

Features

- 2V to 24V Input Voltage
- Up to 24V Output Voltage
- Integrated 80mΩ Power MOSFET
- 1.4MHz Fixed Switching Frequency
- Internal 3.5A Switch Current Limit
- Internal Compensation
- Thermal Shutdown
- Output Adjustable from 0.6V
- Available in a 6-pin SOT-23 package

Applications

- Digital Set-top Box (STB)
- Tablet Personal Computer (Pad)
- LCD Bias Supply
- Battery-Powered Equipment
- Portable Media Player (PMP)
- General Purposes

General Description

The HE9810 is a constant frequency, current mode step-up converter intended for small, low power applications. The HE9810 switches at 1.4MHz and allows the use of tiny, low cost capacitors and inductors 2mm or less in height. Internal soft-start results in small

inrush current and extends battery life.

The HE9810 includes under-voltage lockout, current limiting, and thermal overload protection to prevent damage in the event of an output overload. The HE9810 is available in a small 6-pin SOT-23 package.

Typical Application

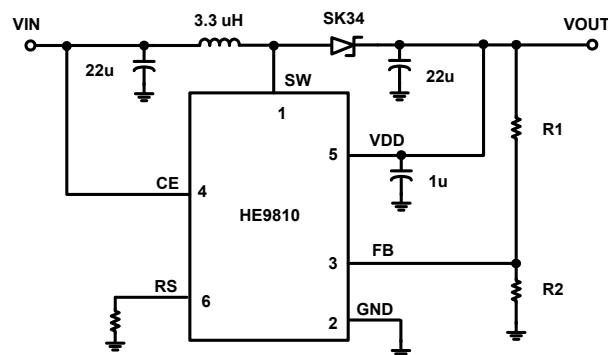


Figure. Basic Application Circuit

$$V_{OUT} = V_{FB} + \left(1 \times \frac{R1}{R2} \right)$$

注：芯片 5 脚 VDD 端可以接 VOUT 也可以接 VIN，当 VIN<5V 时，建议接 VOUT 来增强驱动能力。

Functional Block Diagram

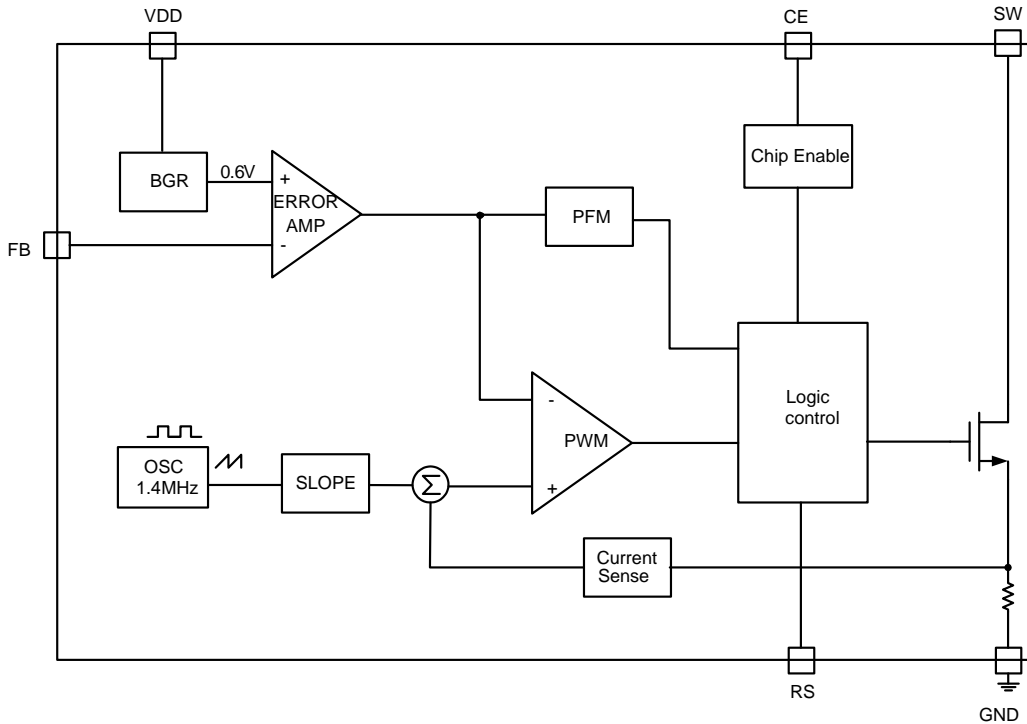
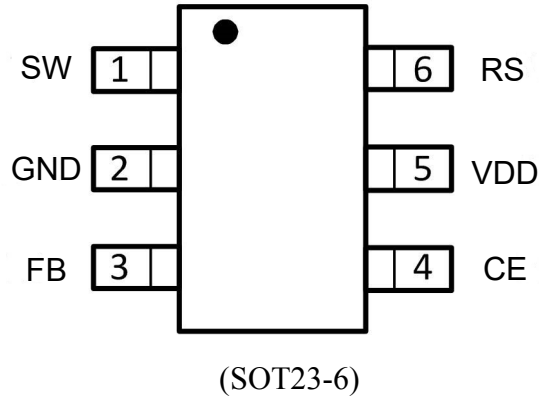


Figure 1. HE9810 Block Diagram

Pin Description

PIN	NAME	FUNCTION
1	SW	Power Switch Output. SW is the drain of the internal MOSFET switch. Connect the power inductor and output rectifier to SW. SW can swing between GND and 24V.
2	GND	Ground Pin
3	FB	Feedback Input. The FB voltage is 0.6V. Connect a resistor divider to FB.
4	CE	Regulator On/Off Control Input. A high input at CE turns on the converter, and a low input turns it off. When not used, connect EN to the input supply for automatic startup.
5	VDD	Input Supply Pin. Must be locally bypassed.
6	RS	Limiting Resistor

Package/order Information



Absolute Maximum Ratings (Note 1)

PARAMETER	ABSOLUTE MAXIMUM RATINGS	UNIT
V_{IN}, V_{EN}	-0.3 to 24	V
V_{SW}	-0.3 to 24	V
All Other Pins	-0.3 to 6	V
Continuous Power Dissipation($T_A=+25^{\circ}\text{C}$)	0.6	W
Junction Temperature	150	$^{\circ}\text{C}$
Operating Temperature Range	-40 to 85	
Lead Temperature	260	$^{\circ}\text{C}$
Storage Temperature	-65 to 150	$^{\circ}\text{C}$
Thermal Resistance θ_{JA}	250	$^{\circ}\text{C}/\text{W}$
Thermal Resistance θ_{JC}	130	$^{\circ}\text{C}/\text{W}$

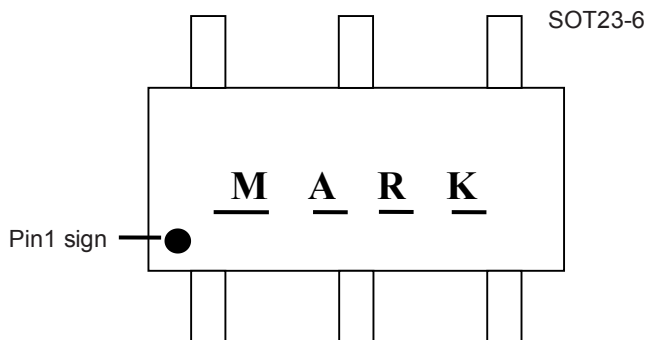
Recommended Operating Conditions

PARAMETER	RECOMMENDED	UNIT
Supply Voltage V_{IN}	2 to 24	V
Output Voltage V_{OUT}	V_{IN} to 24	V
Operating Junction Temp.(T_J)	-40 to 125	$^{\circ}\text{C}$

Electrical Characteristics (Note 3)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Current(Shutdown)	I_{IN}	$V_{EN}=0V$		0.1	1	μA
Quiescent Current (PFM)		$V_{FB}=0.7V$, No switch		50	100	μA
Quiescent Current (PWM)		$V_{FB}=0.5V$, switch		0.2	0.4	mA
SW Leakage		$V_{SW} = 20V$			1	μA
SW On Resistance				80	150	m Ω
Operating Input Voltage			2		24	V
Current Limit	I_{LIMIT}	$V_{IN}= 5V$, Duty cycle=50%		3.5		A
Oscillator Frequency	f_{SW}	$V_{FB}=0.75V$		1.4		MHz
Maximum Duty Cycle	D_{MAX}	$V_{FB}=0.7V$		90		%
Feedback Voltage	V_{FB}		588	600	612	mV
FB Input Bias Current		$V_{FB}=0.6V$	-50	-10		nA
EN Threshold	V_{EN}			1		V
Thermal Shutdown				160		$^{\circ}C$

Marking Information



The major marks: **AL088**

Remark If there are other requirements, please contact our sales office.

■ 应用信息

● 输出电压的设置

通过 FB 的外部电阻分压，输出电压值可根据以下公式计算：

$$VOUT = VFB \times \left(1 + \frac{R1}{R2}\right), \text{ R1 取百 K 级电阻, 例如: R2=100K, R1=1.4M, VFB=0.6V, 则 VOUT=9V}$$

● RS 限流设定

● 通过 RS 脚外置电阻限流，利用限流公式 $RS=25(K)/IL(A)$ ，可计算出合适的限流电阻，其中 ILMT 为电感电流峰值。

● 例如：25K 电阻对应的电感电流峰值为 1A。

● 利用电流公式 $I_{IN} = ILMT \cdot \frac{VIN}{2 \times L \times FS} \times \frac{VOUT - VIN}{VOUT}$ ，可计算出输入平均电流 I_{IN} ，其中 ILMT 为电感电流峰值。

● 例如：VIN=5V，VOUT=9V，RS=25K，L=3.3uH，FS=1.4MHz，则对应的电感电流峰值 ILMT=1A，输入平均电流 $I_{IN}=0.76A$ 。

● 注：RS 不允许悬空，如果不使用外置限流功能，RS 脚请接 GND。

● 电感选择

推荐电感值范围选择 3.3uH 到 10uH。电感选择主要考虑较小的 DCR 电阻以确保较高的效率。

● 输入输出电容

输入电容和输出电容的容值建议使用 22uF 以上，为了得到更小的输出纹波，建议输出使用陶瓷电容。

靠近 5 脚端需要 1uF 电容做稳压用，建议使用陶瓷电容。

● 二极管

续流二极管请使用快速响应的肖特基二极管，正向压降越低则负载效率越高。针对不同的输出电压，注意续流二极管的反向耐压选择要足够高 (>VOUT+5V) 以防止反向漏电或者击穿。

● PCB 布局

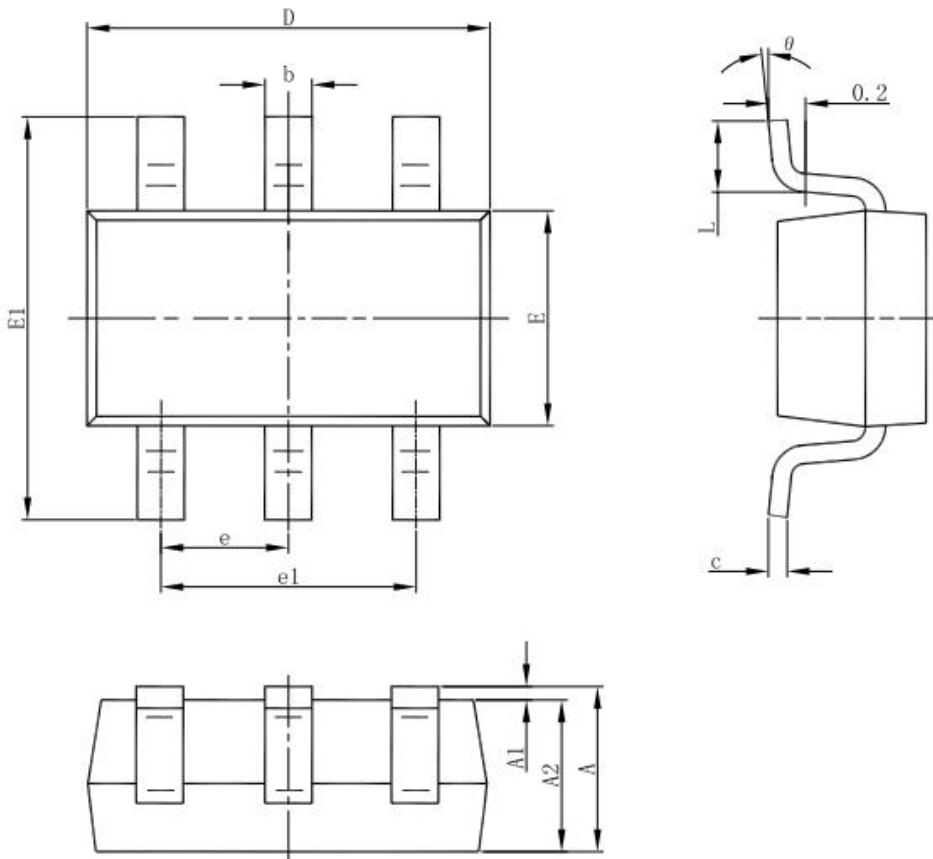
为了得到更好的使用效果，PCB 布局主要注意事项如下：

输入电容和输出电容尽可能靠近芯片引脚；

从 VIN 到电感 L 再到 VOUT 的功率通路，走线尽可能短而粗；

SW 引脚有高频开关信号，注意和板上其他元件的隔离。

Package Description
6-pin SOT23-6 Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°