

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

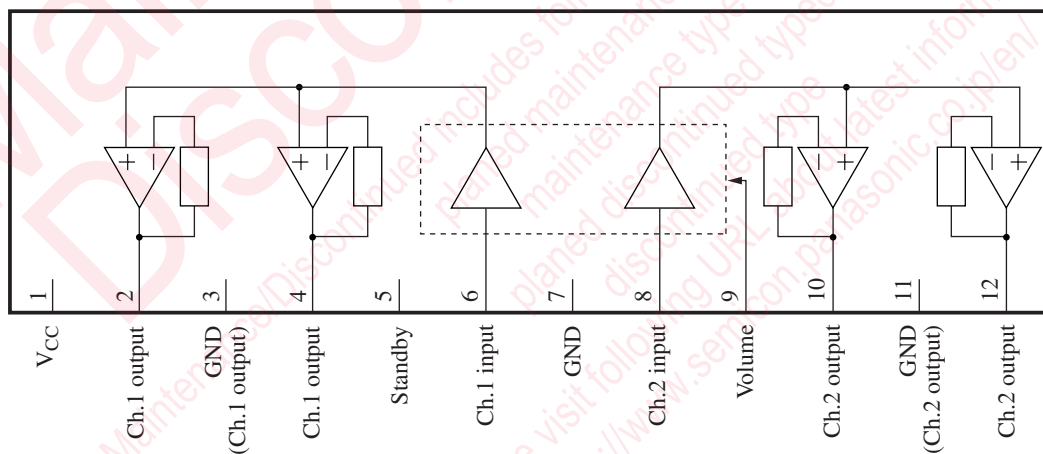
■ Applications

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

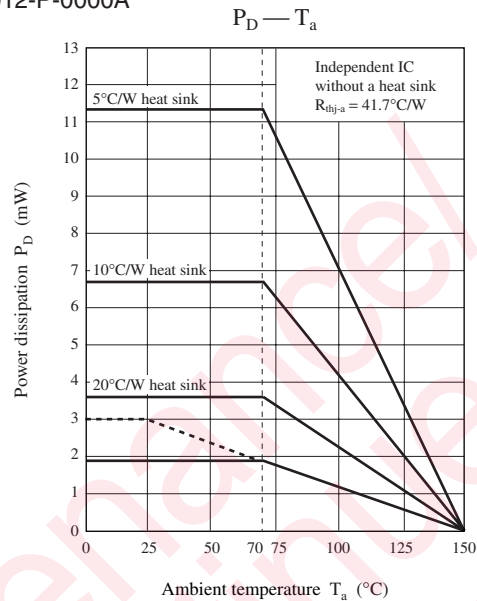
Pin No.	Pin name	Equivalent circuit	Voltage
10	Ch.2 – output pin		3.6 V (at no signal)
11	GND		0 V
12	Ch.2 + output pin		3.6 V (at no signal)

■ Usage Notes

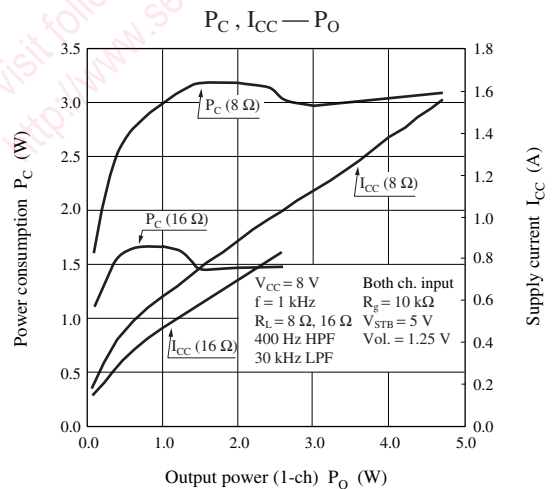
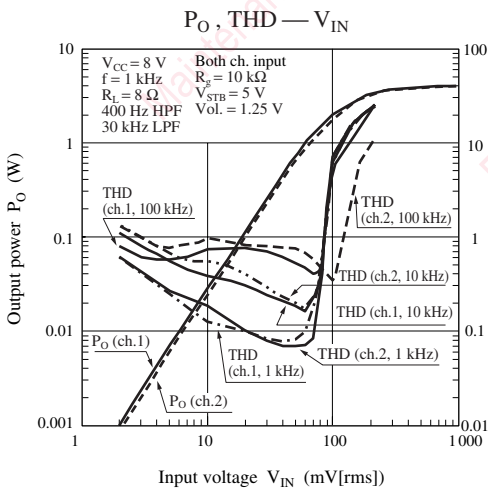
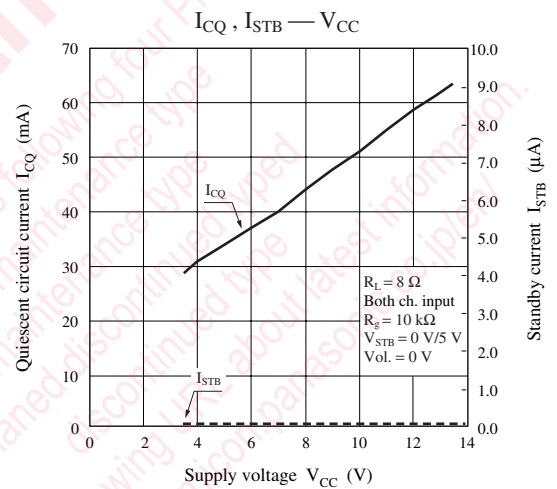
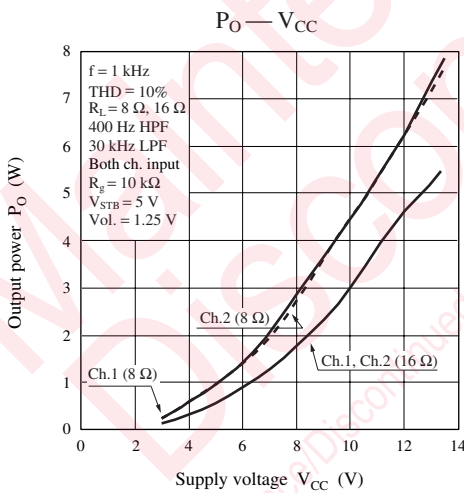
- Please avoid the short-circuits to V_{CC} , ground, or load short-circuit.
- Please connect the cooling fin with the GND potential.
- The thermal shutdown circuit operates at about $T_j = 150^\circ\text{C}$. However, the thermal shutdown circuit is reset automatically if the temperature drops.
- Please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

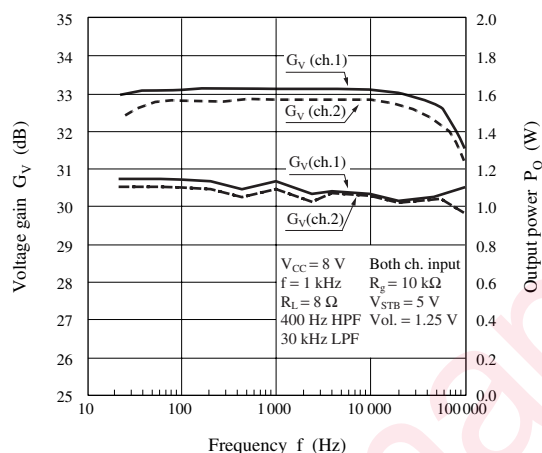
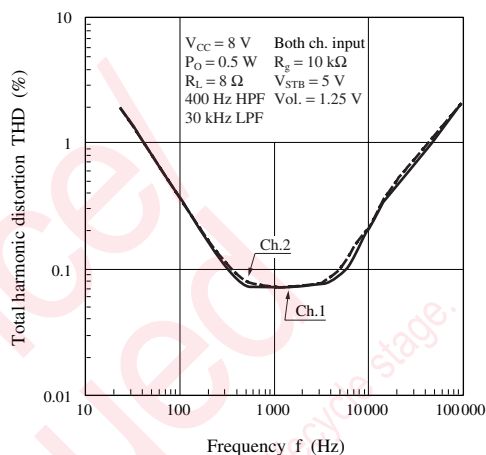
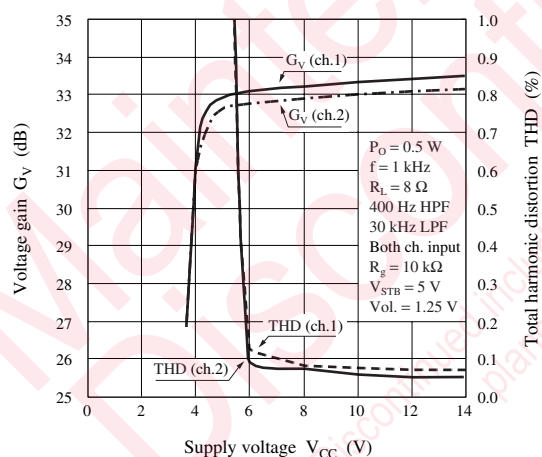
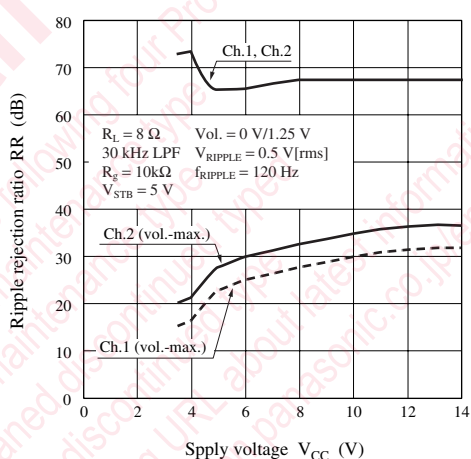
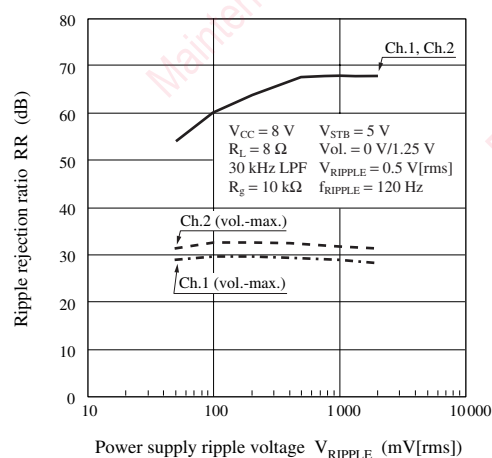
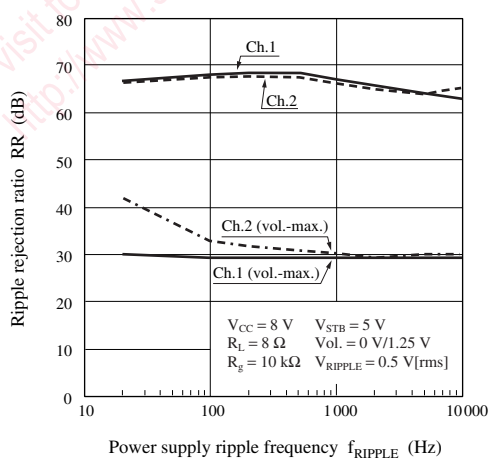


- Main characteristics



■ Technical Data (continued)

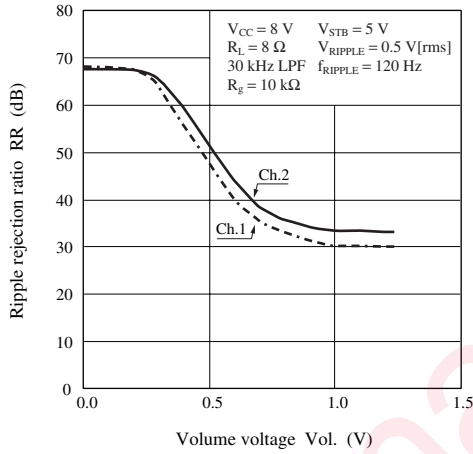
• Main characteristics (continued)

 $G_V, P_O - f$
THD — f 
 $G_V, \text{THD} - V_{CC}$
RR — V_{CC} RR — V_{RIPPLE} RR — f_{RIPPLE} 

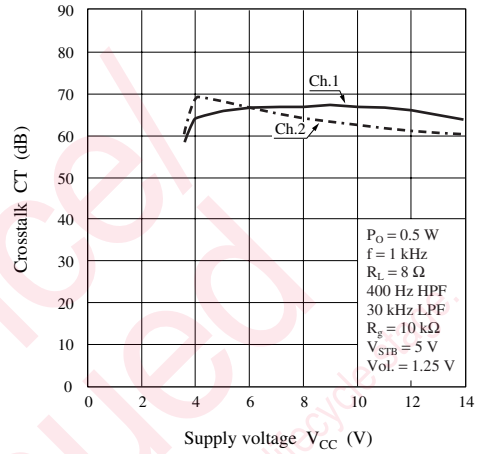
■ Technical Data (continued)

• Main characteristics (continued)

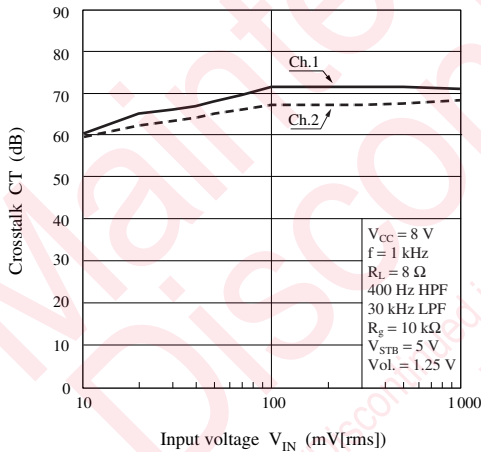
RR — Vol.



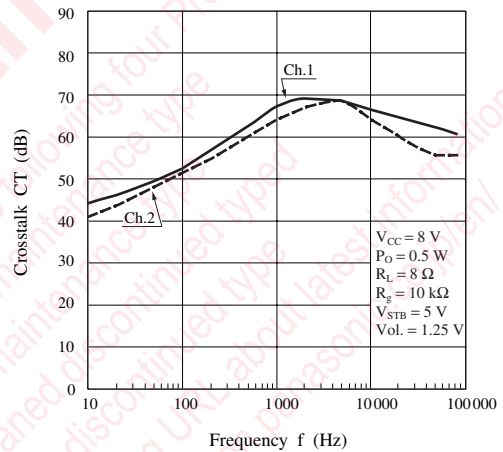
CT — V_{CC}



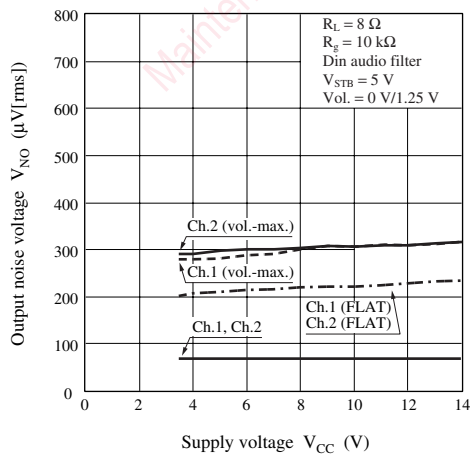
CT — V_{IN}



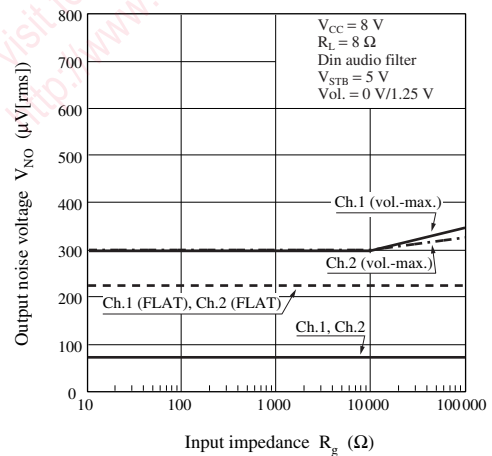
CT — f



V_{NO} — V_{CC}

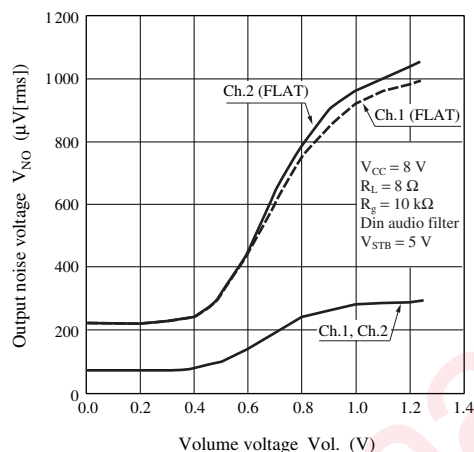
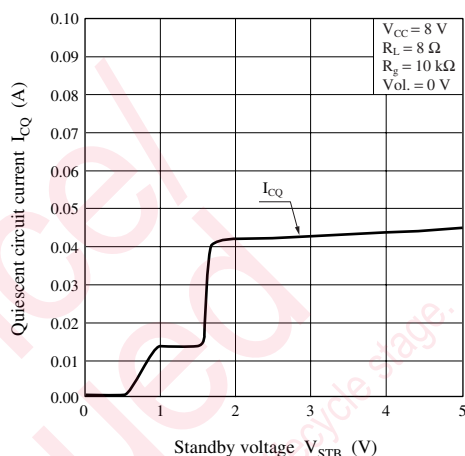
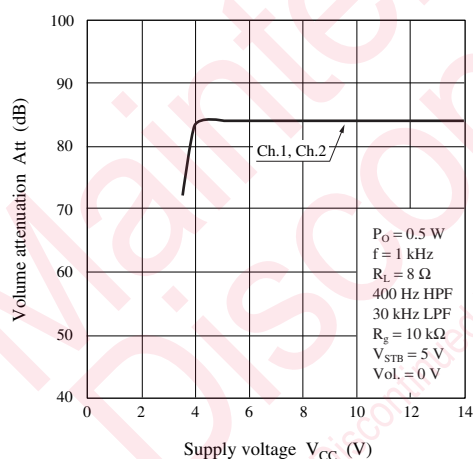
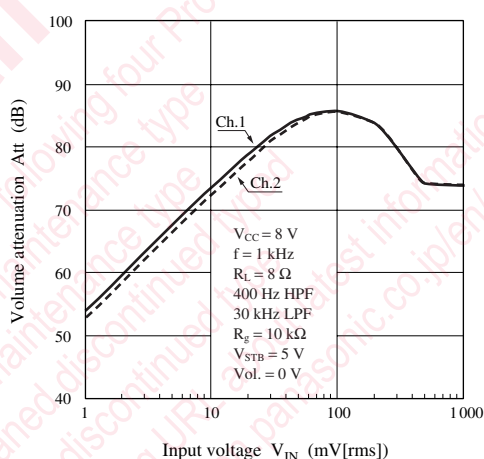
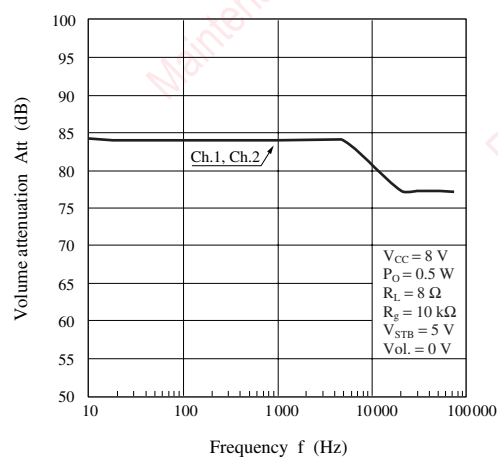
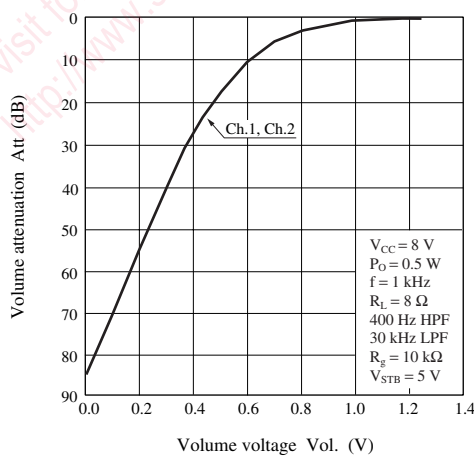


V_{NO} — R_g

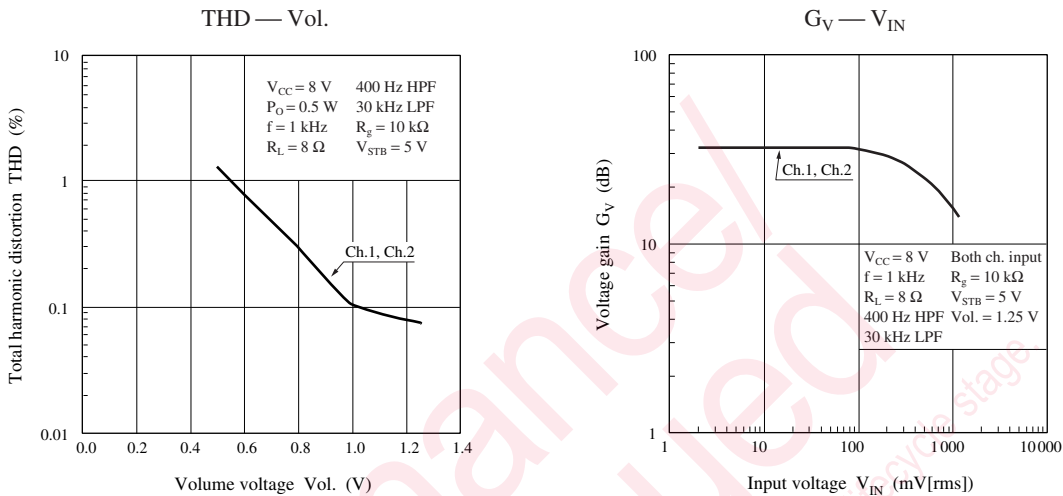


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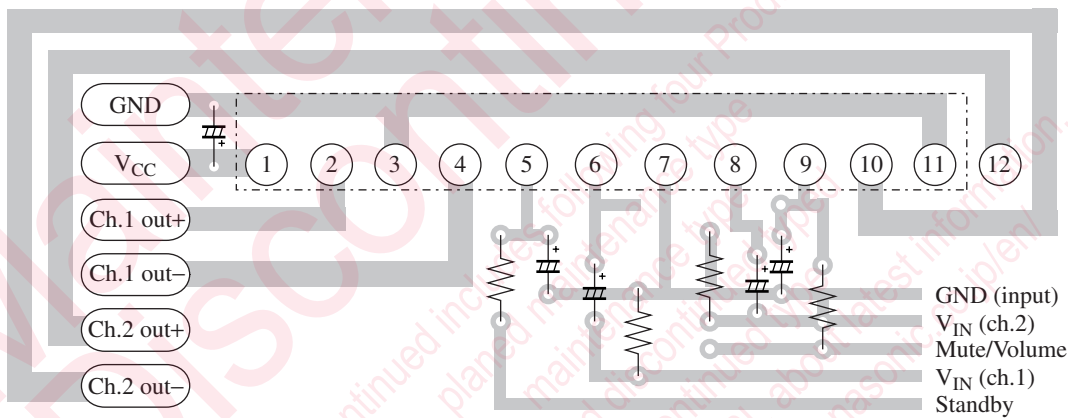
• Main characteristics (continued)

 $V_{NO} - Vol.$

 $I_{CQ} - V_{STB}$

 $Att - V_{CC}$

 $Att - V_{IN}$

 $Att - f$

 $Att - Vol.$


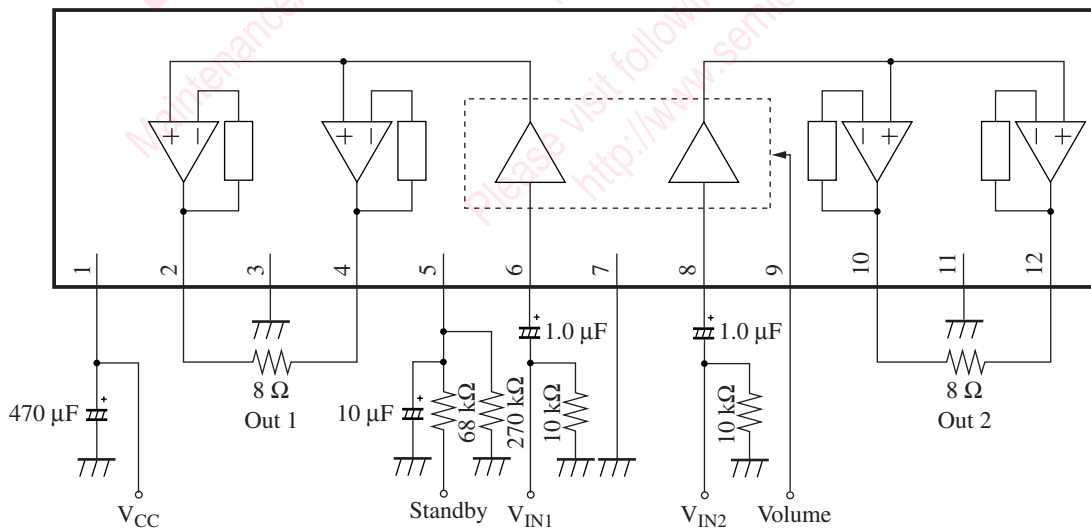
■ Technical Data (continued)
• Main characteristics (continued)



• Example of PCB pattern



■ Application Circuit Example



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