

LINEAR INTEGRATED CIRCUIT

7W 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

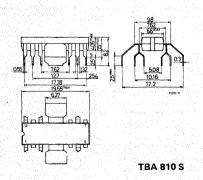
$\overline{V_s}$	Supply voltage	20	V
l _o	Output peak current (non-repetitive)	3.5	Α
l _o	Output current (repetitive)	2.5	Α
P_{tot}	Power dissipation: at $T_{amb} = 70^{\circ} C$	1	W
	at $T_{tab} = 100^{\circ} C$	5	W
$T_{stg'}T_{j}$	Storage and junction temperature	-40 to 150	°C

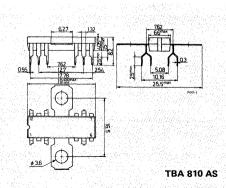
ORDERING NUMBERS: TBA 810 S

TBA 810 AS

MECHANICAL DATA

Dimensions in mm

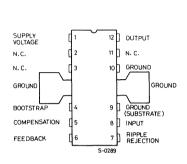


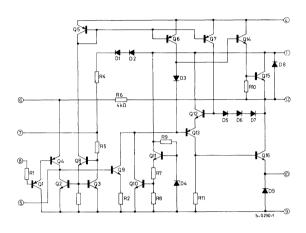




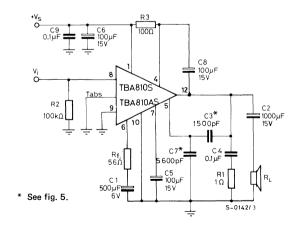
CONNECTION AND SCHEMATIC DIAGRAM

(top view)





TEST AND APPLICATION CIRCUIT



THERMAL DATA		TBA810S TBA810AS		
R _{th j-tab} R _{th j-amb}	Thermal resistance junction-tab Thermal resistance junction-ambient	max max		10°C/W 80°C/W

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



ELECTRICAL CHARACTERISTICS (Refer to the test circuit; $T_{amb} = 25 \,^{\circ}$ C)

	Parameter	Test conditions	Min.	Тур.	Max.	Unit
V _s	Supply voltage (pin 1)		4		20	V
Vo	Quiescent output voltage (pin 12)		6.4	7.2	8	V
1 _d	Quiescent drain current	$V_s = 14.4V$		12	20	mA
I _b	Bias current (pin 8)			0.4		μΑ
P _o	Power output	$d = 10\%$ $R_{L} = 4\Omega$ $f = 1 \text{ kHz}$ $V_{s} = 16 \text{ V}$		7		w
		V _s = 14.4V V _s = 9V V _s = 6V	5.5	6 2.5 1	-	W W W
V _{i(rms)}	Input voltage				220	mV
V _i	Input sensitivity	$P_o = 6W$ $V_s = 14.4V$ $R_L = 4\Omega$ $f = 1kHz$ $R_f = 56\Omega$ $R_f = 22\Omega$		80 35		mV mV
Ri	Input resistance (pin 8)			5		MΩ
B	Frequency response (-3 dB)	$V_{s} = 14.4V$ $R_{L} = 4\Omega$ $C3 = 820 \text{ pF}$ $C3 = 1500 \text{ pF}$	40 to 20,000 40 to 10,000			Hz Hz
d	Distorsion	$P_{O} = 50$ mW to 3W $V_{S} = 14.4$ V $R_{L} = 4\Omega$ f = 1kHz		0.3		%
G _v	Voltage gain (open loop)	$V_s = 14.4V$ $R_L = 4\Omega$ $f = 1kHz$		80		dB
G _v	Voltage gain (closed loop)	$V_s = 14.4V$ $R_L = 4\Omega$ $f = 1kHz$	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
iN	Input noise current	V _s = 14.4V B (-3 dB) = 20 Hz to 20,000 Hz		0.1		nA
η	Efficiency	$P_{O} = 5W$ $V_{S} = 14.4V$ $R_{L} = 4\Omega$ $f = 1kHz$		70		%
SVR	Supply voltage rejection	$V_S = 14.4V$ $R_L = 4\Omega$ $f_{ripple} = 100 \text{ Hz}$,	38		dB

Fig. 1 – Power output versus supply voltage

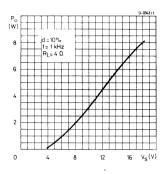


Fig. 2 - Maximum power dissipation versus supply voltage (sine wave operation)

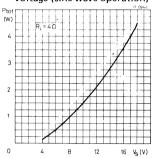


Fig. 3 - Distorsion versus output power

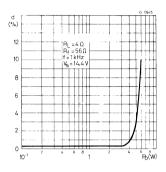


Fig. 4 - Distorsion versus frequency

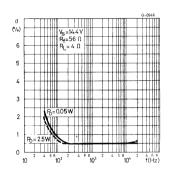


Fig. 5 - Value of C3 versus R_f for various values of B

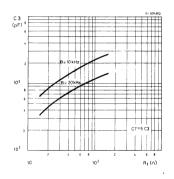


Fig. 6 - Power dissipation and efficiency versus output power

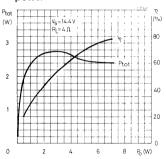


Fig. 7 – Quiescent output voltage (pin 12) versus supply voltage

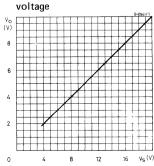


Fig. 8 - Quiescent current versus supply voltage

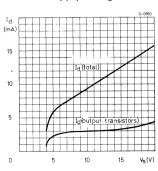
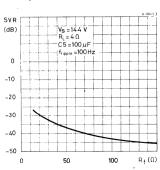


Fig. 9 - Supply voltage rejection



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

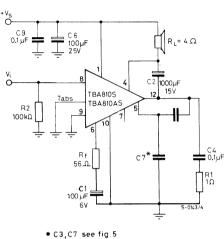
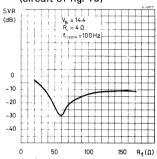


Fig. 1.1 - Supply voltage rejection versus R_f (circuit of fig. 10)



. -

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)

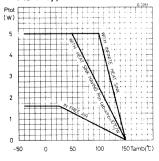
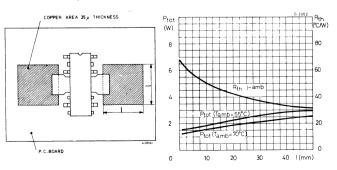


Fig. 13 - Maximum power dissipation versus copper area of the P.C. board (for TBA 810 S only)



During soldering the tabs temperature must not exceed 260 $^{\circ}$ 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

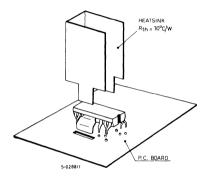
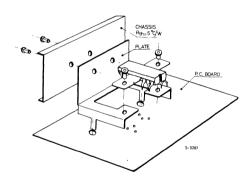


Fig. 14b



THERMAL SHUT-DOWN

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

- 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

