

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.

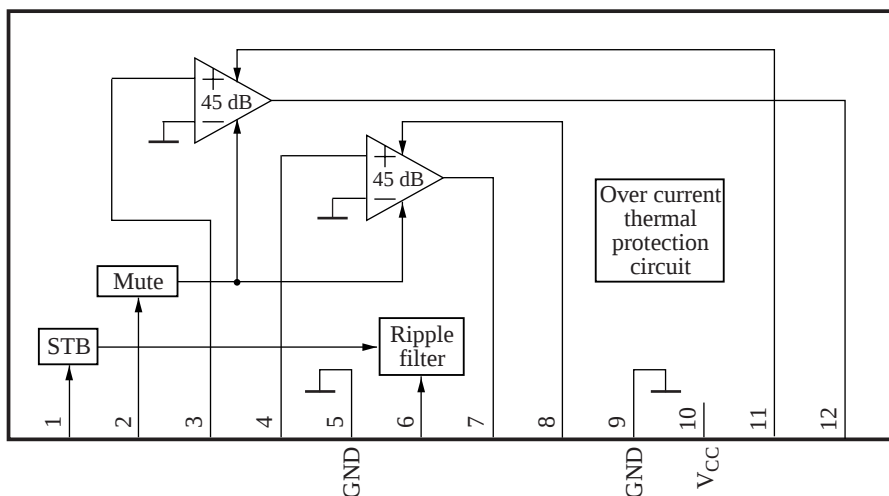
■ Features

- Audio output : 3.1 W $\times$ 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

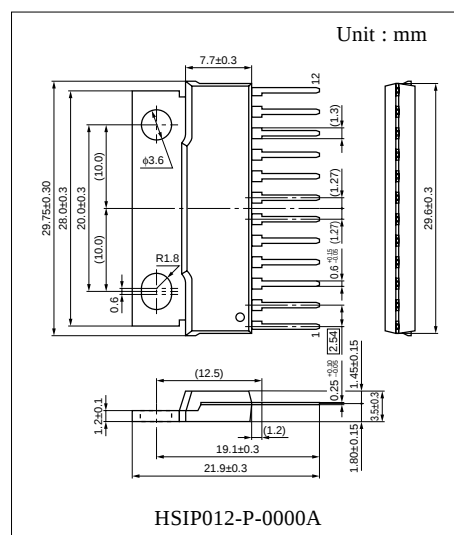
- Radio-cassette

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

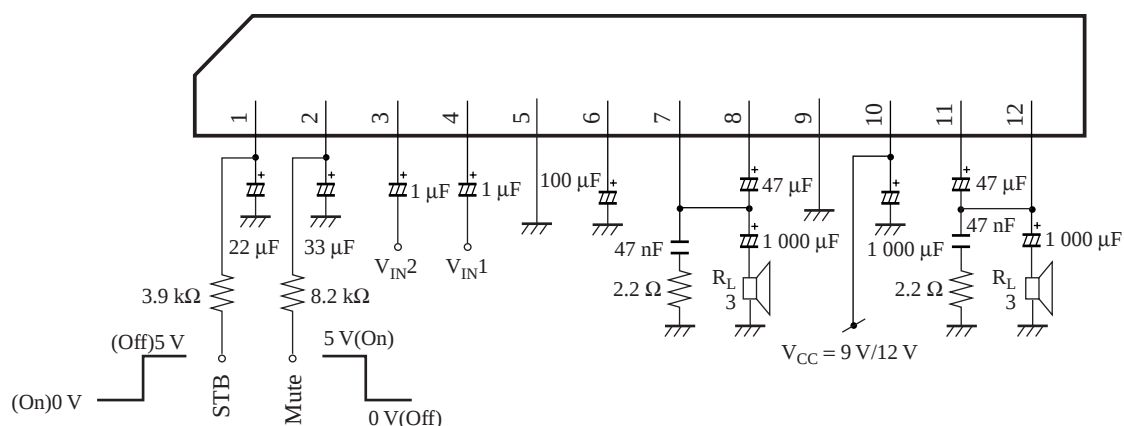
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Quiescent current	I_{CQ}	$V_{IN} = 0\text{ mV}$	12	19	26	mA
Output noise voltage *1	V_{NO}	$V_{IN} = 0\text{ mV}$, $P_G = 10\text{ k}\Omega$	—	0.27	0.5	mVrms
Voltage gain	G_V	$V_{IN} = 3\text{ mV}$	43	45	47	dB
Total harmonic distortion *2	THD	$V_{IN} = 3\text{ mV}$	—	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 *1	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	μA
Muting effects *1	Mut	$V_{IN} = 10\text{ mV}$	60	80	—	dB
Maximum output 2 *3	P_{O2}	THD = 10 %, $V_{CC} = 9\text{ V}$	2.5	3.0	—	W
Crosstalk *1,*3	CT	$R_G = 10\text{ k}\Omega$, $V_{IN} = 10\text{ mV}$, $f = 1\text{ kHz}$	50	64	—	dB

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

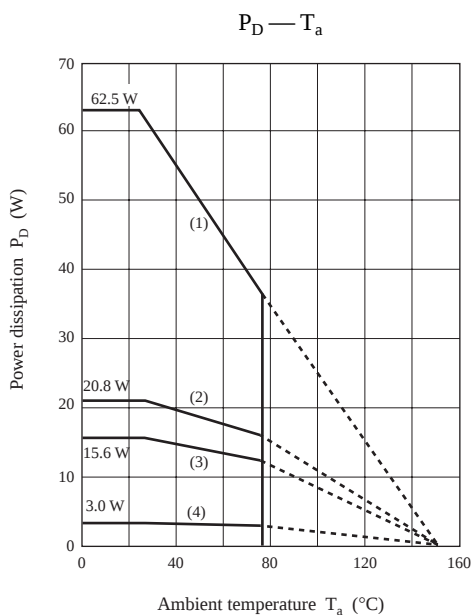
*2: With a filter band from 400 Hz to 30 kHz used.

*3: Reference data for design.

■ Application Circuit Example



■ Characteristics Curve

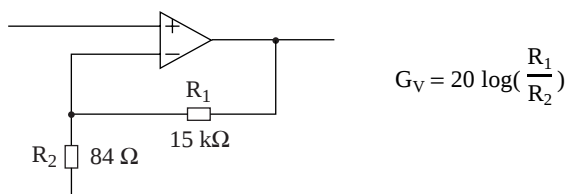


1. $T_C = T_a$ ($\theta_{j-c} = 2^\circ\text{C/W}$)
2. 20.83 W ($\theta_f = 4.0^\circ\text{C/W}$)
With a $100\text{ cm}^2 \times 3\text{ mm}$ Al heat sink (black colour coated) or a $200\text{ cm}^2 \times 2\text{ mm}$ Al heat sink (not lacquered)
3. 15.63 W ($\theta_f = 6.0^\circ\text{C/W}$)
With a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

■ Application Note

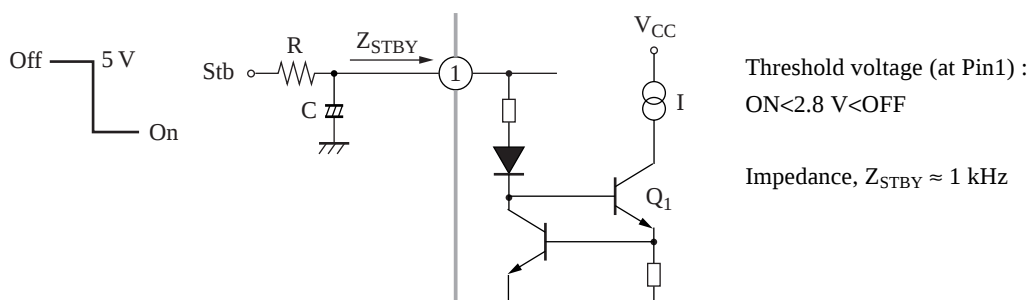
1. Voltage gain

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



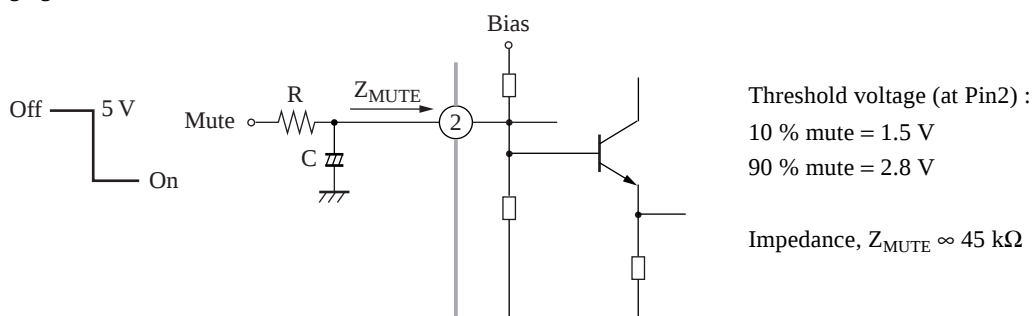
2. Standby function

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.



3. Muting

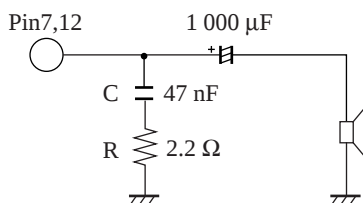
By controlling Pin2 from "H" to "L", the mute function is set from ON to OFF. When Pin2 is floating, DC $\approx 0.02 \text{ V}$. The threshold is set $\approx 2.8 \text{ V}$. The RC is to create a TIME CONSTANT for the mute pulse during charging and discharging.



■ Application Note (continued)

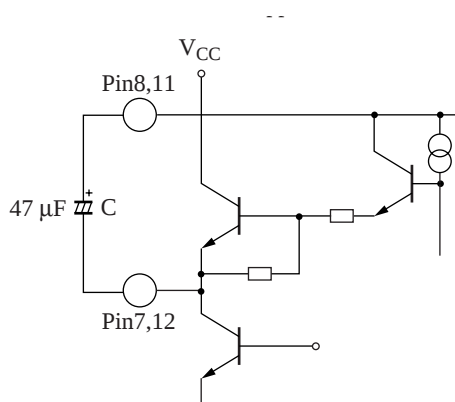
4. Oscillation

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.



Request for your special attention and precautions in using the technical information and semiconductors described in this material

- (1) An export permit needs to be obtained from the competent authorities of the Japanese Government if any of the products or technologies described in this material and controlled under the "Foreign Exchange and Foreign Trade Law" is to be exported or taken out of Japan.
- (2) The technical information described in this material is limited to showing representative characteristics and applied circuit examples of the products. It does not constitute the warranting of industrial property, the granting of relative rights, or the granting of any license.
- (3) The products described in this material are intended to be used for standard applications or general electronic equipment (such as office equipment, communications equipment, measuring instruments and household appliances).
Consult our sales staff in advance for information on the following applications:
 - Special applications (such as for airplanes, aerospace, automobiles, traffic control equipment, combustion equipment, life support systems and safety devices) in which exceptional quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or harm the human body.
 - Any applications other than the standard applications intended.
- (4) The products and product specifications described in this material are subject to change without notice for reasons of modification and/or improvement. At the final stage of your design, purchasing, or use of the products, therefore, ask for the most up-to-date Product Standards in advance to make sure that the latest specifications satisfy your requirements.
- (5) When designing your equipment, comply with the guaranteed values, in particular those of maximum rating, the range of operating power supply voltage and heat radiation characteristics. Otherwise, we will not be liable for any defect which may arise later in your equipment.
Even when the products are used within the guaranteed values, redundant design is recommended, so that such equipment may not violate relevant laws or regulations because of the function of our products.
- (6) When using products for which dry packing is required, observe the conditions (including shelf life and after-unpacking standby time) agreed upon when specification sheets are individually exchanged.
- (7) No part of this material may be reprinted or reproduced by any means without written permission from our company.

Please read the following notes before using the datasheets

- A. These materials are intended as a reference to assist customers with the selection of Panasonic semiconductor products best suited to their applications.
Due to modification or other reasons, any information contained in this material, such as available product types, technical data, and so on, is subject to change without notice.
Customers are advised to contact our semiconductor sales office and obtain the latest information before starting precise technical research and/or purchasing activities.
- B. Panasonic is endeavoring to continually improve the quality and reliability of these materials but there is always the possibility that further rectifications will be required in the future. Therefore, Panasonic will not assume any liability for any damages arising from any errors etc. that may appear in this material.
- C. These materials are solely intended for a customer's individual use.
Therefore, without the prior written approval of Panasonic, any other use such as reproducing, selling, or distributing this material to a third party, via the Internet or in any other way, is prohibited.