

BTL Audio Power IC AN7510/7520 Series

■ Overview

The AN7510/7520 series is a 0.5W to 3W BTL audio power amplifier IC. Equipped with a standby function and mute or DC volume circuit, the series includes a lineup of single and dual output models. With simplified set design due to minimum external components, this IC has a wide variety of applications.

■ Features

- Operating power sources voltage: 3.0V to 13.5V.
- Built-in standby function.
- Built-in mute or DC volume circuit.

■ Specifications

Product name	Parameters	Output power	Vcc	Load resistance	Standby	Mute	Volume	Package
AN7510S		0.5W×2ch	5V	16Ω	○	○		SOP-16pin
AN7511S		0.5W×1ch	5V	16Ω	○	○		SOP-8pin
AN7512S		0.5W×2ch	5V	16Ω	○		○	SOP-16pin
AN7513S		0.5W×1ch	5V	16Ω	○		○	SOP-8pin
AN7510		1.0W×2ch	5V	8Ω	○	○		HDIP-16pin
AN7511		1.0W×1ch	5V	8Ω	○	○		DIP-8pin
AN7512		1.0W×2ch	5V	8Ω	○		○	HDIP-16pin
AN7513		1.0W×1ch	5V	8Ω	○		○	DIP-8pin
* AN7520		3.0W×2ch	8V	8Ω	○	○		HSIP-12pin
* AN7521		3.0W×1ch	8V	8Ω	○	○		HSIP-9pin
AN7522		3.0W×2ch	8V	8Ω	○		○	HSIP-12pin
AN7523		3.0W×1ch	8V	8Ω	○		○	HSIP-9pin

* : Planned

■ Applications

- TVs ● Audio equipment ● Personal computers ● Active speakers

† The products and specifications are subject to change without any notice. Please ask for the latest product standards to guarantee the satisfaction of your product requirements.

Matsushita Electronics Corporation

1 Kotari Yakemachi, Nagaokakyo, Kyoto, 617-8520 Japan Tel. (075) 951-8151

<http://www.mec.panasonic.co.jp>

New publication, effective from Jan. 13 1999.

AN7510, AN7510S

Dual 0.5,1W BTL Audio Power Amplifier Circuit

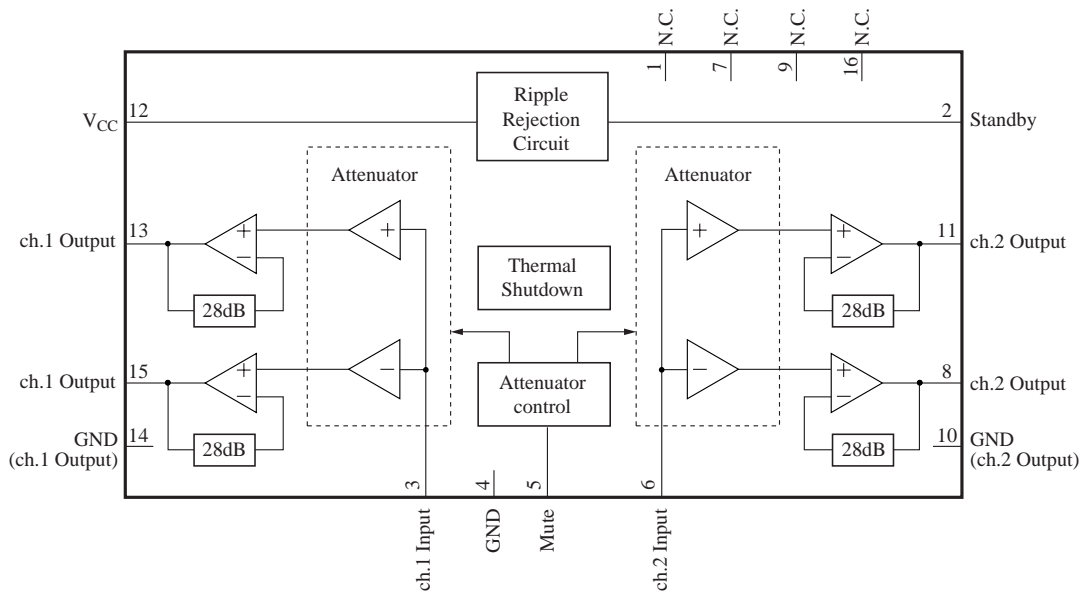
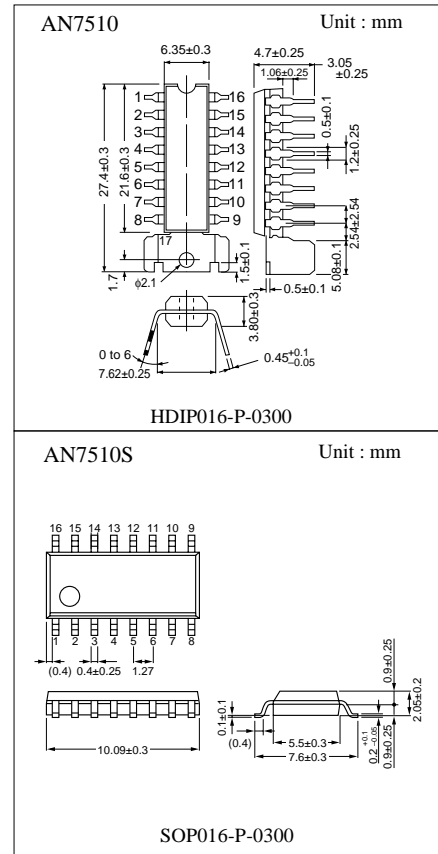
■ Features

- AN7510: $V_{cc}=5V, Output=1W(8\Omega)$
- AN7510S: $V_{cc}=5V, Output=0.5W(16\Omega)$
- Built-in Standby function.
- Built-in Mute circuits.

■ Applications

- TVs, Audio equipment, Personal computers, Active speakers

■ Block Diagram



■ Pin Descriptions

Pin No.	Function	Pin No.	Function
1	N.C	9	N.C
2	Standby	10	GND(Output ch2)
3	ch1 Input	11	ch2 Output(+)
4	GND(Input)	12	Vcc
5	Mute	13	ch1 Output(+)
6	ch2 Input	14	GND(Output ch1)
7	N.C	15	ch1 Output(-)
8	ch2 Output(-)	16	N.C

■ Absolute Maximum Ratings

Parameter	Symbol	Ratio	Unit	Note
Storage temperature	T _{stg}	AN7510 -55 to +150	°C	1
		AN7510S -55 to +125		
Operating ambient temperature	T _{opr}	-25 to +70	°C	1
Supply voltage	V _{cc}	14	V	2
Supply current	I _{cc}	2.0	A	
Power dissipation	PD	AN7510 1127	mW	Ta=70°C
		AN7510S 236		

Note1) Ta=25°C except storage temperature and operating ambient temperature.

Note2) At no-signal.

■ Operating Supply Voltage Range

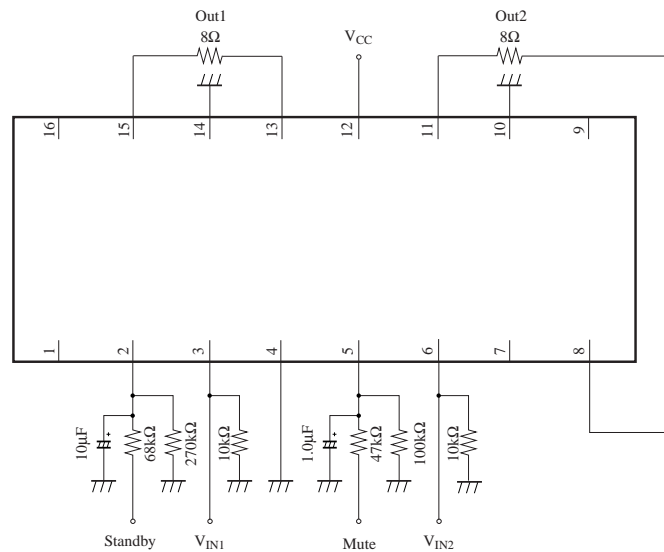
Operating supply voltage range	V _{cc}	3.5V to 13.5V
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■ Electrical Characteristics ($V_{CC}=5.0V, R_L=8\Omega, \text{freq}=1\text{kHz}, T_a=25^\circ\text{C} \pm 2^\circ\text{C}$)

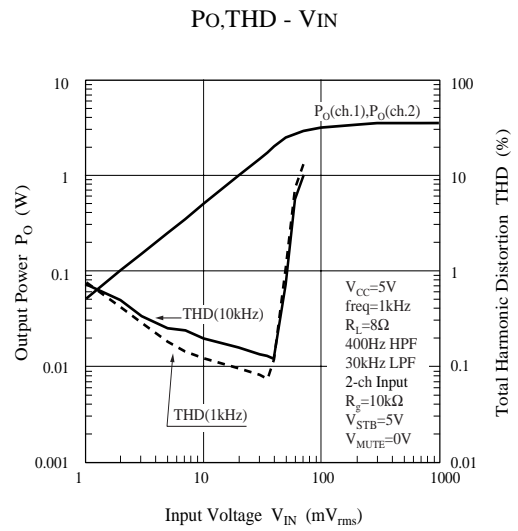
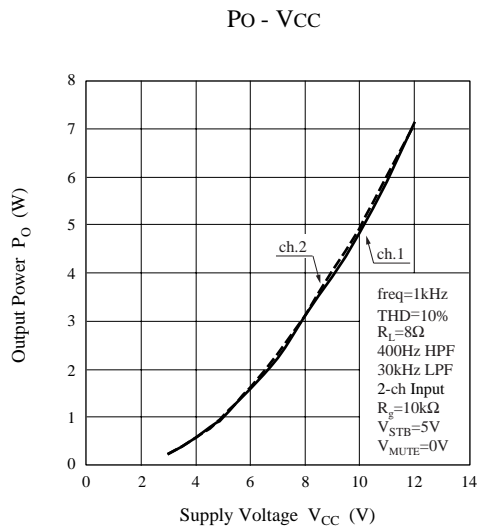
Parameter	Symbol	Condition	min.	typ.	max.	Unit	Note
Quiescent current	ICQ	$V_{IN}=0\text{mV}$	–	50	100	mA	
Standby current	ISTB	$V_{IN}=0\text{mV}$	–	1	10	μA	
Output noise voltage	VNO	$R_g=10\text{k}\Omega$	–	0.14	0.4	mVrms	1
Voltage gain	Gv	$P_o=0.25\text{W}$	32	34	36	dB	
Total harmonic distortion	THD	$P_o=0.25\text{W}$	–	0.05	0.5	%	
Maximum power output	PO	THD=10%	0.8	1.1	–	W	
Ripple rejection ratio	RR	$R_g=10\text{k}\Omega$ $V_r=1\text{Vrms}, f_r=120\text{Hz}$	30	50	–	dB	1
Output offset voltage	Voff	$R_g=10\text{k}\Omega$	-300	0	300	mV	
Muting effect	MT	$P_o=0.25\text{W}$	70	86	–	dB	1
Channel balance	CB	$P_o=0.25\text{W}$	-1	0	1	dB	
Channel crosstalk	CT	$P_o=0.25\text{W}$	55	65	–	dB	

Note1) For this measurement, use the filter <Bandwidth:15Hz to 30kHz(12dB/octave)>

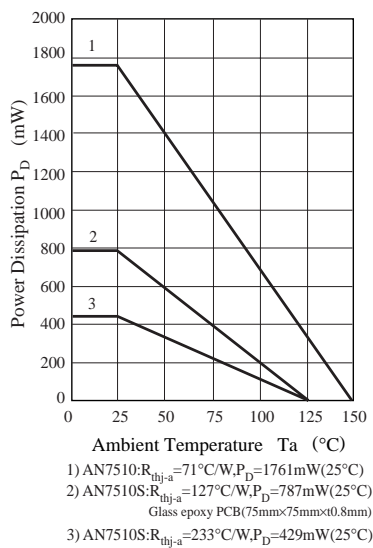
■ Application Circuit



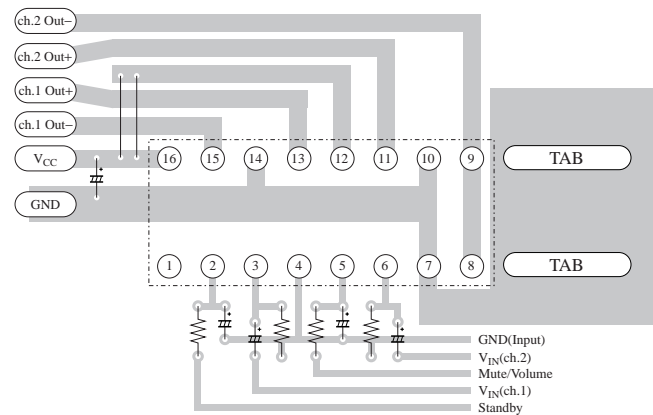
■ Characteristic Curve(AN7510)



■ Package Power Dissipation



■ Printed Board Circuit Layout



AN7511, AN7511S

0.5,1W BTL Audio Power Amplifier Circuit

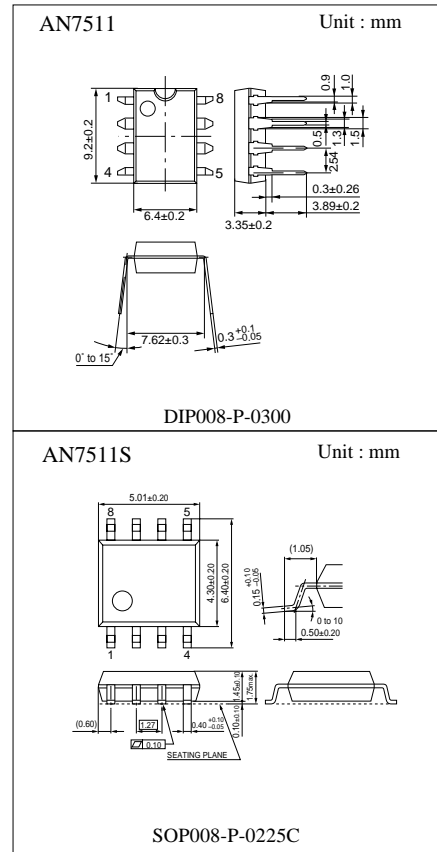
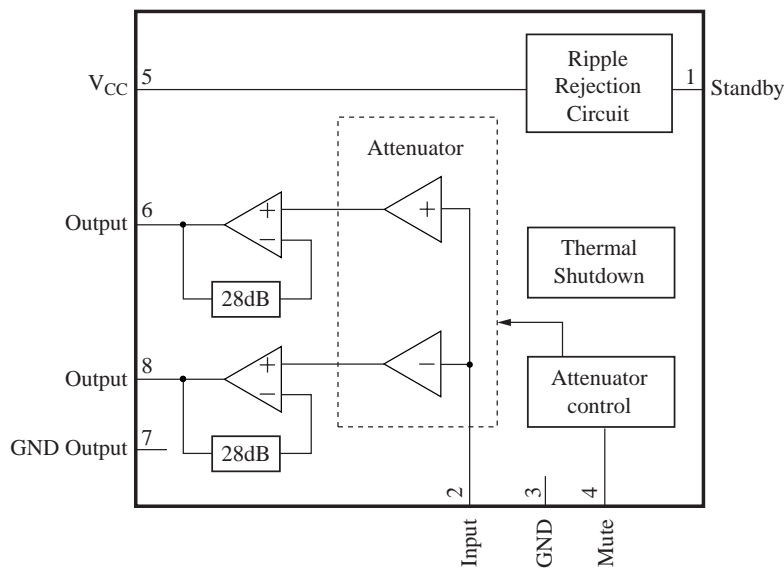
■ Features

- AN7511: $V_{cc}=5V$, Output=1W(8Ω)
- AN7511S: $V_{cc}=5V$, Output=0.5W(16Ω)
- Built-in Standby function.
- Built-in Mute circuits.

■ Applications

- TVs, Audio equipment, Personal computers, Active speakers

■ Block Diagram



■ Pin Descriptions

Pin No.	Function
1	Standby
2	ch1 Input
3	GND(Input)
4	Mute
5	Vcc
6	ch1 Output(+)
7	GND(Output1)
8	ch1 Output(-)

■ Absolute Maximum Ratings

Parameter	Symbol	Ratio	Unit	Note
Storage temperature	T _{stg}	-55 to +150	°C	1
Operating ambient temperature	T _{opr}	-25 to +70	°C	1
Supply voltage	V _{cc}	14	V	2
Supply current	I _{cc}	1.0	A	
Power dissipation	P _D	AN7511 541 AN7511S 245	mW	T _a =70°C

Note1) T_a=25°C except storage temperature and operating ambient temperature.

Note2) At no-signal.

■ Operating Supply Voltage Range

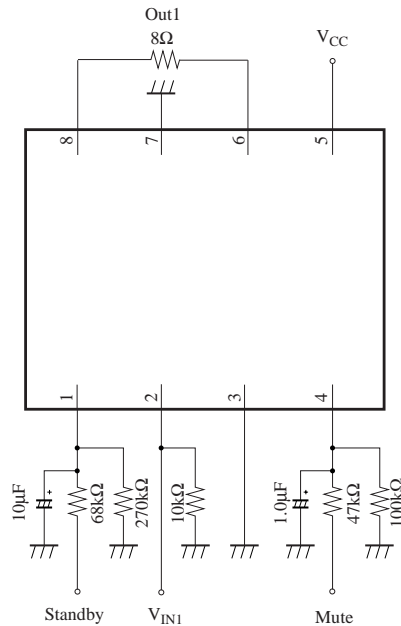
Operating supply voltage range	V _{cc}	3.5V to 13.5V
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■ Electrical Characteristics ($V_{CC}=5.0V, R_L=8\Omega, \text{freq}=1\text{kHz}, T_a=25^\circ\text{C} \pm 2^\circ\text{C}$)

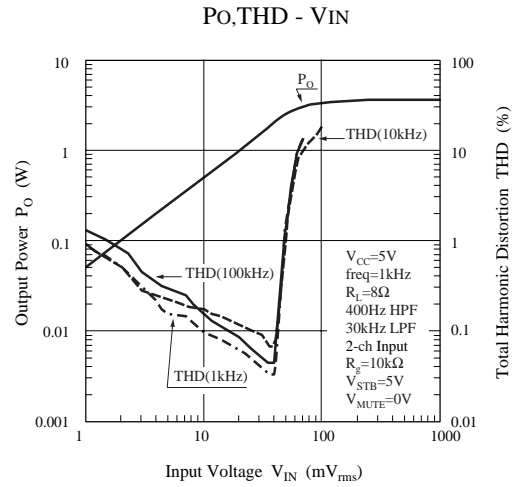
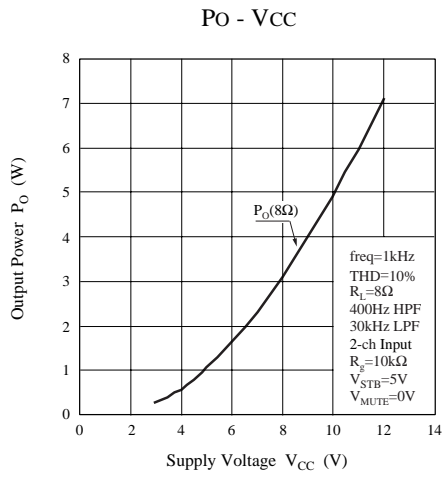
Parameter	Symbol	Condition	min.	typ.	max.	Unit	Note
Quiescent current	ICQ	$V_{IN}=0\text{mV}$	–	30	60	mA	
Standby current	ISTB	$V_{IN}=0\text{mV}$	–	1	10	μA	
Output noise voltage	VNO	$R_g=10\text{k}\Omega$	–	0.14	0.4	mVrms	1
Voltage gain	Gv	$P_o=0.25\text{W}$	32	34	36	dB	
Total harmonic distortion	THD	$P_o=0.25\text{W}$	–	0.05	0.5	%	
Maximum power output	Po	THD=10%	0.8	1.1	–	W	
Ripple rejection ratio	RR	$R_g=10\text{k}\Omega$ $V_r=1\text{Vrms}, f_r=120\text{Hz}$	30	50	–	dB	1
Output offset voltage	Voff	$R_g=10\text{k}\Omega$	-300	0	300	mV	
Muting effect	MT	$P_o=0.25\text{W}$	70	86	–	dB	1

Note1) For this measurement, use the filter <Bandwidth:15Hz to 30kHz(12dB/octave)>

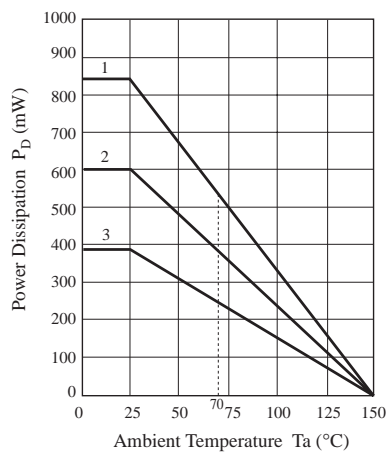
■ Application Circuit



■ Characteristic Curve(AN7511)

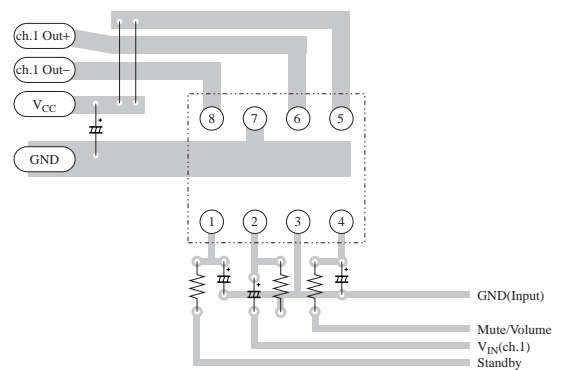


■ Package Power Dissipation



- 1) AN7511: $R_{thj-a}=148^\circ C/W, P_D=845mW(25^\circ C)$
- 2) AN7511S: $R_{thj-a}=209.3^\circ C/W, P_D=597mW(25^\circ C)$
Glass epoxy PCB(50mm×50mm×0.8mm)
- 3) AN7511S: $R_{thj-a}=326.6^\circ C/W, P_D=383mW(25^\circ C)$

■ Printed Board Circuit Layout



AN7512, AN7512S

Dual 0.5,1W BTL Audio Power Amplifier Circuit

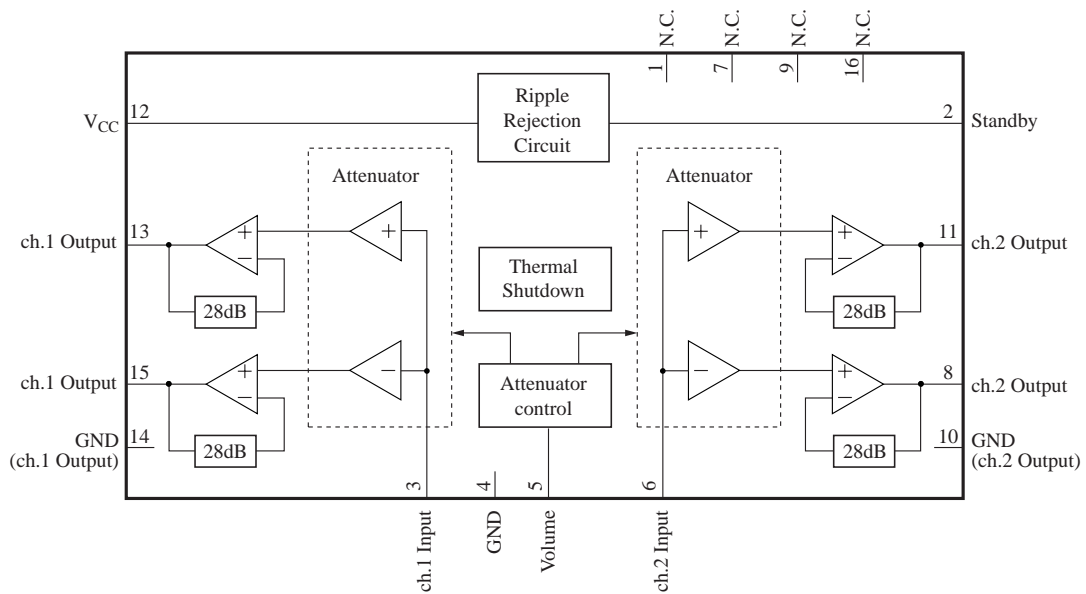
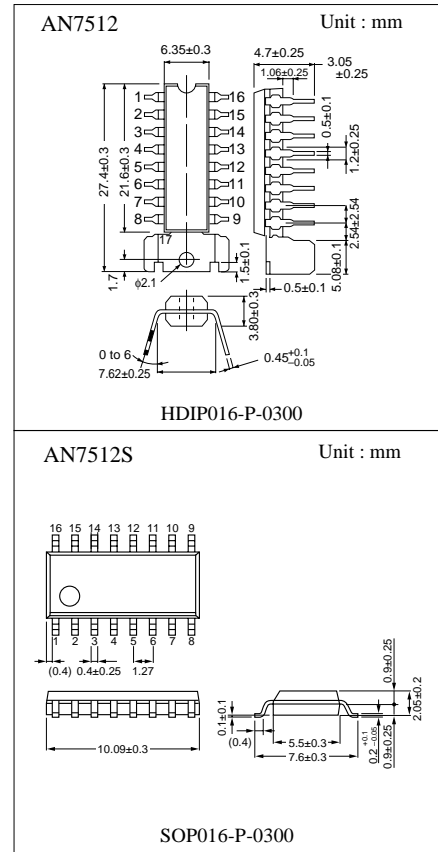
■ Features

- AN7512: $V_{cc}=5V, Output=1W(8\Omega)$
- AN7512S: $V_{cc}=5V, Output=0.5W(16\Omega)$
- Built-in Standby function.
- Built-in DC volume circuits.

■ Applications

- TVs, Audio equipment, Personal computers, Active speakers

■ Block Diagram



■ Pin Descriptions

Pin No.	Function	Pin No.	Function
1	N.C	9	N.C
2	Standby	10	GND(Output ch2)
3	ch1 Input	11	ch2 Output(+)
4	GND(Input)	12	Vcc
5	DC volume	13	ch1 Output(+)
6	ch2 Input	14	GND(Output ch1)
7	N.C	15	ch1 Output(-)
8	ch2 Output(-)	16	N.C

■ Absolute Maximum Ratings

Parameter	Symbol	Ratio	Unit	Note
Storage temperature	T _{stg}	AN7512 -55 to +150 AN7512S -55 to +125	°C	1
Operating ambient temperature	T _{opr}	-25 to +70	°C	1
Supply voltage	V _{cc}	14	V	2
Supply current	I _{cc}	2.0	A	
Power dissipation	PD	AN7512 1127 AN7512S 236	mW	T _a =70°C

Note1) T_a=25°C except storage temperature and operating ambient temperature.

Note2) At no-signal.

■ Operating Supply Voltage Range

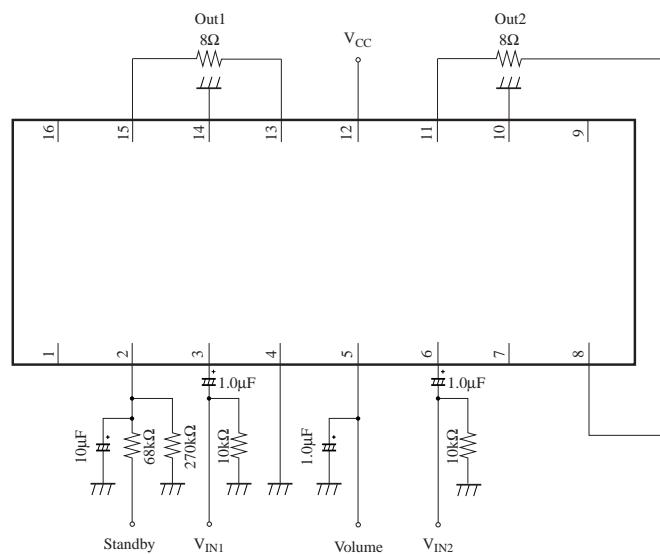
Operating supply voltage range	V _{cc}	3.5V to 13.5V
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■ Electrical Characteristics ($V_{CC}=5.0V, R_L=8\Omega, \text{freq}=1\text{kHz}, T_a=25^\circ\text{C} \pm 2^\circ\text{C}$)

Parameter	Symbol	Condition	min.	typ.	max.	Unit	Note
Quiescent current	ICQ	$V_{IN}=0\text{mV}, V_{ol}=0\text{V}$	–	35	100	mA	
Standby current	ISTB	$V_{IN}=0\text{mV}, V_{ol}=0\text{V}$	–	1	10	μA	
Output noise voltage	VNO	$R_g=10\text{k}\Omega, V_{ol}=0\text{V}$	–	0.10	0.4	mVrms	1
Voltage gain	GV	$P_O=0.25\text{W}, V_{ol}=1.25\text{V}$	32	34	36	dB	
Total harmonic distortion	THD	$P_O=0.25\text{W}, V_{ol}=1.25\text{V}$	–	0.10	0.5	%	
Maximum power output	PO	$\text{THD}=10\%, V_{ol}=1.25\text{V}$	0.8	1.1	–	W	
Ripple rejection ratio	RR	$R_g=10\text{k}\Omega, V_{ol}=0\text{V}$ $V_r=0.5\text{Vrms}, f_r=120\text{Hz}$	30	50	–	dB	1
Output offset voltage	V _{off}	$R_g=10\text{k}\Omega, V_{ol}=0\text{V}$	-250	0	250	mV	
Maximum attenuation	Att	$P_O=0.25\text{W}, V_{ol}=0\text{V}$	70	90	–	dB	1
Input impedance	ZI	$V_{IN}=\pm 0.3\text{VDC}$	24	30	36	$\text{k}\Omega$	
Channel balance1	CB1	$P_O=0.25\text{W}, V_{ol}=1.25\text{V}$	-1	0	1	dB	
Channel balance2	CB2	$P_O=0.25\text{W}, V_{ol}=0.6\text{V}$	-3	0	3	dB	
Center voltage gain	G _{VM}	$P_O=0.25\text{W}, V_{ol}=0.6\text{V}$	22	25	28	dB	
Channel crosstalk	CT	$P_O=0.25\text{W}, V_{ol}=1.25\text{V}$	40	55	–	dB	

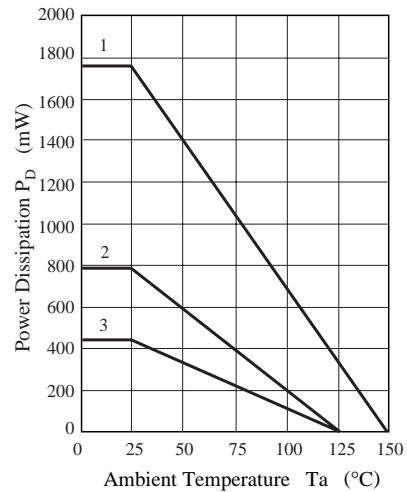
Note1) For this measurement, use the filter <Bandwidth:15Hz to 30kHz(12dB/octave)>

■ Application Circuit



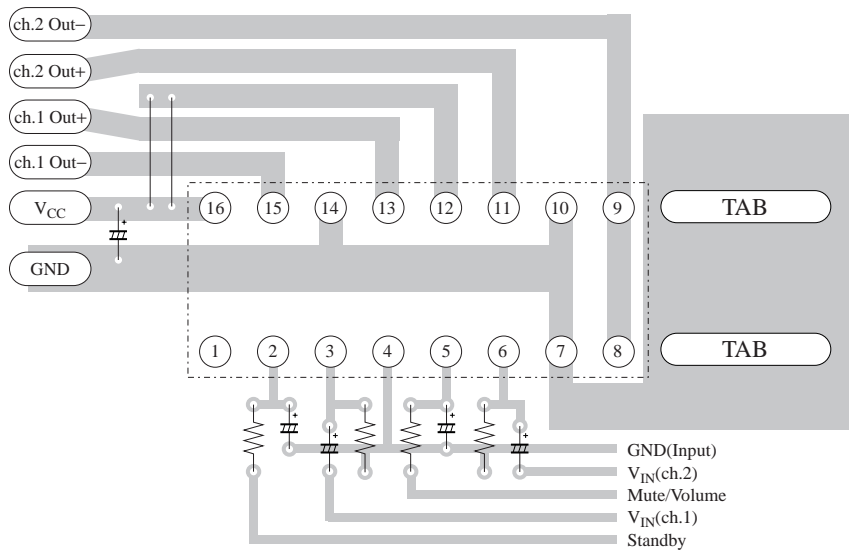
Panasonic

■ Package Power Dissipation



- 1) AN7512: $R_{thj-a}=71^{\circ}\text{C}/\text{W}$, $P_D=1761\text{mW}$ (25°C)
 2) AN7512S: $R_{thj-a}=127^{\circ}\text{C}/\text{W}$, $P_D=787\text{mW}$ (25°C)
 Glass epoxy PCB(75mm×75mm×1.08mm)
 3) AN7512S: $R_{thj-a}=233^{\circ}\text{C}/\text{W}$, $P_D=429\text{mW}$ (25°C)

■ Printed Board Circuit Layout



AN7513, AN7513S

0.5,1W BTL Audio Power Amplifier Circuit

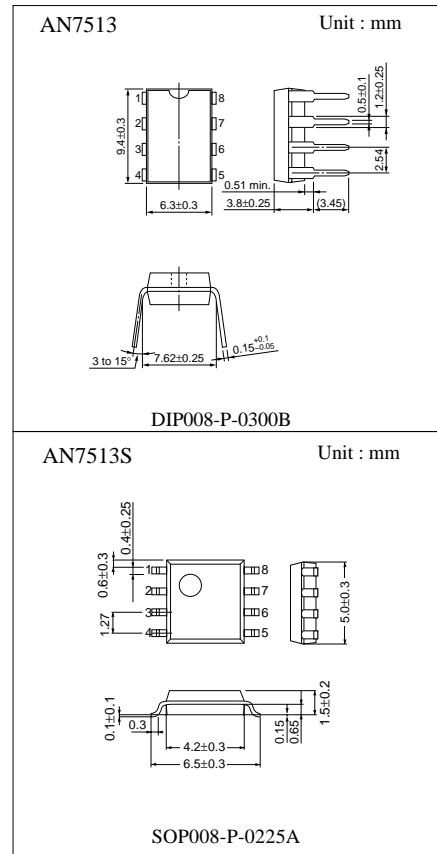
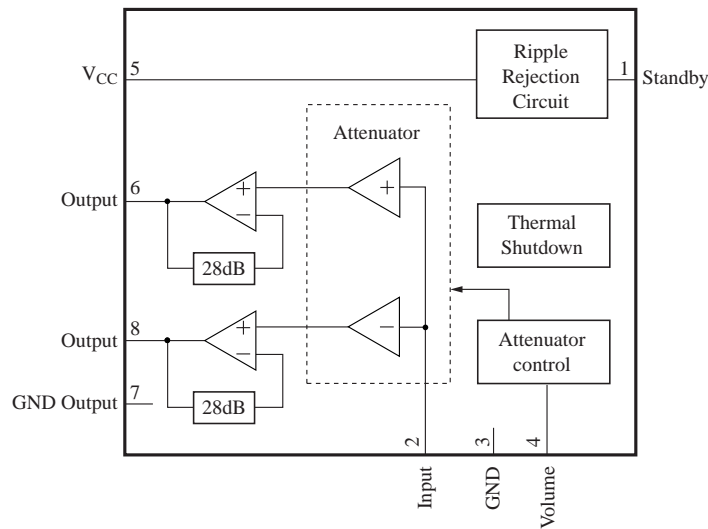
■ Features

- AN7513: $V_{cc}=5V$, Output=1W(8Ω)
- AN7513S: $V_{cc}=5V$, Output=0.5W(16Ω)
- Built-in Standby function.
- Built-in DC volume circuits.

■ Applications

- TVs, Audio equipment, Personal computers

■ Block Diagram



■ Pin Descriptions

Pin No.	Function
1	Standby
2	ch1 Input
3	GND(Input)
4	DC volume
5	Vcc
6	ch1 Output(+)
7	GND(Output1)
8	ch1 Output(-)

■ Absolute Maximum Ratings

Parameter	Symbol	Ratio	Unit	Note
Storage temperature	T _{stg}	-55 to +150	°C	1
Operating ambient temperature	T _{opr}	-25 to +70	°C	1
Supply voltage	V _{cc}	14	V	2
Supply current	I _{cc}	1.0	A	
Power dissipation	PD	AN7513 541 AN7513S 245	mW	T _a =70°C

Note1) T_a=25°C except storage temperature and operating ambient temperature.

Note2) At no-signal.

■ Operating Supply Voltage Range

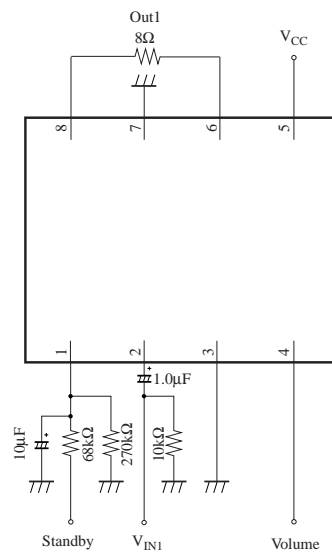
Operating supply voltage range	V _{cc}	3.5V to 13.5V
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■ Electrical Characteristics ($V_{CC}=5.0V, R_L=8\Omega, \text{freq}=1\text{kHz}, T_a=25^\circ\text{C} \pm 2^\circ\text{C}$)

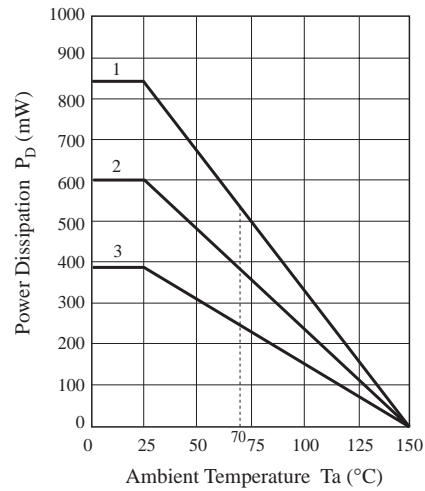
Parameter	Symbol	Condition	min.	typ.	max.	Unit	Note
Quiescent current	ICQ	$V_{IN}=0\text{mV}, V_{OL}=0\text{V}$	–	20	60	mA	
Standby current	ISTB	$V_{IN}=0\text{mV}, V_{OL}=0\text{V}$	–	1	10	μA	
Output noise voltage	VNO	$R_g=10\text{k}\Omega, V_{OL}=0\text{V}$	–	0.10	0.4	mVrms	1
Voltage gain	GV	$P_O=0.25\text{W}, V_{OL}=2.5\text{V}$	31	33	35	dB	
Total harmonic distortion	THD	$P_O=0.25\text{W}, V_{OL}=2.5\text{V}$	–	0.10	0.5	%	
Maximum power output	PO	$\text{THD}=10\%, V_{OL}=2.5\text{V}$	0.7	1.0	–	W	
Ripple rejection ratio	RR	$R_g=10\text{k}\Omega, V_{OL}=0\text{V}$ $V_r=1.0\text{Vrms}, f_r=120\text{Hz}$	30	50	–	dB	1
Output offset voltage	Voff	$R_g=10\text{k}\Omega, V_{OL}=0\text{V}$	-250	0	250	mV	
Maximum attenuation	Att	$P_O=0.25\text{W}, V_{OL}=0\text{V}$	70	85	–	dB	1
Center voltage gain	GVM	$P_O=0.25\text{W}, V_{OL}=0.1.25\text{V}$	20.5	23.5	26.5	dB	

Note1) For this measurement, use the filter <Bandwidth:15Hz to 30kHz(12dB/octave)>

■ Application Circuit

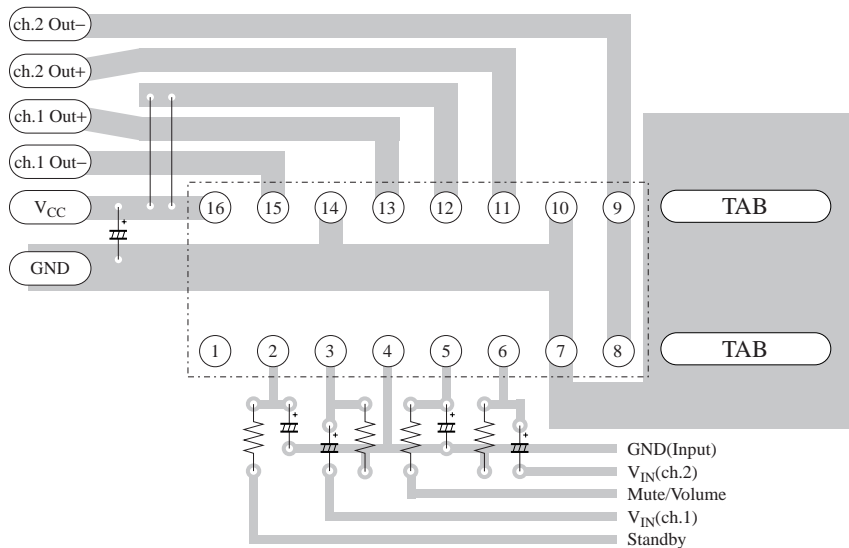


■ Package Power Dissipation



- 1) AN7513: $R_{thj-a} = 148^{\circ}\text{C}/\text{W}$, $P_D = 845\text{mW}$ (25°C)
 2) AN7513S: $R_{thj-a} = 209.3^{\circ}\text{C}/\text{W}$, $P_D = 597\text{mW}$ (25°C)
 Glass epoxy PCB (50mm×50mm×0.8mm)
 3) AN7513S: $R_{thj-a} = 326.6^{\circ}\text{C}/\text{W}$, $P_D = 383\text{mW}$ (25°C)

■ Printed Board Circuit Layout



AN7522

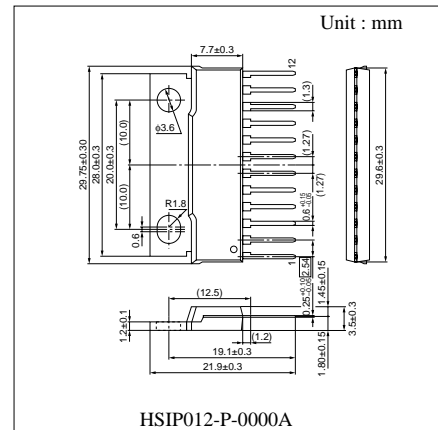
Dual 3W BTL Audio Power Amplifier Circuit

■ Features

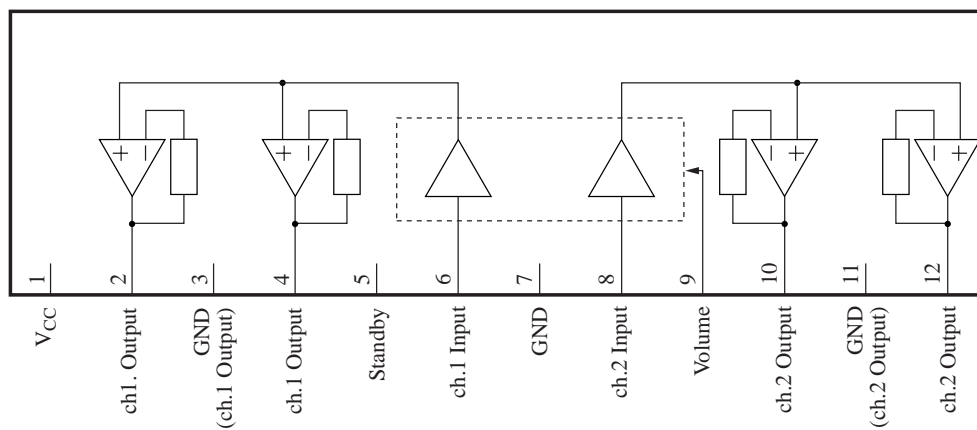
- $V_{cc}=8V, Output=3W(8\Omega)$
- Built-in Standby function.
- Built-in DC volume circuits.

■ Applications

- TVs, Audio equipment, Personal computers, Active speakers



■ Block Diagram



■ Pin Descriptions

Pin No.	Function	Pin No.	Function
1	Vcc	7	GND(Input)
2	ch1 Output(+)	8	ch2 Input
3	GND(Output ch1)	9	DC Volume
4	ch1 Output(-)	10	ch2 Output(-)
5	Standby	11	GND(Output ch2)
6	ch1 Input	12	ch2 Output(+)

■ Absolute Maximum Ratings

Parameter	Symbol	Ratio	Unit	Note
Storage temperature	T _{stg}	-55 to +150	°C	1
Operating ambient temperature	T _{opr}	-25 to +70	°C	1
Supply voltage	V _{cc}	14	V	2
Supply current	I _{cc}	2.0	A	
Power dissipation	PD	1920	mW	T _a =70°C

Note1) T_a=25°C except storage temperature and operating ambient temperature.

Note2) At no-signal.

■ Operating Supply Voltage Range

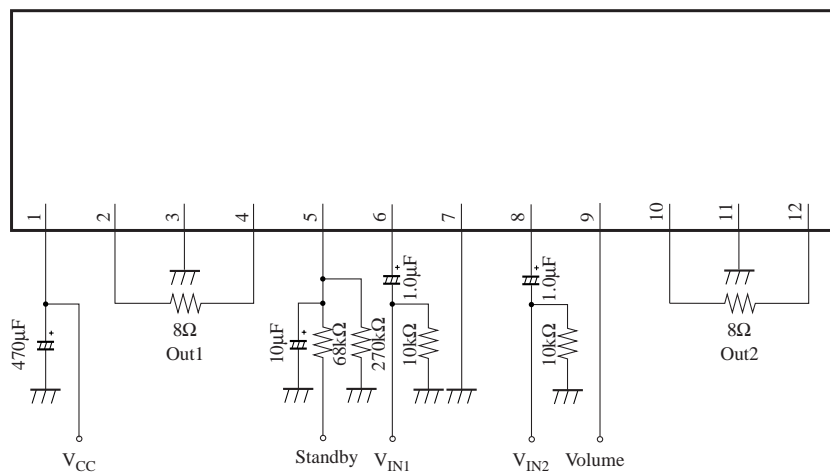
Operating supply voltage range	V _{cc}	3.5V to 13.5V
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■ Electrical Characteristics ($V_{CC}=5.0V, R_L=8\Omega, \text{freq}=1\text{kHz}, T_a=25^\circ\text{C} \pm 2^\circ\text{C}$)

Parameter	Symbol	Condition	min.	typ.	max.	Unit	Note
Quiescent current	ICQ	$V_{IN}=0\text{mV}, \text{Vol.}=0\text{V}$	–	45	100	mA	
Standby current	ISTB	$V_{IN}=0\text{mV}, \text{Vol.}=0\text{V}$	–	1	10	μA	
Output noise voltage	VNO	$R_g=10\text{k}\Omega, \text{Vol.}=0\text{V}$	–	0.10	0.4	mVrms	1
Voltage gain	GV	$P_O=0.25\text{W}, \text{Vol.}=1.25\text{V}$	32	34	36	dB	
Total harmonic distortion	THD	$P_O=0.25\text{W}, \text{Vol.}=1.25\text{V}$	–	0.10	0.5	%	
Maximum power output	PO	$\text{THD}=10\%, \text{Vol.}=1.25\text{V}$	2.4	3.0	–	W	
Ripple rejection ratio	RR	$R_g=10\text{k}\Omega, \text{Vol.}=0\text{V}$ $V_r=0.5\text{Vrms}, f_r=120\text{Hz}$	30	50	–	dB	1
Output offset voltage	Voff	$R_g=10\text{k}\Omega, \text{Vol.}=0\text{V}$	-250	0	250	mV	
Maximum attenuation	Att	$P_O=0.25\text{W}, \text{Vol.}=0\text{V}$	70	90	–	dB	1
Input impedance	ZI	$V_{IN}=\pm 0.3\text{VDC}$	24	30	36	$\text{k}\Omega$	
Channel balance1	CB1	$P_O=0.25\text{W}, \text{Vol.}=1.25\text{V}$	-1	0	1	dB	
Channel balance2	CB2	$P_O=0.25\text{W}, \text{Vol.}=0.6\text{V}$	-3	0	3	dB	
Center voltage gain	GVM	$P_O=0.25\text{W}, \text{Vol.}=0.6\text{V}$	21	24	27	dB	
Channel crosstalk	CT	$P_O=0.25\text{W}, \text{Vol.}=1.25\text{V}$	44	55	–	dB	

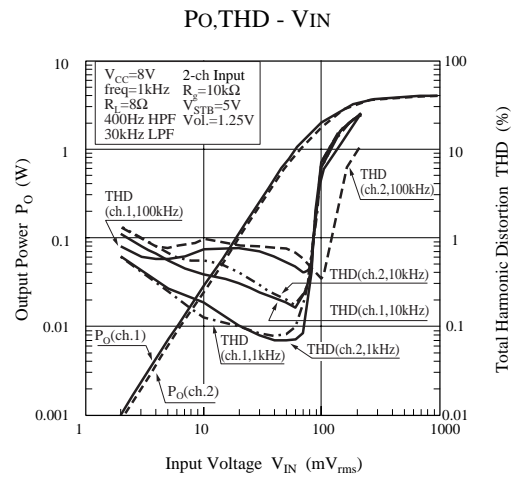
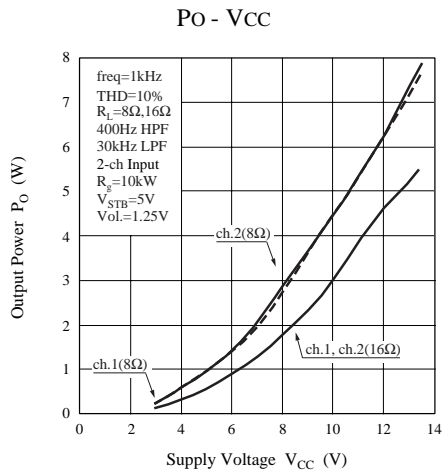
Note1) For this measurement, use the filter <Bandwidth: 15Hz to 30kHz(12dB/octave)>

■ Application Circuit

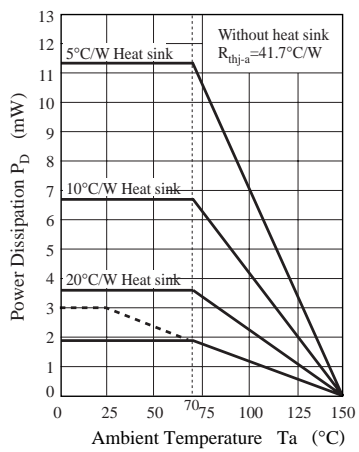


Panasonic

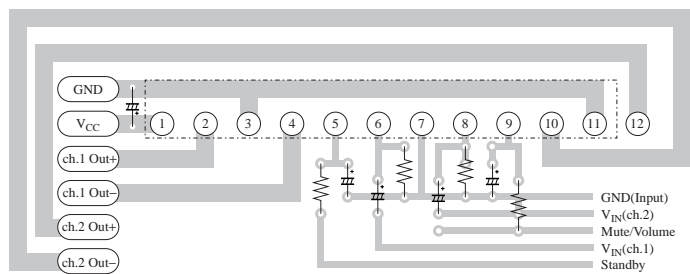
■ Characteristic Curve



■ Package Power Dissipation



■ Printed Board Circuit Layout



AN7523

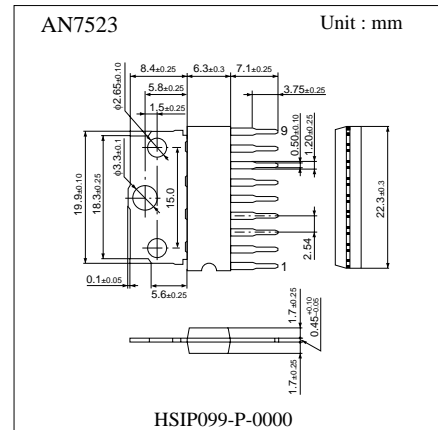
3W BTL Audio Power Amplifier Circuit

■ Features

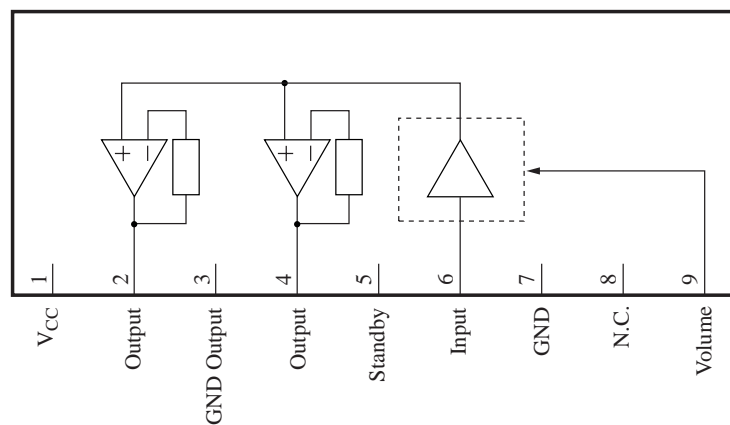
- $V_{CC}=8V$, Output=3W(8Ω)
- Built-in Standby function.
- Built-in DC volume circuits.

■ Applications

- TVs, Audio equipment



■ Block Diagram



■ Pin Descriptions

Pin No.	Function
1	Vcc
2	ch1 Output(+)
3	GND(Output1)
4	ch1 Output(-)
5	Standby
6	ch1 Input
7	GND
8	N.C
9	DC volume

■ Absolute Maximum Ratings

Parameter	Symbol	Ratio	Unit	Note
Storage temperature	T _{stg}	-55 to +150	°C	1
Operating ambient temperature	T _{opr}	-25 to +70	°C	1
Supply voltage	V _{cc}	14	V	2
Supply current	I _{cc}	1.0	A	
Power dissipation	PD	1220	mW	T _a =70°C

Note1) T_a=25°C except storage temperature and operating ambient temperature.

Note2) At no-signal.

■ Operating Supply Voltage Range

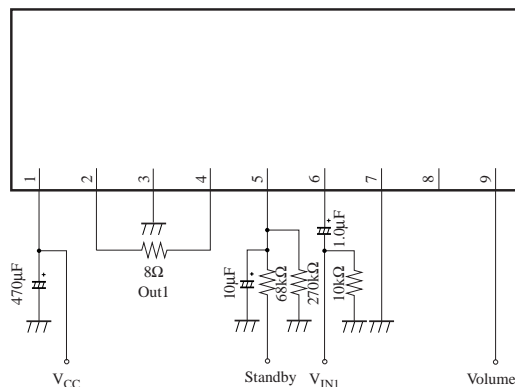
Operating supply voltage range	V _{cc}	3.5V to 13.5V
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■ Electrical Characteristics ($V_{CC}=5.0V, R_L=8\Omega, \text{freq}=1\text{kHz}, T_a=25^\circ\text{C} \pm 2^\circ\text{C}$)

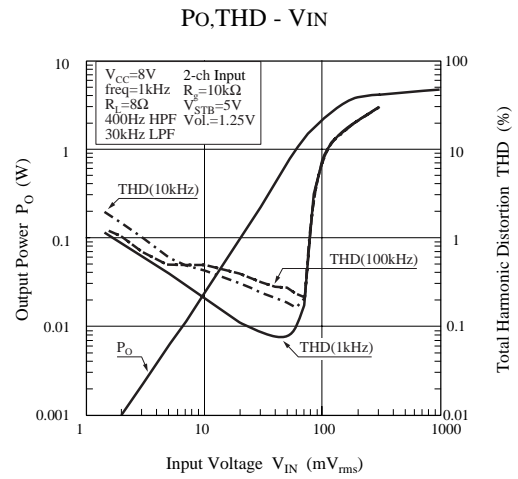
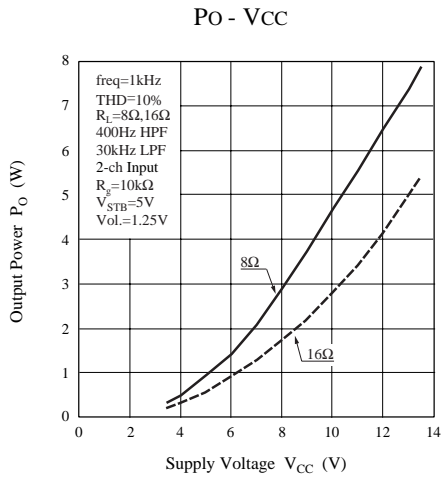
Parameter	Symbol	Condition	min.	typ.	max.	Unit	Note
Quiescent current	ICQ	$V_{IN}=0\text{mV}, \text{Vol.}=0\text{V}$	–	25	60	mA	
Standby current	ISTB	$V_{IN}=0\text{mV}, \text{Vol.}=0\text{V}$	–	1	10	μA	
Output noise voltage	VNO	$R_g=10\text{k}\Omega, \text{Vol.}=0\text{V}$	–	0.10	0.4	mVrms	1
Voltage gain	GV	$P_O=0.25\text{W}, \text{Vol.}=1.25\text{V}$	31	33	35	dB	
Total harmonic distortion	THD	$P_O=0.25\text{W}, \text{Vol.}=1.25\text{V}$	–	0.10	0.5	%	
Maximum power output	PO	$\text{THD}=10\%, \text{Vol.}=1.25\text{V}$	2.4	3.0	–	W	
Ripple rejection ratio	RR	$R_g=10\text{k}\Omega, \text{Vol.}=0\text{V}$ $V_r=0.5\text{Vrms}, f_r=120\text{Hz}$	30	50	–	dB	1
Output offset voltage	V _{off}	$R_g=10\text{k}\Omega, \text{Vol.}=0\text{V}$	-250	0	250	mV	
Maximum attenuation	Att	$P_O=0.5\text{W}, \text{Vol.}=0\text{V}$	70	85	–	dB	1
Center voltage gain	GVM	$P_O=0.5\text{W}, \text{Vol.}=0.6\text{V}$	20.5	23.5	26.5	dB	
Standby terminal current	ISTB	$V_{IN}=0\text{mV}, V_{STB}=3\text{V}$	–	–	25	μA	
Volume terminal current	I _{vol}	$V_{IN}=0\text{mV}, \text{Vol.}=0\text{V}$	-12	–	–	μA	

Note1) For this measurement, use the filter <Bandwidth: 15Hz to 30kHz(12dB/octave)>

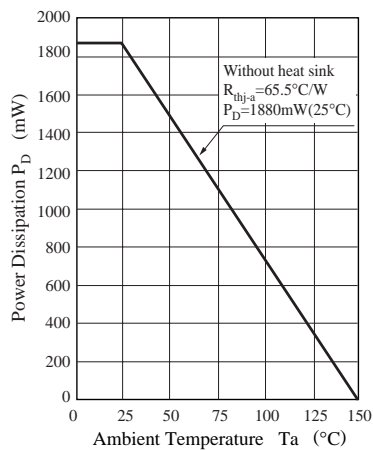
■ Application Circuit



■ Characteristic Curve



■ Package Power Dissipation



■ Printed Board Circuit Layout

