Tactile Silent shaft

**Specification:**

- 1. **Rating:** 12V AC/DC max., 2V DC min.
  10mA AC/DC max., 10 μA DC min.
- 2. **Contact Resistance:** 200mΩ Max
- 3. **Insulation Resistance:** 100MΩ Min (DC500V)
- 4. **Withstand Voltage:** AC100V (50~60Hz) for 1 minute
- 5. **Bounce Time:** ≤5msec (3~4 times/s)
- 6. **Operation Force:** 45±10gf
- 7. **Pre travel:** 1.9mm±0.4mm
- 8. **Tactile Force:** 55±10gf
- 9. **Total travel:** 3.7±0.3mm
- 10. **Return Force:** 10gf min
- 11. **Operating Life:** 70,000,000 Cycles (min).

*Fuel is allowed to have difference before and after life test*

---

**PART NAME**

- **PCB Layout (Bottom Side)**
- **Top View**

**MATERIAL**

- **Rubber 1:** TPE/SUS Nature
- **Rubber 1:** TPE/SUS Nature
- **Base:** PA66 Almond yellow
- **Spring:** Stainless Steel
- **Contact:** Composite gold
- **Cover:** PC Transparent
- **Keystone:** POM Almond yellow
- **Static plate:** Copper Alloy Plating Sn
- **Moveable plate:** Phosphor Copper

**ECN NO.**

- 4

**CHECKED**

- 2022.05.09

**APPROVALS**

- **REMARK**
  - **DATE**
  - **APPROVALS**
  - **NEW**
  - **DESCRIPTION**
  - **CHANGE, CHECK, APPRO**
  - **PART NO.**
  - **TITLE:** PG1511 Silent Tactile Keystroke Switch
  - **PROJECT NO.**

**TOLERANCE ARE**

- ±0.10
- ±0.10
- ±0.10
- ±0.10
- ±0.10
- ±0.10
- ±0.10
- ±0.10

**UNIT:** mm

**SCALE:** 1:1

**DRAWING NO.:** KAILH-PG1511-07083

**SHEET:** 1 of 1

---

**KAILH KAILHA ELECTRONICS CO., LTD**
Product Specification
Content

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1. Scope:

This Product Specification covers the requirement of Mechanical Keyboard switch on product performance, test methods and quality assurance provisions.

2. Product Application:

Mainly applied on computer keyboards, cash registers, industrial equipment and Man-Machine interface.

3. Technology Parameters:

   Ambient Humidity: 45 ~ 85% RH
   Operating Temperature Range: -10°C ~ +70°C
   Storage Temperature Range: -20°C ~ +70°C
   Suggested storage period: about 6 months
   Require the tin part on the switch terminals should keep good after storage guarantee date

   Normal Condition:
      Ambient temperature: 20±2°C
      Relative humidity: 65%±5%RH
      Air pressure: 86~101KPa
      Solder Ability: Lead-tin soldering: 245°C Max 5s Max
                        Lead free soldering: 255°C Max 5s Max
   Withstand Soldering Temperature: Wave soldering: 260±5°C 5±0.5s

4. Ratings

   Rating: 12V AC/DC max. 2V DC min
           10mA AC/DC max. 10μA DC min
   Insulation Resistance: ≥100MΩ/DC 100V
   Withstand Voltage: 100 AC 1 Minute
   Mechanical Life: 80,000,000 Cycles

5. Profile Dimensions

   ![Profile Dimensions Diagram]
## 6. Electrical Performance

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Test Condition</th>
<th>Requirement</th>
</tr>
</thead>
</table>
| 6.1 Contact Resistance | Static load: (Operation force)x2, which is applied on the center of Switch stem. Be measured when the switch contact stabilization.  
Measurement tool: Contact resistance Meter. (1KHz, 20mV, 5~50mA)  
Measured at low current (100mA or less). |                                                                                                          | 200mΩ Max                         |
| 6.2 Insulation Resistance | Apply a Voltage of DC 100 V for 1 minute, according to the below method.  
(1) Between terminals.  
(2) Between terminal and Body. |                                                                                                          | 100mΩ Min                         |
| 6.3 Dielectric withstand voltage | Apply a Voltage of AC 100 V (50~60Hz) for 1 minute, according to the below method.  
(1) Between terminals.  
(2) Between terminal and Body. |                                                                                                          | No evidence of breakdown          |
| 6.4 Bouncing  | Operation speed: 3~4 times/s  
Oscilloscope  
Switch Bouncing Test Circuit | Before Life cycle:  
On: 5ms MAX  
Off: 5ms MAX  
After Life cycle:  
On: 10ms MAX  
Off: 10ms MAX |                                                                                                          |
7. Mechanical Performance

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Test Condition</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Place the vertical direction of switch operation and gradually increase the load applied to the center of the stem until it stop.</td>
<td>See page 11</td>
</tr>
<tr>
<td>7.1</td>
<td>Load Curve</td>
<td><img src="image" alt="Force-Travel Diagram" /></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>See page 11</td>
<td></td>
</tr>
<tr>
<td>7.2</td>
<td>Loading parameter</td>
<td>Place the vertical direction of switch operation and gradually increase the load applied to the center of the stem until it stop.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><img src="image" alt="Loading Parameter Diagram" /></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>See page 11</td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
<td>Specification</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>---------------</td>
<td></td>
</tr>
<tr>
<td>7.3</td>
<td>Static Strength</td>
<td>A static load of 3kgf shall be applied in the direction of button operation for a period of 60 seconds. No damage (Electrical) And mechanical</td>
<td></td>
</tr>
<tr>
<td>7.4</td>
<td>Stem Pull Strength</td>
<td>Break by a pull force applied opposite to the direction of stem operation. 5kgf Min</td>
<td></td>
</tr>
<tr>
<td>7.5</td>
<td>Shock</td>
<td>Measured by according to the below condition: (1) Acceleration: 80g (2) Cycles of test: 3 cycles each in 6 directions, for a total of 18 cycles. Shall meet No.6, 7.1, 7.2.</td>
<td></td>
</tr>
<tr>
<td>7.6</td>
<td>Life Test</td>
<td>1) D.C.12V 10mA resistance load 2) Operation speed: 5-6 times / s 3) Push force: 150gf 4) Operation number: 80,000,000cycles Contact resistance: 1Ω Max Bouncing: 10ms Max Operation force and tactile force: Variation rate within ±30%</td>
<td></td>
</tr>
</tbody>
</table>
# Environmental Performance

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Test Condition</th>
<th>Requirement</th>
</tr>
</thead>
</table>
| 8.1    | Cold test         | (1) Temperature: -20±2°C  
(2) Duration of test: 48h  
(3) Take off a drop water  
(4) Standard conditions after test: 1h | Contact resistance: 200mΩ Max  
Shall meet:  
No. 6.2 to 6.4  
No. 7.1 to 7.2 |
| 8.2    | Heat test         | (1) Temperature: 70±2°C  
(2) Duration of test: 48h  
(3) Take off a drop water  
(4) Standard conditions after test: 1h | Contact resistance: 200mΩ Max  
Shall meet:  
No. 6.2 to 6.4  
No. 7.1 to 7.2 |
| 8.3    | Temperature cycle | (1) Test cycles: 5 cycles  
(2) Standard condition after test: 1h | Contact resistance: 200mΩ Max  
Shall meet:  
No. 6.2 to 6.4  
No. 7.1 to 7.2 |

<table>
<thead>
<tr>
<th></th>
<th>Temperature</th>
<th>Duration of test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 cycle</td>
<td>20±5°C</td>
<td>1h</td>
</tr>
<tr>
<td></td>
<td>-20±5°C</td>
<td>1h</td>
</tr>
<tr>
<td></td>
<td>20±5°C</td>
<td>1h</td>
</tr>
<tr>
<td></td>
<td>70±5°C</td>
<td>1h</td>
</tr>
</tbody>
</table>
# Kailh

## KAIHUA ELECTRONICS

<table>
<thead>
<tr>
<th>P/N:</th>
<th>DOC. No.:</th>
<th>Rev.:</th>
<th>Page:</th>
</tr>
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<tbody>
<tr>
<td>CPG151101S163</td>
<td>KHI-PS2205-31</td>
<td>A</td>
<td>8/11</td>
</tr>
</tbody>
</table>

## 8.4 Soldering heat test

Soldering area: T/2 of PWB thickness. (PWB: T=1.6mm)
Soldering temperature: 260±5°C
Soldering time: 5±0.5s

![Wave Soldering Temperature Curve (Single Wave Peak)](image)

Appearance:
No abnormality.

## 8.5 Solder ability

Lead-tin soldering
Soldering temperature: 245±5°C
Soldering time: 5±0.5s

Lead free soldering
Soldering temperature: 255±5°C
Soldering time: 5±0.5s

At least 90% of surface area of immersed portion shall be covered by solder.
| 8.6 | Humidity test | (1) Temperature: 60±2°C  
(2) Relative humidity: 90~95% R.H.  
(3) Duration of test: 48h  
(4) Take off a drop water  
(5) Standard conditions after test: 1h | Contact resistance: 200mΩ Max  
Shall meet:  
No. 6.2 to 6.4  
No. 7.1 to 7.2 |
| 8.7 | Salt Spray | Apply the following environment to test (only for contact test):  
(1) Temperature: 35±5°C  
(2) Salt water density: 5±1%  
(3) Duration: 12 hours  
(4) After test, the salt deposit shall be removed by running water. | Appearance:  
No corrosion spot, no crack, no base plate naked.  
Contact Resistance: 200 mΩ Max |
| 8.8 | Protection against ingress of dust (IP5X) | The switches are placed in a position of normal use inside the test chamber.  
The test is carried out according to the second enclosure of IEC60529/GB4208.  
The test shall be continued for a period of 8h. | After test:  
Operating is normal  
Between terminals, terminal and surface of the crust,  
Dielectric withstand in voltage ≥100V |
| 8.9 | Protection against ingress of water (IPX4) | The switches are placed in a position of normal use inside the test table.  
The test is carried out according to the second enclosure of IEC60529/GB4208. | After test:  
Operating is normal.  
Water don't enter electric parts of the switch inside.  
Between terminals, terminal and surface of the crust,  
Dielectric withstand in voltage ≥100V |
9. Recommended PCB Layout

Mounting Options

PCB (With pins)  Metal Frame (With pins)

Circuit Board Layouts

Grid line spacing = 1.27mm

Keyswitch without fixation pins

1-Pole 1-Pole w/LED 1-Pole w/Diode

\[ \phi 3.99 \pm 0.1 \]

\[ \phi 1.50 \pm 0.05 \]

\[ \phi 1.0 \pm 0.1 \]

Keyswitch with fixation pins

1-Pole 1-Pole w/LED 1-Pole w/Diode

\[ \phi 3.99 \pm 0.1 \]

\[ \phi 1.70 \pm 0.05 \]

\[ \phi 1.50 \pm 0.05 \]

\[ \phi 1.0 \pm 0.1 \]

Metal Frame Cutout Dimensions
10. Loading Parameter (TT/PT/OT/OF/TF/RF) Specification

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Specification</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>FP</td>
<td>mm</td>
<td>15.25 ± 0.2</td>
<td></td>
</tr>
<tr>
<td>OP</td>
<td>mm</td>
<td>13.25±0.7</td>
<td></td>
</tr>
<tr>
<td>PT</td>
<td>mm</td>
<td>1.9±0.4</td>
<td></td>
</tr>
<tr>
<td>OF</td>
<td>gf</td>
<td>45±10</td>
<td></td>
</tr>
<tr>
<td>TF</td>
<td>mm</td>
<td>55±10</td>
<td></td>
</tr>
<tr>
<td>TT</td>
<td>mm</td>
<td>3.7±0.3</td>
<td></td>
</tr>
</tbody>
</table>

11. Precaution

11.1 Immersion Soldering condition

<table>
<thead>
<tr>
<th>ITEM</th>
<th>CONDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preheat temperature</td>
<td>110°C Max (Ambient temperature of soldering surface of P.W.B)</td>
</tr>
<tr>
<td>Preheat time</td>
<td>60s, Max</td>
</tr>
<tr>
<td>Area of flux</td>
<td>1/2 Max of PWB Thickness</td>
</tr>
<tr>
<td>Temperature of solder</td>
<td>260±5°C</td>
</tr>
<tr>
<td>Time of immersion</td>
<td>3±0.5s</td>
</tr>
<tr>
<td>Number of soldering</td>
<td>2time Max (But should down heat of the first soldering)</td>
</tr>
<tr>
<td>Printed wiring board</td>
<td>Single side copper-clad laminates</td>
</tr>
</tbody>
</table>

(1) After switches were soldered, please be careful not to clean switches with solvent
(2) Under the condition of using soldering iron, soldering temperature shall be 350°C ± 5 °C with 3±0.5s

11.2 Notes

(1) Please be cautious not to give excessive static load or shock to switches.
(2) Please be careful not to stack up P. W. B. after switches were soldered.
(3) Preservation under high temperature and high humidity or corrosive gas should be avoided Especially. When you need to preserve for a long period, do not open the carton.
(4) The standard storage period is 3 months, with maximum up to 6months, preferably to be used as soon as possible. After opening the package, you should put the remaining switches in a plastic bag to prevent from damp and corrosive gas.
(5) This Product Specification is considered as the technical agreement on product between the receiving customer and Kailh. Any information on Product Catalogue which is in conflict with or different from the corresponding information of this document is considered as invalid.
(6) If customer issue purchase orders without confirmation by signature of this specification after receipt, such confirmation will be considered as granted upon receipt of the first purchase order.
(7) If there is no order or no request for new specification after 1 year upon this specification is issued, the specification will be regarded as invalid.
(8) Products meet the ROHS & REACH environmental management substances control standards.