

AN5272

4.0 W × 2 (18 V, 8 Ω) Power Amplifier with Variable Audio Output and Volume Control

Overview

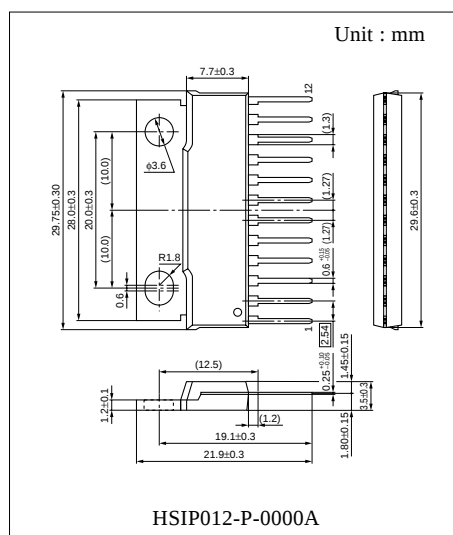
The AN5272 is a monolithic integrated circuit designed for 4.0 W (18 V, 8 Ω) output audio power amplifier. It is a dual channel SEPP IC suitable for stereo operation in TV application.

Features

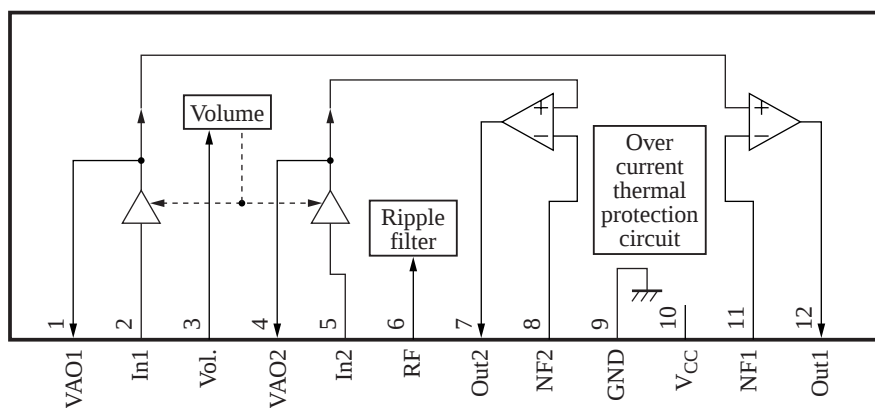
- Built-in DC volume control
- Built-in thermal protection circuit
- Built-in over current protection circuit
- 2 Variable Audio Output (VAO)
- V_{CC} operating range : 12.2 V to 27.5 V

Applications

- TV



Block Diagram



■ Pin Descriptions

Pin No.	Description	Pin No.	Description
1	Variable audio output 1	7	Ch.2 output
2	Ch.1 input	8	Negative feedback ch.2
3	Volume control	9	GND
4	Variable audio output 2	10	V _{CC}
5	Ch.2 input	11	Negative feedback ch.1
6	Ripple filter	12	Ch.1 output

■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	V _{CC}	30	V
Supply current	I _{CC}	3.5	A
Power dissipation *2	P _D	37.5	W
Operating ambient temperature *1	T _{opr}	−25 to +75	°C
Storage temperature *1	T _{stg}	−55 to +150	°C

Note) *1 : T_a = 25 °C except power dissipation, operating ambient temperature and storage temperature.

*2 : Power dissipation of the package at T_a = 75 °C.

■ Recommended Operating Range

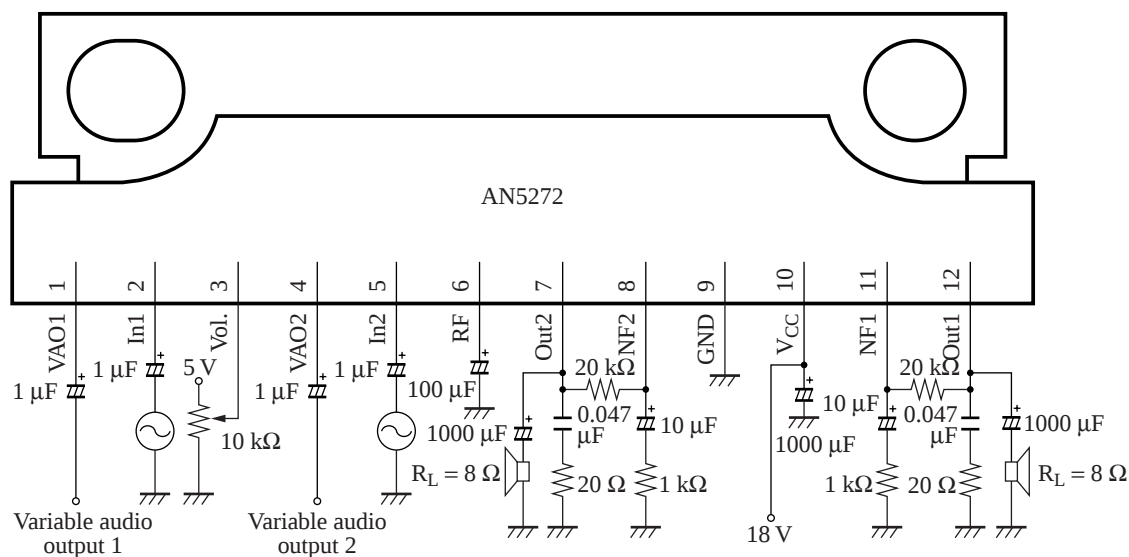
Parameter	Symbol	Range	Unit
Supply voltage	V _{CC}	12.2 to 27.5	V

■ Electrical Characteristics at V_{CC} = 18 V, f = 1 kHz, R_L = 8 Ω, T_a = 25 °C

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Quiescent current	I _{CQ}	No input signal	17	25	33	mA
Voltage gain	G _V	V _{IN} = 90 mV	28	30	32	dB
Total harmonic distortion *1	THD	V _{IN} = 90 mV		0.3	1.0	%
Output power *1	P _O	THD = 10 %	3.6	4.1		W
Channel balance	CB	V _{IN} = 90 mV	−1	0	1	dB
Max. volume attenuation *1	Att	V _{IN} = 90 mV		−70	−64	dB
VAO voltage gain	G _{VAO}	V _{IN} = 90 mV	10	12	14	dB
Output noise voltage *1	V _{NO}	R _g = 10 kΩ, Din-Audio Filter		0.6	1.0	mV[rms]

Note) *1 : With a filter band from 20 Hz to 20 kHz used.

■ Application Circuit Example

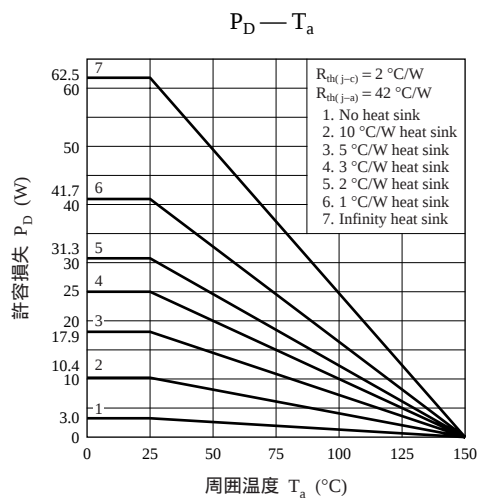
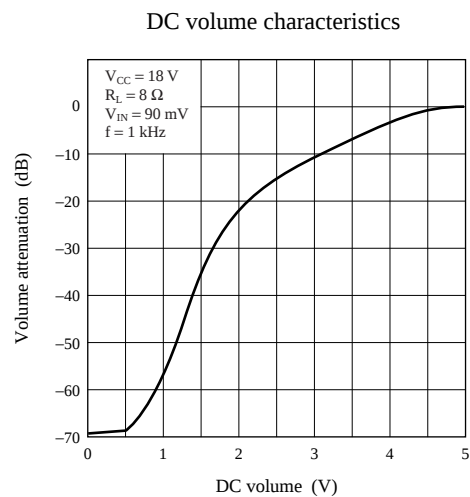
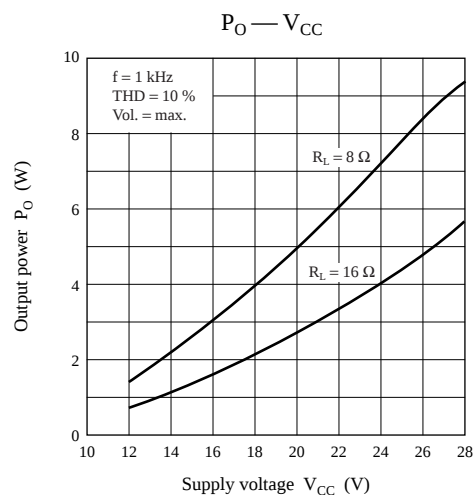
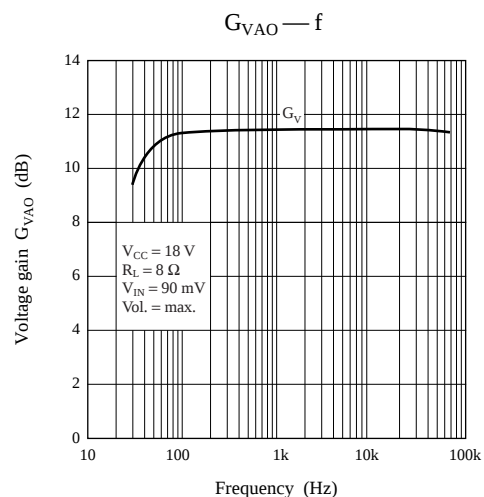
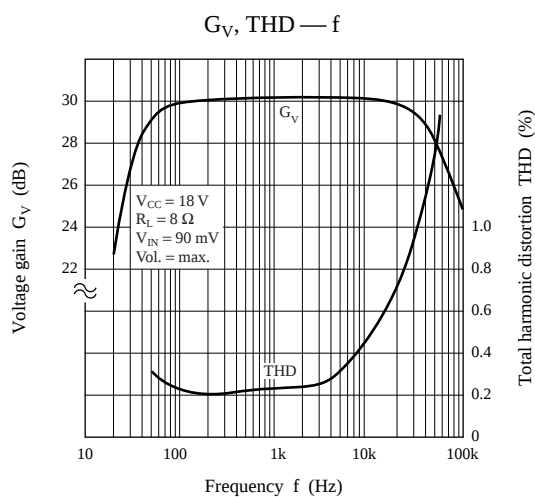
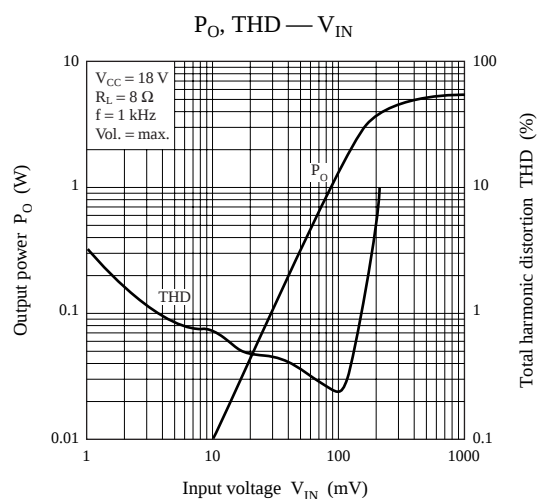


■ Usage Notes

- 1) Depending on the maximum application output power, external heatsink may be needed.
External heatsink should be fixed to the chassis.
- 2) Fin of the IC can be connected to GND.
- 3) Please prevent output to V_{CC} short and output to GND short.
- 4) The temperature protection circuit will operate at T_j around 150 $^{\circ}\text{C}$. However, if the temperature decreases, the protection circuit would automatically be deactivated and resume normal operation.

■ Technical Information

1. Characteristic Curve Chart

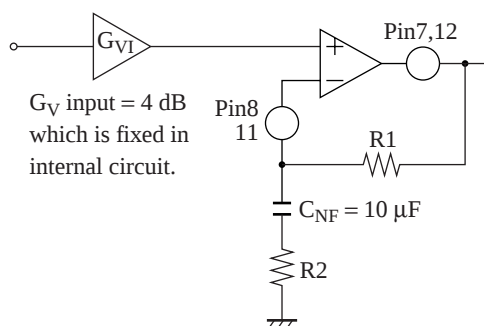


■ Technical Information (continued)

2. Application Note

1) Voltage gain

The voltage gain of the AN5272 can be varied by changing the resistor R2 as shown below :



R_1 is always fixed at 20 k Ω .

R_2 is variable.

$$G_{VO} = 20 \log (R_1/R_2)$$

Typical values are : $R_1 = 20 \text{ k}\Omega$, $R_2 = 1 \text{ k}\Omega$

$$G_{VO} = 20 \log (20 \text{ k}/1 \text{ k}) \\ = 26 \text{ dB}$$

$$G_{VTOTAL} = G_{VI} + G_{VO} \\ = 4 \text{ dB} + 26 \text{ dB} \\ = 30 \text{ dB}$$

2) DC volume control

The DC volume control range is 0 V to 5 V. This range is used in order to be easily controlled by micro-computer using PWM output. The recommended circuit and volume attenuation characteristic are shown below :

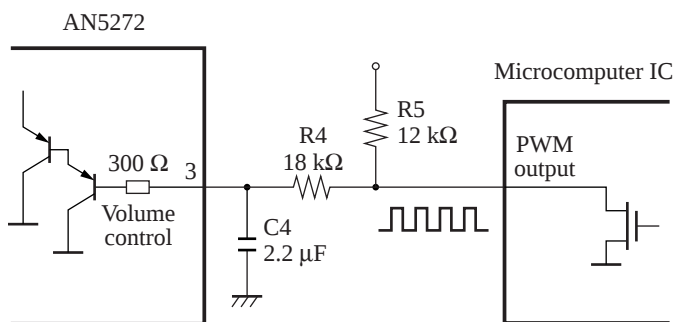


Fig. Volume control interface circuit for AN5272

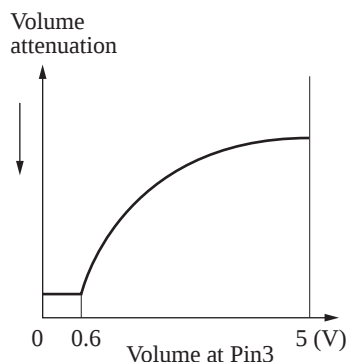
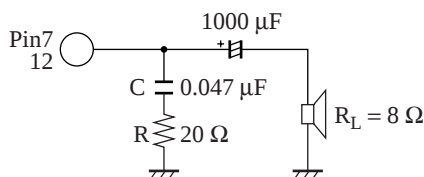


Fig. Volume characteristic of AN5272

3) Oscillation

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

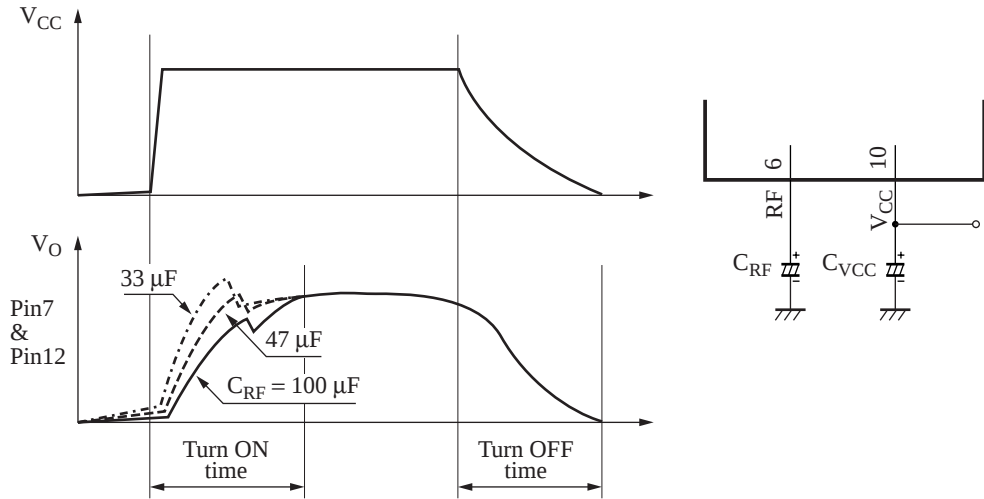


■ Technical Information (continued)

2. Application Note (continued)

4) Power-ON/OFF pop-noise elimination

The output pins 7, 12 and V_O , during power turn ON and OFF are shown below :



The turn ON time in the AN5272 is determined by the capacitance value of C_{RF} . If value of the C_{RF} is smaller, V_O would turn ON faster.

The turn OFF time is dependent on the capacitance value of C_{VCC} . Pop-noise would occur when V_{CC} voltage declines faster than R_F voltage. To solve this, increase the discharge time of V_{CC} by increasing the capacitance values of C_{VCC} .

The recommended values of capacitance for C_{VCC} and C_{RF} are shown below :

No.	C_{RF}	C_{VCC}	Recommended Operating V_{CC} Range	Unit
1	33 μF	470 μF	14.5 to 27.5	V
2	47 μF	470 μF	12.2 to 27.5	V
3	100 μF	1000 μF	12.2 to 27.5	V

5) Stand-by circuit

Stand-by function can be implemented in the AN5272 by external solution. It is realised by pulling the R_F voltage to low and output voltage would follow R_F as shown in the diagram.

