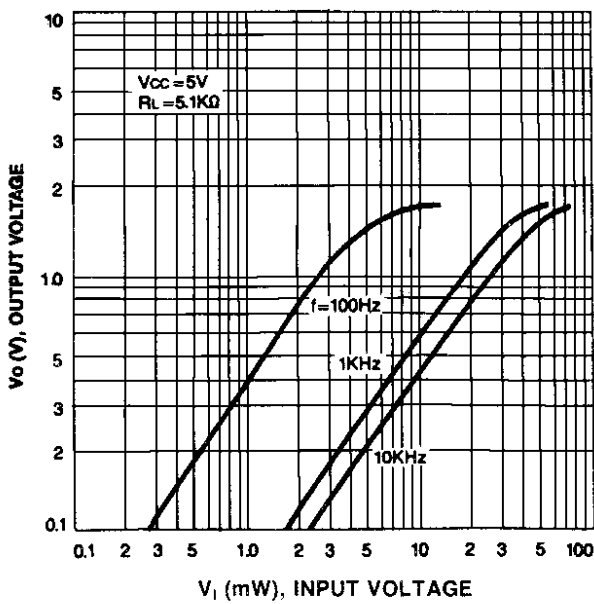
VOLTAGE GAIN-FREQUENCY



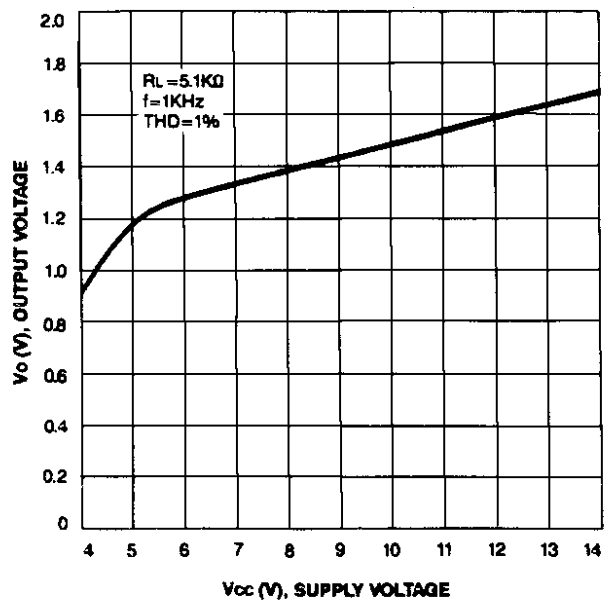
TOTAL HARMONIC DISTORTION-OUTPUT VOLTAGE



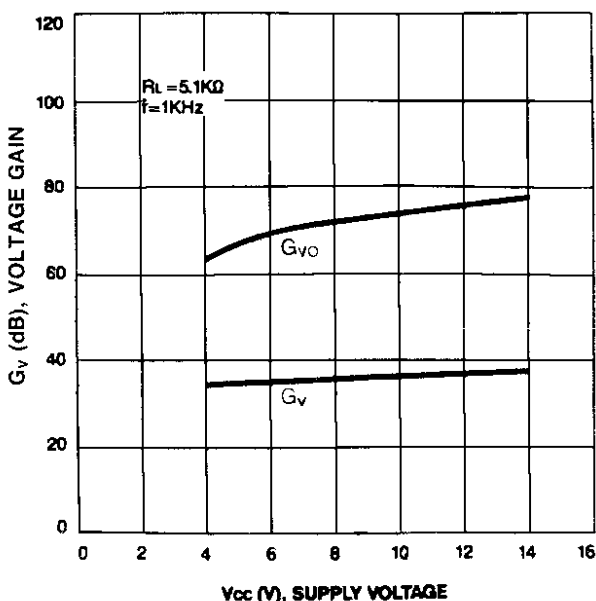
OUTPUT VOLTAGE-INPUT VOLTAGE



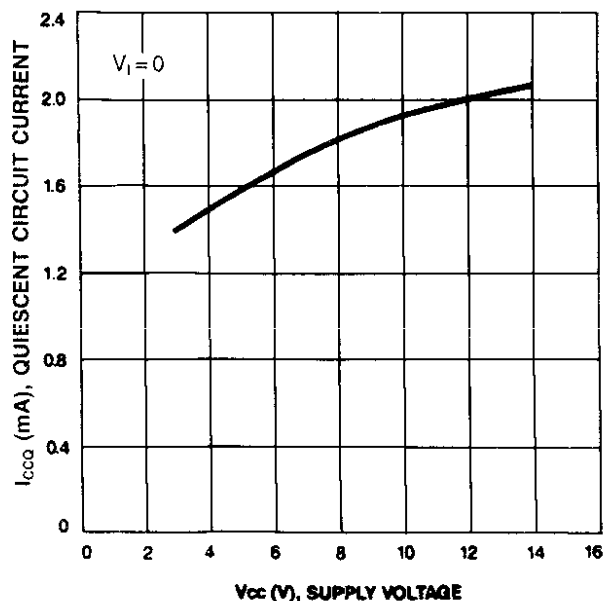
OUTPUT VOLTAGE-SUPPLY VOLTAGE

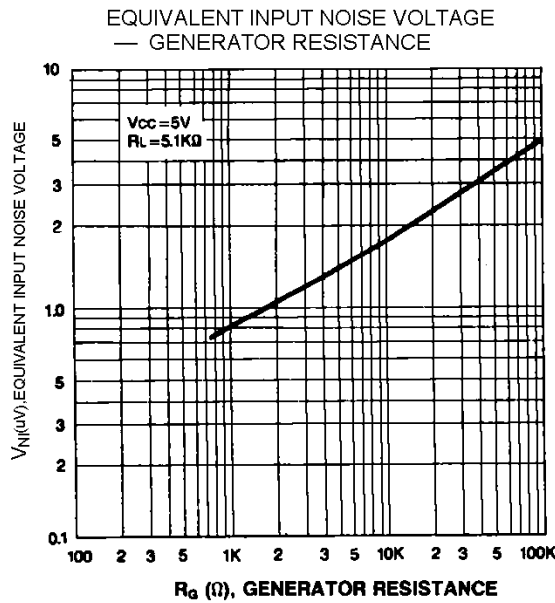


VOLTAGE GAIN-SUPPLY VOLTAGE



QUIESCENT CIRCUIT CURRENT-SUPPLY VOLTAGE





APPLICATION INFORMATION

ACL Grade Binning Table

Symbol	A_v (dB)		ALC Grade (dB)	
	Min	Max	Min	Max
KA2220 J	34	36	-16.0	-27.0
KA2220 M			-25.0	-34.0

External Components (Refer to test circuits)

C₁: Input coupling capacitor

The recommended value is 10μF. If made too small the low frequency characteristics will change for the worse, and too large a capacitance value will increase the rising time when power is applied.

C₂: Bypass capacitor

Short emitter resistor on the AC and prevents an AC signal from feedback to input.

C₃, R₁, R₂: Equalizer network

The closed loop voltage gain is determined by these components in relation to the internal resistance at Pin 3.

C₄: Output coupling capacitor

C₂ is determined as follows:

$$C_4 = \frac{1}{2\pi \cdot f_L \cdot R_L}$$

f_L: low cut-off frequency

R_L: load resistance

C₅: Phase compensation capacitor.

Prevents high frequency oscillation by phase error when feedback is heavy.

C₆: Ripple filter for power supply

A large value is required to get an excellent ripple characteristic under the line operation, but must be made smaller to shorten the starting time.

R₃: Filter resistance.

R₄: Collector resistor of first stage transistor of the IC

Low voltage characteristic can be improved by adjusting this resistance.

ALC GRADE BINNING TEST CIRCUIT

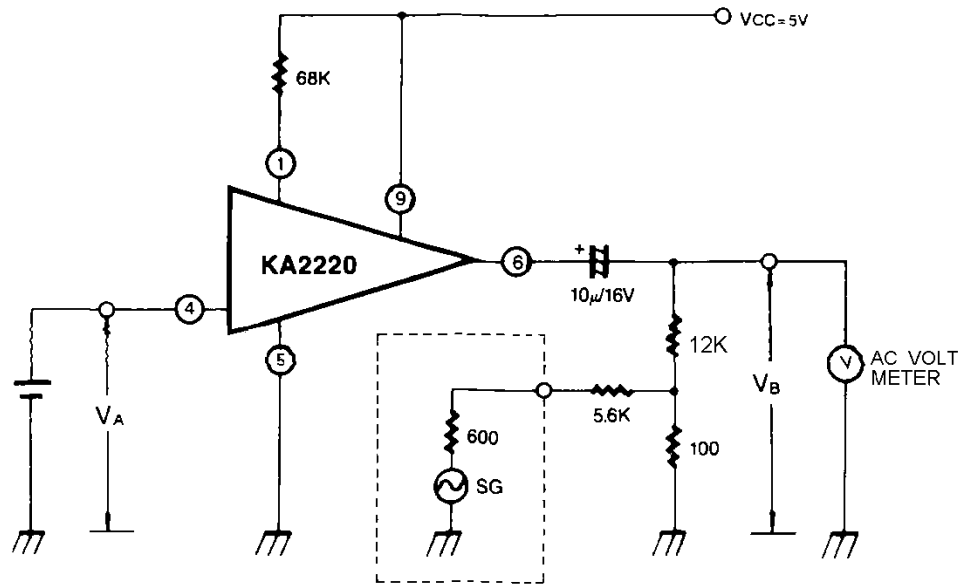


Fig. 3

Test condition: S.G output level should be adjusted to be 13.8mV of the AC voltmeter reading (V_B) when the D.U.T is not connected from the test circuit ($V_{CC} = 5V$, $V_A = 1.16V$, $T_a = 25^\circ C$)

ALC RANK is defined as $ALC-G.R = 20 \log V_{B2}/V_{B1}$

where

V_{B1} : AC voltmeter reading when the D.U.T is not connected

V_{B2} : AC voltmeter reading when the D.U.T is connected

APPLICATION CIRCUIT

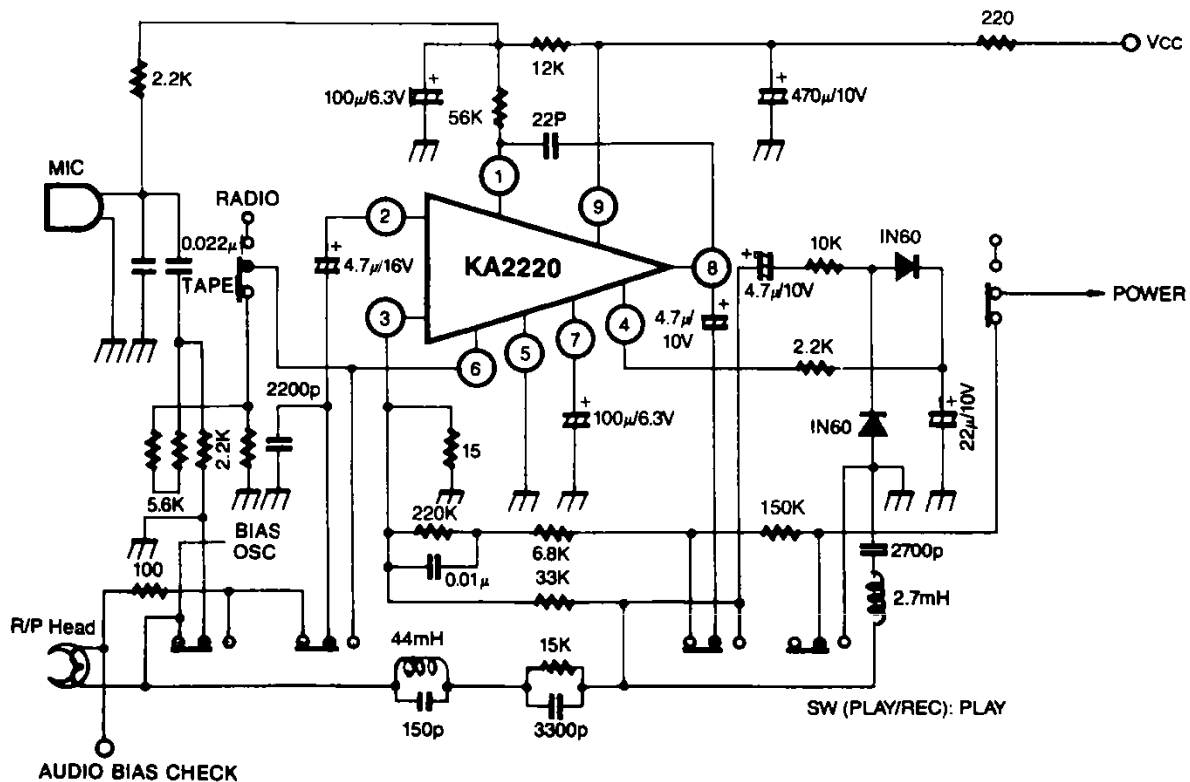


Fig. 4