SGS TBA810S

LINEAR INTEGRATED CIRCUIT

7 W AUDIO AMPLIFIER

The TBA 810 S is a monolithic integrated circuit in a 12 lead quad in-line plastic package, intended for use as a low frequency class B amplifier.
The TBA 810 S provides 7 W power output at 16 V/4 Ω, 6 W at 14.4 V/4 Ω, 2.5 W at 9 V/4 Ω, 1 W at 6 V/4 Ω and works with a wide range of supply voltages (4 to 20 V); it gives high output current (up to 2.5 A), high efficiency (75% at 6 W output), very low harmonic and cross-over distortion. In addition, the circuit is provided with a thermal protection circuit.
The TBA 810 AS has the same electrical characteristics as the TBA 810S, but its cooling tabs are flat and pierced so that an external heatsink can easily be attached.

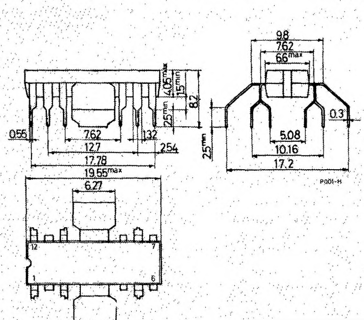
ABSOLUTE MAXIMUM RATINGS

V_s	Supply voltage	20	V
I_o	Output peak current (non-repetitive)	3.5	A
I_o	Output current (repetitive)	2.5	A
P_{tot}	Power dissipation: at T_{amb} = 70°C	1	W
	at T_{tab} = 100°C	5	W
T_{stg}, T_j	Storage and junction temperature	-40 to 150	°C

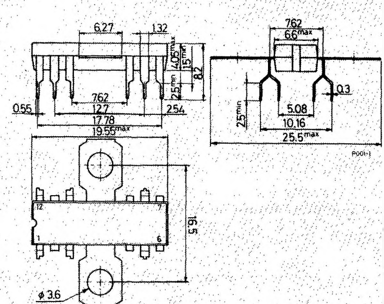
ORDERING NUMBERS: TBA 810 S
TBA 810 AS

MECHANICAL DATA

Dimensions in mm

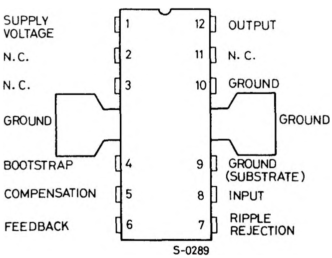


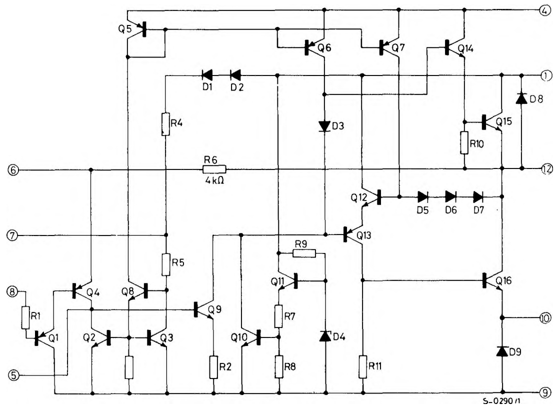
TBA 810 S



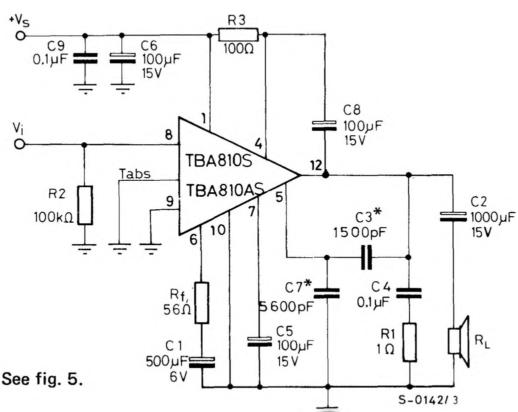
TBA 810 AS

CONNECTION AND SCHEMATIC DIAGRAM
(top view)





TEST AND APPLICATION CIRCUIT



* See fig. 5.

THERMAL DATA

			TBA810S	TBA810AS
$R_{th\ j\text{-}tab}$	Thermal resistance junction-tab	max	12 °C/W	10 °C/W
$R_{th\ j\text{-}amb}$	Thermal resistance junction-ambient	max	70*° C/W	80 ° C/W

* Obtained with tabs soldered to printed circuit with minimized copper area.

ELECTRICAL CHARACTERISTICS (Refer to the test circuit; T_{amb} = 25 °C)

Parameter		Test conditions	Min.	Typ.	Max.	Unit
V_s	Supply voltage (pin 1)		4		20	V
V_o	Quiescent output voltage (pin 12)	V_s = 14.4V	6.4	7.2	8	V
I_d	Quiescent drain current	V_s = 14.4V		12	20	mA
I_b	Bias current (pin 8)	V_s = 14.4V		0.4		μA
P_o	Power output	d = 10% R_L = 4Ω f = 1 kHz V_s = 16V V_s = 14.4V V_s = 9V V_s = 6V	 5.5	 7 6 2.5 1		 W W W W
$V_{i(rms)}$	Input voltage				220	mV
V_i	Input sensitivity	P_o = 6W V_s = 14.4V R_L = 4Ω f = 1kHz R_f = 56Ω R_f = 22Ω		 80 35		 mV mV
R_i	Input resistance (pin 8)			5		MΩ
B	Frequency response (-3 dB)	V_s = 14.4V R_L = 4Ω C3 = 820 pF C3 = 1500 pF		 40 to 20,000 40 to 10,000		 Hz Hz
d	Distorsion	P_o = 50mW to 3W V_s = 14.4V R_L = 4Ω f = 1kHz		0.3		%
G_v	Voltage gain (open loop)	V_s = 14.4V R_L = 4Ω f = 1kHz		80		dB
G_v	Voltage gain (closed loop)	V_s = 14.4V R_L = 4Ω f = 1kHz	34	37	40	dB
e_N	Input noise voltage	V_s = 14.4V R_g = 0 B (-3 dB) = 20Hz to 20,000 Hz		2		μV
i_N	Input noise current	V_s = 14.4V B (-3 dB) = 20 Hz to 20,000 Hz		0.1		nA
η	Efficiency	P_o = 5W V_s = 14.4V R_L = 4Ω f = 1kHz		70		%
SVR	Supply voltage rejection	V_s = 14.4V R_L = 4Ω f_{ripple} = 100 Hz		38		dB

Fig. 1 - Power output versus supply voltage

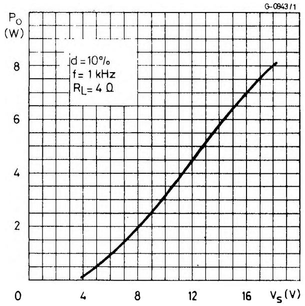


Fig. 2 - Maximum power dissipation versus supply voltage (sine wave operation)

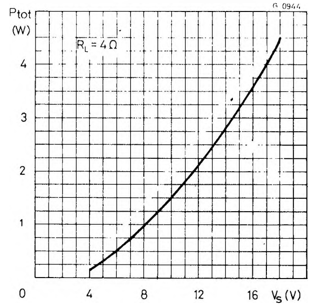


Fig. 3 - Distorsion versus output power

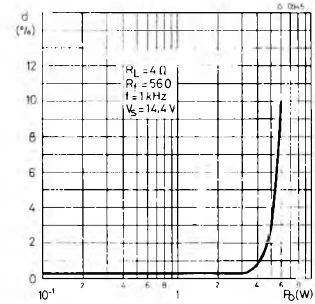


Fig. 4 - Distorsion versus frequency

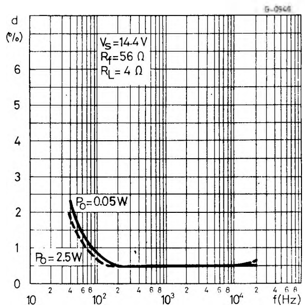


Fig. 5 - Value of C3 versus R_f for various values of B

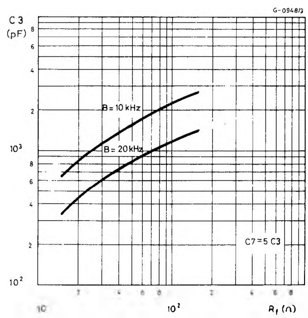


Fig. 6 - Power dissipation and efficiency versus output power

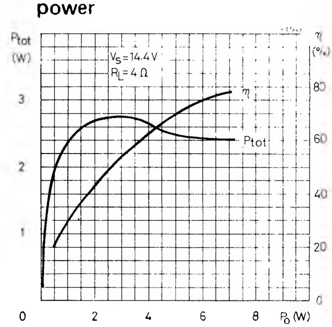


Fig. 7 - Quiescent output voltage (pin 12) versus supply voltage

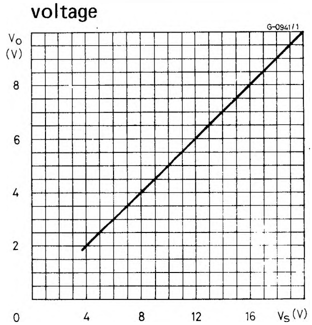


Fig. 8 - Quiescent current versus supply voltage

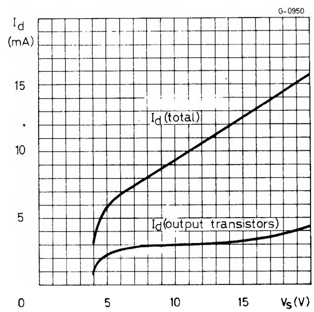
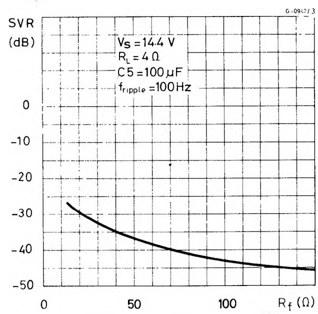
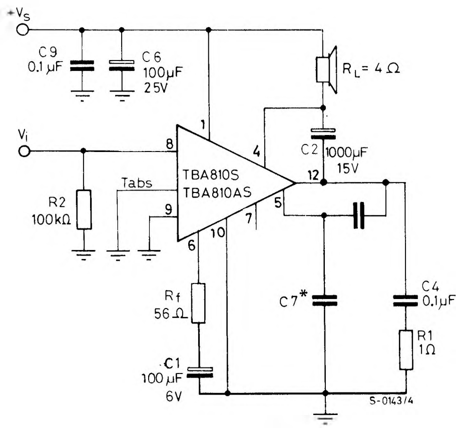


Fig. 9 - Supply voltage rejection



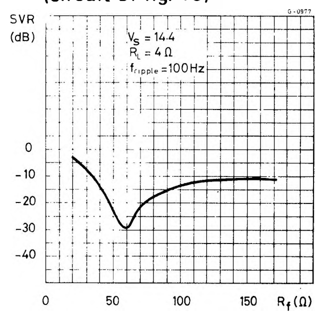
For portable equipment the circuit in Fig. 10 has the advantages of fewer external components and a better behaviour at low supply voltages (down to 4 V).

Fig. 10 - Application circuit with load connected to the supply voltage



* C3, C7 see fig.5

Fig. 11 - Supply voltage rejection versus R_f (circuit of fig. 10)



MOUNTING INSTRUCTIONS

The thermal power dissipated in the circuit may be removed by connecting the tabs to an external heat sink (TBA 810 AS - fig. 12) or by soldering them to an area of copper on the printed circuit board (TBA 810 S - fig. 13).

Fig. 12 - Maximum power dissipation versus ambient temperature (for TBA 810 AS only)

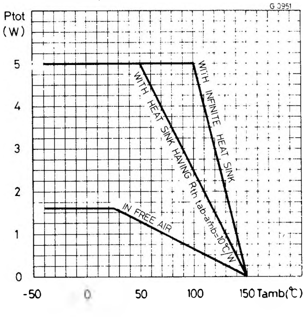
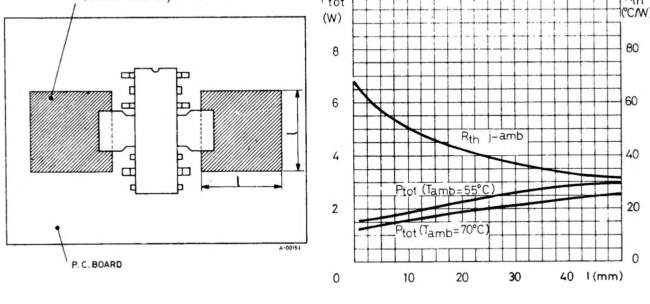


Fig. 13 - Maximum power dissipation versus copper area of the P.C. board (for TBA 810 S only)



During soldering the tabs temperature must not exceed 260 °C and the soldering time must not be longer than 12 seconds.

Fig. 14a and 14b show two ways that can be used for mounting the device.

Fig. 14a shows a method of mounting the TBA 810 S, that is satisfactory both from the point of view of heat dissipation and from mechanical considerations. For TBA 810 AS the desired thermal resistance is obtained by fixing the elements shown in fig. 14b, to a suitably dimensioned plate. This plate can also act as a support for the whole printed circuit board; the mechanical stresses do not damage the integrated circuit. This is firmly fixed to the element, in fig. 14b.

Fig. 14a

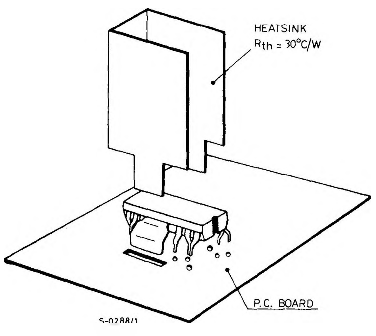
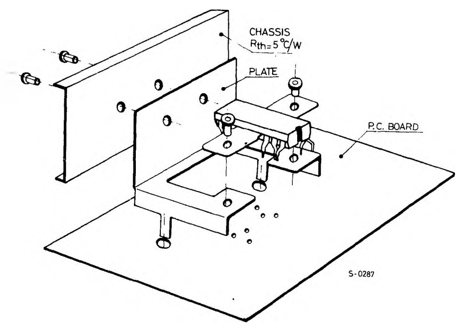


Fig. 14b



THERMAL SHUT-DOWN

The presence of a thermal limiting circuit offers the following advantages:

1) An overload on the output (even if it is permanent), or an above-limit ambient temperature can be easily supported.
2) The heat sink can have a smaller factor of safety compared with that of a conventional circuit. There is no device damage in the case of too high a junction temperature: all that happens is that P_o (and therefor P_{tot}) and I_d are reduced (fig. 15).

Fig. 15 - Output power and drain current versus package temperature