SGS-THOMSON MICROELECTRONICS

TDA2320A

MINIDIP STEREO PREAMPLIFIER

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

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 a 8 lead minidip.

Minidip Plastic

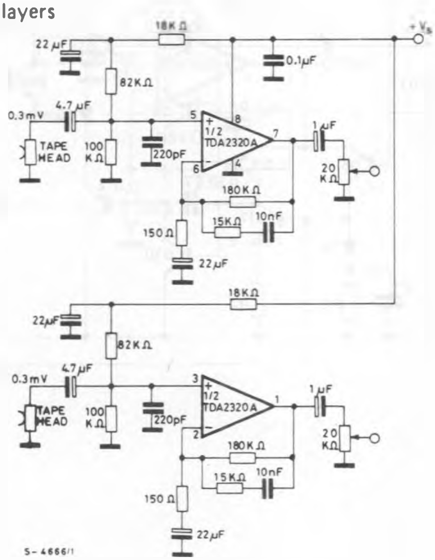
ORDERING NUMBER: TDA 2320A

ABSOLUTE MAXIMUM RATINGS

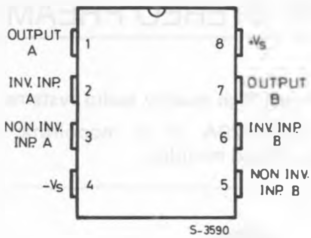
V_s	Supply voltage	36	V
P_{tot}	Total power dissipation at $T_{amb} = 70°C$	400	mW
$T_{stg, j}$	Storage and junction temperature	-40 to 150	°C

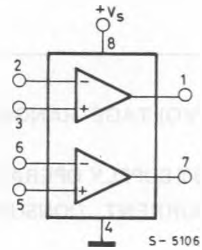
TYPICAL APPLICATION:

Stereo preamplifier for cassette players

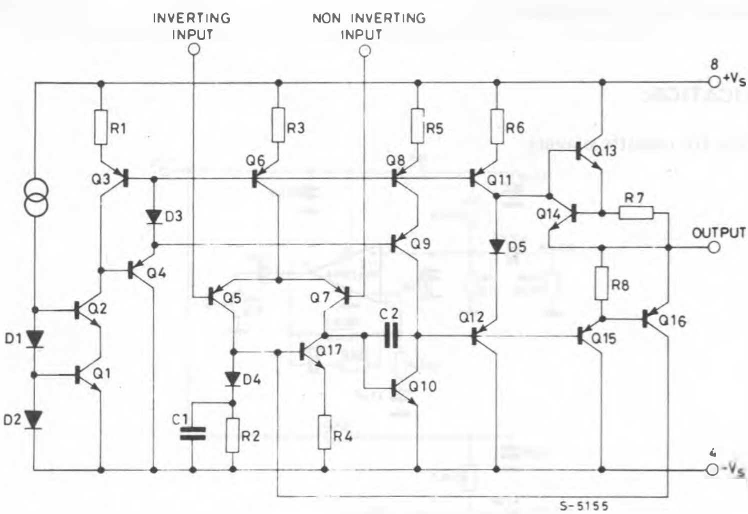


CONNECTION AND BLOCK DIAGRAM
(top view)





SCHEMATIC DIAGRAM
(one section)



TEST CIRCUITS

Fig. 1

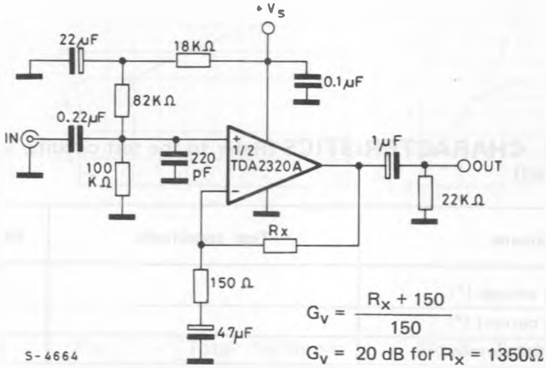
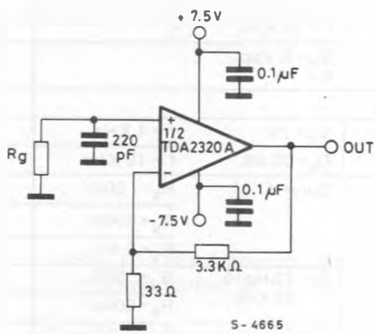


Fig. 2



THERMAL DATA

$R_{th\ j\text{-}amb}$	Thermal resistance junction-ambient	max	200	°C/W

ELECTRICAL CHARACTERISTICS (Refer to the test circuits, V_s = 15V, T_{amb} = 25°C, unless otherwise specified)

	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_s	Supply voltage (*)			3		36	V
I_s	Supply current (*)				0.8	2	mA
I_b	Input bias current				150	500	nA
V_{os}	Input offset voltage	R_g < 10 KΩ			1	5	mV
I_{os}	Input offset current				10	50	nA
G_v	Open loop voltage gain	V_s = 15V	f = 333 Hz		80		dB
			f = 1 KHz		70		
			f = 10 KHz		50		
		V_s = 4.5V	f = 1 KHz		70		
V_o	Output voltage swing (*)	f = 1 KHz	V_s = 15V		13		Vpp
		R_L = 600Ω	V_s = 4.5V		2.5		
B	Gain-bandwidth product	f = 20 KHz		1.5	2.5		MHz
BW	Power bandwidth (*)	V_o = 5 Vpp d = 1%		40	70		KHz
SR	Slew rate (*)			1	1.6		V/μS
d	Distortion (*)	V_o = 2V	f = 1 KHz		0.03		%
		G_v = 20 dB	f = 10 KHz		0.08		
e_N	Total input noise voltage (**)	Curve A	R_g = 50Ω		1		μV
			R_g = 600Ω		1.1	1.4	
			R_g = 5 KΩ		1.5		
		B = 22 Hz to 22 KHz	R_g = 50Ω		1.3		μV
			R_g = 600Ω		1.5		
			R_g = 5 KΩ		2		
		f = 1 KHz	R_g = 600Ω		9		$nV/\sqrt{Hz}$
Cs	Channel separation (**)		f = 1 KHz		100		dB
SVR	Supply voltage (**) rejection		f = 100 Hz		80		dB

(*) Test circuit of fig. 1.
(**) Test circuit of fig. 2.

Fig. 3 - Supply current vs. supply voltage

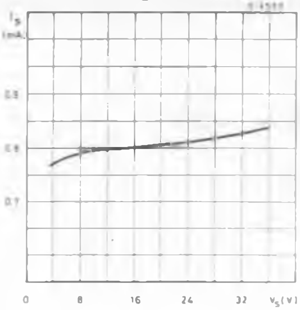


Fig. 4 - Supply current vs. ambient temperature

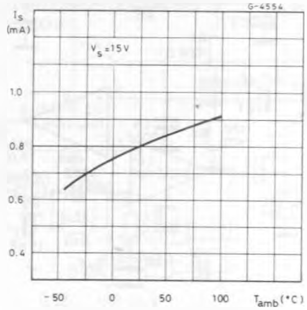


Fig. 5 - Output voltage swing vs. load resistance

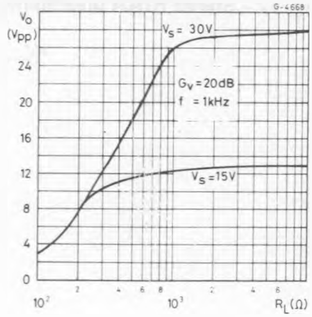


Fig. 6 - Power bandwidth

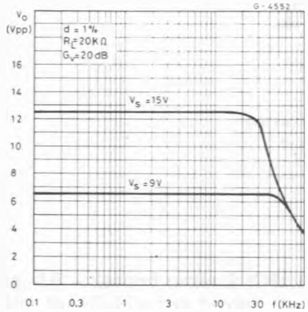


Fig. 7 - Total harmonic distortion vs. output voltage

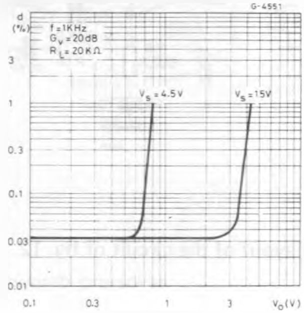


Fig. 8 - Total input noise vs. source resistance

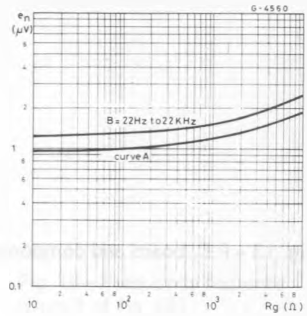


Fig. 9 - Noise density vs. frequency

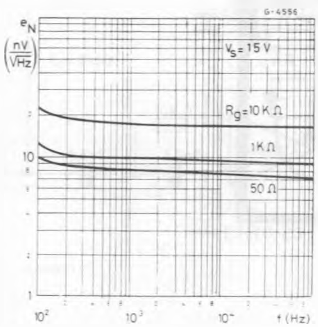


Fig. 10 - RIAA preamplifier response (circuit of fig. 12)

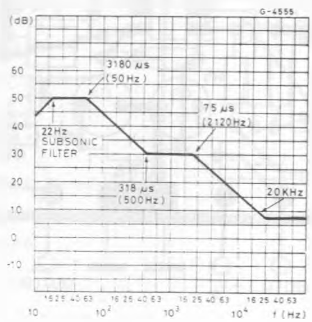
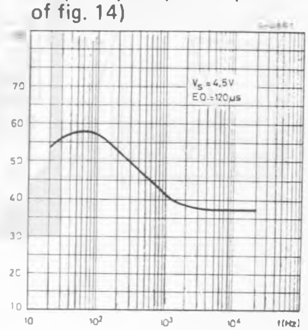


Fig. 11 - Tape preamplifier frequency response (circuit of fig. 14)



APPLICATION INFORMATION

Fig. 12 - Stereo RIAA preamplifier

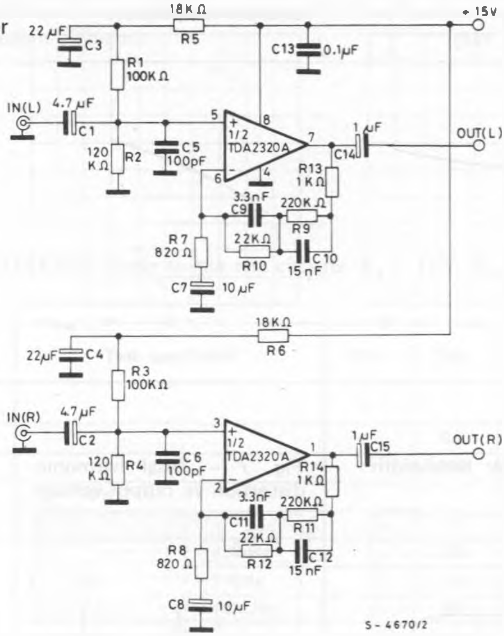
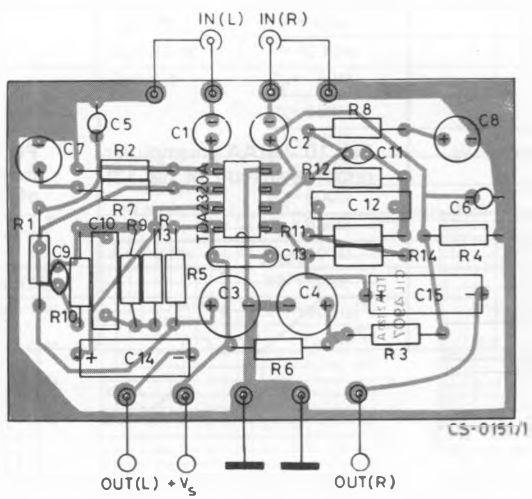


Fig. 13 - P.C. board and components layout of the circuit of fig. 12



APPLICATION INFORMATION (continued)

Fig. 14 - Stereo preamplifier for Walkman cassette players

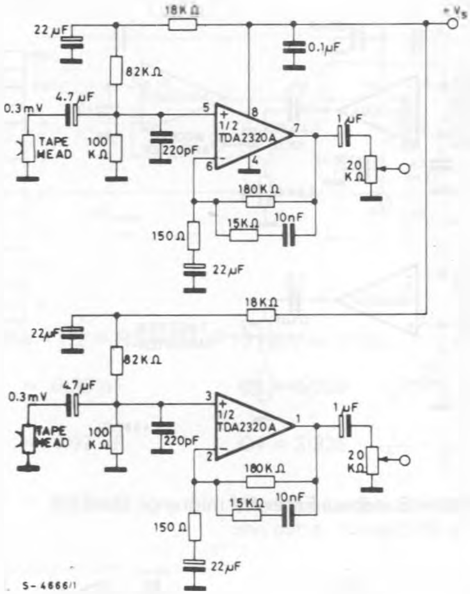


Fig. 15 - Second order 2 KHz Butterworth crossover filter for Hi-Fi active boxes

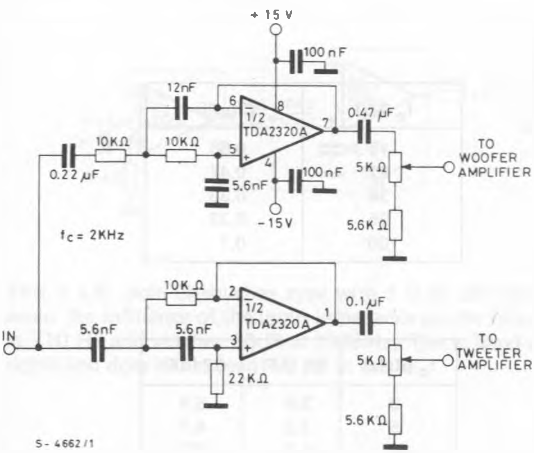
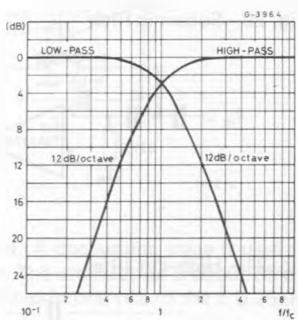


Fig. 16 - Frequency response (circuit of fig. 15)



APPLICATION INFORMATION (continued)

Fig. 17 - Third order 2.8 KHz Bessel crossover filter for Hi-Fi active boxes

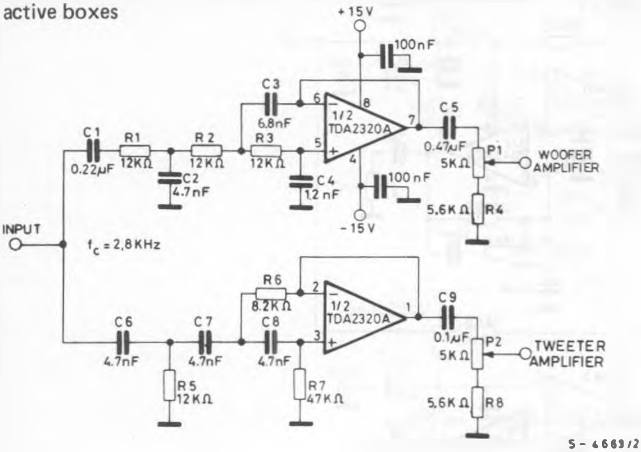


Fig. 18 - Frequency response (circuit of fig. 17)

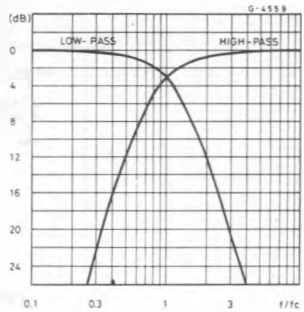


Fig. 19 - 200 Hz to 2 KHz Active Bandpass Filter for midrange speakers

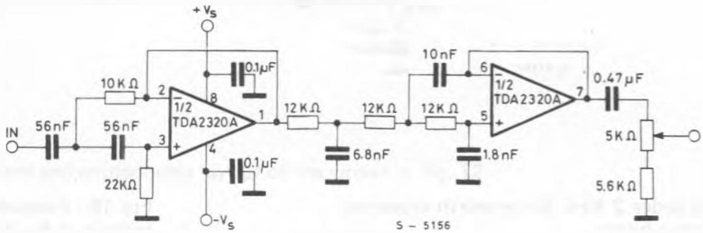
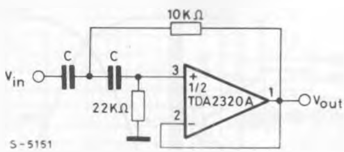
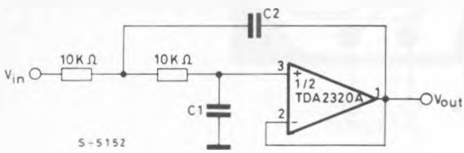


Fig. 20 - Subsonic filter



f_c (Hz)	C (μF)
15	0.68
22	0.47
30	0.33
55	0.22
100	0.1

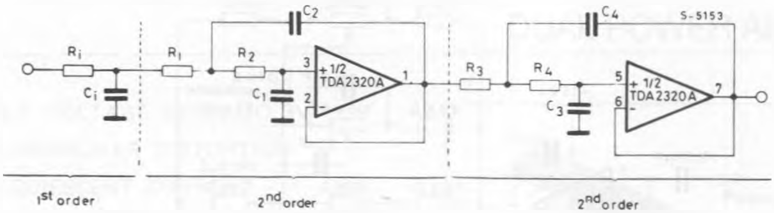
Fig. 21 - High-cut filter



f_c (KHz)	C1 (nF)	C2 (nF)
3	3.9	6.8
5	2.2	4.7
10	1.2	2.2
15	0.68	1.5

APPLICATION INFORMATION (continued)

Fig. 22 - Fifth order 3.4 KHz low-pass Butterworth filter



For f_c = 3.4 KHz and R_i = R1 = R2 = R3 = R4 = 10 KΩ, we obtain:

$$C1 = 1.354 \cdot \frac{1}{R} \cdot \frac{1}{2\pi f_c} = 6.33 \text{ nF}$$

$$C1 = 0.421 \cdot \frac{1}{R} \cdot \frac{1}{2\pi f_c} = 1.97 \text{ nF}$$

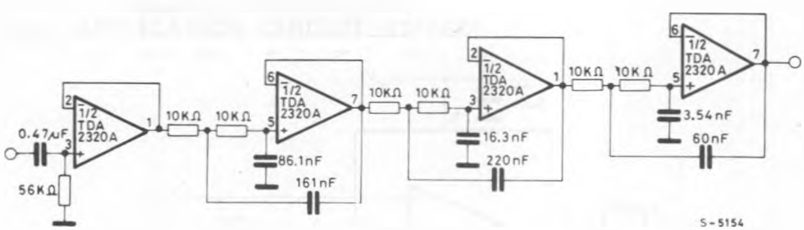
$$C2 = 1.753 \cdot \frac{1}{R} \cdot \frac{1}{2\pi f_c} = 8.20 \text{ nF}$$

$$C3 = 0.309 \cdot \frac{1}{R} \cdot \frac{1}{2\pi f_c} = 1.45 \text{ nF}$$

$$C4 = 3.325 \cdot \frac{1}{R} \cdot \frac{1}{2,\pi f_c} = 15.14 \text{ nF}$$

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

Fig. 23 - Sixth-pole 355 Hz low-pass filter (Chebychev type)



This is a 6- pole Chebychev type with ± 0.25 dB ripple in the passband. A decoupling stage is used to avoid the influence of the input impedance on the filter's characteristics. The attenuation is about 55 dB at 710 Hz and reaches 80dB at 1065 Hz. The in band attenuation is limited in practice to the ± 0.25 dB ripple and does not exceed 1/2 dB at 0.9 fc.

APPLICATION INFORMATION (continued)

Fig. 24 – Three band tone control

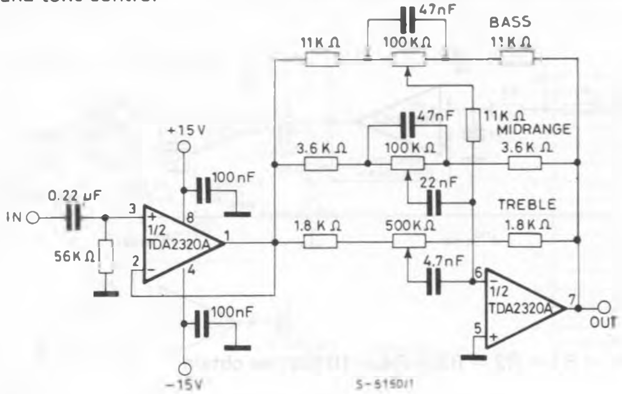


Fig. 25 – Frequency response of the circuit of fig. 24.

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