

内置自适应同步升压和防破音功能的5.5W D类及AB类音频功率放大器

5.5W Boosted Class D and Class AB Audio Amplifier

■ FEATURES

- Anti-Clipping Function (ACF)
- Filter-less Modulation, Eliminating Output Filter
- Output Power
 - 3W ($V_{BAT}=3.3V$, $R_L=4\Omega$, $THD+N<1\%$, 20-20kHz full band)
 - 2.0W ($V_{BAT}=3.3V$, $R_L=8\Omega$, $THD+N<1\%$, 20-20kHz full band)
 - 5.5W ($V_{BAT}=4.2V$, $R_L=3\Omega$, $THD+N=10\%$, $f=1kHz$)
- Efficiency: 83% ($V_{BAT} = 4.2V$, $f = 1kHz$, Load = 4ohm+22uH, $P_o = 0.6W$)
- 79% ($V_{BAT} = 4.2V$, $f = 1kHz$, Load = 4ohm+22uH, $P_o = 4W$)
- Power Supply V_{BAT} : 2.7V~5.5V
- Adaptive Sync Boost Converter
 - Extends the playing time in battery supply applications
 - Adjustable switch peak current limit to avoid over-pulling on battery current
- Class AB / Class D
- Over Current Protection, Thermal Protection, Low voltage malfunction prevention function included
- Pb-Free Packages, ESOP10, QFN3×3-16L
- 防削顶失真功能(防破音, Anti-Clipping Function, ACF)
- 免滤波器数字调制, 直接驱动扬声器
- 输出功率
 - 3W ($V_{BAT}=3.3V$, $R_L=4\Omega$, $THD+N<1\%$, 20-20kHz full band)
 - 2.0W ($V_{BAT}=3.3V$, $R_L=8\Omega$, $THD+N<1\%$, 20-20kHz full band)
 - 5.5W ($V_{BAT}=4.2V$, $R_L=3\Omega$, $THD+N=10\%$, $f=1kHz$)
- 效率: 83% ($V_{BAT} = 4.2V$, $f = 1kHz$, Load = 4ohm+22uH, $P_o = 0.6W$)
- 79% ($V_{BAT} = 4.2V$, $f = 1kHz$, Load = 4ohm+22uH, $P_o = 4W$)
- V_{BAT} 供电范围: 2.7V至5.5V
- 高效自适应同步升压功能
 - 延长电池播放时间
 - 可调节最大限流值, 有效防止电池拉死
- AB/D类可切换
- 保护功能:过流/过热/欠压异常保护功能
- 无铅封装, ESOP10, QFN3×3-16L

■ APPLICATIONS

- | | | | |
|----------------------------|---------------------|---------------|---------|
| • Bluetooth/Wi-Fi Speakers | • Portable Speakers | • 蓝牙/ Wi-Fi音箱 | • 便携式音箱 |
| • Smart speakers | • Smart Home | • 智能音箱 | • 智能家居 |

■ DESCRIPTION

HT8513, HT8515, integrated with adaptive sync boost converter, is a mono Class D audio amplifier that drives up to continuous 3W (<1% THD+N, 20-20kHz full band) into 4ohm speaker and 5.5W (10% THD+N, 1kHz) into 3ohm speaker from a Li-battery voltage. It also integrates Class AB amplifier.

The built-in sync boost converter generates a supply voltage of 6.2V for the audio amplifier. The boost converter is adaptive and is automatically active only when the peak output audio signal exceeds a preset voltage threshold, which is optimized to prevent clipping while maximizing system efficiency.

HT8513, HT8515 features Anti-Clipping Function (ACF) which detects output signal clip due to the over input signal and suppresses the output signal clip automatically. Also, the ACF function can adapt the output clip caused by power supply voltage down with battery. It can significantly improve the sound quality, creating a very comfortable musical enjoyment, and to protect the speakers from overload damage.

Class AB amplifier mode is also available for HT8513, HT8515. Once the EMI Interference from class D and Boost Converter becomes an annoying problem, HT8513 can be changed into Class AB mode.

HT8513, HT8515 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.

As for protection function, over current protection function for speaker output terminals, over temperature protection function are also prepared.

HT8513, HT8515是一款内置自适应同步升压的单声道D类音频功率放大器，由锂电池供电时，THD+N<1%、20-20kHz全频段信号条件下，能连续输出3W功率（4Ω负载），THD+N=10%、1kHz信号下，能连续输出5.5W功率（3Ω负载）；另外，其还支持AB类模式。

HT8513, HT8515内置的同步升压，提供6.2V输出电压给功放。其小音乐信号时不升压，仅当功率较大时，才升压给D类功放，其可大幅提高系统效率，延长电池续航时间。

HT8513, HT8515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BOOST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。

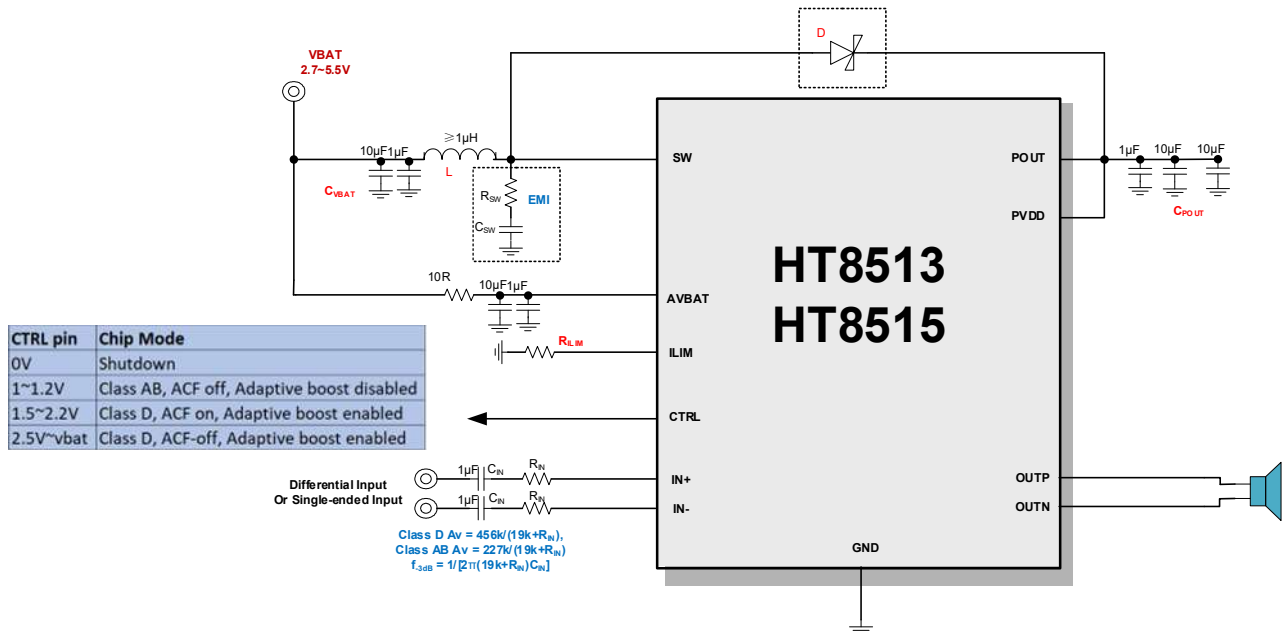
HT8513, HT8515具有AB类和D类的自由切换功能，在受到D类功放EMI干扰困扰时，可随时切换至AB类音频功放模式。

HT8513, HT8515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，HT8513, HT8515集成了输出端过流保护、片内过温保护等功能。

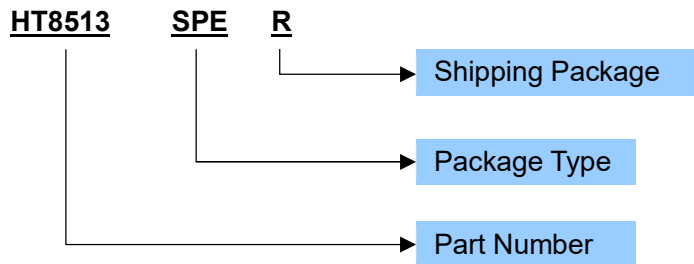
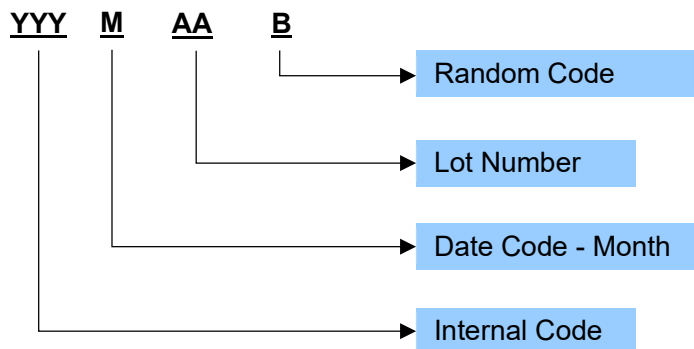
■ TYPICAL APPLICATION

Typical Application	R_{ILIM}	I_{PEAK}	L	D	C_{BAT}	C_{POUT}
3ohm Load	82k	4.5A	4.7uH	SS32	1uF//10uF//100uF	1uF//10uF//470uF
4ohm Load, $P_o > 3W$, $THD+N > 1\%$	82k-100k	3.5-3.8A	1uH-4.7uH	SS32	1uF//10uF	1uF//10uF//220uF
4ohm Load, $P_o \leq 3W$, $THD+N < 1\%$	110k	3.5A	1uH	NC	1uF//10uF	1uF//10uF//10uF
8ohm Load	200k	2.2A	1uH	NC	1uF//10uF	1uF//10uF

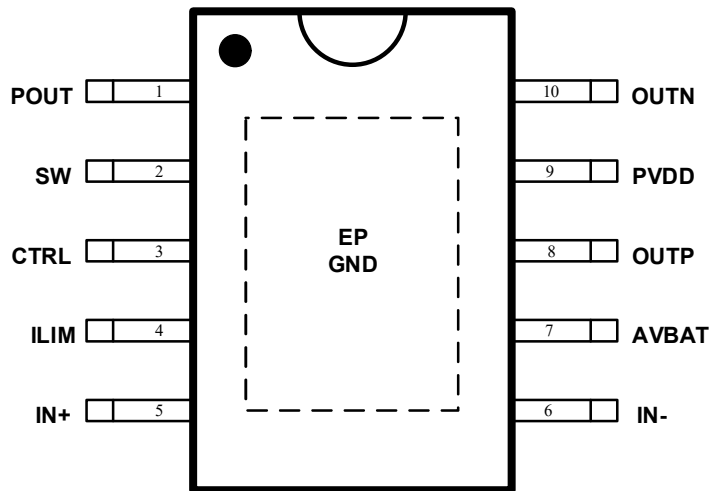


ORDERING INFORMATION

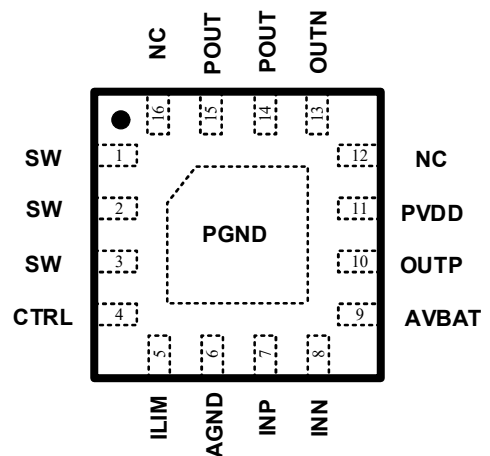
Ordering Number	Package Type	Marking	Operating Temperature Range	Shipping Package / MOQ
HT8513SPER	ESOP10 (SPE)	HT8513 YYMAAB ¹	-40℃～85℃	Tape and Reel (R) / 2500pcs
HT8515SQER	QFN3×3-16L(SQE)	HT8515 YYMAAB	-40℃～85℃	Tape and Reel (R) / 5000pcs

Ordering Number

Production Tracking Code

¹ YYMAAB is production tracking code

■ TERMINAL CONFIGURATION



ESOP10(SPE) Top View



QFN3x3-16L(SQE) Top View

■ TERMINAL FUNCTION

Terminal No.		Name	I/O ¹	Description
SPE	SQE			
1	14,15	POUT	P	Boosted output voltage. 升压输出端
2	1,2,3	SW	I	Boost and rectifying switch input. 升压整流开关输入端
3	4	CTRL	I	Mode Control Terminal. 模式控制脚
4	5	ILIM	I	Adjustable switch peak current limit. An external resistor should be connected between this pin and GND. 最大限流值设置端，外部接电阻到地。
5	7	IN+	I	Positive input (differential+) for audio amplifier. 输入负端
6	8	IN-	I	Negative input (differential-) for audio amplifier. 输入正端
7	9	AVBAT	P	Power supply for internal analog circuitry. 模拟电源端
8	10	OUTP	O	Positive pin for differential speaker amplifier. 输出正端
9	11	PVDD	P	Power supply for internal power circuitry. 功率电源
10	13	OUTN	O	Negative pin for differential speaker amplifier. 输出负端
/	12,16	NC	/	No connection. 内部无电气连接
EP	6	AGND	G	Ground for analog circuitry. 模拟电路地
	EP	PGND	G	Ground for power circuitry, and Thermal Pad. A matching ground pad should be provided on the PCB and the device connected to it via solder. 地。

¹ I: Input; O: Output; G: Ground; P: Power;

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