



GS303 Programmable Linear Hall-Effect IC

可编程线性霍尔 IC GS303

- 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

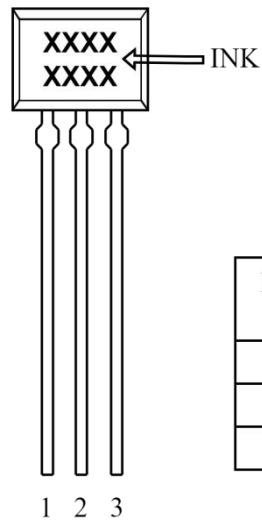
- -40~150°C 使用环境

Wide ambient Temperature Range : Ta -40°C ~ 150°C

- 快速响应兼具宽带宽

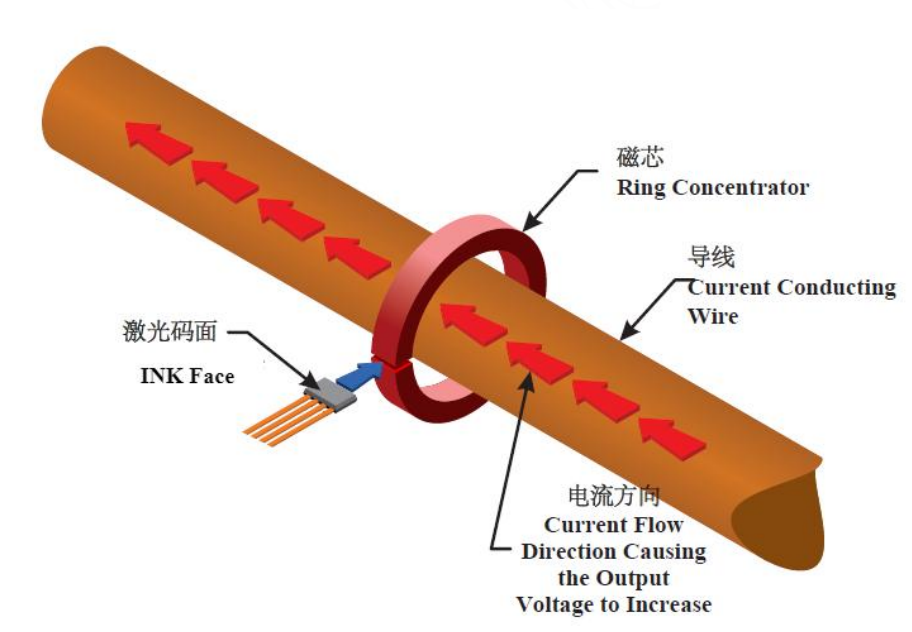
Quick response for magnetic field with wide bandwidth

引脚定义 Pinning Define

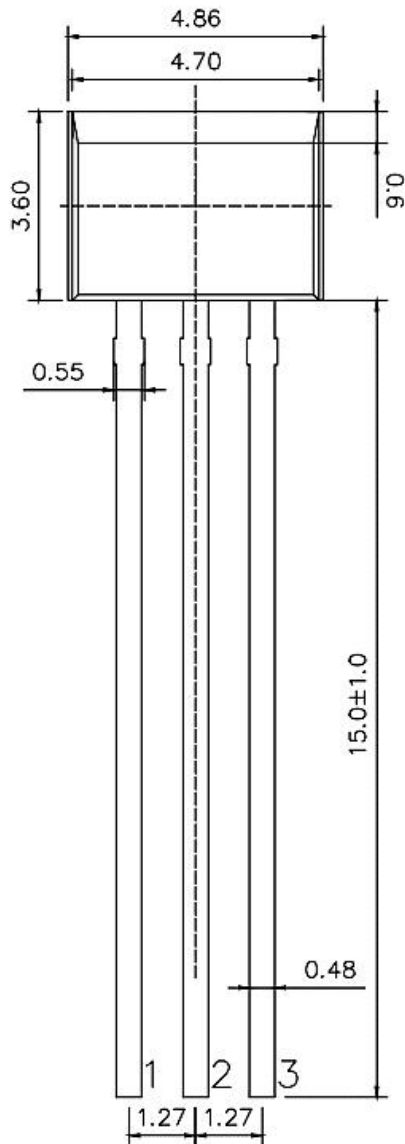


Pinning 引脚	Pinning Define 引脚定义
1	VCC
2	GND
3	VOUT

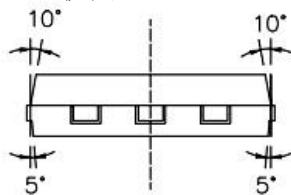
应用场景 Application scenario



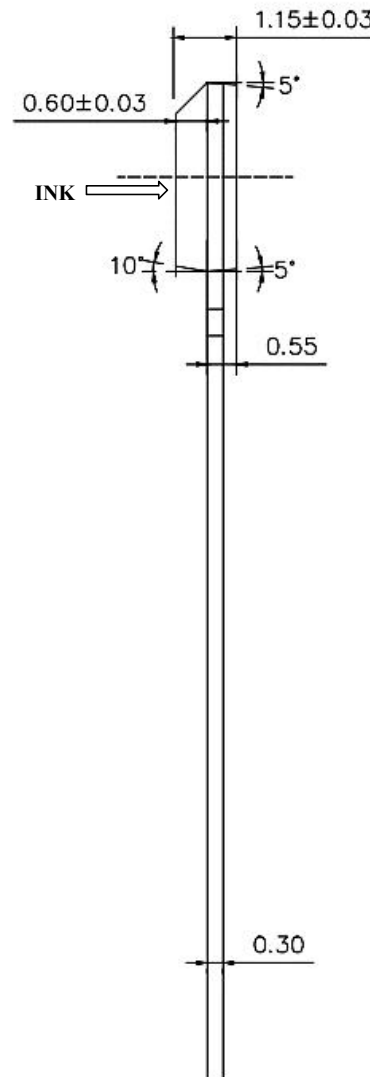
外形尺寸图 Dimensional Drawing (Unit MM)



主视图 Main view



底视图 Bottom view



右视图 Right view

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°.

最大绝对参值 Absolute Maximum Rating

Table 1. GS303 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℃	0.1		VCC-0.1	V
存储温度 Storage Temp.	T _s		-40		150	℃
工作温度 Operation Temp.	T _a		-40		150	℃

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
灵敏度 Sensitivity	Sens	编程前	0.5		1.5	mV/GS
		编程后	1.5		10	mV/GS
灵敏度温漂 Sensitivity drift through temperature	Sens _{TC}	-40℃~125℃	-1.5	±0.5	1.5	%
响应时间 Response Time	T _r	C=100pF@Ta = 25℃	-		2	μs
信号带宽 Signal bandwidth	B _w		-		200	KHz
负载电容 Load Capacitance	C _L	Ta = 25℃	-	100p	-	F
零点输出 Quiescent Voltage	V ₀	编程前	2.400		2.600	V
		编程后	2.490	2.500±0.005	2.510	
零点温漂 Quiescent Voltage drift through temperature	V _{0TC}	Ta=-40~25℃	-7		7	G
		Ta=25~150℃	-10		10	
输出饱和电压 Output Saturation Voltage	V _{out-SatH}				VCC-0.1	V
	V _{out-SatL}		0.1			
灵敏度比率误差 Error of sensitivity	Rat _{ERR} Sens	VCC in range 4.75~5.25V @-40~150℃	-0.5	±0.1	0.5	%
零点比率误差 Error of Quiescent Voltage	Rat _{ERR} V ₀	VCC in range 4.75~5.25V @-40~150℃	-0.5	±0.1	0.5	%
线性误差 Linearity Error	Lin _{ERR}	VCC=5V@-40~150℃	-0.5	±0.1	0.5	%

Note:

G 代表 GS，零点温漂与灵敏度相关，零点温漂算法如下：

$$V_{0TC} = \Delta V_0 / \text{Sens} = (V_0(T) - V_0(25^\circ\text{C})) / \text{Sens}$$

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).

$$\text{Sens} = \frac{V_{\text{OUT}}(B) - V(0)}{B}$$

2. 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℃) .

$$\text{Sens}_{\text{TC}} = \frac{\Delta \text{Sens}}{\text{Sens}(25^{\circ}\text{C})} * 100 = \frac{\text{Sens}(T) - \text{Sens}(25^{\circ}\text{C})}{\text{Sens}(25^{\circ}\text{C})} * 100$$

3. 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:

$$\text{Lin}_{\text{ERR}} = 100 * \frac{\text{MFD}}{\text{F.S.}} = 100 * \frac{\text{MFD}}{V_H - V_L}$$

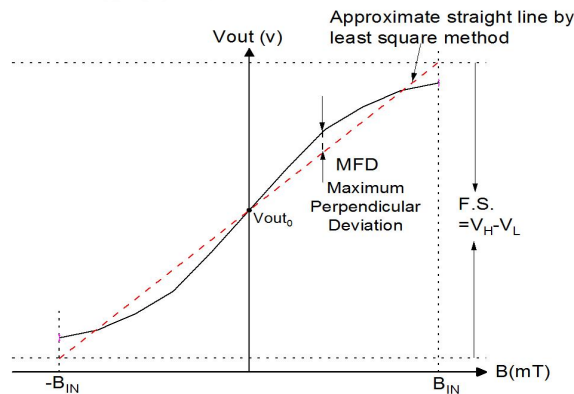


Figure 1. Output characteristics of GS303

4. 灵敏度比率误差 Rat_{ERR}Sens [%]以及零点比率误差 Rat_{ERR}V₀ [%]（仅对比例输出模式有效）

Ratiometric output error of sensitivity Rat_{ERR}Sens [%] and rationmetric output error of Quiescent voltage Rat_{ERR}V₀ [%]（Only valid for proportional output mode）.

GS303 器件具有比例输出。这意味着静态电压输出（V₀）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 GS303 device features ratiometric output. This means that the Quiescent Voltage Output, V₀, 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.

$$\text{Rat}_{\text{ERRSens}} = \left[1 - \frac{V_{\text{out}}(\text{VCC})}{V_{\text{out}}(5\text{V})} * \frac{5\text{V}}{\text{VCC}} \right] * 100$$

$$\text{Rat}_{\text{ERRV0}} = \left[1 - \frac{V_0(\text{VCC})}{V_0(5\text{V})} * \frac{5\text{V}}{\text{VCC}} \right] * 100$$

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.

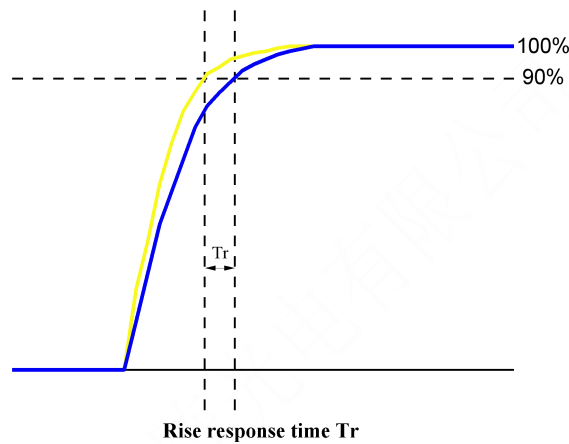


Figure 2. Definition of response time

6. $V_{\text{out-SatH}}$ 、 $V_{\text{out-SatL}}$ 饱和输出电压 Saturation Output Voltage

输出可以随着磁场强度的变化在最大值 $V_{\text{SAT(HIGH)}}$ 和最小值 $V_{\text{SAT(LOW)}}$ 之间摆动。

The output can oscillate between the maximum $V_{\text{out-SatH}}$ and minimum $V_{\text{out-SatL}}$ as the magnetic field strength changes.

7. Sym_{ERR} 【%】灵敏度对称性误差 Symmetry Sensitivity Error

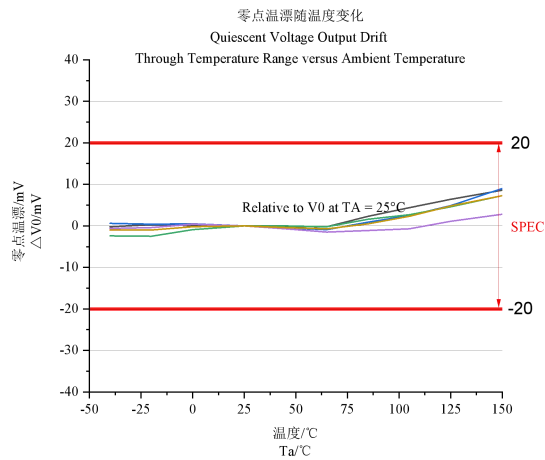
器件在任意两个大小相等、极性相反磁场下的灵敏度是大小相等的。

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

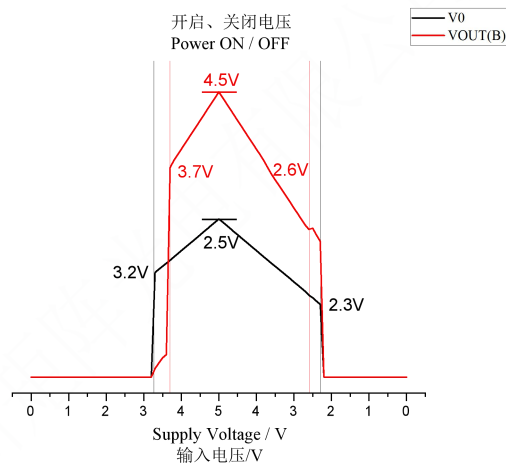
$$\text{Sym}_{\text{ERR}} = \left(1 - \frac{\text{Sens}_{\text{BPOS}}}{\text{Sens}_{\text{BNEG}}} \right) * 100\%$$

输出特性 Output Characteristics

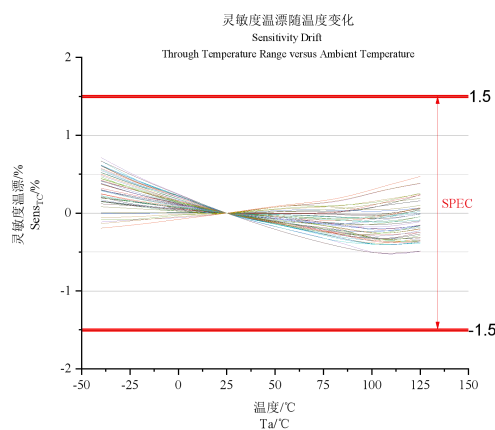
1. 零点温漂 Static voltage temperature drift (Sens=10mV/GS)



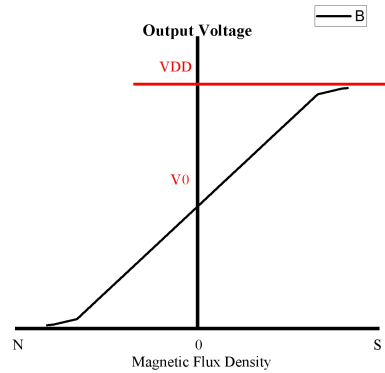
2. 开启/关闭电压 Power On /Off



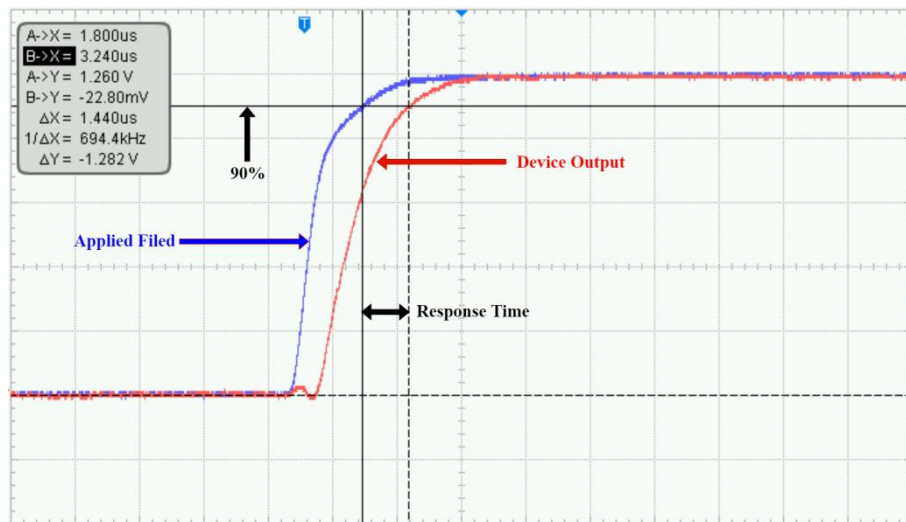
3. Sens_{TC} 灵敏度温漂 Sensitivity drift through temperature (Sens=10mV/GS、B=200GS)



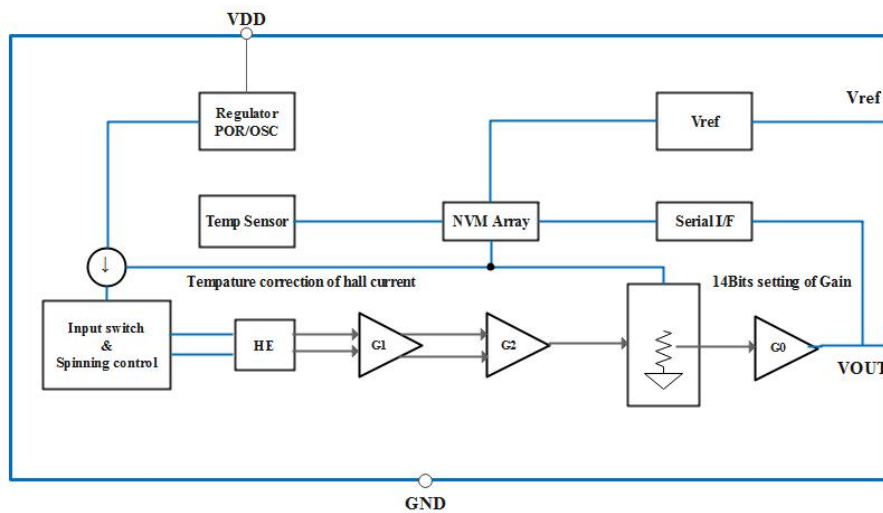
4. 输出电压-磁感应强度 Sensitivity as a function of magnetic flux density **B**.



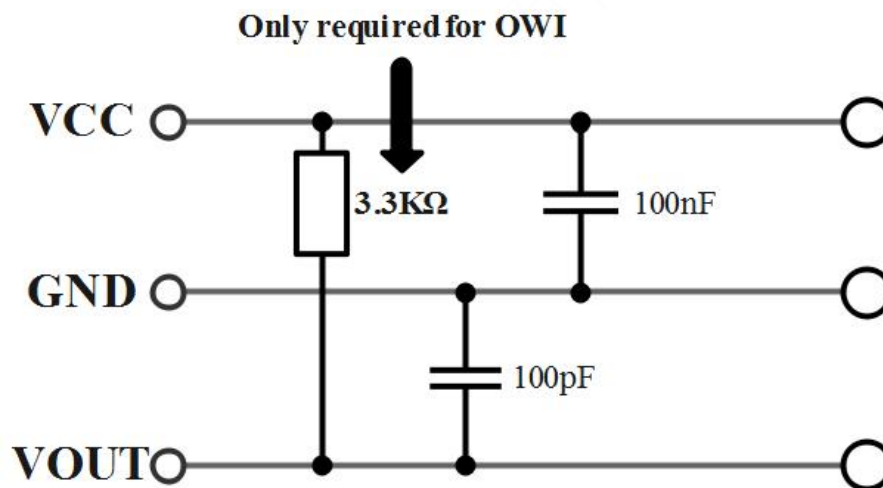
5. T_r 响应时间 Response Time (Sens=10mV/GS、B=50GS、 $C_L=1nF$)



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 calibration, 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	2022.3.20 March 20,2022	初版发行 Initial release