

# AN7124

## Dual 3.1 W Audio Power Amplifier

### ■ Overview

The AN7124 is a monolithic integrated circuit designed for dual audio power amplifier of portable radio cassette.

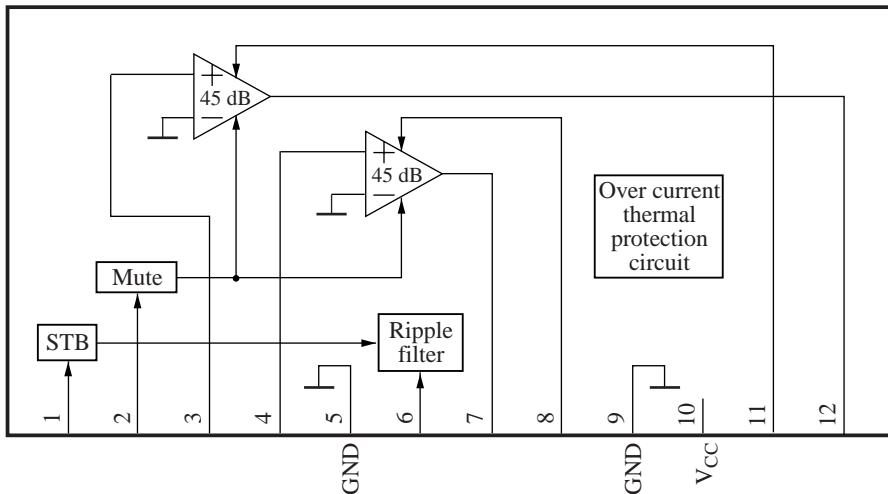
### ■ Features

- Audio output : 3.1 W × 2 channel
- Built-in standby and muting circuit
- Built-in thermal shut down protection circuit
- Low pop noise during standby and mute ON/OFF
- No negative feedback pin

### ■ Applications

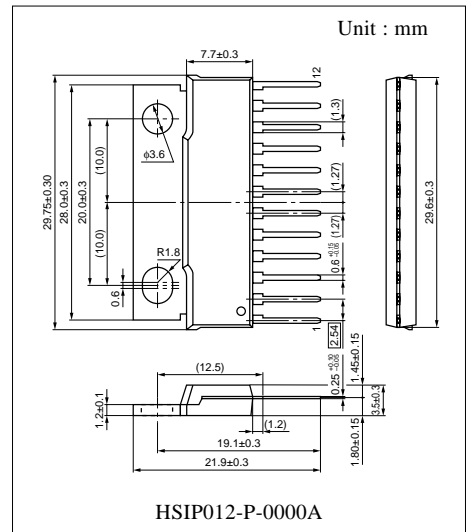
- Radio-cassette

### ■ Block Diagram



### ■ Pin Descriptions

Pin No.	Description	Pin No.	Description
1	Stand-by	7	ch.1 output
2	Muting	8	ch.1 bootstrap
3	ch.2 input	9	Output GND
4	ch.1 input	10	V <sub>CC</sub>
5	Input GND	11	ch.2 bootstrap
6	Ripple filter	12	ch.2 output



### ■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	$V_{CC}$	24	V
Supply current	$I_{CC}$	4.0	A
Power dissipation	$P_D$	37.5	W
Operating ambient temperature	$T_{opr}$	-25 to +75	°C
Storage temperature	$T_{stg}$	-55 to +150	°C

### ■ Recommended Operating Range

Parameter	Symbol	Range	Unit
Supply voltage	$V_{CC}$	6.0 to 18.0	V

### ■ Electrical Characteristics at $V_{CC} = 12\text{ V}$ , $R_L = 3\ \Omega$ , $f = 1\text{ kHz}$ , $T_a = 25\text{ °C}$

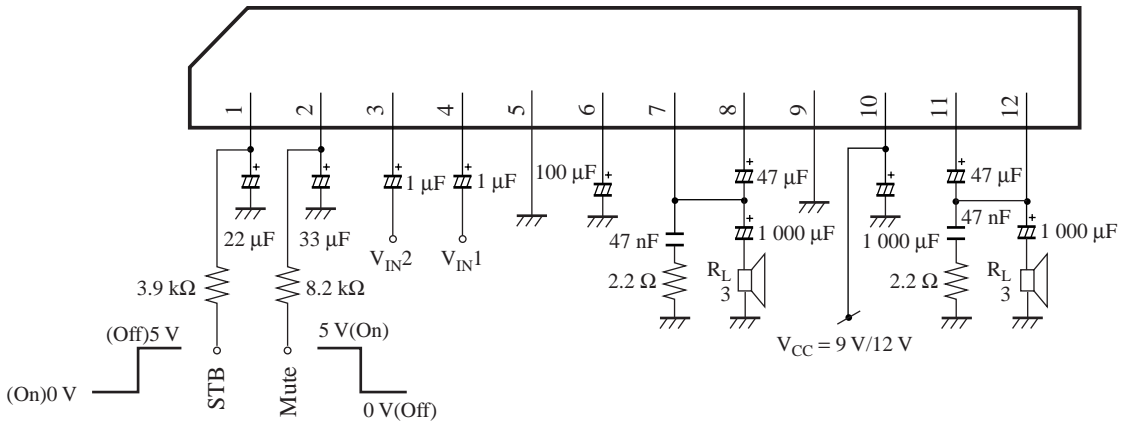
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Quiescent current	$I_{CQ}$	$V_{IN} = 0\text{ mV}$	12	19	26	mA
Output noise voltage <sup>*1</sup>	$V_{NO}$	$V_{IN} = 0\text{ mV}, P_G = 10\text{ k}\Omega$	—	0.27	0.5	mVrms
Voltage gain	$G_V$	$V_{IN} = 3\text{ mV}$	43	45	47	dB
Total harmonic distortion <sup>*2</sup>	THD	$V_{IN} = 3\text{ mV}$	—	0.05	0.5	%
Maximum output 1	$P_{O1}$	THD = 10 %	4.3	5.0	—	W
Channel balance	CB	$V_{IN} = 3\text{ mV}$	-1	0	1	dB
Ripple rejection <sup>*1</sup>	RR	$R_G = 0\ \Omega, V_R = 280\text{ mVrms}, f_R = 120\text{ Hz}$	45	50	—	dB
Standby current	$I_{STB}$	$V_{IN} = 0\text{ mV}$	—	1	10	$\mu\text{A}$
Muting effects <sup>*1</sup>	Mut	$V_{IN} = 10\text{ mV}$	60	80	—	dB
Maximum output 2 <sup>*3</sup>	$P_{O2}$	THD = 10 %, $V_{CC} = 9\text{ V}$	2.5	3.0	—	W
Crosstalk <sup>*1,*3</sup>	CT	$R_G = 10\text{ k}\Omega, V_{IN} = 10\text{ mV}, f = 1\text{ kHz}$	50	64	—	dB

Note) <sup>\*1</sup>: With a filter band from 20 Hz to 20 kHz (12 dB/OCT) used.

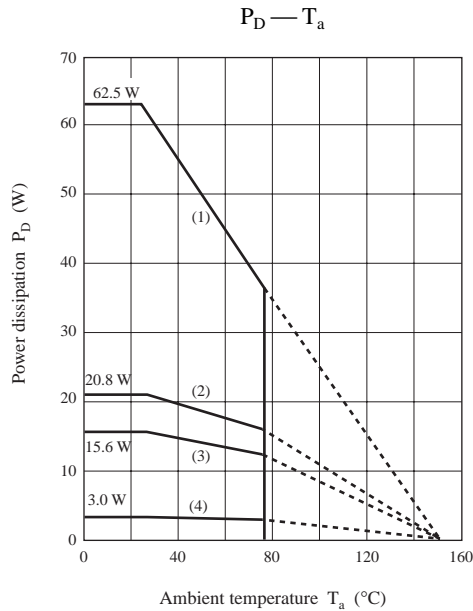
<sup>\*2</sup>: With a filter band from 400 Hz to 30 kHz used.

<sup>\*3</sup>: Reference data for design.

■ Application Circuit Example



■ Characteristics Curve

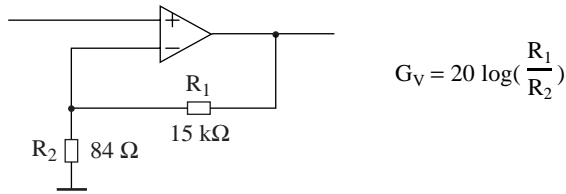


1.  $T_C = T_a$  ( $\theta_{j-c} = 2 \text{ }^\circ\text{C/W}$ )
2. 20.83 W ( $\theta_f = 4.0 \text{ }^\circ\text{C/W}$ )  
With a  $100 \text{ cm}^2 \times 3 \text{ mm}$  Al heat sink (black colour coated) or a  $200 \text{ cm}^2 \times 2 \text{ mm}$  Al heat sink (not lacquered)
3. 15.63 W ( $\theta_f = 6.0 \text{ }^\circ\text{C/W}$ )  
With a  $100 \text{ cm}^2 \times 2 \text{ mm}$  Al heat sink(not lacquered)
4. 3.0 W at  $T_a = 25 \text{ }^\circ\text{C}$  ( $\theta_{j-a} = 42 \text{ }^\circ\text{C/W}$ )  
Without heat sink

■ Application Note

1. Voltage gain

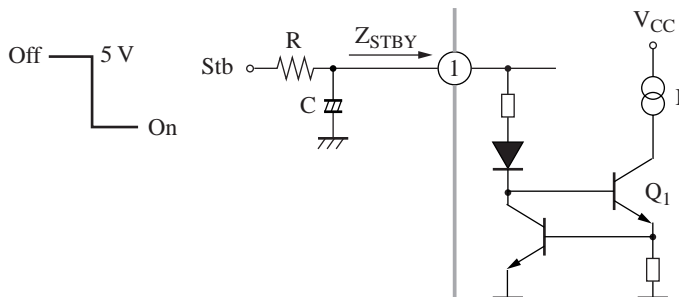
The close loop gain of AN7124 is fixed at 45 dB(typ.)



$$G_v = 20 \log\left(\frac{R_1}{R_2}\right)$$

2. Standby function

Standby is ON when Pin1 is set to "L". By applying a 5 V to the standby pin, transistor Q1 will be turned ON to provide a constant current (I) for driving other parts of the circuit. The RC is to create a TIME CONSTANT for the standby pulse during charging and discharging.

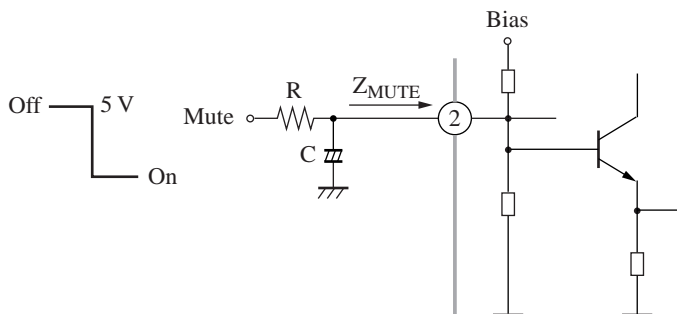


Threshold voltage (at Pin1) :  
ON < 2.8 V < OFF

Impedance,  $Z_{STBY} \approx 1 \text{ k}\Omega$

3. Muting

By controlling Pin2 from "H" to "L", the mute function is set from ON to OFF. When Pin2 is floating, DC  $\approx 0.02 \text{ V}$ . The threshold is set  $\approx 2.8 \text{ V}$ . The RC is to create a TIME CONSTANT for the mute pulse during charging and discharging.



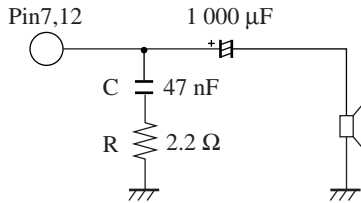
Threshold voltage (at Pin2) :  
10 % mute = 1.5 V  
90 % mute = 2.8 V

Impedance,  $Z_{MUTE} \approx 45 \text{ k}\Omega$

■ Application Note (continued)

4.Oscillation

To prevent oscillation, it is advisable to use C (Zobel network capacitor). Using polyester film capacitor has small characteristic fluctuation with temperature and the frequency.The resistor R connected in series with C is effective for phase correction at high frequency, as a result, it improves the oscillation allowance.



5.Bootstrap

The capacitor C connected between the output and bootstrap pin helps to increase the output dynamic range and hence increases the output power of the IC.

