1. Notification Items

1.1 Law and the regulation which are applied

① Ozone depleting substances specified by Montreal Protocol have not been used in the manufacturing process of the material used in this product.

② This product complies with RoHS Directive (on the restriction of the use of certain hazardous substances in electrical and electronic equipment) (2011/65/EU).

③ The materials used in this product contain only the substances listed in the List of Existing Chemical Substances specified in 'Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc'.

④ Permission must be obtained from the Japanese government if the product that is subject to the "Foreign Exchange and Foreign Trade Law" is to be exported or taken out of Japan.

1.2 Application Limits

The following shall be described for safety precaution:

[Limitation of Application]

- This product has been designed and manufactured for general electronic devices, such as home electronics, office equipment, information device and communication devices. In an event that this product is used for more sophisticated applications requiring higher safety and reliability and its failure or malfunction of this product may impose damage to human life or property, agreement on product specifications for approval suitable for such applications are required. Such applications shall include the following:
  aircraft equipment, aerospace equipment, disaster prevention / crime prevention equipment, medical equipment, transportation equipment (vehicles, trains, ships, etc.), information processing equipment that are highly publicized, and other equivalent equipment
- Regardless of its applications, in an event that this product is used for the equipment requiring high safety levels, place protective circuits or redundant circuits and perform safety tests to improve your products safety.

1.3 Handling of reference specification.

・ Since the contents of this reference specification are subjected to change without prior notifications,please request us a formal specification again for your investigations before using.

1.4 Manufacturing Sites

The country of manufacture : Malaysia	Panasonic Industrial Devices Malaysia Sdn. Bhd.
The country of manufacture : China	Panasonic Industrial Devices (Qingdao) Co., Ltd.
The country of manufacture : Japan	Input Devices Business Unit, Electromechanical Control Business Division Panasonic Corporation

2. Summary

2.1 This specifications applies to the following types of switch.
Push-ON type S.P.S.T

2.2 This specifications is a constituent document of contract for business concluded between your company and Panasonic Corporation.

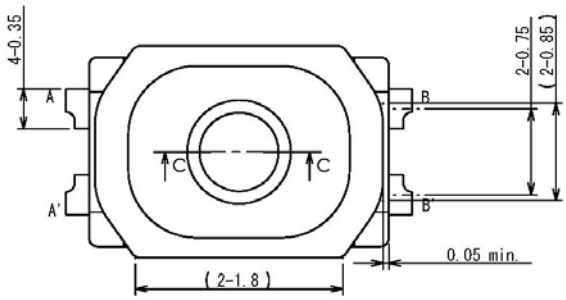
2.3 Items not particularly specified in this specifications shall be in conformance with JIS Standards.

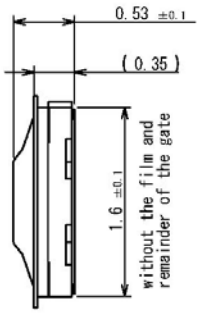
3. Dimension･Marking･Circuit diagram

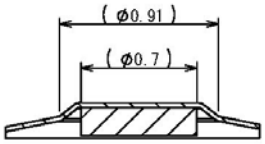
Date code are indicated in the product.

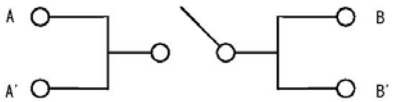
REFERENCE ONLY

General dimension tolerance : ±0.05
() dimensions are reference dimensions.



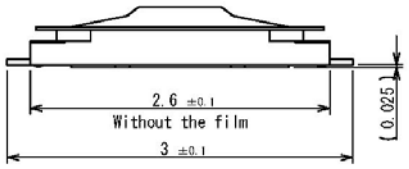


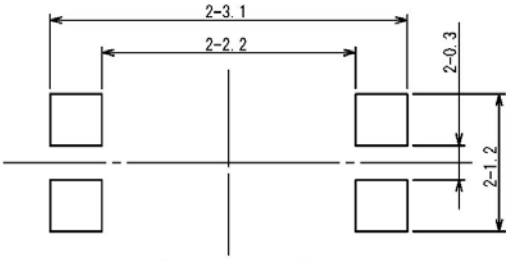




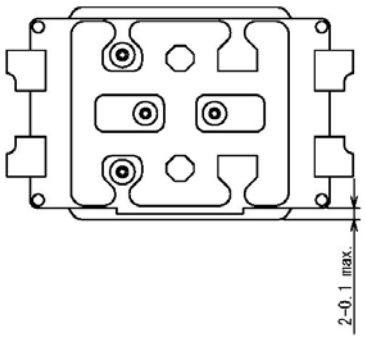
Circuit diagram

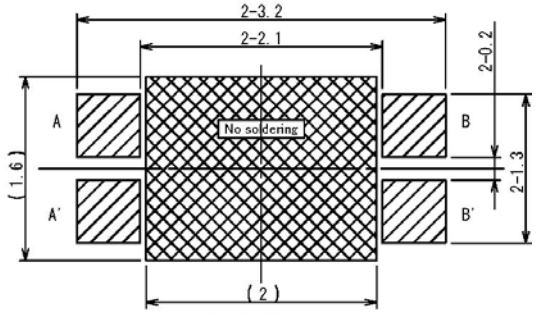
Actuator cross section (Section C-C)





Stencil mask plan





Land pattern plan

Soldering thickness t=0.08±0.01

*Soldering failure may occur depending on applied solder amount, so, please consider to use our recommended stencil and land pattern desing

: Recommended land pattern area

: No soldering area

- Any land pattern or via holes shall not be provided at area.
- If it's necessary to design land pattern or via holes at area, please apply resist to them to protect their metal part completely.
- If their metal parts are not protected completely, short circuit failure may occur by solder ball.
- Besides, there should be convexoconcave by designing additional pattern, it may cause swith tilt, influence on solder-ability or flux intrusion after reflow soldering.
- Therefore, please study any influence of additional land pattern or via holes at area in advance.

4. General specification

4.1 Switch rating DC 15 V 20 mA(max.) DC 2 V 10 μA(min.)

4.2 Operation temperature range -40 ～ + 85 ℃

4.3 Preservative temperature range Single condition : - 40 ～ + 85 ℃
Taping conditior : - 20 ～ + 60 ℃

4.4 Standard conditions

Unless otherwise specified, the test and measurements shall be carried out as follows.

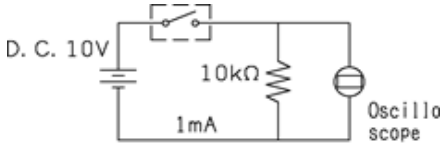
Ambient temperature : 5 ～ 35 ℃
Relative humidity : 45 ～ 85 %
Atmospheric pressure : 86 ～ 106 kPa

However, if doubt arises on the decision based on the measured values under the above-mentioned conditions, the following conditions shall be employed.

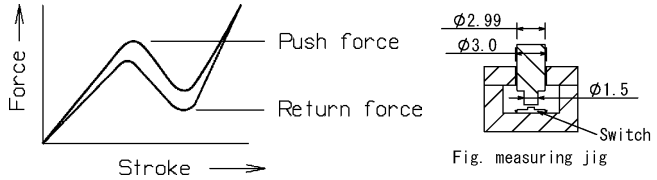
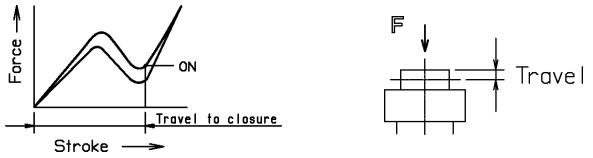
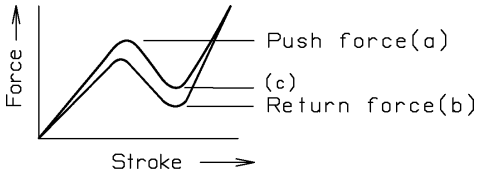
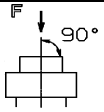
Ambient temperature : 20 ± 2 ℃
Relative humidity : 65 ± 5 %
Atmospheric pressure : 86 ～ 106 kPa

5. Performance

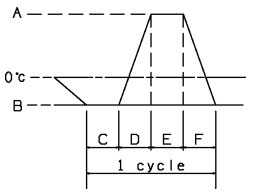
5.1 Electrical characteristics

No.	ITEM	TEST CONDITION	PERFORMANCE
5.1.1	Contact resistance	Push force : {Operation force} × 2 Measurement tool : Contact resistance meter (Capable of 10 μA ～ 10 mA)	500 mΩ max.
5.1.2	Insulation resistance	DC 100 V (Between terminals)	50 MΩ min.
5.1.3	Withstand voltage	AC 250 V for 1 minute. (Between terminals)	No insulation destruction
5.1.4	Bouncing	Operation speed : 3～4 times/s  Switch Bouncing Test Circuit	ON 10 ms max. OFF 10 ms max.

5.2 Mechanical characteristics

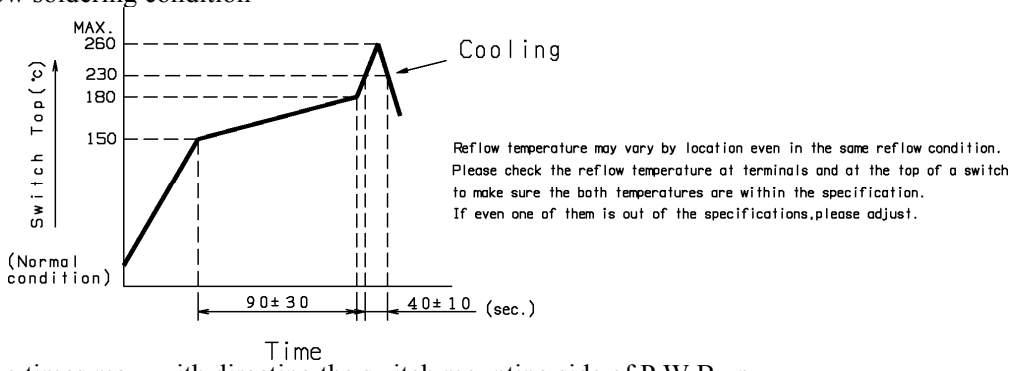
No.	ITEM	TEST CONDITION	PERFORMANCE
5.2.1	Operation force	Operation feeling shall be measured after 3 times pre-operations. Pre-operation condition : 3 times, 1mm/s by 3 N Measurement speed : 0.5 mm/s  Fig. measuring jig	Push force $1.6\ ^{+0.5}_{-0.5}$ N Return force 0.1 N min
5.2.2	Travel to closure		$0.11\ ^{+0.05}_{-0.05}$ mm
5.2.3	Click ratio	Measurement condition:No.5.2.1  Click ratio = (a-c)/a×100%	Click ratio 40 % min.
5.2.4	Push strength	50 N for 15 sec. 	No damage (Electrical and mechanical)
5.2.5	Vibration test	1) Amplitude : 1.5 mm 2) Sweep rate : 10-55-10Hz for 1 minute 3) Sweep method : Logarithmic frequency sweep rate 4) Vibration direction : X,Y,Z(3 directions) 5) Time : Each direction 2 hours (Total 6 hours)	No.5.1 and 5.2.1 to 5.2.2 shall be satisfied.
5.2.6	Soldering heat test	Mount the switch on P.W.B by solder paste. 1) Reflow process 2 times. (Refer to section 6.1) 2) Standard conditions after test : 1 hours	Contact resistance 500 mΩ max. Click ratio 35% min. No.5.1.2 to 5.1.4 and No.5.2.1 to 5.2.2 shall be satisfied.
5.2.7	Solderbility	After spreading flux, the terminal is immersed in solder with following condition. Solder bar : M705/Sn-3.0Ag-0.5Cu (Senju Metal Industry Co.,Ltd.) Flux : CF-110VH-2A (tamura kaken) Soldering temperture : 260±5 ℃ Soldering time : 2±0.5 sec.	95% or more of surface area(Excluding ruptured surface)where is immersed in solder shall be covered by new solder.

5.3 Climatic characteristics

No.	ITEM	TEST CONDITION	PERFORMANCE
5.3.1	Cold test	1) Temperature : -40±2 ℃ 2) Duration of test : 500h 3) Take off a drop water. 4) Standard conditions after test : 1 h	Contact resistance 1000 mΩ max. No.5.1.2 to 5.1.4 and No.5.2.1 to 5.2.2 shall be satisfied.
5.3.2	Heat test	1) Temperature : 85±2 ℃ 2) Duration of test : 500h 3) Standard conditions after test : 1 h	Contact resistance 1000 mΩ max. No.5.1.2 to 5.1.4 and No.5.2.1 to 5.2.2 shall be satisfied.
5.3.3	Heat shock test	1) Test cycles : 20 cycles 2) Standard conditions after test : 1 h  A:+85±2 ℃ B:-40±2 ℃ C:1 hour D:5 minutes max. E:1 hour F:5 minutes max.	Contact resistance 1000 mΩ max. No.5.1.2 to 5.1.4 and No.5.2.1 to 5.2.2 shall be satisfied.
5.3.4	Humidity test	1) Temperature : 60±2 ℃ 2) Relative humidity : 90～95 % 3) Duration of test : 500 h 4) Take off a drop water. 5) Standard conditions after test : 1 h	Contact resistance 1000 mΩ max. No.5.1.2 to 5.1.4 and No.5.2.1 to 5.2.2 shall be satisfied.
5.3.5	Endurance (by spring method)	1) DC 15 V 20 mA Resistance load 2) Operation speed : 2～3 times/s 3) Push force : Maximum value of operation force 4) Operation number : 500,000 times	Contact resistance 20 Ω max. Bouncing : 30 ms max. Variation rate of operation force shall be within ±30 % to the value before testing No.5.1.2 and 5.2.2 shall be satisfied.
5.3.6	Withstand H_2S	1) Density : 3±1ppm 2) Temperature : 40±2 ℃ 3) Relative humidity : 80～85 % 4) Duration of test : 24 h 5) Standard conditions after test : 1 h	Contact resistance 1000 mΩ max. No.5.1.2 to 5.1.4 and No.5.2.1 to 5.2.2 shall be satisfied.
5.3.7	Water resistance (adhere to IPx7)	1) liquid : Fresh water 2) Temperature : 20±15 ℃ (Ambient temperature) 3) Immersion depth : 1m 4) Duration of test : 30min. Water around the switch shall be removed by the moisture absorbing material, then expose the switch in the ambient temperature and humidity for 1 h before checking. * Temperature difference between switch and liquid shall be 5 deg C max.	Water ingress shall be limited enough to prevent deleterious effect to the switch function.
5.3.8	Dust resistance (adhere to IP6x)	1) Dust : Talc (Type 4) 2) Density : 2kg/m^3 3) Temperature : 20±15 ℃ (Ambient temperature) 4) Relative humidity : 45～85 % 5) Duration of test : 8 h	No dust ingress to the inside of switch.

6. Prohibitions and precaution for handling

6.1 Reflow soldering condition



1) Two times max. with directing the switch mounting side of P.W.B up.
2) Re-soldering by soldering iron shall be allowed under 350 ℃ max. 3 sec. max. 1 time only and the tip of iron must not touch to terminals.
   Soldering iron for re-soldering have to be 60 W max.

6.2 Design instructions

1) Please refer to the land pattern plan Panasonic recommends on the 2nd page.
2) Design key top as fig-1.(Recommended operation condition)
   As the design of key top may affect operation feeling,please follow the directions stated below.
   - We recommend to use harder material such as resin for key top, and we do not recommend softer material such as rubber may affect operation feeling.
     However in case if you still would like to use softer material, please consult with us beforehand.
   - Considering decentering between switch and key top, the key top shall be always positioned to be able to push the entire top surface of actuator.
     The switch and the decentering shall be 0.3 mm max..
     If you cannot apply our recommended plunger design,please make plungers size bigger than product outline.
   - Please design housing and key top not to produce friction to each other to avoid inhibition of operation feeling.

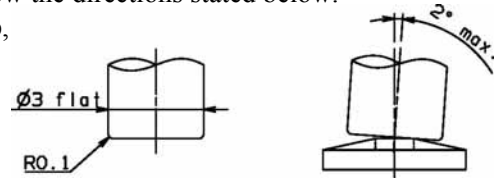


fig-1

3) Please design your knob not to hit the switch film or case even when the switch is fully pushed.
4) Please pay attention not to add side force (static or impact) to the push plate of the switch, especially when the switch is being built into the products.(fig-2)

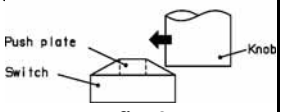


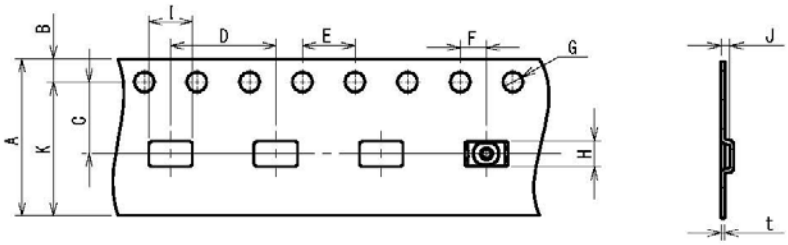
fig-2

6.3 Note

1) Please be cautions not to give excessive static load or shock to switches.
2) Please be careful not to pile up P.W.B. after switches were soldered.
3) Preservation under high temperature and high humidity or corrosive gas should be avoided especially
   When you need to preserve for a long period, do not open the carton.
4) Avoid pressing the film portion of the product with sharp-edged object.
5) Cleaning
   - If flux or solder is scattered on the surface of P.W.B when soldering, characteristics of this product may be damaged.
   - Cleaning after soldering is not allowed.When cleaning is required this switch should be soldered after the cleaning.
6) Avoid the use of the switch under pushed ON condition is continued for a long time.
7) There is a possibility the flux from solder paste infiltrates into the body if plenty of solder paste was applied by switch on the P.W.B.
   So we recommend to use our proposed land design in order to prevent above problem.
   Also please avoid putting additional land by the switch on the P.W.B.
8) Please don't apply any coating material to the switch after reflow soldering.
9) Please be careful not to apply the load sideways to avoid film bending when the switches are soldered.

7. Packing specification

Carrier tape

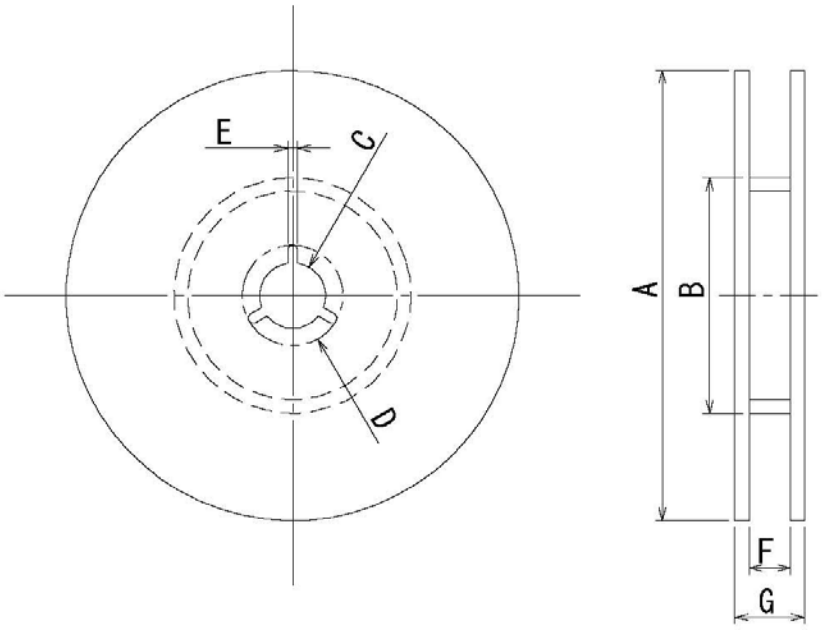


Unit:mm

A	B	C	D	E	F	G	H	I	J	K	L
±0.3 12	±0.1 1.75	±0.1 5.5	±0.1 8	±0.1 4	±0.1 2	±0.3 1.5	±0.2 1.95	±0.2 3.3	±0.2 0.7	(10.25)	+0.15 −0.1 0.3

Taping condition : Lack of products in the middle of taping should be one MAX, but total quantity specified in the specifications should be secured.
Peeling off strength of top tape : It should be within 0.2N to 1. 0N at 165 degree in peeling off angle.
Joint of carrier tape : One joint per one reel may exist.

Reel (10000pcs./reel)



Unit:mm

A	B	C	D	E	F	G
±2 φ380	±1 φ80	±0.5 φ13	±1 φ21	±0.5 2	±1 13.5	±1 17.5

<Prohibitions and precaution for handling>

【Prohibited items on fire and smoking】

- Absolutely avoid use of a product beyond its rated range because doing so may cause a fire. If misuse or abnormal use may result under conditions in which the product is used out of its rated range, take proper measures such as current interruption using a protective circuit.
- The grade of nonflammability for resin used in product is "94HB, " which is based on UL94 Standards (flammability test for plastic materials). Prohibit use in a location where a spreading fire may be generated or prepare against a spreading fire.

【For use in equipment for which safety is requested】

- Although care is taken to ensure product quality, inferior characteristics, short circuits, and open circuits are some problems that might be generated. To design an equipment which places maximum emphasis on safety, review the effect of any single fault of a product in advance and perform virtually fail-safe design to ensure maximum safety by:
  - Preparing a protective circuit or a protective device to improve system safety, and equipment.
  - Preparing a redundant circuit to improve system safety so that the single fault of a product does not cause a dangerous situation.

【Attentions required for storage condition】

- When this product is to be stored in the following circumstances and conditions, it may affect on the performance deteriorations and solderability etc., avoid storing in the following conditions.
  (1) A place where the temperature is -10℃ max., +40℃ min. and the humidity is 85% min.
  (2) In the corrosive gas atmosphere.
  (3) Long-term storage for 6 months min.
  (4) A place where the product is exposed to direct sunlight.
- Store in packed condition so that the load stress is not applied.
- Please use this product as soon as possible, our recommendation is within 3 months and the limitation is 6 months.
- If any remainder left after packing is opened, store it with proper moistureproofing and gasproofing, etc.,