Customer: **vivo Mobile Communication Co., Ltd.**

# SUPPLY SPECIFICATIONS

| | |
|---|---|
| Date of issue | May 28, 2021 |
| Your part number | |
| Mitsumi model name | STU-057A24AC |
| Mitsumi drawing number | R 668121 |

Contents



| | |
|---|---|
| Received by | |
| Date | |
| Signature | |
| Name | |
| Title | |
| Note | |

* As an evidence that you have agreed this SUPPLY SPECIFICATION,
please place your seal and/or signature in the box above, and return to us.

Please note that no purchase order will be accepted for this product before we receive your return.


**MITSUMI ELECTRIC CO., LTD.**

**Head office: 2-11-2, Tsurumaki, Tama-shi, Tokyo, 206-8567, JAPAN**

| 01 8121 File no. | Product specification<br>Tactile switches<br>STU-057A24AC | Approved<br>Dec-29-20<br>SW eng.<br>Ogura | Checked<br>Dec-29-20<br>SW eng.<br>Kikuchi | Drawn<br>Dec-29-20<br>SW eng.<br>Otaka |
|---|---|---|---|---|

| Customer's name | Customer's parts no. | General specification | Issued |
|---|---|---|---|
| Vivo | - | S66-1814 | Dec-29-20 |

1) The items specified in this Product specification are prior to General specification.
2) The items not specified in this Product specification, General specification is applied.

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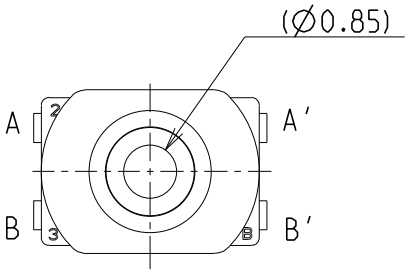
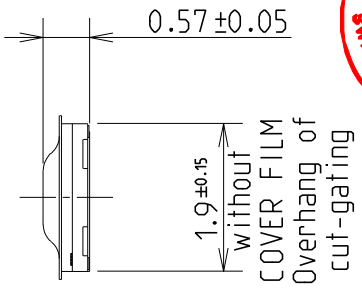
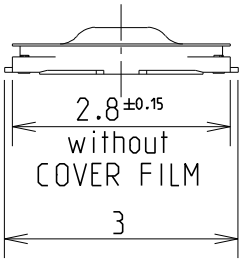
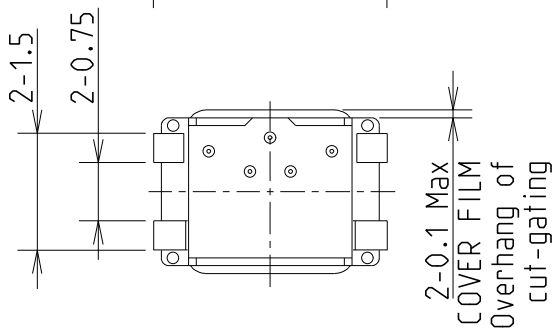


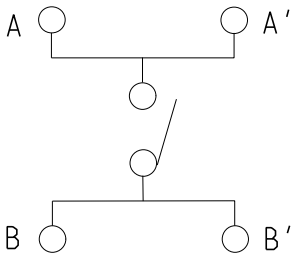



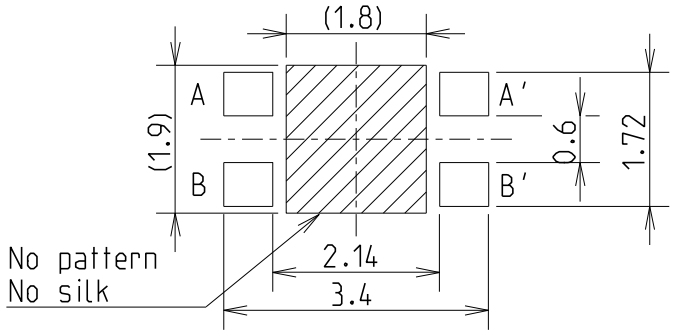

(*1)The switch height shall be measured with applying 5 gf load.

| | |
|---|---|
| Operating force | 2.4+/-0.5 N |
| Return force | 0.1 N min. |
| Click ratio | 40% min. |
| Travel | ⚠1 0.13+/-0.05 mm ~~0.12+/-0.05 mm~~ |
| Contact resistance | 500 mohm max. |
| Max. rating | 20 mA 15 V DC (Resistive load) |
| Min. rating | 10 μA 2 V DC (Resistive load) |
| Operating life | 500,000cycles |




Circuit diagram

The thickness of solder stencil : 80 μm




Reference land dimension

| | |
|---|---|
| Environmental classification | G |
| Parameter sheet result | N |
| Development class | 2 |

RoHS compliant (2011/65/EU)

| Rev. | | | | |
|---|---|---|---|---|
| | | | | |
| | | | | |
| ⚠1 | x1 | changed Travel Spec | '21.5.27 | Otaka |

| Third angle projection | Scale | Tolerance | Ass'y dwg. no. |
|---|---|---|---|
| | 10:1 | +/-0.1 | 66-K392D |

| QA process flow chart | Product inspection standard | Model code | Code | Indent.no. | File no. |
|---|---|---|---|---|---|
| Q66-0876 | 166-8602 | 1612 | R | 66 | 8121 01 |

| 1814 | General specification<br>Tactile switches<br>STU series | Approved<br>Mar. 9, '17<br>SW Eng.<br>Ogura | Checked<br>Mar. 9, '17<br>SW Eng.<br>Nakamura | Issued<br>Mar. 9, '17<br>SW Eng.<br>Otaka |
|---|---|---|---|---|
| | | Released | March 9, 2017 | |

1. General
   1.1. Application
   This specification is applied to Tactile switches named STU series.
   1.2. Operating temperature range: -40 to +85 deg-C
   1.3. Storage temperature range: -40 to +85 deg-C (Product level) △4
   -20 to +50 deg-C (Taped condition)
   1.4. Test Conditions
   Normal temperature; 5 to 35 deg-C, normal humidity; 45 to 85% RH.
   If any doubt arises from judgment, tests and measurements shall be conducted under the following conditions.
   Temperature 20+/- 2deg-C, humidity 65+/-5% RH, and air pressure 86 to 106 kPa.

2. Appearance and Structure
   2.1. Dimensions: Specified on Product specifications.
   2.2. Materials: Refer to Table-1.
   2.3. Appearance: There shall be no defects that affect the performance of the products such as crack, scratch, dirt, discoloration, air bubble of ACTUATOR, and contamination.
   2.4. Cross section view:

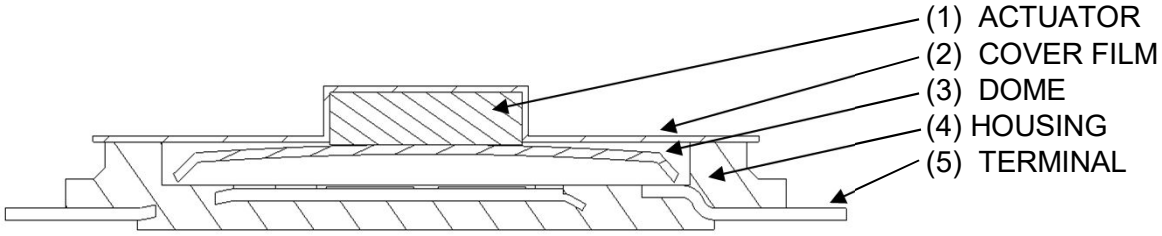



Fig. 1: Cross section of product

Table-1

| Component | Material | Note |
|---|---|---|
| (1) ACTUATOR | 9T Nylon | |
| (2) COVER FILM | 9T Nylon | |
| (3) DOME | Stainless steel | Ag plated |
| (4) HOUSING | 9T Nylon | |
| (5) TERMINAL | Phosphor bronze | Ag plated |

3. Rating
   Specified on Product specification.

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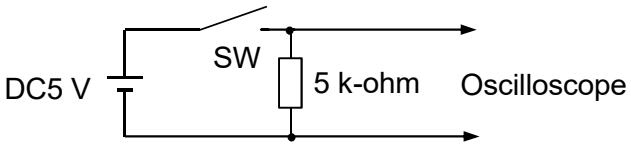
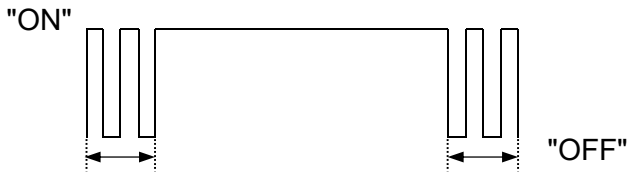
| Revision | | | | | Code | Division | File No. | |
|---|---|---|---|---|---|---|---|---|
| | △4 × 3 | '19.05.30 | P1.Correction of the use temperature range<br>P8,P9.Change Carrier reel diagram | Nakashima | S | 66 | 1814 | 04 |
| | △3 × 1 | '17.09.22 | Added | Otaka | | | | |
| | △2 × 2 | '17.09.12 | Added | Otaka | | | | |
| | △1 | '17.08.01 | Deleted, Changed, Added | Nakamura | | | | |

4. Electric Characteristics

| Item | Test conditions | Criteria |
|---|---|---|
| 4.1. Contact resistance | Measurements shall be made under the following conditions.<br>1) Load: 2 times of the specified standard operating force.<br>2) Measurement conditions: Contact resistance meter at 20 mV Max. and 10uA to 10mA. | Specified on Product specifications. |
| 4.2. Insulation resistance | Measurements shall be made under the following conditions.<br>1) Applied voltage: 100 V, DC<br>2) Applied position: Between terminals. | 50 M-ohm Min. |
| 4.3. Withstanding voltage | Measurements shall be made under the following conditions.<br>1) Applied voltage: 100 V, AC (50/60 Hz)<br>2) Duration: 1 min.<br>3) Leak current: 2 mA<br>4) Applied position: Between terminals. | There shall be no damage and breakdown. |
| 4.4. Bounce | Measurements shall be made under the conditions shown in Fig. 10(P7).<br>Bounce time at "ON" and "OFF" shall be measured under the following conditions.<br>1) Circuit: Refer to Fig. 2.<br>2) Load: 1.5 times of the specified standard operating force.<br>3) Frequency of operation: 3 to 4 times/sec.<br>  <br><br>Fig. 2: Circuit<br>  <br><br>Fig. 3: Bounce | ON bounce:<br>10 ms Max.<br><br>OFF bounce:<br>10 ms Max. |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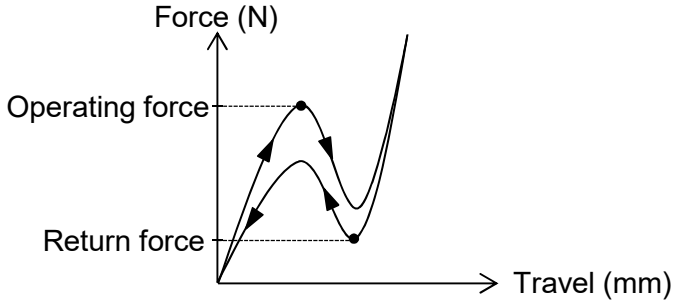
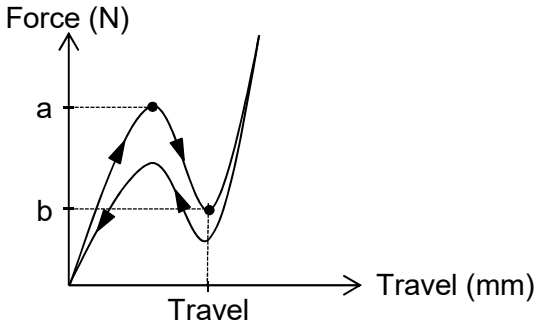
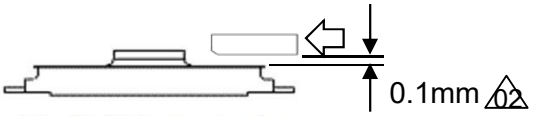
5. Mechanical Characteristics

| Item | Test conditions | Criteria |
|---|---|---|
| 5.1. Operating force<br><br>5.2. Return force | Measurements shall be made under the conditions shown in Fig. 10(P7) just after pressing 10 times lightly.<br>1) Measurement speed: 0.5 mm/sec.<br>2) Limit load to apply: 1.5 to 2 times of the specified standard operating force.<br>  <br><br>Fig. 4: Force-Stroke curve | Specified on Product specifications. |
| 5.3. Click ratio<br><br>5.4. Travel | Refer to 5.1 and 5.2 for the measurement conditions.<br>Click ratio = (a - b) / a x 100%<br>  <br><br>Fig. 5 Force-Stroke curve | Specified on Product specifications. |
| 5.5. Stopper strength | Measurements shall be made after applying static load under the following conditions.<br>Load: 50 N<br>Duration: 15 sec. | There shall be no electrical and mechanical abnormality. |
| 5.6. Side push strength | Measurements shall be made after applying static load under the following conditions.<br>1) Load: 3 N<br>2) Duration: 15 sec.<br>Test shall be made after two times of reflow soldering.<br>  <br><br>Fig.6: Side push strength test | |

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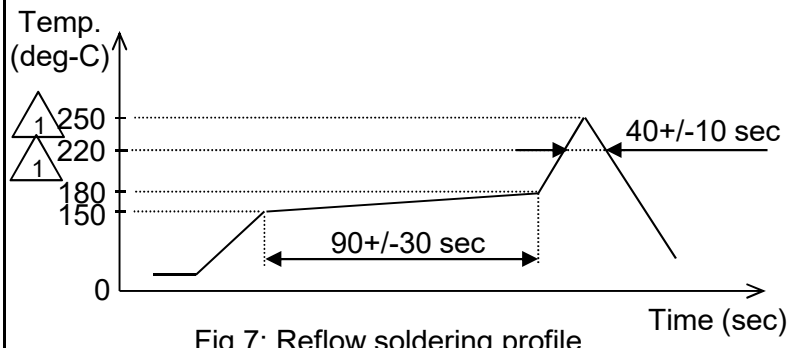
5. Mechanical Characteristics

| Item | Test conditions | Criteria |
|---|---|---|
| 5.7. Vibration resistance | Measurements shall be made after testing under the following conditions.<br>1) Vibration frequency range: 10 to 55 Hz<br>2) Amplitude: 1.5 mm (peak-to-peak)<br>3) Sweep ratio: 10-55-10 Hz in approx. 1 min.<br>4) Frequency sweep mode: Logarithmic or Liner sweep<br>5) Direction of vibration: 3 orthogonal directions including the direction of operation.<br>6) Duration: 2 hr each (6 hr in total) | There shall be no electrical and mechanical abnormality. |
| 5.8. Impact resistance | Measurements shall be made after testing under the following conditions.<br>1) Acieration: 735 m/s$^2$<br>2) Duration: 6 msec<br>3) Test direction: 6 directions<br>4) Number of test: 3 times per direction (18 times in total) | There shall be no electrical and mechanical abnormality. |
| 5.9. Solderability | Measurements shall be made under the following conditions. 1<br>1) Solder temperature: 260 +/- 5 dig-C 1<br>2) Dipping time: 2 +/- 0.5 sec.<br>3) Composition of solder: Sn-3.0Ag-0.5Cu<br>4) Soldering flux: Rosin 25%, Alcohol 75% | More than 95% of dipped part shall be covered with solder. (Except for fracture surface) |
| 5.10. Soldering heat resistance | Measurements shall be made after reflow soldering under the following conditions.<br>1) Heating method: Far-infrared radiation heating<br>2) Temperature profile: As shown in below.<br>3) Allowable soldering process: 2 times Max.<br>  <br><br>Fig.7: Reflow soldering profile | There shall be no abnormality such as marked looseness and drop-off.<br><br>4. Electrical Characteristics.<br><br>Operating force: Item 5.1. |

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5.11. Precautions for soldering

1) This product is designed for reflow soldering. Please do not solder manually.
2) Do not wash the product with solvent or the like.
3) The soldering conditions will be different depending on reflow soldering machines. Conditions of soldering shall be confirmed under actual production conditions.
4) Reflow soldering shall be performed in shorter time and at lower temperature. Otherwise click ratio may be decreased.
5) Please set the proper volume of solder in order to prevent soldering flux ingress and float of the products.
6) Please do not apply soldering flux to the terminals and mounting surface of PWB/FPC.
7) Note that if the load is applied to the terminals during soldering it might cause deformation and defects in electrical performance.

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6. Durability

| Item | Test conditions | Criteria |
|---|---|---|
| 6.1.<br>Operating life | Measurements shall be made after testing under the following conditions and conditions shown in Fig.11.<br>1) Electrical load: Rated load or no load.<br>2) Rate of operation: 2 cycles/sec.<br>3) Depression: The maximum value of specified operating force.<br>4) Cycles of operation: Specified on the product specification. | [After 300k cycle]<br>Contact resistance:<br>20 ohm Max.<br><br>Insulation resistance:<br>10 M-ohm Min.<br><br>Withstanding voltage:<br>Item 4.3.<br><br>△1 Bounce (ON/OFF):<br>30 msec Max.<br><br>Operating force:<br>Within +/-30% of specified initial value.<br><br>Travel:<br>Item 5.4.<br><br>△3 [After 500k cycle]<br>There shall be no electrical and mechanical abnormality. |

7. Environmental

| Item | Test conditions | Criteria |
|---|---|---|
| 7.1.<br>Humidity resistance | Following the test set forth below the sample shall be left in normal temperature and humidity conditions for 1 hr before measurements are made.<br>Water drops shall be removed.<br>1) Temperature: 65+/-2 deg-C, Humidity: 90 to 96% RH<br>2) Duration: 96+/-5 hr | Contact resistance:<br>1 ohm Max.<br>Insulation resistance:<br>10 M-ohm Min.<br>Withstanding voltage:<br>Item 4.3. |
| 7.2.<br>Heat resistance | Following the test set forth below the sample shall be left in normal temperature and humidity conditions for 1 hr before measurements are made.<br>1) Temperature: 85+/-3 deg-C<br>2) Duration: 96+/-5 hr | Bounce (ON/OFF):<br>20 msec Max.<br>Operating force:<br>Within +/-30% of specified initial value.<br>Travel:<br>Item 5.4. |
| 7.3.<br>Cold resistance | Following the test set forth below the sample shall be left in normal temperature and humidity conditions for 1 hr before measurements are made.<br>Water drops shall be removed.<br>1) Temperature: -40+/-3 deg-C<br>2) Duration: 96+/-5 hr | |

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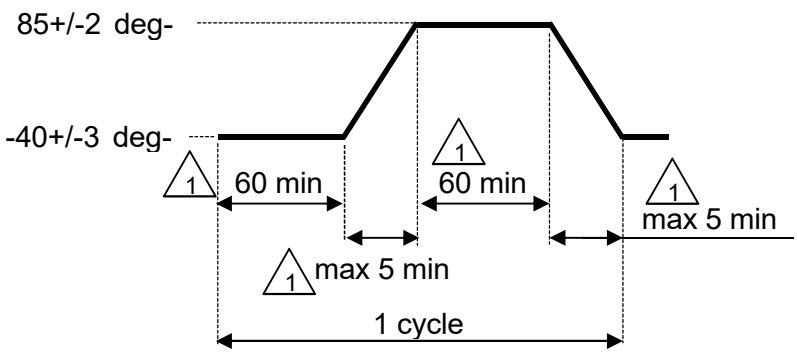
7. Environmental

| Item | Test conditions | Criteria |
|---|---|---|
| 7.4. Temperature cycling | Following continuous 5 cycles of the temperature cycling test set forth below, the sample shall be left in normal temperature and humidity conditions for 1hr before measurements are made.<br>  <br><br>Fig.8: Temperature cycling test conditions | Contact resistance:<br>1 ohm Max.<br><br>Insulation resistance:<br>10 M-ohm Min.<br><br>Withstanding voltage:<br>Item 4.3.<br><br>Bounce (ON/OFF):<br>20 msec Max.<br><br>Operating force:<br>Within +/-30% of specified initial value.<br><br>Travel:<br>Item 5.4. |
| 7.5. Water resistance<br>△02 | Ingress shall be confirmed after the test under the following conditions based on IPX8.<br>1) Depth of immersion: 1.5 m<br>2) Duration of immersion: 30 min. | Water which affect characteristics shall not get inside the switch. |
| | | |

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8. Use Condition
   - 8.1. Operating temperature range: Refer to the item 1.2. (Temperature range which the product is ON and OFF electrically.) There shall be no freezing and condensation.
   - 8.2. Using environment
     1) Do not expose the products to corrosive gas such as sulfur gas and salty wind.
     2) Visible dust must be cleared.
     3) Please do not apply excessive load to the products to avoid deformation and deterioration.

9. Storage Condition
   - 9.1. Storage temperature range: Refer to the item 1.3. There shall be no freezing and condensation.
   - 9.2. Environment
     1) Do not expose the products to corrosive gas such as sulfur gas, and salty wind.
     2) Visible dust must be cleared.
     3) Please do not apply excessive load to the products to avoid deformation and deterioration.

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9.3. Storage method
1) Products shall be packed in an airtight plastic bag and stored in cool place avoiding direct sunshine.
2) Do not stack too many switches for strafe. Shall be free from high temperature and high humidity.
3) Do not store the product in the state of applying load on its operation area.
4) Products should be used within six months after the date of delivery.

10. Precautions in Use
10.1. Do not clean the products with a solvent or the like.
10.2. Do not use the products with beyond the rated current and voltage.
10.3. Do not apply excessive load to the terminals and the operating part.
10.4. Larger static load than specified and/or shock shall not be applied to the operating part.
10.5. After mounting the products on PWB/FPC, please do not stack too many PWB/FPC in order to avoid excessive load to the switch mounted area.
10.6. The dimensions of a pattern on PWB/FPC shall refer to the recommended dimensions in Product specifications.
10.7. If you use this product in one of the following environmental conditions, progress of sulfaration and oxidization on the contact part (silver) will be accelerated, which may cause contact failure.
Therefore, be careful about the operation environment.
1) Around a sulfarate hot spring where sulfide gas is generated.
2) In case this product is always used in a place where exhaust gas from automobiles exist.
10.8. Do not push the cover film of products with something sharp.
10.9. Please design and assemble your unit not to apply over load to the switch.
10.10. Please let us know beforehand if you use other shape of pushing rod than the shape described in Fig. 2.
10.11. Please be careful on designing and handling especially when the switch is being built into the unit, not to add side force (static or impact) to the ACTUATOR as shown below (Fig. 10), because the ACTUATOR might deform or come off.

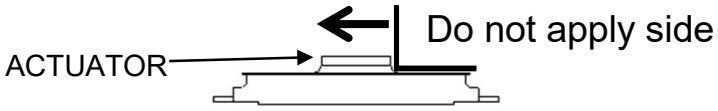
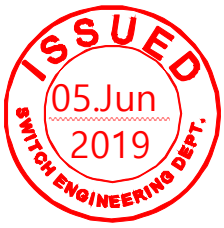



Fig. 9 Load and impact from side direction




10.12. Unless provided for otherwise, the products have been designed and manufactured for application in equipment and devices which are sold to end users in the market, including audio-visual equipment, electrical home appliances, office machines, information and communication equipment, and amusement equipment.
The products are not intended for use in, and must not be used for, any application for nuclear equipment, driving equipment for aerospace or any other unauthorized use.
With the exception of the abovementioned prohibited applications, please contact us (MITSUMI) and/or evaluate the total system regarding applicability for applications involving high levels of safety and liability such as medical equipment, burglar alarm equipment, disaster prevention equipment and undersea equipment.
Please also incorporate fail-safe design, protection and redundant circuitry, malfunction protection, and/or fire protection into the complete system to ensure safety and reliability of the total system.
10.13. If you intend to use the products for automotive, please let us know beforehand.
10.14. Please avoid the usage which the ON state of the switch lasts for a long time.

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11. Push Rod

Refer to Fig.-10 and 11 for the measuring conditions and the recommended push rod.

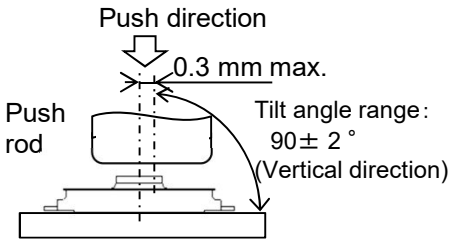



Fig.-10 Measuring conditions

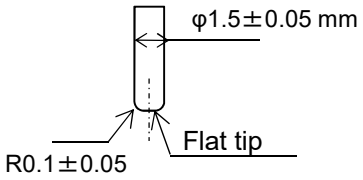


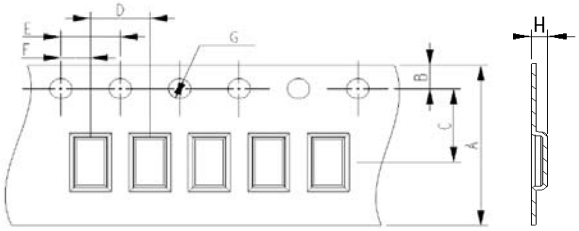

Fig.-11 Push rod
(Material: SUS)

12. Packing Specification

12.1. Dimensions of carrier tape are as shown below.

12.2. Taping rule

1) Tape winding direction is in clockwise.
(When pulling the tape toward, feeding holes should be located on the right side.)
2) Feeding holes shall not be covered with the cover tape.
The cover tape shall not be run off the edge of the carrier tape.
3) 160 mm or more from the end of trailer tape part shall be empty.
4) The leader part shall be 400 mm or more and it should include 100 mm of empty part.
The leader part shall have 20 to 30 mm of un-sealed cover tape.
5) The top tape of the leader part shall be stuck on the side of the reel by 30 to 50 mm using adhesive tape.
6) Peeling strength of cover tape from carrier tape is 0.1 to 1.3 N at 165 to 180 deg.
7) QR-code label and Mitsumi label shall be stuck on the side of the reel.
8) The products shall free drop from the reversed carrier tape without cover tape after pressing at 0.1 to 0.2 N force.
9) Continuous two missing switches shall not be allowed.
Total number of missing switches shall be 0.1% or less of the packed quantity per reel.
10) The direction of products in the pockets is not specified.
11) 20,000 switches shall be packed in a reel.




| A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|
| 12 | 1.75 | 5.5 | 4+/-0.1 | 4+/-0.1 | 2 | 1.5 dia. +0.1/-0 | 1 |

Fig. 12 Carrier tape dimensions

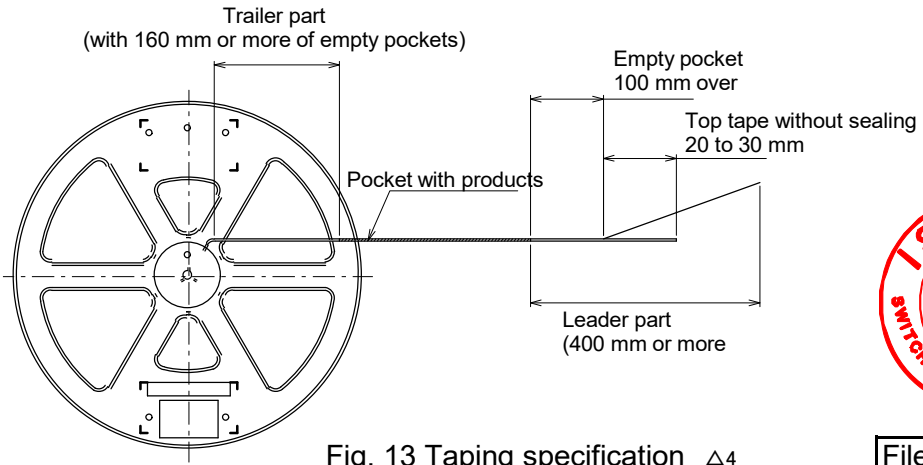



Fig. 13 Taping specification △4

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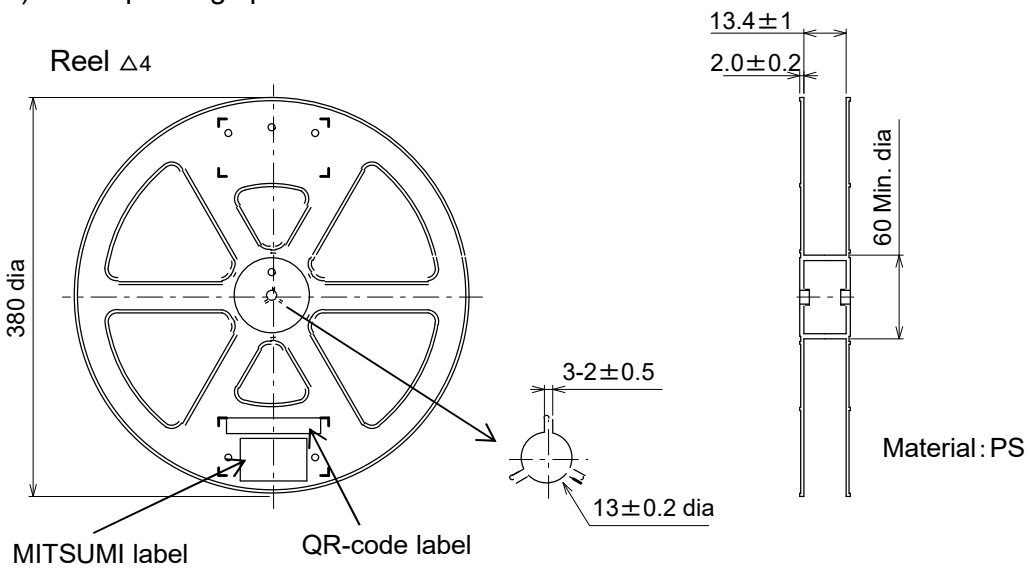
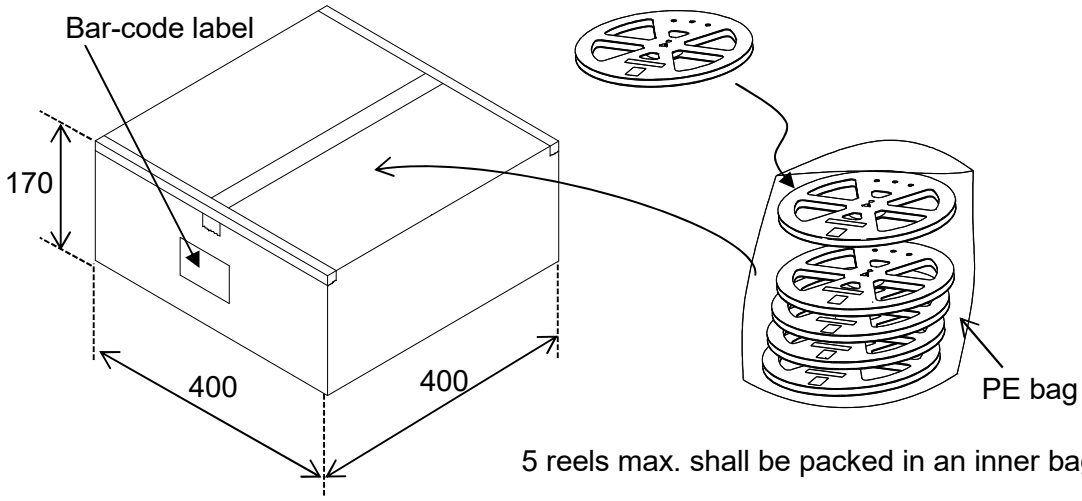
13. Packing Specification

1) Inner packing specification

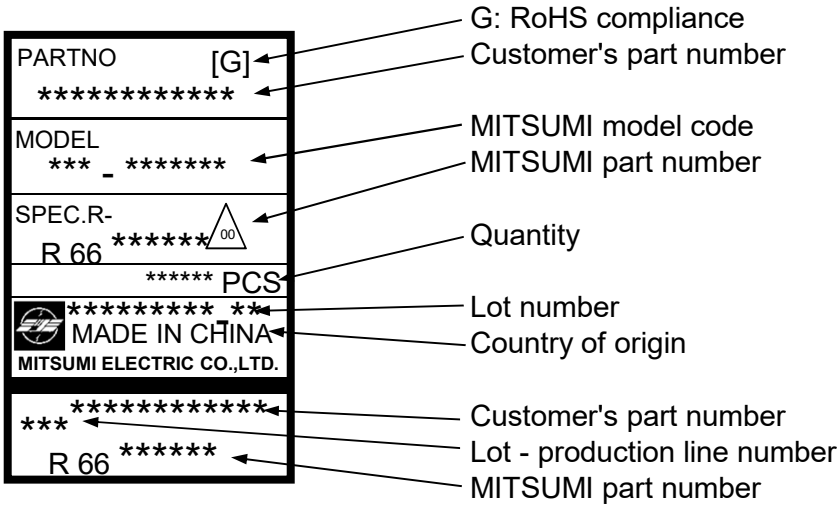



2) Outer box specification




5 reels max. shall be packed in an inner bag.

3) MITSUMI label specification





File number
1814