

## 4 W AUDIO POWER AMPLIFIER WITH D.C. VOLUME CONTROL

The TDA1013 is a monolithic integrated audio amplifier circuit with d.c. volume control in a 9-lead single in-line (SIL) plastic package. The wide supply voltage range makes this circuit very suitable for applications in mains-fed apparatus such as : television receivers and record players.

The d.c. volume control stage has a good control characteristic with a range of more than 80 dB; control can be obtained by means of a variable d.c. voltage between 4 and 8 V.

The audio amplifier has a well defined open loop gain and a fixed integrated closed loop gain. This offers an optimum in number of external components, performance and stability.

The SIL package (SOT-110A) offers a simple and low-cost heatsink connection.

## QUICK REFERENCE DATA

Supply voltage range	$V_p$	5 to 35 V
Repetitive peak output current	$I_{ORM}$	max. 1,5 A
Total sensitivity (d.c. control at max. gain) for $P_o = 2,5$ W	$V_i$	typ. 55 mV
<b>Audio amplifier</b>		
Output power at $d_{tot} = 10\%$ $V_p = 18$ V; $R_L = 8 \Omega$	$P_o$	typ. 4,5 W
Total harmonic distortion at $P_o = 2,5$ W; $R_L = 8 \Omega$	$d_{tot}$	typ. 0,5 %
Sensitivity for $P_o = 2,5$ W	$V_i$	typ. 125 mV
<b>D.C. volume control unit</b>		
Gain control range	$\phi$	> 80 dB
Signal handling at $d_{tot} < 1\%$ (d.c. control at 0 dB)	$V_i$	> 1,2 V
Sensitivity for $V_o = 125$ mV at max. voltage gain	$V_i$	typ. 55 mV
Input impedance (pin 9)	$ Z_i $	typ. 200 k $\Omega$

## PACKAGE OUTLINE

9-lead SIL; plastic (SOT-110A).

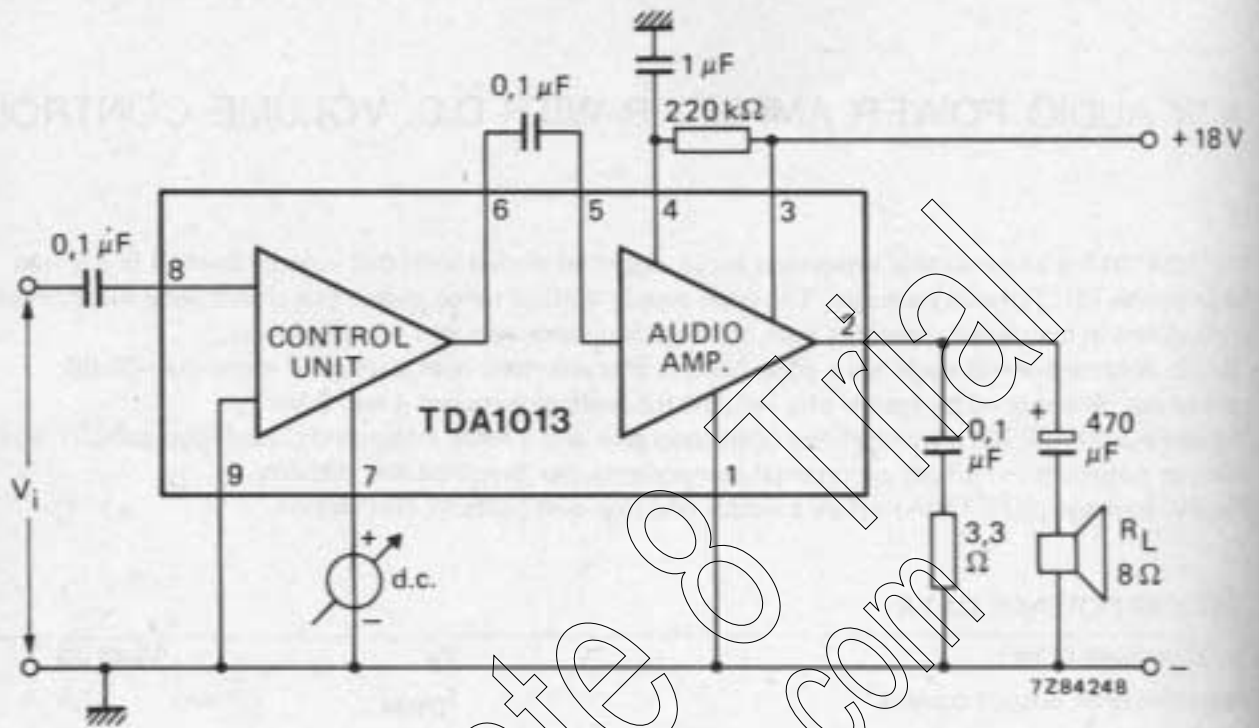


Fig. 1 Block diagram and external components.

**RATINGS**

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Supply voltage	$V_p$	max.	35 V
Non-repetitive peak output current	$I_{OSM}$	max.	3 A
Repetitive peak output current	$I_{ORM}$	max.	1,5 A
Storage temperature	$T_{stg}$		-55 to + 150 °C
Crystal temperature	$T_j$		-25 to + 150 °C
Total power dissipation			see derating curve Fig. 2

**HEATSINK DESIGN**

Assume  $V_p = 18 V$ ;  $R_L = 8 \Omega$ ;  $T_{amb} = 60 \text{ }^\circ\text{C}$  (max.);  $T_j = 150 \text{ }^\circ\text{C}$  (max.); for a 4 W application into an 8 Ω load, the maximum dissipation is about 2,5 W.

The thermal resistance from junction to ambient can be expressed as:

$$R_{th\ j-a} = R_{th\ j-tab} + R_{th\ tab-h} + R_{th\ h-a} = \frac{T_{j\ max} - T_{amb\ max}}{P_{max}} = \frac{150 - 60}{2,5} = 36 \text{ K/W.}$$

Since  $R_{th\ j-tab} = 12 \text{ K/W}$  and  $R_{th\ tab-h} = 1 \text{ K/W}$ ,  $R_{th\ h-a} = 36 - (12 + 1) = 23 \text{ K/W.}$

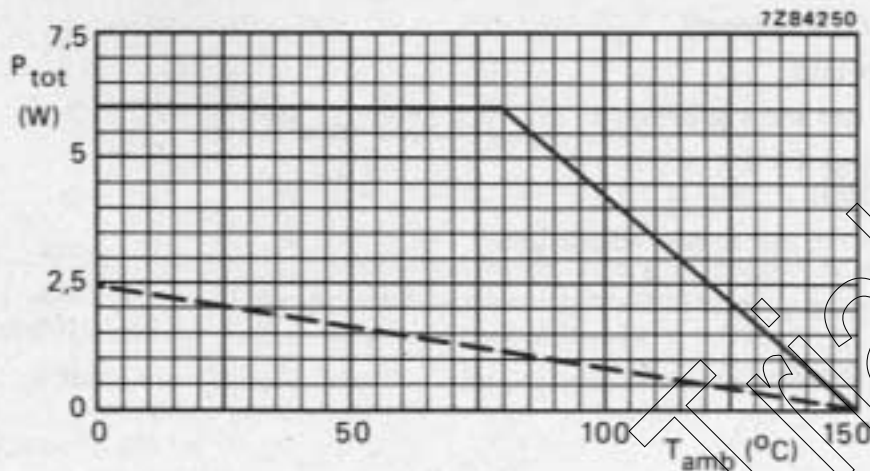


Fig. 2 Power derating curve.  
 — infinite heatsink.  
 - - - without heatsink.

**CHARACTERISTICS**

V<sub>p</sub> = 18 V; R<sub>L</sub> = 8 Ω; f = 1 kHz; T<sub>amb</sub> = 25 °C, unless otherwise specified

DEVELOPMENT SAMPLE DATA

Supply voltage	V <sub>p</sub>	typ.	18 V
Total quiescent current	I <sub>tot</sub>	typ.	35 mA
Ripple rejection at f = 100 Hz; R <sub>S</sub> = 0	RR	>	40 dB
Signal-to-noise ratio (d.c. control at minimum gain) see also note	S/N	>	60 dB
Total sensitivity (d.c. control at maximum gain) for P <sub>O</sub> = 2,5 W	V <sub>i</sub>	typ.	55 mV
<b>Audio amplifier</b>			
Repetitive peak output current	I <sub>ORM</sub>	<	1,5 A
Output power at d <sub>tot</sub> = 10%	P <sub>O</sub>	>	4 W
Total harmonic distortion at P <sub>O</sub> = 2,5 W	d <sub>tot</sub>	typ.	0,5 %
Voltage gain	G <sub>v</sub>	typ.	30 dB
Sensitivity for P <sub>O</sub> = 2,5 W	V <sub>i</sub>	typ.	125 mV
Input impedance (pin 5)	Z <sub>i</sub>	typ.	200 kΩ
Frequency response	f	>	15 kHz

**Note**

Measured in a bandwidth according to IEC-curve 'A', related to P<sub>O</sub> = 2,5 W; R<sub>S</sub> = 5 kΩ.

**CHARACTERISTICS (continued)**

**D.C. volume control unit**

Gain control range (see also Fig. 3)

$\phi$  > 80 dB

Signal handling at  $d_{tot} < 1\%$   
(d.c. control at 0 dB)

$V_i$  > 1.2 V

Sensitivity for  $V_o = 125$  mV at max. voltage gain

$V_i$  typ. 55 mV

Input impedance (pin 9)

$|Z_i|$  typ. 200 k $\Omega$   
100 to 500 k $\Omega$

Output impedance (pin 7)

$|Z_o|$  typ. 1 k $\Omega$

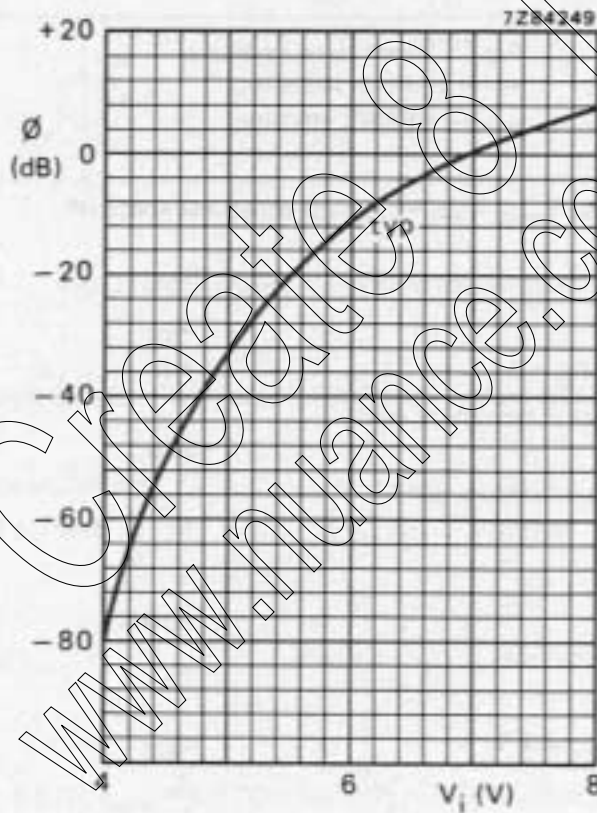


Fig. 3 Gain control curve;  $V_i$  at pin 8.