DEVELOPMENT SAMPLE DATA

This information is derived from development samples
made available for evaluation. It does not necessarily
imply that the device will go into regular production.

TDA1013

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

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Supply voltage range	V_P		15 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
Audio amplifier			
Output power at d_{tot} = 10 % V_P = 18 V; R_L = 8 Ω	P_O	typ.	4,5 W
Total harmonic distortion at P_O = 2,5 W; R_L = 8 Ω	d_{tot}	typ.	0,5 %
Sensitivity for P_O = 2,5 W	V_i	typ.	125 mV
D.C. volume control unit			
Gain control range	ϕ	>	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 kΩ

PACKAGE OUTLINE

9-lead SIL; plastic (SOT-110A).
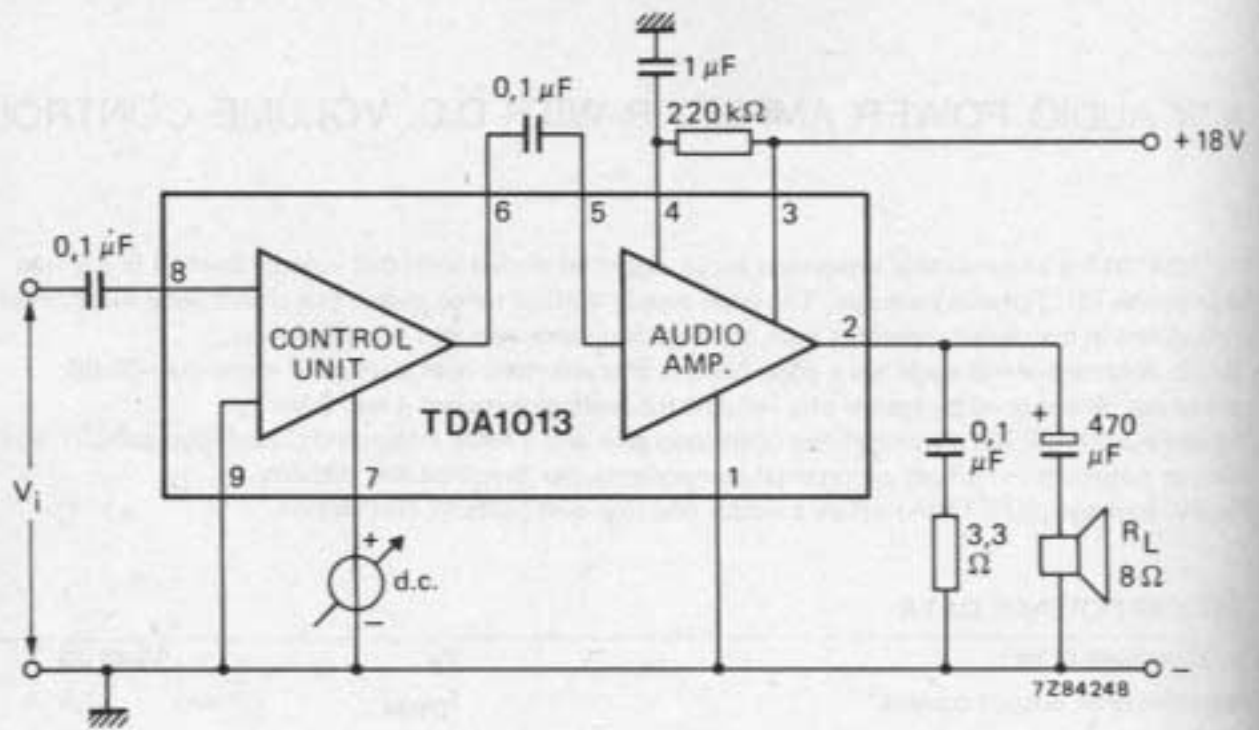
Fig. 1 Block diagram and external components.

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 Ω; T_{amb} = 60 °C (max.); T_j = 150 °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 K/W and $R_{th\ tab-h}$ = 1 K/W, $R_{th\ h-a}$ = 36 − (12 + 1) = 23 K/W.
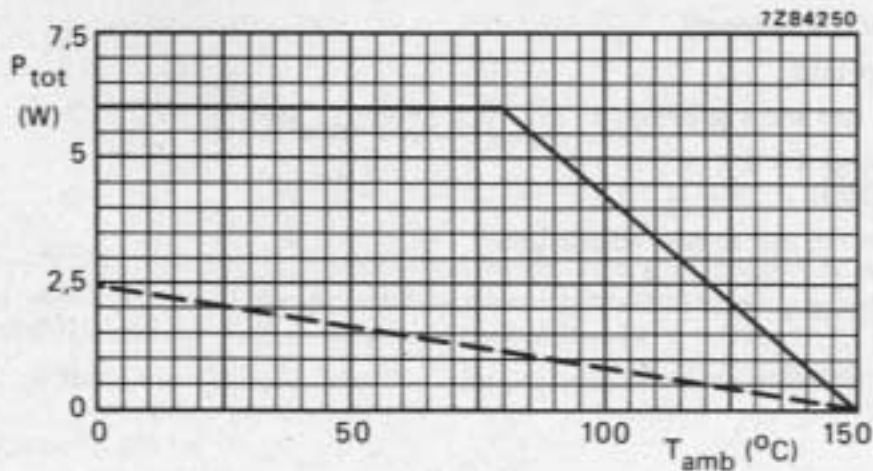
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Fig. 2 Power derating curve.
——— infinite heatsink;
– – – without heatsink.

CHARACTERISTICS

$V_P = 18$ V; $R_L = 8\ \Omega$; $f = 1$ kHz; $T_{amb} = 25\ ^\circ$C; unless otherwise specified

Supply voltage	V_P	typ.	18	V
			15 to 35	V
Total quiescent current	I_{tot}	typ.	35	mA
Ripple rejection at $f = 100$ Hz; $R_S = 0$	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 $P_O = 2,5$ W	V_i	typ.	55	mV
Audio amplifier				
Repetitive peak output current	I_{ORM}	<	1,5	A
Output power at $d_{tot} = 10\%$	P_O	>	4	W
		typ.	4,5	W
Total harmonic distortion at $P_O = 2,5$ W	d_{tot}	typ.	0,5	%
Voltage gain	G_v	typ.	30	dB
Sensitivity for $P_O = 2,5$ W	V_i	typ.	125	mV
Input impedance (pin 5)	$|Z_i|$	typ.	200	$k\Omega$
			100 to 500	$k\Omega$
Frequency response	f	>	15	kHz

Note

Measured in a bandwidth according to IEC-curve 'A', related to $P_O = 2,5$ W; $R_S = 5\ k\Omega$.

CHARACTERISTICS (continued)

D.C. volume control unit

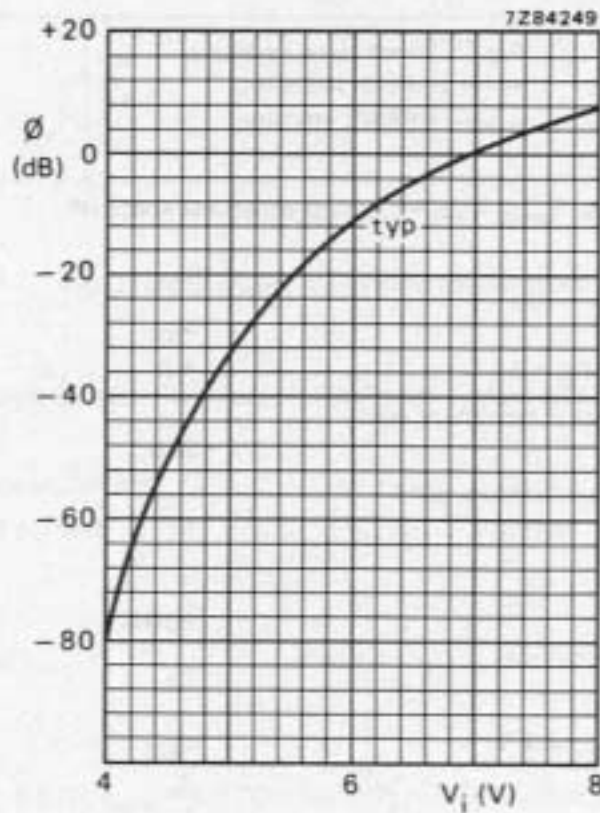|			
Gain control range (see also Fig. 3)	ϕ	>	80 dB
Signal handling at d_{tot} < 1 % (d.c. control at 0 dB)	V_i	>	1,2 V
Sensitivity for V_o = 125 mV at max. voltage gain	V_i	typ.	55 mV
Input impedance (pin 9)	$|Z_i|$	typ. 100 to	200 kΩ 500 kΩ
Output impedance (pin 7)	$|Z_o|$	typ.	1 kΩ

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