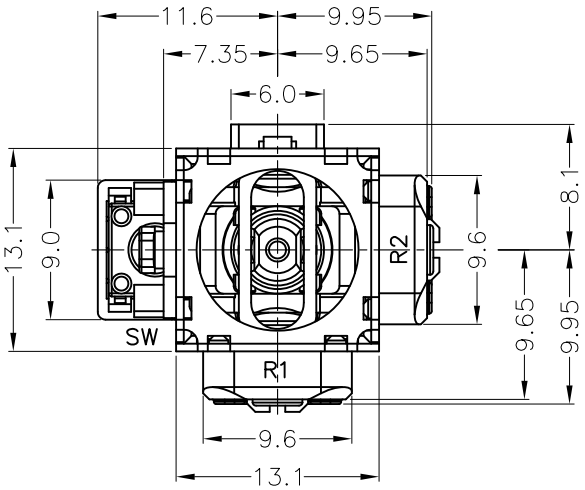
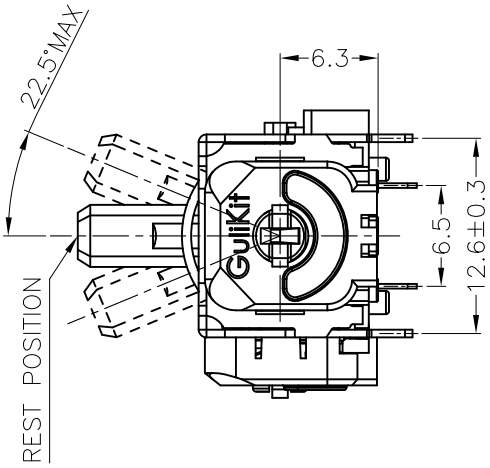
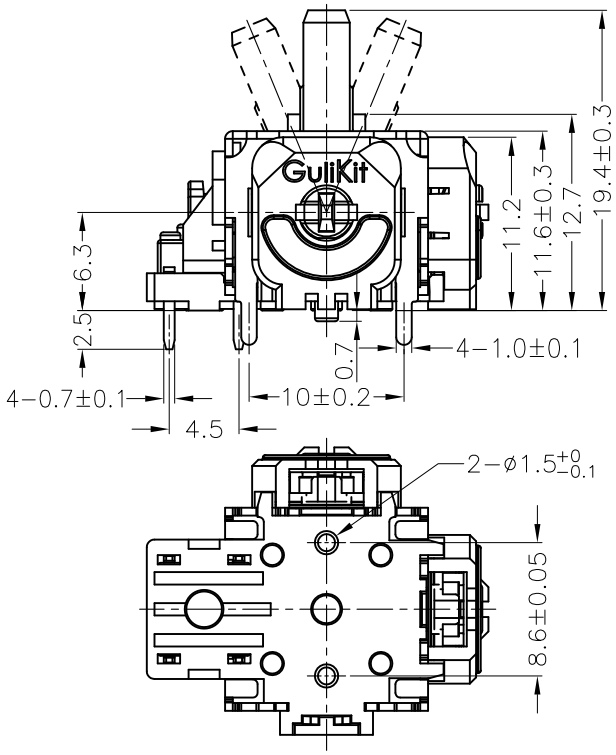
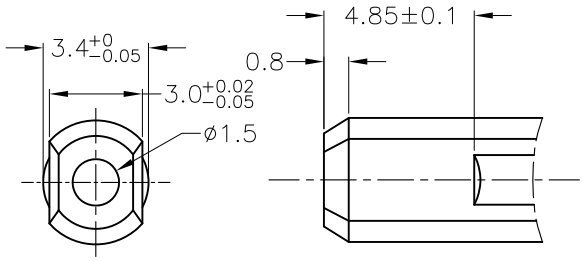
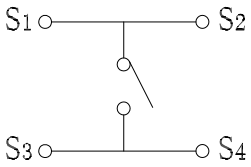




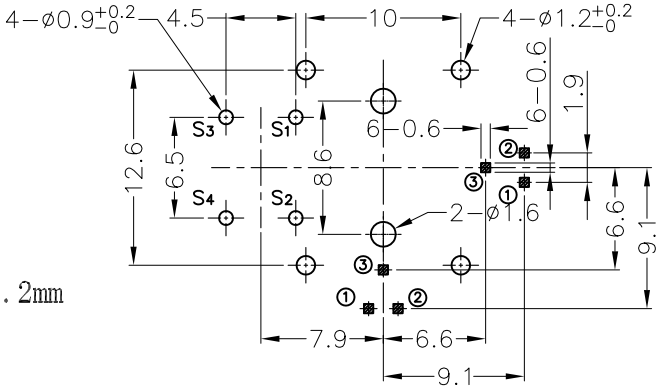




轴心详图（2:1）



CIRCUIT·SW



注：1.基板板厚=1.2
RECOMMENDATORY THICKNESS OF P.W.B.IS 1.2mm

2.VR端子厚 t=0.3mm
POT.TERMINAL THICKNESS

3.SW 端子板厚 t=0.3mm
SWITCH TERMINAL THICKNESS

4.外壳厚度 t=0.5mm
FPAME THICKNESS

①脚：VDD ②脚：VOUT ③脚：GND
P.C.B MOUNTING HOLE DETAIL

VERSION	GuliKit 深圳市谷粒科技有限公司 Shenzhen Guli Tech Co.,Ltd	MODEL: GL1801SYAE-001		DRAW	SCALE
A0		DRAWING NO:		Linda	3:1
.ISSU.	DATE / REVISION	Design	TOL.UNLESS OTHERWISE SPEC.	CHKD	UNIT
00			BASIC DIMENSIONS / TOL.	Allen	mm
01			L≤10 / ±0.3		
02			10<L / ±0.5	APPD	
03			100≤L / ±0.8	Levin	
04			ANGLE / ±5°		第 1 页

GL18系列规格书

GL18 SERIES SPECIFICATION

适用机型：GL18 系列 **日期:2022 年 11月 9 日**

1.General 一般事项

1-1 Scope 适用范围

This specification is applicable to electromagnetic joystick used in electronic equipment.

本规格书适用于电子设备使用之电磁摇杆。

1-2 Standard atmospheric conditions 标准大气状态

Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests is as follows:

除另有规定外，量测应在以下大气条件下进行：

Ambient temperature 温度	: 15℃ ~ 35℃
Relative humidity 相对湿度	: 25% ~ 85%
Air pressure 气压	: 86 KPa~ 106 KPa

If there is any doubt about the results, measurements should be made within the following limits:

如有任何疑虑时，量测应在以下条件下进行：

Ambient temperature 温度	: 20℃ ± 1℃
Relative humidity 相对湿度	: 63% ~ 67%
Air pressure 气压	: 86 KPa~ 106 KPa

1-3 Operating temperature range 适用温度范围 : -10℃ ~ +70℃

1-4 Storage temperature range 保存温度范围 : -30℃ ~+80℃

2. Construction 构造

2-1 Dimension 尺寸 : Refer to attached drawing 参见成品图

3.Mechanical characteristics
机械性能

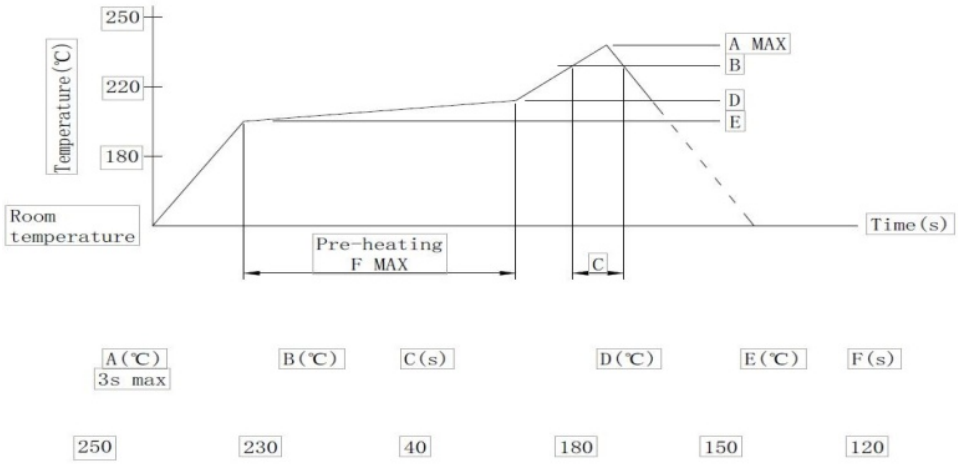
NO. 序号	ITEM 项 目	CONDITIONS 条件	SPECIFICATION 规格
1	Figure of lever operation 摇杆动作形式	/	Circular operating 圆形式
2	Operation angle of lever 摇杆使用有效角度	Add a fit force on the lever top to push it to max. angle of each direction when lever is released and reset position. 当摇杆处于自由复归位置时,在摇杆顶部施加一定力将摇杆推向任意方向最大角度。	22.5° max 最大 22.5°
3	Operating force of lever 摇杆作用力	Test position is at more than 10 degrees deflection of lever. 摇杆偏斜 10 度以上之位置测定。	120±40 gf
4	Accuracy of reset position of lever 摇杆复归精度	Measure the angle between the lever and the axial center line after the lever pushed to the direction of X-X(Y-Y) and resets. 摇杆推向 X-X(Y-Y)方向自由复归后测量摇杆与垂直中心线的角度。	±3°
5	Knob strength 扭曲强度	Apply force on the lever perpendicular to the lever’s rotation direction. 旋转于摇杆的力作用于摇杆上	More than 3Kgf.cm 3 seconds min 大于 3Kgf.cm，至少 3 秒钟
6	The stopper strength of the lever 摇杆止动强度	Apply side force on the lever perpendicular to the lever’s axial direction. 垂直于摇杆的力作用于摇杆上。	More than 3Kgf 3 seconds min 大于 3Kgf，至少 3 秒钟
7	Pull strength of lever 摇杆拉拔强度	Apply specified push force on the lever downward. 作用于摇杆上，沿摇杆方向向下。	More than 5Kgf 3 seconds min 大于 5Kgf，至少 3 秒钟
8	Push Strength of lever 摇杆推强度	Apply side force on the lever perpendicular to the lever’s axial direction. 垂直于摇杆的力作用于摇杆上。	More than 10kgf 3 seconds min 大于 10Kgf，至少 3 秒钟

4. Electrical characteristics
电气特性

NO. 序 号	ITEM 项　目	CONDITIONS 条件	SPECIFICATION 规 格
1	Voltage Divider Error 分压误差值	The partial pressure error value is the magnetic induction strength value after the free reset of the rocker and the magnetic induction strength value at the limit position of the rocker. Place the magnetic field strength tester under the magnet, and the partial pressure error value is tested in the free state of the rocker and in the x-x and Y-Y directions 分压误差值是摇杆自由复归后磁感应强度值以及摇杆极限位置的磁感应强度值，将磁场强度测试机放在在磁铁下面, 分压误差值在摇杆自由状态和运作于 X-X 和 Y-Y 方向到底测试	Free state：30GS±20 X direction 22.5°：More than 750GS -X direction 22.5°:More than 750GS Y direction 22.5°:More than 750GS -Y direction 22.5°:More than 750GS 自由状态：30GS±20 X 方向 22.5°:大于 750GS -X 方向 22.5°：大于 750GS Y 方向 22.5°：大于 750GS -Y 方向 22.5°：大于 750GS

5. Endurance characteristics
耐久性能

NO. 序 号	ITEM 项　目	CONDITIONS 条件	SPECIFICATION 规 格
1	Resistance to soldering heat 焊锡耐热性	Manual Soldering: Less than 350℃ and quicker than 3 seconds. 手焊: 350℃以下，3 秒以内。 Soldering test shall be using below materials. 使用以下材料进行焊锡试验。 Using printed: single sided Wiring board copper clad laminate 使用板子 t =1.2mm 单面铜箔玻纤板 Solder: Sn-Ag solder (Pb free) 半田：：Sn-Ag 材料 无 Pb Flux : specific gravity 0.82min. 助焊剂 ：比重 0.82 以上 Soldering condition is in this below. 如下焊锡条件进行试验。 Preheating: The surface of the solder side shall be heated 90℃ to 100℃,for 45 seconds or less. 预热温度: 基板表面温度 90℃～100℃，45 秒以内。	Not less than 95% of the surface dipped shall be covered with new solder. 浸锡部分表面最少 95%被新锡覆盖。 Without damage and lever deformation, Without the looseness and failing function of witch. 无不良性能产生,无松动及开关性能损坏。

		Solder : The board shall be soldered up to the mounting side surface (but solder shall not come into the mounting side surface) for within 5seconds at 255℃ to 260℃. 焊锡：温度 255～260℃、5 秒以下。焊锡面最大为 PCB 板的上面。PCB 板表面无沾锡流动。 Flux :The foaming method shall be applied. Flux shall not come into the mounting side surface and fluxing time shall be 3seconds or less. 助焊剂： 3 秒以内在 PCB 表面喷撒，PCB 板上助焊剂流动。 Soldering time: One time with above condition. 焊锡次数：按上记条件 1 次。	
2	soldering Heat 焊接加热	Soldering temperature is only allowed within 3+1 seconds at Max. 250C of copper foil surface after preheating 焊接温度 250℃以下，仅允许时间 3 土 1 秒以内.  	
3	Dry heat 耐热性	Temperature:80±2℃ Time: 96 hours The controller shall be subjected to standard atmospheric conditions for 2 hours ，after which measurement shall be made. 在温度 80±2℃恒温槽中放置 96 小时，取出后在正常状态下放置 2 小时后测试。	Without damage and lever deformation, Without the looseness and failing function of witch. 无不良性能产生,无松动及开关性能损坏。
4	Cold 耐寒性	Temperature:-30 ±2℃ Time: 96 hours Surface moisture shall be removed, and then the controller shall be subjected to standard atmospheric conditions for 2 hours， after which measurement shall be made. 在温度-30±2℃恒温槽中放置 96 小时，表面水份摄取后在正常状态下放置 2 小时后测试。	Without damage and lever deformation, Without the looseness and failing function of witch. 无不良性能产生,无松动及开关性能损坏。

5	Damp heat 耐湿性	Temperature: 60 ± 2℃ Humidity: 90~95%RH Time: 96 hours Surface moisture shall be removed. And then the controller shall be subjected to standard atmospheric conditions for 2hours,after which measurement shall be made. 在温度 60±2℃ 90%~95%RH 恒温槽中放置 96 小时，表面水份摄取后在正常状态下放置 2 小时后测试。	Without damage and lever deformation, Without the looseness and failing function of witch. 无不良性能产生,无松动及开关性能损坏。
6	Temperature cycling test 温度循环测试	Low temperature : -20±3℃ 30 minutes High temperature: +60±3℃ 30 minutes Number of cycles: 5 Surface moisture shall be removed, and then the controller shall be subjected to standard atmospheric conditions for 2 hours ， after which measurement shall be made. 在低温为-20±3℃恒温槽放置 30 分钟,高温 60±3℃放置 30 分钟,测试 5 次,表面水份摄取后在正常状态下放置 2 小时后测试。	Without damage and lever deformation, Without the looseness and failing function of witch. 无不良性能产生,无松动及开关性能损坏。
7	Free falling 自由落下试验	Height: 75cm. Number of falls: 3 times 从高度为 75 厘米落下测试 3 次后。	Without damage and lever deformation, Without the looseness and failing function of witch. 无不良性能产生,无松动及开关性能损坏。
8	Number of cycles 耐久寿命	Mechanical life should be tested 5,000,000 cycles at the the speed of one cycle per second without electrical load when joystick rotate 360° at 22.5° position. 无负载状态下以1圈/秒速度将摇杆推至 22.5° 位置进行 360° 旋转测试，寿命 5,000,000 圈。	without mechanical malfunction 机械性能无异常
	Switch number of cycles 开关寿命	Under electrical load DC5V/5mA, compress 750gf force to the lever which is released and reset to vertical position. Switch life should be tested more than 1,000,000 cycles at the speed of 2 cycles per second. 负载状态下(DC5V/5mA)，在摇杆自由复归后的垂直方向施加 750gf 的按压力,以 2 次/秒的速度对开关进行测试,寿命 1,000,000 次以上。	Contact resistance 200Ω Max, No mechanical malfunction. Be satisfied with 6.1 and 6.2 接触阻抗最大 200Ω, 机械方面能动作(符合第 6.1 条和第 6.2 条)。

6. Switch characteristics (FOR WITH-SWITCH TYPE)
开关规格(适用于带开关机种)

NO. 序号	ITEM 项 目	CONDITIONS 条件	SPECIFICATION 规格
1	Operating force 作动力	Apply side force perpendicular to the lever's axial direction on the lever until the lever stops, measure the max force value. 将一个轴向力施加于摇杆上直到其不动为止,量取施力期间之最大值。	750±300 gf
2	Travel 移动量	Put the switch lever upward, apply 2 times of the static operating force over the lever's axial direction of the lever, measure the variance of the switch stroke. 将开关操作部位(摇杆)置于静止位置,并在操作柄中央施加两倍于作动力之静负荷测量柄被压到不动时之移动距离。	$0.4^{+0.5}_{-0.3}$ mm
3	Maximum Ratings 最大定格电压	Within 70℃ 70℃以内。	12 V DC 50 mA
4	Contact resistance 接触阻抗	Apply 2 times of the operating force of the static load on the vertical direction of the lever, measure the resistance by using the Contact Resistance Tester with 1KHZ, 20mV, 5~50mA of current. 将两倍于作动力之静负荷加于操作柄之中央以(1KHZ,20mV, 5~50mA)微电流接触阻抗计测定。	Less than 100 mΩ 低于 100 mΩ
5	Insulation resistance 绝缘阻抗	A voltage of DC100V is applied between terminals. 以 DC100V 之电压加于端子间测定。	More than 100 MΩ 100 MΩ以上
6	Withstand voltage 耐电压	A voltage of AC 250V/2mA (50~60HZ) shall be applied for 1min between terminals. 以 AC250V/2mA (50~60HZ)电压施加于端子间 1 分钟。	Without breakdown. 无绝缘破坏之现象。

7 GH39F Series linear Hall GH39F 系列线性霍尔

1.Linear Hall circuit is composed of Hall voltage generator, linear amplifier and emitter follower. Its input is magnetic induction intensity, and its output is voltage proportional to the input.

1.线性霍尔电路由霍尔电压发生器，线性放大器和射极跟随器组成，其输入是磁感应强度，输出是和输入量成比例的电压。

2.Product features

2.产品特点:

2.1 Long service life, small size, convenient installation

2.1 寿命长 体积小 安装方便

2.2 High accuracy and sensitivity

2.2 精确度高 灵敏度高

2.3 Good linearity and good temperature stability

2.3 线性好 温度稳定性好

2.4High reliability

2.4 可靠性高

3. Typical applications

3. 典型应用场合

3.1 Motion detector Gear sensor

3.1 运动检测器 齿轮传感器

3.2 Proximity detector Current detection sensor

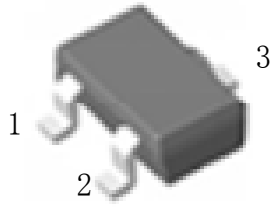
3.2 接近检测器 电流检测传感器

3.3 Electric bicycle governor

3.3 电动自行车调速器

4.管脚定义

SW: SOT23-3L



SOT23-3L	Pin name 引脚名称	Function description 功能描述
1	VDD	电源电压
2	VOUT	输出
3	GND	地

5. Product technical parameters

5. 产品技术参数

5.1 Limit parameter

5.1 极限参数

Parameter 参数	Symbol 符号	numerical value 量值	Unit 单位
supply voltage 电源电压	VCC	15	V
Output current 输出电流	Iout	10	mA
Working ambient temperature 工作环境温度	TA	-40～+85	℃
Storage temperature 贮存温度	TS	-65～150	℃

5.2 Electromagnetic characteristics (TA=25℃ VCC =5V)

5.2 电磁特性 (TA=25℃ VCC =5V)

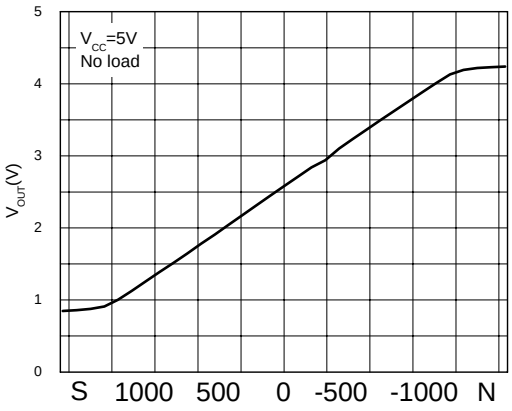
Parameters 参数	Symbol 符号	Test Condition 实验条件	Min 最小值	Typ 标准值	Max 最大值	Unit 单位
supply voltage 电源电压	VCC		3.0		6.5	V
Static output voltage 静态输出电压	Vout	B=0	2.25	2.5	2.75	V
Supply current 电源电流	ICC			6.0	9.0	mA
Power on Time 开机时间	TPO	dVcc/dt≥5V/ us	-	-	30	us
Sensitivity 灵敏度	SNST	N:B=0GS to 1000GS S:B=0GS to 1000GS	1.45	1.8	2.0	mV/GS
Noise 杂音	NF			≤300		mV
Lower limit voltage of output terminal 输出端下限电压	VL		0.80		1.05	V
Upper limit voltage of output terminal 输出端上限电压	VH		3.95		4.20	V
Magnetic field range 磁场范围	B		N:650 S:650	N:1000 S:1000		GS
Linearity 线性度	LIN			0.70		%

Note: the output voltage shall be measured with a voltmeter with input impedance greater than 10k Ω; The magnetic induction intensity should be measured in the most sensitive area of the device (see the outline drawing)

注:输出电压应用输入阻抗大于 10KΩ 的电压表来测量；磁感应强度应在器件最灵敏的区域(见外形图)测量

6. characteristic curve

6. 特性曲线

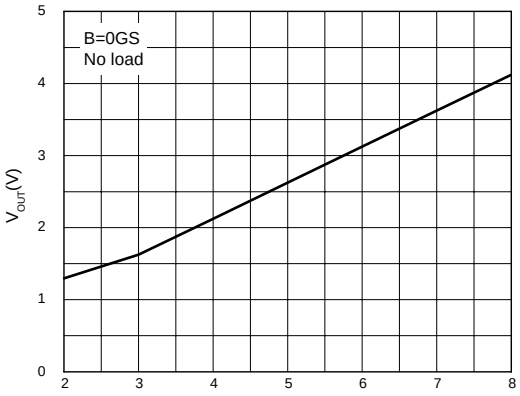


Magnetic field strength B (GS)

磁场强度 B(GS)

Variation of output voltage with magnetic field strength

输出电压随磁场强度的变化

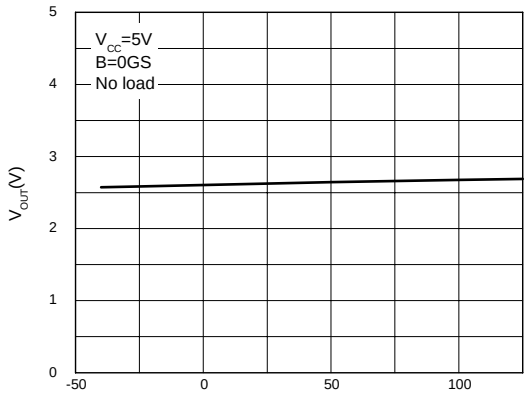


Power supply voltage, VCC (V)

电源电压,V_{CC}(V)

Variation of static output voltage with power supply voltage

静态输出电压随电源电压的变化



Temperature TA (℃)

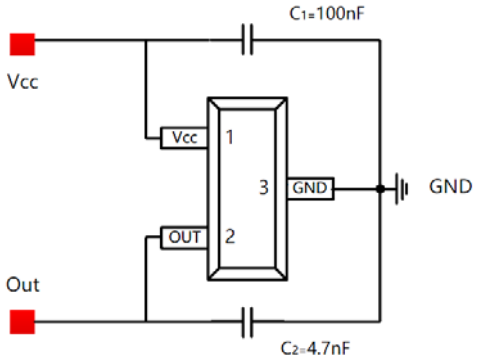
温度 TA(℃)

Change of static output voltage with temperature

静态输出电压随温度的变化

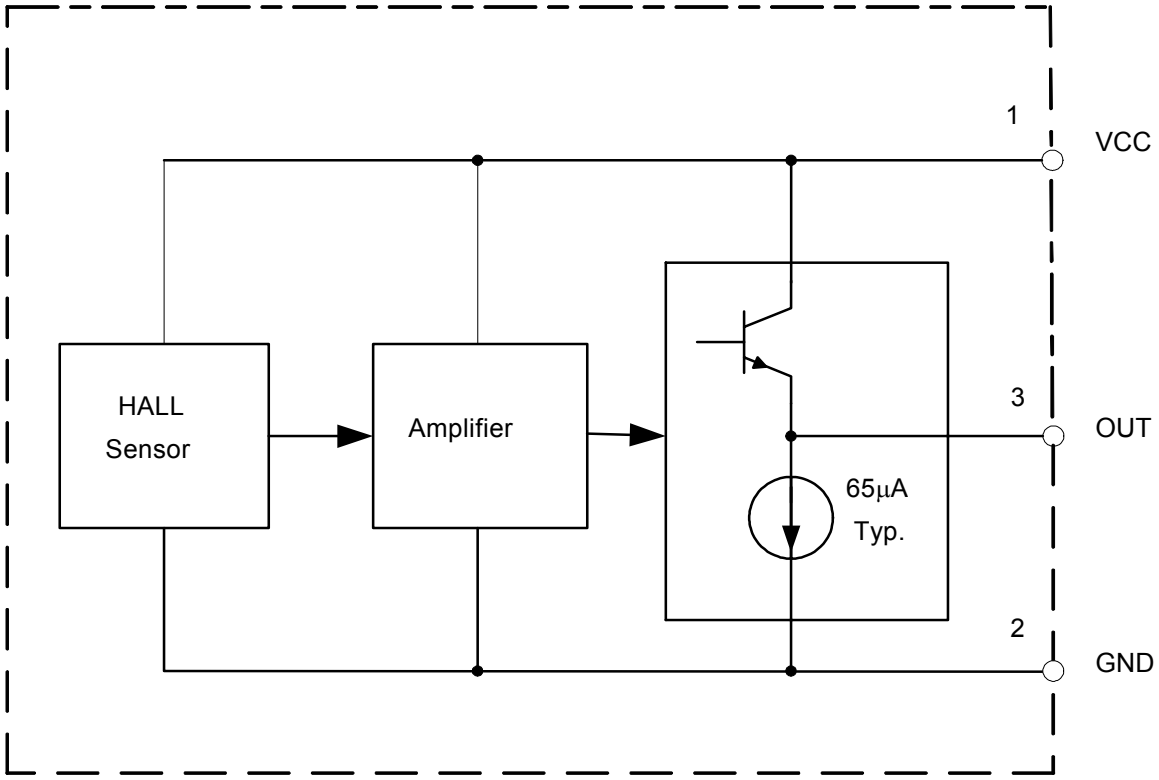
7. Circuit diagram

7. 电路图



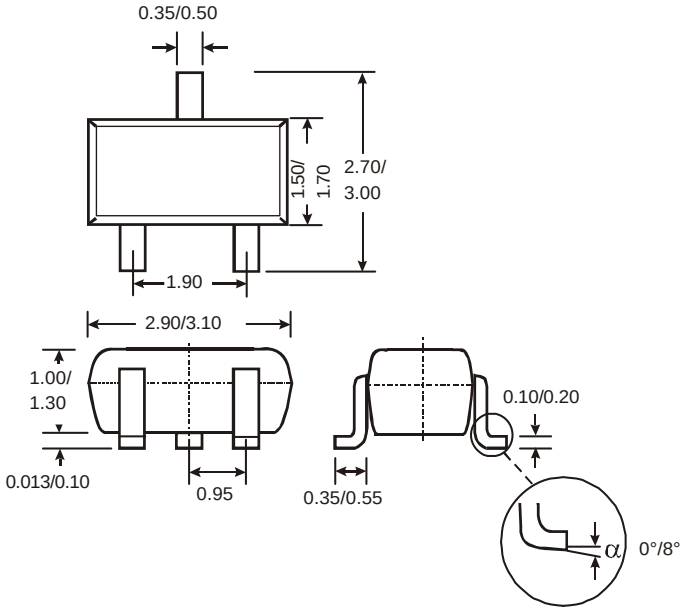
8. Internal block diagram of circuit

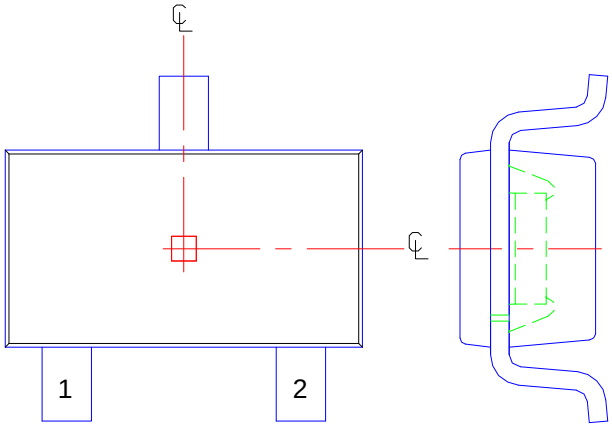
8. 电路内部框图



9. Encapsulate information SOT23-3L

9. 封装信息 SOT23-3L





10. Magnet characteristics

10.磁铁特性

Symbol 符号	Parameters 参数	Test Condition 实验条件	Min 最小值	Typ 标准值	MAX 最大值	Unit 单位
T	N35H	Galvanized neodymium iron boron 镀锌钕铁硼	N:2500 S:2500	N:2900 S:2900	N:3300 S:3300	GS
TA	N35H	Working ambient temperature 工作环境温度	-40	25	+120	℃
SENS (T)	N35H	Magnetic flux changes with temperature 磁通量随温度变化	-10		10	%

Note: it is recommended to design a 1.2mm thick base plate. when the magnetic flux of magnetic objects is greater than 4500gs, it will not affect the Vout of the assembled hall joystick

备注：建议设计 1.2mm 厚的基板，带有磁性的物件磁通量大于 4500GS 才不会影响组立后的 Hall摇杆的 Vout。

11 Angle voltage of finished product（TA=25℃ VCC =3.3V）

11 成品角度电压（TA=25℃ VCC =3.3V）

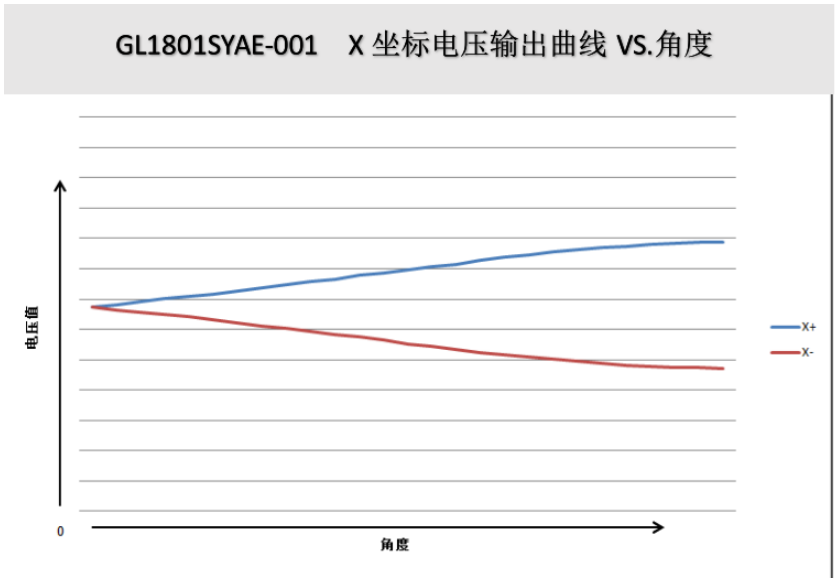
Position 位置	numerical value 数 值	Unit 单位
CENTRE 置中	X:1.386～1.941 Y:1.386～1.941	V
X- (22.5°)	≤1.35	V
X+ (22.5°)	≥1.95	V
Y- (22.5°)	≤1.35	V
Y+ (22.5°)	≥1.95	V

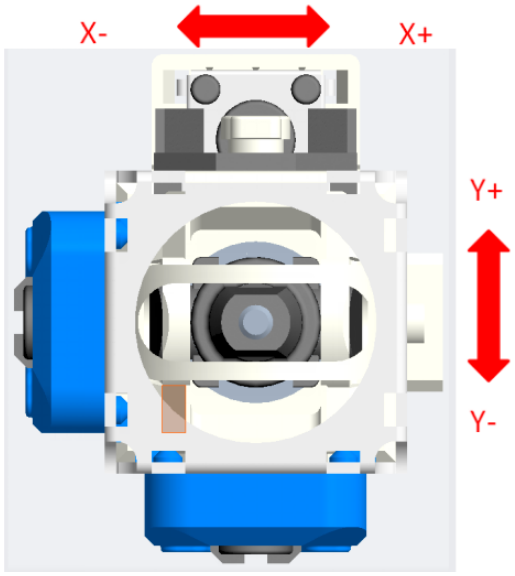
Note: above data is only consistent with the motherboard provided by our company, and other motherboards are inconsistent with this data.

备注：以上数据仅符合我司提供的主板，其他主板与此数据不符。

12.1 X+/X-)output voltage vs. angle curve

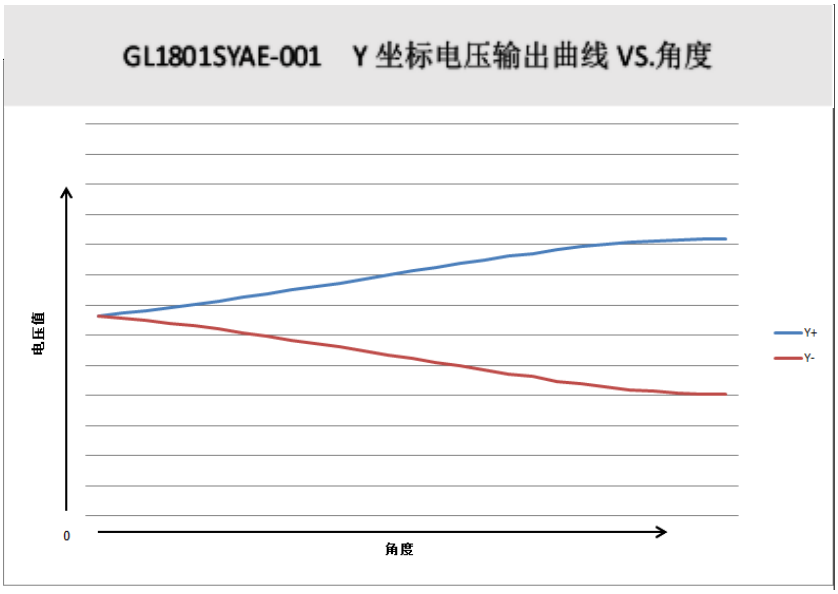
12.1X+/X-输出电压 Vs.角度曲线图

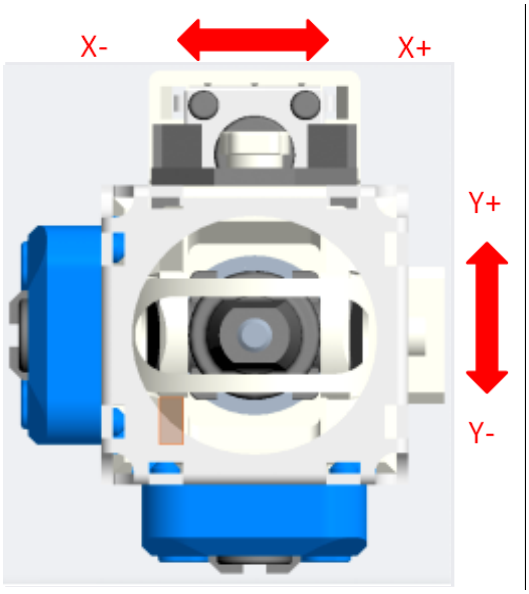




12.2 Y+/Y- output voltage vs. angle curve

12.2 Y+/Y-输出电压 Vs.角度曲线图





Note: this GH39F linear Hall device is shipped with our lever, Any chip performance problems have nothing to do with our company.

备注：此 GH39F 线性霍尔器是与我司摇杆搭配出货,出现任何关于芯片性能问题与我司无关。

8.Finished product inspection specification

8.成品检验规

Number 序号	Inspection items 检验项目	Inspection standard 检 验 标 准	Meter 测定器	Remarks 备注	Test description 检测说明
1	Appearance 外观	The surface is smooth without deformation and damage, and the marked impedance is consistent with the real object 表面光洁，无变形破损，标示阻抗与实物相符	E	MA	PJ: Projector PG: Plug gauge N:Vernier caliper M : micrometer SM: Thread gauge TG: Torsion meter SG: tensimeter OM: Ohmmeter NT: Noise machine DB: Synchronizer MS: Microscope F:Special inspection tool D: Multifunctional tester E:Visual inspection PJ:投影机 PG:塞　规 N :游标卡尺 M :分厘卡 SM:螺纹量规 TG:扭力计 SG:拉力计 OM:欧姆表 NT:杂音机 DB:同步机 MS:显微镜 F :专用检具 D :多功能测试仪 E :目　　视
2	Size 尺寸	See finished product drawing 见《成品图》	N	MA	
3	Operating force of lever 摇杆作用力	The rotation is flexible, and the return is crisp, 120 ± 40gf, and the force difference in each direction is less than 30gf (the test point is on the top of the rocker) 转动灵活，回位爽快，120±40gf，各方向力差在 30gf 以下(测试点在摇杆顶部)	SG	MA	
4	Switch actuation 开关作动力	750gf ± 150gf (apply an axial force to the rocker until the switch is turned on) 750gf ±150gf （将一个轴向力施加于摇杆上直到开关导通为止）	SG	MA	
5	Rocker reset accuracy 摇杆复位精度	± 2 ◦ (measure the angle between the rocker and the vertical centerline after the rocker is pushed to the x-x (Y-Y) direction and reset freely) ±2°（摇杆推向 X-X(Y-Y)方向自由复归后测量摇杆与垂直中心线的角度）	PJ	MA	
6	Distance between lower rocker arm and switch sub 下摇臂与开关子间距	0.2±0.1 mm	F	MA	
7	Switch performance test 开关性能检测	When the rocker is in the free position, press the rocker, the switch switching sound is clear, the switch on-off performance is good, and the switch sound must be synchronized with the switch on-off. The contact impedance of the switch is below 100m Ω. (life test confirmation). 在摇杆处于自由位置，压下摇杆，开关切换声音清脆，开关通断性能良好,开关声音须与开关通断同步。开关接触阻抗在 100m Ω以下。(寿命测试确认)。	D	MA	

8	Switch pressing strength 开关按压强度	More than 10kg (put the product on a special fixture, press it to 10kg with a push-pull meter, use a multimeter to test the foot of the switch, and the switch can be turned on). 10kg 以上（产品放在专用治具上，用推拉力计压到 10kg 时，用万用表测试开关子对脚，开关可导通）。	SG	MA	
9	impact test 冲击试验	The impactor is an iron block weighing 140g and 50cm in height, which falls freely (with an acceleration of 9.8m/s²), The iron block falls vertically on the sleeve with V On the rocker of the R cap, the switch switching performance is good after the test, and the rest of the stressed parts are free of deformation and damage, and all functions are normal. 冲击物为铁块重 140g、高度 50cm 自由下落(加速度为 9.8m/s²)，铁块垂直落在套有 V.R 帽之摇杆上，测试后开关切换性能良好，其余受力部位无变形和破损且所有功能正常。	F	MA	
10	Rocker twist strength 摇杆扭曲强度	3.0Kgf.cm MIN	TG	MA	

	Design dept 经办者	Check 审查	Approved 核准
GuliKit 深圳市谷粒科技有限公司 Shenzhen Guli Tech Co.,Ltd	*Linda*	*Allen*	*Levin*