内置高效率自适应电荷泵升压，防削顶失真功能，D/AB切换的5.2W单声道音频功率放大器

■ 特点

- 4种防削顶失真功能(Anti-Clipping Function, ACF)
- 自适应电荷泵升压功能
- 内部固定28dB增益
- 输出功率
  - 5.2W (V_{BAT}=4.2V, R_L=4Ω, THD+N=10%)
  - 4.0W (V_{BAT}=3.7V, R_L=4Ω, THD+N=10%)
  - 3.0W (V_{BAT}=3.3V, R_L=4Ω, THD+N=10%)
- 效率
  - 84% (V_{BAT}=3.7V, R_L=4Ω, 0.4W)
  - 75% (V_{BAT}=3.7V, R_L=4Ω, 2W)
- 电源
  - -升压输入V_{BAT}：2.7V至5.5V
  - -升压输出CPOUT：6.4V
- 静态工作电流：3mA
- 关断电流：<1uA
- AB/D类可切换
- 免滤波器数字调制，直接驱动扬声器
- 保护功能:过流/过热/欠压异常保护功能
- 无铅封装， SOP16L-PP, QFN16L-PP

■ 应用

- 智能音响
- 无线音响
- 便携式音频设备
- 智能手机

■ 概述

HT8310是一款D类音频功率放大器，在V_{BAT}=4.2V、THD+N=10%，4Ω负载条件下能连续输出5.2W功率。该D类功放的电源电压由内置的自适应电荷泵升压模块提供。该升压模块在低功率时不升压，可有效提升电池的播放时间。

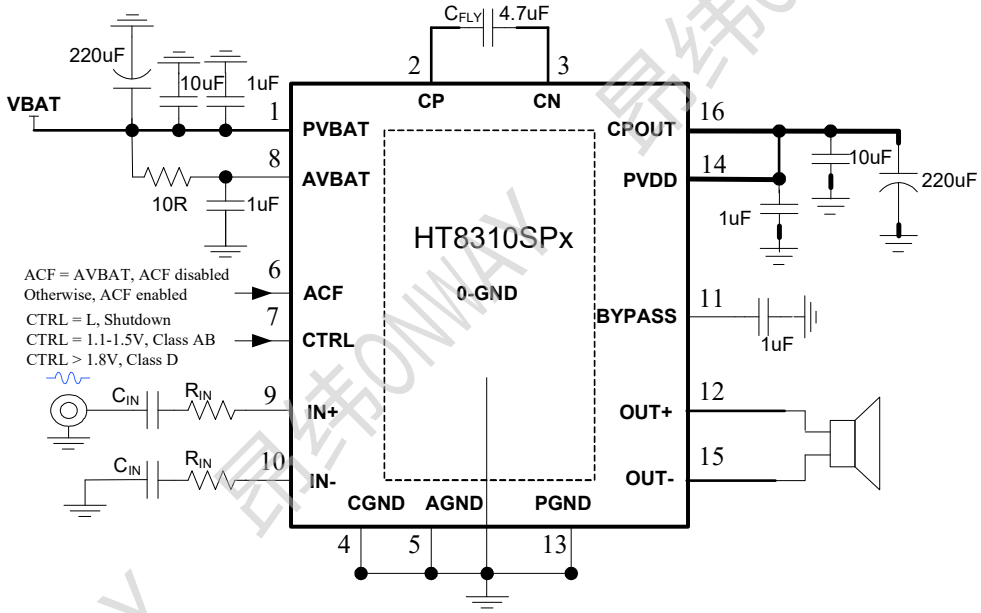
HT8310的最大特点是防削顶失真（ACF）输出控制功能，可检测并抑制由于输入音乐、语音信号幅度过大所引起的输出信号削顶失真（破音），也能自适应地防止在升压电压下降所造成的输出削顶，显著提高音质，创造非常舒适的听音享受，并保护扬声器免受过载损坏。其具有4种不同的ACF模式，可针对不同应用场合。同时芯片还具有ACF-Off 模式。

HT8310具有AB类和D类的自由切换功能，在受到D类功放EMI干扰困扰时，可随时切换至AB类音频功放模式（此时电荷泵升压功能关闭）。

HT8310内部集成免滤波器数字调制技术，能够直接驱动扬声器，并最大程度减小脉冲输出信号的失真和噪音。输出无需滤波网络，极少的外部元器件节省了系统空间和成本，是便携式应用的理想选择。

此外，HT8310内部固定28dB增益，内置的关断功能使待机电流最小化，还集成了输出端过流保护、片内过温保护和电源欠压异常保护等功能。

■ 典型应用图



5.2W Anti-Clipping Mono Class D/AB Audio Amplifier with Adaptive Charge Pump Regulator

■ FEATURE

- 4 modes of Anti-Clipping Function (ACF)
- Adaptive Charge Pump Regulator
- Maximum Voltage Gain: 28dB
- Output Power
  - 5.2W (V_{BAT}=4.2V, R_L=4Ω, THD+N=10%)
  - 4.0W (V_{BAT}=3.7V, R_L=4Ω, THD+N=10%)
  - 3.0W (V_{BAT}=3.3V, R_L=4Ω, THD+N=10%)
- Efficiency
  - 84% (V_{BAT} = 3.7V, R_L = 4 Ω, Po = 0.4W)
  - 75% (V_{BAT} = 3.7V, R_L = 4 Ω, Po = 2.0W)
- Power Supply
  - -Input V_{BAT}：2.7V to 5.5V
  - -Output CPOUT：6.4V
- Quiescent Current: 3mA
- Shutdown Current: <1uA
- Class AB / Class D selectable
- Filter-less Modulation, Eliminating Output Filter
- Over Current Protection, Thermal Protection, Low voltage malfunction prevention function included
- Pb-Free Packages , SOP16L-PP, QFN16L-PP

■ APPLICATIONS

- Smart Speakers
- Wireless Speakers
- Portable Audio Devices
- Smart Phones

■ GENERAL DESCRIPTION

HT8310 is a Class D audio amplifier which can deliver continuous 5.2W output power into a 4Ω speaker with 4.2V battery supply when THD+N = 10%. The class D audio amplifier's power supply is adaptively boosted by the integrated charge pump regulator which only works while the output power is big enough. This will significantly extend the playing time in battery supply applications.

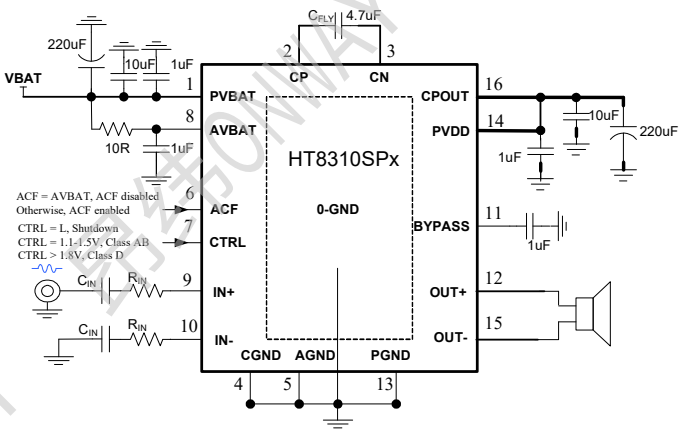
HT8310 features Anti-Clipping Function (ACF) which detects output signal clip due to the over input signal and suppresses the output signal clip automatically. Also, it can adapt the output clip caused by power supply voltage down. It can significantly improve the sound quality, creating a very comfortable musical enjoyment, and to protect the speakers from overload damage. It provides 4 different ACF modes and ACF OFF mode to adjust different applications.

Class AB amplifier mode is also available for HT8310. Once the EMI Interference from class D and Boost Converter becomes an annoying problem, HT8310 can be changed into Class AB mode.

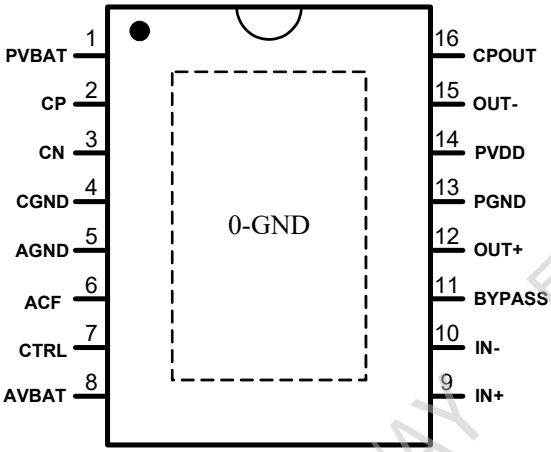
HT8310 has a filter-less modulation circuit which directly drives speakers while realizes low distortion and low noise characteristics. Thanks to filter-less, circuit design with fewer external parts can be made in portable applications.

HT8310 has an internal gain of 28dB and an independent Shutdown function which can minimize the power consumption. As for protection function, over current protection function for speaker output terminals, over temperature protection function, and low supply voltage malfunction preventing function are also prepared.

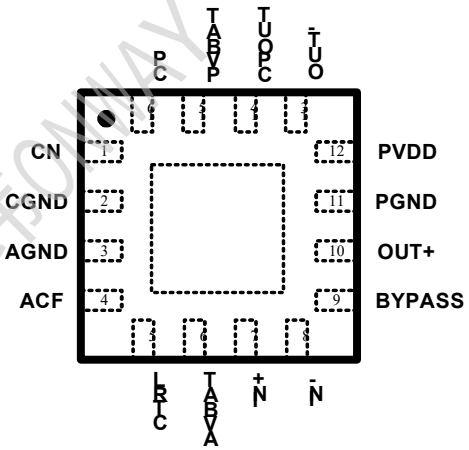
■ TYPICAL APPLICATION



■ TERMINAL CONFIGURATION



HT8310SPx (SOP16L-PP) Top View



HT8310SQx(QFN16L-PP) Top View

■ TERMINAL FUNCTION [1]

SOP Terminal No.	QFN Terminal No.	Name	I/O	ESD Protection	Description
0	/	GND	GND	--	Ground
1	15	PVBAT	POWER	PN	Power supply for the charge pump regulator
2	16	CP	I	PN	Flying capacitor positive terminal
3	1	CN	I	PN	Flying capacitor negative terminal
4	2	CGND	GND	--	Ground for the charge pump regulator
5	3	AGND	GND	--	Analog ground
6	4	ACF	I	PN	ACF selection terminal. ACF is disabled when it is pulled to VBAT directly.
7	5	CTRL	I	PN	Mode selection terminal. When it is pulled low, the device goes into shutdown mode.
8	6	AVBAT	POWER	PN	Analog power supply
9	7	IN+	I	PN	Positive audio input terminal
10	8	IN-	I	PN	Negative audio input terminal
11	9	BYPASS	O	PN	Analog reference terminal, connecting a 1uF capacitor to ground
12	10	OUT+	O	PN	Positive BTL audio output
13	11	PGND	GND	--	Power ground for audio amplifier
14	12	PVDD	POWER	PN	Power supply for audio amplifier
15	13	OUT-	O	PN	Negative BTL audio output
16	14	CPOUT	POWER	PN	Boosted voltage output of the charge pump regulator

■ ORDERING INFORMATION

Part Number	Package Type	Marking	Operating Temperature Range	Container/MOQ
HT8310SPT	SOP16L-PP	HT8310^{SP}	-40℃～85℃	Tube/50PCS
HT8310SPR	SOP16L-PP	HT8310^{SP}	-40℃～85℃	Tape and Reel/2500PCS
HT8310SQR	QFN16L-PP	HT8310^{SQ}	-40℃～85℃	Tape and Reel/5000PCS

[1] I: Input; O: Output