

## Head phone amplifier IC AN7535NSA

### Overview

The AN7535NSA is an audio signal processing IC in which line amplifier and beep circuit are built-in in a head phone amplifier for portable equipment. As the head phone output circuit has adopted the Center Amplifier System which needs no coupling capacitor, it is the most suitable for streamlining audio-circuit.

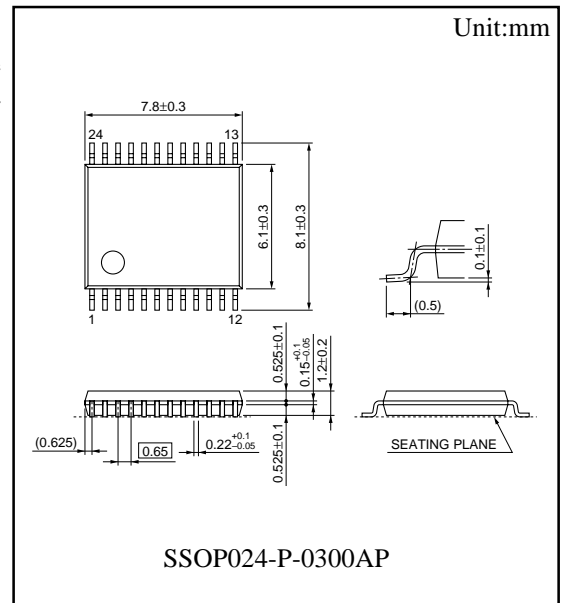
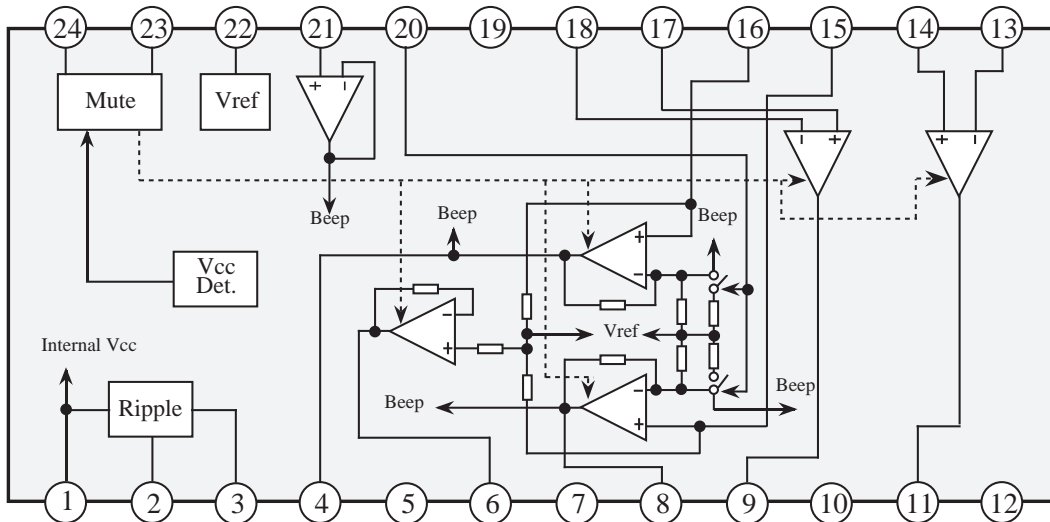
### Features

- The output coupling capacitor useless.  
(Center Amplifier System)
- Built-in line amplifier.
- Built-in head phone amplifier gain switch circuit.(8dB/12dB)
- Built-in mute circuit .
- Built-in beep circuit.
- Built-in power outage shock sound countermeasure circuit.

### Applications

- CD,MD,Portable audio equipment.

### Block Diagram



† 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.

## ■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit	Note
Storage temperature	T <sub>stg</sub>	-55 to +125	°C	1
Operating ambient temperature	T <sub>opr</sub>	-20 to +75	°C	1
Supply voltage	V <sub>cc,LineVcc</sub>	7	V	
Supply current	I <sub>cc</sub> Line I <sub>cc</sub>	200 20	mA	
Power dissipation	PD	370	mW	2

Note 1) T<sub>a</sub>=25°C except storage temperature and operating ambient temperature.

Note 2) PD is T<sub>a</sub>=75°C, When mounted onto the glass epoxy PCB(50mm×50mm×0.8mm).

## ■ Recommended Operating Range

Operating supply voltage range	V <sub>cc,Line Vcc</sub>	1.8V to 3.4V
--------------------------------	--------------------------	--------------

## ■ Electrical Characteristics(V<sub>cc</sub>=2.6V,Line V<sub>cc</sub>=2.8V,T<sub>a</sub>=25°C±2°C unless otherwise specified.)

Parameter	Symbol	Condition	min	typ	max	Unit	Note
Quiescent current (1)	IC <sub>Qm</sub>	Mute ON	0.7	1.55	3.0	mA	
Quiescent current (2)	IC <sub>Q1</sub>	No signal,3-pin current	2.2	5.0	8.8	mA	
Quiescent current (3)	IC <sub>Q2</sub>	No signal,10-pin current	0.4	1.05	2.0	mA	
Head phone amplifier							
Voltage gain (1)	GV <sub>1</sub>	f=1kHz,V <sub>O</sub> =0.35V <sub>rms</sub>	10.0	11.5	13.0	dB	
Voltage gain (2)	GV <sub>2</sub>	f=1kHz,V <sub>O</sub> =0.35V <sub>rms</sub>	6.0	7.5	9.0	dB	
Channel balance	CB	f=1kHz,V <sub>O</sub> =0.35V <sub>rms</sub>	-1	0	1	dB	1
Total harmonic distortion	THD	f=1kHz,V <sub>O</sub> =0.35V <sub>rms</sub>	–	0.07	0.3	%	1
Maximum power output	P <sub>O</sub>	f=1kHz,THD=10%	20	30	–	mW	1
Output noise voltage	V <sub>NO</sub>	R <sub>g</sub> =10kΩ,A curve filter	–	-102	-90	dBm	1
Crosstalk	CT	f=1kHz,V <sub>O</sub> =0.35V <sub>rms</sub> ,30kHzLPF	40	46	–	dB	1
Ripple rejection ratio	RR	VR=100Hz,0.1V <sub>rms</sub>	60	70	–	dB	1
Output mute Att.	V <sub>mute</sub>	f=1kHz,V <sub>in</sub> =-15dBm,30kHzLPF	70	96	–	dB	1
Beep sound output	V <sub>Obeep</sub>	f=1kHz,V <sub>in</sub> =2.2dBm,sine wave	5	10	15	mV <sub>p-p</sub>	1,2

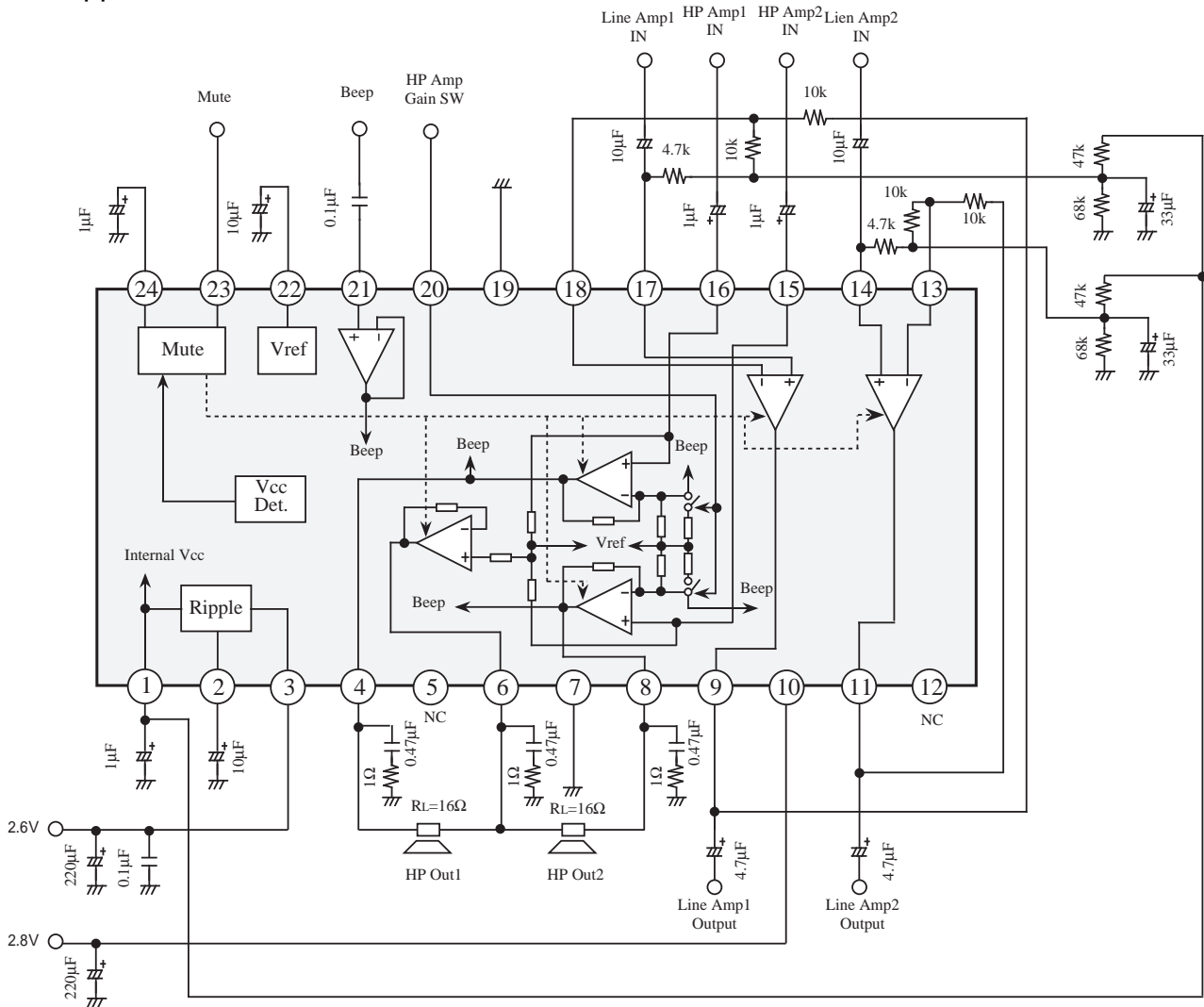
Note1) Gain setting condition of voltage gain (2)

Note2) A condition of both mute ON/OFF .

■ Electrical Characteristics(Ta=25°C±2°C unless otherwise specified.)

Parameter	Symbol	Condition	min	typ	max	Unit	Note
Line amplifier	GVL						
Voltage gain	THDL	Vin=1kHz,-6dBm,RL=10kΩ	5.0	6.0	7.0	dB	
Total harmonic distortion	CTL	Vin=1kHz,-6dBm RL=10kΩ,30kHzLPF	–	0.003	0.03	%	
Output noise voltage	VNOL	Rg=10kΩ,A curve filter	–	-104	-98	dB	
Crosstalk	CTL	Vin=1kHz,-6dBm RL=10kΩ,30kHzLPF	85	95	–	dB	
Line mute Att.	VmuteL	f=1kHz,Vin=-15dBm,30kHzLPF	70	80	–	dB	
Mute ON voltage	VmON	23-Pin voltage	–	–	0.5	V	
Mute OFF voltage	VmOFF	23-Pin voltage	2.2	–	–	V	
Gain select SW ON voltage	VgON	Gv=10 to 13dB, 20-pin voltage	–	–	0.5	V	
Gain select SW OFF voltage	VgOFF	Gv=6.0 to 9.0dB, 20-pin voltage	2.2	–	–	V	

## Application circuit



## Pin Descriptions

No.	Function	No.	Function
1	Constant supply voltage	13	Line amplifier-2 NF terminal
2	Ripple filter	14	Line amplifier-2 input terminal
3	Head phone amplifier supply voltage	15	Head phone amplifier-1 input terminal
4	Head phone amplifier-1 output	16	Head phone amplifier-2 input terminal
5	NC	17	Line amplifier-1 input terminal
6	Center amplifier output	18	Line amplifier-1 NF terminal
7	Power GND,Output GND	19	Pre GND,Input GND
8	Head phone amplifier-2 output	20	Head phone amplifier select SW
9	Line amplifier-1 output	21	Beep sound signal input
10	Line amplifier supply voltage	22	Reference voltage
11	Line amplifier-2 output	23	Mute input terminal
12	NC	24	Mute time constant setting