

# AN7512

## Dual 1-W BTL audio power amplifier

### ■ Overview

The AN7512 is an audio power amplifier IC for stereo system. The BTL (Balanced Transformer-Less) method can provide fewer external parts and more easy design for applications.

### ■ Features

- 1-W output (8  $\Omega$ ) with supply voltage of 5 V
- On-chip standby function
- On-chip volume function

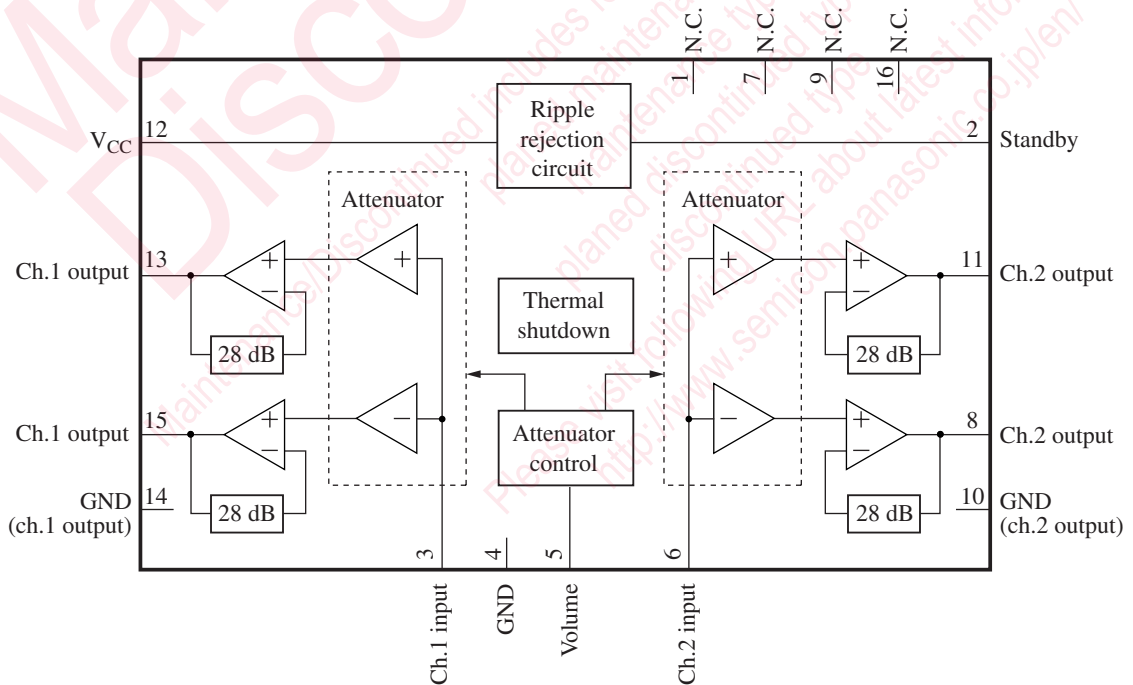
### ■ Applications

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

### ■ Package

- HDIP016-P-300A

### ■ Block Diagram



### ■ Pin Descriptions

Pin No.	Description	Pin No.	Description
1	N.C.	9	N.C.
2	Standby (standby state if this pin is open.)	10	Ground (output ch.2)
3	Ch.1 input	11	Ch.2 + output
4	Ground (input)	12	Supply voltage
5	Volume (muting off if this pin is open.)	13	Ch.1 + output
6	Ch.2 input	14	Ground (output ch.1)
7	N.C.	15	Ch.1 – output
8	Ch.2 – output	16	N.C.

Note) Please do not apply voltage or current to the N.C. pin from outside.

### ■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage <sup>*2</sup>	$V_{CC}$	14	V
Supply current	$I_{CC}$	2.0	A
Power dissipation <sup>*3</sup>	$P_D$	1 127	mW
Operating ambient temperature <sup>*1</sup>	$T_{opr}$	-25 to +70	°C
Storage temperature <sup>*1</sup>	$T_{stg}$	-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  $V_{CC} = 5.0 \text{ V}$ ,  $R_L = 8 \Omega$ ,  $f = 1 \text{ kHz}$ ,  $T_a = 25^\circ\text{C} \pm 2^\circ\text{C}$** 

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Quiescent circuit current	$I_{CQ}$	$V_{IN} = 0 \text{ mV}$ , $\text{Vol.} = 0 \text{ V}$	—	35	100	mA
Standby current	$I_{STB}$	$V_{IN} = 0 \text{ mV}$ , $\text{Vol.} = 0 \text{ V}$	—	1	10	$\mu\text{A}$
Output noise voltage *	$V_{NO}$	$R_g = 10 \text{ k}\Omega$ , $\text{Vol.} = 0 \text{ V}$	—	0.10	0.4	mV[rms]
Voltage gain	$G_V$	$P_O = 0.25 \text{ W}$ , $\text{Vol.} = 1.25 \text{ V}$	31	33	35	dB
Total harmonics distortion	THD	$P_O = 0.25 \text{ W}$ , $\text{Vol.} = 1.25 \text{ V}$	—	0.10	0.5	%
Maximum output power	$P_{O1}$	THD = 10 %, $\text{Vol.} = 1.25 \text{ V}$	0.7	1.0	—	W
Ripple rejection ratio *	RR	$R_g = 10 \text{ k}\Omega$ , $\text{Vol.} = 0 \text{ V}$ , $V_R = 0.5 \text{ V[rms]}$ , $f_R = 120 \text{ Hz}$	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	$P_O = 0.25 \text{ W}$ , $\text{Vol.} = 0 \text{ V}$	70	85	—	dB
Channel balance 1	CB1	$P_O = 0.25 \text{ W}$ , $\text{Vol.} = 1.25 \text{ V}$	-1	0	1	dB
Channel balance 2	CB2	$P_O = 0.25 \text{ W}$ , $\text{Vol.} = 0.6 \text{ V}$	-3	0	3	dB
Intermediate voltage gain	$G_{VM}$	$P_O = 0.25 \text{ W}$ , $\text{Vol.} = 0.6 \text{ V}$	20.5	23.5	26.5	dB
Channel crosstalk	CT	$P_O = 0.25 \text{ W}$ , $\text{Vol.} = 1.25 \text{ V}$	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**

Pin No.	Pin name	Equivalent circuit	Voltage
1	N.C.	Open	—
2	Standby pin		5 V

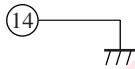
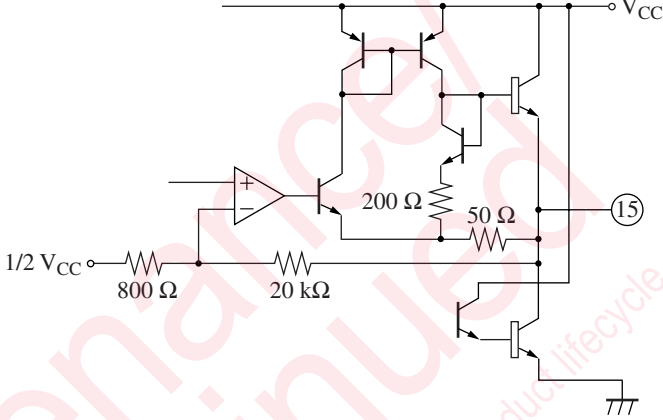
■ Terminal Equivalent Circuits (continued)

Pin No.	Pin name	Equivalent circuit	Voltage
3	Ch.1 input pin		1.4 V
4	GND		0 V
5	Volume pin		—
6	Ch.2 input pin		1.4 V
7	N.C.	Open	—

■ Terminal Equivalent Circuits (continued)

Pin No.	Pin name	Equivalent circuit	Voltage
8	Ch.2 - output pin		2.15 V
9	N.C.	Open	—
10	GND		0 V
11	Ch.2 + output pin		2.15 V
12	V <sub>CC</sub>	—	5.0 V
13	Ch.1 + output pin		2.15 V

■ Terminal Equivalent Circuits (continued)

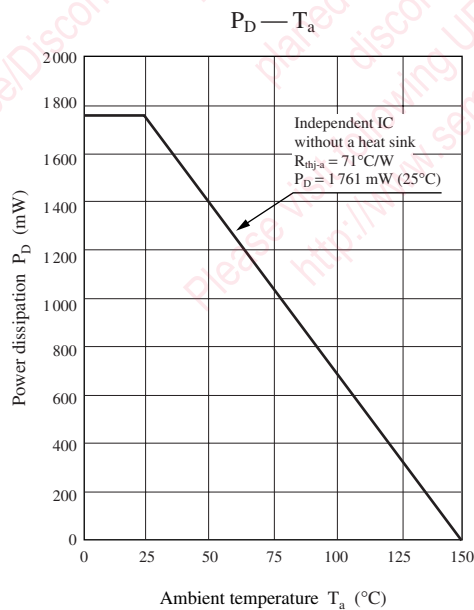
Pin No.	Pin name	Equivalent circuit	Voltage
14	GND		0 V
15	Ch.1 – output pin		2.15 V
16	N.C.	Open	—

■ Usage Notes

- Please avoid the short circuit 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.

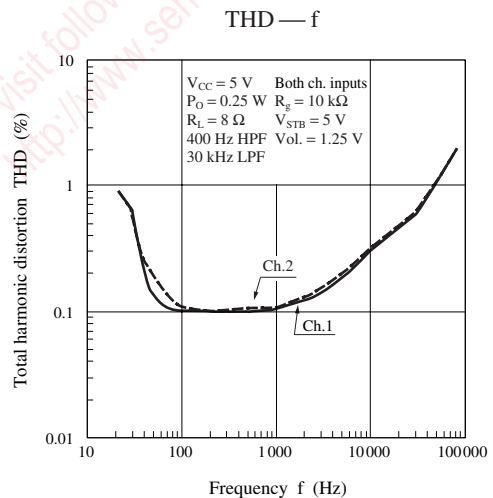
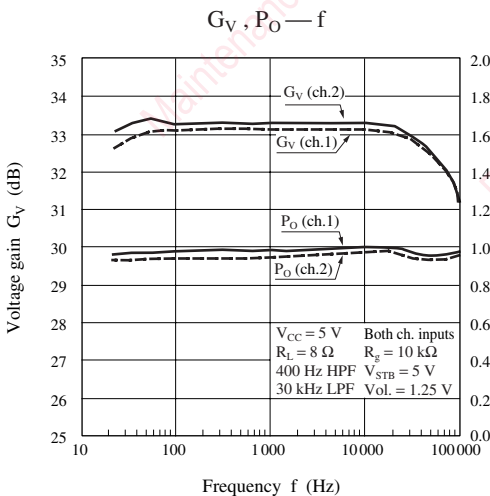
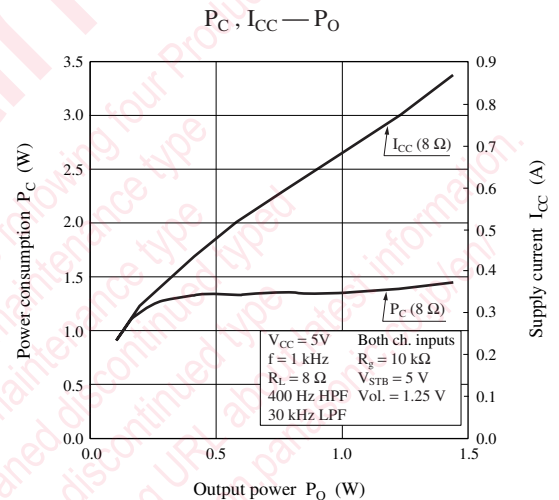
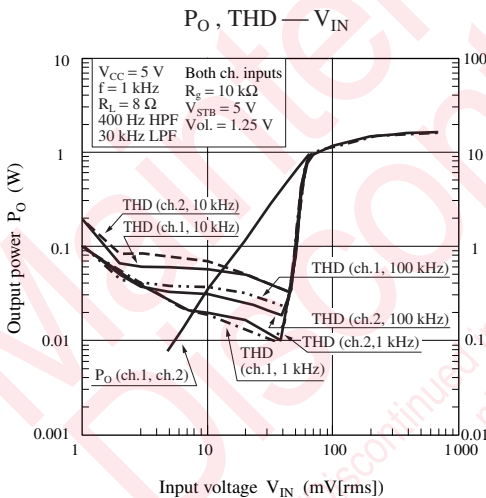
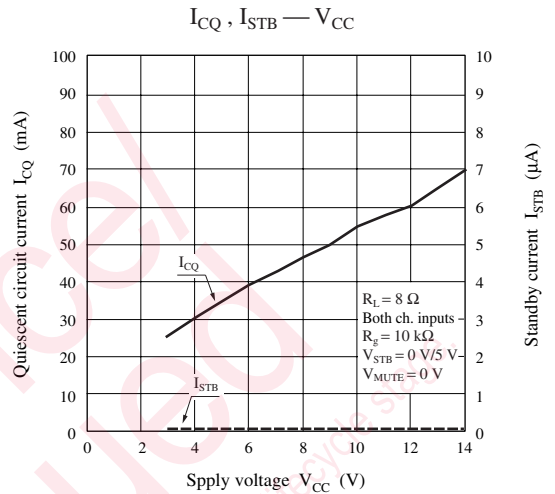
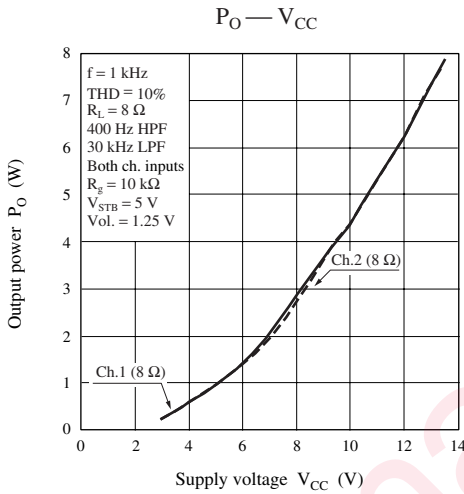
■ Technical Data

- $P_D - T_a$  curve of HDIP016-P-0300



■ Technical Data (continued)

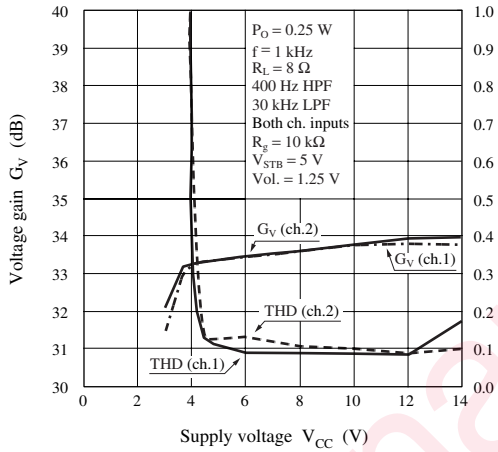
• Main characteristics



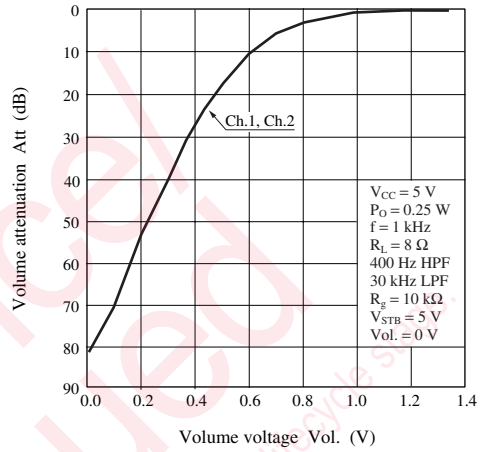
■ Technical Data (continued)

• Main characteristics (continued)

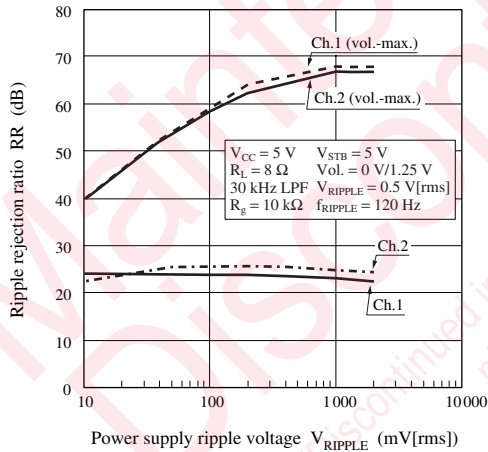
$G_V$ , THD —  $V_{CC}$



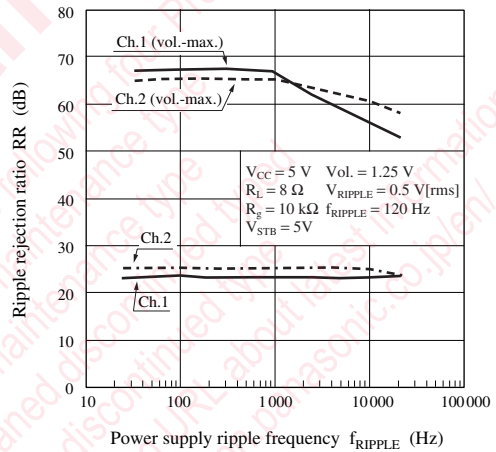
Att — Vol.



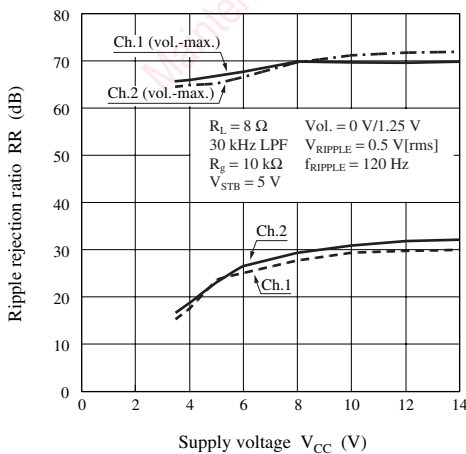
RR —  $V_{RIPPLE}$



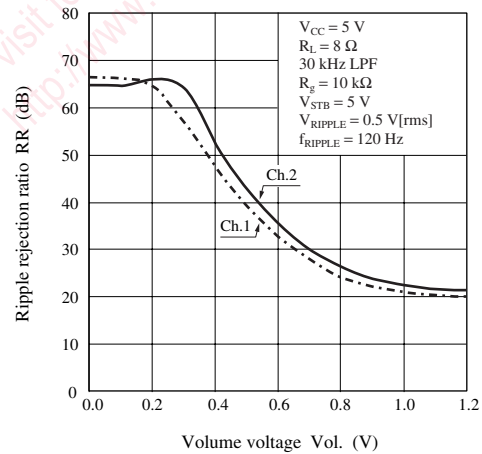
RR —  $f_{RIPPLE}$



RR —  $V_{CC}$

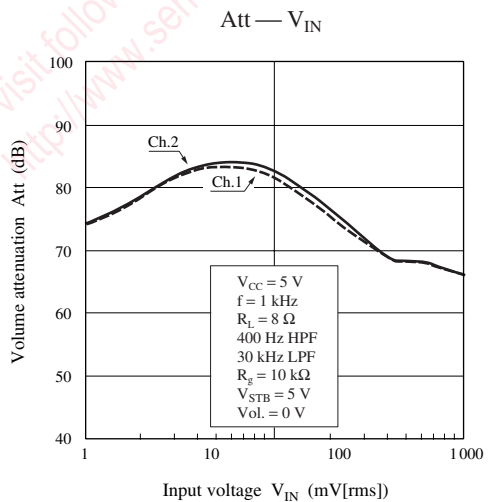
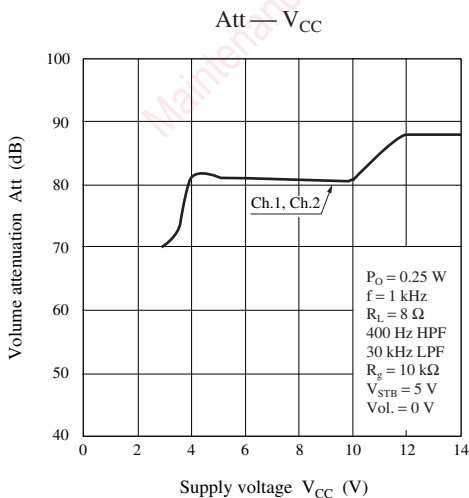
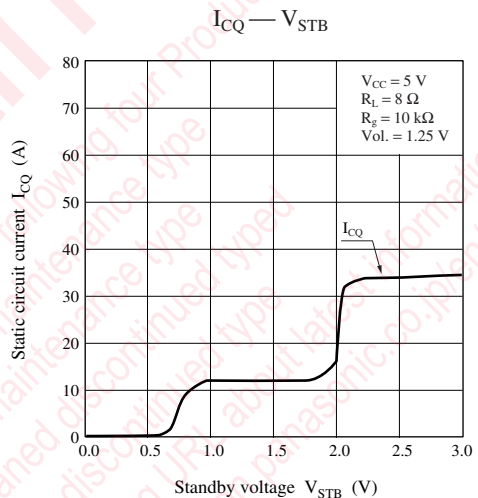
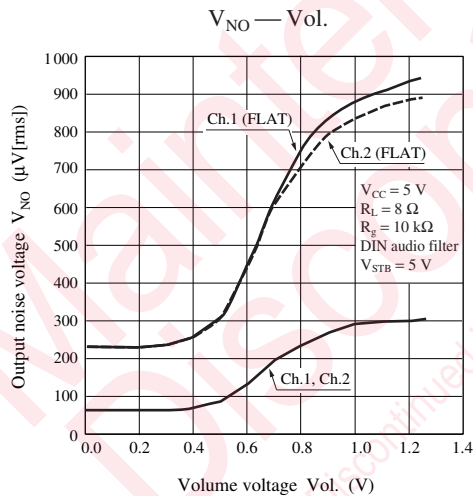
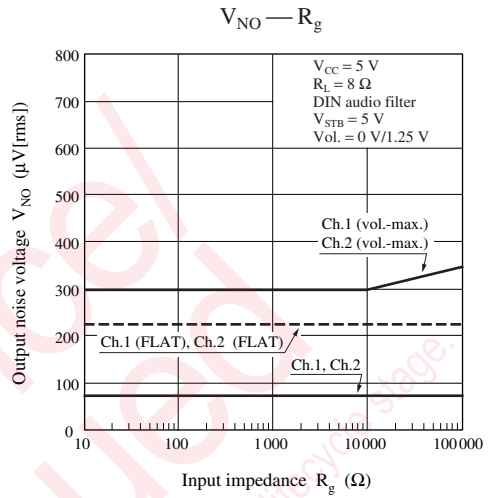
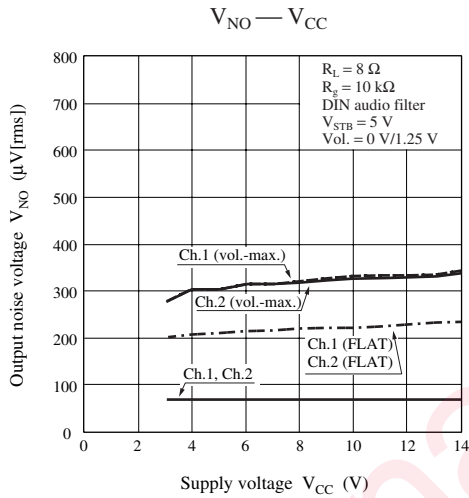


RR — Vol.



■ Technical Data (continued)

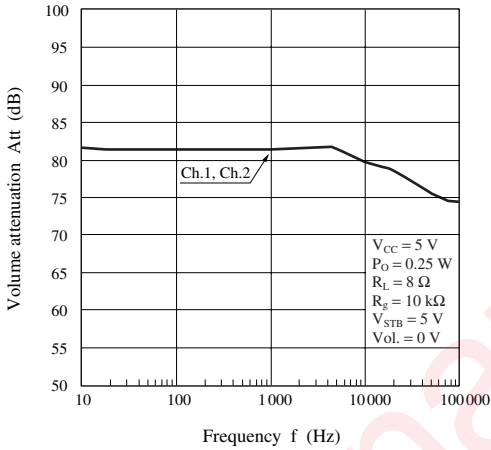
• Main characteristics (continued)



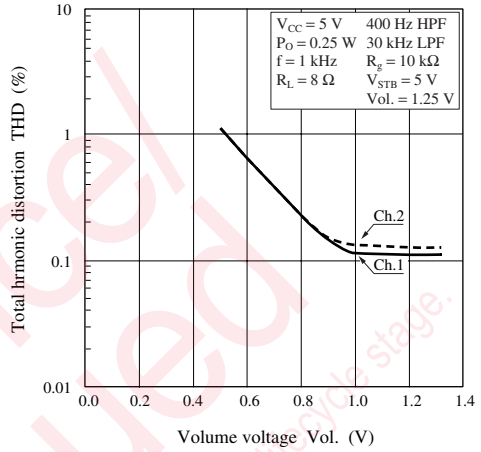
■ Technical Data (continued)

● Main characteristics (continued)

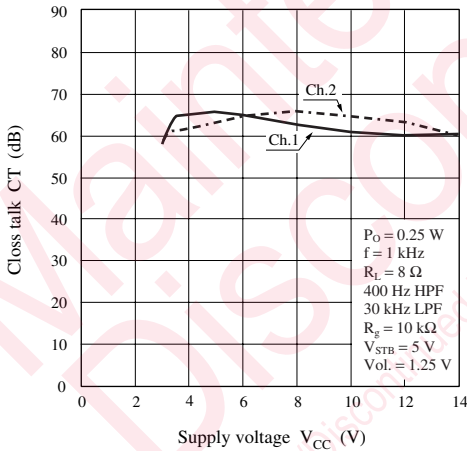
Att — f



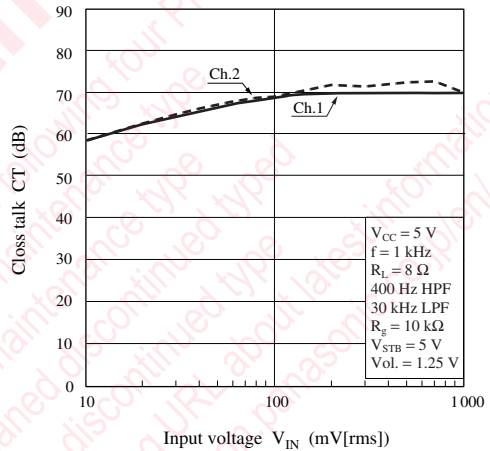
THD — Vol.



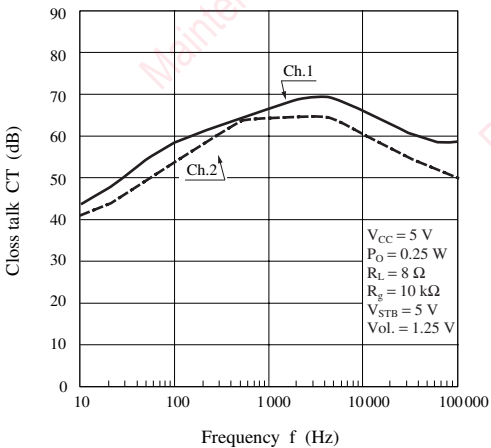
CT —  $V_{CC}$



CT —  $V_{IN}$

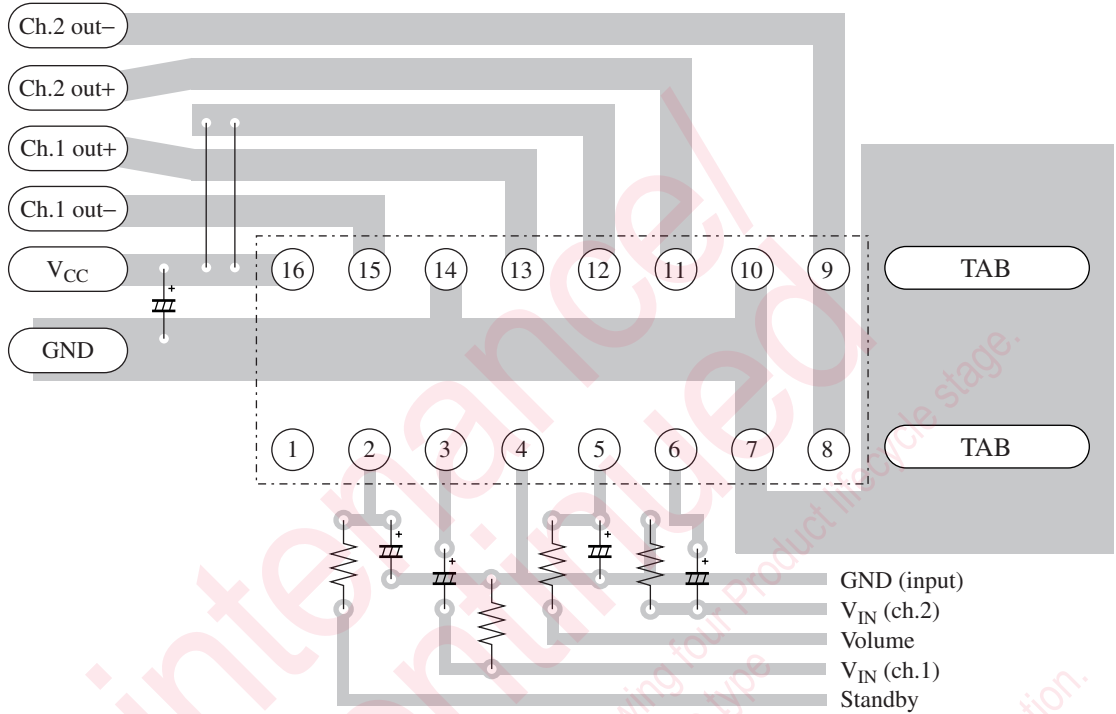


CT — f

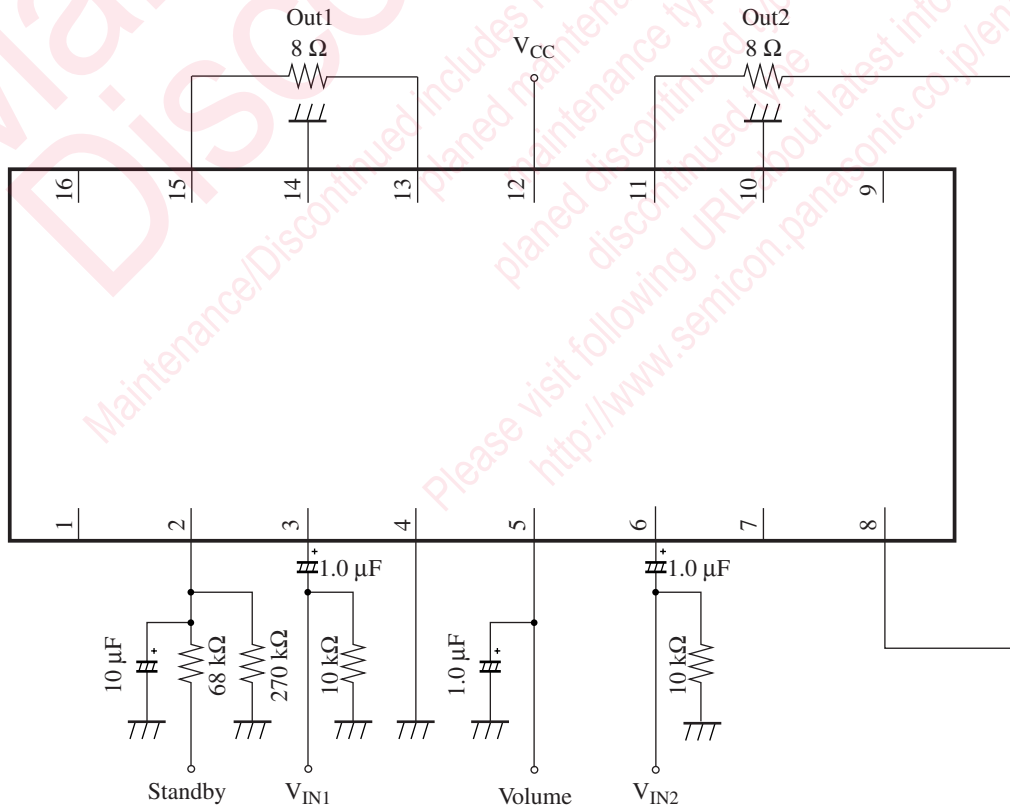


■ Technical Data (continued)

• Example of PCB pattern



■ Application Circuit Example



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