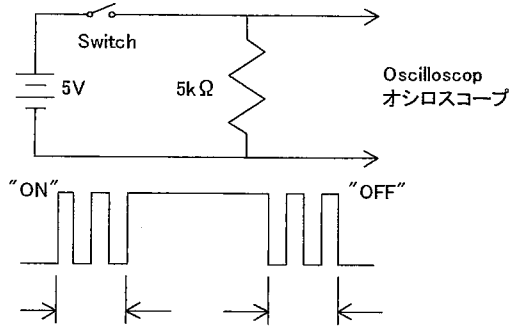
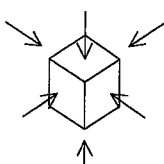


| DOCUMENT No.<br>KHH-701                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                             | TITLE<br>PRODUCT SPECIFICATIONS<br>製 品 仕 様 書 |      |      |      | PAGE<br>1/6 |           |                         |                  |                                   |                                                                                                                                                                                                                                                                                                            |                                      |                                      |                                                                                                                                                                                                                                                                                                  |                                      |                            |                                                                                                                                                                                                                                                                                                                                             |                                            |
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| BACKGROUND                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                             |                                              |      |      |      |             |           |                         |                  |                                   |                                                                                                                                                                                                                                                                                                            |                                      |                                      |                                                                                                                                                                                                                                                                                                  |                                      |                            |                                                                                                                                                                                                                                                                                                                                             |                                            |
| <p>1. General 一般事項</p> <p>1.1 Application 適用範囲 This specification is applied to TACT switches which have no keypad.<br/>この規格書は、キーボードなしのタクトスイッチについて適用する。</p> <p>1.2 Operating temperature range 使用温度範囲: <math>-40 \sim +90^{\circ}\text{C}</math> (normal humidity, normal air pressure 常湿・常圧)</p> <p>1.3 Storage temperature range 保存温度範囲: <math>-40 \sim +90^{\circ}\text{C}</math> (normal humidity, normal air pressure 常湿・常圧)</p> <p>1.4 Test conditions 試験状態 Unless otherwise specified, the atmospheric conditions for making measurements and tests are as follows.<br/>試験及び測定は特に規定がない限り以下の標準状態のもとで行う。<br/>Normal temperature 常 温: (Temperature 温度 <math>5 \sim 35^{\circ}\text{C}</math>)<br/>Normal humidity 常 湿: (Relative humidity 湿度 <math>25 \sim 85\%</math>)<br/>Normal air pressure 常 圧: (Air pressure 気圧 <math>86 \sim 106\text{kPa}</math>)<br/>If any doubt arise from judgement, tests shall be conducted at the following conditions.<br/>ただし、判定に疑義を生じた場合は以下の基準状態で行う。<br/>Ambient temperature 温 度: <math>20 \pm 2^{\circ}\text{C}</math><br/>Relative humidity 相対湿度: <math>60 \sim 70\%</math><br/>Air pressure 気 圧: <math>86 \sim 106\text{kPa}</math></p> <p>2. Appearance, style and dimensions 外観、形状、寸法</p> <p>2.1 Appearance 外観 There shall be no defects that affect the serviceability of the product.<br/>性能上有害な欠陥があってはならない。</p> <p>2.2 Style and dimensions 形状、寸法 Refer to the assembly drawings. 製品図による。</p> <p>3. Type of actuating 動作形式 Tactile feedback タクティールフィードバック</p> <p>4. Contact arrangement 回路形式 <u>1 poles 1 throws</u> <u>1 回路 1 接点</u><br/>(Details of contact arrangement are given in the assembly drawings 回路の詳細は製品図による)</p> <p>5. Ratings 定格</p> <p>5.1 Maximum ratings 最大定格 <u>12 V DC</u> <u>50 mA</u></p> <p>5.2 Minimum ratings 最小定格 <u>1 V DC</u> <u>10 <math>\mu</math>A</u></p> <p>6. Electrical specification 電気的性能</p> <table border="1"> <thead> <tr> <th>Items 項 目</th> <th>Test conditions 試 験 条 件</th> <th>Criteria 判 定 基 準</th> </tr> </thead> <tbody> <tr> <td>6.1 Contact resistance<br/>接 触 抵 抗</td> <td>Applying a below static load to the center of the stem, measurements shall be made.<br/>スイッチ操作部中央に下記の静荷重を加え、測定する。<br/>(1) Depression 押圧力: <u>1.96 N</u><br/>(2) Measuring method 測定方法: 1 kHz small-current contact resistance meter<br/>or voltage drop method at 5VDC 10mA.<br/>1kHz微小電流接触抵抗計、又はDC5V 10mA電圧降下法</td> <td><u>100 m<math>\Omega</math></u> Max.</td> </tr> <tr> <td>6.2 Insulation resistance<br/>絶 縁 抵 抗</td> <td>Measurements shall be made following the test set forth below:<br/>下記条件で試験を行った後、測定する。<br/>(1) Test voltage 印加電圧: <u>100 V DC</u> for 1 min.<br/>(2) Applied position 印加場所: Between all terminals. And if there is a metal frame, between terminals and ground(frame)<br/>端子間、金属フレームがある場合は、端子と金属フレーム間</td> <td><u>100 M<math>\Omega</math></u> Min.</td> </tr> <tr> <td>6.3 Voltage proof<br/>耐 電 圧</td> <td>Measurements shall be made following the test set forth below:<br/>下記条件で試験を行った後、測定する。<br/>(1) Test voltage 印加電圧: <u>250 V AC</u> (<math>50 \sim 60\text{Hz}</math>)<br/>(2) Duration 印加時間: 1 min<br/>(3) Applied position 印加場所: Between all terminals. And if there is a metal frame, between terminals and ground(frame)<br/>端子間、金属フレームがある場合は、端子と金属フレーム間</td> <td>There shall be no breakdown.<br/>絶縁破壊のないこと。</td> </tr> </tbody> </table> |                                                                                                                                                                                                                                                                                                                                             |                                              |      |      |      |             | Items 項 目 | Test conditions 試 験 条 件 | Criteria 判 定 基 準 | 6.1 Contact resistance<br>接 触 抵 抗 | Applying a below static load to the center of the stem, measurements shall be made.<br>スイッチ操作部中央に下記の静荷重を加え、測定する。<br>(1) Depression 押圧力: <u>1.96 N</u><br>(2) Measuring method 測定方法: 1 kHz small-current contact resistance meter<br>or voltage drop method at 5VDC 10mA.<br>1kHz微小電流接触抵抗計、又はDC5V 10mA電圧降下法 | <u>100 m<math>\Omega</math></u> Max. | 6.2 Insulation resistance<br>絶 縁 抵 抗 | Measurements shall be made following the test set forth below:<br>下記条件で試験を行った後、測定する。<br>(1) Test voltage 印加電圧: <u>100 V DC</u> for 1 min.<br>(2) Applied position 印加場所: Between all terminals. And if there is a metal frame, between terminals and ground(frame)<br>端子間、金属フレームがある場合は、端子と金属フレーム間 | <u>100 M<math>\Omega</math></u> Min. | 6.3 Voltage proof<br>耐 電 圧 | Measurements shall be made following the test set forth below:<br>下記条件で試験を行った後、測定する。<br>(1) Test voltage 印加電圧: <u>250 V AC</u> ( $50 \sim 60\text{Hz}$ )<br>(2) Duration 印加時間: 1 min<br>(3) Applied position 印加場所: Between all terminals. And if there is a metal frame, between terminals and ground(frame)<br>端子間、金属フレームがある場合は、端子と金属フレーム間 | There shall be no breakdown.<br>絶縁破壊のないこと。 |
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| 6.2 Insulation resistance<br>絶 縁 抵 抗                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Measurements shall be made following the test set forth below:<br>下記条件で試験を行った後、測定する。<br>(1) Test voltage 印加電圧: <u>100 V DC</u> for 1 min.<br>(2) Applied position 印加場所: Between all terminals. And if there is a metal frame, between terminals and ground(frame)<br>端子間、金属フレームがある場合は、端子と金属フレーム間                                            | <u>100 M<math>\Omega</math></u> Min.         |      |      |      |             |           |                         |                  |                                   |                                                                                                                                                                                                                                                                                                            |                                      |                                      |                                                                                                                                                                                                                                                                                                  |                                      |                            |                                                                                                                                                                                                                                                                                                                                             |                                            |
| 6.3 Voltage proof<br>耐 電 圧                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Measurements shall be made following the test set forth below:<br>下記条件で試験を行った後、測定する。<br>(1) Test voltage 印加電圧: <u>250 V AC</u> ( $50 \sim 60\text{Hz}$ )<br>(2) Duration 印加時間: 1 min<br>(3) Applied position 印加場所: Between all terminals. And if there is a metal frame, between terminals and ground(frame)<br>端子間、金属フレームがある場合は、端子と金属フレーム間 | There shall be no breakdown.<br>絶縁破壊のないこと。   |      |      |      |             |           |                         |                  |                                   |                                                                                                                                                                                                                                                                                                            |                                      |                                      |                                                                                                                                                                                                                                                                                                  |                                      |                            |                                                                                                                                                                                                                                                                                                                                             |                                            |
| PAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | SYMB                                                                                                                                                                                                                                                                                                                                        | BACKGROUND                                   | DATE | APPD | CHKD | DSGD        |           |                         |                  |                                   |                                                                                                                                                                                                                                                                                                            |                                      |                                      |                                                                                                                                                                                                                                                                                                  |                                      |                            |                                                                                                                                                                                                                                                                                                                                             |                                            |

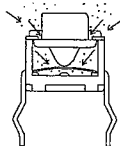
DSGD. Apr. 12. 2006  
J. Onodera  
CHKD. May. 08. 2006  
M. Suzuki  
APPD. 8. May 2006  
J. Mahe

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| DOCUMENT No.<br>KHH-701             |                                       | TITLE<br>PRODUCT SPECIFICATIONS<br>製品仕様書                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                          | PAGE<br>2/6 |
|                                     |                                       |                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                          |             |
|                                     | Items 項目                              | Test conditions 試験条件                                                                                                                                                                                                                                                                                                                                     | Criteria 判定基準                                                                                                                                                            |             |
| 6.4                                 | Bounce<br>バウンス                        | <p>Lightly striking the center of the stem at a rate encountered in normal use (3 to 4 operations per s ),bounce shall be tested at "ON" and "OFF".<br/>スイッチ操作部の中央部を通常の使用状態(3~4回/秒)で軽く打鍵し、ON時及びOFF時のバウンスを測定する。</p> <div></div>                                          | ON bounce : <u>5</u> ms Max.<br>OFF bounce: <u>5</u> ms Max.                                                                                                             |             |
| 7. Mechanical specification 機械的性能   |                                       |                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                          |             |
|                                     | Items 項目                              | Test conditions 試験条件                                                                                                                                                                                                                                                                                                                                     | Criteria 判定基準                                                                                                                                                            |             |
| 7.1                                 | Operating force<br>作動力                | <p>Placing the switch such that the direction of switch operation is vertical and then gradually increasing the load applied to the center of the stem, the maximum load required for the switch to come to a stop shall be measured.<br/>スイッチの操作方向が垂直になる様にスイッチを設置し、操作部中央部に徐々に荷重を加え、操作部が停止するまでの最大荷重を測定する。</p>                                            | <u>0.98 ± 0.49</u> N                                                                                                                                                     |             |
| 7.2                                 | Travel<br>移動量                         | <p>Placing the switch such that the direction of switch operation is vertical and then applying a below static load to the center of the stem, the travel distance for the switch to come to a stop shall be measured.<br/>スイッチの操作方向が垂直になる様にスイッチを設置し、操作部中央部に以下の静荷重を加え、操作部が停止するまでの距離を測定する。<br/>(1) Depression 押圧力: <u>1.96</u> N</p>                      | <u>0.25 + 0.2 / - 0.1</u> mm                                                                                                                                             |             |
| 7.3                                 | Return force<br>復帰力                   | <p>The sample switch is installed such that the direction of switch operation is vertical and,upon depression of the stem in its center the travel distance,the force of the stem to return tot its free position shall be measured.<br/>スイッチの操作方向が垂直になる様にスイッチを設置し、操作部中央部を移動量押圧後、操作部が復帰する力を測定する。</p>                                                     | <u>0.10</u> N Min.                                                                                                                                                       |             |
| 7.4                                 | Stop strength<br>ストッパー強度              | <p>Placing the switch such that the direction of switch operation is vertical and then a below static load shall be applied in the direction of stem operation.<br/>スイッチの操作方向が垂直になる様にスイッチを設置し、スイッチの操作方向へ以下の静荷重を加える。<br/>(1) Depression 押圧力: <u>29.4</u> N<br/>(2) Time 時間: <u>60</u> s</p>                                                               | There shall be no sign of damage mechanically and electrically.<br>機械的、電氣的に異常のないこと。                                                                                      |             |
| 7.5                                 | Stem strength<br>ステム抜き強度              | <p>Placing the switch such that the direction of switch operation is vertical and then the maximum force to withstand a pull applied opposite to the direction of stem operation shall be measured.<br/>スイッチの操作方向が垂直になる様にスイッチを設置し、操作部の操作方向とは反対方向に操作部を引っ張って抜けない力である。</p>                                                                                  | <u>29.4</u> N                                                                                                                                                            |             |
| 8. Environmental specification 耐候性能 |                                       |                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                          |             |
|                                     | Items 項目                              | Test conditions 試験条件                                                                                                                                                                                                                                                                                                                                     | Criteria 判定基準                                                                                                                                                            |             |
| 8.1                                 | Resistance to low temperatures<br>耐寒性 | <p>Following the test set forth below the sample shall be left in normal temperature and humidity conditions for 1 h before measurements are made:<br/>次の試験後、常温、常湿中に1時間放置後測定する。<br/>(1) Temperature 温度: <u>-40 ± 2</u> °C<br/>(2) Time 時間: <u>96</u> h<br/>(3) Waterdrops shall be removed. 水滴は取り除く。</p>                                                 | Item 6.<br>Item 7.1<br>Item 7.2                                                                                                                                          |             |
| 8.2                                 | Heat resistance<br>耐熱性                | <p>Following the test set forth below the sample shall be left in normal temperature and humidity conditions for 1 h before measurements are made:<br/>次の試験後、常温、常湿中に1時間放置後測定する。<br/>(1) Temperature 温度: <u>90 ± 2</u> °C<br/>(2) Time 時間: <u>96</u> h</p>                                                                                                | Item 6.<br>Item 7.1<br>Item 7.2                                                                                                                                          |             |
| 8.3                                 | Moisture resistance<br>耐湿性            | <p>Following the test set forth below the sample shall be left in normal temperature and humidity conditions for 1 h before measurements are made:<br/>次の試験後、常温、常湿中に1時間放置後測定する。<br/>(1) Temperature 温度: <u>60 ± 2</u> °C<br/>(2) Time 時間: <u>96</u> h<br/>(3) Relative humidity 相対湿度: <u>90 ~ 95</u> %<br/>(4) Waterdrops shall be removed. 水滴は取り除く。</p> | Contact resistance 接触抵抗(Item 6.1) :<br><u>200</u> mΩ Max.<br>Insulation resistance 絶縁抵抗(Item 6.2) :<br><u>10</u> MΩ Min.<br>Item 6.3<br>Item 6.4<br>Item 7.1<br>Item 7.2 |             |

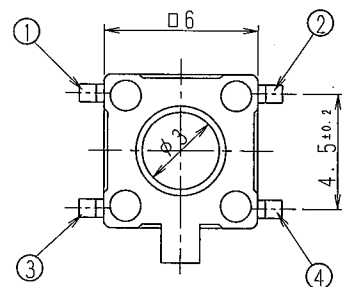
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| DOCUMENT No.<br>KHH-701         |                                 | TITLE<br>PRODUCT SPECIFICATIONS<br>製品仕様書                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                              | PAGE<br>3/6 |
|                                 |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                              |             |
|                                 | Items 項目                        | Test conditions 試験条件                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Criteria 判定基準                                                                                                                                                                                                                                                                                                                                                |             |
| 8.4                             | Change of temperature<br>温度サイクル | <p>After below cycles of following conditions, the switch shall be allowed to stand under normal room temperature and humidity conditions for 1 h, and measurement shall be made. Water drops shall be removed.<br/>下記条件で以下回数のサイクル試験後、常温常湿中に1時間放置し測定する。<br/>ただし、水滴は取り除く。</p> <div><div><div>A</div><div>B</div><div><div><div>C</div><div>D</div><div>E</div><div>F</div></div><div>1 cycle</div></div></div><div><div>A = <u>+90</u> °C</div><div>B = <u>-40</u> °C</div><div>C = <u>2</u> h</div><div>D = <u>1</u> h</div><div>E = <u>2</u> h</div><div>F = <u>1</u> h</div><div>(1) Number of cycles<br/>サイクル数 : <u>5</u> cycles</div></div></div> <div>Item 6.<br/>Item 7.1<br/>Item 7.2</div> |                                                                                                                                                                                                                                                                                                                                                              |             |
| 9. Endurance specification 耐久性能 |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                              |             |
|                                 | Items 項目                        | Test conditions 試験条件                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Criteria 判定基準                                                                                                                                                                                                                                                                                                                                                |             |
| 9.1                             | Operating life<br>動作寿命          | <p>Measurements shall be made following the test set forth below:<br/>下記条件で試験を行った後、測定する。<br/>(1) <u>5</u> VDC <u>5</u> mA resistive load 抵抗負荷<br/>(2) Rate of operation 動作速度 : <u>2</u> to <u>3</u> operations per s 回/秒<br/>(3) Depression 押圧力 : <u>1.47</u> N<br/>(4) Cycles of operation 動作回数 : <u>1,000,000</u> cycles 回</p>                                                                                                                                                                                                                                                                                                                                                                   | <p>Contact resistance 接触抵抗(Item 6.1) :<br/><u>200</u> mΩ Max.<br/>Insulation resistance 絶縁抵抗(Item 6.2) :<br/><u>10</u> MΩ Min.<br/>Bounce バウンス(Item 6.4) :<br/>ON bounce : <u>10</u> ms Max.<br/>OFF bounce : <u>10</u> ms Max.<br/>Operating force 作動力(Item 7.1) :<br/><u>-30</u> ~ <u>+30</u> % of initial force<br/>初期値に対して<br/>Item 6.3<br/>Item 7.2</p> |             |
| 9.2                             | Vibration resistance<br>耐振性     | <p>Measurements shall be made following the test set forth below:<br/>下記条件で試験を行った後、測定する。<br/>(1) Vibration frequency range 振動数範囲 : <u>10</u> ~ <u>55</u> Hz<br/>(2) Total amplitude 全振幅 : <u>1.5</u> mm<br/>(3) Sweep ratio 掃引の割合 : <u>10-55-10</u> Hz Approx. <u>1</u> min 約 <u>1</u> 分<br/>(4) Method of changing the sweep vibration frequency: Logarithmic or uniform<br/>掃引振動数の変化方法 対数又は一様掃引<br/>(5) Direction of vibration: Three mutually perpendicular directions, including<br/>振動の方向 the direction of the travel<br/>スイッチ操作方向を中心とした垂直3方向<br/>(6) Duration 振動時間 : <u>2</u> h each (<u>6</u> h in total) 各 <u>2</u> 時間 (計 <u>6</u> 時間)</p>                                                 | <p>Item 6.1<br/>Item 7.1<br/>Item 7.2</p>                                                                                                                                                                                                                                                                                                                    |             |
| 9.3                             | Shock<br>耐衝撃性                   | <p>Measurements shall be made following the test set forth below:<br/>下記条件で試験を行った後、測定する。<br/>(1) Acceleration 加速度 : <u>784</u> m/s<sup>2</sup><br/>(2) Acting time 作用時間 : <u>11</u> msec<br/>(3) Test direction 試験方向 : 6 directions 6 面<br/>(4) Number of shocks 試験回数 : <u>3</u> times per direction<br/>(<u>18</u> times in total)<br/>各方向各 <u>3</u> 回 (計 <u>18</u> 回)</p> <div></div>                                                                                                                                                                                                                        | <p>Item 6.1<br/>Item 7.1<br/>Item 7.2</p>                                                                                                                                                                                                                                                                                                                    |             |
|                                 |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                              |             |

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| DOCUMENT No.<br>KHH-701        |                                                     | TITLE<br>PRODUCT SPECIFICATIONS<br>製 品 仕 様 書                                                                                                                                                                                                                                                                                                                                                                          |  | PAGE<br>4/6 |
| 10. Soldering conditions 半田付条件 |                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |
|                                | Items 項 目                                           | Recommended conditions 推 奨 条 件                                                                                                                                                                                                                                                                                                                                                                                        |  |             |
| 10.1                           | Hand soldering<br>手 半 田                             | Please practice according to below conditions.<br>以下の条件にて実施して下さい。<br>(1)Soldering temperature 半田温度 : 360 °C Max.<br>(2)Continuous soldering time 連続半田時間 : 3 s Max.<br>(3)Capacity of soldering iron 半田コテ容量 : 60 W Max.<br>(4)Excessive pressure shall not be applied to the terminal.<br>端子に異常加圧のないこと<br>(5)Safeguard the switch assembly against flux penetration from its top side.<br>スイッチの上面からフラックスが浸入しない様にして下さい。 |  |             |
| 10.2                           | Automatic flow<br>Soldering<br>オートディップ半田            | In case an automatic flow soldering apparatus is used for soldering, adhere to the following conditions:<br>噴流式自動半田装置で、半田付けされる場合は、次の条件に従って下さい。                                                                                                                                                                                                                                                                        |  |             |
|                                | Items 項 目                                           | Soldering conditions 半田付け条件                                                                                                                                                                                                                                                                                                                                                                                           |  |             |
|                                | (1)Preheat temperature プリヒート温度                      | 110 °C Max.<br>(Ambient temperature of printed circuit board on soldering side)<br>(プリント基板の半田付け面の周囲の温度)                                                                                                                                                                                                                                                                                                               |  |             |
|                                | (2)Preheat time プリヒート時間                             | 60 s Max.                                                                                                                                                                                                                                                                                                                                                                                                             |  |             |
|                                | (3)Flux foaming フラックス発泡量                            | To such an extend that flux will be kept flush with the printed circuit board's top surface on which components are mounted. Preparatory flux must not be applied to that side of printed circuit board on which components are mounted and to the area where terminals are located.<br>プリント基板の部品実装面上にフラックスが周囲から上がらない程度にする。なお、プリント基板の部品実装面上及びスイッチ端子部に予備フラックスが塗布されていないこと。                                              |  |             |
|                                | (4)Soldering temperature 半田温度                       | 260 °C Max.                                                                                                                                                                                                                                                                                                                                                                                                           |  |             |
|                                | (5)Duration of solder immersion 半田浸漬時間              | 5 s Max.                                                                                                                                                                                                                                                                                                                                                                                                              |  |             |
|                                | (6)Allowable frequency of soldering process<br>半田回数 | 2 times Max.<br>Twice soldering would be dipped after the temperature goes down to a normal temperature.<br>2回目を行う場合は、スイッチが常温に戻ってから行うこと。                                                                                                                                                                                                                                                                              |  |             |
|                                | (7)Recommended printed circuit board<br>推奨プリント基板    | Printed circuit board shall be paper phenol with single-sided pattern. Please do not design a through-hole at and/or near the switch mounting area. Thickness of printed circuit board is specified in the product drawing.<br>プリント基板は紙フェノール片面パターンを推奨します。スイッチ周辺にスルーホールを設けないでください。基板板厚は製品図に記載しています。                                                                                                                    |  |             |
|                                | (8)Recommended flux<br>推奨フラックス                      | Soldering flux shall be "EC-19S-8" (TAMURA KAKEN) or equivalent. (Specific gravity of soldering flux shall be more than 0.81 at 20°C.)<br>フラックスについては、タムラ化研 "EC-19S-8"相当品を使用してください。<br>(20°C換算でフラックス比重0.81以上)                                                                                                                                                                                                          |  |             |
|                                | (9)Other precaution その他注意事項                         | Safeguard the switch assembly against flux penetration from its top side.<br>スイッチの上面からフラックスが浸入しない様にして下さい。                                                                                                                                                                                                                                                                                                             |  |             |

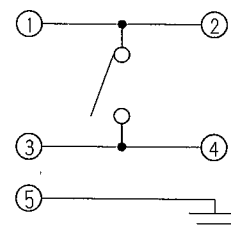
| DOCUMENT No.<br>KHH-701                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | TITLE<br>PRODUCT SPECIFICATIONS<br>製 品 仕 様 書 | PAGE<br>5/6 |
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| <p>【Precaution in use】ご使用上の注意</p> <p>A. General 一般項目</p> <p>A1. This product has been designed and manufactured for general electronic devices, such as audio devices, visual devices, home electronics, Information devices and communication devices. In case this product is used for more sophisticated equipment requiring higher safety and reliability, such as life support system, space &amp; aviation devices, disaster prevention &amp; security system, please make verification of conformity or check on us for the details.<br/>本製品はオーディオ機器、映像機器、家電機器、情報機器、通信機器などの一般電子機器用に設計・製造したものです。生命維持装置、宇宙・航空機器、防災・防犯機器などの高度な安全性や信頼性が求められる用途に使用される場合は、貴社にて適合性の確認を頂くか、当社へご確認ください。</p> <p>A2. This product is designed and manufactured assuming that it is to be used with the resistance for direct current. If you use other kinds of resistance (inductive (L) or capacitive (C)), please let us know beforehand.<br/>本製品は直流の抵抗負荷を想定して設計・製造されています。その他の負荷(誘導性負荷(L)、容量性負荷(C))で使用される場合は、別途ご相談ください。</p> <p>B. Soldering and assemble to PC board process 半田付、基板実装工程</p> <p>B1. Note that if the load is applied to the terminals during soldering they might suffer deformation and defects in electrical performance.<br/>端子をはんだ付けされる場合、端子に荷重が加わりますと条件によりガタ、変形及び電氣的特性劣化のおそれがありますのでご注意ください。</p> <p>B2. If soldering is made under the temperature or duration exceeding our recommend condition, molded plastic body may be melt. We highly recommend that soldering should be made under our recommended temperature conditions.<br/>弊社推奨半田付け条件を越えた条件で半田付けされますとスイッチ樹脂部の溶けが発生する可能性があります。半田付けは弊社推奨条件範囲内で実施して頂けるようお願い致します。</p> <p>B3. If you use a through-hole PCB or a PCB with smaller thickness than recommended, please previously check the soldering conditions adequately, because there is larger heat stress.<br/>スルーホールプリント基板及び推奨板厚より薄い基板をご使用される場合は推奨基板よりも熱ストレスの影響が大きくなりますので半田付条件については事前に十分な確認をして下さい。</p> <p>B4. If you use a PCB with smaller thickness than recommended, please pay enough attention to rising of switches when mounted.<br/>推奨板厚より薄い基板をご使用の際は、実装時のスイッチ浮きに十分ご注意ください。</p> <p>B5. When the switch is mounted on a printed circuit board, the case shall be held. And insert the product body to the specified fixing plane and fix it giving it the horizontal position. If it isn't fixed horizontally, it may cause malfunction.<br/>本スイッチをプリント基板へ取り付けける場合は、ケースを持って行って下さい。製品本体を規定の取付面まで挿入して水平になるように取り付けてください。水平にならないまま取り付けますと、動作不良の要因となります。</p> <p>B6. If the stem is given stress from the side, it may result in damages to switch functions. Therefore please handle it with extreme care.<br/>When the switch is carried, any shock shall not be applied to the stem.<br/>ステムに横からの力が加わりますと、スイッチの機能破壊につながる危険性がありますので取扱いは十分注意して下さい。<br/>移動する場合はステムに衝撃が加わらない様に注意して下さい。</p> <p>B7. Do not press the stem but the switch body when you correct rising of the switch mounted on PCB.<br/>基板実装後スイッチの浮きを修正する際は、スイッチのステムを押さずにスイッチ本体を押す様にして下さい。</p> <p>B8. Conditions for thermosetting oven. 熱硬化炉条件<br/>When the board on which the switch is mounted has to be put in the oven so as to harden adhesive for other parts, the conditions shall be 160°C at max. (on the parts mounted side of PCB), and not longer than 2 minutes.<br/>スイッチを取り付けた後、他の部品の接着剤硬化等のため熱硬化炉を通す場合、条件は160°C以下(基板部品面の温度)、2分以内として下さい。</p> <p>B9. Take most care not to let flux foam penetrate the switch when you perform auto-dip soldering, which may sometimes produce too much foam. Take special care when you have LED or grounded terminals.<br/>オートディップの場合フラックスの発泡量過多によりフラックスがスイッチ内部に浸入する場合がありますので十分にご注意ください。<br/>(LED付・アース端子付の場合は特にご注意ください)</p> <p>C. Washing process 洗浄工程</p> <p>C1. Following the soldering process, do not try to clean the switch with a solvent or the like.<br/>半田付け後、溶剤等でスイッチを洗浄しないでください。</p> <p>D. Mechanism design (switch layout) 機構設計</p> <p>D1. The dimensions of a hole and pattern for mounting a printed circuit board shall refer to the recommended dimensions in the engineering drawings.<br/>プリント基板取付穴及びパターンは、製品図に記載されている推奨寸法をご参照下さい。</p> <p>D2. Do not use the switch in a manner that the stem will be given stress from the side. If you push the stem from the side, the switch may be broken.<br/>ステムを横方向から押す様な使い方は避けて下さい。ステム先端に横方向から荷重が加わりますとスイッチが破壊される場合があります。</p> <p>D3. Press the center of the stem. Click feel may be changed, if you press the edge. This is because the center will be displaced, depending on the hinge structure or cumulative tolerances. When you use the hinge structure, take special care so that the keytop point to press the switch won't move.<br/>ステムのセンターを押す様にして下さい。ヒンジ構造及びセット上の累積公差によるセンターズレなどステムを端押しする状態では感触が変化する場合があります<br/>ヒンジ構造の場合は、押下時ステム押し位置が移動しますので、特にご注意ください。</p> <p>D4. This switch is designed for unit construction that it is pressed by human operation. Please avoid using this switch as mechanical detecting function. In case such detecting function is required, please consult with our detector switch section.<br/>当スイッチは、直接人の操作を介してスイッチを押す構造にてご使用下さい。メカ的な検出機能へのご使用は、避けてください。検出機能には弊社検出スイッチをご使用下さい。</p> <p>D5. The switch will be broken, if you give larger stress than specified. Take most care not to let the switch be given larger stress than specified.<br/>(Refer to the strength of the stopper.)<br/>スイッチ操作時に規定以上の荷重が加わるとスイッチが破損する場合があります。スイッチに規定荷重以上の力が加わらない様にご注意下さい。<br/>(ストッパー強度参照)</p> |                                              |             |

| DOCUMENT No.<br>KHH-701                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | TITLE<br>製品仕様書 | PRODUCT SPECIFICATIONS<br>製品仕様書 | PAGE<br>6/6 |
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| <p>E. Using environment 使用環境</p> <p>E1. Foreign matter invaded from outside. 外部侵入物</p> <p>Since this switch does not have sealed structure, it may have contact failure caused by the dust from outside up to the environment.<br/>当スイッチは密閉構造ではありませんので、使用環境によっては塵埃が内部に侵入し、接点障害を起こす場合があります。<br/>When you use this switch, precaution must be taken against the dust.<br/>The followings are examples of dust invasion:<br/>ご使用の際はスイッチに異物が侵入しないようにご注意ください。<br/>以下に塵埃侵入例を示します。ご参考にして下さい。</p> <p>①Debris from the cut or hole of PCB in process, or wastes from the PCB protection material (e.g. newspaper, foamed polystyrene etc.) invaded the switch.<br/>工程内における基板切断面や穴から発生するクズやPCB保護材(新聞紙、発泡スチロール等)から出るゴミがスイッチに侵入した。</p> <p>②Flux or powdered flux produced by stacking PCB's or excess foaming invaded the switch.<br/>基板重ねによりフラックス粉末がスイッチに侵入した。</p> <p>※ When you need higher dust-proof, make selection among the switches of dust-proof types in our catalog.<br/>より高い防塵性が必要な場合は、当社カタログより防塵タイプのスイッチを選定しご使用願います。</p> <p>Dusty environment 塵埃環境</p>  <p>“→”Indicates the route of invasion.<br/>“→”は侵入経路を示します。</p> <p>E2. In case this product is always used around a sulfurate hot spring where sulfide gas is generated or in a place where exhaust gas from automobiles exists, take most care due to the switch performance might be affected.<br/>硫黄系温泉地等常時ガスが発生する場所や自動車等の排気ガスの発生する場所で常時使用する場合、当製品の性能に影響を及ぼすおそれがありますので十分に注意下さい。</p> <p>E3. Follow the directions if you have parts/materials described below within the module where the switch is installed.<br/>同一セット内に以下の様な部材に関しましては以下の点にご注意願います。</p> <ul style="list-style-type: none"> <li>For parts, rubber materials, adhesive agents, plywood, packing materials and lubricant used for the mechanical part of the device, do not use those ones that may generate gas of sulfurization or oxidation.<br/>部品、ゴム材料、接着剤、合板、機器の梱包材、機器内の駆動部に使用される潤滑剤については、硫化、酸化ガスを発生しないものを採用してください。</li> <li>When you use silicon rubber, grease, adhesive agents and oil, use those that will not generate low molecular siloxane gas. The low molecular siloxane gas may form silicon dioxide coat on the SW contact part, resulting in the contact failure.<br/>シリコン系ゴム、グリース、接着剤、オイルを使用される場合は、低分子シロキサンガスを発生しないものを使用してください。低分子シロキサンガスが発生しますとSW接点部に2酸化珪素の被膜を形成して接点障害を引き起こす場合があります。</li> <li>When you apply chemical agents such as coating agents to the products, please let us know beforehand.<br/>製品のコーティング剤等の薬品を付着させる場合は、別途ご相談ください。</li> </ul> <p>E4. Do not use this switch in the atmosphere with high humidity or with bedewing probability, because such atmosphere may cause leak among terminals.<br/>高湿度環境下、又は結露する可能性がある環境では、端子間の電流リークが発生する可能性がありますので本スイッチはご使用にならないでください。</p> <p>F. Storage method. 保管方法</p> <p>F1. If you don't use the product immediately, store it as delivered in the following environment with neither direct sunshine nor corrosive gas and in normal temperatures. However, it is recommended that you should use it as soon as possible before six months pass.<br/>製品は納入形態のまま常温、常湿で直射日光の当たらず腐食性ガスが発生しない場所に保管し納入から6ヶ月以内を限度として出来るだけ早くご使用ください。</p> <p>F2. After you break the seal, you should put the remaining in a plastic bag to separate it from the outside and store it in the same environment mentioned above. You should use it up as soon as possible.<br/>開封後はポリフクロで外気との遮断を図り上記と同じ環境下で保管しすみやかにご使用下さい。</p> <p>F3. Do not stack too many switches for strafe.<br/>過剰な積み重ねは行わないで下さい。</p> <p>G. Others. その他</p> <p>G1. This specification will be invalid one year after it is issued, if you don't return it or don't place an order.<br/>本仕様書は発行日より1年間を経過して、ご返却又はご注文の無い場合は、無効とさせていただきます。</p> <p>G2. Please understand that the specifications other than electric and mechanical characteristics and outside dimensions may be changed at our own discretion.<br/>電氣的、機械的特性、外観寸法および取付寸法以外につきましては、当社の都合により変更させて頂く事が有りますので、あらかじめ御了承下さい。</p> <p>G3. Never use the product beyond the rating. It may catch fire. If you think that the product may be used beyond the rating due to some abnormal conditions, you must take certain protective measures, such as a protective circuit to shut down the current.<br/>定格を超えての使用は火災発生のおそれがありますので絶対に避けて下さい。また異常使用等で定格を超える恐れがある場合は保護回路等で電流遮断等の対策をして下さい。</p> <p>G4. The flammability grade of the plastic used for this product is "94HB" by the UL Standard (slow burning). Therefore, either refrain from using it in the place where it can catch fire, or take measures to preclude catching fire.<br/>本製品に使用している樹脂等の燃焼グレードはUL規格の"94HB"(遅燃性グレード)相当を使用しております。つきましては類焼の恐れがある場所での使用を禁止するか、類焼防止対策をお願いします。</p> <p>G5. Though we are confident in switch quality, we cannot deny the possibility that they could fail due to short or open circuit. Therefore, if you use a switch for a product requiring higher safety level, we would like you to verify in advance what effects your module would receive in case the switch alone should fail. And secure safety as a whole system by introducing the fail-safe design, i.e. a protection network.<br/>スイッチの品質には万全を尽くしていますが故障モードとしてショート、オープンの発生が皆無とは言えません。安全性が重視されるセットの設計に際しては、SWの単品故障にたいしてセットとしての影響を事前に検討いただき、保護回路、等のフェールセーフ設計のご検討を十分に行い安全を確保して頂きますようお願いします。</p> |                |                                 |             |

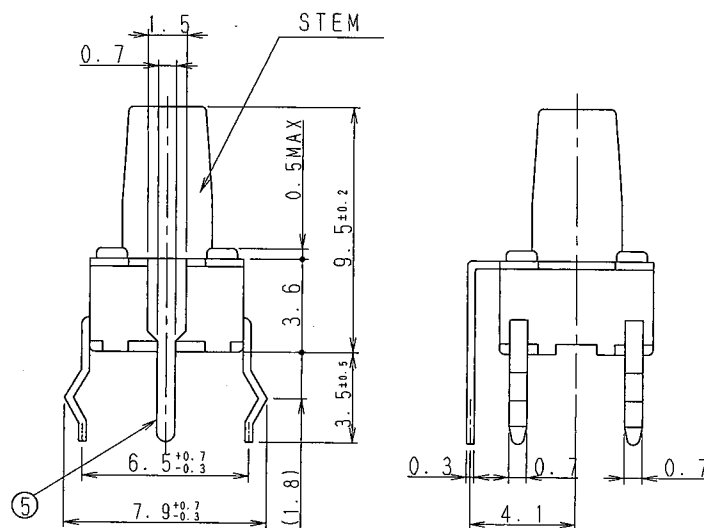
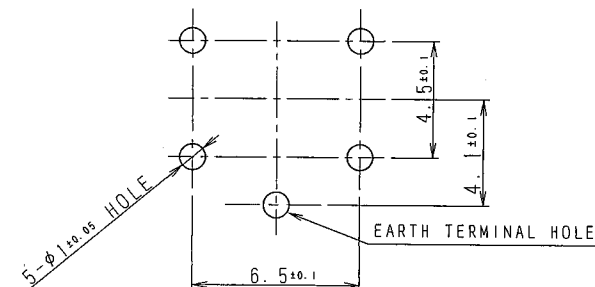
SYMB REVISIONS



回路図  
CIRCUIT DIAGRAM



プリント基盤取付穴寸法  
(スイッチ取付面側より見る)  
P.C BOARD MOUNTING HOLE DIMENSIONS  
(WHEN VIEWED FROM SWITCH MOUNTING FACE)



注記

1. ステム色調はブラックとする
2. 推奨 P. C. B. 板厚は 1.6 mm

NOTE

1. STEM COLOR TO BE BLACK.
2. THE RECOMMENDABLE THICKNESS OF P. C. B. SHALL BE 1.6 MM.

| TOLERANCE UNLESS OTHERWISE SPEC. |            |
|----------------------------------|------------|
| BASIC DIMENSIONS                 | TOLERANCES |
| UP TO 10                         | ±0.3       |
| ABOVE 10 TO 100                  | ±0.5       |
| ABOVE 100                        | ±0.8       |
| ANGULAR DIMENSIONS               | ±3°        |

|          |  |  |  |          |  |      |  |                                |  |      |  |                                                                                       |  |                  |  |        |  |                    |  |  |  |  |  |  |  |  |  |  |  |         |  |
|----------|--|--|--|----------|--|------|--|--------------------------------|--|------|--|---------------------------------------------------------------------------------------|--|------------------|--|--------|--|--------------------|--|--|--|--|--|--|--|--|--|--|--|---------|--|
|          |  |  |  |          |  |      |  |                                |  |      |  |                                                                                       |  |                  |  |        |  |                    |  |  |  |  |  |  |  |  |  |  |  |         |  |
| PART NO. |  |  |  | MATERIAL |  |      |  | SPEC/NAME                      |  |      |  | FINISH                                                                                |  |                  |  | REMARK |  |                    |  |  |  |  |  |  |  |  |  |  |  |         |  |
|          |  |  |  |          |  |      |  | <b>ALPS ELECTRIC CO., LTD.</b> |  |      |  |                                                                                       |  |                  |  |        |  |                    |  |  |  |  |  |  |  |  |  |  |  |         |  |
|          |  |  |  |          |  |      |  | DSGD. MAR. 20. '98 DS3         |  |      |  | SCALE                                                                                 |  | NO.              |  |        |  |                    |  |  |  |  |  |  |  |  |  |  |  |         |  |
|          |  |  |  |          |  |      |  | C. SAITO                       |  |      |  | 5:1                                                                                   |  | SKHHPNA010       |  |        |  |                    |  |  |  |  |  |  |  |  |  |  |  |         |  |
|          |  |  |  |          |  |      |  | CHKD. MAR. 20. '98 DS3         |  |      |  |  |  | TITLE            |  |        |  |                    |  |  |  |  |  |  |  |  |  |  |  |         |  |
|          |  |  |  |          |  |      |  | M. ODASHIMA                    |  |      |  |                                                                                       |  | PRODUCT DRAWING. |  |        |  |                    |  |  |  |  |  |  |  |  |  |  |  |         |  |
|          |  |  |  |          |  |      |  | APPD. MAR. 20. '98 DS3         |  |      |  | UNIT                                                                                  |  | DOCUMENT NO.     |  |        |  |                    |  |  |  |  |  |  |  |  |  |  |  |         |  |
| NO.      |  |  |  | SYMB     |  | DATE |  | APPD                           |  | CHKD |  | DSGD                                                                                  |  | M. IGARASHI      |  | mm     |  | SKHHPNA010.1100.32 |  |  |  |  |  |  |  |  |  |  |  |         |  |
|          |  |  |  |          |  |      |  |                                |  |      |  |                                                                                       |  |                  |  |        |  |                    |  |  |  |  |  |  |  |  |  |  |  |         |  |
|          |  |  |  |          |  |      |  |                                |  |      |  |                                                                                       |  |                  |  |        |  | 07                 |  |  |  |  |  |  |  |  |  |  |  | APPROVE |  |

APPROVED