Panasonic

New

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

■ Specifications

Parameters / Product name	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

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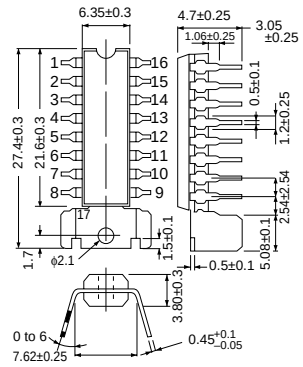
New publication, effective from Jan. 13 1999.

AN7510, AN7510S

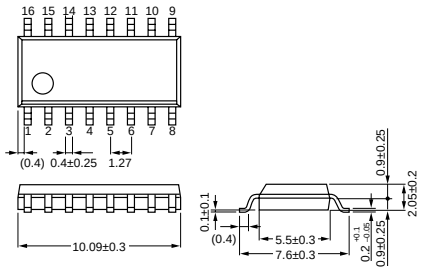
Dual 0.5,1W BTL Audio Power Amplifier Circuit

AN7510 Unit : mm



HDIP016-P-0300

AN7510S Unit : mm



SOP016-P-0300

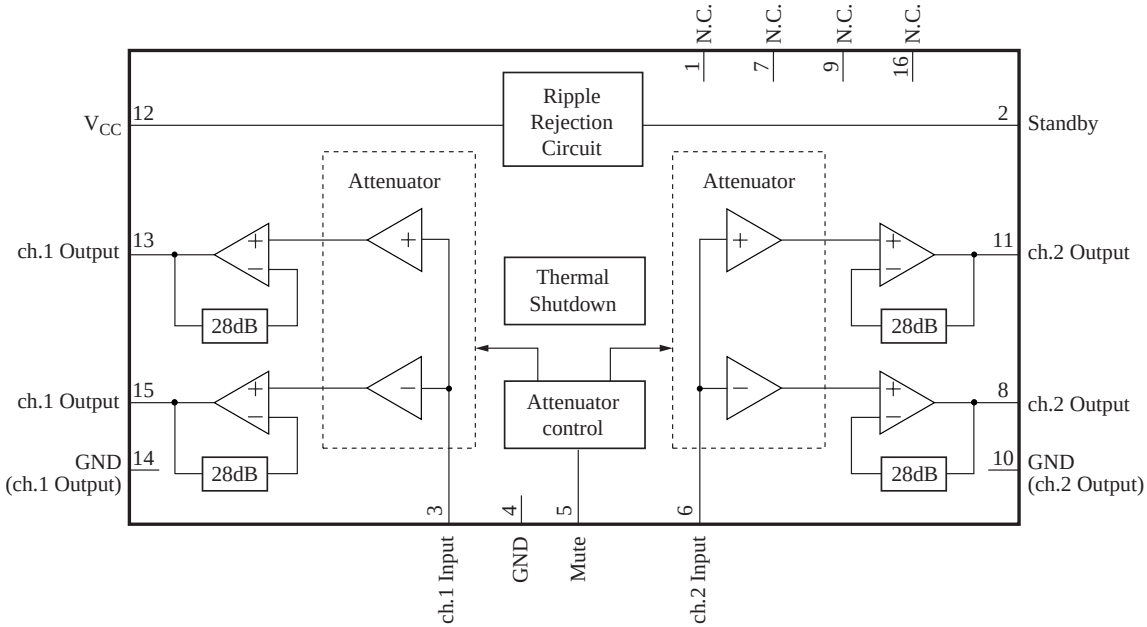
■ Features

- AN7510: Vcc=5V,Output=1W(8Ω)
- AN7510S:Vcc=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	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 AN7510S -55 to +125	ºC	1
Operating ambient temperature	T_{opr}	-25 to +70	ºC	1
Supply voltage	V_{CC}	14	V	2
Supply current	I_{CC}	2.0	A	
Power dissipation	P_D	AN7510 1127 AN7510S 236	mW	Ta=70ºC

Note1) Ta=25ºC except storage temperature and operating ambient temperature.
Note2) At no-signal.

■ Operating Supply Voltage Range

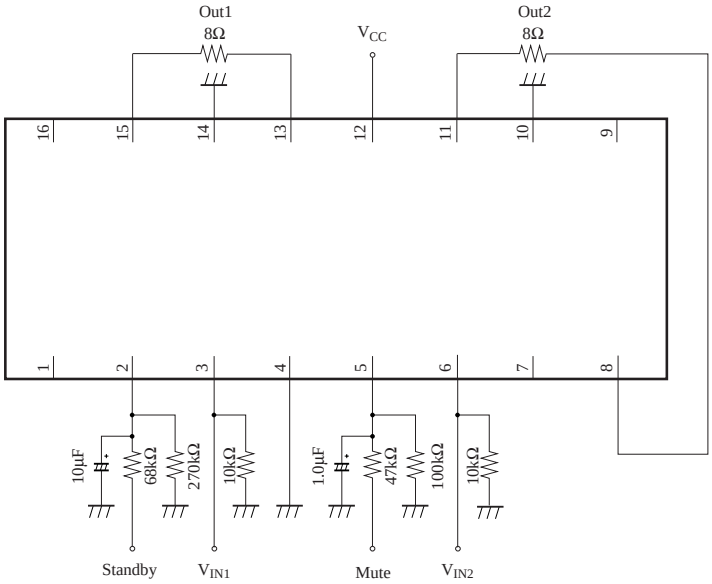
Operating supply voltage range	Vcc	3.5V to 13.5V

■ Electrical Characteristics (Vcc=5.0V,RL=8Ω,freq=1kHz,Ta=25ºC ±2 ºC)

Parameter	Symbol	Condition	min.	typ.	max.	Unit	Note
Quiescent current	ICQ	VIN=0mV	–	50	100	mA	
Standby current	ISTB	VIN=0mV	–	1	10	μA	
Output noise voltage	VNO	Rg=10kΩ	–	0.14	0.4	mVrms	1
Voltage gain	GV	PO=0.25W	32	34	36	dB	
Total harmonic distortion	THD	PO=0.25W	–	0.05	0.5	%	
Maximum power output	PO	THD=10%	0.8	1.1	–	W	
Ripple rejection ratio	RR	Rg=10kΩ Vr=1Vrms,fr=120Hz	30	50	–	dB	1
Output offset voltage	Voff	Rg=10kΩ	-300	0	300	mV	
Muting effect	MT	PO=0.25W	70	86	–	dB	1
Channel balance	CB	PO=0.25W	-1	0	1	dB	
Channel crosstalk	CT	PO=0.25W	55	65	–	dB	

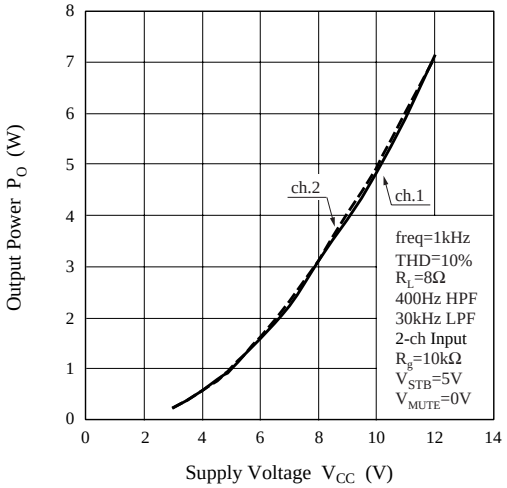
Note1) For this measurement,use the filter <Bandwidth:15Hz to 30kHz(12dB/octave)>

■ Application Circuit

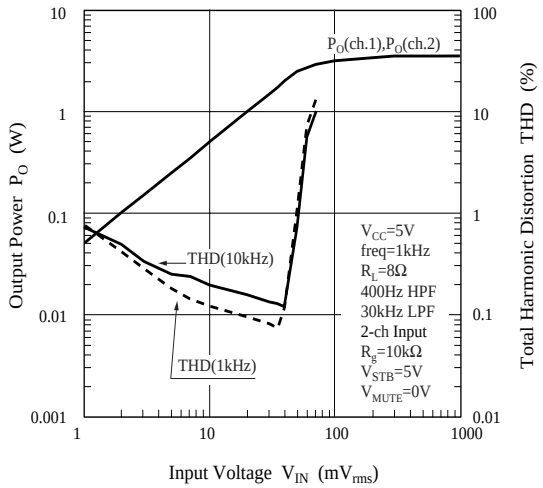


■ Characteristic Curve(AN7510)

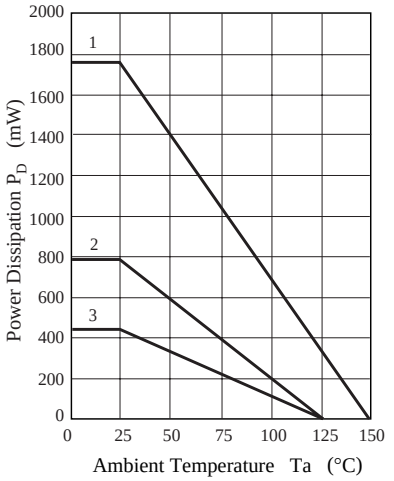
PO - VCC



PO,THD - VIN

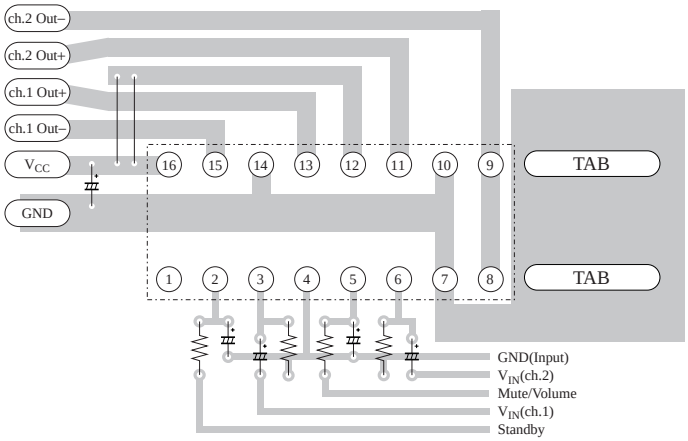


■ Package Power Dissipation



1) AN7510:R_{thj-a}=71°C/W,P_D=1761mW(25°C)
2) AN7510S:R_{thj-a}=127°C/W,P_D=787mW(25°C)
Glass epoxy PCB(75mm×75mm×t0.8mm)
3) AN7510S:R_{thj-a}=233°C/W,P_D=429mW(25°C)

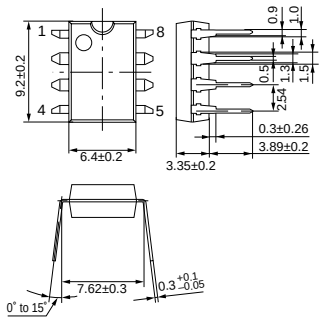
■ Printed Board Circuit Layout



AN7511, AN7511S

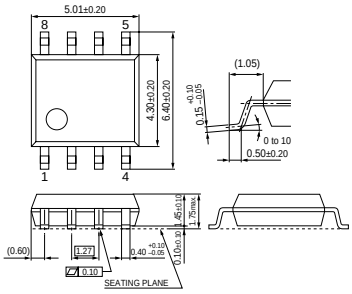
0.5,1W BTL Audio Power Amplifier Circuit

AN7511 Unit : mm



DIP008-P-0300

AN7511S Unit : mm



SOP008-P-0225C

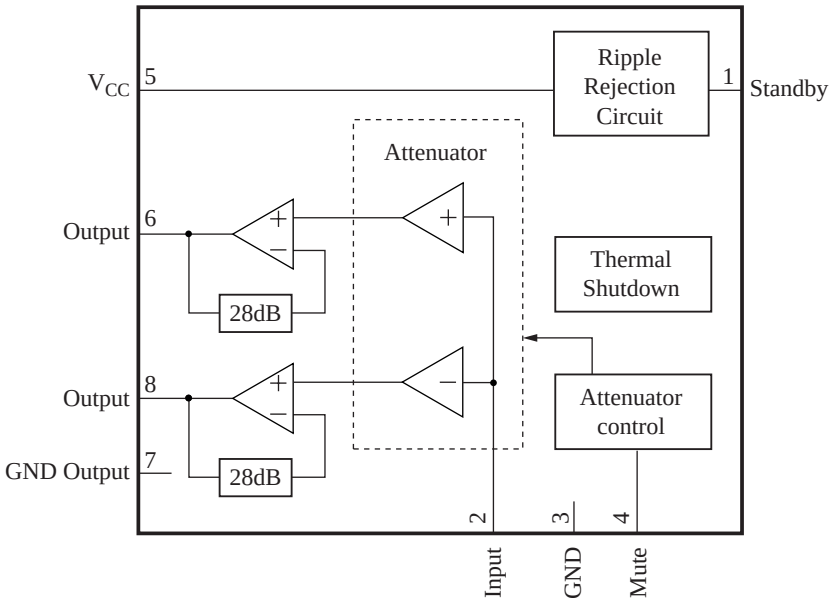
■ Features

- AN7511: Vcc=5V,Output=1W(8Ω)
- AN7511S:Vcc=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	ºC	1
Operating ambient temperature	T_{opr}	-25 to +70	ºC	1
Supply voltage	V_{CC}	14	V	2
Supply current	I_{CC}	1.0	A	
Power dissipation	P_D	AN7511 541 AN7511S 245	mW	Ta=70ºC

Note1) Ta=25ºC except storage temperature and operating ambient temperature.
Note2) At no-signal.

■ Operating Supply Voltage Range

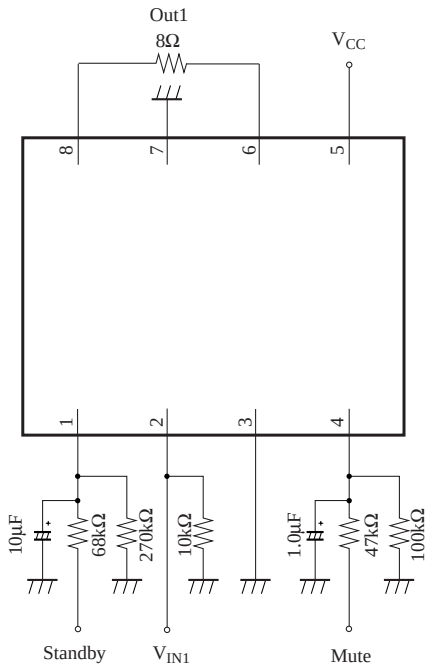
Operating supply voltage range	Vcc	3.5V to 13.5V

■ Electrical Characteristics (Vcc=5.0V,RL=8Ω,freq=1kHz,Ta=25ºC ±2 ºC)

Parameter	Symbol	Condition	min.	typ.	max.	Unit	Note
Quiescent current	ICQ	VIN=0mV	–	30	60	mA	
Standby current	ISTB	VIN=0mV	–	1	10	μA	
Output noise voltage	VNO	Rg=10kΩ	–	0.14	0.4	mVrms	1
Voltage gain	GV	PO=0.25W	32	34	36	dB	
Total harmonic distortion	THD	PO=0.25W	–	0.05	0.5	%	
Maximum power output	PO	THD=10%	0.8	1.1	–	W	
Ripple rejection ratio	RR	Rg=10kΩ Vr=1Vrms,fr=120Hz	30	50	–	dB	1
Output offset voltage	Voff	Rg=10kΩ	-300	0	300	mV	
Muting effect	MT	PO=0.25W	70	86	–	dB	1

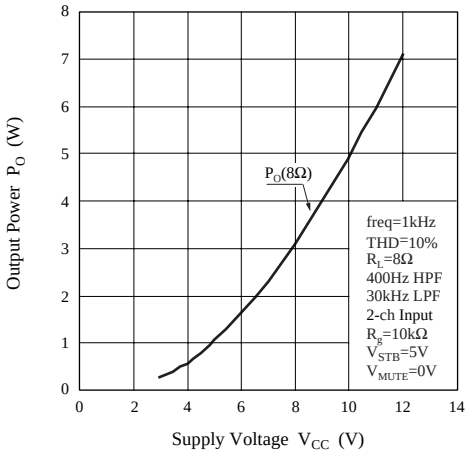
Note1) For this measurement,use the filter <Bandwidth:15Hz to 30kHz(12dB/octave)>

■ Application Circuit

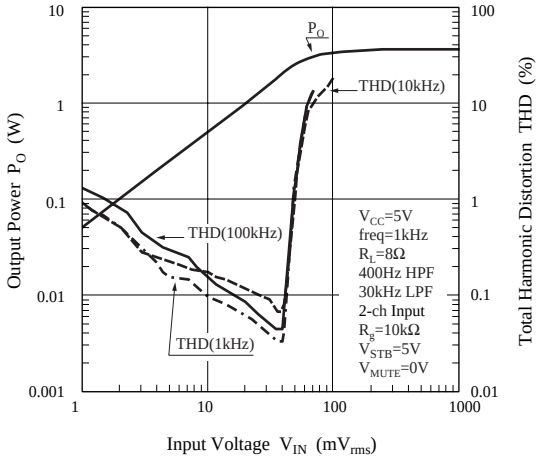


■ Characteristic Curve(AN7511)

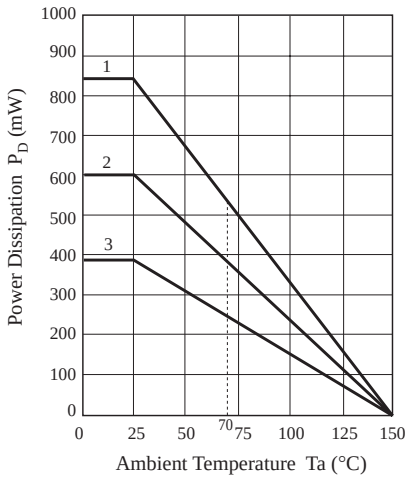
PO - VCC



PO,THD - VIN

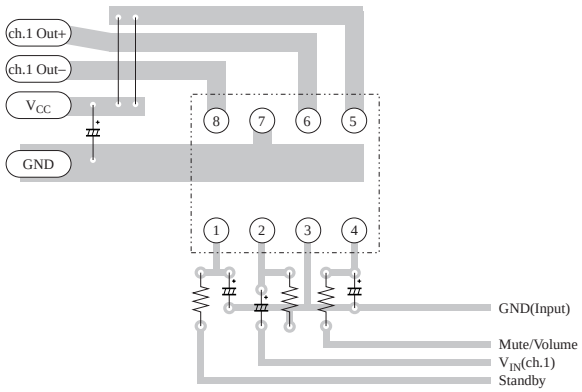


■ Package Power Dissipation



1) AN7511:R_{thj-a}=148°C/W,P_D=845mW(25°C)
2) AN7511S:R_{thj-a}=209.3°C/W,P_D=597mW(25°C)
Glass epoxy PCB(50mm×50mm×t0.8mm)
3) AN7511S:R_{thj-a}=326.6°C/W,P_D=383mW(25°C)

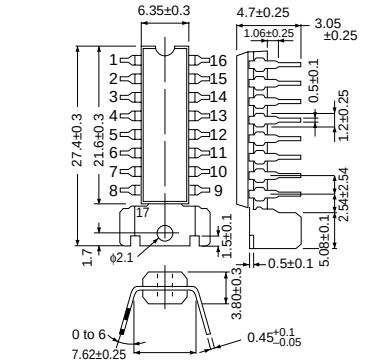
■ Printed Board Circuit Layout



AN7512, AN7512S

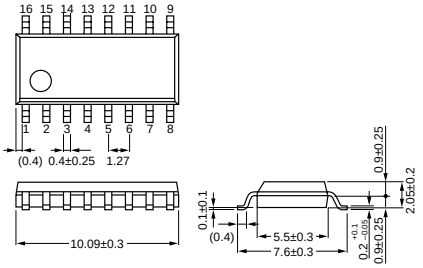
Dual 0.5,1W BTL Audio Power Amplifier Circuit

AN7512 Unit : mm



HDIP016-P-0300

AN7512S Unit : mm



SOP016-P-0300

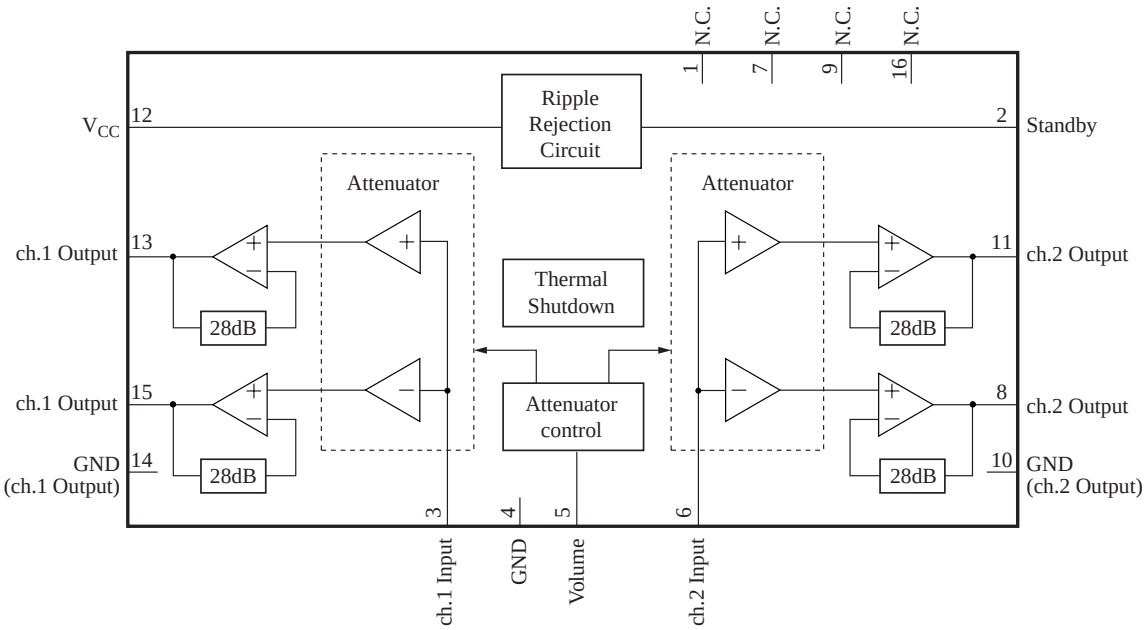
■ Features

- AN7512: Vcc=5V,Output=1W(8Ω)
- AN7512S:Vcc=5V,Output=0.5W(16Ω)
- 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	ºC	1
Operating ambient temperature	T_{opr}	-25 to +70	ºC	1
Supply voltage	V_{CC}	14	V	2
Supply current	I_{CC}	2.0	A	
Power dissipation	P_D	AN7512 1127 AN7512S 236	mW	Ta=70ºC

Note1) Ta=25ºC except storage temperature and operating ambient temperature.
Note2) At no-signal.

■ Operating Supply Voltage Range

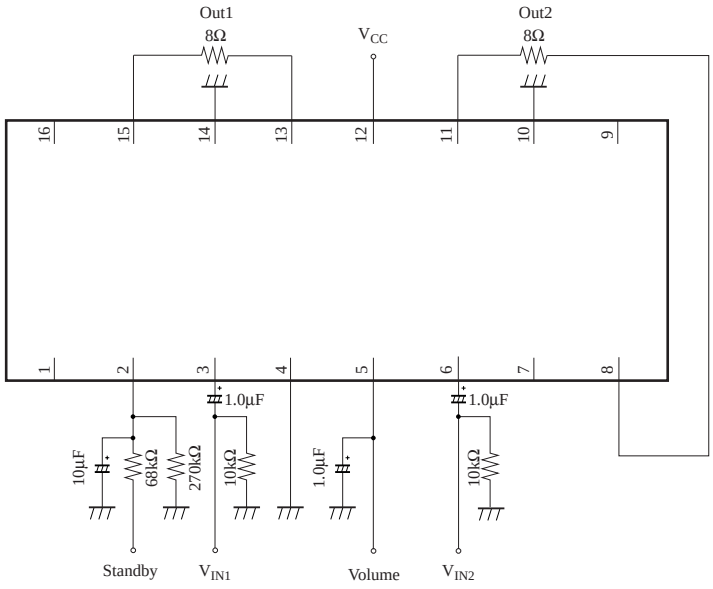
Operating supply voltage range	Vcc	3.5V to 13.5V

■ Electrical Characteristics (Vcc=5.0V,RL=8Ω,freq=1kHz,Ta=25ºC ±2 ºC)

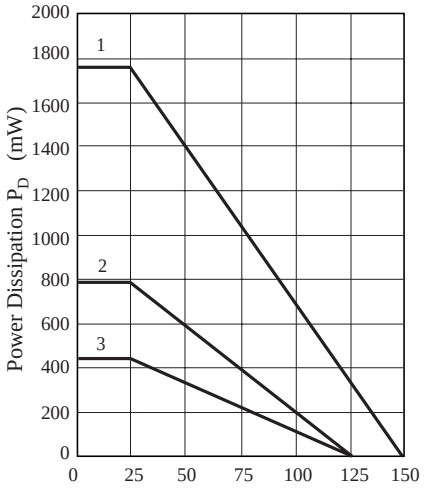
Parameter	Symbol	Condition	min.	typ.	max.	Unit	Note
Quiescent current	ICQ	VIN=0mV,Vol.=0V	–	35	100	mA	
Standby current	ISTB	VIN=0mV,Vol.=0V	–	1	10	μA	
Output noise voltage	VNO	Rg=10kΩ,Vol.=0V	–	0.10	0.4	mVrms	1
Voltage gain	GV	PO=0.25W,Vol.=1.25V	32	34	36	dB	
Total harmonic distortion	THD	PO=0.25W,Vol.=1.25V	–	0.10	0.5	%	
Maximum power output	PO	THD=10%,Vol.=1.25V	0.8	1.1	–	W	
Ripple rejection ratio	RR	Rg=10kΩ,Vol.=0V Vr=0.5Vrms,fr=120Hz	30	50	–	dB	1
Output offset voltage	Voff	Rg=10kΩ,Vol.=0V	-250	0	250	mV	
Maximum attenuation	Att	PO=0.25W,Vol=0V	70	90	–	dB	1
Input impedance	ZI	VIN=±0.3VDC	24	30	36	kΩ	
Channel balance1	CB1	PO=0.25W,Vol=1.25V	-1	0	1	dB	
Channel balance2	CB2	PO=0.25W,Vol=0.6V	-3	0	3	dB	
Center voltage gain	GVM	PO=0.25W,Vol=0.6V	22	25	28	dB	
Channel crosstalk	CT	PO=0.25W,Vol=1.25V	40	55	–	dB	

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

■ Application Circuit

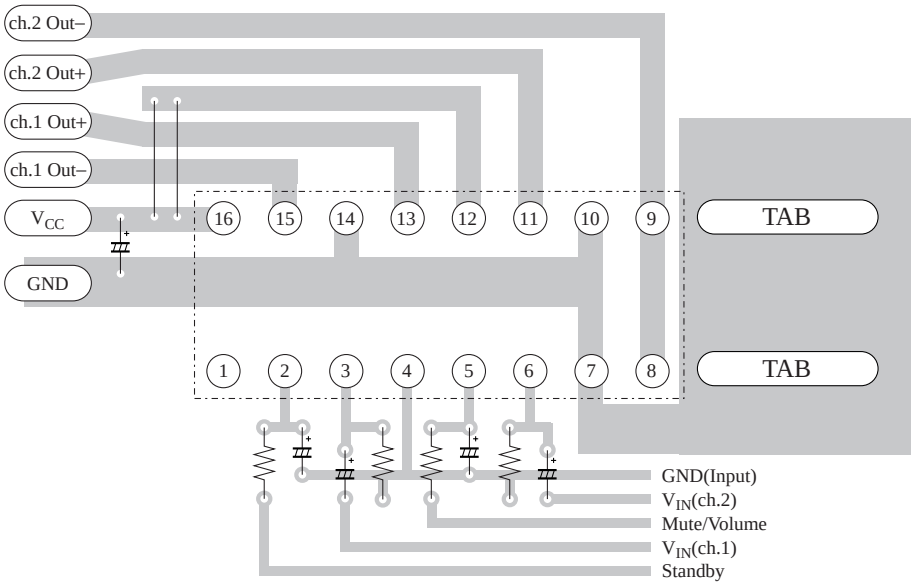


■ Package Power Dissipation



1) AN7512:R_{thj-a}=71°C/W,P_D=1761mW(25°C)
2) AN7512S:R_{thj-a}=127°C/W,P_D=787mW(25°C)
Glass epoxy PCB(75mm×75mm×t0.8mm)
3) AN7512S:R_{thj-a}=233°C/W,P_D=429mW(25°C)

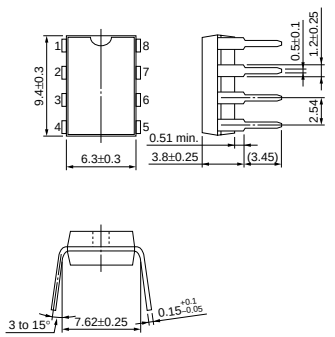
■ Printed Board Circuit Layout



AN7513, AN7513S

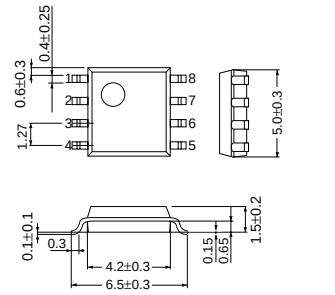
0.5,1W BTL Audio Power Amplifier Circuit

AN7513 Unit : mm



DIP008-P-0300B

AN7513S Unit : mm



SOP008-P-0225A

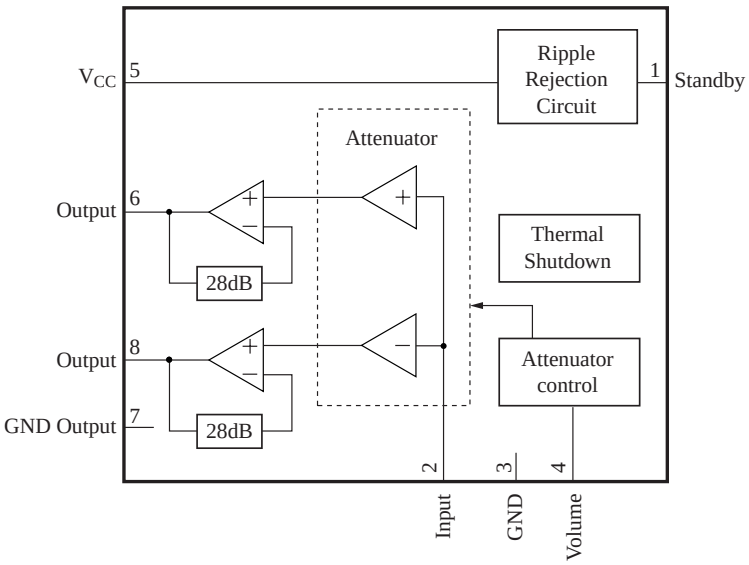
■ Features

- AN7513: Vcc=5V,Output=1W(8Ω)
- AN7513S:Vcc=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	ºC	1
Operating ambient temperature	T_{opr}	-25 to +70	ºC	1
Supply voltage	V_{CC}	14	V	2
Supply current	I_{CC}	1.0	A	
Power dissipation	P_D	AN7513 541 AN7513S 245	mW	Ta=70ºC

Note1) Ta=25ºC except storage temperature and operating ambient temperature.
Note2) At no-signal.

■ Operating Supply Voltage Range

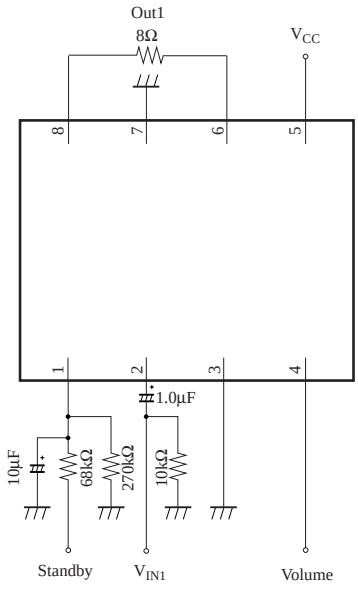
Operating supply voltage range	Vcc	3.5V to 13.5V

■ Electrical Characteristics (Vcc=5.0V,RL=8Ω,freq=1kHz,Ta=25ºC ±2 ºC)

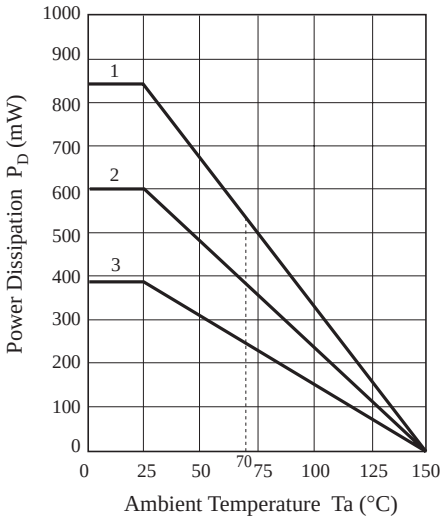
Parameter	Symbol	Condition	min.	typ.	max.	Unit	Note
Quiescent current	ICQ	VIN=0mV,Vol.=0V	–	20	60	mA	
Standby current	ISTB	VIN=0mV,Vol.=0V	–	1	10	μA	
Output noise voltage	VNO	Rg=10kΩ,Vol.=0V	–	0.10	0.4	mVrms	1
Voltage gain	GV	PO=0.25W,Vol.=2.5V	31	33	35	dB	
Total harmonic distortion	THD	PO=0.25W,Vol.=2.5V	–	0.10	0.5	%	
Maximum power output	PO	THD=10%,Vol.=2.5V	0.7	1.0	–	W	
Ripple rejection ratio	RR	Rg=10kΩ,Vol.=0V Vr=1.0Vrms,fr=120Hz	30	50	–	dB	1
Output offset voltage	Voff	Rg=10kΩ,Vol.=0V	-250	0	250	mV	
Maximum attenuation	Att	PO=0.25W,Vol=0V	70	85	–	dB	1
Center voltage gain	GVM	PO=0.25W,Vol=0.1.25V	20.5	23.5	26.5	dB	

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

■ Application Circuit

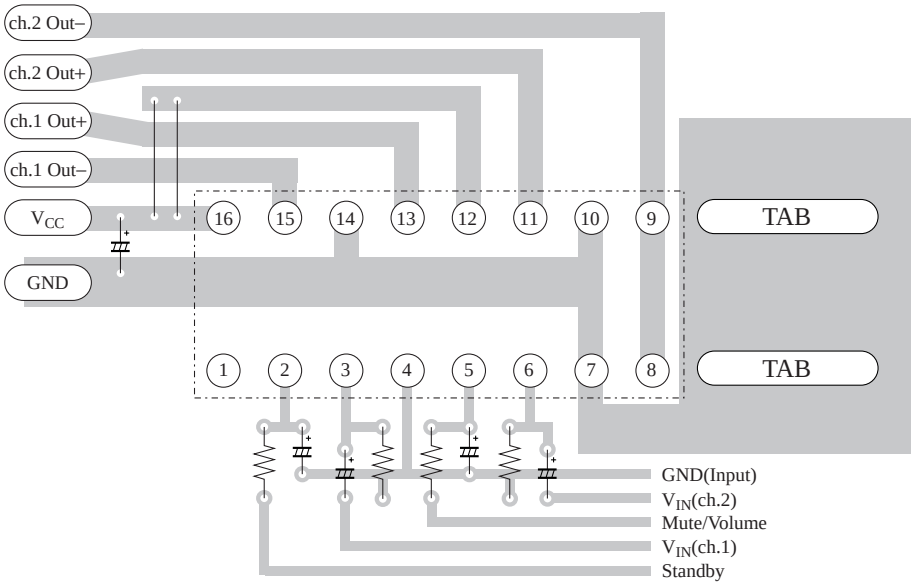


■ Package Power Dissipation



1) AN7513:$R_{thj\text{-}a}$=148°C/W,P_D=845mW(25°C)
2) AN7513S:$R_{thj\text{-}a}$=209.3°C/W,P_D=597mW(25°C)
Glass epoxy PCB(50mm×50mm×t0.8mm)
3) AN7513S:$R_{thj\text{-}a}$=326.6°C/W,P_D=383mW(25°C)

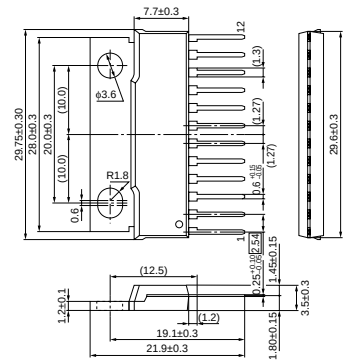
■ Printed Board Circuit Layout



AN7522

Dual 3W BTL Audio Power Amplifier Circuit

Unit : mm



HSIP012-P-0000A

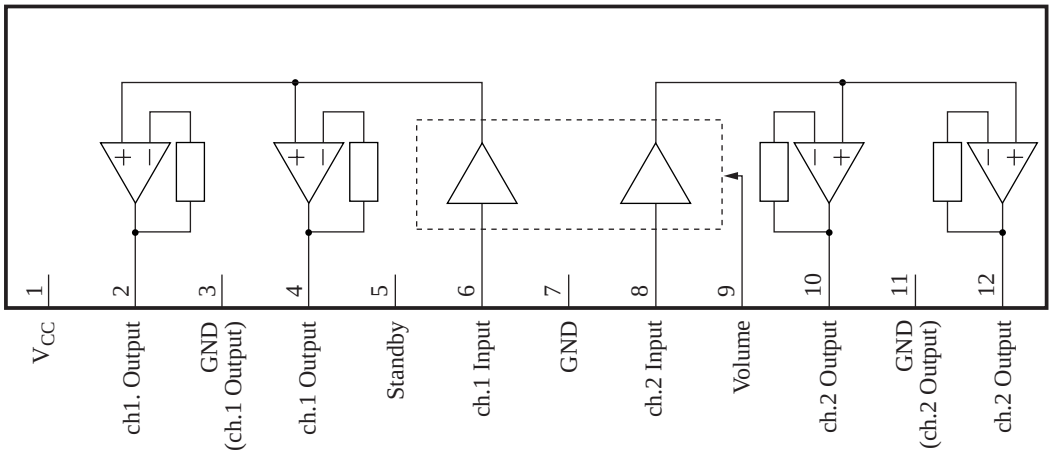
■ Features

- Vcc=8V,Output=3W(8Ω)
- 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(Intput)
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	ºC	1
Operating ambient temperature	T_{opr}	-25 to +70	ºC	1
Supply voltage	V_{CC}	14	V	2
Supply current	I_{CC}	2.0	A	
Power dissipation	P_D	1920	mW	Ta=70ºC

Note1) Ta=25ºC except storage temperature and operating ambient temperature.
Note2) At no-signal.

■ Operating Supply Voltage Range

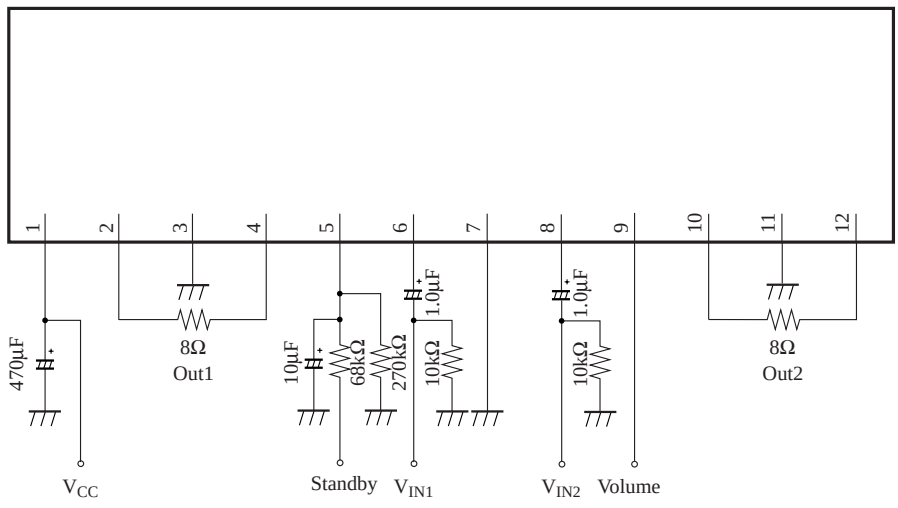
Operating supply voltage range	Vcc	3.5V to 13.5V

■ Electrical Characteristics (Vcc=5.0V,R_L=8Ω,freq=1kHz,Ta=25°C ±2 °C)

Parameter	Symbol	Condition	min.	typ.	max.	Unit	Note
Quiescent current	I_{CQ}	V_{IN}=0mV,Vol.=0V	–	45	100	mA	
Standby current	I_{STB}	V_{IN}=0mV,Vol.=0V	–	1	10	μA	
Output noise voltage	V_{NO}	Rg=10kΩ,Vol.=0V	–	0.10	0.4	mVrms	1
Voltage gain	G_V	P_O=0.25W,Vol.=1.25V	32	34	36	dB	
Total harmonic distortion	THD	P_O=0.25W,Vol.=1.25V	–	0.10	0.5	%	
Maximum power output	P_O	THD=10%,Vol.=1.25V	2.4	3.0	–	W	
Ripple rejection ratio	RR	Rg=10kΩ,Vol.=0V Vr=0.5Vrms,fr=120Hz	30	50	–	dB	1
Output offset voltage	V_{off}	Rg=10kΩ,Vol.=0V	-250	0	250	mV	
Maximum attenuation	Att	P_O=0.25W,Vol=0V	70	90	–	dB	1
Input impedance	Z_I	V_{IN}=±0.3V_{DC}	24	30	36	kΩ	
Channel balance1	CB1	P_O=0.25W,Vol=1.25V	-1	0	1	dB	
Channel balance2	CB2	P_O=0.25W,Vol=0.6V	-3	0	3	dB	
Center voltage gain	G_{VM}	P_O=0.25W,Vol=0.6V	21	24	27	dB	
Channel crosstalk	CT	P_O=0.25W,Vol=1.25V	44	55	–	dB	

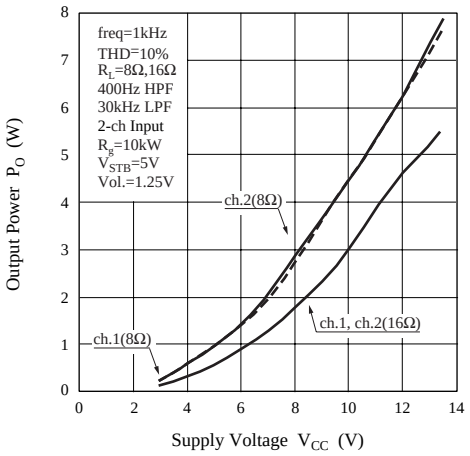
Note1) For this measurement,use the filter <Bandwidth:15Hz to 30kHz(12dB/octave)>

■ Application Circuit

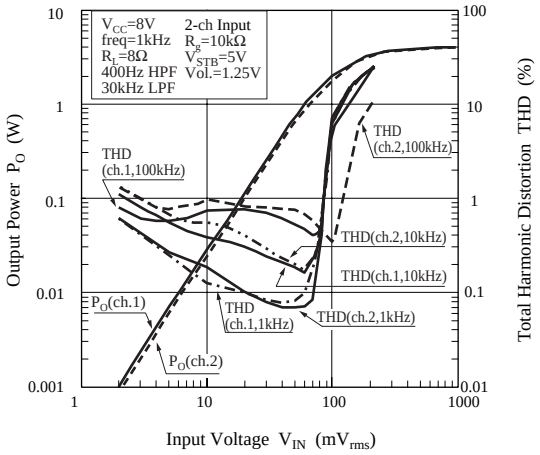


■ Characteristic Curve

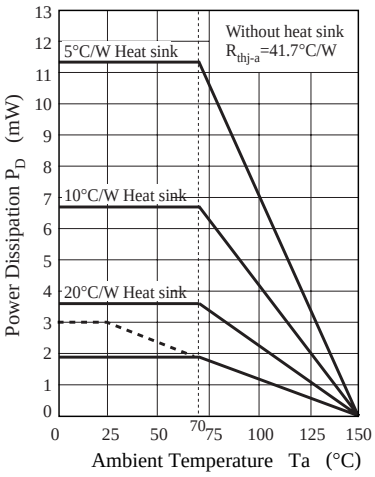
PO - VCC



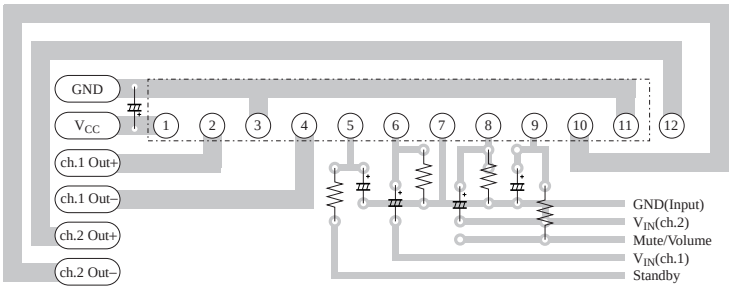
PO,THD - VIN



■ Package Power Dissipation



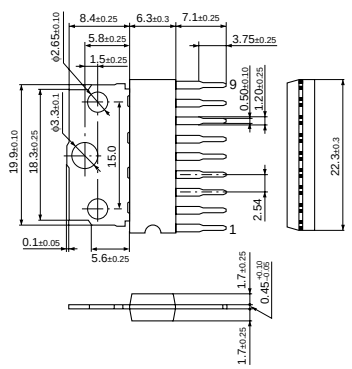
■ Printed Board Circuit Layout



AN7523

3W BTL Audio Power Amplifier Circuit

AN7523 Unit : mm



HSIP099-P-0000

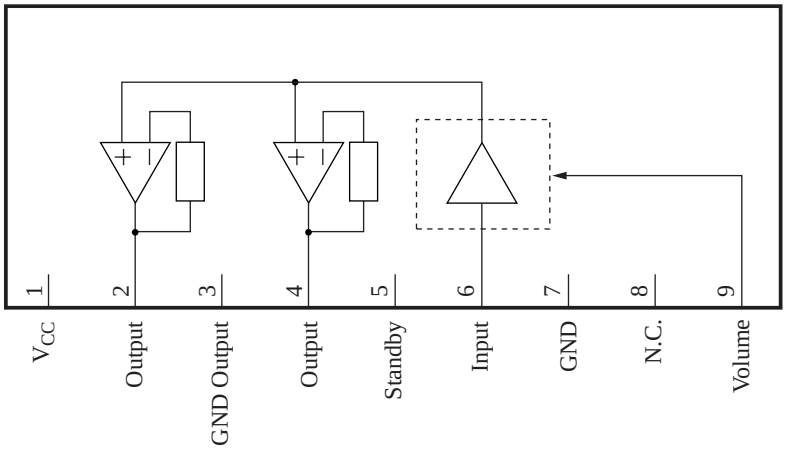
■ Features

- Vcc=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	ºC	1
Operating ambient temperature	T_{opr}	-25 to +70	ºC	1
Supply voltage	V_{CC}	14	V	2
Supply current	I_{CC}	1.0	A	
Power dissipation	P_D	1220	mW	Ta=70ºC

Note1) Ta=25ºC except storage temperature and operating ambient temperature.
Note2) At no-signal.

■ Operating Supply Voltage Range

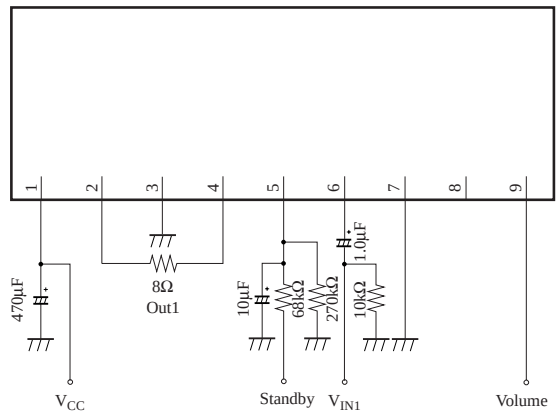
Operating supply voltage range	Vcc	3.5V to 13.5V

■ Electrical Characteristics (Vcc=5.0V,RL=8Ω,freq=1kHz,Ta=25ºC ±2 ºC)

Parameter	Symbol	Condition	min.	typ.	max.	Unit	Note
Quiescent current	ICQ	VIN=0mV,Vol.=0V	–	25	60	mA	
Standby current	ISTB	VIN=0mV,Vol.=0V	–	1	10	μA	
Output noise voltage	VNO	Rg=10kΩ,Vol.=0V	–	0.10	0.4	mVrms	1
Voltage gain	GV	PO=0.25W,Vol.=1.25V	31	33	35	dB	
Total harmonic distortion	THD	PO=0.25W,Vol.=1.25V	–	0.10	0.5	%	
Maximum power output	PO	THD=10%,Vol.=1.25V	2.4	3.0	–	W	
Ripple rejection ratio	RR	Rg=10kΩ,Vol.=0V Vr=0.5Vrms,fr=120Hz	30	50	–	dB	1
Output offset voltage	Voff	Rg=10kΩ,Vol.=0V	-250	0	250	mV	
Maximum attenuation	Att	PO=0.5W,Vol=0V	70	85	–	dB	1
Center voltage gain	GVM	PO=0.5W,Vol=0.6V	20.5	23.5	26.5	dB	
Standby terminal current	ISTB	VIN=0mV,VSTB=3V	–	–	25	μA	
Volume terminal current	Ivol	VIN=0mV,Vol=0V	-12	–	–	μA	

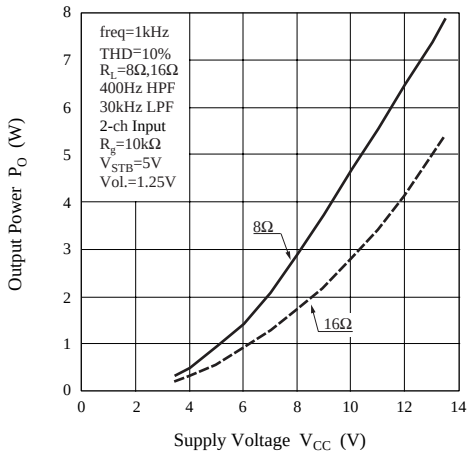
Note1) For this measurement,use the filter <Bandwidth:15Hz to 30kHz(12dB/octave)>

■ Application Circuit

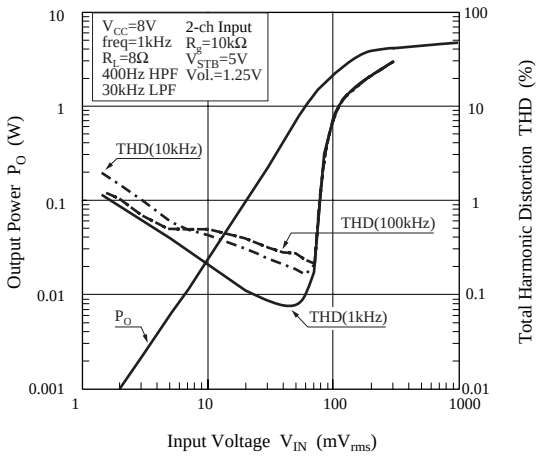


■ Characterristic Curve

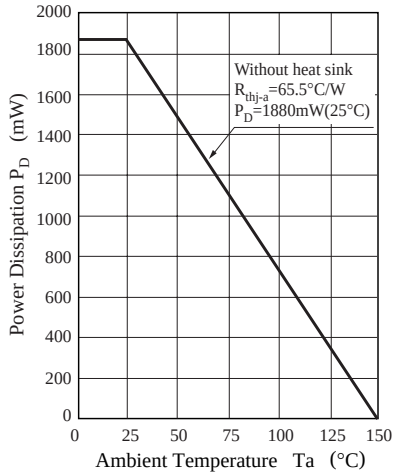
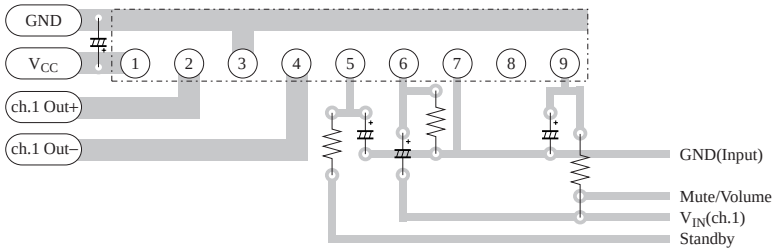
PO - VCC



PO,THD - VIN



■ Package Power Dissipation



■ Printed Board Circuit Layout