



带音频检测和输出关断的13V, 10A自适应H类同步升压转换器

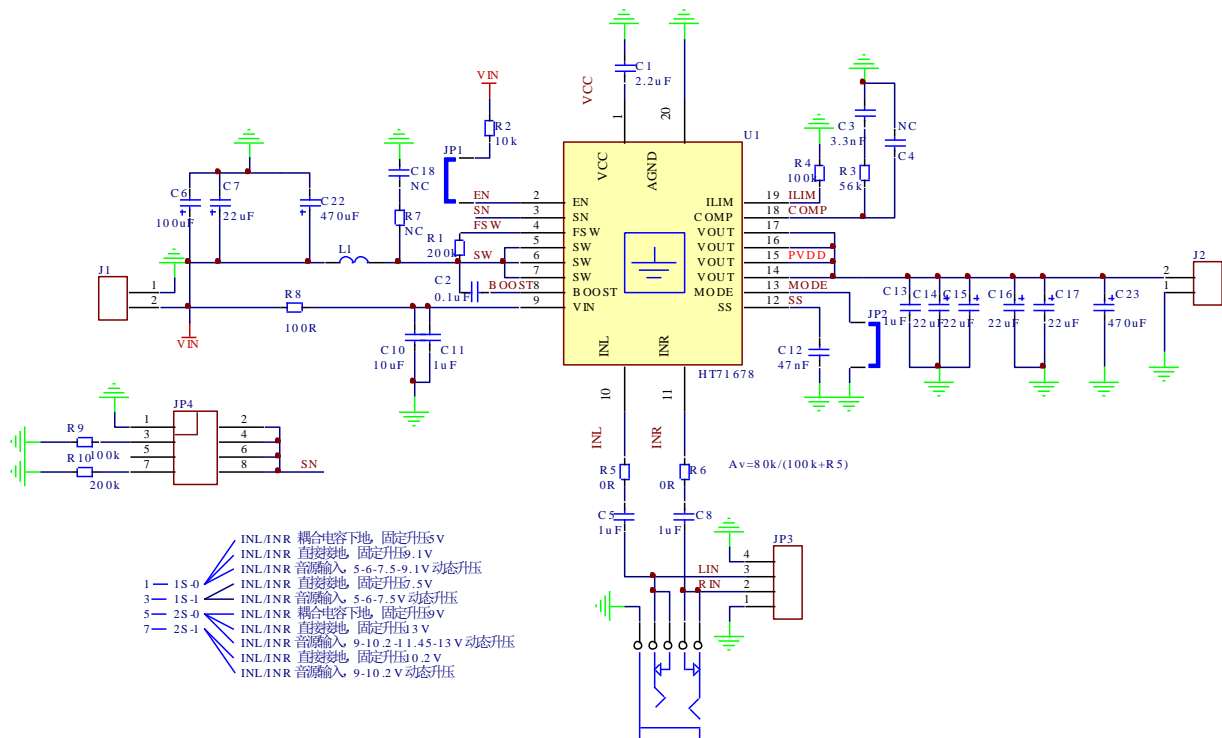
■ 特点

- 输入电压范围 V_{IN} : 2.7V-13V
- 输出电压范围 V_{OUT} : 4.5V-13V
- 可编程峰值电流: 10A
- 高转换效率的自适应H类升压
 - 92% ($V_{IN} = 7.4V, V_{OUT} = 13V, I_{OUT} = 3A$)
 - 92% ($V_{IN} = 3.6V, V_{OUT} = 9.1V, I_{OUT} = 1A$)
 支持单节(1S)和双节串联(2S), 共10种模式
给音频功放供电时, 有效延长电池播放时间
- 轻载条件下两种调制方式: 脉频调制 (PFM) 和强制脉宽调制 (PWM)
- 集成输出关断的栅极驱动
- 低关断功耗, 关断电流1uA
- 可调节的开关频率: 200k-1.4M
- 可编程软启动
- 输出过压 (14V)、逐周期过流、热关断等保护
- DFN20L, 4.5mm*3.5mm 无铅超薄封装

■ 应用

- 无线音箱
- 快充移动电源
- USB TYPE-C 电源传输
- 平板电脑, 笔记本电脑
- 便携式音箱
- 电子烟
- 拉杆音箱
- POS机终端

■ 典型应用图



■ 概述

HT71678是一款高功率、全集成升压转换器, 带有负载关断功能的栅极驱动, 集成16mΩ功率开关管和23mΩ同步整流管, 为便携式系统提供高效的小尺寸解决方案。

HT71678具有2.7V至13V宽输入电压范围, 可为采用单节或两节锂电池的应用提供支持。该器件具备10A开关电流能力, 并且能够提供最高13V的输出电压。

HT71678带有音频信号检测功能, 可根据信号幅度自适应调整升压输出值, 以达到更高的系统整体效率。其支持10种不同的模式选择。

HT71678采用自适应恒定关断时间峰值电流控制拓扑结构来调节输出电压。在中等到重负载条件下, HT71678工作在PWM 模式。在轻负载条件下, 该器件可通过MODE引脚选择下列两种工作模式之一。一种是可提高效率的PFM模式; 另一种是可避免因开关频率较低而引发应用问题的强制PWM模式。PWM模式下, HT71678的开关频率可通过外部电阻调节, 支持200kHz至1.4MHz的范围。

HT71678还支持可编程的软启动, 以及可调节的开关峰值电流限制。另外, HT71678集成了输出关断功能的栅极驱动, 在SD状态, 可完全断开输入电源。

此外, 该器件还提供有14V输出过压保护、逐周期过流保护和热关断保护。



13V,10A Adaptive Class-H Synchronous Boost Converter with Load Disconnect Control and Audio Detection

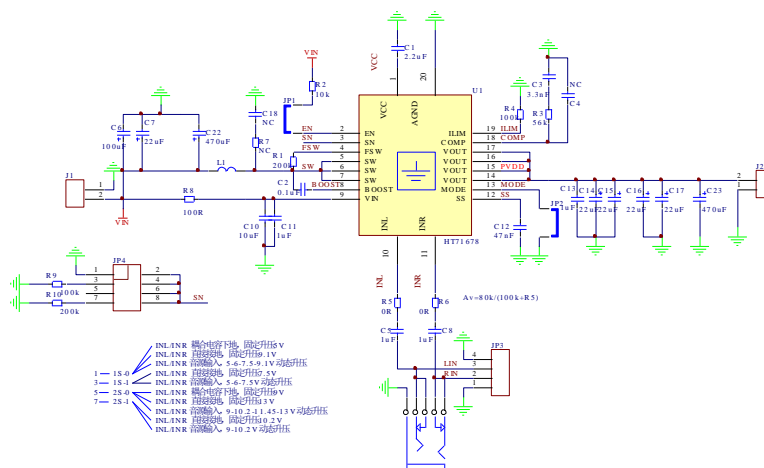
FEATURES

- Input voltage range V_{IN} : 2.7V to 13V
- Output voltage range V_{OUT} : 4.5V to 13V
- Programmable switch peak current limit: up to 10A
- High Efficiency adaptive Class H Boost converter
92% ($V_{IN} = 7.4V, V_{OUT}=13V, I_{OUT} =3A$)
92% ($V_{IN} = 3.6V, V_{OUT}=9.1V, I_{OUT} =1A$)
10 modes with different boost voltage rails that fits one battery or two batteries in series, and extends the battery life in audio applications.
- 2 modulation mode available: PFM or PWM mode at light load
- Integrated gate driver for load disconnect and output short protection
- 1.0 μ A current consumption during shutdown
- Adjustable switching frequency: 200k to 1.4MHz
- Programmable soft start
- Output overvoltage protection (at 14V), cycle-by-cycle overcurrent protection, thermal shutdown protection
- Pb-free Packages,DFN20L, 4.5mm*3.5mm

APPLICATIONS

- Wireless/ Speakers • Portable Speakers
- Quick Charge Power Bank • E-Cigarette
- Power Interface (USB Type-C, Thunderbolt)
- POS Terminal • Tablet PC/Note Book

TYPICAL APPLICATION



DESCRIPTION

The HT71678 is a high-power density, fully integrated synchronous boost converter with a 16m Ω power switch and a 23m Ω rectifier switch to provide a high efficiency and small size solution in portable systems. The HT71678 has wide input voltage range from 2.7 V to 13 V to support applications with single cell and two cell Lithium batteries. The device has 10A switch current capability and can provide an output voltage up to 13V.

HT71678 integrates the audio detection function which will activate the boost converter generate a voltage rail so that the whole efficiency will be improved in audio applications. There are 10 different modes with different voltage rails.

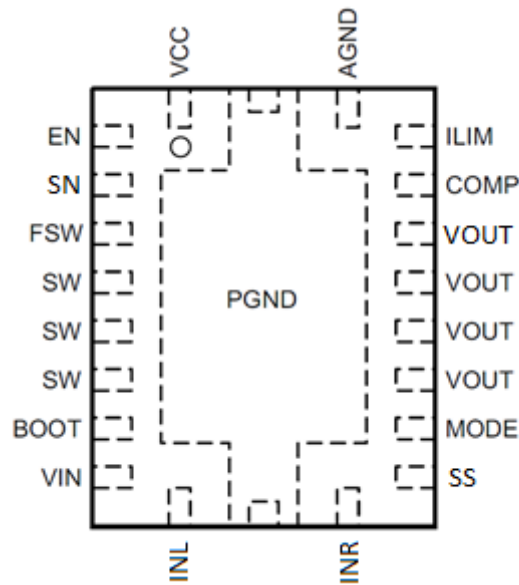
The HT71678 uses adaptive constant off-time peak current control topology to regulate the output voltage. In moderate to heavy load condition, it works in the PWM mode. In light load condition, the device has two operation modes selected by the MODE pin. One is PFM mode to improve the efficiency and another one is the forced PWM mode to avoid application problems caused by low switching frequency. The switching frequency in the PWM mode is adjustable ranging from 200kHz to 1.4MHz by an external resistor.

HT71678 could isolate the output from input side when shut down by a gate drive output disconnecting external FET, so that the load current consumption could be limited.

The HT71678 also implements a programmable soft-start function and an adjustable switching peak current limit function. In addition, the device provides 14V output overvoltage protection, cycle-by-cycle overcurrent protection, and thermal shutdown protection.



■ TERMINAL CONFIGURATION



■ TERMINAL FUNCTION

Terminal No.	NAME	I/O ^{*1}	Description
1	VCC	O	Output of the internal regulator. A ceramic capacitor of 2.2uF is required between this pin and ground.
2	EN	I	Enable logic input. Logic high level enables the device. Logic low level disables the device and turns it into shutdown mode.
3	SN	O	Mode selection for Adaptive Class H
4	FSW	I	The switching frequency is programmed by a resistor between this pin and the SW pin.
5/6/7	SW	PWR	The switching node pin of the converter.
8	BOOT	O	Power supply for high-side MOSTFET gate driver. A ceramic capacitor of 0.1uF must be connected between this pin and the SW pin.
9	VIN	I	IC power supply input.
10	INL	I	Analog audio signal input of left channel.
11	INR	I	Analog audio signal input of right channel.
12	SS	O	Soft-start programming pin. An external capacitor connected to ground sets the ramp rate of the internal error amplifier's reference voltage during soft-start
13	MODE	I	Operation mode selection pin for the device in light load condition. When this pin is connected to ground, the device works in PWM mode. When this pin is left floating, the device works in PFM mode.
14/15/16/17	VOUT	PWR	Boost converter output.
18	COMP	O	Output of the internal error amplifier, the loop compensation network should be connected between this pin and the AGND pin.
19	ILIM	I	Adjustable switch peak current limit. An external resistor should be connected between this pin and the AGND pin.
20	AGND	-	Signal ground of the IC.
0	PGND	PWR	Power ground of the IC.

¹ I: input O: output PWR: power



ORDERING INFORMATION

Part Number	Package Type	Marking	Operating Temperature Range	Shipping Package / MOQ
HT71678DNER	DFN20L	HT71678	-40°C~85°C	Tape and Reel / 5000PCS

ELECTRICAL CHARACTERISTIC

Absolute Maximum Ratings²

PARAMETER		Symbol	MIN	MAX	UNIT
Voltage range	BOOT	/	-0.3	SW+7	V
	SW, FSW, V _{OUT} , DIS, V _{IN}		-0.3	14.2	
	EN, VCC, SS, COMP, MODE, INL, INR		-0.3	7	
	ILIM, FB, SN		-0.3	3.6	
Operating temperature range		T _A	-40	85	°C
Operating junction temperature range		T _J	-40	150	°C
Storage temperature range		T _{STG}	-50	150	°C

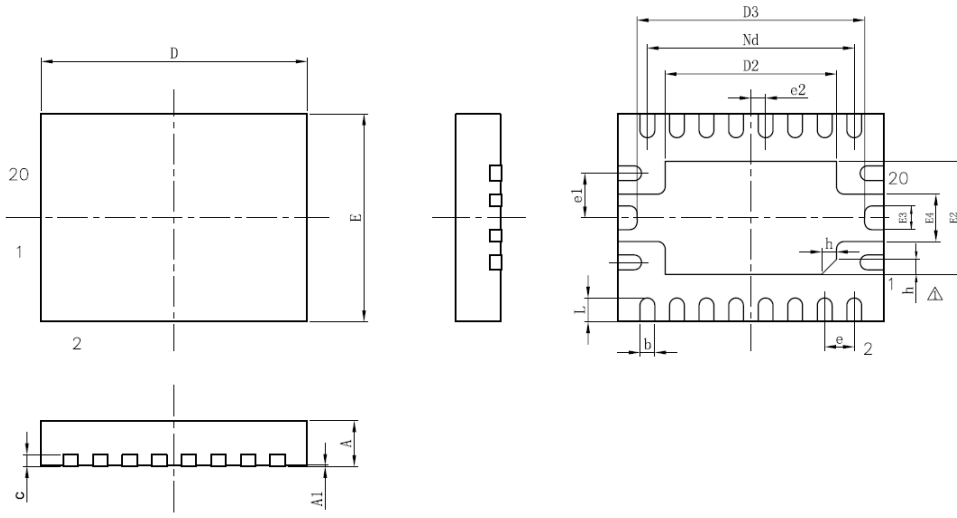
Recommended Operating Conditions

PARAMETER	Symbol	CONDITION	MIN	TYP	MAX	UNIT
Input power voltage range	V _{IN}		2.7		13.2	V
IC power supply voltage range	V _{IN}		2.7		13.2	V
Output voltage range	V _{OUT}		4.5		20	V
Inductance, effective value	L		0.47	2.2	10	μH
Input capacitance, effective value	C _I		10			μF
Output capacitance, effective value	C _O		6.8	47	1000	μF
Operating temperature	T _a		-40	25	85	°C
Operating junction temperature	T _J		-40		125	°C

² Stresses beyond those listed under absolute maximum ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under recommended operating conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.



PACKAGE OUTLINE



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	—	0.01	0.05
b	0.18	0.25	0.30
c	0.18	0.20	0.25
D	4.40	4.50	4.60
D2	3.10	3.20	3.30
D3	3.85REF		
e	0.50BSC		
e1	0.75BSC		
e2	0.25BSC		
Nd	3.50BSC		
E	3.40	3.50	3.60
E2	2.10	2.20	2.30
E3	0.35REF		
E4	0.75REF		
L	0.35	0.40	0.45
h	0.20	0.25	0.30
载体尺寸 (mm)	134*94		