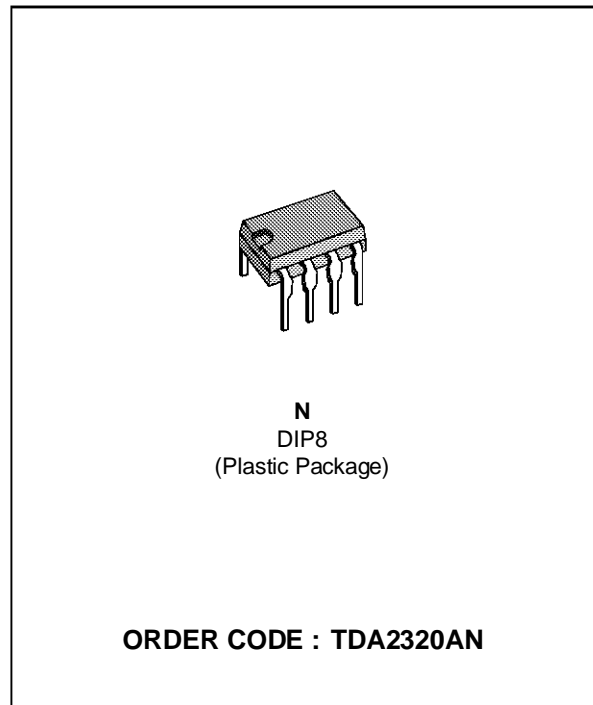


**STEREO AMPLIFIER**

- WIDE SUPPLY VOLTAGE RANGE (3 to 36V)
- SINGLE OR SPLIT SUPPLY OPERATION
- VERY LOW CURRENT CONSUMPTION (0.8mA)
- VERY LOW DISTORTION
- NO POP-NOISE

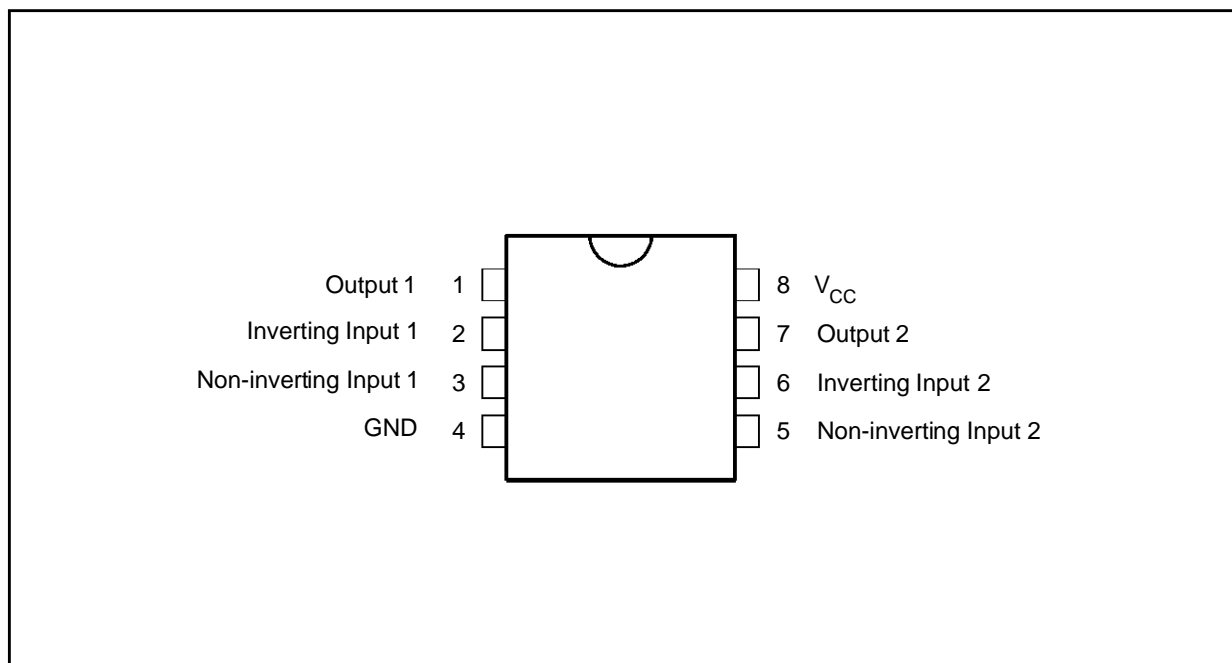


**DESCRIPTION**

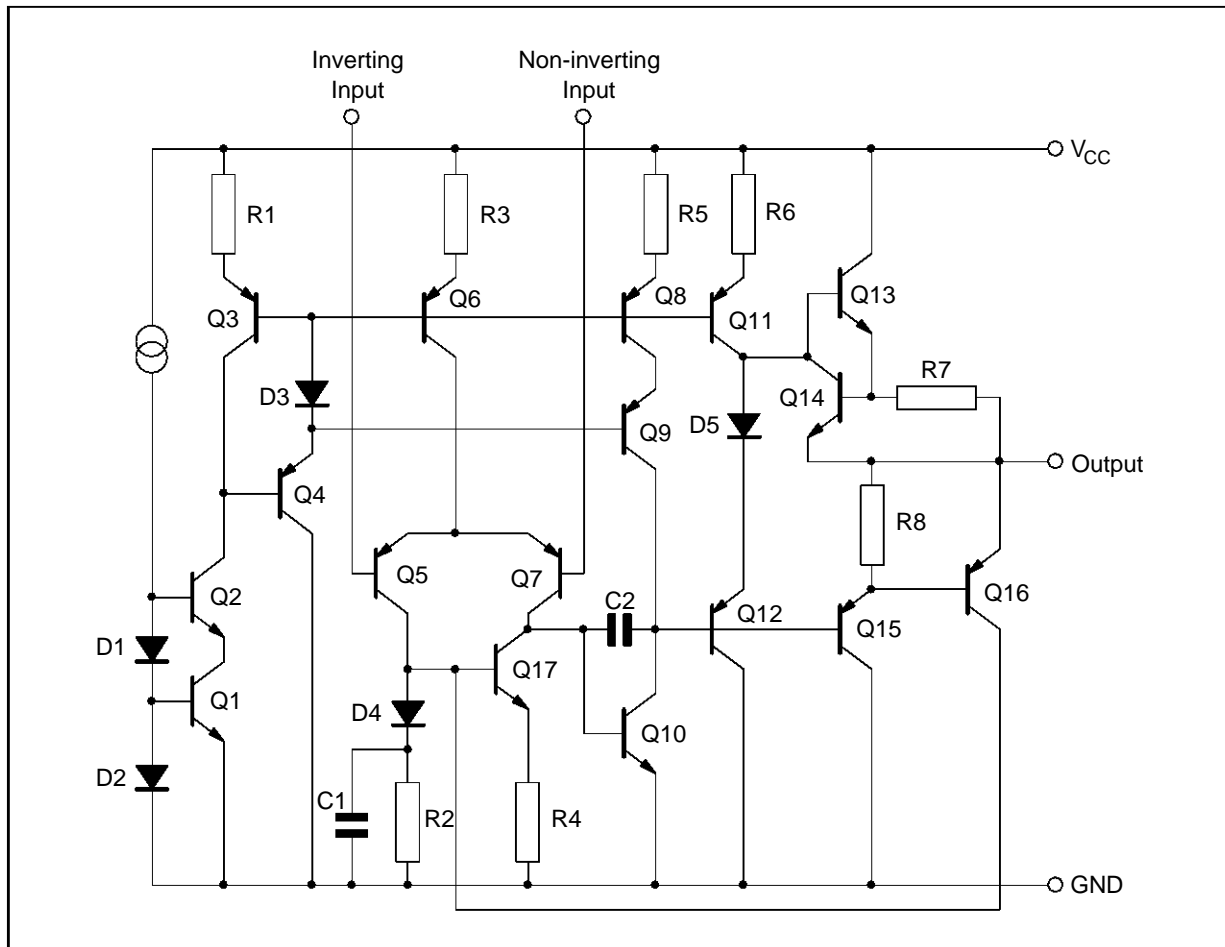
The TDA2320A is a stereo class A preamplifier intended for application in portable cassette players and high quality audio systems.

The TDA2320A is a monolithic integrated circuit in a 8 lead plastic dip.

**PIN CONNECTIONS (top view)**



**SCHEMATIC DIAGRAM (1/2 TDA2320A)**



2320A-02.EPS

**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	36	V
P <sub>tot</sub>	Total Power Dissipation at T <sub>amb</sub> = 70°C	400	mW
T <sub>stg</sub> , T <sub>j</sub>	Storage and Junction Temperature	-40 to 150	°C

2320A-01.TBL

**ELECTRICAL CHARACTERISTICS**V<sub>CC</sub> = 15V, T<sub>amb</sub> = 25°C (unless otherwise specified) (refer to the test circuits)

Symbol	Parameter	Min.	Typ.	Max.	Unit
V <sub>CC</sub>	Supply Voltage (*)	3		36	V
I <sub>CC</sub>	Supply Current (*)		0.8	2	mA
I <sub>ib</sub>	Input Bias Current		150	500	nA
V <sub>io</sub>	Input Offset Voltage R <sub>s</sub> ≤ 10kΩ		1	5	mV
I <sub>io</sub>	Input Offset Current		10	50	nA
A <sub>vd</sub>	Open Loop Voltage Gain V <sub>CC</sub> = 15V f = 333Hz f = 1kHz f = 10kHz V <sub>CC</sub> = 4.5V f = 1kHz		80 70 50 70		dB
V <sub>OPP</sub>	Output Voltage Swing (f = 1kHz, R <sub>L</sub> = 600Ω) (*) V <sub>CC</sub> = 15V V <sub>CC</sub> = 4.5V		13 2.5		V
GBP	Gain-bandwidth Product f = 20kHz	1.5	2.5		MHz
FBP	Power Bandwidth (*) V <sub>o</sub> = 5V <sub>PP</sub> , THD = 1%	40	70		kHz
SR	Slew Rate (*)	1	1.6		V/μs
THD	Distortion (V <sub>o</sub> = 2V, A <sub>V</sub> = 20dB) (*) f = 1kHz f = 10kHz		0.03 0.08		%
e <sub>n</sub>	Equivalent Input Noise Voltage (**) Curve A B = 22Hz to 22kHz f = 1kHz R <sub>s</sub> = 50Ω R <sub>s</sub> = 600Ω R <sub>s</sub> = 5kΩ R <sub>s</sub> = 50Ω R <sub>s</sub> = 600Ω R <sub>s</sub> = 5kΩ R <sub>s</sub> = 600Ω		1 1.1 1.5 1.3 1.5 2 9	1.4	μV      nV√Hz
V <sub>O1</sub> /V <sub>O2</sub>	Channel Separation (**) f = 1kHz		100		dB
SVR	Supply Voltage Rejection Ratio(**) f = 100Hz		80		dB

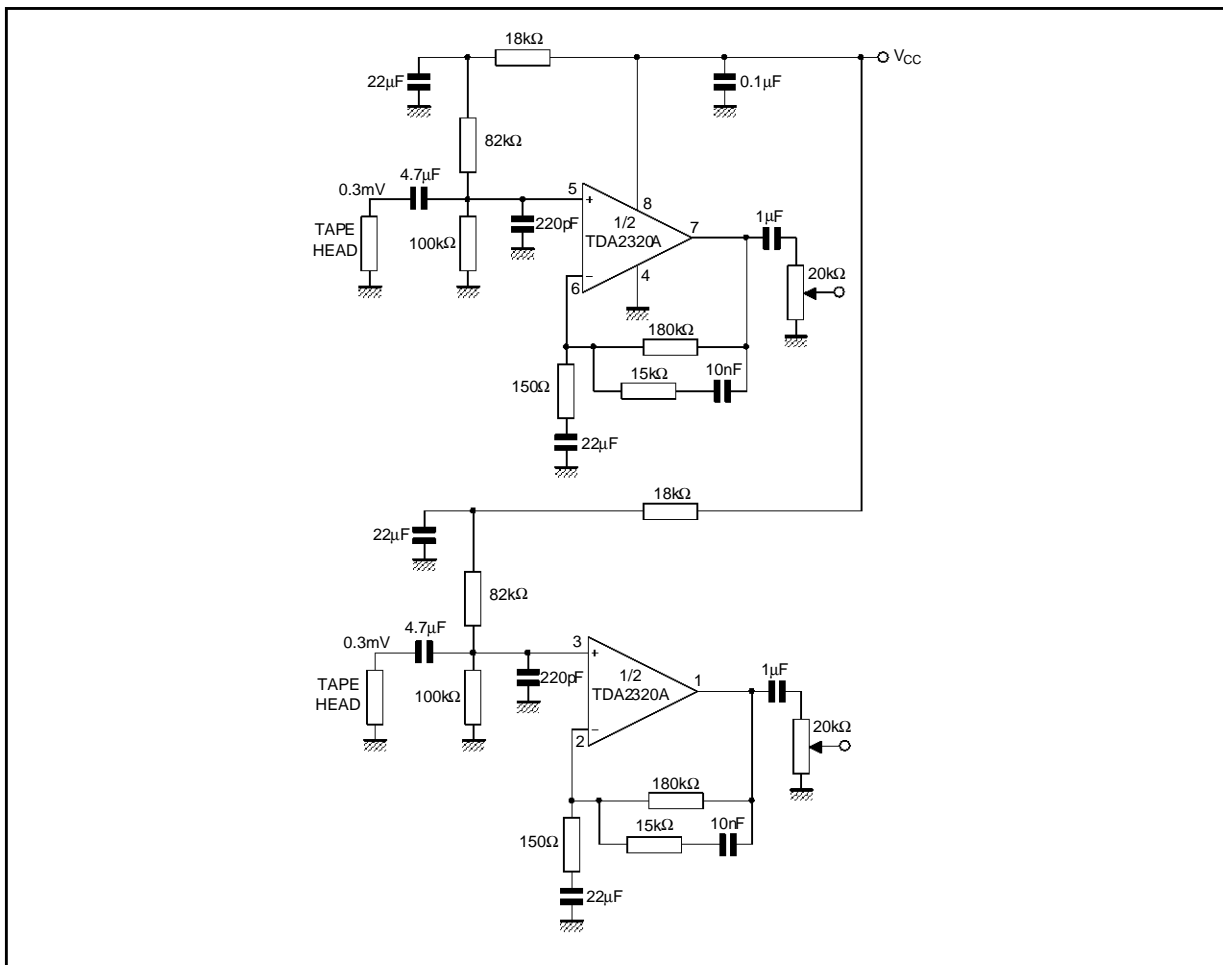
(\*) Test circuit of figure 1

(\*\*) Test circuit of figure 2

2320A-02.TBL

TYPICAL APPLICATION

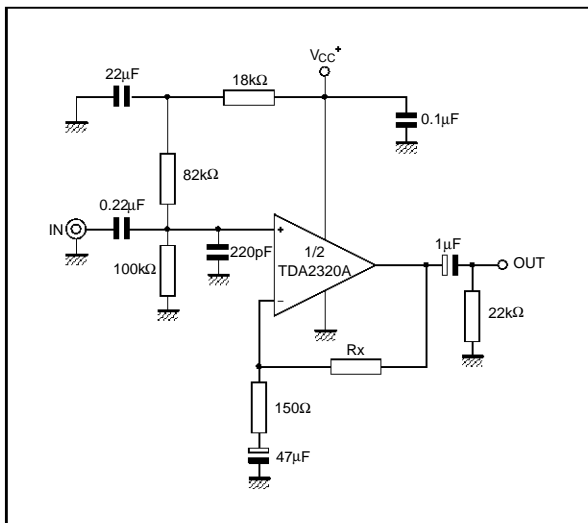
STEREO PREAMPLIFIER FOR CASSETTE PLAYERS



2320A-03.EPS

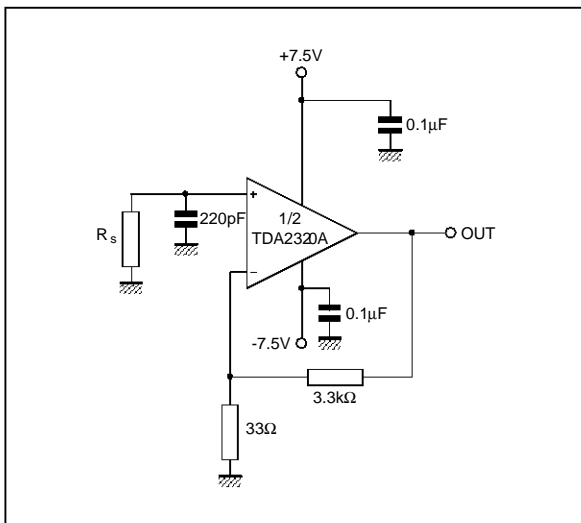
TEST CIRCUITS

Figure 1



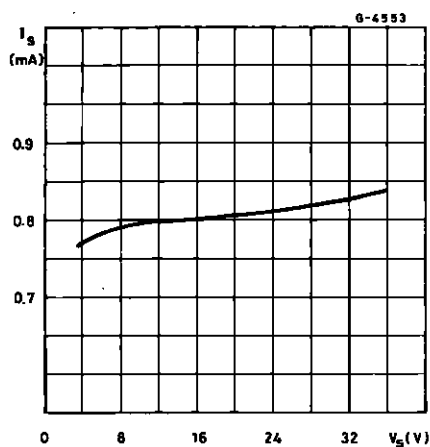
2320A-04.EPS

Figure 2



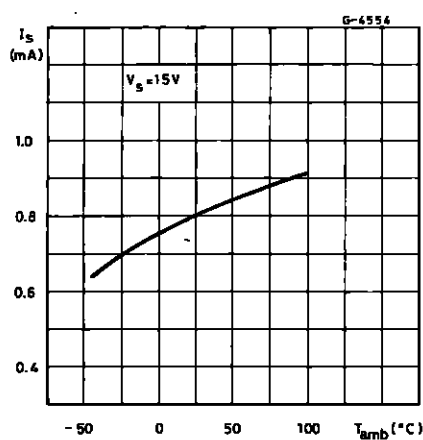
2320A-05.EPS

**Figure 3 :** Supply Current versus Supply Voltage



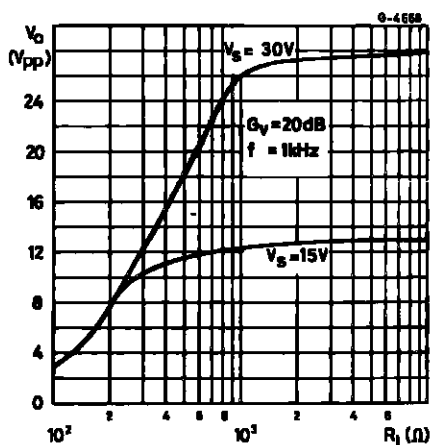
2320A-06.EPS

**Figure 4 :** Supply Current versus Ambient Temperature



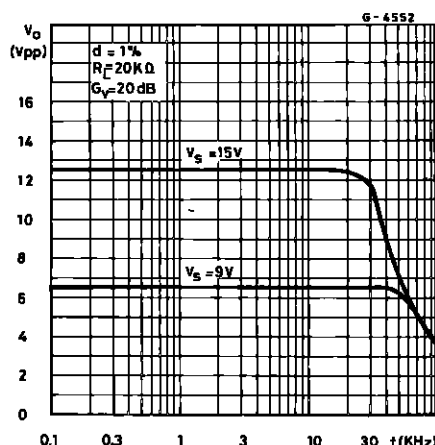
2320A-07.EPS

**Figure 5 :** Output Voltage Swing versus Load Resistance



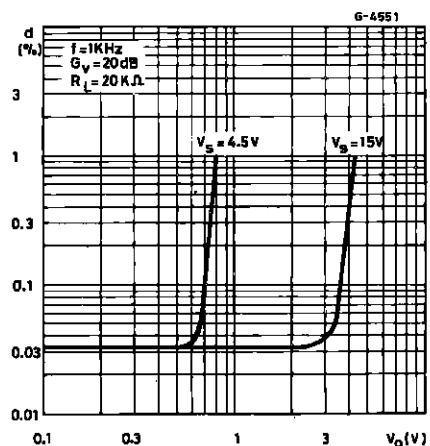
2320A-08.EPS

**Figure 6 :** Power Bandwidth



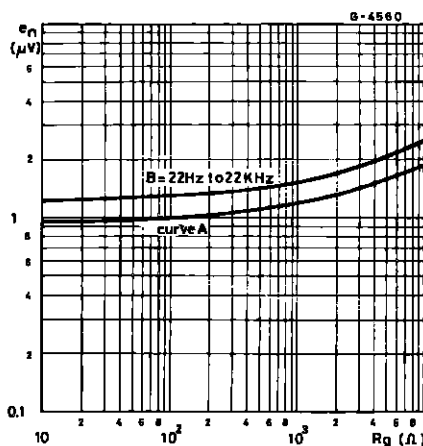
2320A-09.EPS

**Figure 7 :** Total Harmonic Distortion versus Output Voltage



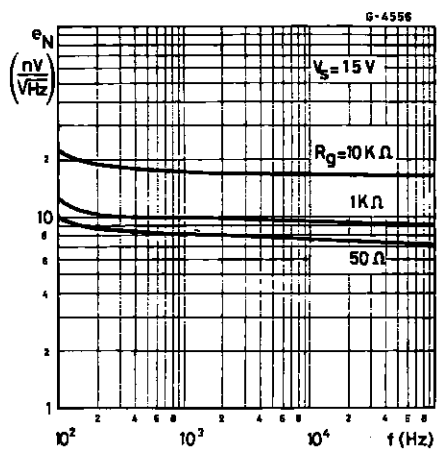
2320A-10.EPS

**Figure 8 :** Total Input Noise versus Source Resistance



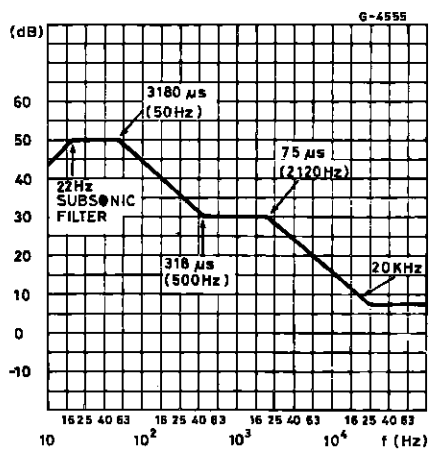
2320A-11.EPS

Figure 9 : Noise Density versus Frequency



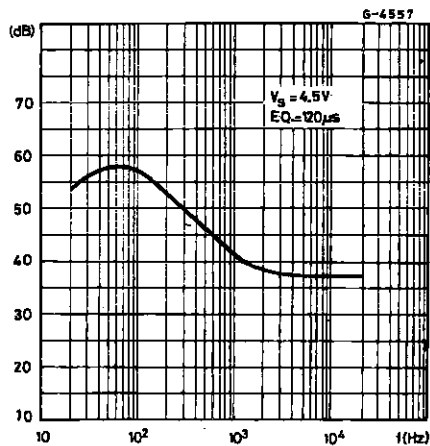
2320A-12.EPS

Figure 10 :RIAA Preamplifier Response



2320A-13.EPS

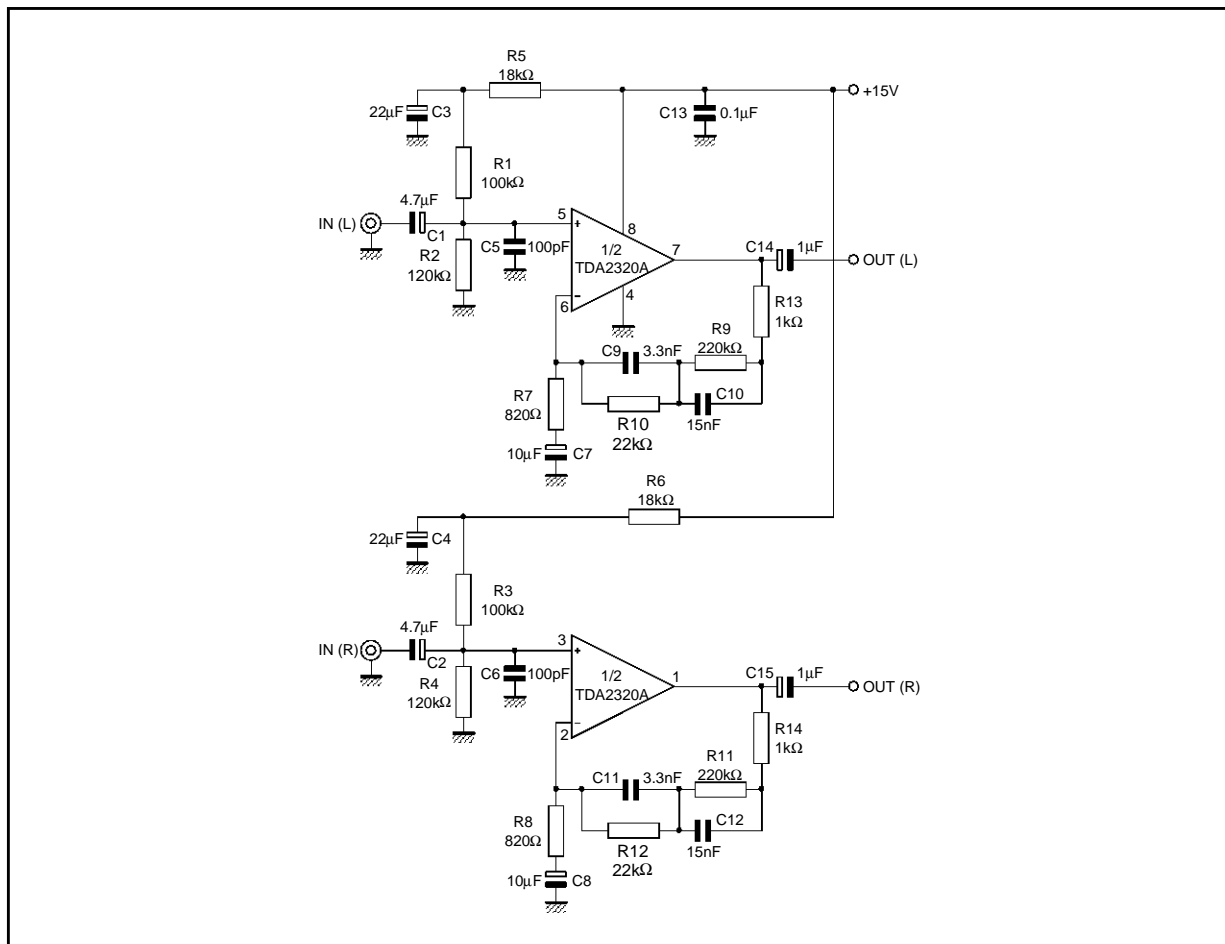
Figure 11 :Tape Preamplifier Frequency



2320A-14.EPS

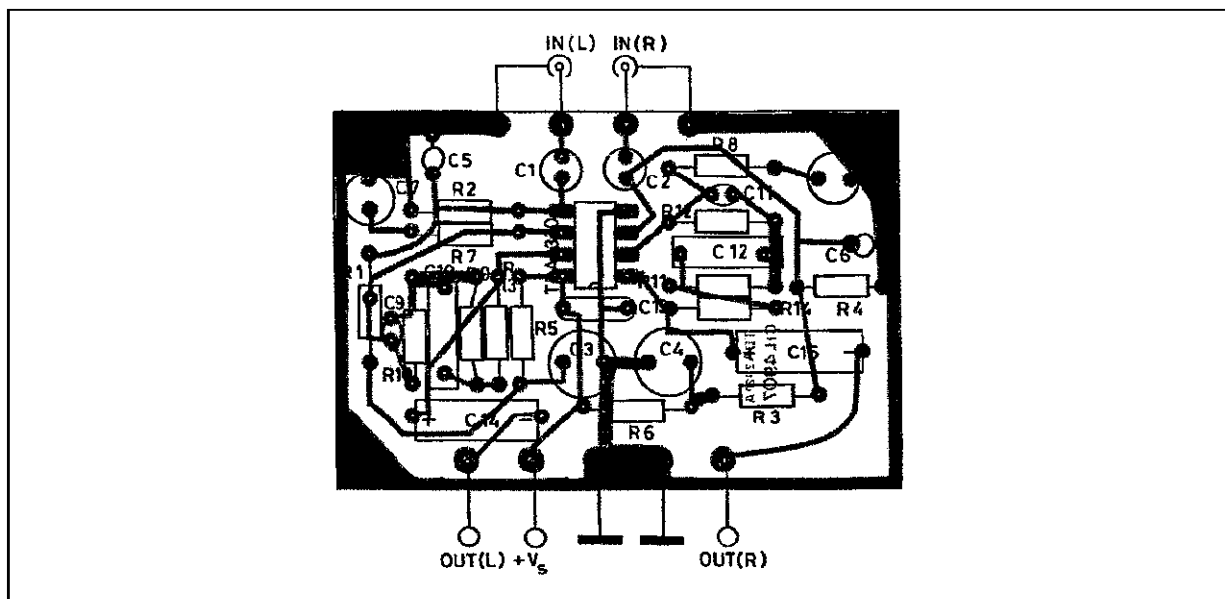
APPLICATION INFORMATION

Figure 12 :Stereo RIAA Preamplifier



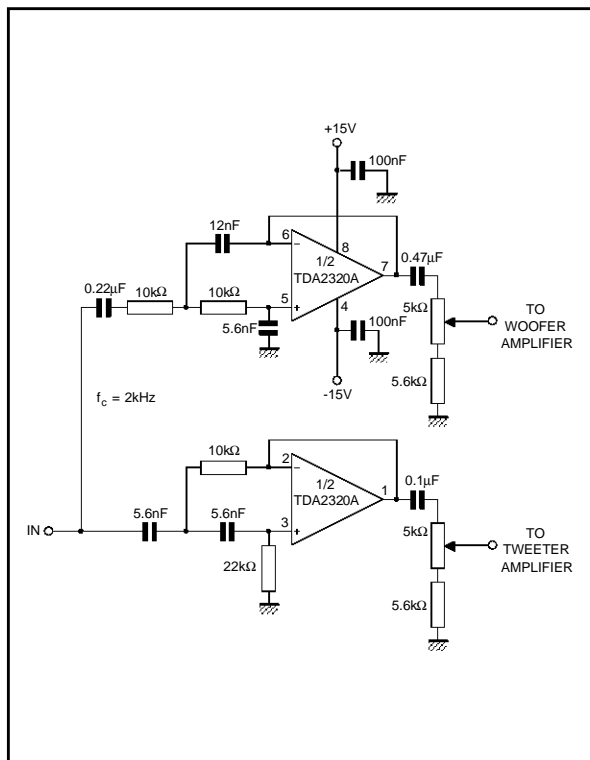
2320A-15.EPS

Figure 13 :P.C. Board and Components layout of the Circuit of figure 12



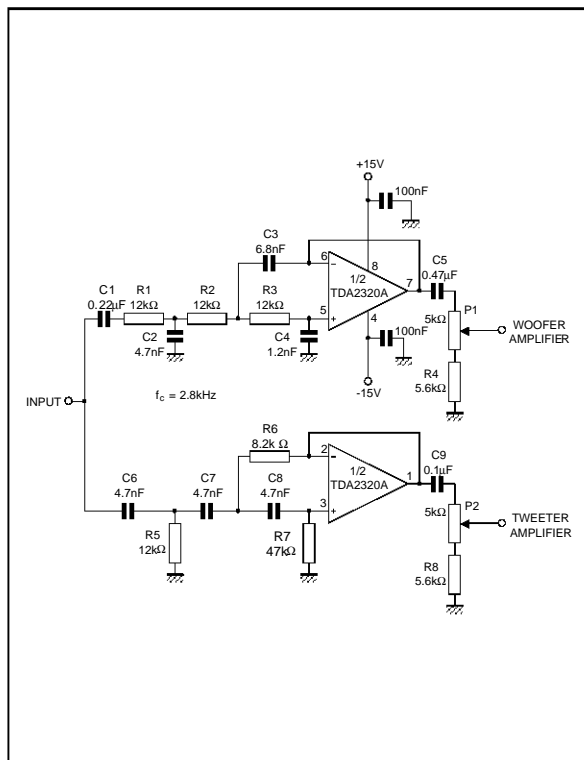
2320A-16.TIF

**Figure 14** : Second Order 2kHz Butterworth Crossover Filter for Hi-Fi Active Boxes



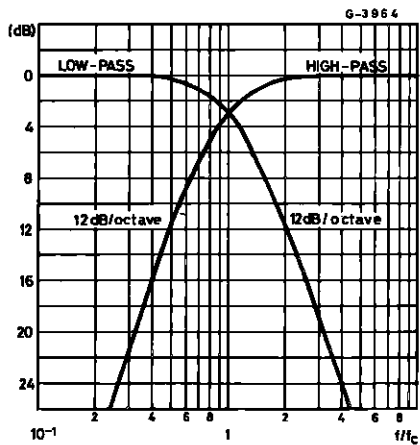
2320A-17.EPS

**Figure 15** : Third Order 2.8kHz Bessel Crossover Filter for Hi-Fi Active Boxes



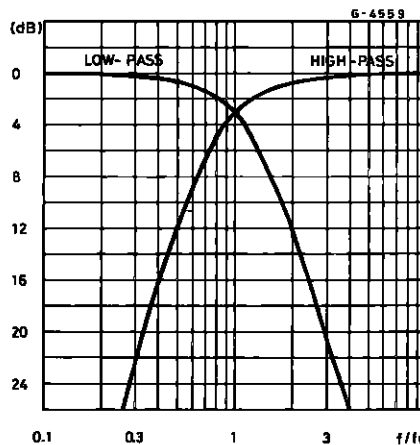
2320A-18.EPS

**Figure 16** : Frequency Response (circuit of figure 14)



2320A-19.EPS

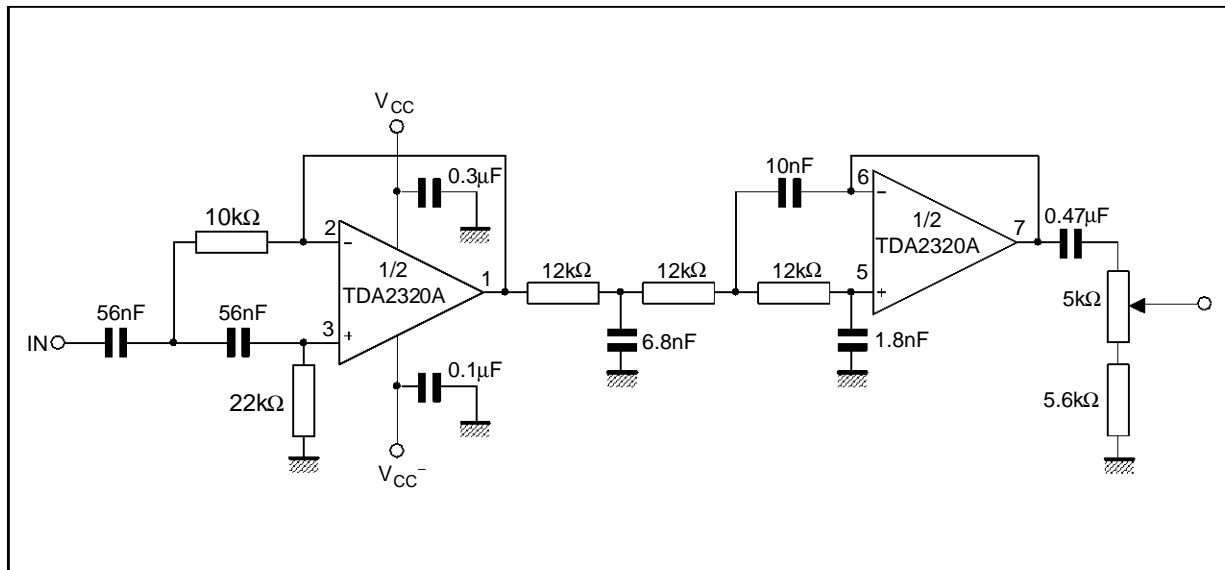
**Figure 17** : Frequency Response (circuit of figure 15)



2320A-20.EPS

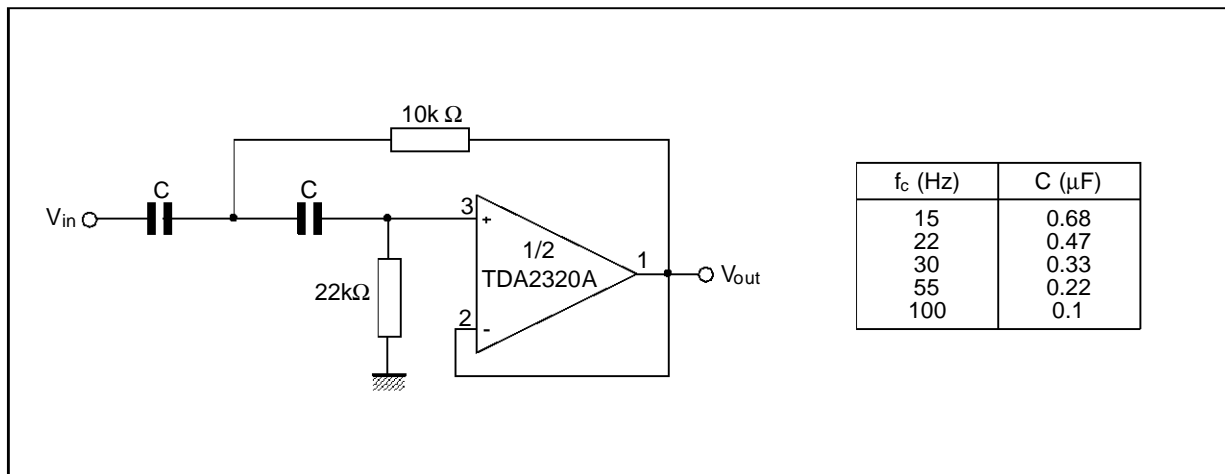


Figure 18 : 200Hz to 2kHz Active Bandpass Filter for Midrange Speakers



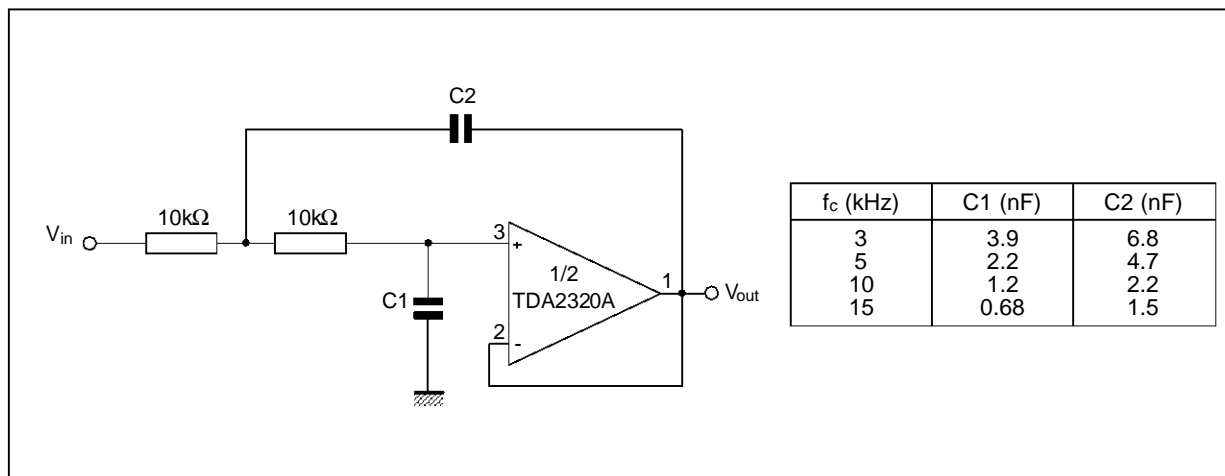
2320A-21.EPS

Figure 19 : Subsonic Filter



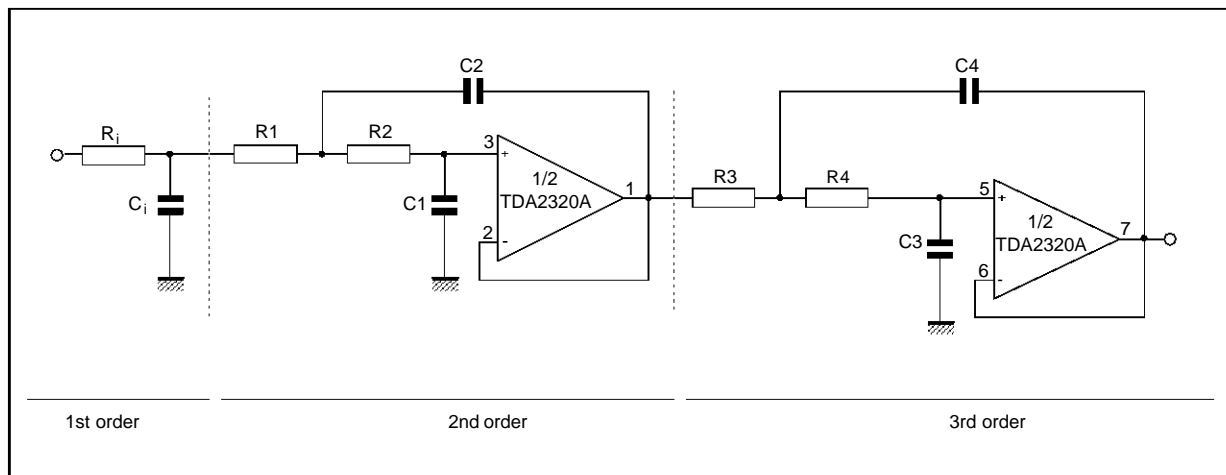
2320A-22.EPS

Figure 20 : High-cut Filter



2320A-23.EPS

Figure 21 :Fifth Order 3.4kHz Low-pass Butterworth Filter



2320A-24.EPS

For  $f_c = 3.4\text{kHz}$  and  $R_i = R_1 = R_2 = R_3 = R_4 = 10\text{k}\Omega$ , we obtain :

$$C_1 = 1.354 \cdot \frac{1}{R} \cdot \frac{1}{2\pi f_c} = 6.33\text{nF}$$

$$C_3 = 0.309 \cdot \frac{1}{R} \cdot \frac{1}{2\pi f_c} = 1.45\text{nF}$$

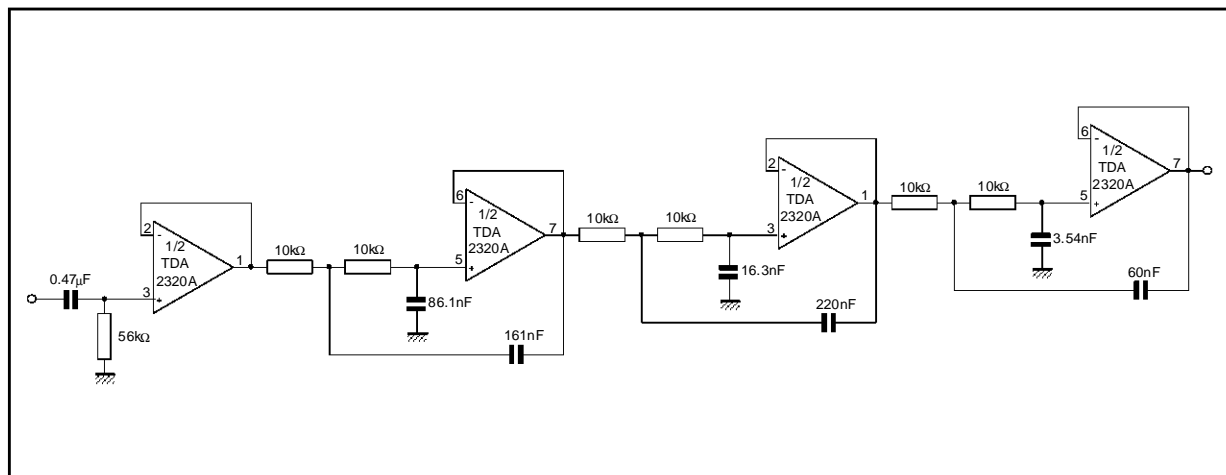
$$C_2 = 0.421 \cdot \frac{1}{R} \cdot \frac{1}{2\pi f_c} = 1.97\text{nF}$$

$$C_4 = 3.325 \cdot \frac{1}{R} \cdot \frac{1}{2\pi f_c} = 15.14\text{nF}$$

$$C_2 = 1.753 \cdot \frac{1}{R} \cdot \frac{1}{2\pi f_c} = 8.20\text{nF}$$

The attenuation of the filter is 30dB at 6.8kHz and better than 60dB at 15kHz.

Figure 22 :Sixth-pole 355Hz Low-pass Filter (Chebychev type)

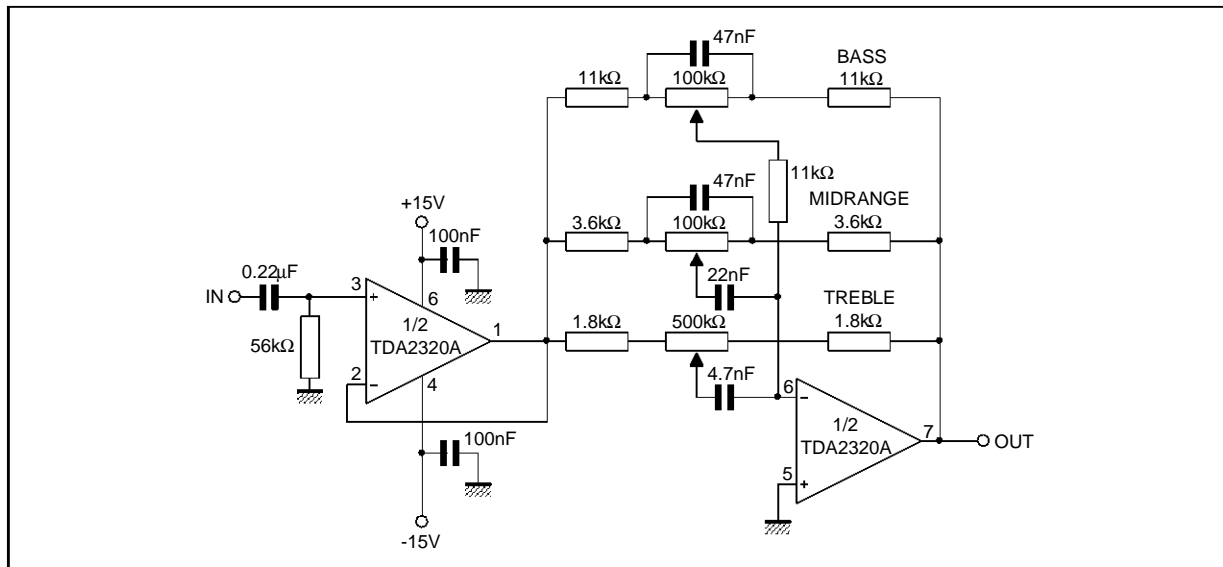


2320A-25.EPS

This is a 6-pole Chebychev type with  $\pm 0.25\text{dB}$  ripple in the passband. A decoupling stage is used to avoid the influence of the input impedance of the filter's characteristics.

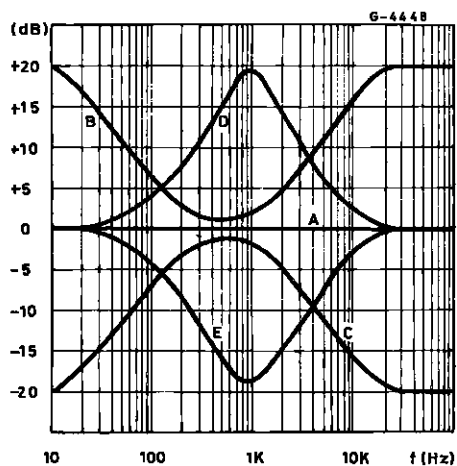
The attenuation is about 55dB at 710Hz and reaches 80dB at 1065Hz. The in band attenuation is limited in practice to the  $\pm 0.25\text{dB}$  ripple and does not exceed  $1/2\text{dB}$  at  $0.9f_c$ .

Figure 23 : Three Band Tone Control



2320A-26.EPS

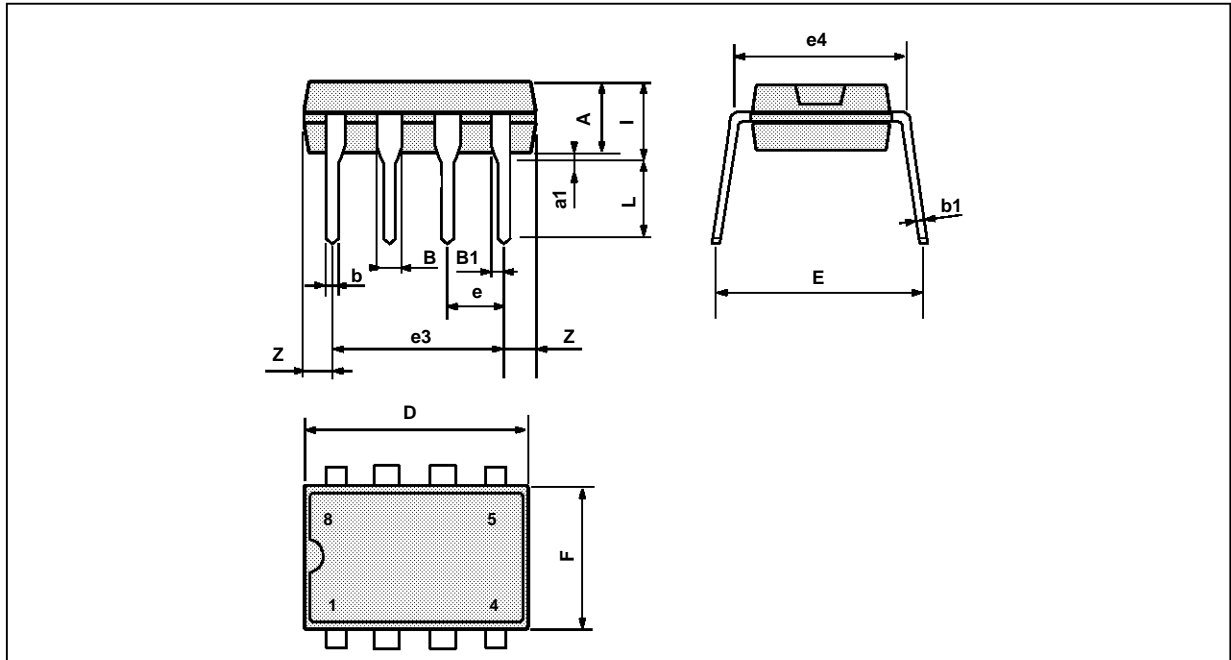
Figure 24 :Frequency Response of the Circuit of figure 23



- A : all controls flat
- B : bass & treble boost, mid flat
- C : bass & treble cut, mid flat
- D : mid boost, bass & treble flat
- E : mid cut, bass treble flat

2320A-27.EPS

**PACKAGE MECHANICAL DATA**  
8 PINS -PLASTIC DIP



PM-DIP8.EPS

Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		3.32			0.131	
a1	0.51			0.020		
B	1.15		1.65	0.045		0.065
b	0.356		0.55	0.014		0.022
b1	0.204		0.304	0.008		0.012
D			10.92			0.430
E	7.95		9.75	0.313		0.384
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			6.6			0.260
i			5.08			0.200
L	3.18		3.81	0.125		0.150
Z			1.52			0.060

DIP8.TBL

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