

## 50 W HIGH- PERFORMANCE HI-FI AMPLIFIER

### GENERAL DESCRIPTION

The TDA1514A integrated circuit is a hi-fi power amplifier for use as a building block in radio, tv and other audio applications. The high performance of the IC meets the requirements of digital sources (e.g. Compact Disc equipment).

The circuit is totally protected, the two output transistors both having thermal and SOAR protection (see Fig.3). The circuit also has a mute function that can be arranged for a period after power-on with a delay time fixed by external components.

The device is intended for symmetrical power supplies but an asymmetrical supply may also be used.

### Features

- High output power
- Low harmonic distortion
- Low intermodulation distortion
- Low offset voltage
- Good ripple rejection
- Mute/stand-by facilities
- Thermal protection
- Protected against electrostatic discharge
- No switch-on or switch-off clicks
- Very low thermal resistance
- Safe Operating Area (SOAR) protection

### QUICK REFERENCE DATA

parameter	conditions	symbol	min.	typ.	max.	unit
Supply voltage range (pin 6 to pin 4)		$V_P$	$\pm 10$	—	$\pm 30$	V
Total quiescent current	$V_P = \pm 27.5$ V	$I_{tot}$	—	56	—	mA
Output power	THD = -60 dB; $V_P = \pm 27.5$ V; $R_L = 8 \Omega$	$P_O$	—	40	—	W
	$V_P = \pm 23$ V; $R_L = 4 \Omega$	$P_O$	—	48	—	W
Closed loop voltage gain	determined externally	$G_c$	—	30	—	dB
Input resistance	determined externally	$R_i$	—	20	—	k $\Omega$
Signal plus noise-to-noise ratio	$P_O = 50$ mW	(S+N)/N	—	83	—	dB
Supply voltage ripple rejection	$f = 100$ Hz	SVRR	—	64	—	dB

### PACKAGE OUTLINE

9-lead SIL, plastic power (SOT131R).

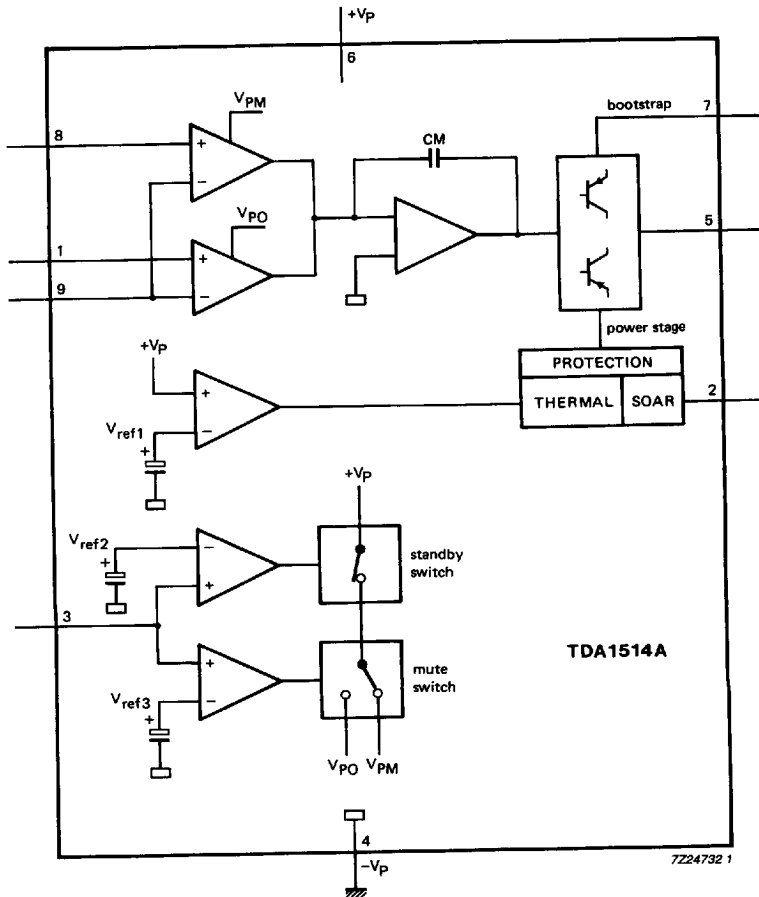


Fig.1 Block diagram.

**RATINGS**

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

parameter	symbol	min.	max.	unit
Supply voltage (pin 6 to pin 4)	V <sub>p</sub>	—	± 30	V
Bootstrap voltage (pin 7 to pin 4)	V <sub>bstr</sub>	—	70	V
Output current (repetitive peak)	I <sub>o</sub>	—	8	A
Operating ambient temperature range	T <sub>amb</sub>	see Fig.2		
Storage temperature range	T <sub>stg</sub>	—55	+ 150	°C
Power dissipation		see Fig.2		
Thermal shut-down protection time	t <sub>pr</sub>	—	1	hour
Mute voltage (pin 3 to pin 4)	V <sub>m</sub>	—	7.25	V

**THERMAL RESISTANCE**

From junction to mounting base

R<sub>th j-mb</sub> 1 K/W

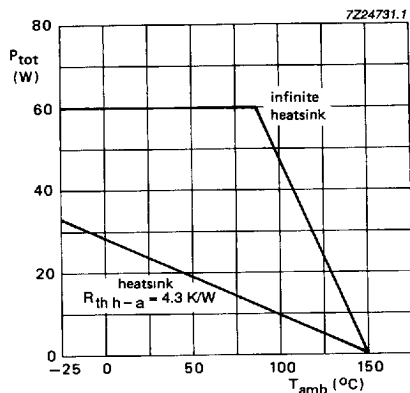


Fig.2 Power derating curve.

The theoretical maximum power dissipation for  $P_O = 40$  W with a stabilized power supply is:

$$\frac{V_P^2}{2\pi^2 R_L} = 19 \text{ W; where } V_P = \pm 27.5 \text{ V; } R_L = 8 \Omega$$

Considering, for example, a maximum ambient temperature of 50 °C and a maximum junction temperature of 150 °C the total thermal resistance is:

$$R_{th j-a} = \frac{150 - 50}{19} = 5.3 \text{ K/W}$$

Since the thermal resistance of the SOT131A encapsulation is  $R_{th j-mb} < 1 \text{ K/W}$ , the thermal resistance required of the heatsink is  $R_{th h-a} < 4.3 \text{ K/W}$ .

#### SAFE OPERATING AREA (SOAR) PROTECTION

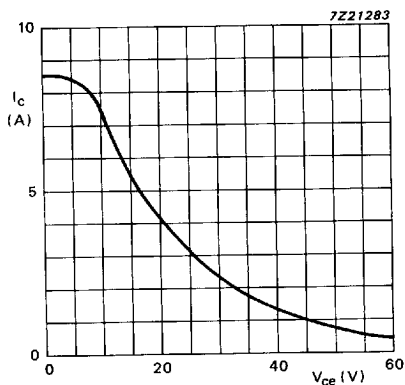


Fig.3 SOAR protection curve.

## CHARACTERISTICS

$V_p = \pm 27.5$  V;  $R_L = 8 \Omega$ ;  $f = 1$  kHz;  $T_{amb} = 25$  °C; test circuit as Fig.4; unless otherwise specified.

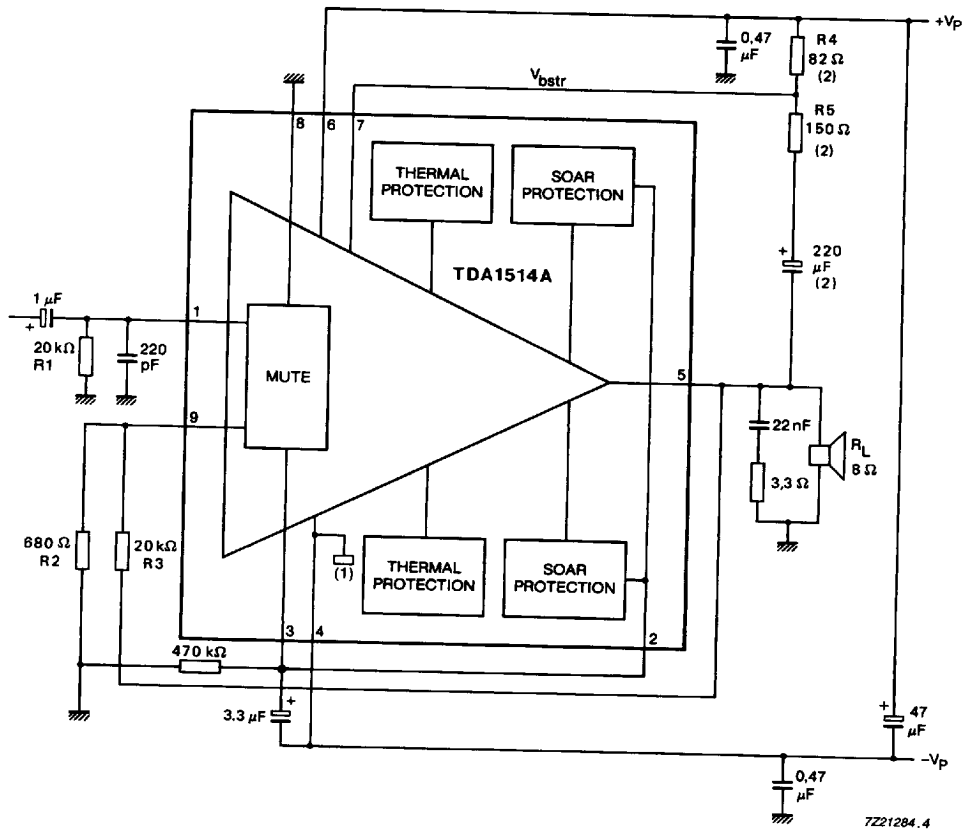
parameter	conditions	symbol	min.	typ.	max.	unit
Supply voltage range (pin 6 to pin 4)		$V_p$	$\pm 10$	—	$\pm 30$	V
Maximum output current (peak value)		$I_{OMmax}$	6.4	—	—	A
<b>Operating state</b>						
Voltage (pins 3 to 4)		$V_{3-4}$	6	—	7.25	V
Total quiescent current	$R_L = \infty$	$I_{tot}$	30	56	90	mA
Output power	THD = -60 dB	$P_o$	37	40	—	W
	THD = -20 dB	$P_o$	—	51	—	W
Output power	$V_p = \pm 23$ V; THD = -60 dB					
	$R_L = 8 \Omega$	$P_o$	—	28	—	W
	$R_L = 4 \Omega$	$P_o$	—	48	—	W
Total harmonic distortion	$P_o = 32$ W	THD	—	-90	-80	dB
Intermodulation distortion	$P_o = 32$ W note 1	$d_{im}$	—	-86	—	dB
Power bandwidth	(-3 dB); THD = -60 dB	B	—	20 to 25 000	—	Hz
Slew rate		$dV/dt$	—	14	—	V/ $\mu$ s
Closed loop voltage gain	note 2	$G_c$	—	30	—	dB
Open loop voltage gain		$G_o$	—	89	—	dB
Input impedance	note 3	$ Z_i $	1	—	—	M $\Omega$
Signal-to-noise ratio	note 4 $P_o = 50$ mW	S/N	80	83	—	dB
Output offset voltage		$V_o$	—	7	200	mV
Input bias current		$I_i$	—	0.1	1.0	$\mu$ A
Output impedance		$ Z_o $	—	—	0.1	$\Omega$
Supply voltage ripple rejection	note 5	SVRR	58	64	—	dB
Quiescent current into pin 2	note 6	$I_2$	—	0.1	—	$\mu$ A

## CHARACTERISTICS (continued)

parameter	conditions	symbol	min.	typ.	max.	unit
<b>Mute state</b>						
Voltage on pin 3	$V_{i(rms)} = 1\text{ V}$ $f = 1\text{ kHz}$ note 5	V3-4	2	—	4.5	V
Offset voltage		$V_o$	—	30	200	V
Output voltage		$V_o$	—	450	—	$\mu\text{V}$
Ripple rejection		RR	—	60	—	dB
<b>Standby state</b>						
Voltage on pin 3	notes 5 and 7	V3-4	0	—	0.9	V
Total quiescent current		$I_{tot}$	—	18	25	mA
Ripple rejection		RR	—	60	—	dB
Supply voltage to obtain standby state		$\pm V_p$	5.0	—	7.0	V

## Notes to the characteristics

1. Measured with two superimposed signals of 50 Hz and 7 kHz with an amplitude relationship of 4 : 1.
2. The closed loop gain is determined by external resistors (Fig.4, R2 and R3) and is variable between 20 and 46 dB.
3. The input impedance in the test circuit (Fig.4) is determined by the bias resistor R1.
4. The noise output voltage is measured in a bandwidth of 20 Hz to 20 kHz with a source resistance of 2 k $\Omega$ .
5.  $f = 100\text{ Hz}$ ;  $R_S = 2\text{ k}\Omega$ ; ripple voltage = 500 mV<sub>(eff)</sub> on positive and negative supply.
6. The quiescent current into pin 2 has an impact on the mute time.
7. Without bootstrap.



- (1) Mounting base connected to  $-V_p$ .
- (2) When used without a bootstrap these components are disconnected and pin 6 is connected to pin 7 thus decreasing the output power by approximately 4 W.
- (3) When  $R_L = 4 \Omega$ :  $R_4 = 47 \Omega$  and  $R_5 = 82 \Omega$ .

Fig.4 Application and test circuit.