FCT-A系列电流传感器 Current Sensor IC

FCT-A系列电流传感器为汽车和工业应用领域内AC，DC的电流检测提供了体积更小，性价比更高的解决方案，并可提供多种输出模式。

The FCT-A series of current sensors provides a smaller, more cost-effective solution for AC and DC current sensing in automotive and industrial applications, and is available in a variety of output modes.

优势特征Advantage features：

- 应用Hall感应原理的开环型电流传感器
  An open-loop current sensor using the Hall sensing principle
- 单电源5V供电
  Single power supply: 5V power supply
- 支持单向，双向输出
  Support one-way, two-way output
- 模拟信号输出
  Analog signal output
- 原边测量电流范围可从±50A-±250A
  The primary side measurement current range is from ±50A to ±250A
- 传感器工作温度范围The operating temperature range of the sensor：-40 °C to +125°C
  (150A为-40 °C to +105°C；200A/250A为-40 °C to +85°C)

- 零点输出电压Zero output voltage：

  -xR：偏置QVO与供电电源V_{CC}等比例输出，增益Gain固定
  $V_{QVO}=V_{CC}/2$ or $V_{CC}/10$
  The bias QVO is output in equal proportion to the power supply VCC, and the gain gain is fixed VQVO=VCC/2 or VCC/10

  -xF：偏置QVO和增益Gain均固定
  Both the bias QVO and gain gain are fixed
  $V_{QVO}=2.50$ or 0.50

- 良好的精度、线性度以及温漂
  Good accuracy, linearity and temperature drift
- 低内阻（100μΩ），可有效控制发热功耗
  Low internal resistance (100μΩ) can effectively control heat generation and power consumption
- 内置断线、过电压（OVD)、欠电压(UVD)检测
  Built-in disconnection, overvoltage (OVD), and undervoltage (UVD) detection
- 输出电压钳位
  Output voltage clamping
- 产品符合UL认证，符合AECQ100
  The products are UL certified and AECQ100 compliant

证书编号.Certificate number：E531116-A6002-UL

产品应用：

- EV/HEV电机控制器

EV/HEV motor controllers

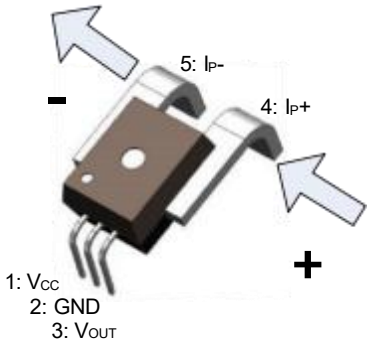
- 变频器

Frequency converters

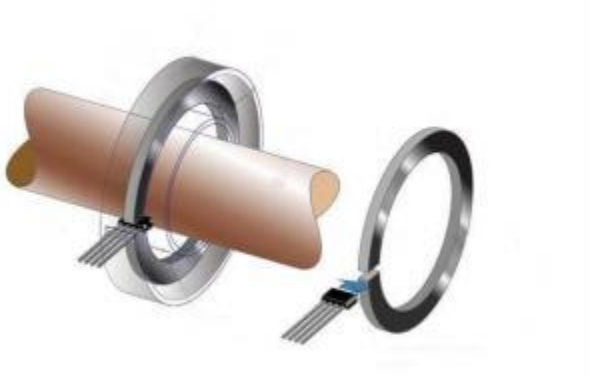
- DC/DC

管脚定义Pin definition：

管脚pins	名称name	描述description
1	V_{CC}	传感器供电电源 Power supply for the sensor
2	GND	地earth
3	V_{OUT}	传感器模拟输出 Sensor analog output
4	I_P+	电流流入+ Current flows into +
5	I_P-	电流流入- Current Inflow-



工作原理How it works：



开环电流传感器利用安培定律（一根通电直导线周边产生的磁场与导线中的电流成比例），利用 hall 器件的特性，通过检测原边电流产生的磁场强度 B 的大小，从而检测出导线中的电流大小。在磁滞的线性区间内，B 与 I 的比例关系为：

An open-loop current sensor uses Ampere's law (the magnetic field generated around a energized straight wire is proportional to the current in the wire) and the characteristics of the hall device to detect the magnitude of the magnetic field strength B generated by the primary current to detect the magnitude of the current in the wire. Within the linear interval of hysteresis, the ratio of B to I is ：

$B(I_P) = K * I_P$ （K 为常数）

K is a constantHall

电压可以表示为

The voltage can be expressed as::

$V_H=(R_H/d) * I * K * I_P$

除了 I_P 是变化量，其余都是常量，由此

Except for the IP which is the amount of change, the rest are constants,

thus： $V_H=K_1 * I_P$（K_1 为常数）

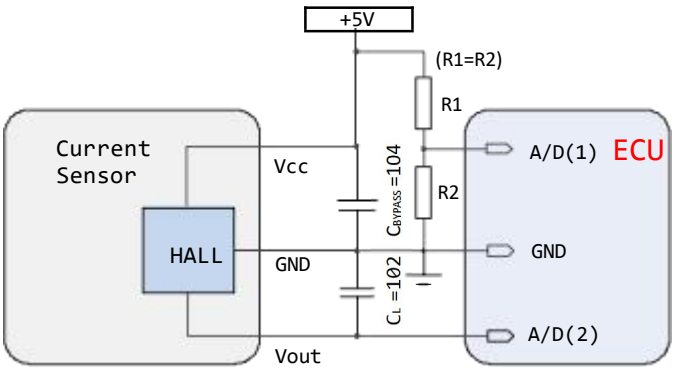
K is a constantHall

特定的Hall芯片通过放大V_H从而得到电压来推算出原边电流。

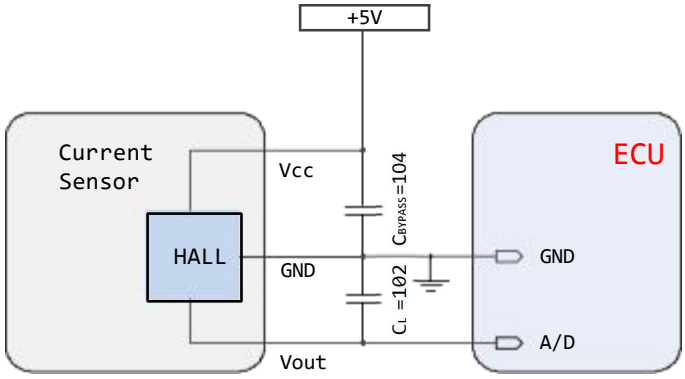
A specific Hall chip calculates the primary

current by amplifying VH to obtain a voltage

推荐电路Recommended circuits：



-xR：$V_{QVO}=V_{CC}/2$, Gain固定



-xF：V_{QVO}=2.5V, Gain固定

Vcc端的BYPASS电容，需要尽量靠近传感器的Vcc脚

*The BYPASS capacitor on the Vcc side needs to be as close to the Vcc pin of the sensor as possible

Vout端的BYPASS电容，需要尽量靠近传感器的Vout脚

*The BYPASS capacitor on the Vout side needs to be as close to the Vout pin of the sensor as possible

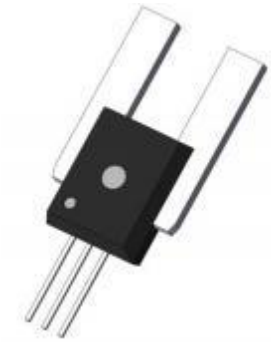
封装形式 Form factor：

标准封装（PFF）

Standard package

PSF封装

encapsulation



PSS封装

encapsulation

SMT封装

encapsulation

命名规则 Naming conventions:

订货信息Ordering information:

型号	零点电压 VOUT(Q) (V)	原边电流范围 I_P (A)	灵敏度 Sens(Typ.) (mV/A)	封装形式	MPQ (PCS)	MOQ (PCS)
FCT050BR-A	$V_{cc}/2$	±50	40	PFF PSF	40	400
FCT050BF-A	2.50					
FCT050UR-A	$V_{cc}/10$	50	80	PSS SMT	40	400
FCT050UF-A	0.50					
FCT100BR-A	$V_{cc}/2$	±100	20	PFF PSF	40	400
FCT100BF-A	2.50					
FCT100UR-A	$V_{cc}/10$	100	40	PSS SMT	40	400
FCT100UF-A	0.50					
FCT150BR-A	$V_{cc}/2$	±150	13.33	PFF PSF	40	400
FCT150BF-A	2.50					
FCT150UR-A	$V_{cc}/10$	150	26.67	PSS SMT	40	400
FCT150UF-A	0.50					
FCT200BR-A	$V_{cc}/2$	±200	10	PFF PSF	40	400
FCT200BF-A	2.50					
FCT200UR-A	$V_{cc}/10$	200	20	PSS SMT	40	400
FCT200UF-A	0.50					
FCT250BR-A	$V_{cc}/2$	±250	8	PFF PSF	40	400
FCT250BF-A	2.50					
FCT250UR-A	$V_{cc}/10$	250	16	PSS SMT	40	400
FCT250UF-A	0.50					

**标准电流规格之外的电流请联系工厂*

For currents other than the standard current specifications, please contact the factory

最大额定参数 Maximum ratings

Characteristic	Symbol	Rating	Unit
供电电压Supply voltage	V_{CC}	-0.3 to 6.5	V
供电电流Supply current	I_{CC}	18	mA
输出电压Output voltage	V_{OUT}	0.15 to V_{CC}-0.15	V
工作温度Operating temperature	T_A	-40 to 125	℃
最大结温Maximum junction temperature	T_J	165	℃
存储温度Storage temperature	T_S	-55 to 150	℃
ESD HBM	V_{ESD}	8	KV

通用电气参数General Electrical Parameters

V_{CC} = 5.0V 时的直流工作参数（除非另有说明），T_A 在规定温度范围内。DC operating parameters at VCC = 5.0V (unless otherwise stated) with TA within the specified temperature range.

Parameter	Symbol	Condition		Min	Typ.	Max	Unit
供电电压Supply voltage	V_{CC}			4.75	5	5.25	V
供电电流Supply current	I_{CC}	R_L ≥ 10KΩ			13	18	mA
QVO 随动误差 (-R)QVO Follow-up Error (-R)	E_r			-0.3		0.3	%
零电流输出Zero current output	V_{QVO}	FCTxxxBR	T_A = 25°C	V_{CC}/2			V
		FCTxxxBF		2.50			
		FCTxxxUR		V_{CC}/10			
		FCTxxxUF		0.50			
输出电压范围@I PThe output voltage range @IP	V_{OUT}-V_{QVO}	FCTxxxBR		±2			
		FCTxxxBF					
		FCTxxxUR		4			
		FCTxxxUF					
负载电阻 Load resistance	R_L	V_{OUT} to V_{CC} or GND		10			KΩ
负载电容 Load capacitance	C_L	V_{OUT} TO GND			1	10	nF
响应时间 Response time	$t_{RESPONSE}$	T_A=25°C, C_L=1nF, I_P step=50% of I_{P+}, 90%输入 到 90%输出			2		μs
带宽bandwidth	BW	小信号 -3dB, C_L=1nF, T_A=25°C			240		KHz
上电复位电压 Power-on reset voltage	$V_{POR(H)}$	TA = 25°C, VCC 上升时恢复启动Resume boot when rising		2.82	3.0	3.25	V
	$V_{POR(L)}$	TA = 25°C, VCC 下降时触发复位 Triggers a reset on descent		2.58	2.8	3.06	V

过电压检测 Overvoltage detection	$V_{OVD(EN)}$	TA = 25°C，触发电压Trigger voltage	6.35	6.50	6.70	V
	$V_{OVD(DIS)}$	TA = 25°C，恢复电压Restore voltage	5.85	6.00	6.20	V
欠电压检测 Undervoltage detection	$V_{UVD(H)}$	TA = 25°C，恢复电压Restore voltage	4.10	4.20	4.35	V
	$V_{UVD(L)}$	TA = 25°C，触发电压Trigger voltage	3.70	3.80	3.95	V
输出脚电流 Output pin current		Vout和Vcc短路short circuit			-20	mA
		Vout和GND短路short circuit	28			mA
输出电压（钳位） Output Voltage (Clamping)	VCLP(HIGH)	TA = 25°C, RL = 10 kΩ to GND		VCC-VCC*0.06	VCC-0.25	V
	VCLP(LOW)	TA = 25°C, RL = 10 kΩ to VCC	0.25	VCC*0.06		V
断线检测 (VCC/GND)Wire Break Detection (VCC/GND)	VBRK_DN	TA = 25°C, RL = 10 kΩ to GND		400		mV
	VBRK_UP	TA = 25°C, RL = 10 kΩ to VCC (5V)	4.8	4.9	5	V

隔离特性 Isolation characteristics

Characteristic	Symbol	Notes	Rating	Unit
介电强度试验电压 *1Dielectric strength test voltage*1	VISO	根据UL标准60950-1第二版，Agency type测试60秒 According to UL Standard 60950-1 2nd Edition, Agency type test for 60 seconds	4800	VAC
工作电压（基本绝缘）Operating Voltage (Basic Insulation)	VWFSI	根据UL标准60950-1第二版，基本（单）离隔 According to UL Standard 60950-1 2nd Edition, basic (single) separation	990 700	VDC or Vpk Vrms
工作电压（增强绝缘）Operating Voltage (Reinforced Insulation)	VWFRI	根据UL标准60950-1第二版，增强（双重）隔离 Enhanced (double) isolation according to UL Standard 60950-1 2nd Edition	636 450	VDC or Vpk Vrms

*1：60秒测试仅用于UL试验； 在生产中根据UL60950-1第二版进行测试。

***1: The 60-second test is only used for UL tests. Tested in production according to the second version of UL60950-1.**

050B* 性能参数Performance parameters

V_{CC} = 5.0V 时的直流工作参数（除非另有说明），T_A=-40°C ~125°C

DC operating parameters at VCC = 5.0V (unless otherwise stated), TA=-40°C ~125°C

Parameter	Symbol	Condition	Min	Typ.	Max	Unit
标称参数 Nominal parameters						
原边电流测量范围 Primary current measurement range	I_P		-50		50	A
传感器灵敏度Sensor sensitivity	$Sens_{TA}$	@V_{CC}=5.0V		40		mV/A
精度参数 Accuracy parameters						
灵敏度误差 Sensitivity error	E_{Sens}	@T_A=25 °C;V_{CC}=5.0V	-1		1	%
零点电失调电压Zero-point electrical offset voltage	V_{OE}	I_P=0A, T_A=25 °C	-4	±3	4	mV
		I_P=0A, T_A=-40 °C ~125°C	-20	±8	20	mV
零点磁失调电流Zero point magnetic offset current	I_{OM}	I_P=0A, T_A=25°C, after excursion of 50A		125	250	mA
零点偏移电流Zero offset current	I_{OFFSET}	T_A=25°C			0.3	A
线性度误差 Linearity error	Lin_{ERR}	Of full rang	-1	0.5	1	%
总输出误差Total output error	$E_{TOT(HT)}$	Full scale of I_P, T_A=25 °C~125 °C	-2		2	%
	$E_{TOT(LT)}$	Full scale of I_P, T_A=-40°C~25°C	-2		2	%

050U* 性能参数 Performance parameters

V_{CC} = 5.0V 时的直流工作参数（除非另有说明），T_A=-40°C ~125°C

DC operating parameters at VCC = 5.0V (unless otherwise stated), TA=-40°C ~125°C

Parameter	Symbol	Condition	Min	Typ.	Max	Unit
标称参数标称参数Nominal parameters						
原边电流测量范围 Primary current measurement range	I_P		0		50	A
传感器灵敏度Sensor sensitivity	$Sens_{TA}$	@V_{CC}=5.0V		80		mV/A
精度参数 Accuracy parameters						
灵敏度误差 Sensitivity error	E_{Sens}	@T_A=25°C;V_{CC}=5.0V	-1		1	%
零点电失调电压Zero-point electrical offset voltage	V_{OE}	I_P=0A，T_A=25°C	-4	±3	4	mV
		I_P=0A，T_A=-40°C ~125°C	-20	±8	20	mV
零点磁失调电流Zero point magnetic offset current	I_{OM}	I_P=0A, T_A=25°C, after excursion of 50A		80	150	mA
零点偏移电流Zero offset current	I_{OFFSET}	T_A=25°C			0.15	A
线性度误差 Linearity error	Lin_{ERR}	Of full rang	-1	0.5	1	%
总输出误差Total output error	$E_{TOT(HT)}$	Full scale of I_P, T_A=25°C~125°C	-2		2	%
	$E_{TOT(LT)}$	Full scale of I_P, T_A=-40°C~25°C	-2		2	%

100B* 性能参数 Performance parameters

V_{CC} = 5.0V 时的直流工作参数（除非另有说明），T_A=-40°C ~125°C

DC operating parameters at VCC = 5.0V (unless otherwise stated), TA=-40°C ~125°C

Parameter	Symbol	Condition	Min	Typ.	Max	Unit
标称参数标称参数 Nominal parameters						
原边电流测量范围 Primary current measurement range	I_P		-100		100	A
传感器灵敏度Sensor sensitivity	$Sens_{TA}$	@V_{CC}=5.0V		20		mV/A
精度参数 Accuracy parameters						
灵敏度误差 Sensitivity error	E_{Sens}	@T_A=25 °C;V_{CC}=5.0V	-1		1	%
零点电失调电压Zero-point electrical offset voltage	V_{OE}	I_P=0A, T_A=25 °C	-4	±3	4	mV
		I_P=0A, T_A=-40 °C ~125°C	-20	±8	20	mV
零点磁失调电流Zero point magnetic offset current	I_{OM}	I_P=0A, T_A=25 °C, after excursion of 100A		200	300	mA
零点偏移电流Zero offset current	I_{OFFSET}	T_A=25 °C	-		0.5	A
线性度误差 Linearity error	Lin_{ERR}	Of full rang	-1	0.5	1	%
总输出误差Total output error	$E_{TOT(HT)}$	Full scale of I_P, T_A=25 °C~125°C	-2		2	%
	$E_{TOT(LT)}$	Full scale of I_P, T_A=-40 °C~25°C	-2		2	%

100U* 性能参数 Performance parameters

V_{CC} = 5.0V 时的直流工作参数（除非另有说明），T_A=-40°C ~125°C

DC operating parameters at VCC = 5.0V (unless otherwise stated), TA=-40°C ~125°C

Parameter	Symbol	Condition	Min	Typ.	Max	Unit
标称参数 Nominal parameters						
原边电流测量范围 Primary current measurement range	I_P		0		100	A
传感器灵敏度Sensor sensitivity	$Sens_{TA}$	@V_{CC}=5.0V		40		mV/A
精度参数 Accuracy parameters						
灵敏度误差 Sensitivity error	E_{Sens}	@T_A=25 °C;V_{CC}=5.0V	-1		1	%
零点电失调电压Zero-point electrical offset voltage	V_{OE}	I_P=0A, T_A=25 °C	-4	±3	4	mV
		I_P=0A, T_A=-40 °C ~125 °C	-20	±8	20	mV
零点磁失调电流Zero point magnetic offset current	I_{OM}	I_P=0A, T_A=25 °C, after excursion of 100A		100	150	mA
零点偏移电流Zero offset current	I_{OFFSET}	T_A=25°C	-		0.25	A
线性度误差 Linearity error	Lin_{ERR}	Of full rang	-1	0.5	1	%
总输出误差Total output error	$E_{TOT(HT)}$	Full scale of I_P, T_A=25 °C~125°C	-2		2	%
	$E_{TOT(LT)}$	Full scale of I_P, T_A=-40°C~25°C	-2		2	%

150B* 性能参数 Performance parameters

V_{CC} = 5.0V 时的直流工作参数（除非另有说明），T_A=-40°C ~105°C

DC operating parameters at VCC = 5.0V (unless otherwise stated), TA=-40°C ~125°C

Parameter	Symbol	Condition	Min	Typ.	Max	Unit
标称参数 Nominal parameters						
原边电流测量范围 Primary current measurement range	I_P		-150		150	A
传感器灵敏度Sensor sensitivity	$Sens_{TA}$	@V_{CC}=5.0V		13.33		mV/A
精度参数 Accuracy parameters						
灵敏度误差 Sensitivity error	E_{Sens}	@T_A=25°C;V_{CC}=5.0V	-1		1	%
零点电失调电压Zero-point electrical offset voltage	V_{OE}	I_P=0A，T_A=25°C	-4	±3	4	mV
		I_P=0A，T_A=-40°C ~105°C	-20	±8	20	mV
零点磁失调电流Zero point magnetic offset current	I_{OM}	I_P=0A，T_A=25°C，after excursion of 150A		300	400	mA
零点偏移电流Zero offset current	I_{OFFSET}	T_A=25°C			0.75	A
线性度误差 Linearity error	Lin_{ERR}	Of full rang	-1	0.5	1	%
总输出误差Total output error	$E_{TOT(HT)}$	Full scale of I_P，T_A=25°C~105°C	-2		2	%
	$E_{TOT(LT)}$	Full scale of I_P，T_A=-40°C~25°C	-2		2	%

150U* 性能参数 Performance parameters

V_{CC} = 5.0V 时的直流工作参数（除非另有说明），T_A=-40°C ~105°C

DC operating parameters at VCC = 5.0V (unless otherwise stated), TA=-40°C ~125°C

Parameter	Symbol	Condition	Min	Typ.	Max	Unit
标称参数 Nominal parameters						
原边电流测量范围 Primary current measurement range	I_P		0		150	A
传感器灵敏度Sensor sensitivity	$Sens_{TA}$	@V_{CC}=5.0V		26.67		mV/A
精度参数 Accuracy parameters						
灵敏度误差 Sensitivity error	E_{Sens}	@T_A=25°C;V_{CC}=5.0V	-1		1	%
零点电失调电压Zero-point electrical offset voltage	V_{OE}	I_P=0A，T_A=25°C	-4	±3	4	mV
		I_P=0A，T_A=-40°C ~105°C	-20	±8	20	mV
零点磁失调电流Zero point magnetic offset current	I_{OM}	I_P=0A, T_A=25°C, after excursion of 150A		180	240	mA
零点偏移电流Zero offset current	I_{OFFSET}	T_A=25°C			0.45	A
线性度误差 Linearity error	Lin_{ERR}	Of full rang	-1	0.5	1	%
总输出误差Total output error	$E_{TOT(HT)}$	Full scale of I_P, T_A=25°C~105°C	-2		2	%
	$E_{TOT(LT)}$	Full scale of I_P, T_A=-40°C~25°C	-2		2	%

200B* 性能参数 Performance parameters

V_{CC} = 5.0V 时的直流工作参数（除非另有说明），T_A=-40°C ~85°C

DC operating parameters at VCC = 5.0V (unless otherwise stated), TA=-40°C ~125°C

Parameter	Symbol	Condition	Min	Typ.	Max	Unit
标称参数 Nominal parameters						
原边电流测量范围 Primary current measurement range	I_P		-200		200	A
传感器灵敏度Sensor sensitivity	$Sens_{TA}$	@V_{CC}=5V		10		mV/A
精度参数 Accuracy parameters						
灵敏度误差 Sensitivity error	E_{Sens}	@T_A=25°C;V_{CC}=5V	-1		1	%
零点电失调电压Zero-point electrical offset voltage	V_{OE}	I_P=0A, T_A=25°C	-4	±3	4	mV
		I_P=0A, T_A=-40°C ~85°C	-20	±8	20	mV
零点磁失调电流Zero point magnetic offset current	I_{OM}	I_P=0A, T_A=25°C, after excursion of 200A		400	500	mA
零点偏移电流Zero offset current	I_{OFFSET}	T_A=25°C			1.0	A
线性度误差 Linearity error	Lin_{ERR}	Of full rang	-1	0.5	1	%
总输出误差Total output error	$E_{TOT(HT)}$	Full scale of I_P, T_A=25°C~85°C	-2		2	%
	$E_{TOT(LT)}$	Full scale of I_P, T_A=-40°C~25°C	-2		2	%

200U* 性能参数 Performance parameters

V_{CC} = 5.0V 时的直流工作参数（除非另有说明），T_A=-40°C ~85°C

DC operating parameters at VCC = 5.0V (unless otherwise stated), TA=-40°C ~125°C

Parameter	Symbol	Condition	Min	Typ.	Max	Unit
标称参数 Nominal parameters						
原边电流测量范围 Primary current measurement range	I_P		0		200	A
传感器灵敏度Sensor sensitivity	$Sens_{TA}$	@V_{CC}=5V		20		mV/A
精度参数 Accuracy parameters						
灵敏度误差 Sensitivity error	E_{Sens}	@T_A=25°C;V_{CC}=5V	-1		1	%
零点电失调电压Zero-point electrical offset voltage	V_{OE}	I_P=0A, T_A=25°C	-4	±3	4	mV
		I_P=0A, T_A=-40°C ~85°C	-20	±8	20	mV
零点磁失调电流Zero point magnetic offset current	I_{OM}	I_P=0A, T_A=25°C, after excursion of 200A		200	250	mA
零点偏移电流Zero offset current	I_{OFFSET}	T_A=25°C			0.5	A
线性度误差 Linearity error	Lin_{ERR}	Of full rang	-1	0.5	1	%
总输出误差Total output error	$E_{TOT(HT)}$	Full scale of I_P, T_A=25°C~85°C	-2		2	%
	$E_{TOT(LT)}$	Full scale of I_P, T_A=-40°C~25°C	-2		2	%

250B* 性能参数 Performance parameters

V_{CC} = 5.0V 时的直流工作参数（除非另有说明），T_A=-40°C ~85°C

DC operating parameters at VCC = 5.0V (unless otherwise stated), TA=-40°C ~125°C

Parameter	Symbol	Condition	Min	Typ.	Max	Unit
标称参数 Nominal parameters						
原边电流测量范围 Primary current measurement range	I_P		-250		250	A
传感器灵敏度Sensor sensitivity	$Sens_{TA}$	@V_{CC}=5V		8		mV/A
精度参数 Accuracy parameters						
灵敏度误差 Sensitivity error	E_{Sens}	@T_A=25°C;V_{CC}=5V	-1		1	%
零点电失调电压Zero-point electrical offset voltage	V_{OE}	I_P=0A, T_A=25°C	-4	±3	4	mV
		I_P=0A, T_A=-40°C ~85°C	-20	±8	20	mV
零点磁失调电流Zero point magnetic offset current	I_{OM}	I_P=0A, T_A=25°C, after excursion of 250A		500	640	mA
零点偏移电流Zero offset current	I_{OFFSET}	T_A=25°C			1.25	A
线性度误差 Linearity error	Lin_{ERR}	Of full rang	-1	0.5	1	%
总输出误差Total output error	$E_{TOT(HT)}$	Full scale of I_P, T_A=25°C~85°C	-2		2	%
	$E_{TOT(LT)}$	Full scale of I_P, T_A=-40°C~25°C	-2		2	%

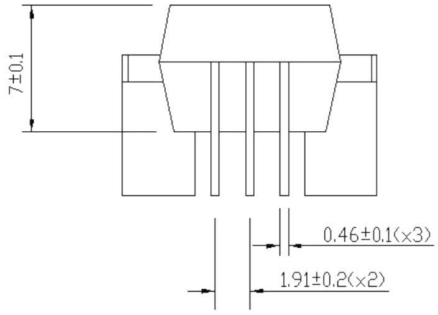
250U* 性能参数 Performance parameters

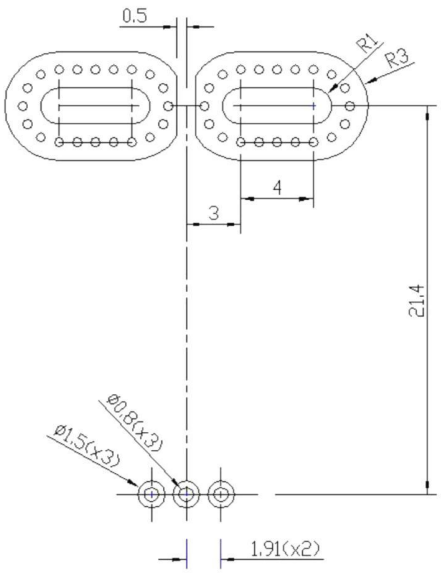
V_{CC} = 5.0V 时的直流工作参数（除非另有说明），T_A=-40°C ~85°C

DC operating parameters at VCC = 5.0V (unless otherwise stated), TA=-40°C ~125°C

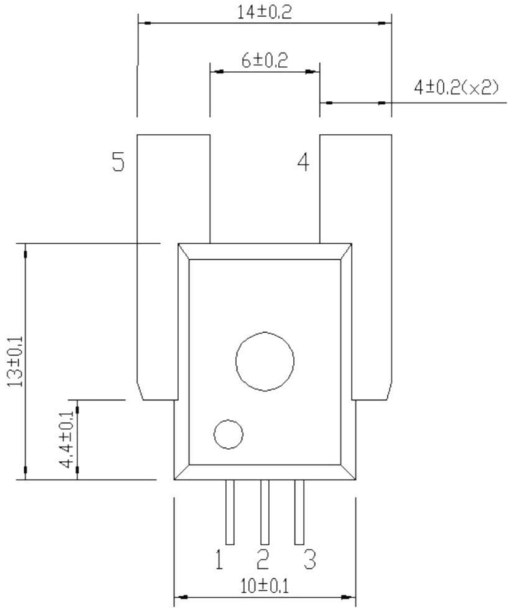
Parameter	Symbol	Condition	Min	Typ.	Max	Unit
标称参数 Nominal parameters						
原边电流测量范围 Primary current measurement range	I_P		0		250	A
传感器灵敏度Sensor sensitivity	$Sens_{TA}$	@V_{CC}=5V		16		mV/A
精度参数 Accuracy parameters						
灵敏度误差 Sensitivity error	E_{Sens}	@T_A=25°C;V_{CC}=5V	-1		1	%
零点电失调电压Zero-point electrical offset voltage	V_{OE}	I_P=0A, T_A=25°C	-4	±3	4	mV
		I_P=0A, T_A=-40°C ~85°C	-20	±8	20	mV
零点磁失调电流Zero point magnetic offset current	I_{OM}	I_P=0A, T_A=25°C, after excursion of 250A		250	320	mA
零点偏移电流Zero offset current	I_{OFFSET}	T_A=25°C			0.65	A
线性度误差 Linearity error	Lin_{ERR}	Of full rang	-1	0.5	1	%
总输出误差Total output error	$E_{TOT(HT)}$	Full scale of I_P, T_A=25°C~85°C	-2		2	%
	$E_{TOT(LT)}$	Full scale of I_P, T_A=-40°C~25°C	-2		2	%

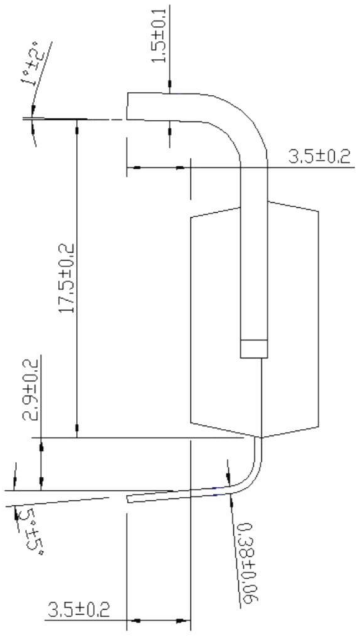
标准（PFF）封装尺寸图 Standard (PFF) package size drawing





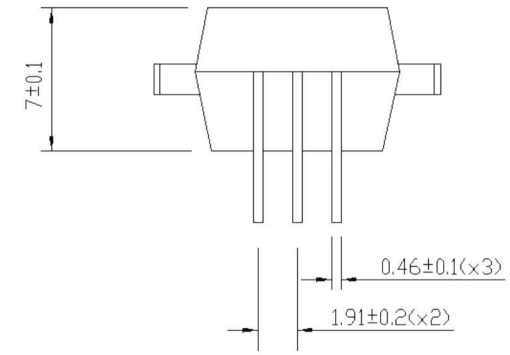
PCB设计示意图

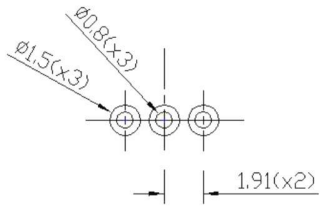




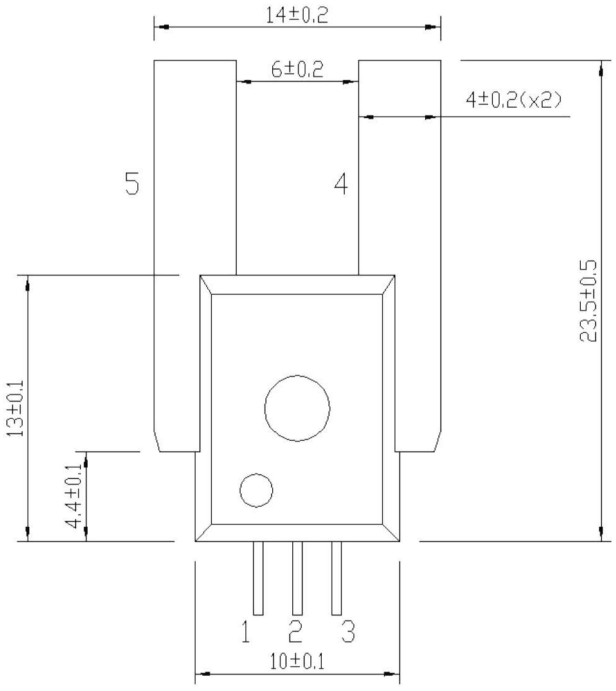
Terminals	Definitions
1	Vcc
2	GND
3	Vout
4	IP+
5	IP-

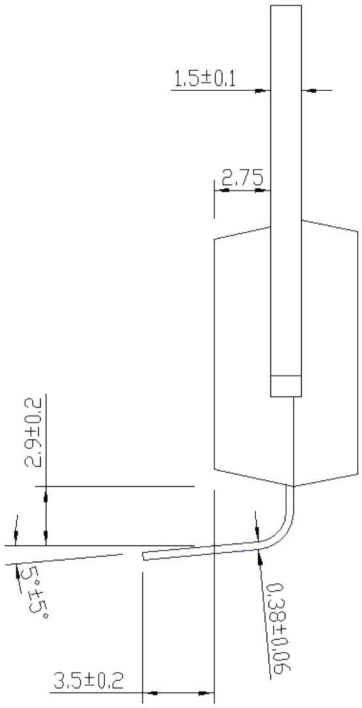
PSF封装尺寸图PSF package dimensions





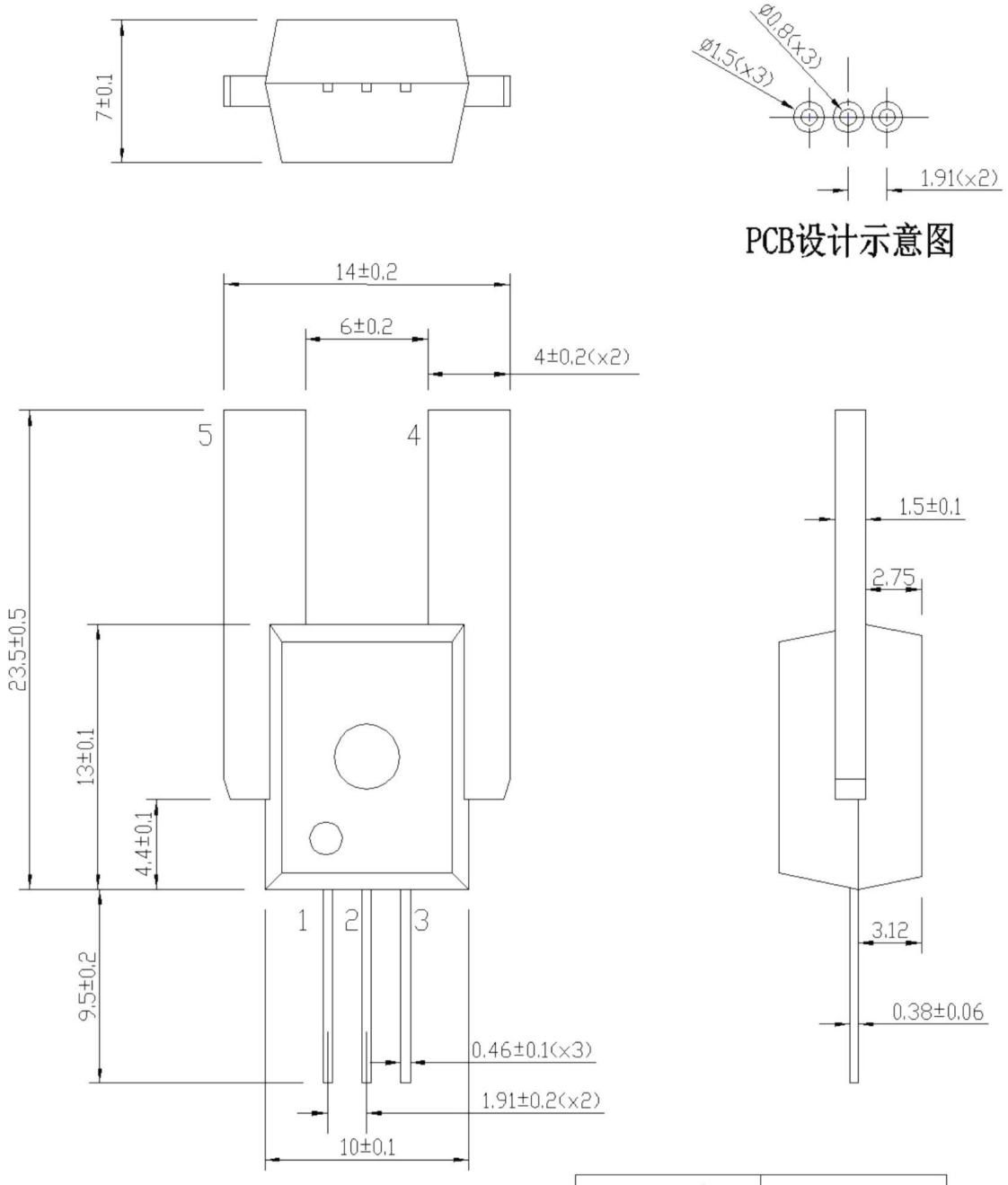
PCB设计示意图





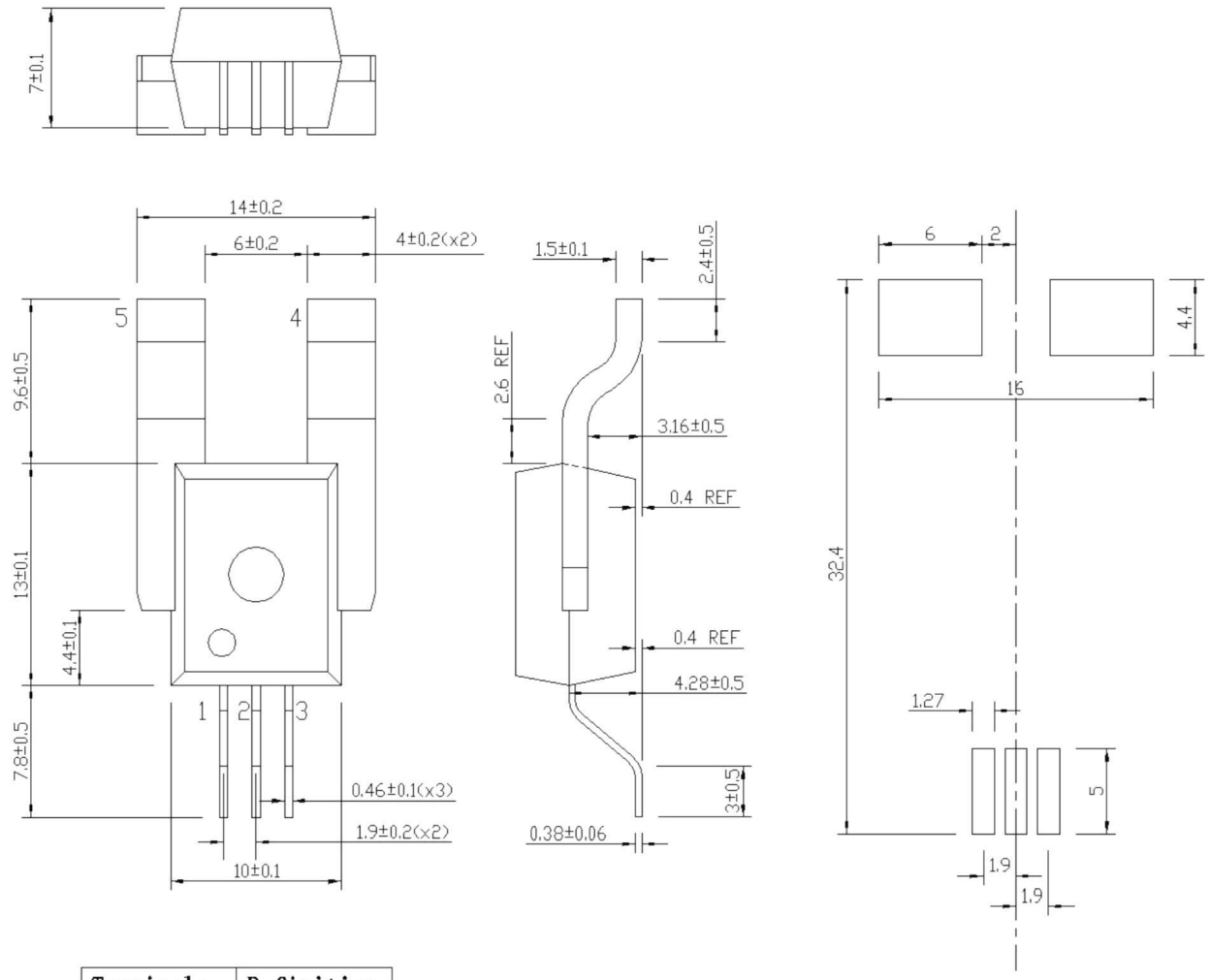
Terminals	Definitions
1	Vcc
2	GND
3	Vout
4	IP+
5	IP-

PSS封装尺寸图PSS package dimensions



Terminals	Definitions
1	Vcc
2	GND
3	Vout
4	IP+
5	IP-

SMT封装尺寸图 SMT package size drawing



Terminals	Definitions
1	Vcc
2	GND
3	Vout
4	IP+
5	IP-

PCB设计示意图

性能参数定义 Performance parameter definition ：

●**静态输出电压(QVO)**：在无明显磁场B = 0 G状态下的传感器输出电压V_{QVO}

-xR：V_{QVO}和增益与电源电压V_{CC}具有恒定的比率； $V_{QVO} = V_{CC}/2$ **or** $V_{QVO} = V_{CC}/10$

-xF：V_{QVO}和增益在一定范围内不随电源电压V_{CC}变化而变化；$V_{QVO} = 2.5V$ **or** $V_{QVO} = 0.5V$

Quiescent Output Voltage (QVO): The output voltage of the sensor VQVO in the absence of an obvious magnetic field B = 0 G

-xR: VQVO and gain have a constant ratio to the supply voltage VCC; VQVo = VCC/2 or VQVo = VCC/10

-xF: VQVO and gain do not change with supply voltage VCC within a certain range; VQVo = 2. 5V or VQVo = 0. 5V

●**灵敏度Sens(Sensitivity)**：Sens是参考输出直线 $V_{OUT} = V_{QVO} + 2 \times I_p/I_{p_MAX}$的斜率，指随着电流的变化，输出的变化，其与电流的关系是：$sens = 2/I_{p\_MAX}$

Sensitivity: Sens is the slope of the reference output line VOUT = VQVO + 2 × ip/Ip_MAX which refers to the change of output with the change of current, and its relationship with current is: sens = 2/Ip_MAX

●**零点温漂(Offset with Temperature)**：由于内部部件的公差,所受应力以及散热因素，零点在工作环境温度下可能会发生偏移。

Offset with Temperature: Due to tolerances, stresses, and heat dissipation of internal components, the zero point may shift at the ambient temperature.

●**灵敏度温漂(Sensitivity with temperature)**：由于内部的温度补偿系数的影响，灵敏度在整个工作温度下会比在常温下的预期值发生变化。

Sensitivity with temperature: Due to the influence of the internal temperature compensation coefficient, the sensitivity will change at the whole operating temperature compared with the expected value at room temperature.

●**零点电失调电压(Electrical Offset Voltage)**：由于HALL元件以及内部的运算放大器本身的放大倍数的噪音引起的误差，称之为失调电压

Electrical Offset Voltage: An error caused by the amplification multiple of the HALL element and the internal op amp itself, which is called the offset voltage

●**零点磁失调电压(Magnetic Offset)**：在原边电流由最大值I_P->0时，由于传感器的磁芯材料的磁滞现象引起，在输出端产生的误差称之为零点磁失调电压

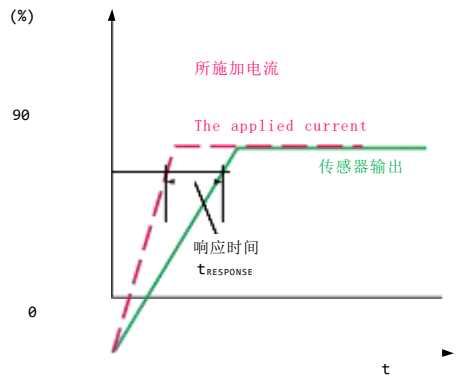
Zero Magnetic Offset Voltage: When the primary current is from the maximum IP->0, the error generated at the output is called the zero magnetic offset voltage due to the hysteresis phenomenon of the core material of the sensor

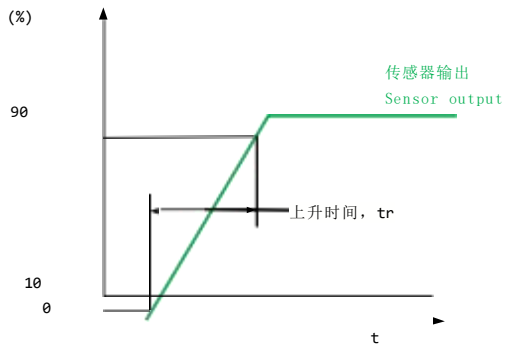
●**零点失调电压(offset voltage)**：零点失调电压是原边电流为零时的输出电压，理想值为 $V_{QVo} = V_{CC}/2$(或者为2.5V)。因此，V_{QVO}与理想值的差异称为总零点失调电压误差。此偏移误差可归因于零点电失调电压(由于ASIC内部QVO调整的分辨率)、磁偏移、温度漂移和温度引起的磁滞。
Offset Voltage: The offset voltage is the output voltage when the primary current is zero, ideally VQVo = VCC/2 (or 2.5V). Therefore, the difference between the VQVO and the ideal value is called the total zero offset voltage error. This offset error can be attributed to the zero electrical offset voltage (due to the resolution adjusted by the ASIC's internal QVO), magnetic offset, temperature drift, and temperature-induced hysteresis.

●**响应时间 (Response Time)**：传感器的响应时间指的是当所施加电流达到最终的90%与传感器输出到所施加电流的对应值之间的时间间隔
Response Time: The response time of the sensor is the time interval between when the applied current reaches 90% of the final value and when the sensor outputs to the corresponding value of the applied current

●**上升时间 (rise time)**：传感器的上升时间指的是传感器输出10%与达到最终的90%时的时间间隔

Rise Time: The rise time of the sensor is the time interval between 10% of the sensor's output and 90% of the final output





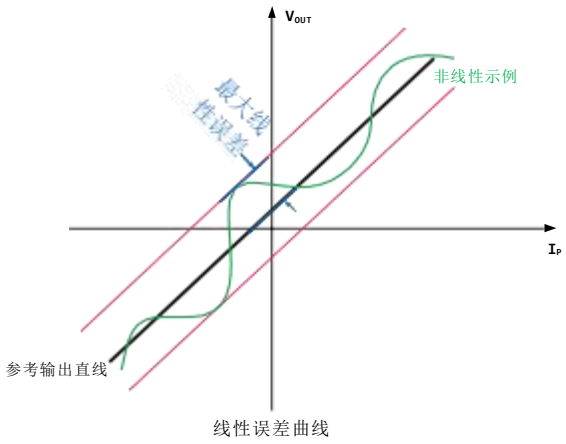
- **零点比率误差(QVO Ratiometricity error)**：供电电压 V_{CC} 从 5.0V 变化到 $4.75<V_{CC1}<5.2$

- 、5V 时， 传感器零点输出与理论值的偏差，公式定义如下：

$$E_r = （1- \frac{V_{QVO(V_{CC1})}/V_{QVO(5V)}}{V_{CC1}/5} ） \times 100\%$$

- **线性度 (Linearity)**：与参考输出直线 （-BR模式：$V_{out} = V_{CC}/2 + 2\times I_P/I_{P(MAX)}$）

(-BF模式下：$V_{OUT} = 2.5 + 2 \times I_P/I_{P(MAX)}$)的对比，最大的正向或者反向误差



线性误差曲线

- **总输出误差(Total Output Error E_{TOT})**：传感器的电流测量值与实际电流（I_P）之间的差值，公式定义为理想输出电压和实际输出电压之间的差值除以理想灵敏度：

Total Output Error ETOT: The difference between the sensor's current measurement and the actual current (IP), which is defined as the difference between the ideal output voltage and the actual output voltage divided by the ideal sensitivity

$$E_{TOT(I_P)} = \frac{V_{I_{OUT}(I_P)} - V_{I_{OUT(ideal)}(I_P)}}{Sens_{(ideal)} \times I_P}$$

$$V_{I\,OUT(ideal)(IP)} = V_{IOUT(Q)} + (sens_{(ideal)} \times I_P)$$

在相对较高的电流下，E_{TOT} 主要是由于灵敏度误差造成的；而在相对较低的电流下，E_{TOT} 主要是由于偏置电压误差（V_{OE}）。 实际上，当 I_P 接近零时，由于偏置电压误差，E_{TOT} 接近无穷大。

At relatively high currents, ETOT is mainly due to sensitivity errors; At relatively low currents, ETOT is mainly due to bias voltage error (VOE). In fact, when the IP is close to zero, the ETOT is close to infinity due to the bias voltage error

注意事项 Precautions：

1. 错误的接线可能导致传感器损坏。传感器接 5V 电源后，被测电流从传感器箭头方向穿过，即可在输出端测得相对应的电压值。

Incorrect wiring can cause damage to the sensor. After the sensor is connected to the 5V power supply, the measured current passes through the direction of the sensor arrow, and the corresponding voltage value can be measured at the output end.

2. -BR：输出电压 V_{OUT} 是与供电电压 V_{CC} 成正比例关系，$V_{OUT} = {V_{CC}}/2 + 2 \times {I_p}/{I_{P(MAX)}}$，供电电压变化，会引起 V_{OUT} 等比例的变化。

-BR: The output voltage VOUT is proportional to the supply voltage VCC, VOUT = VCC⁄2 + 2 × Ip⁄I, the supply voltage changes

, which causes a change in VOUT proportions.

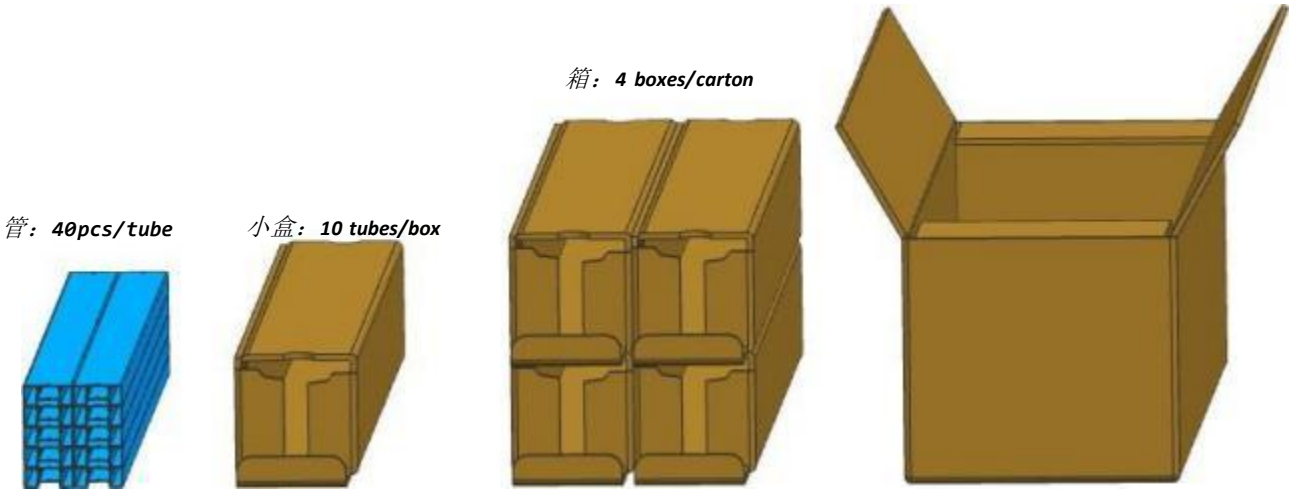
例如：V_{CC} 范围 4.75V~5.25V；对应 0A 下的静态输出电压 V_{QVO} 输出范围为 2.375V~2.625V 。满量程 $V_{OUT(IPMAX)}$的输出范围为 4.375V~4.625V。

For example: VCC range 4.75V~5.25V; Corresponding to the quiescent output voltage VQVO at 0A, the output range is 2.375V~2.625V. The output range of full-scale VOUT(IPMAX) is 4.375V~4.625V.

-BF模式：零点输出电压 V_{QVO}=2.5V，增益固定为 2V，输出曲线为：$V_{OUT} = 2.5 + 2 \times {}^{Ip}/_{Ip(MAX)}$ 例如：V_{CC}范围 4.75V~5.25V；对应 0A下的静态输出电压 V_{QVO}输出为 2.5V；满量程 $V_{OUT(IPMAX)}$的 输出恒定为 4.5V。

-BF mode: zero output voltage VQVO=2.5V, gain fixed at 2V, output curve is: VOUT = 2. 5 + 2 × Ip/Ip(MAX) For example: VCC range 4.75V~5.25V; Corresponding to a quiescent output voltage at 0A VQVO output is 2.5V; The output of the full-scale VOUT(IPMAX) is constant at 4.5V.

包装信息 Packaging information ：



版本历史 Version history ：

版本号 Version number	变更日期 Date of change	备注 remark
V1	2023/3/5	初版 first edition
V1.1	2023/10/12	修改公式，增加符合AECQ100 Modify the formula to add a AECQ100 that conforms to it
V1.2	2023/12/19	订正错误信息 Correction of error messages
V1.3	2024/05/24	更新供电电压信息 Update the supply voltage information
V1.4	2024/08/12	低内阻增加具体值100μΩ The low internal resistance increases by 100 μΩ
V1.5	2024/08/28	增加UL标志 UL mark added