

氮化镓线性霍尔传感器_MS-GC601

GC601 是一款基于氮化镓 (GaN) 宽禁带半导体的高性能线性霍尔传感器，具有卓越的高电子迁移率和耐高温特性，传感器极低的温度系数与极高线性度适用于苛刻环境中的磁场监测应用。

产品特性

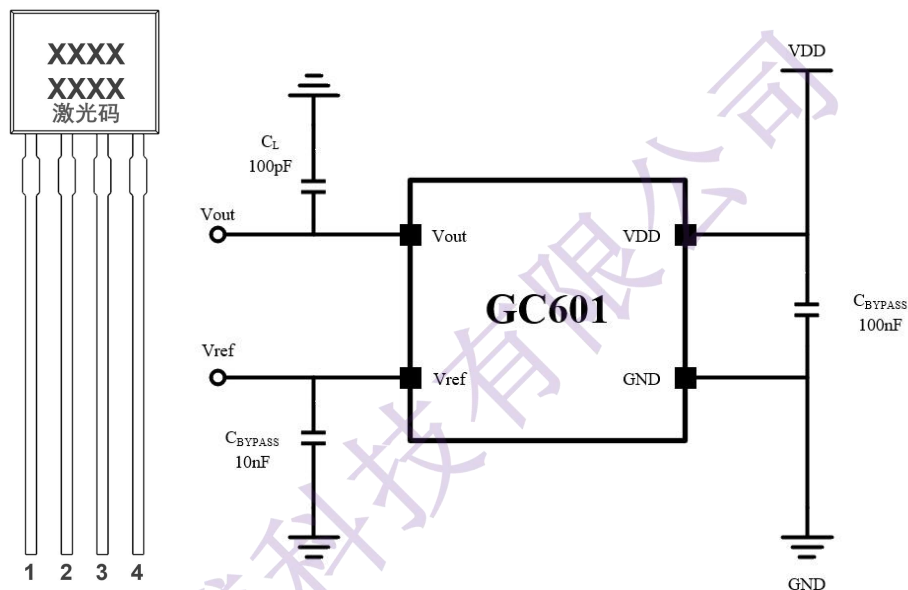
- 可编程线性霍尔 IC
- 线性度：<0.2% FS
- 灵敏度：±0.01 ~ ±20 mV/Gs
- 全温区精度：<1% FS
- 常温精度：<0.2%
- 输出范围：2.5±2 V / 1.65±1.35 V
- 工作温度：-40°C~125°C
- 标准行业封装：TO-94

应用领域

- 电流检测
- 电机控制
- 磁编码器
- 1D 线性位置检测
- 液位传感
- 振动传感

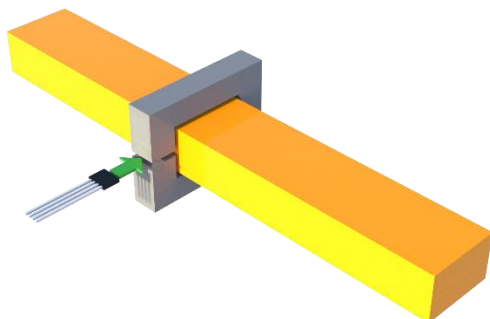


引脚定义及应用电路

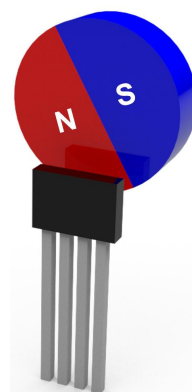


编号 No.	符号 Symbol	描述 Description
1	VDD	输入电压 Power input
2	GND	接地 Ground
3	OUT	输出电压 Single output
4	V _{ref}	参考电压 Reference voltage

典型应用场景



电流传感器



转速传感器

最大绝对值

项目 Item	符号 Symbol	条件 Conditions	值 Value	单位 Unit
静电保护 ESD HBM protection	V_{ESD}	HBM ⁽¹⁾	±3000	V
		CDM ⁽²⁾	±2000	V
最大输入电压 Max. Input Voltage	V_{DD}	$T_a = 25^{\circ}\text{C}$	6.5	V
最大输出电压 Max. Output Voltage	V_{OUT}	$T_a = 25^{\circ}\text{C}$	VCC-0.1	V
最小输出电压 Min. Output Voltage	V_{OUT}	$T_a = 25^{\circ}\text{C}$	0.1	V
最大输出电流 Max. Output Current	I_{OUT}	$T_a = 25^{\circ}\text{C}$	45	mA
工作温度 Operating Temp. Range	T_{opr}		-40~125	°C
保存温度 Storage Temp. Range	T_{STG}		-40~125	°C

电气特性

特性 Characteristics	符号 Symbol	条件 Conditions	最小值 Min.	典型值 Typ.	最大值 Max.	单位 Unit
供电电压 Supply Voltage	V_{CC}	$T_a = 25^{\circ}\text{C}$	3	3.3 / 5	5.5	V
电流 Current Consumption	I_{CC}	In Programming @ $T_a = 25^{\circ}\text{C}$			33	mA
		In normal operation @ $T_a = 25^{\circ}\text{C}$		6	11	mA
可编程灵敏度范围 Sensitivity Range	Sens	$T_a = 25^{\circ}\text{C}$	0.01		20	mV/Gs
信号带宽 ⁽¹⁾ Bandwidths	B_W		50	250	600	kHz
响应时间 Response Time	t_r				1.5	μs
负载电容 Load Capacitance	C_L	$T_a = 25^{\circ}\text{C}$	10p	100p	10n	F
参考电压 Reference Voltage	V_{ref}	$T_a = 25^{\circ}\text{C}$	2.480		2.520	V
零点输出 Quiescent Voltage	V_0	$V_{CC} = 5\text{ V}@25^{\circ}\text{C}$	2.495	2.500 ± 0.002	2.505	V
		$V_{DD} = 3.3\text{ V}@25^{\circ}\text{C}$	1.645	1.650 ± 0.002	1.655	V
灵敏度温漂 Temp. Sens Drift	$T_{\text{sens-drift}}$	$T_a = -40 \sim 125^{\circ}\text{C}$	-1	± 0.3	1	%
输出饱和电压 Saturation Output Voltage	$V_{\text{out_Sat}}$	$T_a = -40 \sim 125^{\circ}\text{C}$	0.1	$\frac{1}{2} V_{CC}$	$V_{CC} - 0.1$	V
灵敏度比率误差 Error of Sensitivity	$Rat_{\text{ERR}} \text{Sens}$	V_{CC} in range 4.85~5.15V@-40~125 $^{\circ}\text{C}$	-0.5		0.5	%
零点比率误差 Error of Quiescent Voltage	$Rat_{\text{ERR}} V_0$	V_{CC} in range 4.85~5.15V@-40~125 $^{\circ}\text{C}$	-0.5		0.5	%
灵敏度对称性误差 Symmetry Sensitivity Error	Sym_{ERR}	$T_a = -40 \sim 125^{\circ}\text{C}$	-0.5	± 0.3	0.5	%
线性度误差 Linearity Error	Lin_{ERR}	$T_a = -40 \sim 125^{\circ}\text{C}$		0.1	0.2	%
总误差 Total Error	$Total\ Error$	$T_a = -40 \sim 125^{\circ}\text{C}$		0.5	1	%

电气特性 (续)

特性 Characteristics	符号 Symbol	条件 Conditions	最小值 Min.	典型值 Typ.	最大值 Max.	单位 Unit
固定输出模式 Fixed Output Mode ⁽²⁾ :						
参考电压温漂 Reference Voltage Drift Through Temperature	ΔV_{ref}	VCC = 5 V@-40~125°C	-0.03	±0.02	0.03	V
		VCC = 3.3 V@-40~125°C	-0.02	±0.015	0.02	
零点温漂 Quiescent Voltage Drift Through temperature	ΔV_0	VCC = 5 V@25~125°C	-0.015		0.015	V
		VCC = 5 V@-40~25°C	-0.03		0.01	
		VCC = 3.3 V@25~125°C	-0.012		0.012	
		VCC = 3.3 V@-40~25°C	-0.025		0.01	
零点差分温漂 Quiescent Voltage Drift Through temperature	$\Delta(V_0\text{-}V_{\text{ref}})$	VCC = 5 V@-40~125°C	-0.02	±0.01	0.02	V
		VCC = 3.3 V@-40~125°C	-0.01	±0.007	0.01	
比例输出模式 Ratiometric Output Mode ⁽³⁾ :						
参考电压温漂 Reference Voltage Drift Through Temperature	ΔV_{ref}	VCC = 5 V@-40~125°C	-0.01	±0.005	0.01	V
		VCC = 3.3 V@-40~125°C	-0.007	±0.005	0.007	
零点温漂 Quiescent Voltage Drift Through temperature	ΔV_0	VCC = 5 V@-40~125°C	-0.01	±0.005	0.01	V
		VCC = 3.3 V@-40~125°C	-0.007	±0.005	0.007	
零点差分温漂 Quiescent Voltage Drift Through temperature	$\Delta(V_0\text{-}V_{\text{ref}})$	VCC = 5 V@-40~125°C	-0.02	±0.005	0.02	V
		VCC = 3.3 V@-40~125°C	-0.01	±0.005	0.01	

Note:

- 带宽可通过编程控制
Bandwidth can be controlled through programming
- 固定输出模式：输出电压不随供电电压波动
Fixed output mode: The output voltage does not fluctuate with the supply voltage
- 比例输出模式：输出电压随供电电压波动
Ratiometric mode: Output voltage fluctuates with the supply voltage
- 差分输出:

$$\text{差分零点输出} = V_0 - V_{ref}$$

$$\text{差分灵敏度} = \frac{V_{out}(B) - V_{ref}}{B}$$

Differential Output: Quiescent Voltage output is equal to V_0 subtract V_{ref} while Magnetized Output is equal to $V_{out}(B)$ subtract V_{ref}

- 零点和灵敏度可分别设置为是否随电压变化
Static voltage and sensitivity can be set to vary with or without voltage, respectively

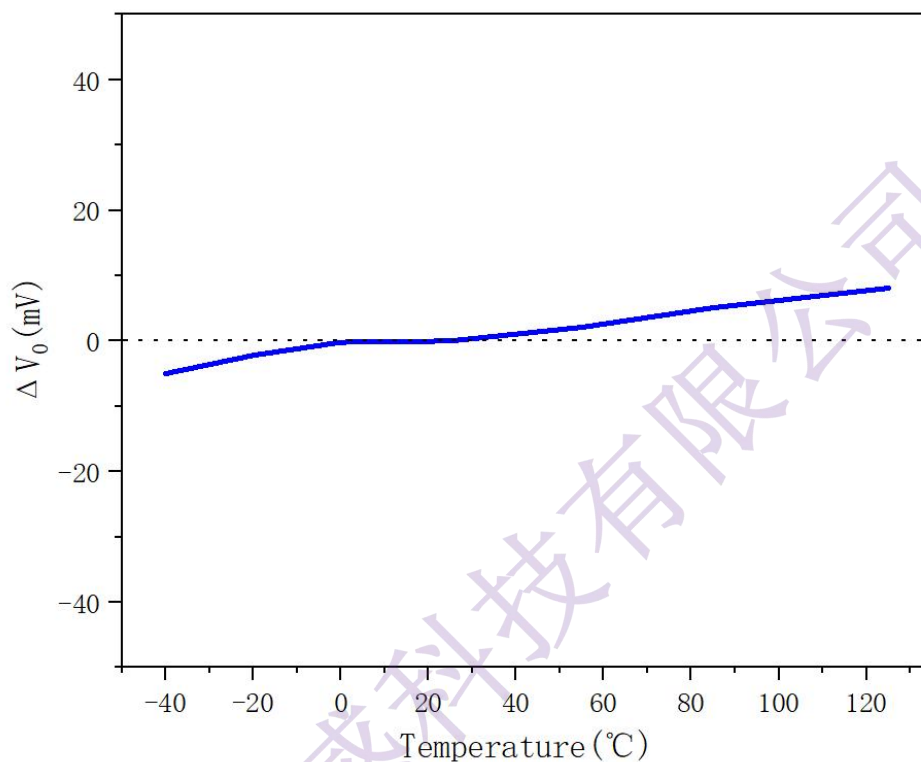
特性定义

1. 零点温漂| Zero Temp Drift 【mV】

零点输出随温度变化的偏移量。

Offset change of null output over temperature.

$$V_{0\text{drift}} = V_{0T1} - V_{025^{\circ}\text{C}}$$



2. 灵敏度|Sensitivity 【mV/Gs】

输出信号变化量与输入磁场变化量的比值。

Ratio of output signal change to applied magnetic field change.

$$Sens = \frac{V_{out}(B) - V_0}{B}$$

3. 灵敏度温漂|Sensitivity temperature Drift 【%】

灵敏度值随温度变化的偏移量。

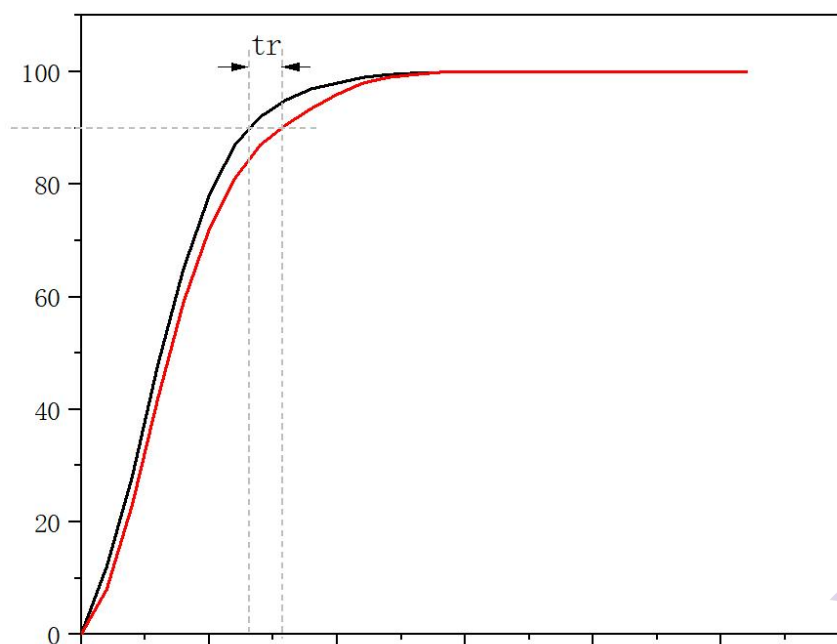
Sensitivity changes over temperature.

$$T_{sens-drift} = \frac{V_{out}(T1) - V_{out}(T1_{25^{\circ}\text{C}})}{B}$$

4. 响应时间|Response time 【μs】

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。

Time required for output to reach a specified percentage (e.g., 90%) of final value.

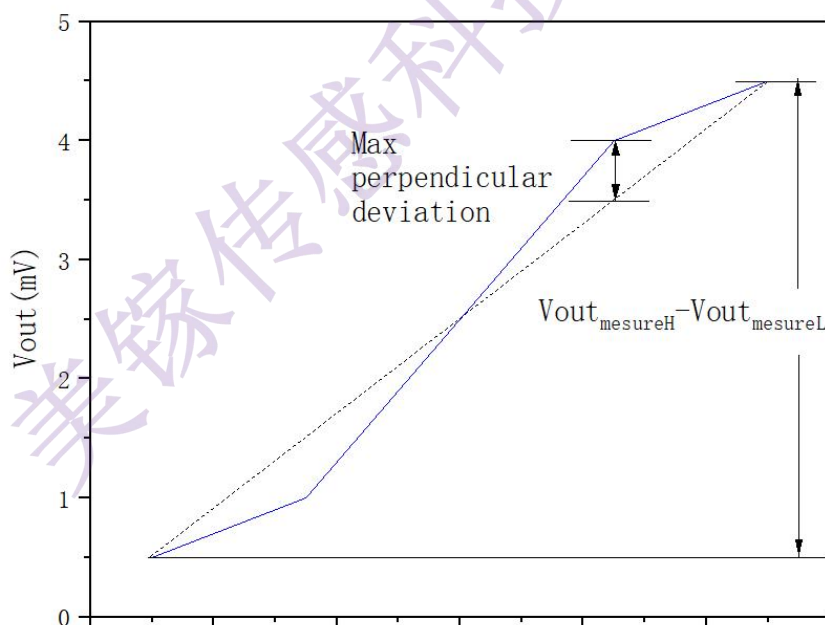


5. 线性度误差|Linearity Error【%】

相同温度下不同磁场测试电压与线性拟合间的误差比例。

The error ratio between the test voltage and the linear fitting at the same temperature under different magnetic fields.

$$\Delta K = \text{Max}(V_{out_{B_i}} - \frac{V_{out_{measure-H}} - V_{out_{measure-L}}}{B_{Max}} \times B_i) \times 100$$

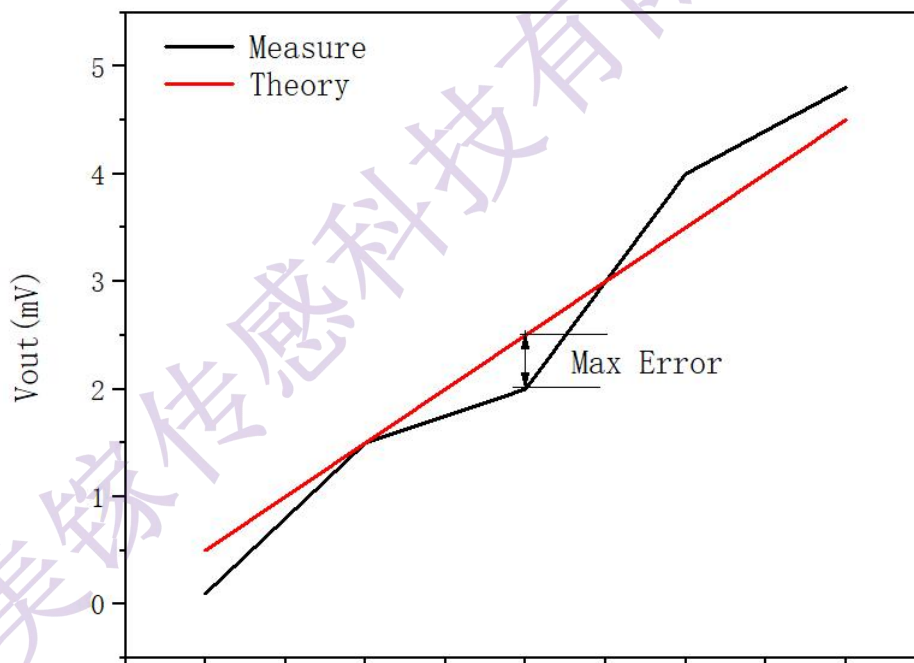


6. 总精度|Total Error【%】

包含零点误差、灵敏度误差、线性度和温漂的总误差，为测试值与理论值的最大偏差。

Total error including offset, sensitivity error, nonlinearity, and temp drift, which is the error between test and theory.

$$\text{Total Error} = \text{Max}\left(\frac{V_{out_measure} - V_{out_theory}}{V_{out_H} - V_{out_L}}\right) \times 100$$



7. 饱和输出电压| Saturation Output Voltage 【V】

输出可以随着磁感应强度的变化在最大值 VSAT(HIGH) 和最小值 VSAT(LOW) 之间摆动。

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

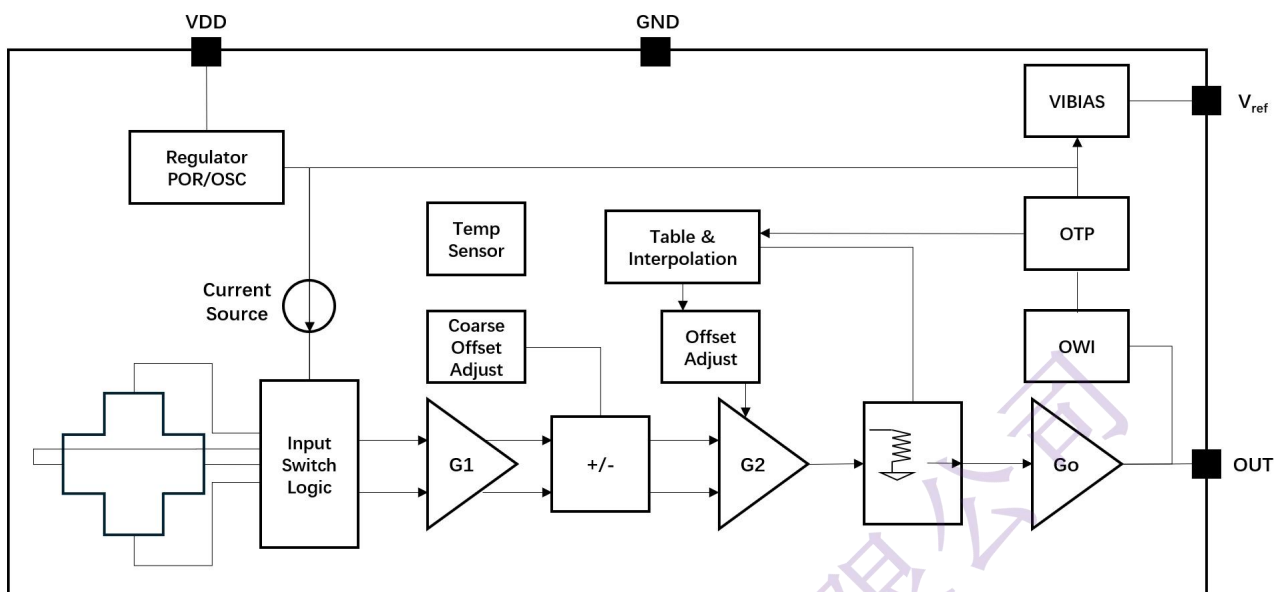
8. 灵敏度对称性误差| Symmetry Sensitivity Error 【%】

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。

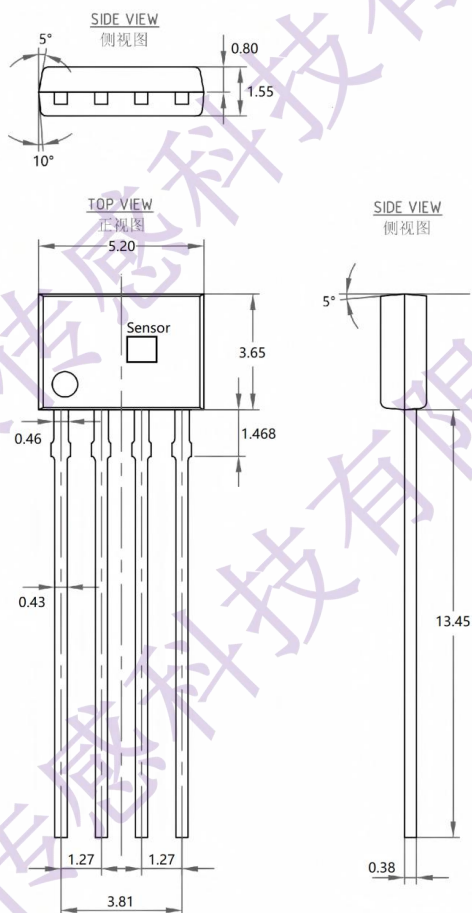
The magnetic sensitivity of device is constant for any two applied magnetic fields of equal magnitude and opposite polarities. $Sym_{ERR}(\%)$ is measured and defined as:

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

功能框图



外形尺寸图



历史版本说明

版本 Revision	版本记录人 Doc Owner	编辑日期 Edit Date	编辑内容 Revision Content	备注 Others
1.0	YL. Wang	2025.09.23	初版发布	