SC810，芯片式开环霍尔电流传感器，SO8 封装
SC810，Fully Integrated Current Sensor IC

概述/ Description

SC810 是上海兴工微电子（Senko Micro）开发的基于开环霍尔原理的芯片式电流传感器，可用于交流或直流电流测量，应用于工业，商业和通讯系统。芯片内部由一块精密的低失调线性霍尔电路和与电路距离相当近的铜导体电流路径构成。当路径中注入交流或直流电流时，电路中的霍尔元件对电流产生的磁场进行感应，经过信号处理后输出与电流呈线性关系的电压信号。

原边导体的引脚（从1，2到3，4）在电气上与副边信号引脚（从5到8）实现了隔离，这使得SC810可以应用于需要电气隔离的应用场合，替代线性光耦和其他隔离器件。

The Senko Micro's SC810 provides economical and precise solutions for AC or DC current sensing in industrial, commercial, and communications systems. The device package allows for easy implementation by the customer. The device consists of a precise, low-offset, linear Hall circuit with a copper conduction path located near the surface of the die. Applied current flowing through this copper conduction path generates a magnetic field which the Hall IC converts into a proportional voltage. A precise, proportional voltage is provided by the low-offset, chopper-stabilized Linear Hall IC, which is programmed for accuracy after packaging.

The terminals of the conductive path (from pin1 and 2 to pin 3 and 4) are electrically isolated from the signal leads (pins 5 through 8). This allows the SC810 to be used in applications requiring electrical isolation without the use of opto-isolators or other costly isolation techniques.

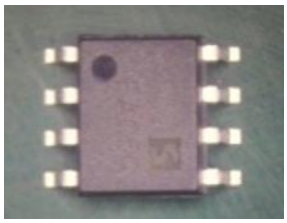
特性/ Features

- 开环霍尔原理
  Open Loop Hall principle
- 非接触式交直流测量
  Contactless AC/DC measurement
- 可选参考电压模式：固定1.65v，
  Selected Reference voltage mode: Fixed 1.65V,
- 极低的原边阻抗（1mΩ）
  1mΩ internal conductor resistance
- 原副边1分钟隔离耐压2kv
  2 kV RMS （1min AC test）minimum isolation voltage from pins 1-4 to pins 5-8
- SO-8封装
  Small footprint, low-profile SOP8-SC package
- 单电源供电：5v
  Single Power Supply：5V

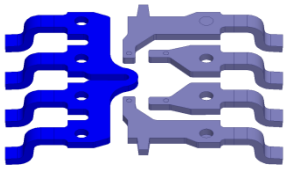
应用场合

- 电机控制
- 变频器
- 功率因数校正
- 过电流检测

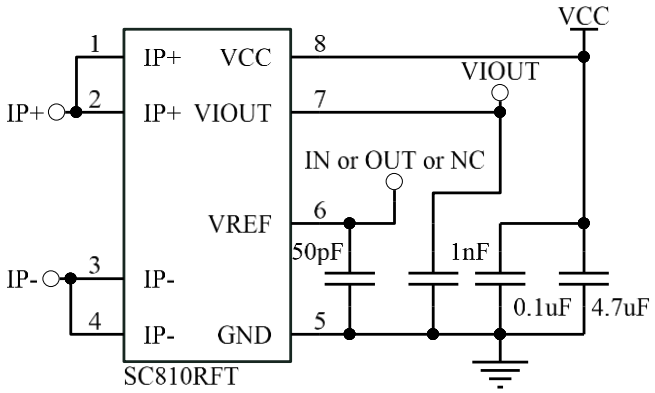
顶视图/Top view



芯片内部框架：



应用电路图/ Typical Application



说明：

1. 4.7uF 电源滤波电容**必须**使用以保证性能
   4.7uF bypass is **MUST** have to guarantee performance;
2. SC810DFT 适用于需要使用参考脚 VREF 的场合
   SC810DFT is fit for the application which need VREF, otherwise, use SC810FFT please.
3. SC810DFT 的第 6 脚可以悬空或输出：等于 Vout@IP=0A。
   Pin6 of SC810DFT can be NC or Output: Equal to Vout@IP=0A.

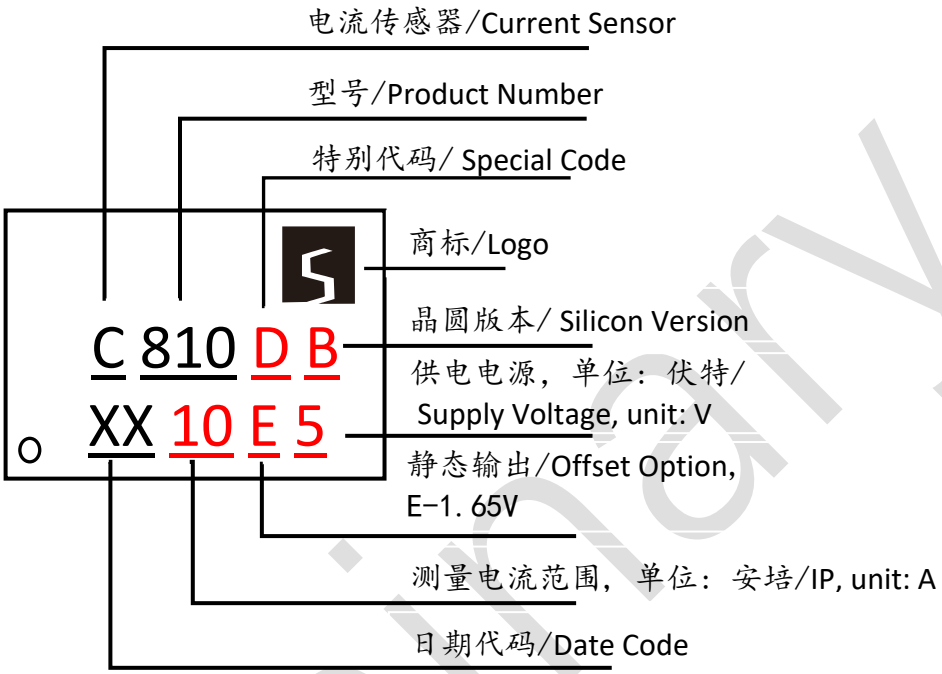
订购信息/ Order information

型号 Part Number	特征码 Special Code	温度范围 Temp Range	包装方式 Packaging	测量电流范围 IP(A)	Vout @IP=0A	灵敏度Sens @ VCC=5V (mV/A)	产品状态/ Product Status *2
SSC810DFT-10E5	D	F (-40~125℃)	T (1000pcs/卷)	±10	E(1.65V)	135	Sample

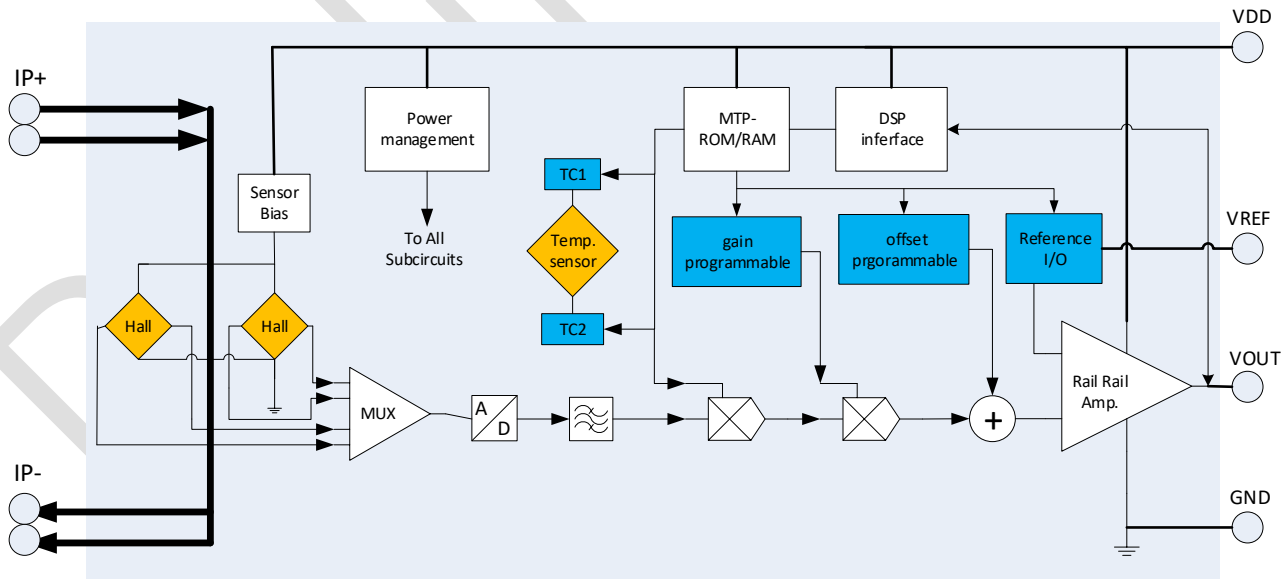
*1 E5： 电源为 4.5v~5.5v， IP=0A 情况下，VIOUT=1.65v，
E5 Vout=1.65v with IP=0A, when power supply from 4.5v~5.5v

*2 MP = 量产, Sample = 样品，量产状态下的所有产品由自动化设备打标，样品状态下的产品由手工打标。
MP = mass production, All products in MP status will be marked by automation machine as Mark Description, All products in sample status will be marked by manually machine as Mark Description.

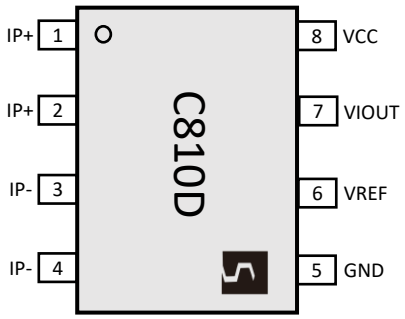
丝印描述/Mark Description



功能框图/Functional Block Diagram(SC810RFT)



管脚分配/Pin Configuration (SC810RFT)



管脚号码 /Number	名称/Name	描述/ Description
1,2	IP+	原边电流输入正/Terminals for current being sampled;
3,4	IP-	原边电流输入负/ Terminals for current being sampled;
5	GND	地/ Signal Ground terminal
6	VREF	输出模式：静态电压输出，始终等于原边为0时的输出电压/NC or Output: Equal to Vout@IP=0A.
7	VIOUT	模拟输出脚/ Analog output signal
8	VCC	电源引脚/ Device power supply terminal

绝对最大额定值/Absolute Maximum Ratings

绝对最大额定值是器件工作的限值，如果超过该值可能造成器件损坏。经常性工作在该值范围之外可能会影响器件可靠性。

Absolute maximum ratings are limiting values to be applied individually, and beyond which the serviceability of the circuit may be impaired. Functional operability is not necessarily implied. Exposure to absolute maximum rating conditions for an extended period of time may affect device reliability.

符号/ Characteristic	指标/ Symbol	备注/ Notes	额定值/ Rating	单位/ Unit
V_{CC}	电源电压/ Supply voltage		6.0	V
V_{RCC}	反向电源电压/Reverse Supply Voltage		-0.1	V
V_{IOUT}	输出电压/Output voltage		6.0	V
V_{RIOUT}	反向输出电压/Reverse Output Voltage		-0.1	V
$I_{IOUT(Source)}$	输出脚拉电流/Output Current Source		20	mA
$I_{IOUT(Sink)}$	输出脚灌电流/Output Current Sink		20	mA
T_A	环境温度范围/Nominal Operating Ambient Temperature	Range F	-40~105	℃
$T_{J(max)}$	最大结温/Maximum Junction Temperature		165	℃
T_{stg}	存储温度/Storage Temperature			℃

常规工作参数 Common operating Characteristics

注意：除特别备注外，全温度范围T_A=-40°C ~ 105°C, C_{Bypass}=4.7uf，C_{Load}=1.5nF, V_{CC}=5V,
Note: Over full range of T_A=-40°C ~ 105°C, C_{Bypass}=4.7uf，C_{Load}=1.5nF, V_{CC}=5V, unless otherwise specified.

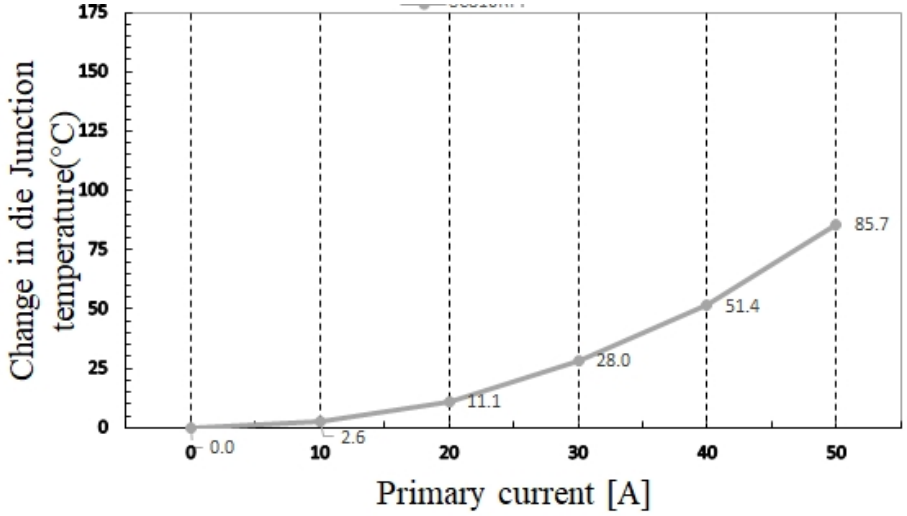
参数	符号	测试条件	最小值	典型值	最大值	单位
电源电压/Supply Voltage	V_{CC}	Operating	4.5	5	5.5	V
供电电流/Supply Current	I_{CC}	V_{CC} = 5.0 V, output open		9	15	mA
Vout外接电容范围/ Output Capacitance Load	C_{LOAD}	V_{IOUT} to GND		1.5	3	nF
Vout外接电阻范围/ Output Resistive Load	R_{LOAD}	V_{IOUT} to GND	0.17			kΩ
原边导体阻抗/ Primary Conductor Resistance	$R_{PRIMARY}$	T_A = 25°C		0.9	1.1	mΩ
响应时间(R型) / Response Time (Code R)	t_r	I_P = I_P(max), T_A = 25°C, C_{OUT} = 1nF		3.5		μS
带宽/Frequency Bandwidth	f	–3 Db, T_A=25°C; I_P=10 A peak-to-peak				kHz
上电时间/Power-On Time	T_{po}	Output reaches 90% of steady-state level, T_J = 25°C, 20 A present		100	500	uS
内部滤波阻抗/ Internal Filter Resistance	$R_{F(INT)}$			1.7		KΩ
电源旁路电容/ Power supply bypass capacitor	C_{bypass}	Normal operating	2.2	4.7		uF
Vref外接电容范围/ Vref capacitance load(Output)	C_{REF}			0	100	pF
Vref外接输入范围/ Reference input voltage	Vref		0.7		2.6	V
Vref拉电流能力/ VREF Source Current	Vref_Isource	Vref shorted to GND.		71		uA
Vref灌电流能力/ VREF Sink Current	Vref_Isink	Vref shorted to VCC		14.4		mA

隔离参数 Insulation coordination

参数/ Parameter	Symbol	Value	Unit	Comment
RMS voltage for AC insulation test，50Hz，1min 1分钟隔离耐压测试（50Hz）	V_{iso}	2000	V	According to UL60950-1
Impulse withstand voltage 1.2/50us 冲击耐受电压 1.2/50us	V_{imp}	6000	V	According to UL60950-1
Clearance 电气间隙	D_{cl}	3.8~4.0	mm	
Creepage distance 爬电距离	D_{cp}	3.8~4.0	mm	
Comparative tracking index 电气爬痕指数	CTI	600	V	

温升与原边电流关系图/Thermal Rise vs. Primary Current

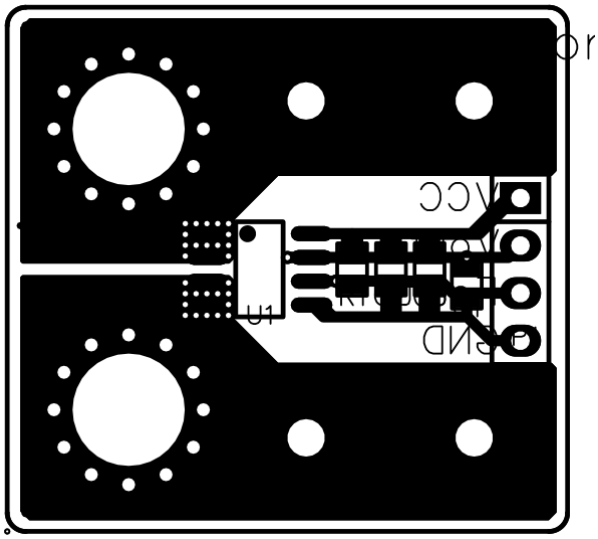
Typical junction temperature [°C] on SC810 vs Primary current [A] @26°C based on Demo Board
在 26°C 环境温度下，SC810 在基于 DEMO 板条件下测试得到的结温与原边电流的关系图。



Demo 板信息/Demo Board information

板名称/Board Name	A10-V2
层数/Layer number	2
与原边管脚连接的铜皮面积（包含所有层）/ Total Copper size connected to Primary pins (Including all layers)	1224 mm^2
铜厚/Copper layer thickness	2oz / 70um
板厚/Board Thickness	1mm

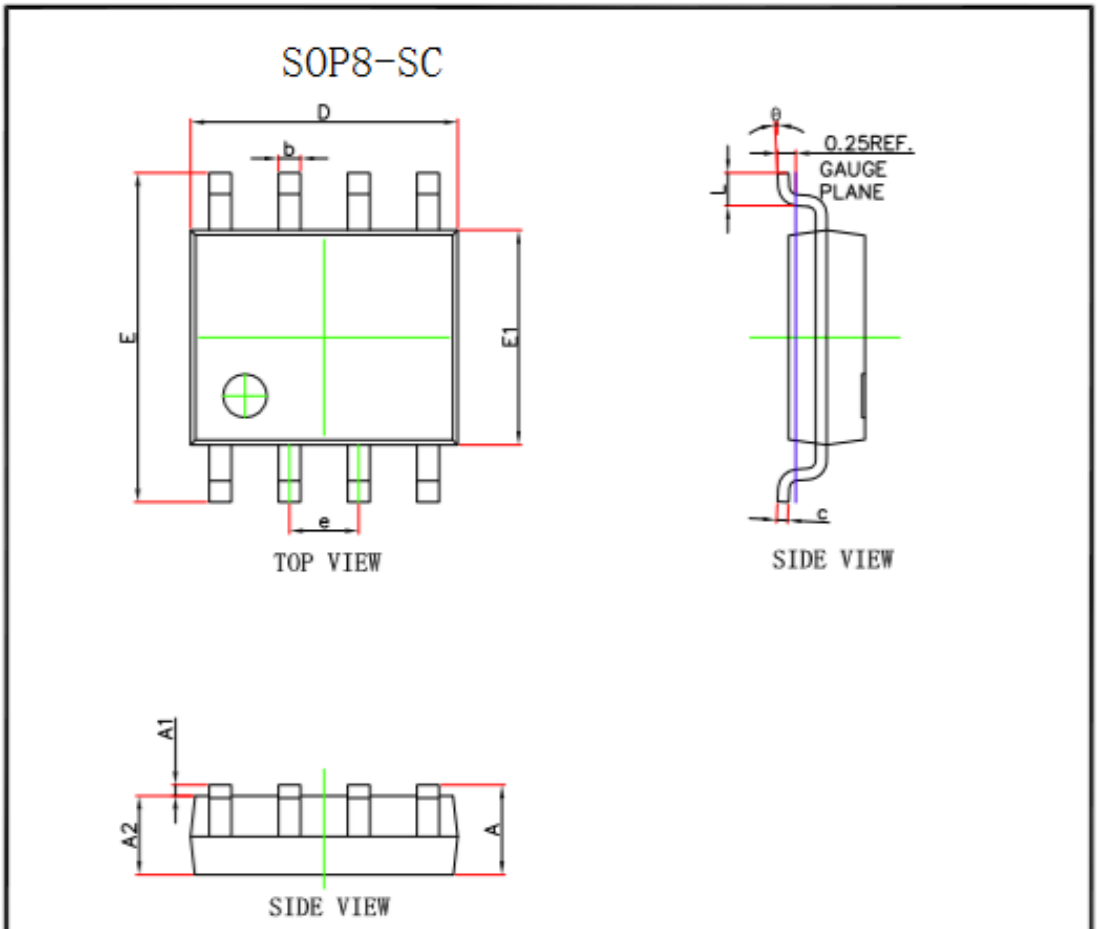
Demo 板参考布线图/Demo Board Layout



封装信息/Package Information

注意：封装为 SOP8-SC, 所有尺寸单位为毫米

Note: Package is SOP8-SC, all dimensions are in millimeters.



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
D	4.700	5.100	0.185	0.201
E1	3.800	4.000	0.150	0.157
E	5.800	6.200	0.228	0.244
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

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Revision Table

Revision	Change	Page	Author	Date
1.0	Initial draft for Chinese version		Deng	2019.12
1.1	更正打标代码信息, 及版式布局		Jon	2020.03