GS803SC-3 Linear Hall-Effect IC

线性霍尔 IC GS803SC-3

- 线性砷化镓与硅基混合霍尔 IC

  GaAs + Si Hybrid Linear Hall-Effect IC

- 4.5V~5.5V 供电电压范围，最高耐压 20V

  Single power supply：VCC 4.5V ~ 5.5V (Maximum withstand voltage 20V)

- 比例输出模式

  Ratiometric Output

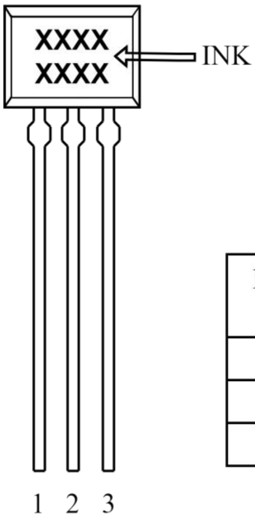
- -40~150℃使用环境

  Wide ambient Temperature Range : Ta -40℃ ~ 150℃

- 快速响应兼具宽带宽

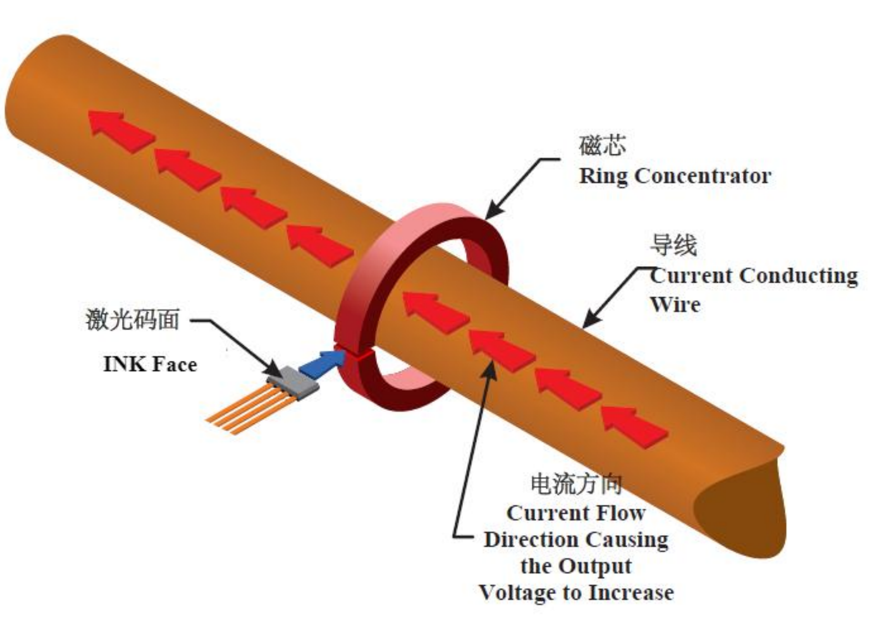
  Quick response for magnetic field with wide bandwidth

引脚定义 Pinning Define

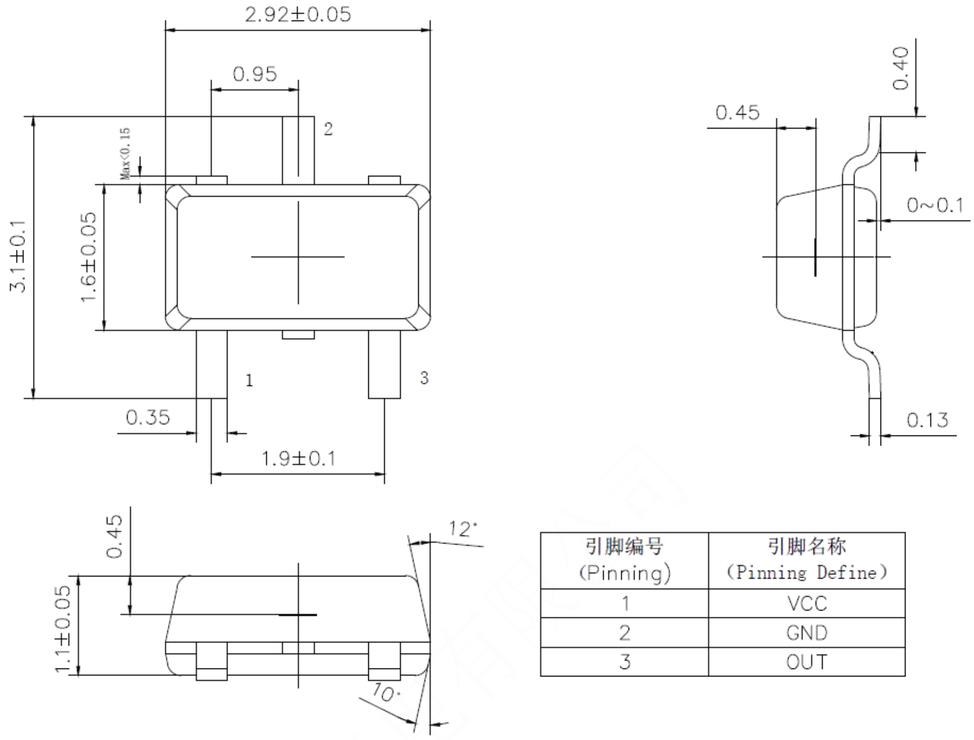


Pinning 引脚	Pinning Define 引脚定义
1	VCC
2	GND
3	VOUT

应用场景 Application scenario



外形尺寸图 Dimensional Drawing (Unit MM)



引脚编号 (Pinning)	引脚名称 (Pinning Define)
1	VCC
2	GND
3	OUT

备注 Note:

未标识的尺寸公差为±0.05mm，角度的公差为±1°

Unmarked tolerances are controlled according to ±0.05mm while the Angle tolerance is ±1°.

选型指南 Selection Guide

Table 1. GS803SC-3 Selection Guide

型号 Part Number	标准灵敏度 Sensitivity (Typ)(mV/GS)
GS80302SC-3	2.5
GS80309SC-3	9
GS80309SC-3R	-9

最大绝对参值 Absolute Maximum Rating

Table 1. GS803SC-3 Working conditions

特性 **Characteristics**	符号 **Symbol**	条件 **Condition**	最小值 **Min**	标准值 **Typ**	最大值 **Max**	单位 **Unit**
输入电压 Supply Voltage	**VCC**	T_a = 25℃	4.5		5.5	V
极限耐压 Ultimate withstand Vltage	**VCC_{Max}**				20	V
输出电流 Output Current	I_{out}	T_a = 25℃	-10		10	mA
输出电压 Output Voltage	V_{out}	T_a = 25℃	-0.3		**VCC**+0.3	V
存储温度 Storage Temp.	T_s		-40		150	℃
工作温度 Operation Temp.	T_a		-40		150	℃

工作参数 Operation Conditions

Table 2. Electric and magnetic characteristics Ta=-40 to 125℃

特性 **Characteristics**	符号 **Symbol**	条件 **Condition**	最小值 **Min**	标准值 **Typ**	最大值 **Max**	单位 **Unit**
供电电压 Supply Voltage	V_{CC}	Ta = 25℃	4.5	5	5.5	V
电流 Current Consumption	I_{CC}	Ta=25℃	-	6.5	12	mA
可编程灵敏度范围 Sensitivity Range	Sens	GS80302SC-3，Ta = 25℃	2.4	2.5	2.6	mV/GS
		GS80309SC-3，Ta = 25℃	8.73	9	9.27	
		GS80309SC-3R，Ta = 25℃	-9.27	-9	-8.73	
响应时间 Response Time	T_r①②	C=20pF@Ta = 25℃	-		2	µs
信号带宽 Signal bandwidth	B_w		-	250	500	KHz
负载电容 Load Capacitance	C_L	Ta = 25℃,VDD to GND		100n	200n	F
		Ta = 25℃,Vout to GND		100p		
零点输出 Quiescent Voltage	V_0	VCC=5V@25℃	2.49	2.5±0.005	2.51	V
零点温漂 Quiescent Voltage drift through temperature	△V0	GS80302SC-3	-0.03		0.03	V
		GS80309SC-3	-0.015		0.015	
		GS80309SC-3R	-0.015		0.015	
灵敏度温漂 Sensitivity drift through temperature	$Sens_{TC}$	-40℃~125℃	-1.5	±0.5	1.5	%
输出饱和电压 Output Saturation Voltage	$V_{out\text{-}SatH}$	Iout = - 0.5mA	VCC-0.25			V
	$V_{out\text{-}SatL}$	Iout = - 0.5mA			0.25	
灵敏度比率误差 Error of sensitivity	$Rat_{ERR}Sens$	**VCC** in range 4.85~5.15V @-40~125℃	-0.5		0.5	%
零点比率误差 Error of Quiescent Voltage	$Rat_{ERR}V_0$	**VCC** in range 4.85~5.15V @-40~125℃	-0.5		0.5	%
线性误差 Linearity Error	Lin_{ERR}	VCC=5V@-40~125℃	-0.5	±0.1	0.5	%

Note:

输出引脚上的负载电容为 100pF，信号带宽为 200kHz，负载电容可根据需求的带宽进行调节

The recommended load capacitance on the Vout pin is 100pF and the signal bandwidth is 200kHz. The load capacitance can be adjusted according to the required signal bandwidth.

特性定义 Characteristics Definitions

1. Sens 【mV/GS】灵敏度 Sensitivity

   灵敏度定义为磁感应输出与磁感应强度的比值，即加磁输出减去零点输出后的数值与磁感应强度的比值

   Sensitivity is defined as the slope of the approximate straight line calculated by the least square method, using data of OUT voltage (Vout) when the magnetic flux density (B) is swept within the range of input magnetic flux density (Bin).

$$\mathrm{Sens} = \frac{\mathrm{VOUT(B)} - \mathrm{V(0)}}{\mathrm{B}}$$

2. $\mathrm{Sens_{TC}}$ 【%】灵敏度温漂 Sensitivity drift through temperature

   灵敏度温漂定义为温度导致的灵敏度变化值与校准温度（常温 25℃）下的灵敏度的比值

   Sensitivity temperature drift is defined as the ratio of the value of the sensitivity change due to temperature to the sensitivity at the calibrated temperature（25℃）.

$$\mathrm{Sens_{TC}} = \frac{\Delta\ \mathrm{Sens}}{\mathrm{Sens(25℃)}} * 100 = \frac{\mathrm{Sens(T)} - \mathrm{Sens(25℃)}}{\mathrm{Sens(25℃)}} * 100$$

3. $\mathrm{Lin_{ERR}}$【%】线性误差 Linearity Error

   线性误差定义为最大垂直偏差（MFD）与最大量程（F.S.）的比值

   最大垂直偏差（MFD）指得是实际输出与拟合输出曲线的在同一磁感应强度下的最大误差即 Vout（B 实际）-Vout（B 拟合）。定义公式如下所示：

   Linearity error is defined as the ratio of the maximum perpendicular deviation (MFD) to the full scale (F.S.), where MFD is the maximum difference between the OUT voltage (Vout) and the approximate straight line calculated in the sensitivity definition. Definition formula is shown in below:

$$\mathrm{Lin_{ERR}} = 100 * \frac{\mathrm{MFD}}{\mathrm{F.S.}} = 100 * \frac{\mathrm{MFD}}{\mathrm{V_H - V_L}}$$

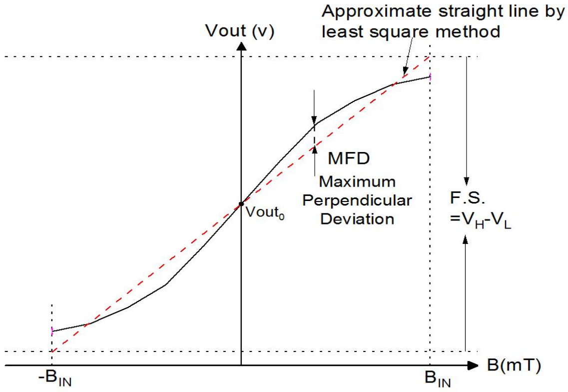


Figure 1. Output characteristics of GS803SC-3

4. 灵敏度比率误差 $\mathrm{Rat_{ERR}Sens}$ [%]以及零点比率误差 $\mathrm{Rat_{ERR}V_0}$ [%]（仅对比例输出模式有效）

   Ratiometric output error of sensitivity $\mathrm{Rat_{ERR}Sens}$ [%] and rationmetric output error of Quiescent voltage $\mathrm{Rat_{ERR}V_0}$ [%]（Only valid for proportional output mode）.

   GS803SC-3 器件具有比例输出。这意味着静态电压输出（V_0）和磁灵敏度（Sens）与电源电压（VCC）成正比。换句话说，当电源电压增加或减少一定百分比时，每个特性也增加或减少相同的百分比。误差是测量到的相对于 5v 的电源电压变化与测量到的每个特性变化之间的差值。

   The GS803SC-3 device features ratiometric output. This means that the Quiescent Voltage Output, V_0, magnetic sensitivity, Sens are proportional to the Supply Voltage, VCC. In other words, when the supply voltage increases or decreases by a certain percentage, each characteristic also increases or decreases by the same percentage. Error is the difference between the measured change in the supply voltage relative to 5 V, and the measured change in each characteristic.

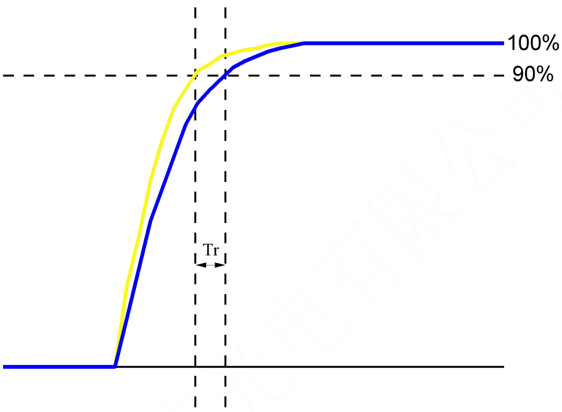
$$\mathrm{Rat_{ERR}Sens} = \left[1 - \frac{\mathrm{Vout(VCC)}}{\mathrm{Vout(5V)}} * \frac{5V}{\mathrm{VCC}}\right] * 100$$

$$\mathrm{Rat_{ERR}V0} = \left[1 - \frac{\mathrm{V_0(VCC)}}{\mathrm{V_0(5V)}} * \frac{\mathrm{5V}}{\mathrm{VCC}}\right] * 100$$

5. T_r [μs] 上升响应时间 Rise response time

响应时间定义为在磁感应强度脉冲输入下，从输入磁场的 90%到输出电压的 90%的时间延迟。

Rise response time is defined as the time delay from the 90% of input magnetic field (B) to the 90% of the OUT voltage (Vout) under the pulse input of magnetic flux density.



Rise response time Tr

Figure 2. Definition of response time

6. $\mathrm{Sym_{ERR}}$ 【%】灵敏度对称性误差 Symmetry Sensitivity Error

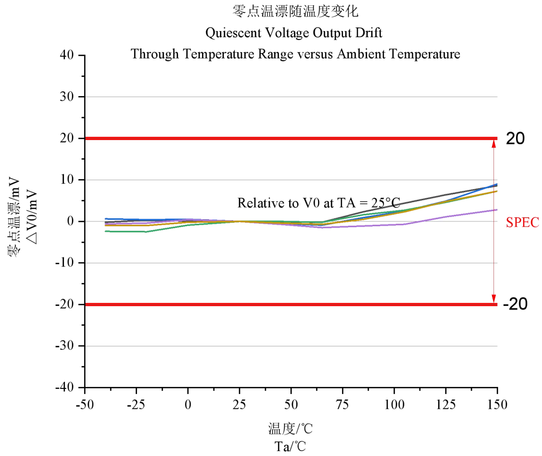
器件在任意两个大小相等、极性相反磁场下的灵敏度是大小相等的。

The magnetic sensitivity of device is constant for any two applied magnetic fields of equal magnitude and opposite polarities. $\mathrm{Sym_{ERR}}$ (%) is measured and defined as:

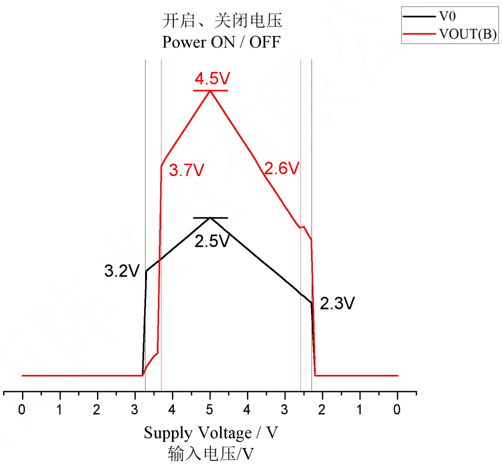
$$\mathrm{Sym_{ERR}} = \left(1 - \frac{\mathrm{Sens_{BPOS}}}{\mathrm{Sens_{BNEG}}}\right) * 100\%$$

输出特性 Output Characteristics

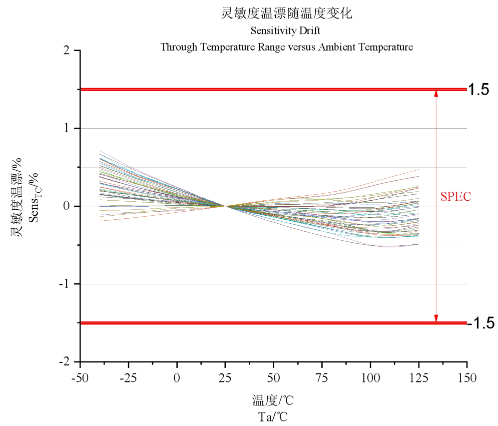
1. 零点温漂 Static voltage temperature drift



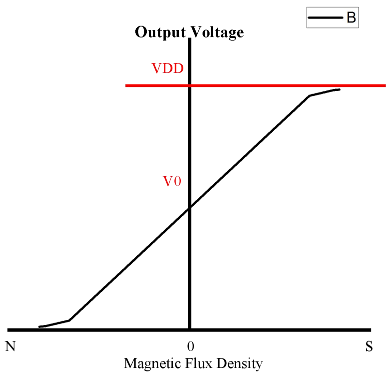
2. 开启/关闭电压 Power On /Off



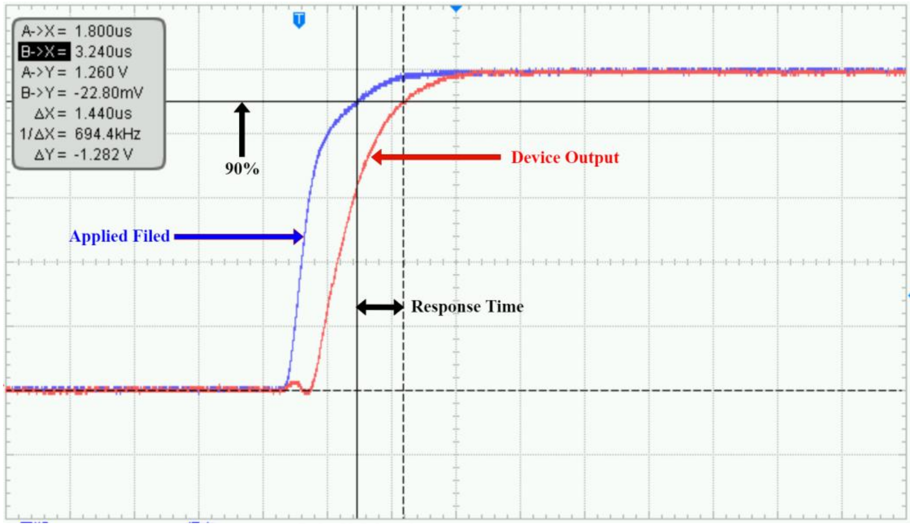
3. Sens$_{TC}$ 灵敏度温漂 Sensitivity drift through temperature（Sens=10mV/GS、B=200GS）



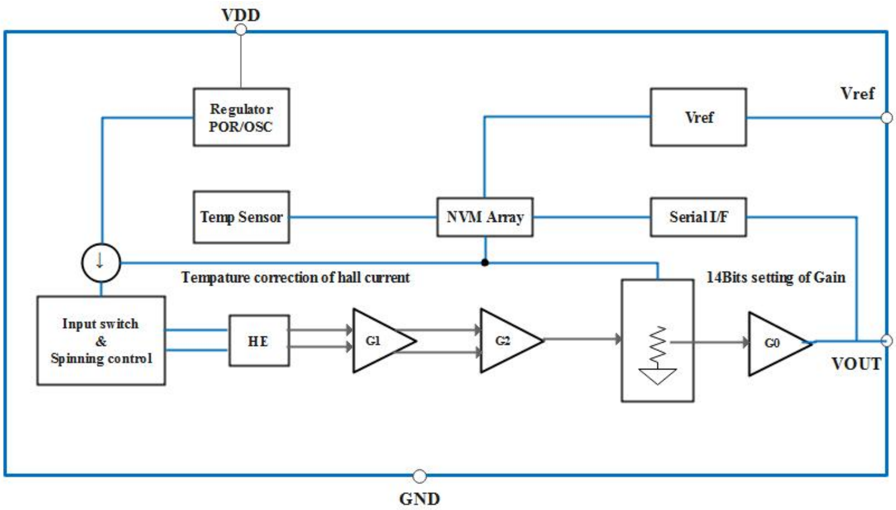
4. 输出电压-磁感应强度 Sensitivity as a function of magnetic flux density **B.**



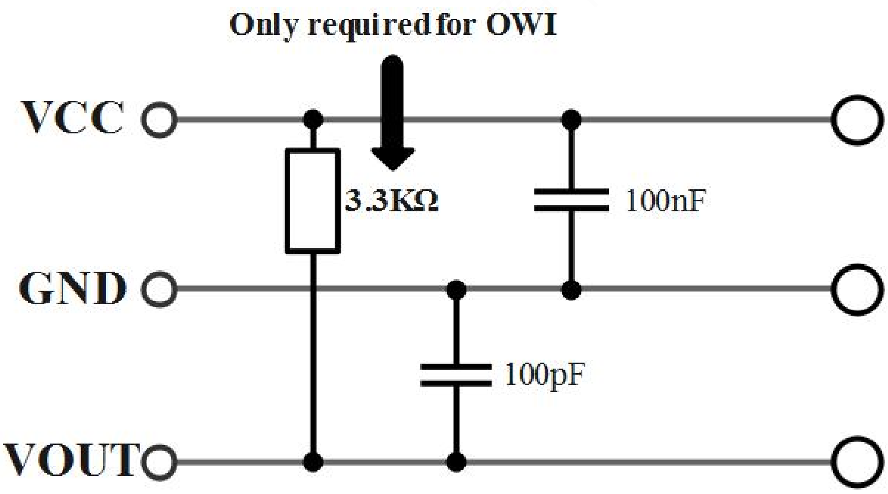
5. Tr 响应时间 Response Time（Sens=10mV/GS、B=50GS、C_L=1nF）



功能框图 Function Block Diagram



应用电路 Application Circuits



Note：

3.3 kΩ电阻只需要在进行 OWI 通讯时使用，编程结束后可去除

3.3 kΩ pull-up resistance is required for OWI communication protocol during Vout calibration. After calib-ration, the pull-up resistance can be removed.

修订履历 Revision History

版本 Version	日期 Date	修订内容 Description
1.0	2022.5.12 May 12,2022	初版发行 Initial release