

SPECIFICATIONS

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1. Features

REFERENCE

1-1 Scope of application : These specifications apply to the surface mount switch, (LS12T2-T).

1-2 Shape and dimensions : As per the outline drawing.

1-3 Appearance : Any defects that affect performances are not allowed.

1-4 Temperature range for use : $\underline{-30}$ ~ $\underline{+85}$ °C (Switch must keep ON-OFF function.)

1-5 Temperature range for storage : $\underline{-40}$ ~ $\underline{+85}$ °C

1-6 Tests and measuring conditions :

Tests and measurements are performed under the standard conditions,
unless specified otherwise.

Normal temperature : $\underline{20}$ ± $\underline{15}$ °C

Normal humidity : $\underline{65}$ ± $\underline{20}$ %

Normal pressure : $\underline{86}$ ~ $\underline{106}$ kPa

1-7 Parts code :

	LS12T	2	—	T
■ Series				
■ Operating force	$\underline{2}$	: $\underline{1.6}$ N		
■ Packing style	$\underline{I}$	: <u>Taping (basic delivery style)</u>		

2. Rating Maximum rating DC $\underline{12}$ V , $\underline{20}$ mA

Minimum rating DC $\underline{1}$ V , $\underline{10}$ μA

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3. Initial characteristics

REFERENCE

3-1 Mechanical characteristics

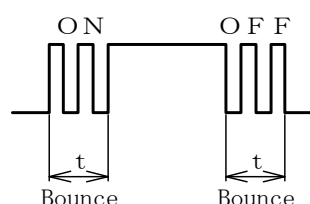
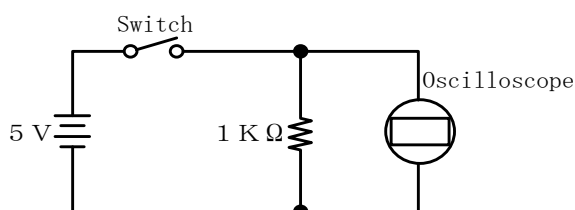
No.	Item	Performance	Measuring conditions
1	Operating force	<u>1.6</u> ± <u>0.5</u> N	Measure maximum operating force by vertically pressing the center of operating part gradually until it stops.
2	Stroke	<u>0.2</u> ± <u>0.1</u> mm	Measure stroke by vertically pressing the center of operating part until it stops.
3	Return force	<u>0.3</u> N or more	Measure return force after vertically pressing the center of the operating part until it does not move any more.

【Tip of the measuring head】

 Φ2.0, flat Metal (SUS)	 SR0.8 Metal (SUS)
For switch with plunger/actuator	For other switch

3-2 Electrical characteristics

No.	Item	Performance	Measuring conditions
1	Contact resistance	<u>500</u> mΩ or less	Vertically apply static force, which is 1.5~3 times that of standard value, to the center of operating part and measure with 1KHz micro-current measuring instrument.
2	Insulation resistance	<u>100</u> MΩ or more	Apply DC 100V between the terminals for one minute, if the switch has a metal cover, apply it between the metal cover and the terminal for one minute.
3	Bounce	<u>20</u> ms or less	Press the center of operating part at the speed of 3 - 5 times per second lightly, and measure bounce at ON and OFF. Refer to the figure below.



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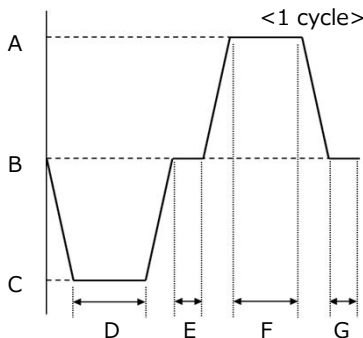
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4. Durability test

REFERENCE

4-1 Details of the tests

No.	Item	Test conditions
1	Operating life	1) DC <u>12</u> V , <u>5</u> mA resistance load 2) Test speed : <u>2</u> times/second 3) Test force : <u>2.1</u> N 4) Number of times of the test : <u>100</u> k times
2	Heat resistance	After exposure to the ambient condition of <u>85</u> $\pm$ <u>2</u> $^{\circ}$ C for <u>96</u> hours, expose test pieces for one hour in normal temperature and humidity and measure at standard condition.
3	Cold resistance	After exposure to the ambient condition of <u>-40</u> $\pm$ <u>2</u> $^{\circ}$ C for <u>96</u> hours, expose test pieces for one hour in normal temperature and humidity and measure at standard condition. Water droplets should be removed.
4	Humidity resistance	After exposure to the ambient condition of <u>60</u> $\pm$ <u>2</u> $^{\circ}$ C and relative humidity of <u>90~95</u> % for <u>96</u> hours, expose test pieces for one hour in normal temperature and humidity and measure at standard condition. Water droplets should be removed.
5	Temperature cycle	 A = <u>90</u> $^{\circ}$C B = <u>20</u> $^{\circ}$C C = <u>-40</u> $^{\circ}$C D = <u>0.5</u> h E = <u>0.25</u> h F = <u>0.5</u> h G = <u>0.25</u> h After applying the temperature cycle as per the diagram on the left <u>10</u> cycles, measure the test piece. Water droplet should be removed.
6	Vibration resistance	Total amplitude of <u>1.5</u> mm. Vibration frequency of <u>10</u> to <u>55</u> Hz. In case of sweep, <u>10-55-10</u> Hz for approximately one minute. Vibrating directions: X, Y and Z. Test hours: <u>2</u> hours for each direction, total <u>6</u> hours.
7	Shock resistance	Shock acceleration <u>30</u> G. Shock directions X, Y and Z. Shock are applied <u>3</u> times for each 3 directions, total <u>9</u> times.
8	Stopper intensity	Apply static force of <u>30</u> N vertically to the center of operating part for <u>15</u> seconds.
9	Withstand voltage	Apply AC <u>250</u> V (50Hz or 60Hz) for <u>1</u> minute.

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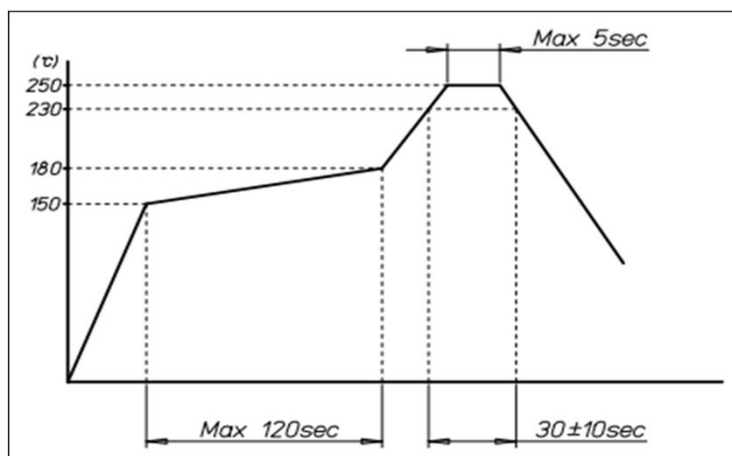
4-2 Failure judgment criteria

No.	Judgment item	Measurement condition	Failure judgment criteria
1	Operating force	Refer to 3-1. Measuring conditions	± 30 % or more of initial value.
2	Contact resistance	Refer to 3-2. Measuring conditions	10 Ω or more
3	Insurance resistance	Refer to 3-2. Measuring conditions	10 M Ω or less
4	Bounce	Refer to 3-2. Measuring conditions	30 ms. or more when both ON and OFF.

5. Recommended soldering conditions

5-1 Reflow soldering

- (1) Temperatures of both pre-heating and main heating of the reflow furnace are to be set in accordance with the following temperature profile.
- (2) Maximum reflow number of times allowed: 2 times
2nd reflow should be conducted after the switch has cooled to normal temperature.
- (3) For improving solder wetness, it is recommended to plate the surface of PCB pattern with Au.
- (4) Recommended solder paste: S70G Type 5 from Senju Metal Industrial Co., Ltd. or similar.
If you use paste other than our recommendation, please verify it carefully before use.
- (5) Conditions can change for each reflow furnace, therefore sufficient verification prior to production is required.
- (6) As for PCB pattern and opening shape of the metal mask, refer to Page 8.
- (7) The standoff amount of SW after soldering should be controlled to be less than 50 μ m.



5-2 Manual soldering

- (1) Use a soldering iron of 20W or less and keep the temperature of the tip to less than 350°C, and use only one time for less than 3 seconds.
- (2) Pay attention to the soldering iron so that it does not touch product directly when handling.
- (3) After soldering, care must be taken not to handle the switch until its temperature cools and returns to normal temperature.

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6. Packing specifications

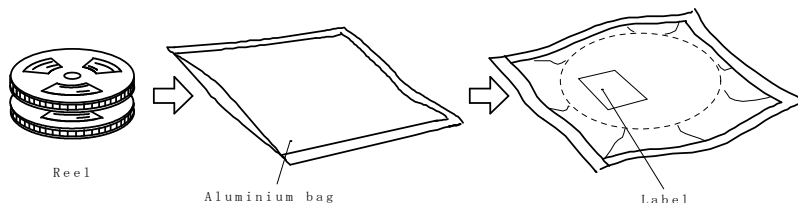
REFERENCE

6-1. Moisture proof-packing

Switches are packed in an aluminum envelope to retain the initial product quality.

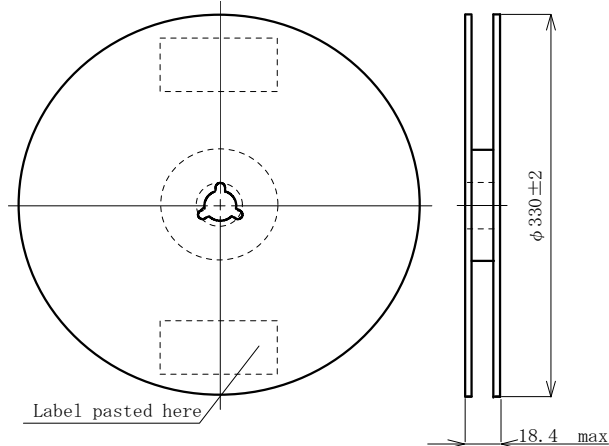
Packed quantity: 2 reels/bag

(Depending on the shipped quantity, 1 reel is in a bag.)

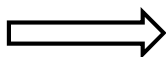


6-2. Taping specification (In accordance with JIS C 0806-3)

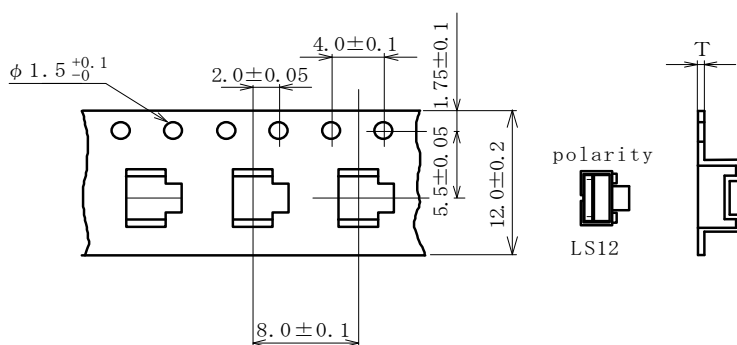
Packed quantity: 3,000 pcs./reel



6-3. Tape dimensions



Direction of pulling out



T	0.3	$\pm 0.05\text{mm}$
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7. Recommendation for design

(Unit:mm)

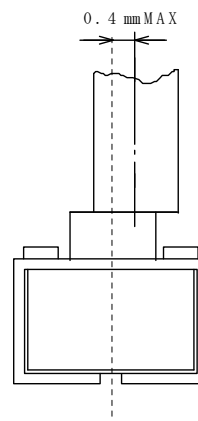
7-1. Recommended tip shape of the Keycap

REFERENCE

We recommend the size is bigger than the plunger operating part of 1.5mm x 0.9mm.

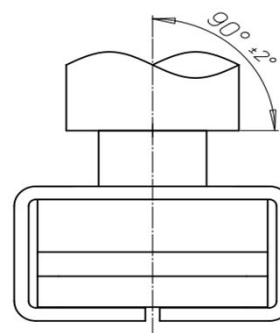
7-2. Recommended operating condition: Offset

Design the offset amount between the center of operating part and that of keycap as 0.4mm Max.



7-3. Recommended operating condition: Tilt

Design the tilt of keycap to be within $90\pm 2^\circ$



7-4. Recommended operating condition: Material

Select hard resin as the key cap material.
Soft material such as rubber is not recommended because it can impact on the characteristics.

Notes:

This section is for operation guarantee and not for characteristics guarantee (Section 3).

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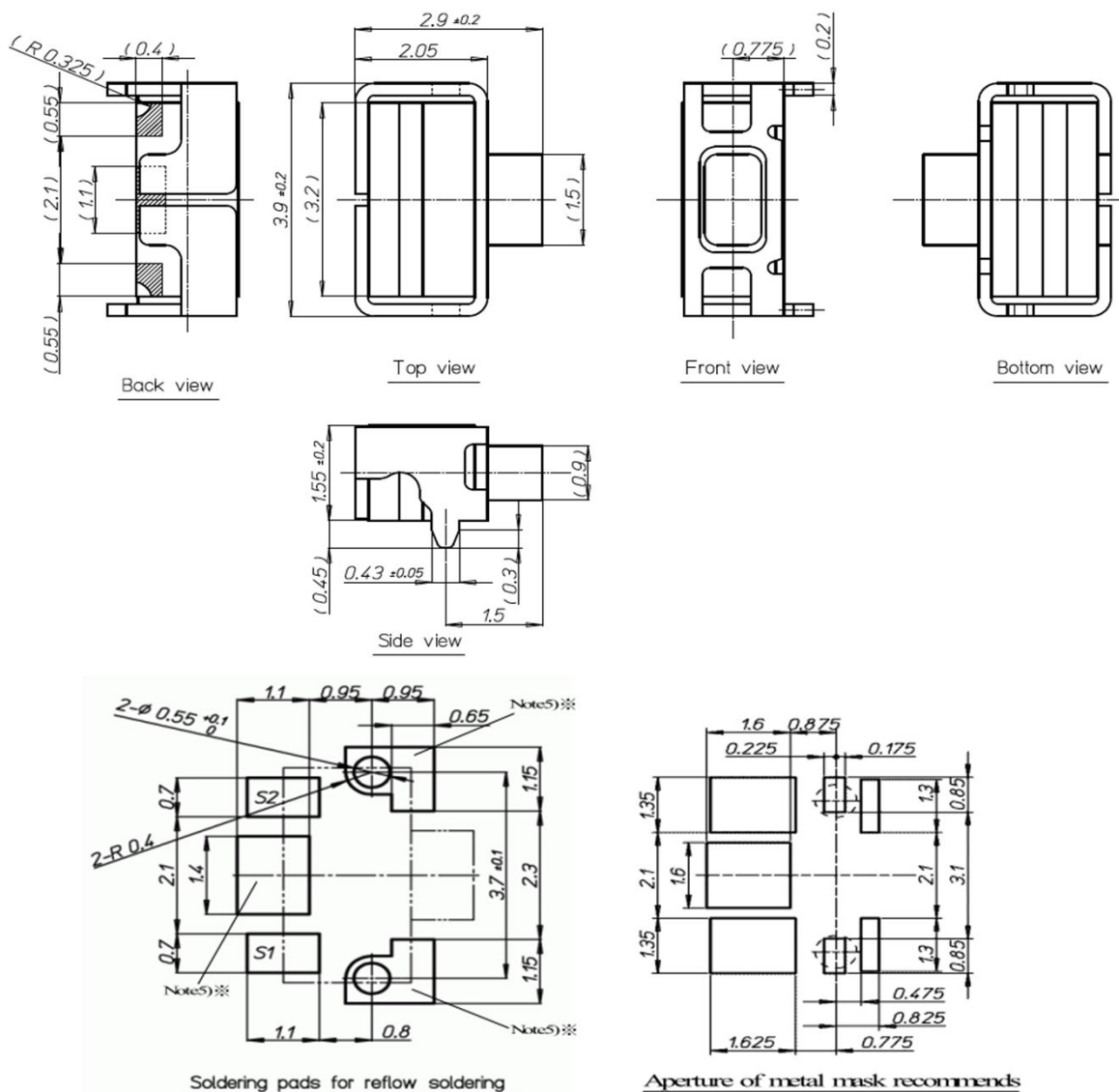
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8. Outline dimensional drawing

REFERENCE

Unit: mm

Tolerance: ± 0.2 

Notes:

- (1) Thickness of metal mask for solder printing 0.1mm.
- (2) In case thickness of metal mask for solder printing is except 0.10mm, it is recommended to change the aperture rate as above drawing in order to secure solder amount.
- (3) Finish of the pattern is Sn-plating.
- (4) Positioning tolerance of switch portion : 0.2 MAX.
- (5) ※-marked patterns (three points) are used for fixing the switches.
Do not connect them to other circuits.

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9. Precautions

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- (1) This switch is not applicable for use in automobiles.
If you intend to use the switch for automobiles, please notify us before use for sure.
Do not use this switch in the equipment which requires high level safety and reliability, such as aviation apparatus, medical equipment etc.
- (2) If a short circuit is anticipated between the terminals due to high temperature high humidity, condensation or water droplets, please apply coating on the surface of solder.
- (3) Storage period of product
Before opening the moisture proof bag: Within 6 months after shipped from us and stored under normal temperature and humidity. After opening the bag, store products under normal temperature and normal humidity conditions and use them soon.
Store the switch in the place where the sunlight does not shine on and corrosive gas does not generate.
- (4) Do not use a switch so that stress is applied from the side to the plunger or actuator of the switch.
It can cause damage or peeling off.
- (5) Care must be taken to ensure that a force bigger than the specified value by the stopper intensity is not applied to the switch operating part. Physical stress should not be applied to the main body of switch other than the operating part.
- (6) Do not apply a shock to the switch.
If a shock is inevitable as a result of the structure used, it is recommended to build a stopper function and so on.
- (7) Warpage of the mounting PCB/FPC or PCB/FPC support can affect the performance and/or reliability of the switch. Pay attention to the impact of warpage when designing.
- (8) This switch was designed under the assumption that it would not remain pressed for a long time.
If you intend to use the switch in such a way, contact us before use.
- (9) If you intend to wash the switch with solvent after SMT soldering or manual soldering, contact us in advance.
- (10) When a switch is used for a set which requires critical safety, verify the influence brought by the failure of the switch itself in advance and secure the safety by preparing solutions such as a protective circuit, protective device or fail-safe design, etc.
- (11) Do not use the switch in the process or with the method under the environment that the switch is exposed to the pressure exceeding the range specified in item 1-6.
It can affect the characteristics or reliability of the switch.
- (12) If shipment is started three months after the specifications are issued, we regard the specifications as approved by customer, even if the specifications with his approval signature are not returned to us.

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