Product Specification

Number: L-KLS4-PS4-F20

Name: 3D joystick

Customer:

Date: 2025-09-15

Customer Signature:

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Jenny	Jack.C		

Revision Status

Version	Date	Revision Description	Prepared	Checked	Approved

1.General 一般事项

1-1 Scope 适用范围

This specification applies to the joystick which carbon composition resister, used in electronic equipment.
本规格书适用于电子设备使用之碳素抵抗体用摇杆。

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℃

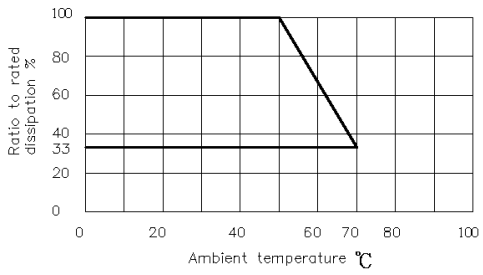
2. Construction 构造

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

3. Mechanical characteristics 机械性能

序号 NO.	项 目 ITEM	性 能 PERFORMANCE	测试条件 TEST METHODS AND REFERENCE
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	30.0° max 最大 30.0°	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。
3	Operating force of lever 摇杆作用力	120±50 gf	Test position is at more than 10 degrees deflection of lever. 摇杆偏斜 10 度以上之位置测定。
4	The stopper strength of the lever 摇杆止动强度	More than 3.1Kgf 3 seconds min 大于 3.1Kgf，至少 3 秒钟	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。
5	Accuracy of reset position of lever 摇杆复归精度	±3°	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。
6	Pull strength of lever 摇杆拉拔强度	The change of total resistance should be within ±20%, without switch malfunction. 全阻值变化范围为±20%，开关性能符合初始规格。	More than 5.0 Kgf 3 seconds min 大于 5.0 Kgf，至少 3 秒钟
	Push Strength of lever 摇杆推强度	The change of total resistance should be within ±20%, without switch malfunction after test. 全阻值变化范围为±20%，开关性能符合初始规格。	More than 5 Kgf 3 seconds min 大于 5.0Kgf，至少 3 秒钟

4. Electrical characteristics 电气特性

序号 NO.	项 目 ITEM	性 能 PERFORMANCE	测试条件 TEST CONDITIONS
1	Total resistance 全阻值	10K±20%	Between terminal 1 and terminal 3. 1-3 端子间。
2	Resistance taper 阻抗特性型式	Type B; Refer to attached drawing "Resistance taper characteristics" B 型；见附页"阻型特性图"	Percentage of the voltage of terminal 1-2 to the voltage of terminal 1-3. 端子 1-2 电压对端子 1-3 电压的百分比。
3	Rated power 额定功率	Linear Taper B: 0.0125W B 型: 0.0125W	The rated power should be changed according to the following chart when the ambient temperature changed. 它随环境温度按以下曲线变化。 Derating curve of rated dissipation 
4	Rated voltage 额定电压	Linear Taper B: AC 50V DC 5V B 型: AC 50V DC 5V	E= √PR E:额定电压 Rated voltage(V) P:额定功率 Rated power(W) R:公称全阻值 Nominal total resistance(Ω) The rated voltage is calculated by above formula. When the rated voltage exceeds the maximum operating voltage, the maximum operating voltage should be the rated voltage. 额定电压按以上公式计算，当额定电压超过最大工作电压时，最大工作电压即为额定电压。
5	Temperature characteristic 阻抗温度特性	Variation of total resistance shall be within +5%/-20%. 全阻值相对于测试前变化率为 +5%/-20%。	The without electrical load V.R should be stored at temperature of 70±3℃ for 5hrs and measure immediately. 将产品置于在 70±3℃的恒温槽内以无负荷的条件下放置 5 小时后马上测量。

6	Voltage Divider Error 分压误差值	41.5%~58.5%	Voltage divider error is defined the ratio of the voltage terminals 1-2 to terminals 1-3 after the drive arm rested. 5V D.C. shall be applied to the terminals between 1and 3 and then voltage divider error shall be measured with the drive arm operation on the line X-X and Y-Y. (Terminal 1-2/Terminal 1-3 × 100%) 分压误差值是摇杆自由复归后端子 1-2 与端子 1-3 电压比例.将 5V D.C 电压加在端子 1-3 之间, 分压误差值在摇杆运作于 X-X 和 Y-Y 方向到底复归后测试.(端子 1-2/端子 1-3 × 100%)
7	Contact Noise 接触杂音 (CRV)	10% or less of the total resistance for over 60°(60° included) carbon film angle (Before the life test) ; 15% or less of the total resistance for 40° thru 60° carbon film angle (Before the life test) ; 碳膜角度为 60°(含)以上时,全阻值的 10%以下(寿命测试前); 碳膜角度为40°~60°时,全阻值的15%以下(寿命测试前); 15% or less of the total resistance for over 60°(60° included) carbon film angle (After the life test) ; 20% or less of the total resistance for 40° thru 60° carbon film angle (After the life test) ; 碳膜角度为 60°(含)以上时,全阻值的 15%以下(寿命测试后); 碳膜角度为40°~60°时,全阻值的20%以下(寿命测试后);	By the test angle of less than 90% carbon film angle。 测试角度小于碳膜角度的 90%。
8	Insulation resistance 绝缘阻抗值	More than 100 MΩ. 100 MΩ以上。	Apply one minute 250VDC to the individual terminals and case. 金属外壳与端子间加 DC250V 电压 1 分钟。
9	Withstand voltage 耐电压特性	Without arc or breakdown. 无损坏或弧光。	Apply one minute of 250VAC 50Hzto the individual terminals and case. 在特定端子与外壳间加 AC250V 50Hz 电压 1 分钟 。

5. Endurance characteristics 耐久性能(Single test of item 单一测试项目)

序号 NO.	项 目 ITEM	性 能 PERFORMANCE	测试条件 TEST CONDITIONS
1	Resistance to soldering 焊锡性	Not less than 90% of the surface dipped shall be covered with new solder. 浸锡部分表面最少 90%被新锡覆盖。	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。 Temperature of solder: 260±5℃ 焊锡温度：260±5℃。 Dipping duration:5±0.5S. 浸锡时间：5±0.5 秒。 The percentage of soldering flux is 0.82. 助焊剂比重:0.82。
2	Resistance to soldering heat 焊锡耐热性	Variation of total resistance shall be within ±5%, and terminals shall not work loose to injure electric performance after test. 全阻值变化±5%以内,测试后无端子松动,不会损坏电气性能。	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。 Temperature of solder: 260±5℃ 焊锡温度：260±5℃, Dipping duration:5±0.5S. 浸锡时间：5±0.5 秒。 The percentage of soldering flux is 0.82. 助焊剂比重:0.82。
			Manual Soldering: Less than 350℃ and quicker than 3 seconds. 手銲: 350℃以下，3 秒以内。
3	Resistance to soldering flux 耐助焊剂特性	Variation of total resistance shall be within ±5%, and terminals shall not work loose to injure electric performance after test. 全阻值变化±5%以内,测试后无端子松动,不会损坏电气性能。	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。 Temperature of solder: 260±5℃ 焊锡温度：260±5℃, Dipping duration:5±0.5S. 浸锡时间：5±0.5 秒。 The percentage of soldering flux is 0.82. 助焊剂比重:0.82。
4	Dry heat 耐热性	Variation of total resistance should be within $^{+5\%}_{-30\%}$, without mechanical malfunction. 全阻值变化要在$^{+5\%}_{-30\%}$以内，机械性能无异常。	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。

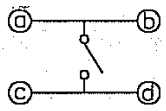
5	Cold 耐寒性	The total resistance change should be within ±20%, without mechanical malfunction. 全阻值变化要在±20%以内,机械性能无异常。	Temperature:-30 ±2℃ Time: 96 hours Surface moisture shall be removed, and then the controller shall be subjected to standard atmospheric conditions for 2 hours, after which measurement 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。
6	Damp heat 耐湿性	Use 250V DC insulation resistance tester to test, insulation resistance should be 20MΩ min.，the total resistance change should be within +35/-5%,switch contact resistance is 200mΩ max, without mechanical malfunction. 用 250V DC 绝缘测试机测试，绝缘阻抗须 20MΩ以上,全阻值变化在+35/-5%以内，开关接触阻抗最大 200mΩ，机械性能无异常。	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。
7	Temperature cycling test 温度循环测试	The change of total resistance should be within ±20%, insulation resistance is 100MΩ min,without mechanical malfunction. 全阻值变化±20%以内，绝缘阻抗100MΩ以上,机械性能无异常。	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。

8	Free falling 自由落下试验	Without damage and lever deformation,but deformations of terminals and molded parts are allowed.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,端子变形除外。	Height: 75cm. Number of falls: 3 times 从高度为 75 厘米落下测试 3 次后。
9	Number of cycles 耐久寿命	Variation of total resistance shall be within±20%, without mechanical malfunction. 全阻值变化±20%，机械性能无异常。	Mechanical life should be tested 1,000,000 cycles at the the speed of one cycle per second without electrical load when joystick rotate 360° at 26° position. 无负载状态下以 1 个来回/秒速度将摇杆推至 26.0° 位置进行 360° 旋转测试，寿命 1,000,000 次。
	Switch number of cycles 开关寿命	Contact resistance 200mΩ Max (test conditions is the same as 6.5 item) . Insulation resistance: More than 100 MΩ. No mechanical malfunction after test. 接触阻抗值：200mΩ以内（测试条件同 6.5 项）； 绝缘阻值:100MΩ以上; 机械性能无异常。	Under electrical load DC5V/5mA, compress 7.1N force to the lever which is released and reset to vertical position. Switch life should be tested more than 500,000 cycles at the the speed of 1 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 7.1N(720gf)的按压力,以 1 次/秒的速度对开关进行测试,寿命 500,000 次以上。

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

序号 NO.	项 目 ITEM	性 能 PERFORMANCE	测试条件 TEST CONDITIONS
1	Operating force 作动力	700±200 gf	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。

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

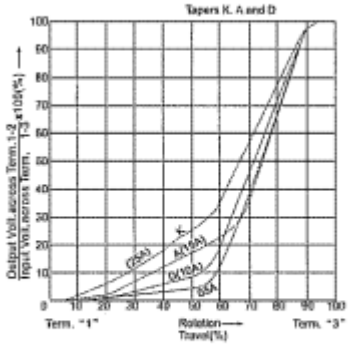
序号 NO.	项 目 ITEM	性 能 PERFORMANCE	测试条件 TEST CONDITIONS
1	Operating force 作动力	700±200 gf	Apply side force perpendicular to the lever's axial direction on the lever until the lever stops, measure the max force value. 将一个轴向力施加于摇杆上直到其不动为止,量取施力期间之最大值。
2	Travel 移动量	0.35+0.6/-0.2mm	Put the switch lever upward, 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。
3	Circuit diagram 电路图		/
4	Maximum Ratings 最大定格电压	12 V DC 50 mA	/
5	Contact resistance 接触阻抗	Less than 100 mΩ 低于 100 mΩ	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。
6	Insulation resistance 绝缘阻抗	More than 100 MΩ 100 MΩ以上	A voltage of DC100V is applied between terminals. 以DC100V之电压加于端子间测定。
7	Withstand voltage 耐电压	Without breakdown. 无绝缘破坏之现象。	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。

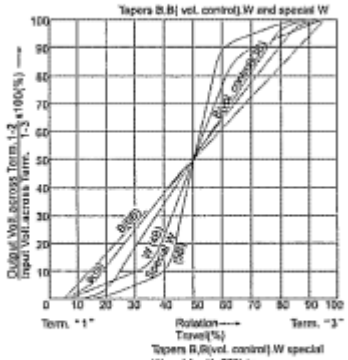
SPECIFICATIONS

Electrical characteristics

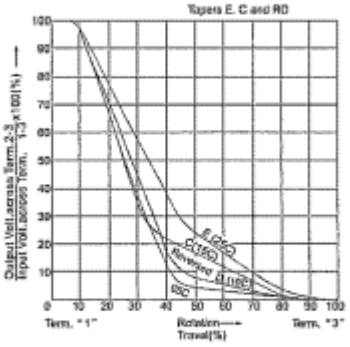
• Resistance Taper Characteristics

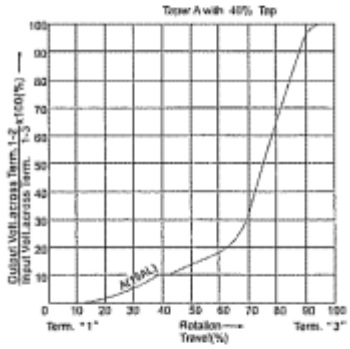
Resistance Taper Characteristic	Test Position (%)	$\frac{V1-2}{V1-3}$ X100% (%)	$\frac{V2-3}{V1-3}$ X100% (%)
A	50	10~25	—
B	50	40~60	—
C	50(started from Term.3)	—	10~25
D	50	6~15	—
E	50	—	18~34
W	30（±5 degree)	5~15	—
	50	40~60	—
	70（±5 degree)	85~95	—

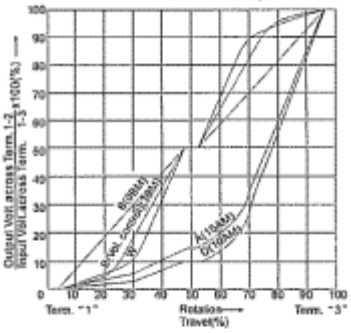


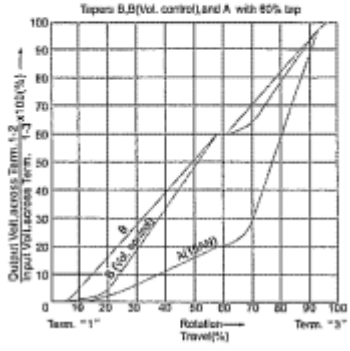


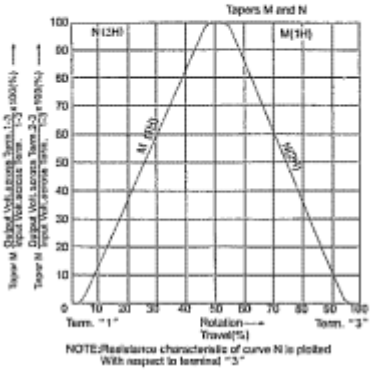
Tapers B,B(vol. control),W special W and A with 50% tap





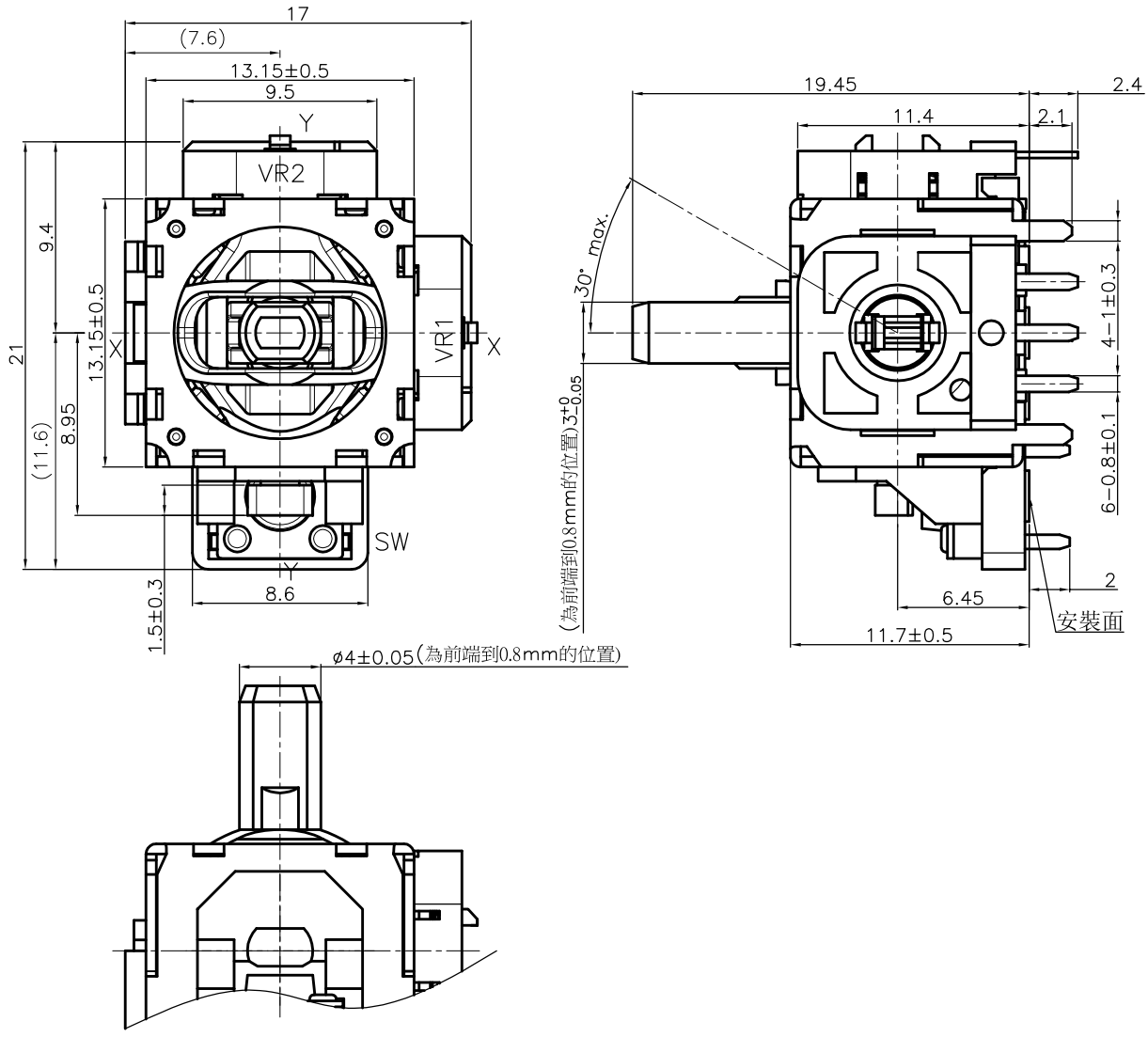






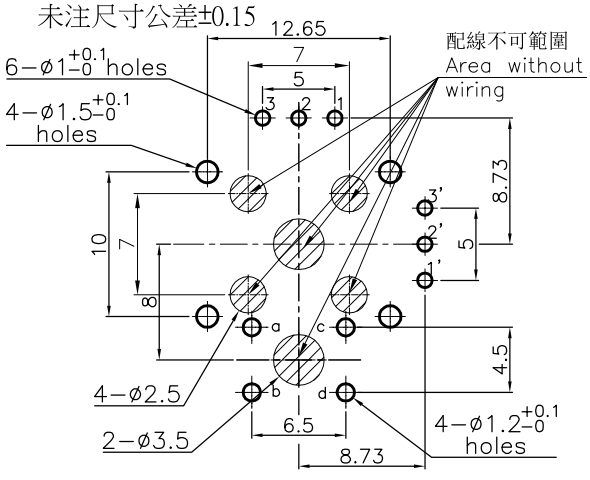
NOTE:Resistance characteristic of curve N is plotted With respect to terminal "3"

Part name	3D joystick	Date	2025-09-15
Part number	L-KLS4-PS4-F20	Edition	V1
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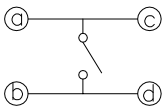
PCB板孔尺寸圖(2:1)

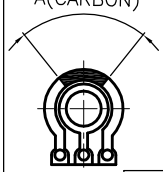
未注尺寸公差±0.15



開關回路圖

(Cricuit diagram)





A 60°

No tolerance specified for ± dimensions	
10<	±0.3
10~100	±0.5
>100	±0.8
angle	±5°