1. SCOPE(适用范围)

This specification covers the performance, tests and quality requirements for the Ball switch series .本规范涵盖了Vibration switch系列的性能、测试和质量要求。)

2. PRODUCT DESCRIPTION(产品描述)

DESCRIPTION(描述)	Part Number(料号)
Ball switch 振动滚珠开关 Ø4.8X8.5MM 角度倾斜开关	SW-460-25N10G

3. APPLICABLE DOCUMENT（适用文件）

The following documents form a part of this specification to the extent specified herein. In the event of conflict between the requirements of this specification and the product drawing, the product drawing shall take precedence. In the event of conflict between the requirements of this specification and the referenced documents, this specification shall take precedence.(下列文件构成本规范的一部分，在此规定的范围内。本规范要求与产品图纸有冲突时，以产品图纸为准。如果本规范的要求与参考文件发生冲突，应以本规范为准。)

4. REQUIREMENTS（要求）

4.1. Design and Structure（设计和结构）

Product shall be of the design, structure and physical dimensions specified on the applicable product drawing.(产品的设计、结构和物理尺寸参考所适用的产品图纸)

4.2. Materials/ Finish (材料/表面处理)

Materials used in the structure of product shall be as specified on the applicable product drawing. (产品结构中使用的材料参考所适用的产品图纸)

4.3. Ratings（额定功率）

Item（项目）	Standard（标准）

Rated Voltage (Maximum)额定电压	＜12V
Rated Current (Maximum)额定电流	＜20mA
Operating temperature range工作温度范围	-10℃～+100℃ From -10 to +100 degree centigrade
Storage Temperature Range储存温度范围	-20℃～+60℃ From -20 to +60 degree centigrade

5. TEST STANDARD（测试条件）

5.1 Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests are as follows（除另有说明外，用以进行测量和测试的标准环境条件范围如下）

Ambient temperature（环境温度）: 5℃ to 35℃

Normal humidity（正常湿度）: 45% to 85%

Air pressure（气压）: 86Kpa to 106Kpa

5.2 However if doubt arises on the decision based on the measured Values under the above-mentioned Conditions.The following conditions shall be employed:
（但是在对判定产生疑问时,按下述状态实施）

Temperature （温度）： 20±2℃

Relative humidity （相对湿度）： 65±5%

Air pressure（气压）: 86Kpa to 106Kpa

6. PERFORMANCE AND TEST DESCRIPTION （性能和测试类型）

6.1 APPEARANCE （外观）

ITEM	DESCRIPTION（类型）	TEST CONDITION（测试条件）	REQUIREMENT（要求）

1	Appearance （外观）	Visual.（目视）	The switch shall have good finishing, and no rust, crack or plating defects（产品外观良好，无锈蚀、裂纹和镀层缺陷）

6.2 ELECTRICAL （电气）

ITEM	DESCRIPTION（类型）	TEST CONDITION （测试条件）	REQUIREMENT（要求）
1	Insulation Resistance. （绝缘电阻）	A voltage of DC5V shall be applied between open terminals, and between the terminal and the metal frame for 60±5Sec. （在相互绝缘的所有端子之间及各接线端子与金属外壳 之间载入 DC5V, 持续时间 60±5秒）	Closed circuit resistance（闭路电阻）:< 10 mΩ Open circuit resistance（开路电阻）:> 10 MΩ
2	Dielectric Voltage （耐电压）	A voltage of AC 100V(50-60HZ),2mA trip current shall be applied between open terminals, and between the frame and the terminal for 60±5Sec. (在相互绝缘的所有接线端子之间及各接线端子与金属外壳之间载入 AC110V (50-60HZ), 2mA, 持续时间60±5秒）	No insulation defect shall be observed: and no dielectric breakdown shall occur.（试验后，无绝缘性不良的现象： 无击穿现象发生）
3	Capacitor（电容量）	Capacitor shall be measured at 10KHz/1.0V, and machine is LY2810 LCR digital galvanothermy testor.（以频率 10KHz/电压 1.0 V 作为电容档调试参数值，采用 LCR 数位电桥测试仪（LY2810）测量，直接读数）	1.When there is an electric current between the circuit terminals（当回路端子之间出现电流时，电容量为）：500-750 u F 2.When there is no current between the circuit terminals（当回路端子之间未出现电流时，电容量为）：3.0-5.0 p F

6.3 MECHANICAL （机械）

ITEM	DESCRIPTION（类型）	TEST CONDITION （测试条件）	REQUIREMENT（要求）
1	Terminal strength （接线端强度）	A static load of 1Kgf(9.8N) shall be applied to the tip of terminal in an optional direction for 1 min. the test shall be done the three per terminal.（以 1Kgf (9.8N)作用为沿可选择的方向逐渐施加于接线端末端，保持 60 秒。每个接线端子测量三次）	Shall be free from terminal looseness damage and insulator breakage.（端子无松动，损坏及绝缘层的破裂） The electrical performance requirements specified in section 6.2 shall be satisfied.(电气性能应符合第6.2部分的要求）

2	**Durability（负荷寿命）**	**20,000 cycles of operation shall be performed continuously at a rete of 15~20 cycles per minute and rotating angle 10°one cycles with DC 5V lm A load.(在带负荷 DC 5V lm A 的条件下，在寿命试验设备上按 10° 旋转来回切换方式，以频率为 15~20 次/分钟 续转换 20,000 次。）**	**After test（实验后）：The electrical performance requirements specified in section 6.2 shall be satisfied.（电气性能应符合第6.2部分的要求）The sensor shall be free from abnormal in appearance&construction.（感应器外观及结构应无损坏）**
3	**Mechanical Life（机械寿命）**	**20,(per cycl -180 one cycles with unload.（在无负荷条件下，在寿命试验设备上按 10° 旋转来回切换方式，以频率为 120~180 次/分钟续转换 20,000 次。）**	
4	**Vibration characteristic（振动特性）**	**Amplitude（振幅）:1.5mm Sweep Rate（频率）:10~55~10Hz about 1 minute Sweep Logarithmic frequency or liner sweep （按每分钟内10~55~10Hz 呈线性或对数曲线性）Sweep direction（周期）: Vertical 3 directions（互相垂直 3 方向）Examination hours 2 hours (total 6 hours)（每方向振动试验 2 小时（共6小时））**	**The electrical performance requirements specified in section6.2 shall be satisfied.（电气性能应符合第6.2部分的要求）The sensor shall be free from abnormalities in appearance&construction.（感应器外观及结构应无损坏）**

6.4 ENVIRONMENTAL (环境)

ITEM	DESCRIPTION（类型）	TEST CONDITION（测试条件）	REQUIREMENT（要求）

<table>
<tr><td>1</td><td>Solder ability（可焊性）</td><td>Switch shall be checked after following test.（滚珠开关在下述参数条件下进行试验）：
(1) . Solder（焊料）: Sn-3Ag-0.5Cu
(2) . Flux（焊剂）: Rosin Flux JIS K 5902
(3) .Soldering temperature（焊接温度）: 245±5℃
(4) .Immersing time（焊接时间:3±0.5sec</td><td>More than 90% of immersed part shall be covered with solder.（超过90%的焊锡面积被焊料所覆盖）</td></tr>
<tr><td>2</td><td>Resistance to Soldering heat(焊锡耐热性)</td><td>Switch shall be checked after following test（滚珠开关在下述参数条件下进行试验）：
(1). Solder（焊料）: Sn-3Ag-0.5Cu
(2). Flux（焊剂）: Rosin Flux JIS K 5902
(3).Soldering temperature and immersing time（焊接时间及温度）：
<table>
<tr><td>烙铁 Soldering Iron</td><td>380±10℃</td><td>3 sec Max</td></tr>
<tr><td rowspan="2">量产时自动焊接
Auto-soldering during mass production
推荐波峰焊条件 Wave soldering is recommended</td><td>预热温度
Pre heat <110℃</td><td>时间 60sec
Pre heat <</td></tr>
<tr><td>焊接温度
Solder temperature<260℃</td><td>焊接时间
Solder time<3s
基板厚度：1.60mm</td></tr>
</table>
</td><td>No abnormalities shall be observed in appearance and operation. The electrical performance.（无外观及功能损坏，电气性能应符合第 4 部分要求）</td></tr>
<tr><td>3</td><td>Cold Proof(耐低温)</td><td>After testing at －30±℃ for 96 hours, the Switch shall be allowed to stand under 2 hours, and then measurement shall be made within 1 hours, water drops shall be eliminated.（滚珠开关在－30±℃的温控箱内保持 96 小时，然后在正常温度和温度下恢复 2 小时，并在些后 1 小时内对滚珠开关进行测量，水滴应消失）</td><td rowspan="2">After test（实验后）：
The sensor shall be free from abnormalities in appearance & construction.（开关外观及结构应无损坏）
The electrical performance requirements specified in section 6.2 shall be satisfied.（电气性能应符合第 6. 2部分的要求）</td></tr>
<tr><td>4</td><td>Hot Proof(耐高温)</td><td>After testing at 70±2℃ for 96 hours, the sensor shall be allowed to stand normal room temperature and humidity conditions for 2 hours, and then measurement shall be made within 1 hour. （滚珠开关在 70±2℃的温控箱内保持 96 小时，然后在正常温度和温度下恢复 2 小时，并在些后 1 小时内对此產品进行测量）</td></tr>
</table>

5	Moisture Resistance(耐湿性)	After testing at 40±2℃,90-95%RH for 96 hours, the sensor shall be allowed to stand normal room temperature and humidity conditions for 2 hours, and then measurement shall be made within 1 hour. Water drops shall be eliminated.（滚珠开关在 40±2℃, 90-95%RH 的温控箱内保持 96小时，然后在正常温度和温度下恢复 2 小时，并在些后 1 小时内对滚珠开关进行测量, 水滴应消失）	After test（实验后）: The sensor shall be free from abnormalities in appearance & construction.（开关外观及结构应无损坏） The electrical performance requirements specified in section 6.2 shall be satisfied.（电气性能应符合第6. 2部分的要求）
6	Temperature Cycling(温度循环)	After 5 cycles of following conditions, the switch shall be allowed to stand under normal room temperature and humidity conditions for 2 hours, and then measurement shall be made within 1 hour. Water drops shall be eliminated.（滚珠开关按上述实验条件试验5个循环，然后在正常温度和温度下恢复 2小时，并在些后 1小时内对滚珠开关进行测量, 无水滴）	
7	Salt Spray Test(盐雾试验)	The part of switch shall be subjected to a fine mist of a solution at a temperature of 35±2℃ for 12 hours continuously (salt solution concentration 5±1% by weight) 部件放置在温度为 35±2℃、浓度为 5±1%的盐雾中做腐蚀试验，保持 12 小时。）	Appearance shall no rust, oxidation, corrosion and other undesirable phenomena.（外观须无生锈、氧化、腐蚀等不良现象）
8	Hand Soldering（手工焊接）	Please practice according to bellow conditions:（请按以下条件进行焊接） (1) Soldering temperature焊锡温度 : ≤350℃ (2) Continuous soldering time连续焊接时间: ≤3 S (3) Capacity of soldering iron电铬铁的功率: ≤60 W	Should not have any flaw scratch and crack.（无任何裂痕、刮伤和破裂）

7. OTHER PRECAUTIONS 其他注意事项:

7.1. Following the soldering process, do not try to clean the switch with a solvent or the like.
进行焊接过程中，不可以用溶剂或类似品清洗开关

7.2. Safeguard the switch assembly against flux penetration from its topside.

防止助焊剂从开关的顶端渗入

7.3. Please have the products keep in close status and the storage time is 90 days guaranty after delivering the goods at most. 交货后保证开关处于封密状态并库存时间 90 天以下

Rev.	Description	Date revised	Created/ Revised by
01	New Release	2021/05/20	Josephine Lin