

# AN7522

## Dual 3-W BTL audio power amplifier

### ■ Overview

AN7522 is an audio power amplifier IC for the stereo system. In the BTL (balanced transformerless) method, fewer external parts and easier design for applications are required.

### ■ Features

- 3-W output (8  $\Omega$ ) with supply voltage of 8 V
- On-chip standby function
- On-chip volume function

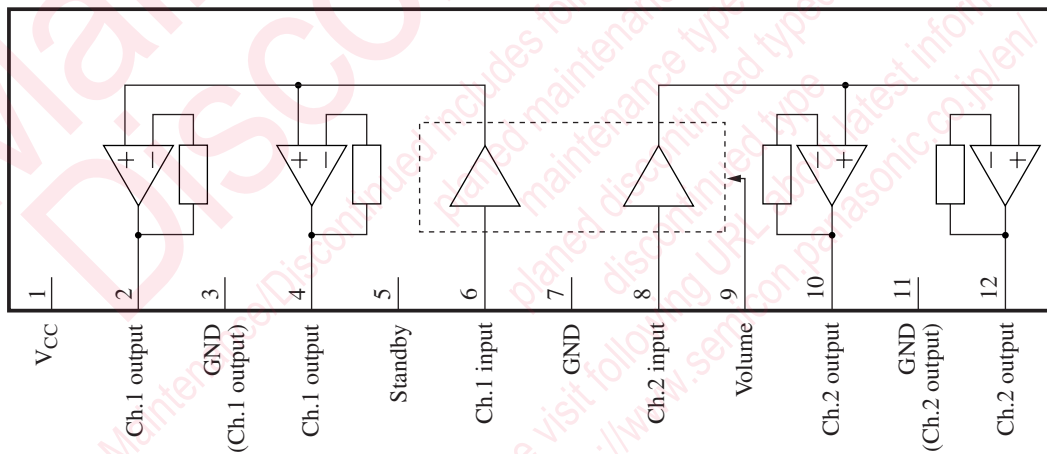
### ■ Applications

- Televisions, audio equipment, personal computers, and active speakers

### ■ Package

- HSIP012-P-0000E

### ■ Block Diagram



### Pin Descriptions

Pin No.	Descriptions	Pin No.	Descriptions
1	Supply voltage	7	Ground (input)
2	Ch.1 + output	8	Ch.2 input
3	Ground (output ch.1)	9	Volume (max. volume if this pin is open.)
4	Ch.1 – output	10	Ch.2 – output
5	Standby (standby state if this pin is open.)	11	Ground (output ch.2)
6	Ch.1 input	12	Ch.2 + output

### Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage *2	$V_{CC}$	14	V
Supply current	$I_{CC}$	2.0	A
Power dissipation *3	$P_D$	1.92	W
Operating ambient temperature *1	$T_{opr}$	-25 to +70	°C
Storage temperature *1	$T_{stg}$	-55 to +150	°C

Note) \*1: Except for the operating ambient temperature and storage temperature, all ratings are for  $T_a = 25^\circ\text{C}$ .

\*2: At no signal.

\*3: The power dissipation shown is the value for  $T_a = 70^\circ\text{C}$ .

### Recommended Operating Range

Parameter	Symbol	Range	Unit
Supply voltage	$V_{CC}$	3.5 to 13.5	V

### Electrical Characteristics at $V_{CC} = 8.0\text{ V}$ , $R_L = 8\ \Omega$ , $f = 1\text{ kHz}$ , $T_a = 25^\circ\text{C} \pm 2^\circ\text{C}$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Quiescent circuit current	$I_{CQ}$	$V_{IN} = 0\text{ mV}$ , Vol. = 0 V	—	45	100	mA
Standby current	$I_{STB}$	$V_{IN} = 0\text{ mV}$ , Vol. = 0 V	—	1	10	$\mu\text{A}$
Output noise voltage *	$V_{NO}$	$R_g = 10\text{ k}\Omega$ , Vol. = 0 V	—	0.10	0.4	mV[rms]
Voltage gain	$G_V$	$P_O = 0.5\text{ W}$ , Vol. = 1.25 V	31	33	35	dB
Total harmonic distortion	THD	$P_O = 0.5\text{ W}$ , Vol. = 1.25 V	—	0.10	0.5	%
Maximum output power	$P_{O1}$	THD = 10%, Vol. = 1.25 V	2.4	3.0	—	W
Ripple rejection ratio *	RR	$R_g = 10\text{ k}\Omega$ , Vol. = 0 V, $V_R = 1\text{ V[rms]}$ , $f_R = 120\text{ Hz}$	30	50	—	dB
Output offset voltage	$V_{OFF}$	$R_g = 10\text{ k}\Omega$ , Vol. = 0 V	-250	0	250	mV
Volume attenuation rate *	Att	$P_O = 0.5\text{ W}$ , Vol. = 0 V	70	85	—	dB
Channel balance 1	CB1	$P_O = 0.5\text{ W}$ , Vol. = 1.25 V	-1	0	1	dB
Channel balance 2	CB2	$P_O = 0.5\text{ W}$ , Vol. = 0.6 V	-3	0	3	dB
Intermediate voltage gain	$G_{VM}$	$P_O = 0.5\text{ W}$ , Vol. = 0.6 V	20.5	23.5	26.5	dB
Channel crosstalk	CT	$P_O = 0.5\text{ W}$ , Vol. = 1.25 V	40	55	—	dB

Note) \*: In measuring, the filter for the range of 15 Hz to 30 kHz (12 dB/OCT) is used.

■ Terminal Equivalent Circuits at  $V_{CC} = 8\text{ V}$

Pin No.	Pin name	Equivalent circuit	Voltage
1	$V_{CC}$	—	8 V
2	Ch.1 + output pin		3.6 V (at no signal)
3	GND		0 V
4	Ch.1 - output pin		3.6 V (at no signal)
5	Standby pin		0 V or 5 V (Standby off at supply 5 V. Standby at 0.4 V less or open.)

■ Terminal Equivalent Circuits at  $V_{CC} = 8\text{ V}$  (continued)

Pin No.	Pin name	Equivalent circuit	Voltage
6	Ch.1 input pin		1.4 V (Input circuit bias voltage is output.)
7	GND		0 V
8	Ch.2 input pin		1.4 V (Input circuit bias voltage is output.)
9	Volume pin		Supply to 0 V to 1.25 V

### ■ Terminal Equivalent Circuits at $V_{CC} = 8\text{ V}$ (continued)

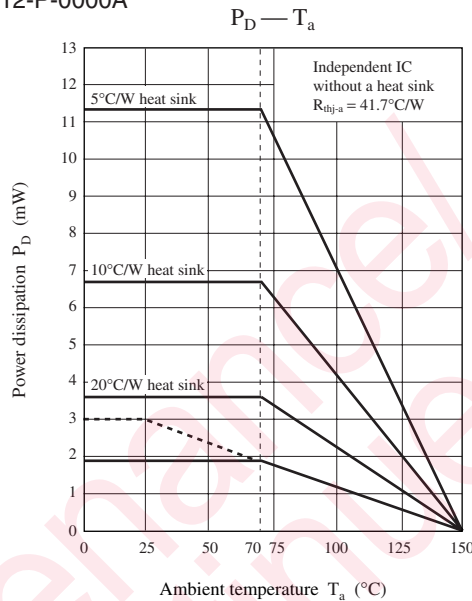
Pin No.	Pin name	Equivalent circuit	Voltage
10	Ch.2 – output pin		3.6 V (at no signal)
11	GND		0 V
12	Ch.2 + output pin		3.6 V (at no signal)

### ■ Usage Notes

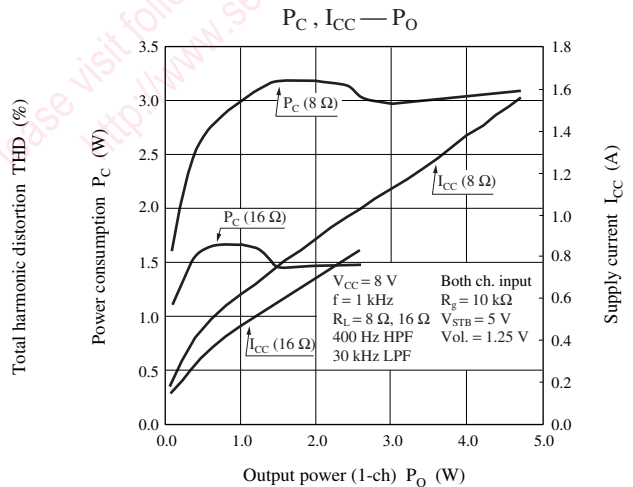
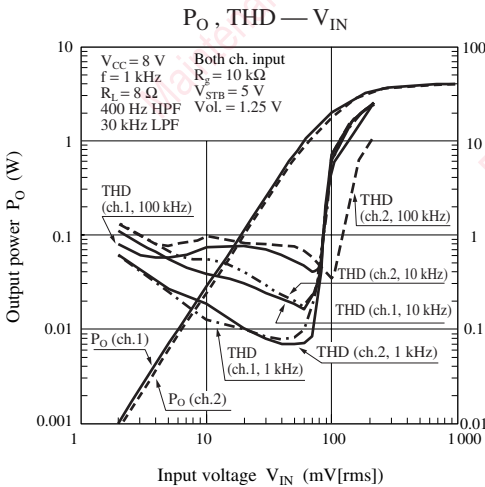
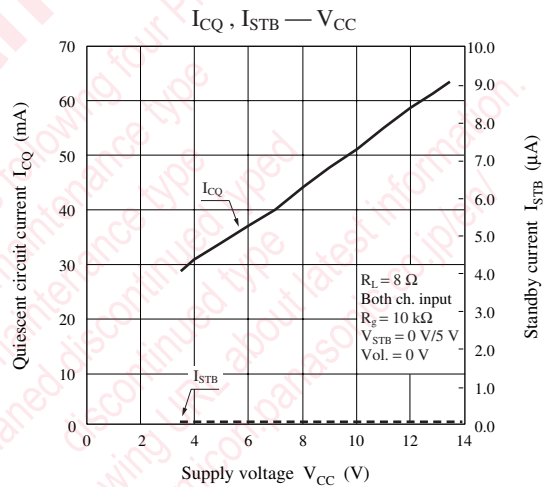
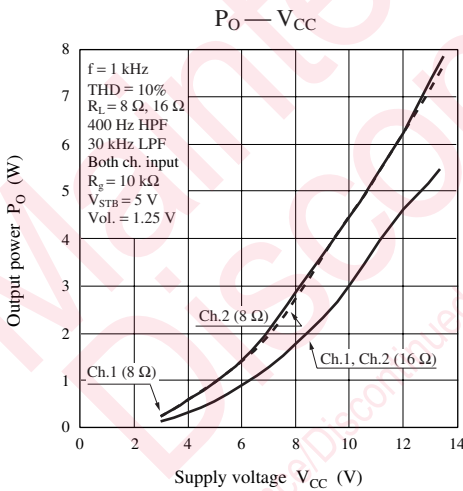
- Please avoid the short-circuits to  $V_{CC}$ , ground, or load short-circuit.
- Please connect the cooling fin with the GND potential.
- The thermal shutdown circuit operates at about  $T_j = 150^\circ\text{C}$ . However, the thermal shutdown circuit is reset automatically if the temperature drops.
- Please carefully design the heat radiation especially when you take out high power at high  $V_{CC}$ .
- Please connect only the ground of signal with the signal GND of the amplifier in the previous stage.

■ Technical Data

- $P_D - T_a$  curves of HSIP012-P-0000A

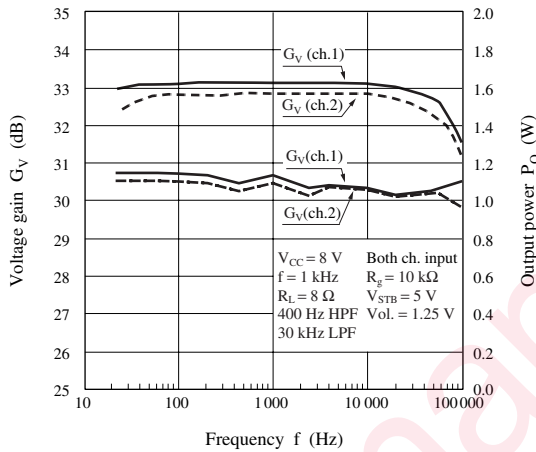


- Main characteristics

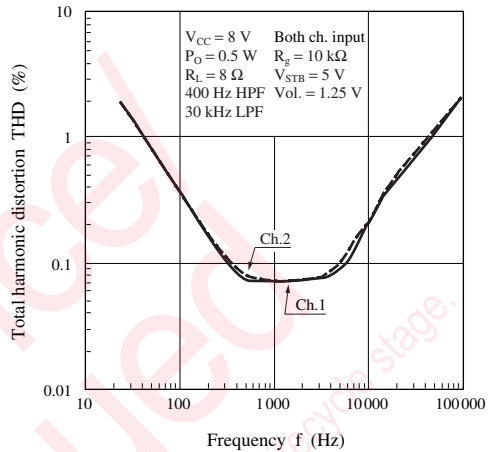


■ Technical Data (continued)  
 • Main characteristics (continued)

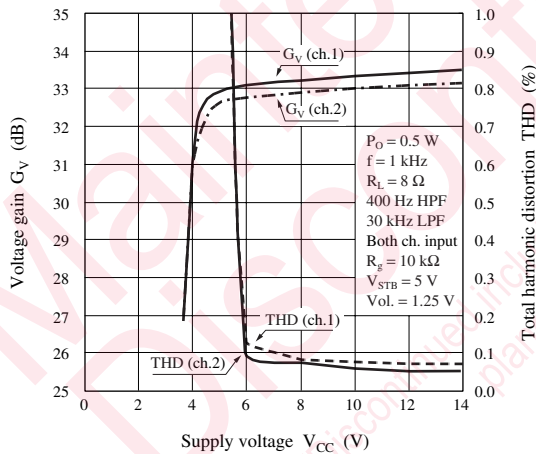
$G_V, P_O - f$



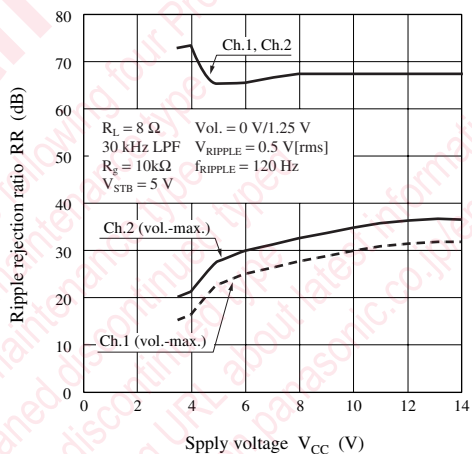
THD —  $f$



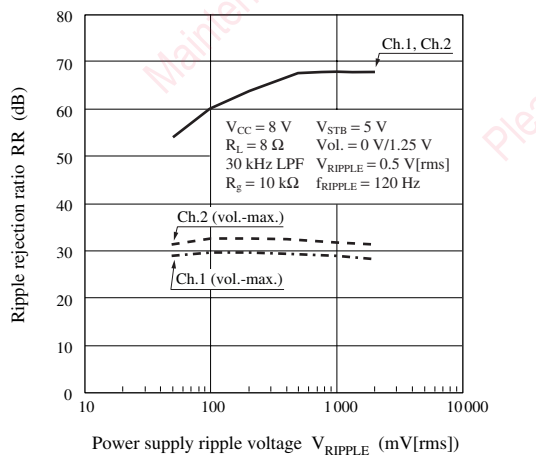
$G_V, \text{THD} - V_{CC}$



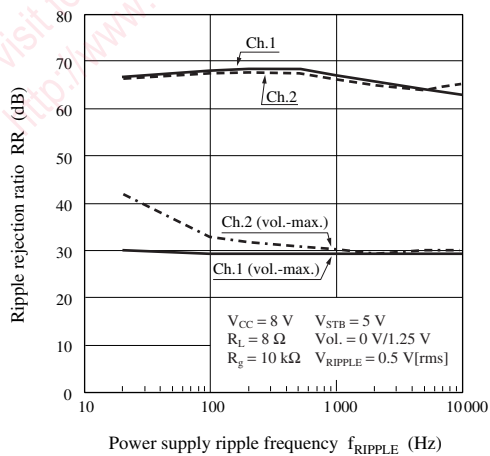
RR —  $V_{CC}$



RR —  $V_{RIPPLE}$



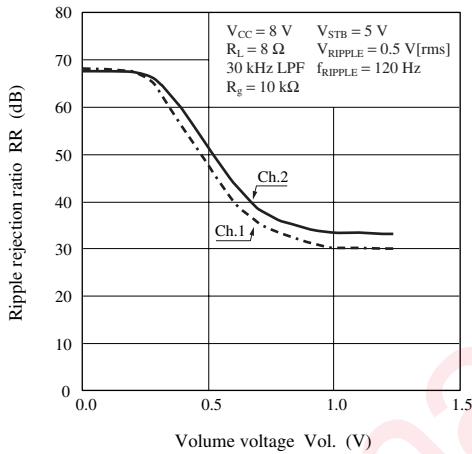
RR —  $f_{RIPPLE}$



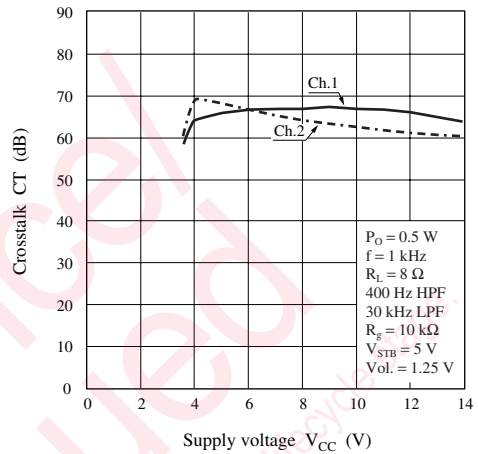
■ Technical Data (continued)

• Main characteristics (continued)

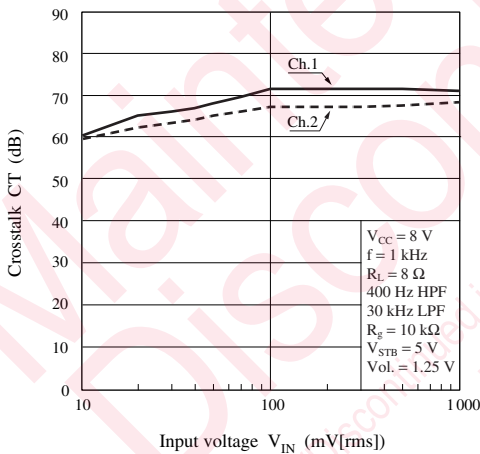
RR — Vol.



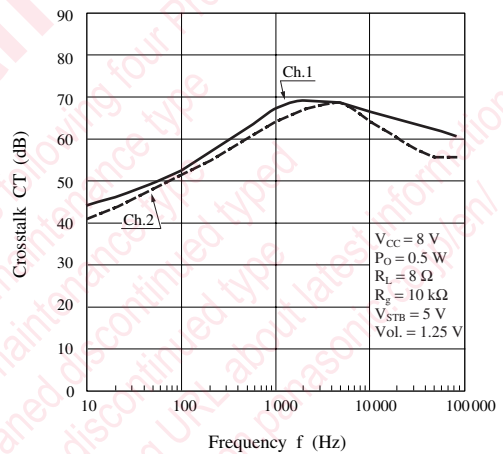
CT — V<sub>CC</sub>



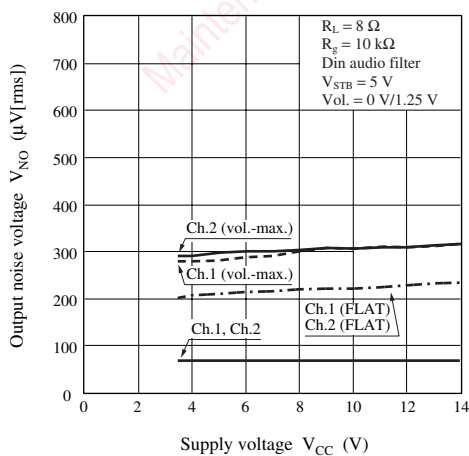
CT — V<sub>IN</sub>



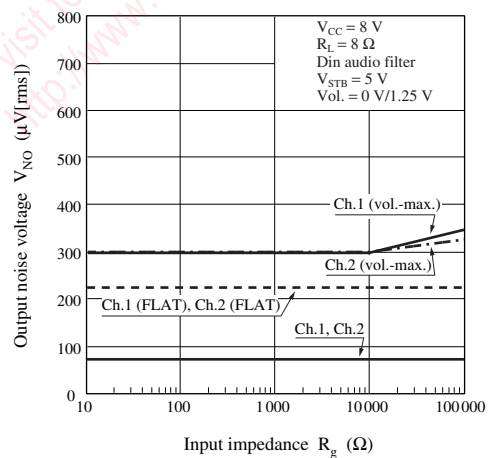
CT — f



V<sub>NO</sub> — V<sub>CC</sub>



V<sub>NO</sub> — R<sub>g</sub>

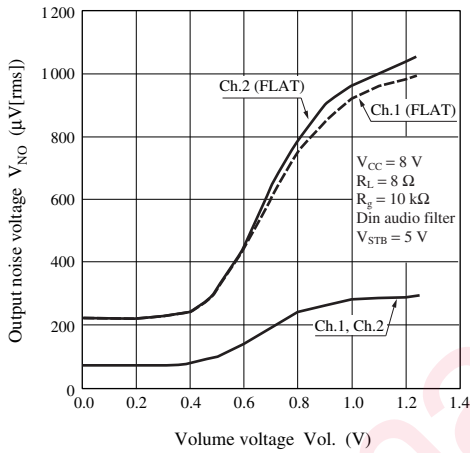




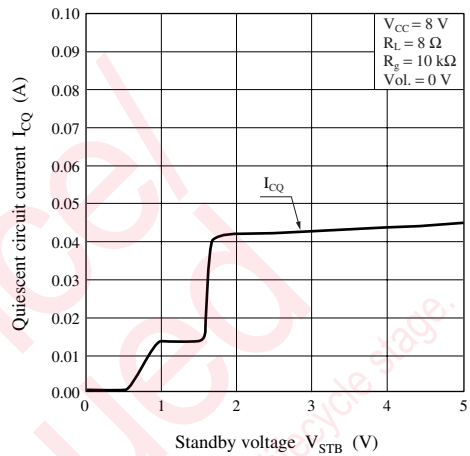
■ Technical Data (continued)

• Main characteristics (continued)

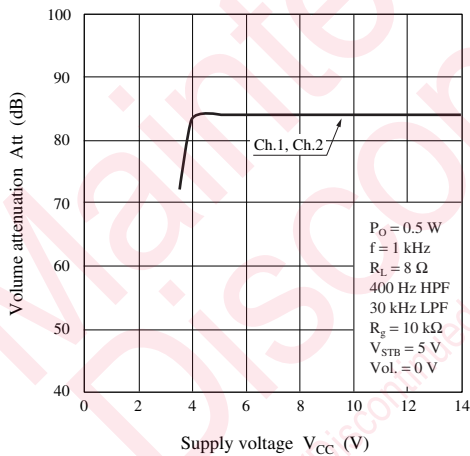
$V_{NO} — Vol.$



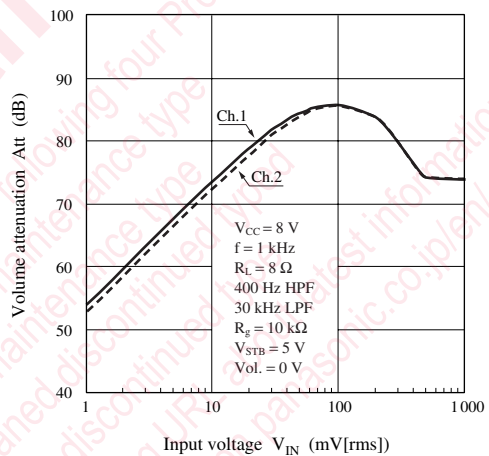
$I_{CQ} — V_{STB}$



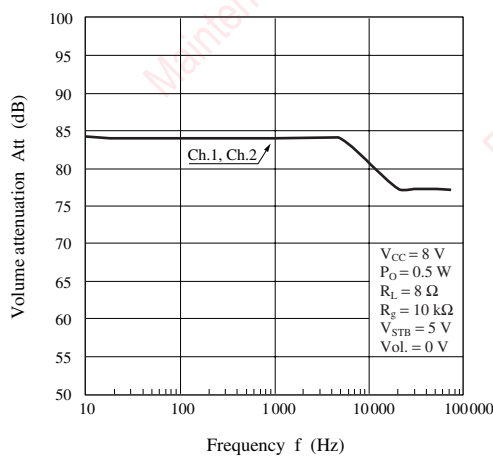
Att —  $V_{CC}$



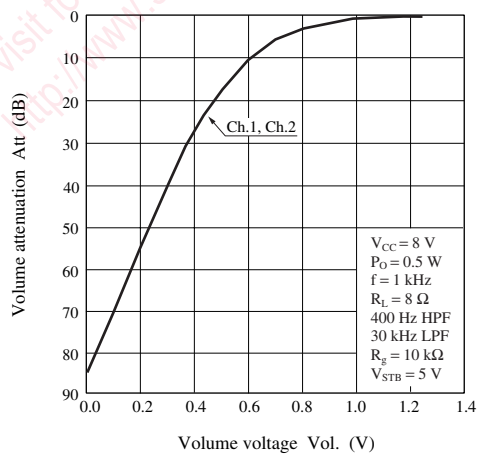
Att —  $V_{IN}$



Att — f

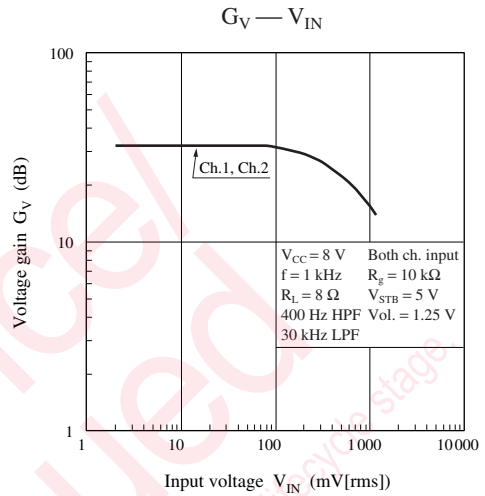
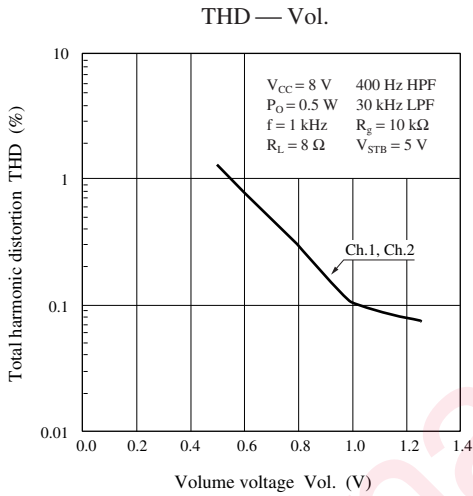


Att — Vol.

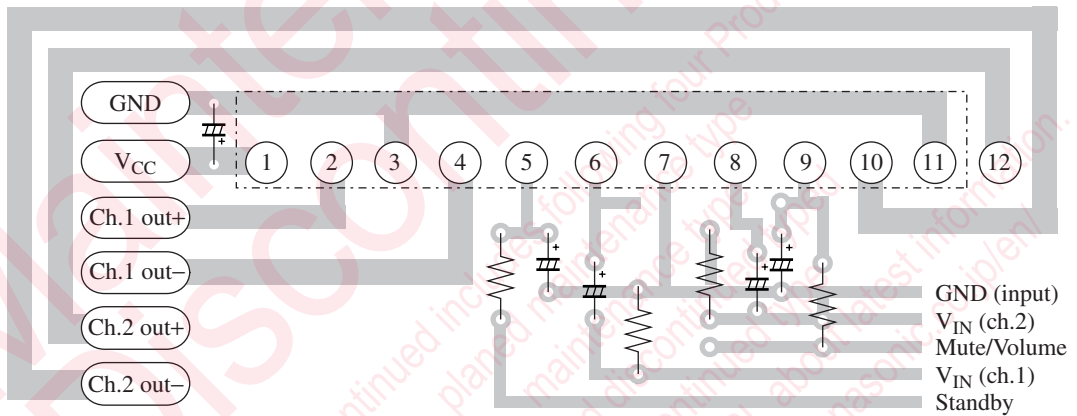


■ Technical Data (continued)

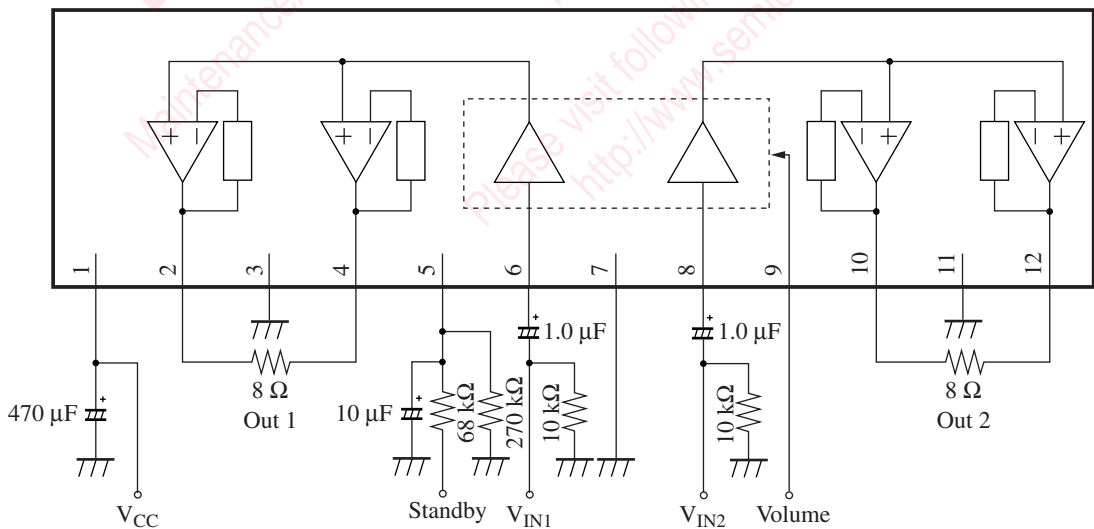
- Main characteristics (continued)



- Example of PCB pattern



■ Application Circuit Example



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