RECORDING/PLAYBACK AND 2 W AUDIO POWER AMPLIFIER

GENERAL DESCRIPTION

The TDA1016 is a monolithic integrated audio power amplifier, preamplifier and A.L.C. circuit designed for applications in radio-recorders and recorders. The wide supply voltage range makes this circuit very suitable for d.c. and a.c. apparatus. The circuit incorporates the following features:

Features

- Power amplifier/monitor amplifier
- Preamplifier/record and playback amplifier
- Automatic Level Control (A.L.C.) circuit
- Voltage stabilizer
- Short-circuit (up to 12 V a.c.) and thermal protection.

QUICK REFERENCE DATA

Supply voltage range	V_P	3,6 to 15	V
Supply current; total quiescent at V_P = 6 V	I_{tot}	typ. 10	mA
Operating ambient temperature range	T_{amb}	−25 to 150	°C
Power amplifier			
Output power at d_{tot} = 10%			
V_P = 6 V; R_L = 4 Ω	P_o	typ. 1	W
V_P = 9 V; R_L = 4 Ω	P_o	typ. 2	W
Closed loop gain	G_c	typ. 36	dB
Preamplifier			
Open loop gain	G_o	min. 70	dB
Minimum closed loop voltage gain	$G_{c\,min}$	min. 35	dB
Output voltage at d_{tot} = 1%	V_o	min. 1	V
Automatic Level Control (A.L.C.)			
Gain variation for ΔV_i = 40 dB	ΔG_v	typ. 2	dB
Stabilized supply voltage			
Output voltage	$V_{5\text{-}16}$	typ. 2,6	V

PACKAGE OUTLINE

16-lead DIL; plastic, with internal heat spreader (SOT38).

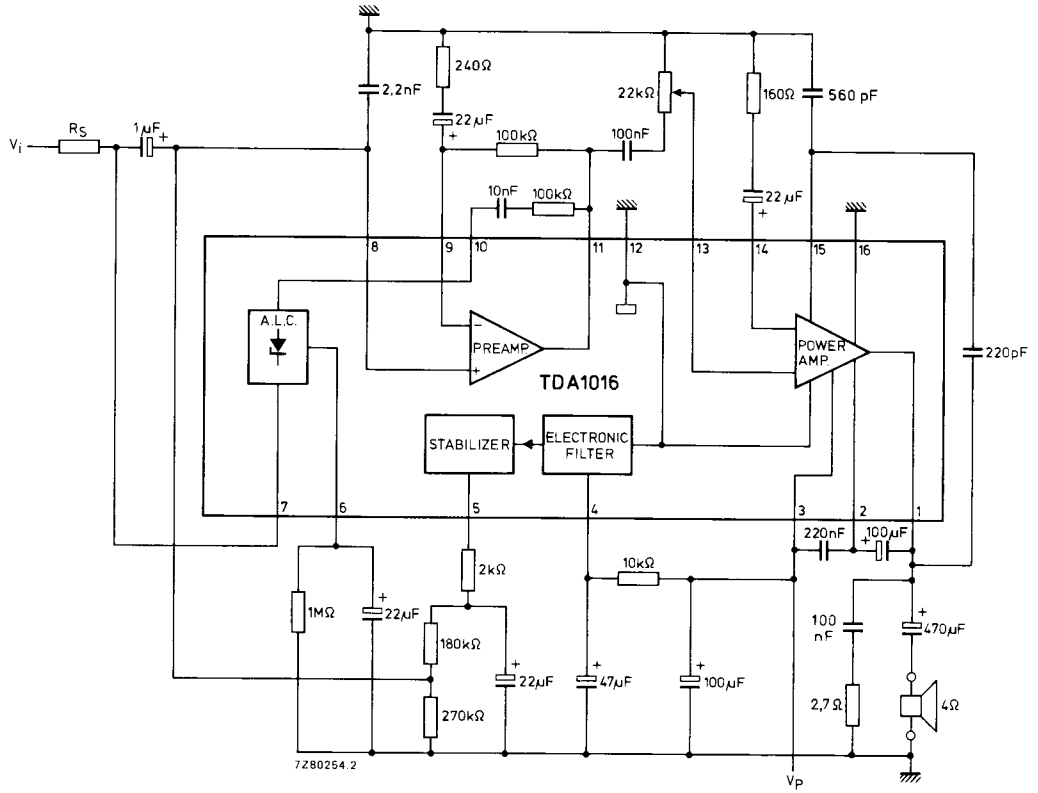

Fig. 1 Block diagram with external components; also used as test circuit.

RATINGS

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

Supply voltage (pin 3)	V_P	max.	18 V
Repetitive peak output current	I_{ORM}	max.	1 A
Non-repetitive peak output current (pin 1)	I_{OSM}	max.	2 A
Total power dissipation	see derating curve Fig. 2		
A.C. short-circuit duration of load during sinewave drive; V_P = 12 V	t_{sc}	max.	100 hours
Crystal temperature	T_c	max.	150 °C
Storage temperature range	T_{stg}		−55 to + 150 °C
Operating ambient temperature range	T_{amb}		−25 to + 150 °C

THERMAL RESISTANCE

The power derating curve (Fig. 2) is based on the following data

From junction to ambient	$R_{th\,j\text{-}a}$	=	55 K/W

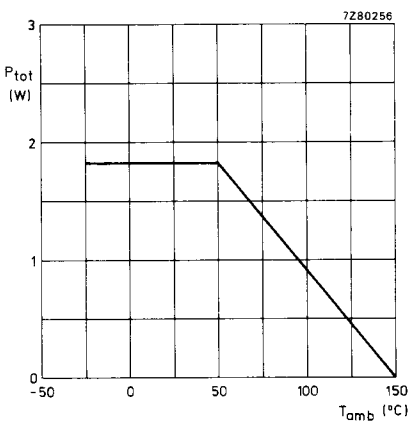

Fig. 2 Power derating curve.

CHARACTERISTICS

V_P = 6 V; R_L = 4 Ω; f = 1 kHz; T_{amb} = 25 °C; measured in test circuit Fig. 1; unless otherwise specified

parameter	symbol	min.	typ.	max.	unit
Supply (pin 3)					
Supply voltage	V_P	3,6	6	15	V
Supply current; total quiescent at V_P = 6 V	I_{tot}	–	10	–	mA
Power amplifier					
Output power at d_{tot} = 10%*					
V_P = 6 V	P_o	–	1	–	W
V_P = 9 V	P_o	–	2	–	W
Closed loop voltage gain	G_c	–	36	–	dB
Total harmonic distortion at P_o = 0,5 W	d_{tot}	–	–	1	%
Input impedance	$\|Z_i\|$	0,5	–	–	MΩ
Ripple rejection at f = 100 Hz (R_S = 0 Ω)	RR	40	50	–	dB
Noise output voltage (r.m.s. value) R_S = 0 Ω; B = 60 Hz to 15 kHz	$V_{n(rms)}$	–	90	200	μV
Noise output voltage at 500 kHz R_S = 0 Ω; B = 5 kHz	V_n	–	8	–	μV
Preamplifier					
Open loop voltage gain at f = 10 kHz	G_o	70	78	–	dB
Closed loop voltage gain	G_c	–	52	–	dB
Minimum closed loop voltage gain (when changing R_f)	$G_{c\,min}$	35	–	–	dB
Output voltage at d_{tot} = 1%	V_o	1	–	–	V
Output voltage with A.L.C. V_i = 2 mV	V_o	0,45	0,5	0,55	V
Total harmonic distortion with A.L.C.					
V_i = 2 mV	d_{tot}	–	–	1	%
V_i = 360 mV	d_{tot}	–	–	3	%
Signal-to-noise ratio related to V_i = 1,2 mV; R_S = 1 kΩ; B = 60 Hz to 15 kHz	S/N	–	60	–	dB
Input impedance	$\|Z_i\|$	100	–	–	kΩ
Ripple rejection at f = 100 Hz; R_S = 0 Ω	RR	50	54	–	dB
Output impedance **	$\|Z_o\|$	–	–	50	Ω

* Measured with an ideal coupling capacitor connected to the speaker load.
** I_P (effective value) must not exceed 1 mA.

parameter	symbol	min.	typ.	max.	unit
Automatic Level Control (A.L.C.) (see Fig. 3)**					
Gain variation for ΔV_i = 45 dB	ΔG_v	–	2	3	dB
Limiting time*	t_l	–	–	50	ms
Level setting time*	t_s	–	–	50	ms
Recovery time* ▲	t_r	–	100	–	s
Voltage stabilizer					
Output voltage	$V_{11\text{-}15}$	–	2,6	–	V
Load current	I_{11}	–	–	1,5	mA
Ripple rejection at f = 100 Hz	RR	40	–	–	dB

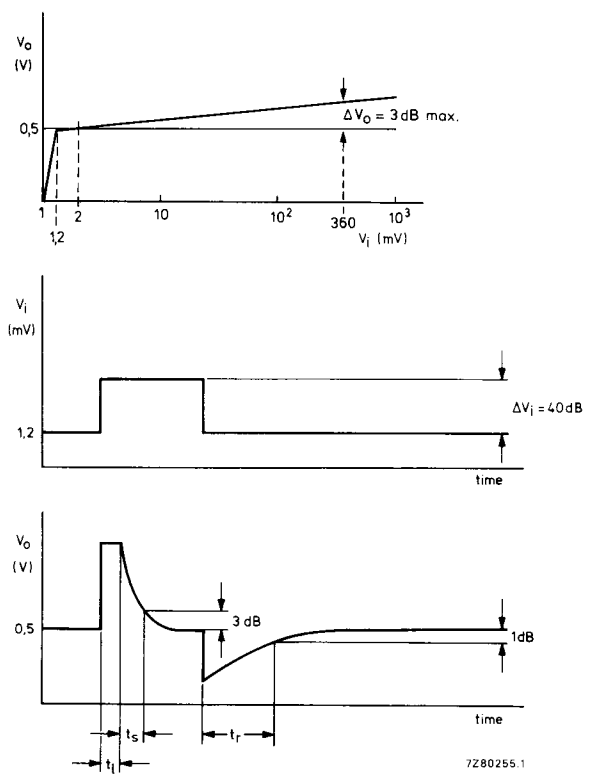

Fig. 3 Typical A.L.C. curve with R_S = 10 kΩ.

* At ΔV_i = 40 dB with respect to V_i = 1,2 mV.

** The A.L.C. tracking in stereo has a typical spread of 1 dB if pins 6 of both ICs are connected to the same RC network.

▲ Without a shunt resistor across A.L.C.
With 1 MΩ or 2,2 MΩ across A.L.C. recovery time becomes 22 or 50 seconds.