

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 Ω) with supply voltage of 8 V
- On-chip standby function
- On-chip volume function

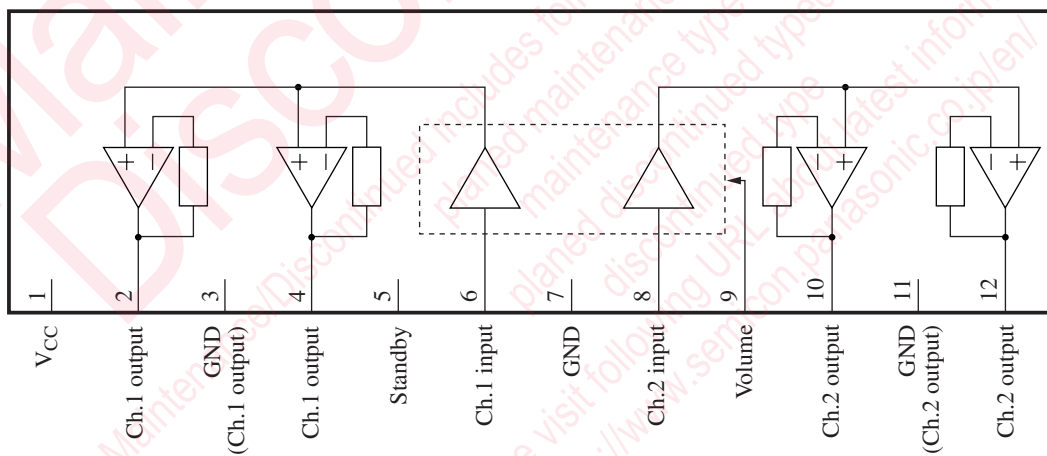
■ Applications

- 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 | μA |
| 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)

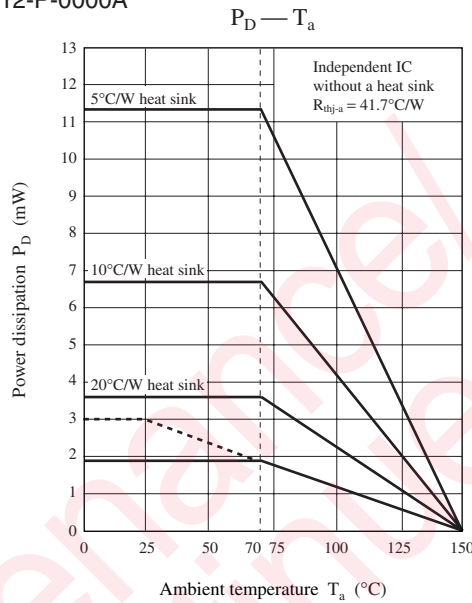
| Pin No. | Pin name | Equivalent circuit | Voltage |
|---------|-------------------|--------------------|-------------------------|
| 10 | Ch.2 – output pin | | 3.6 V (at no signal) |
| 11 | GND | | 0 V |
| 12 | Ch.2 + output pin | | 3.6 V (at no signal) |

■ Usage Notes

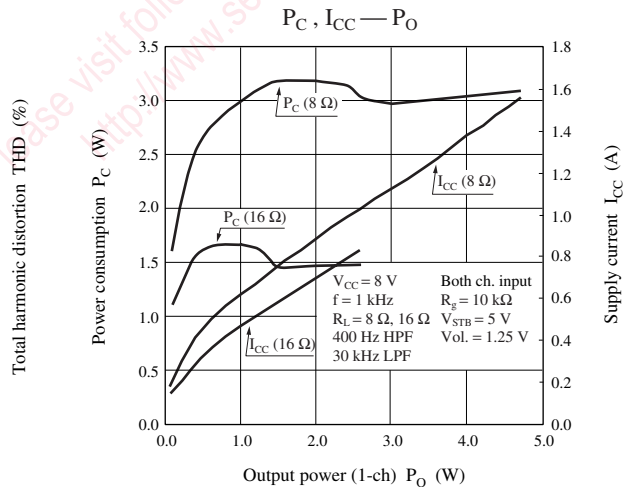
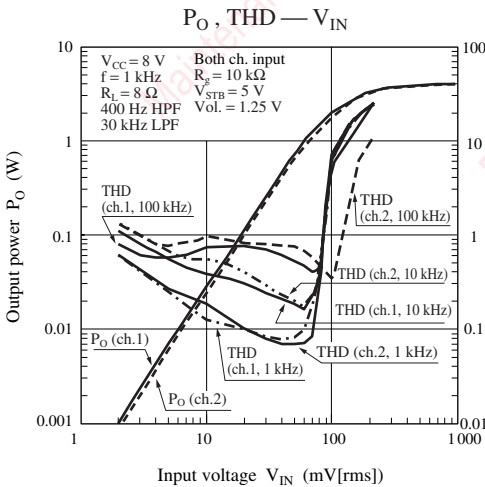
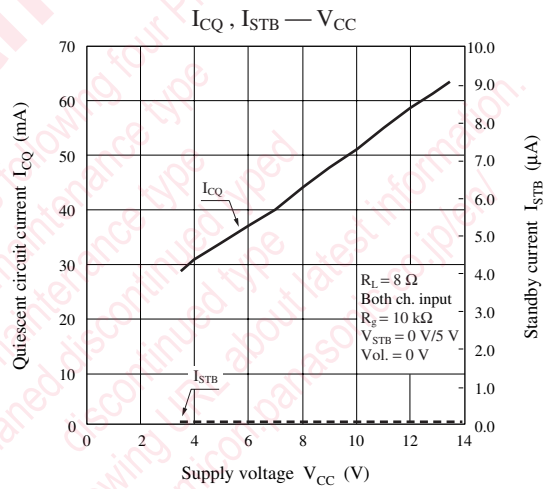
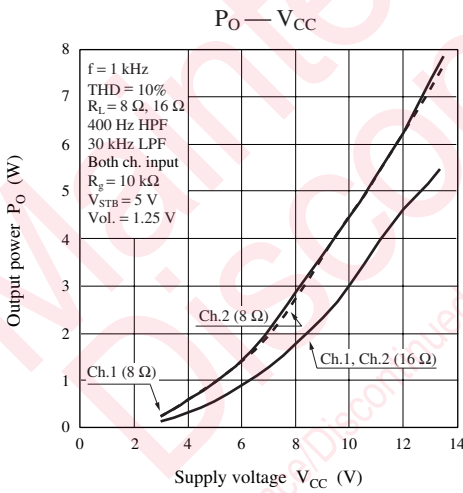
- Please avoid the short-circuits to V_{CC} , ground, or load short-circuit.
- Please connect the cooling fin with the GND potential.
- The thermal shutdown circuit operates at about $T_j = 150^\circ\text{C}$. However, the thermal shutdown circuit is reset automatically if the temperature drops.
- Please 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

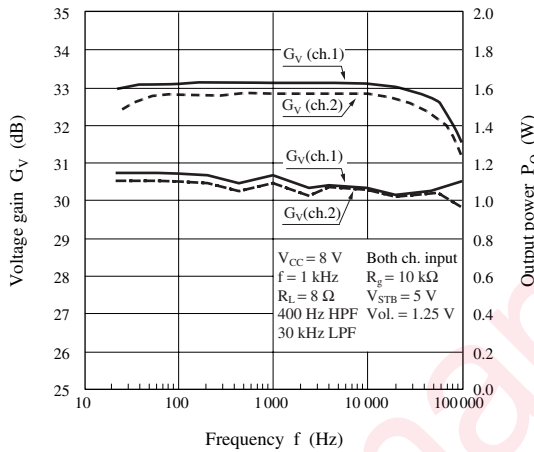


- Main characteristics

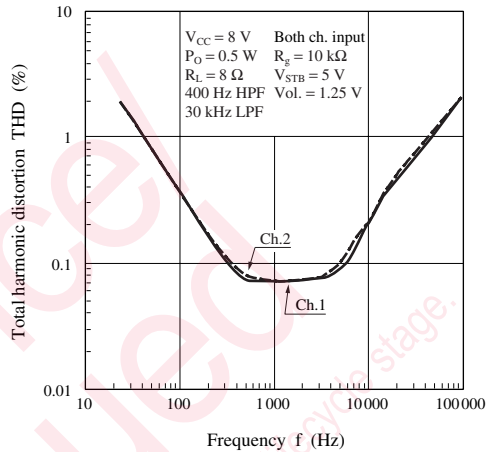


■ Technical Data (continued)
 • Main characteristics (continued)

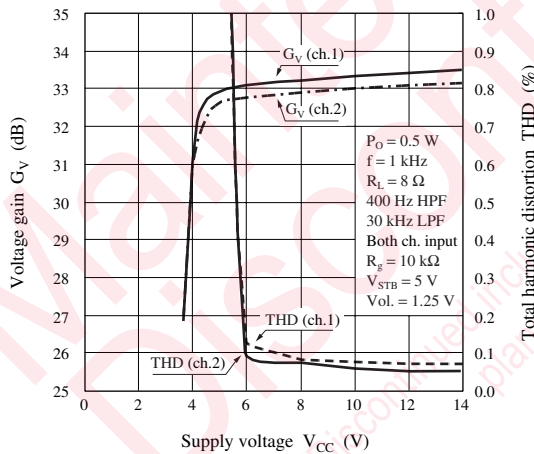
$G_V, P_O - f$



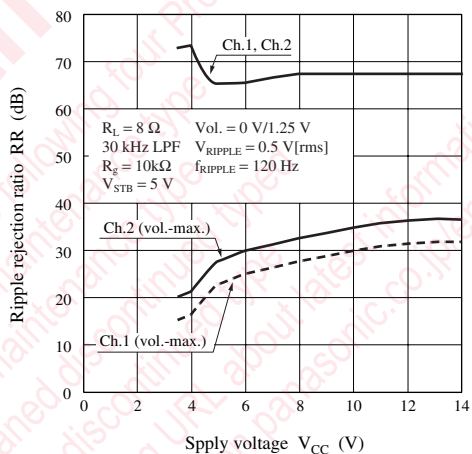
THD — f



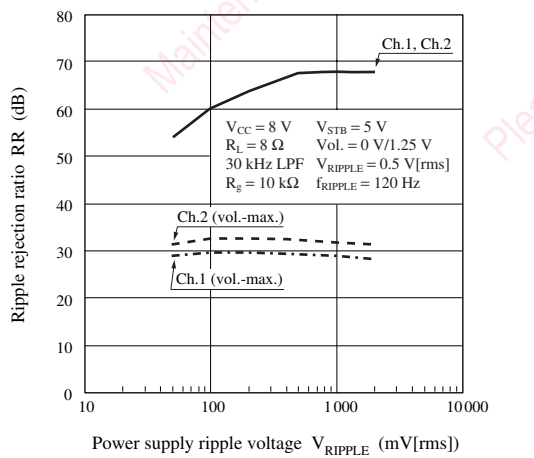
$G_V, \text{THD} - V_{CC}$



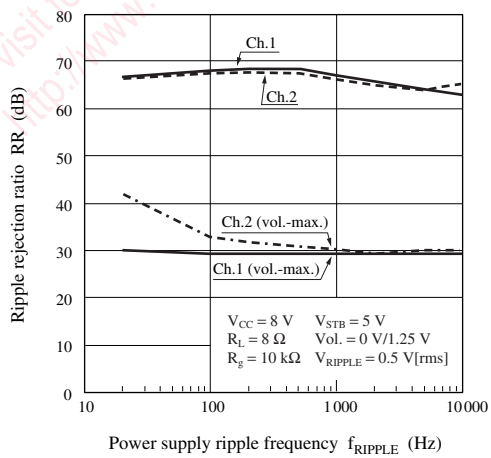
RR — V_{CC}



RR — V_{RIPPLE}



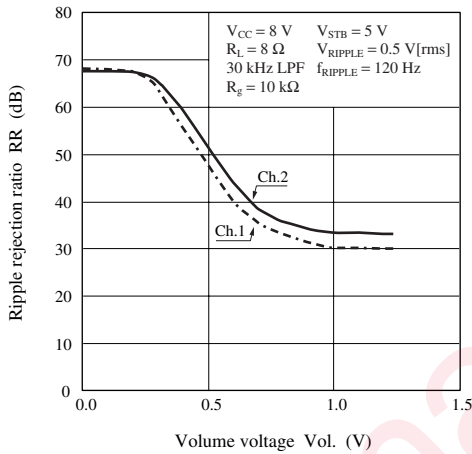
RR — f_{RIPPLE}



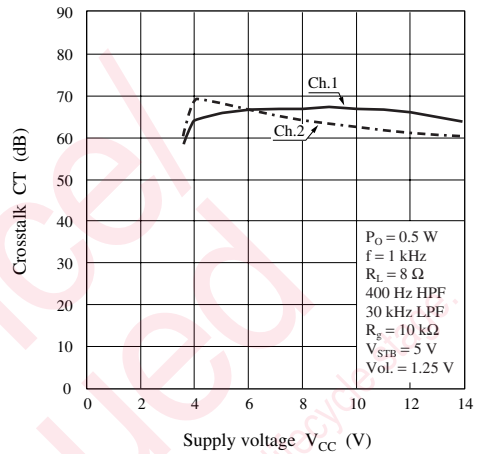
■ Technical Data (continued)

• Main characteristics (continued)

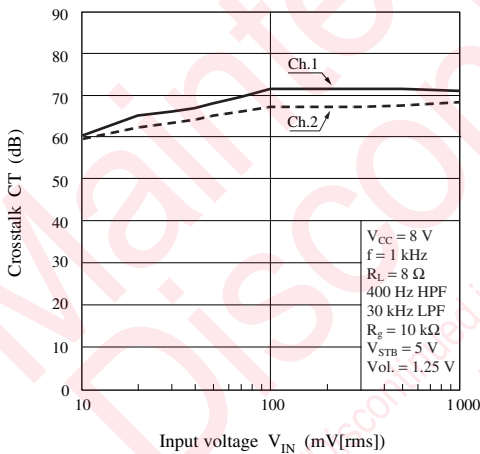
RR — Vol.



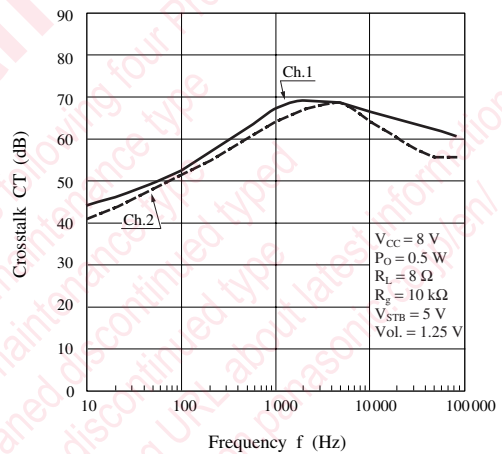
CT — V_{CC}



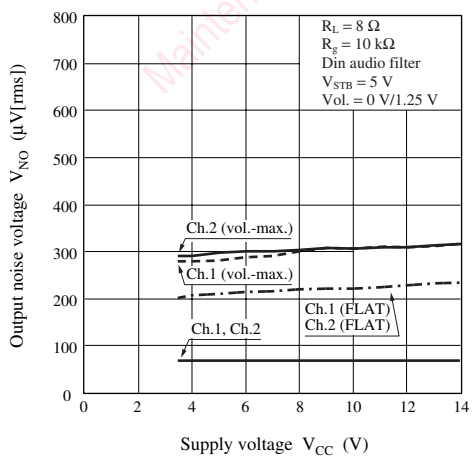
CT — V_{IN}



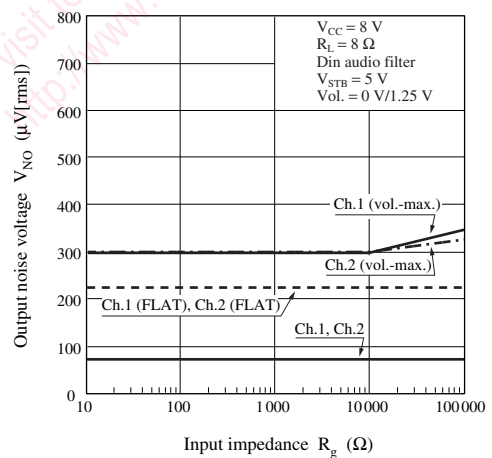
CT — f



V_{NO} — V_{CC}



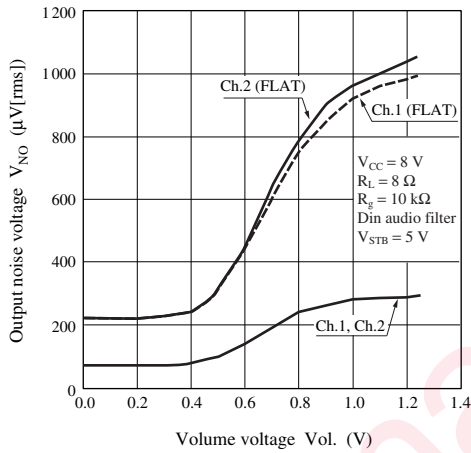
V_{NO} — R_g



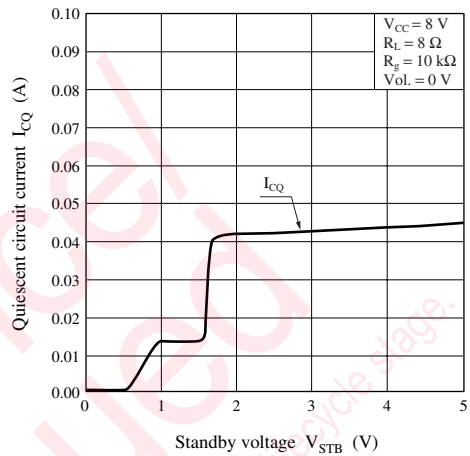
■ Technical Data (continued)

• Main characteristics (continued)

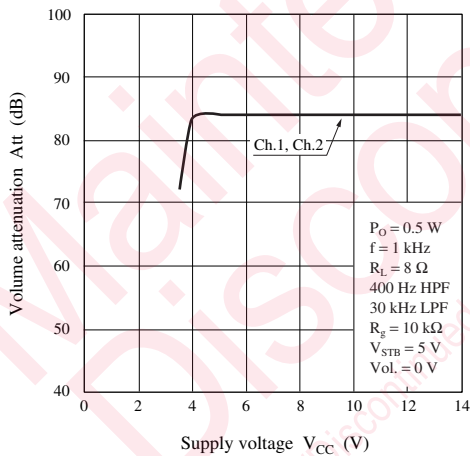
$V_{NO} - Vol.$



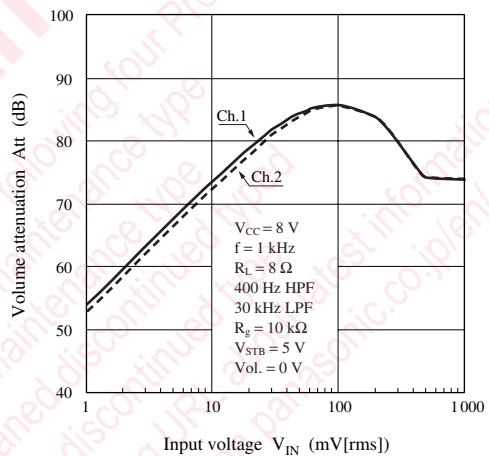
$I_{CQ} - V_{STB}$



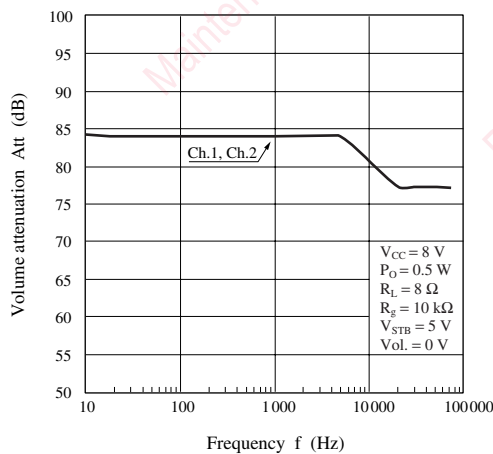
Att — V_{CC}



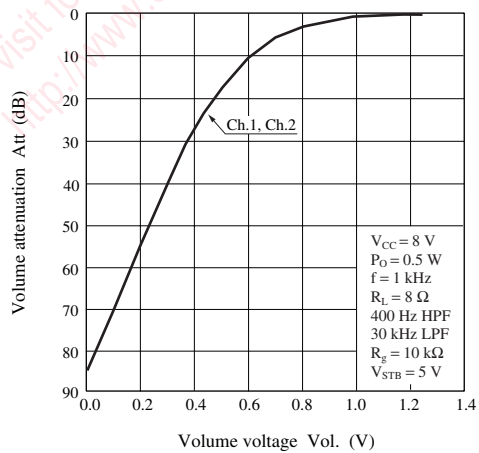
Att — V_{IN}



Att — f

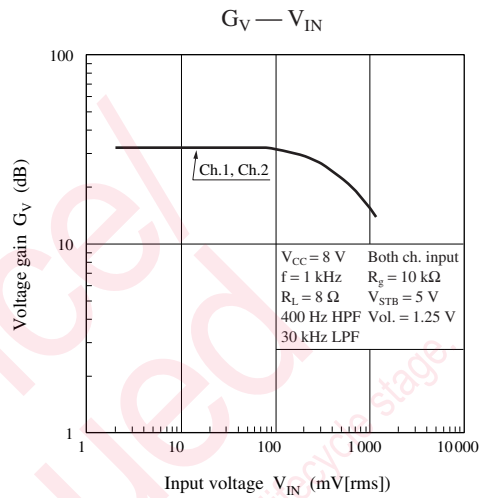
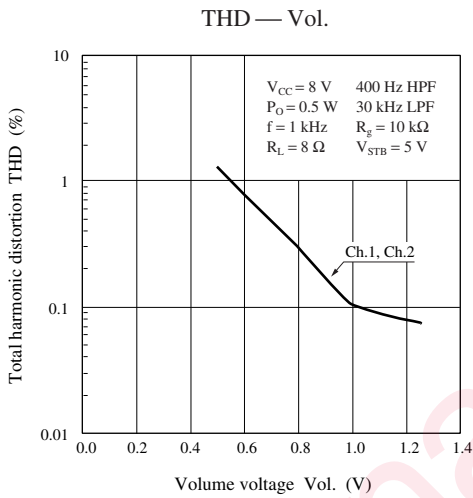


Att — Vol.

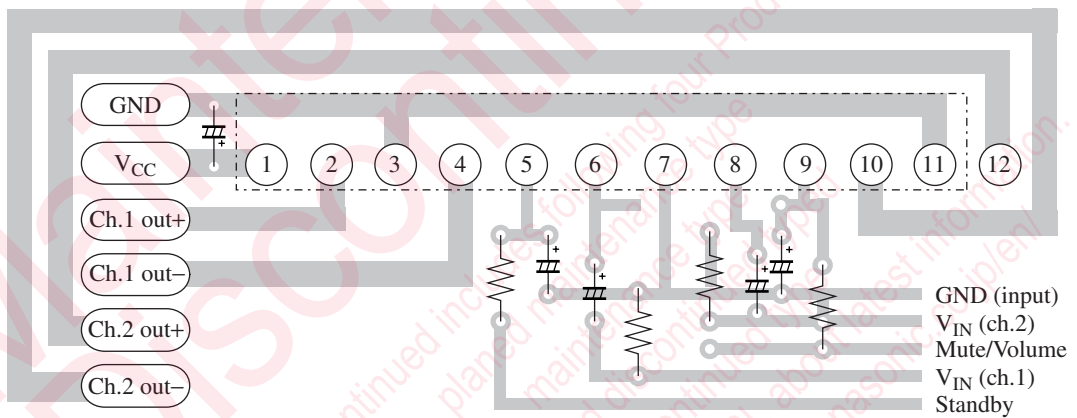


■ Technical Data (continued)

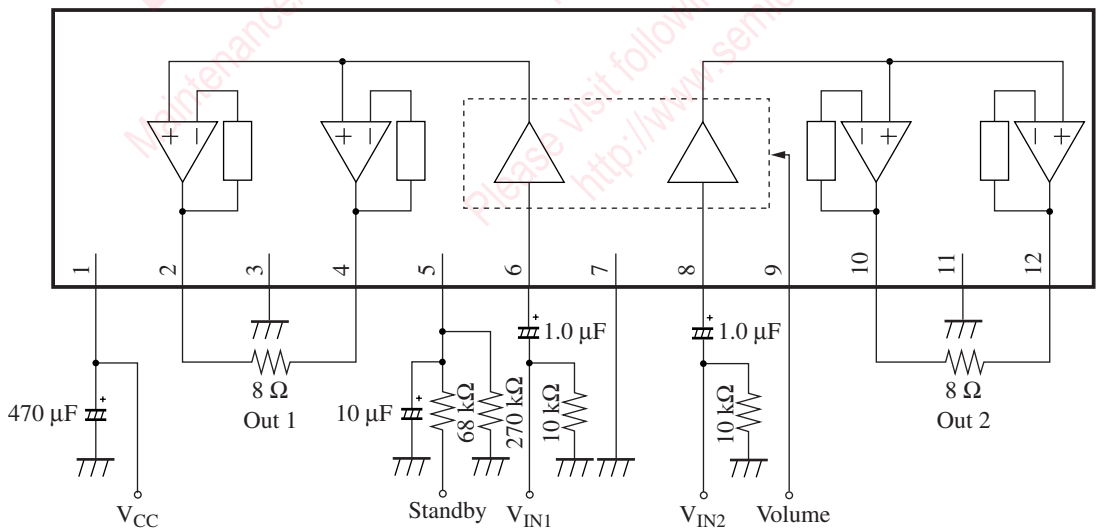
- Main characteristics (continued)



- Example of PCB pattern



■ Application Circuit Example



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