

# AN7512SH

## Dual 1-W BTL audio power amplifier

### Overview

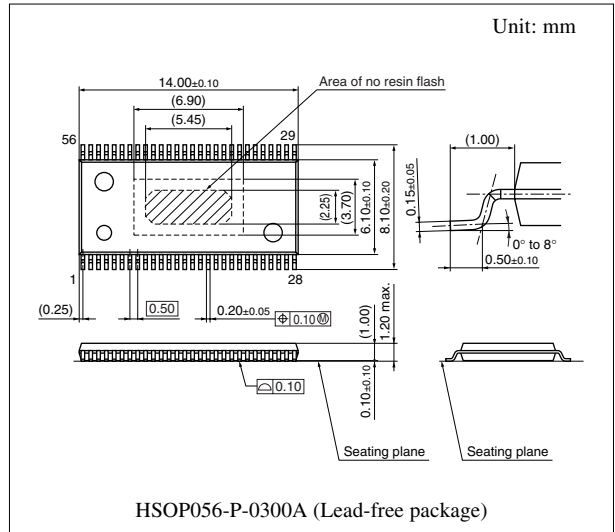
The AN7512SH is an audio power amplifier IC with surface mount package for stereo system. The BTL (Balanced Transformer-Less) method can provide fewer external parts and more easy design for applications.

### Features

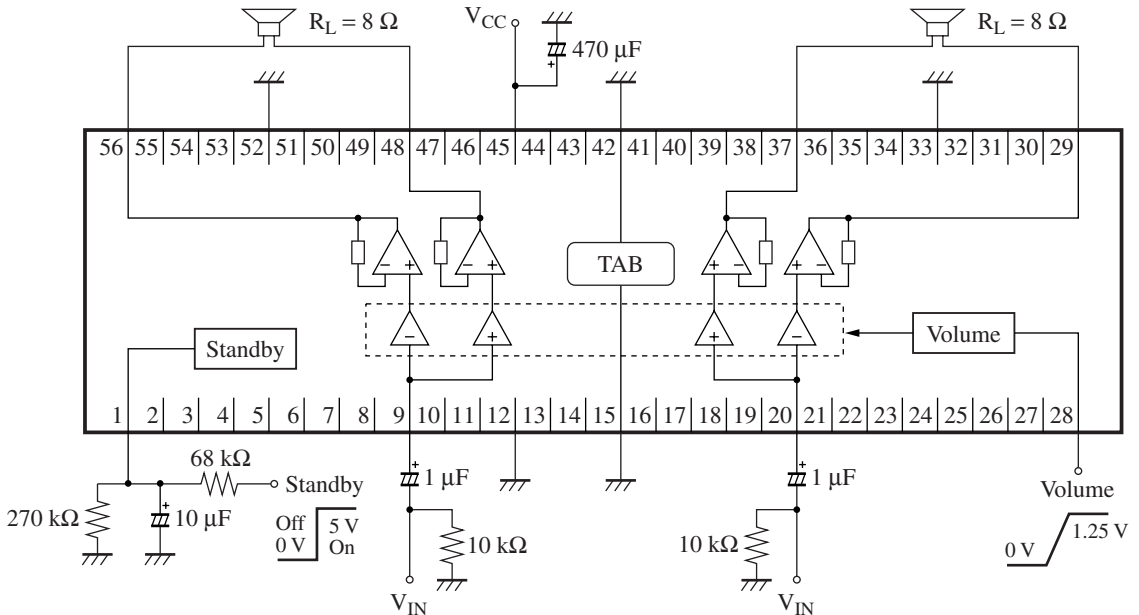
- 1-W output (8 Ω) with supply voltage of 5 V
- On-chip standby function
- On-chip volume function
- Small and thin surface mount package

### Applications

- LCD televisions, monitor with speaker for personal computers



### Block Diagram



### ■ Pin Descriptions

Pin No.	Description	Pin No.	Description
1	Standby (standby state if this pin is open.)	33	Ground (output ch.2)
9	Ch.1 input	37	Ch.2 + output
12	Ground (input)	42	TAB (tablet)
15	TAB (tablet)	45	Supply voltage
20	Ch.2 input	48	Ch.1 + output
28	Volume (muting off if this pin is open.)	52	Ground (output ch.1)
29	Ch.2 – output	56	Ch.1 – output

N.C. Pin No.	2, 3, 4, 5, 6, 7, 8, 10, 11, 13, 14, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27, 30, 31, 32, 34, 35, 36, 38, 39, 40, 41, 43, 44, 46, 47, 49, 50, 51, 53, 54, 55
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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>	$P_D$	690	mW
Operating ambient temperature <sup>*1</sup>	$T_{opr}$	-25 to +75	°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 the independent IC without a heat sink at  $T_a = 25^\circ\text{C}$ .

Refer to  $P_D - T_a$  curves at mounted on standard board.

### ■ Recommended Operating Range

Parameter	Symbol	Range	Unit
Supply voltage	$V_{CC}$	3 to 8	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	$I_{CQ}$	$V_{IN} = 0\text{ mV}$ , Vol. = 0 V	—	35	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	$G_V$	$P_O = 0.25\text{ W}$ , Vol. = 1.25 V	31	33	35	dB
Total harmonics distortion	THD	$P_O = 0.25\text{ W}$ , Vol. = 1.25 V	—	0.10	0.5	%
Maximum output power	$P_{O1}$	THD = 10%, Vol. = 1.25 V	0.7	1.0	—	W
Ripple rejection ratio *	RR	$R_g = 10\text{ k}\Omega$ , Vol. = 0 V, $V_R = 0.5\text{ V[rms]}$ , $f_R = 120\text{ Hz}$	30	50	—	dB
Output offset voltage	$V_{OFF}$	$R_g = 10\text{ k}\Omega$ , Vol. = 0 V	-250	0	250	mV
Volume attenuation rate *	Att	$P_O = 0.25\text{ W}$ , Vol. = 0 V	70	85	—	dB
Channel balance 1	CB1	$P_O = 0.25\text{ W}$ , Vol. = 1.25 V	-1	0	1	dB
Channel balance 2	CB2	$P_O = 0.25\text{ W}$ , Vol. = 0.6 V	-3	0	3	dB
Intermediate voltage gain	$G_{VM}$	$P_O = 0.25\text{ W}$ , Vol. = 0.6 V	20.5	23.5	26.5	dB
Channel crosstalk	CT	$P_O = 0.25\text{ W}$ , 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

Pin No.	Pin name	Equivalent circuit	Voltage
1	Standby pin		Standby off at 5 V application.
2	N.C.	—	—
3	N.C.	—	—
4	N.C.	—	—
5	N.C.	—	—
6	N.C.	—	—
7	N.C.	—	—
8	N.C.	—	—

### ■ Terminal Equivalent Circuits (continued)

Pin No.	Pin name	Equivalent circuit	Voltage
9	Ch.1 input pin		1.4 V (Input circuit bias voltage is output.)
10	N.C.	—	—
11	N.C.	—	—
12	GND		0 V
13	N.C.	—	—
14	N.C.	—	—
15	GND	Connected to TAB	—
16	N.C.	—	—
17	N.C.	—	—
18	N.C.	—	—
19	N.C.	—	—
20	Ch.2 input pin		1.4 V (Input circuit bias voltage is output.)


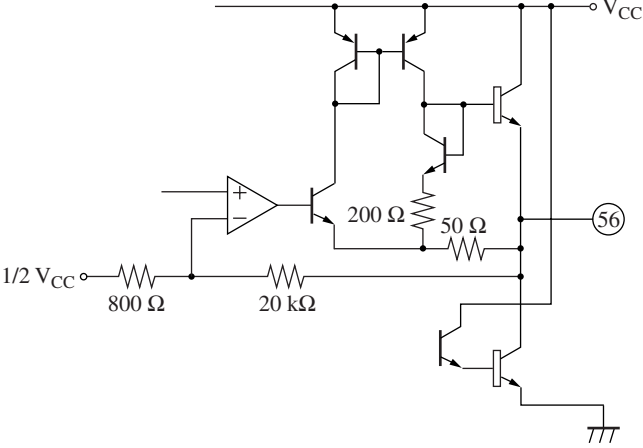
■ Terminal Equivalent Circuits (continued)

Pin No.	Pin name	Equivalent circuit	Voltage
21	N.C.	—	—
22	N.C.	—	—
23	N.C.	—	—
24	N.C.	—	—
25	N.C.	—	—
26	N.C.	—	—
27	N.C.	—	—
28	Volume pin		Supplied with 0 V to 1.25 V
29	Ch.2 – output pin		2.15 V (at no signal)
30	N.C.	—	—
31	N.C.	—	—
32	N.C.	—	—
33	GND		0 V
34	N.C.	—	—
35	N.C.	—	—
36	N.C.	—	—

### ■ Terminal Equivalent Circuits (continued)

Pin No.	Pin name	Equivalent circuit	Voltage
37	Ch.2 + output pin		2.15 V (at no signal)
38	N.C.	—	—
39	N.C.	—	—
40	N.C.	—	—
41	N.C.	—	—
42	GND	Connected to TAB	0 V
43	N.C.	—	—
44	N.C.	—	—
45	V <sub>CC</sub>	—	5.0 V
46	N.C.	—	—
47	N.C.	—	—
48	Ch.1 + output pin		2.15 V (at no signal)
49	N.C.	—	—
50	N.C.	—	—
51	N.C.	—	—

### ■ Terminal Equivalent Circuits (continued)

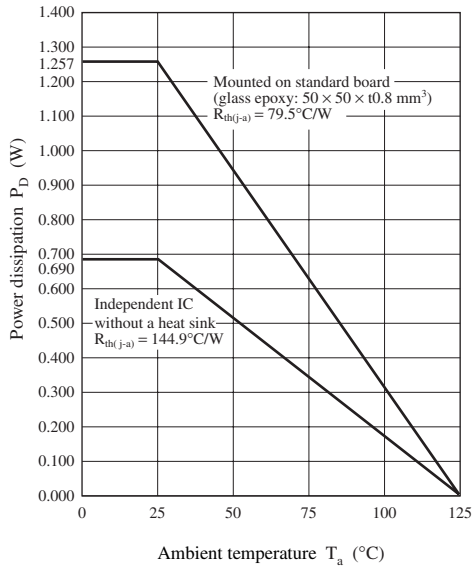
Pin No.	Pin name	Equivalent circuit	Voltage
52	GND		0 V
53	N.C.	—	—
54	N.C.	—	—
55	N.C.	—	—
56	Ch.1 – output pin		2.15 V (at no signal)

### ■ Usage Notes

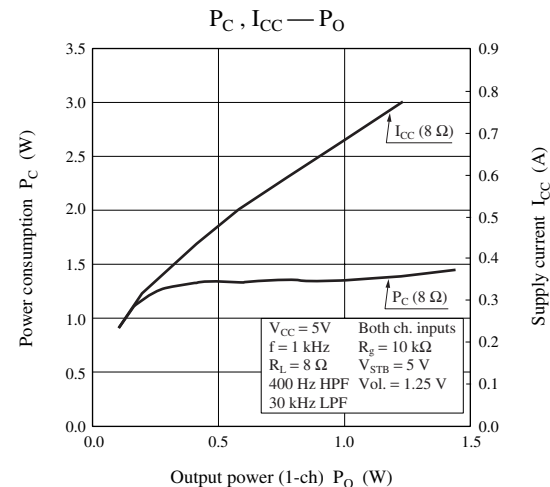
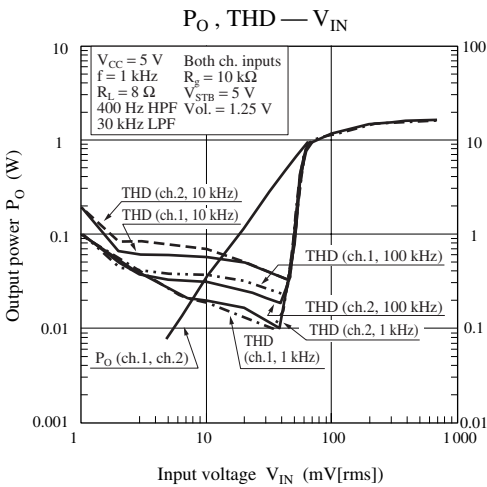
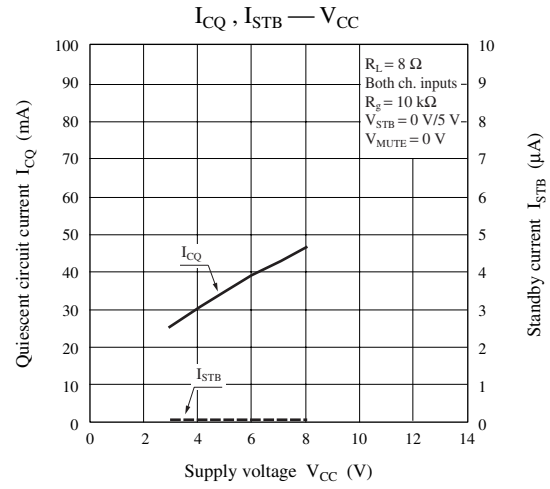
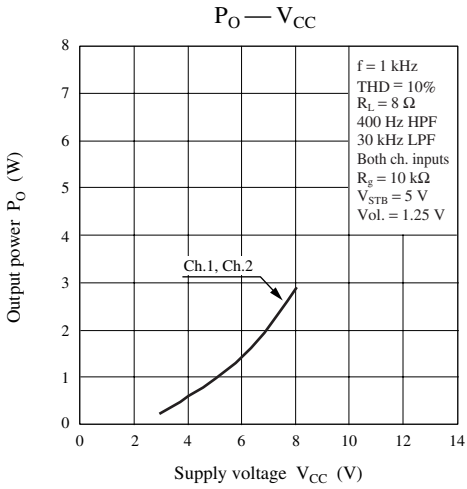
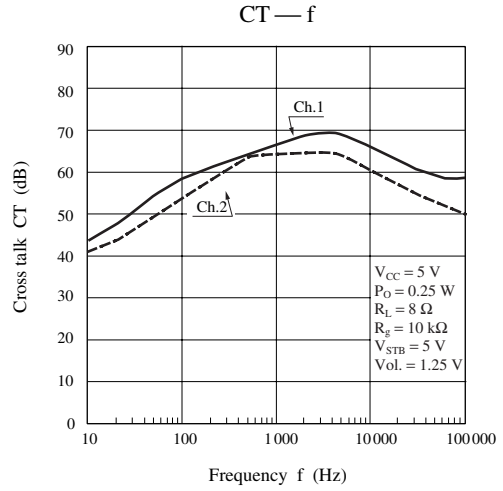
- Please avoid the short circuit to  $V_{CC}$ , ground, or load short circuit.
- Please connect the cooling fin with the GND potential.
- The thermal shutdown circuit operates at about  $T_j = 150^\circ\text{C}$ . However, the thermal shutdown circuit is reset automatically if the temperature drops.
- Please carefully design the heat radiation especially when you take out high power at high  $V_{CC}$ .
- Please connect only the ground for the signal input with the signal GND of the amplifier in the previous stage.
- Take notice that the ripple rejection ratio is poor in case of headphone use.
- Take notice that as to following pins, electric surge voltage is low.  
At 200 pF, Pin1 = +140 V, Pin9 = +140 V, Pin20 = +130 V, Pin28 = +150 V.
- Use a speaker with 8 Ω or more impedance.

■ Technical Data

•  $P_D - T_a$  curve of HSOP056-P-0300A



• Main characteristics

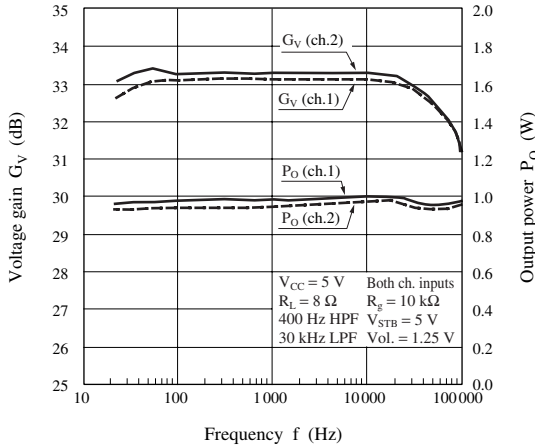




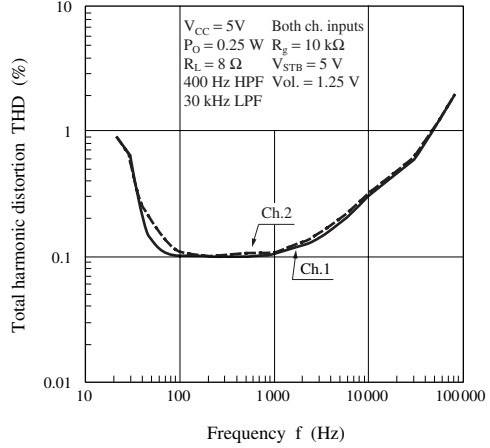
■ Technical Data (continued)

• Main characteristics (continued)

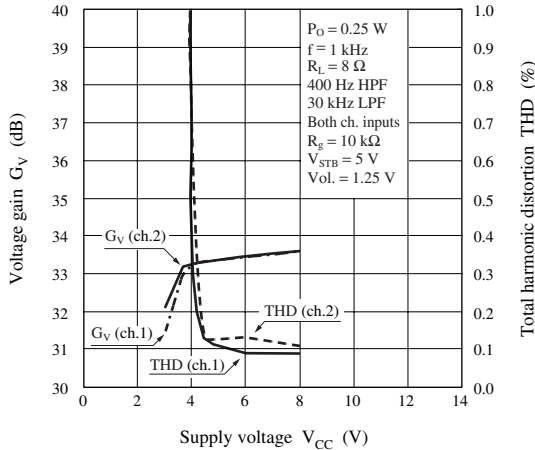
$G_V, P_O - f$



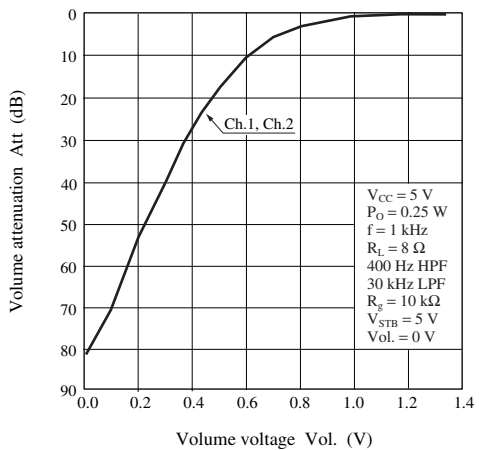
THD — f



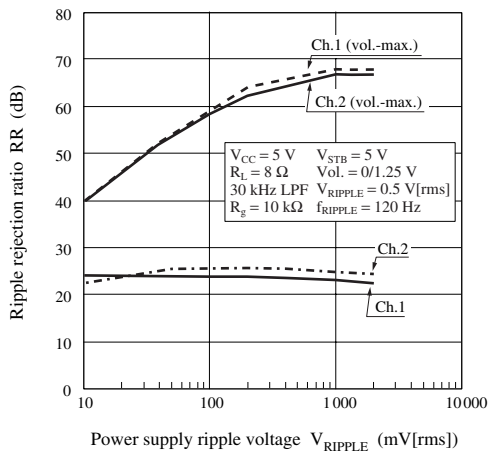
$G_V, THD - V_{CC}$



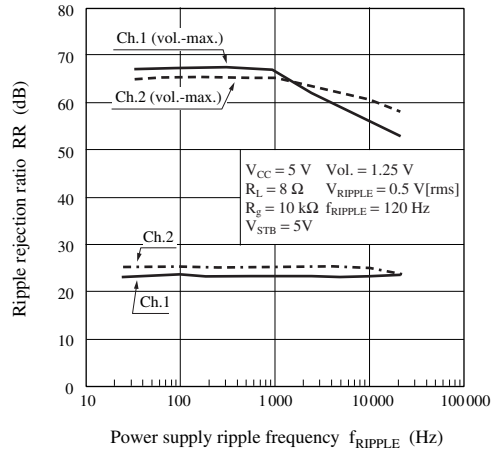
Att — Vol.



RR —  $V_{RIPPLE}$



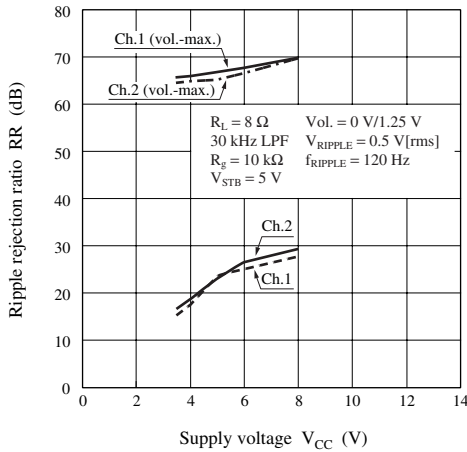
RR —  $f_{RIPPLE}$



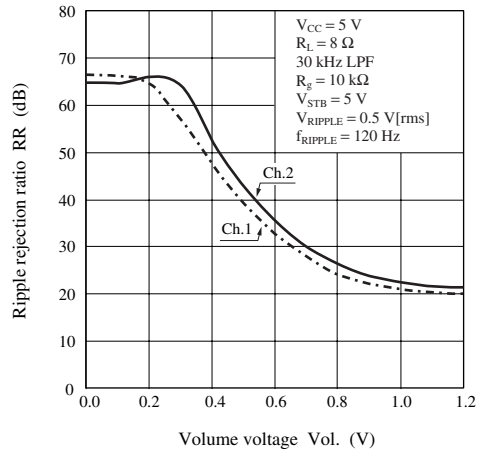
■ Technical Data (continued)

• Main characteristics (continued)

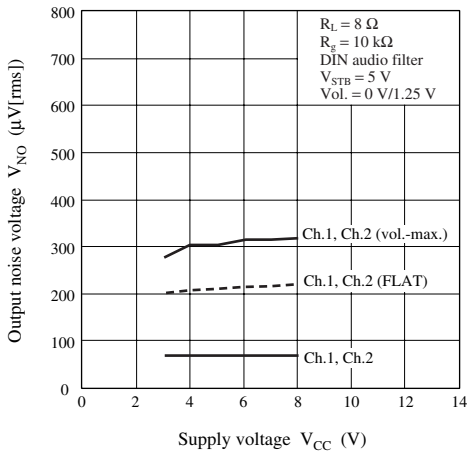
RR —  $V_{CC}$



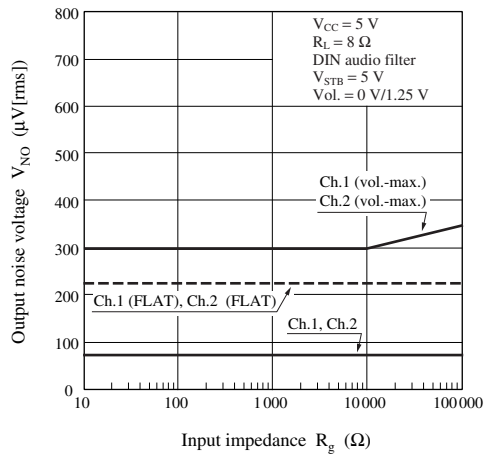
RR — Vol.



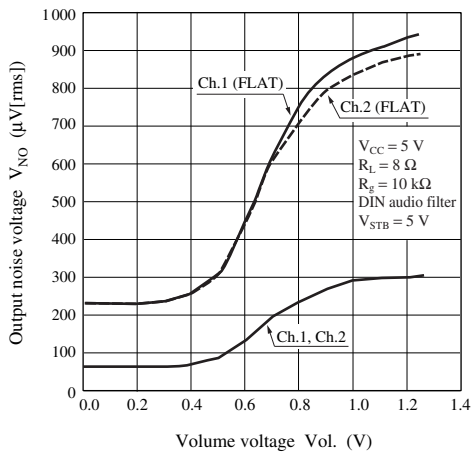
$V_{NO}$  —  $V_{CC}$



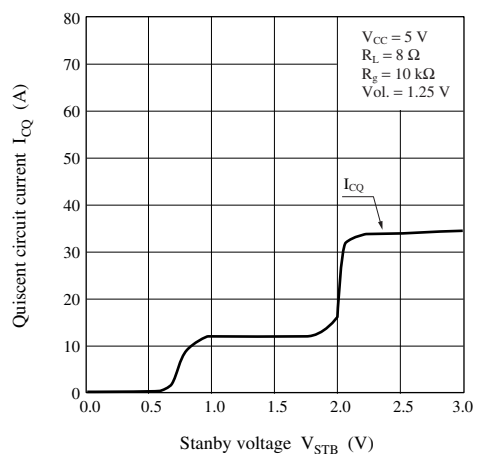
$V_{NO}$  —  $R_g$



$V_{NO}$  — Vol.



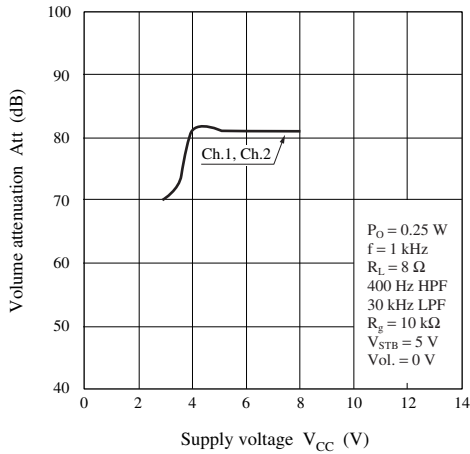
$I_{CQ}$  —  $V_{STB}$



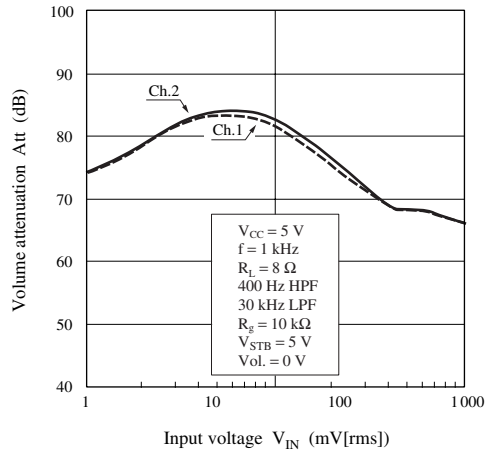
■ Technical Data (continued)

• Main characteristics (continued)

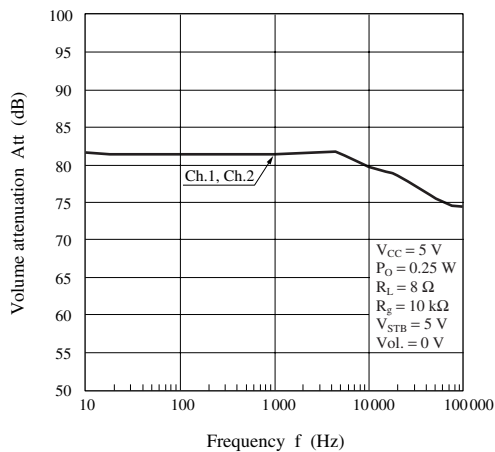
Att —  $V_{CC}$



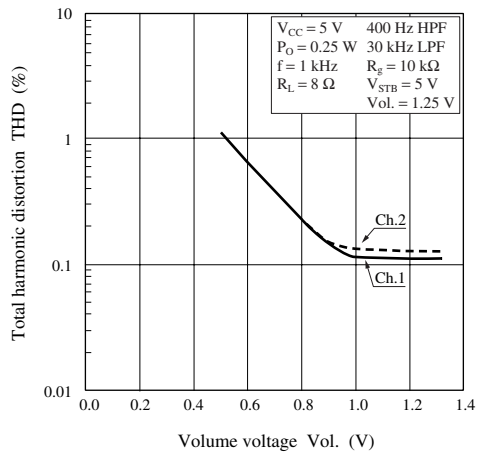
Att —  $V_{IN}$



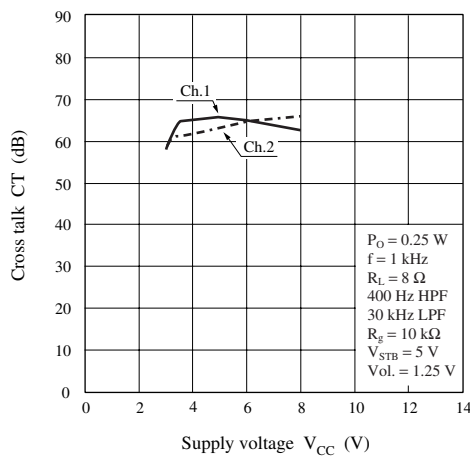
Att —  $f$



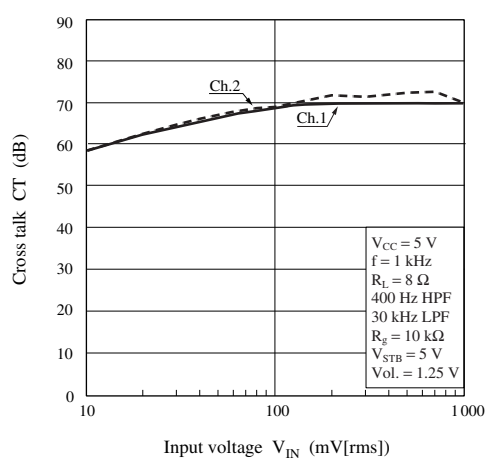
THD — Vol.



CT —  $V_{CC}$



CT —  $V_{IN}$



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