

5-BAND GRAPHIC EQUALIZER AMPLIFIER

The KA22235 is a monolithic integrated circuit consisting of an operational amplifier, five resonant circuits with an active filter, and it is suitable for radio cassette tape recorders, car stereos or music center audio systems.

FEATURES

- Low peripheral parts.
- Low distortion (THD = 0.01% Typ. f = 1KHz Flat).
- Low noise ( $V_{NO} = 7\mu V$  Typ. Flat).
- Wide operating voltage range:  $V_{CC} = 3.5V \sim 16V$ .
- Recommended supply voltage:  $V_{CC} = 5V \sim 14V$ .
- Low current:  $I_{CC} = 5mA$  (Typ).
- Large allowable input ( $V_i = 2.1V$  Typ.  $V_{CC} = 8V, f = 1KHz$  Flat).
- Increasing the bands by adding resonant circuit or using two KA22235 in series.
- Built in input buffer, output buffer.

APPLICATIONS

- Radio Cassettes
- Home Stereos
- Car Stereos

BLOCK DIAGRAM

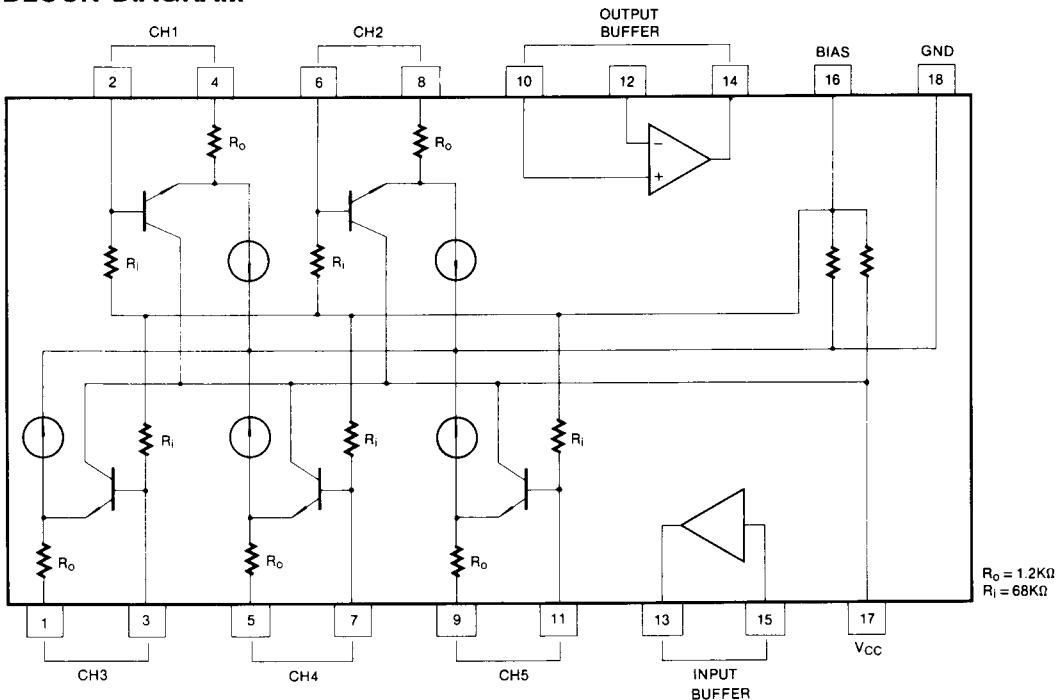
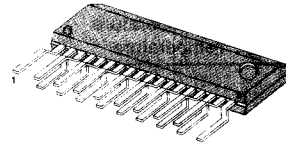


Fig. 1

18 ZSIP



ORDERING INFORMATION

Device	Package	Operating Temperature
KA22235	18 ZSIP	-20 ~ +70°C

ABSOLUTE MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

Characteristic	Symbol	Value	Unit
Supply Voltage	$V_{CC}$	16	V
Power Dissipation	$P_d$	550	mW
Operating Temperature	$T_{opr}$	-20 ~ +70	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-40 ~ +125	$^\circ\text{C}$

## ELECTRICAL CHARACTERISTICS

( $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 8\text{V}$ , unless otherwise specified)

Characteristic	Symbol	Test Conditions		Min	Typ	Max	Unit	
		f(Hz)	Condition					
Circuit Current	$I_{CC}$		$V_i = 0$	3.0	5.0	8.0	mA	
Output Voltage	$V_o$	1K	THD = 1%	1.5	2.1		V	
Total Harmonic Distortion	THD	1K	$V_o = 120\text{mV}$		0.01	0.1	%	
Output Noise Voltage	$V_{NO}$		$R_\theta = 0$ , Flat BW(-3dB)=10Hz ~ 30KHz		7.0	30	$\mu\text{V}$	
Voltage Gain	Flat	$A_v$ (Flat)	1K	$V_i = 200\text{mV}$	-2.5	0.5	1.5	dB
	Boost	$A_v$ (Boost)	100	$V_i = 200\text{mV}$	10.5	12.5	14.5	dB
			300					
			1K					
			3K					
			10K					
	Cut	$A_v$ (Cut)	100	$V_i = 200\text{mV}$	-14.5	-12.5	-10.5	dB
			300					
			1K					
			3K					
10K								

TEST CIRCUIT

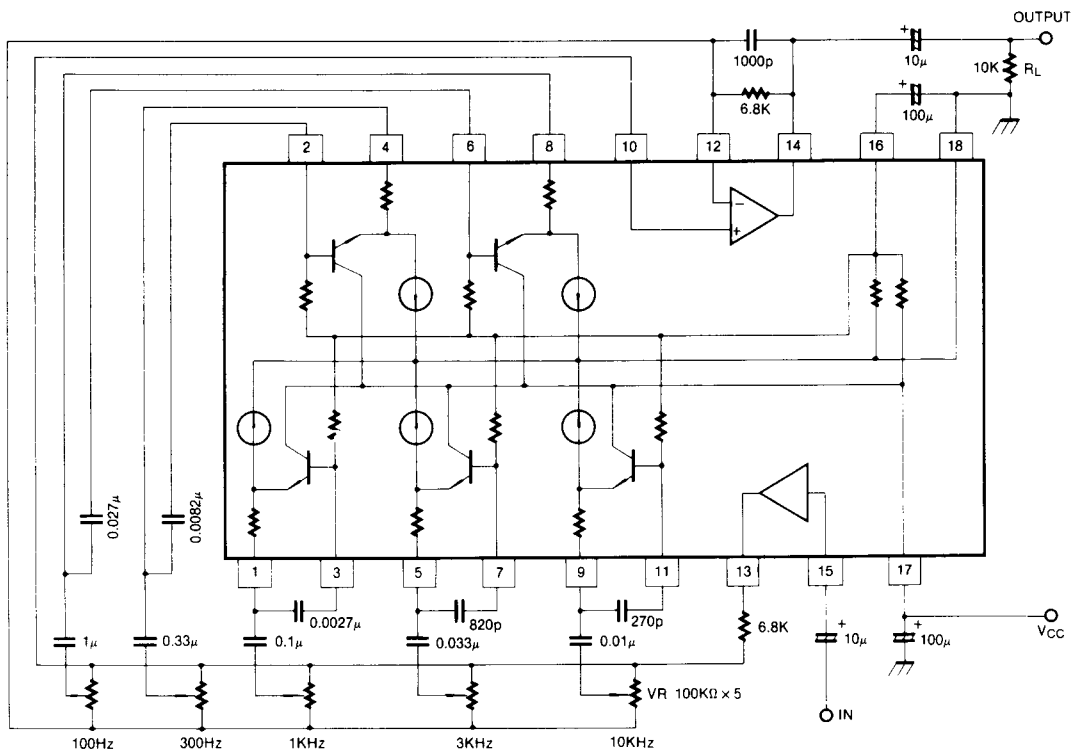


Fig. 2

APPLICATION CIRCUIT

(1) 10-Band Graphic Equalizer

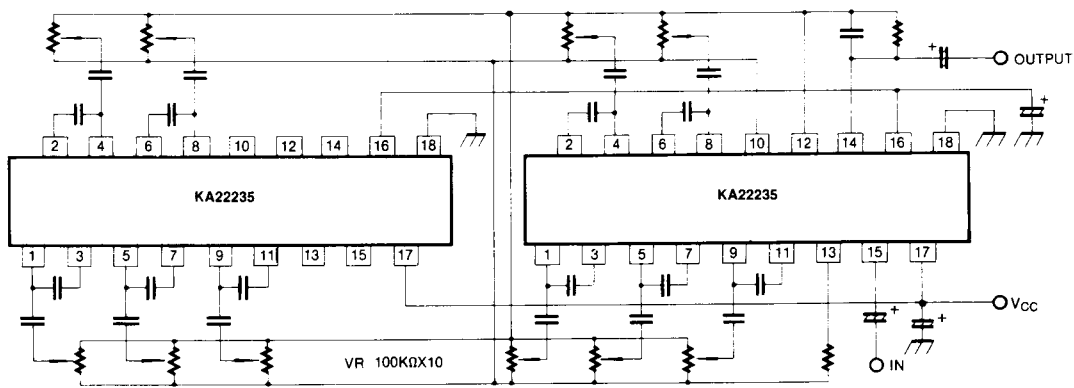


Fig. 3

3

(2) 7-Band Dual Graphic Equalizer

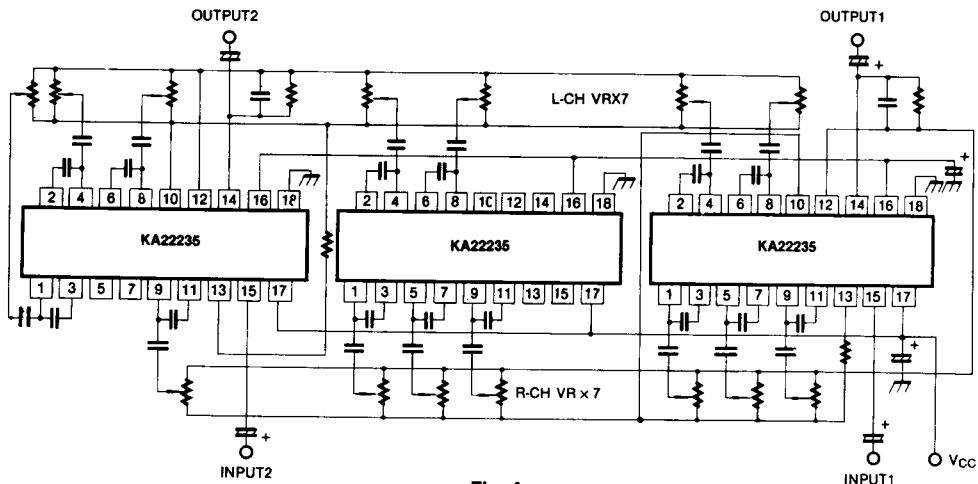


Fig. 4

SIMULATED INDUCTOR

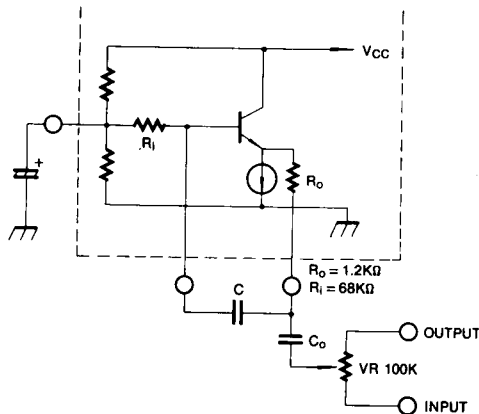


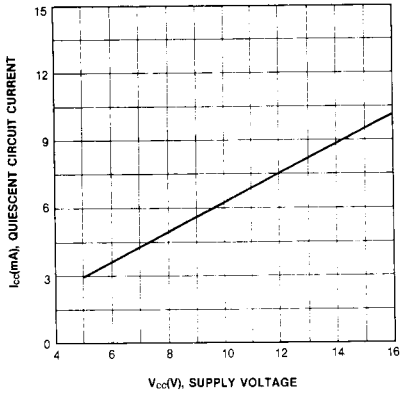
Fig. 5

As shown in Fig. 5, resonant frequency  $f_0$ , and selectivity  $Q$  are determined by the external capacitor,  $C$ ,  $C_0$ , and built-in resistor,  $R$ ,  $R_0$ , as follows:

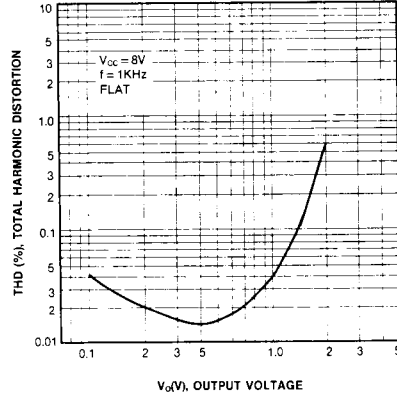
$$f_0(\text{Hz}) = \frac{1}{2\pi\sqrt{R_0 R_i C C_0}} \quad Q = \sqrt{\frac{C R_0}{C_0 R_i}}$$

where  $R_i = 68\text{K}\Omega$ ,  $R_0 = 1.2\text{K}\Omega$

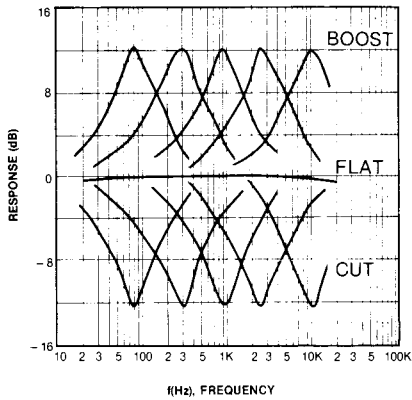
QUIESCENT CIRCUIT CURRENT-SUPPLY VOLTAGE



TOTAL HARMONIC DISTORTION-OUTPUT VOLTAGE



FREQUENCY RESPONSE



3