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 as amended by (EU)2015/863].

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]

(a) This product has been designed and manufactured for general electronic devices, such as home electronics, office equipment, information devices and communication devices.

(1) This product is not intended for use in more sophisticated applications which require a higher safety standard and more reliability, including if a failure or malfunction may cause bodily injury or property damage.

(2) If the product is intended for more sophisticated applications prior approval must be obtained. Such applications shall include, but are not limited to, the following: aircraft equipment, aerospace equipment, disaster prevention equipment, crime prevention equipment, medical equipment, transportation equipment (such as vehicles, trains, ships, etc.), and information processing equipment that are highly publicized, and other equivalent equipment.

(b) Regardless of its applications, in an event that this product is used for equipment with high safety standards, protective circuits or back up circuits must be used and safety tests must be performed.

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 : China Panasonic Industrial Devices (Qingdao) Co., Ltd.

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 Industry Co., Ltd..

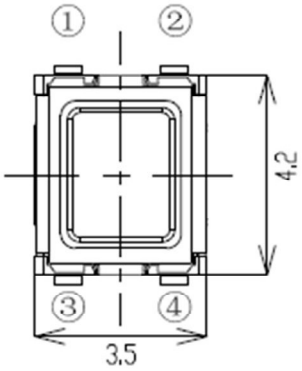
2.3 Items not particularly specified in this specifications shall be in conformance with JIS Standards.

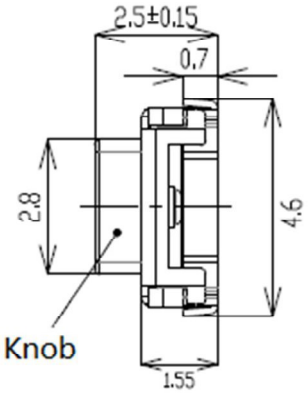
3. Dimension・Marking・Circuit diagram

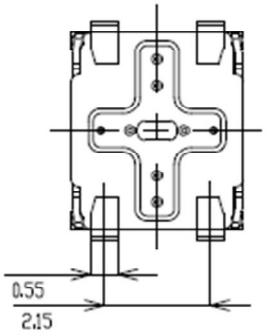
Date code are indicated in the product.

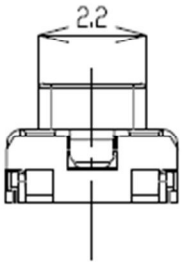
REFERENCE ONLY

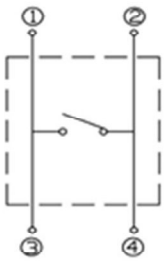
General dimension tolerance : ±0.2
( ) dimensions are reference dimensions.







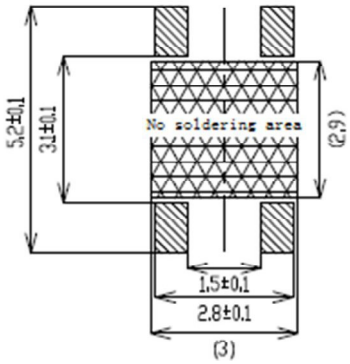




Circuit Diagram

Knob color : Black

Solder thickness : t=0.15±0.03



Land pattern plan

▨ : 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 additioan 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.

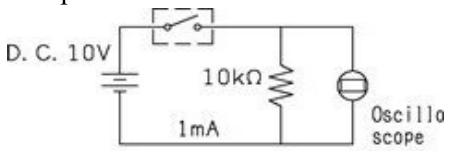
Ambient temperature : 5 ～ 35 ℃
Relative humidity : 45 ～ 85 %
Atmospheric pressure : 86 ～ 106 kPa

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

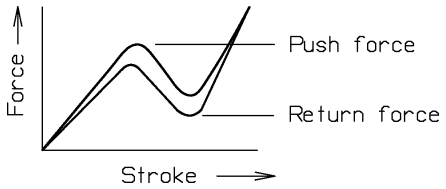
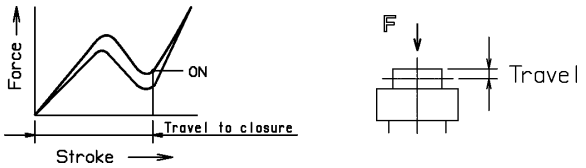
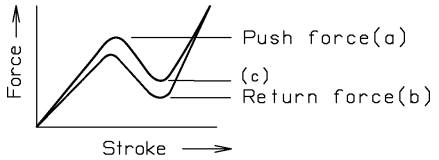
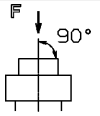
Ambient temperature : 20 ± 2 ℃
Relative humidity : 65 ± 5 %
Atmospheric pressure : 86 ～ 106 kPa

5. Performance

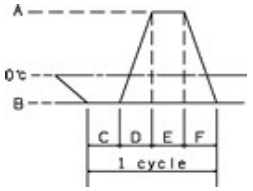
5.1 Electrical characteristics

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)	100 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

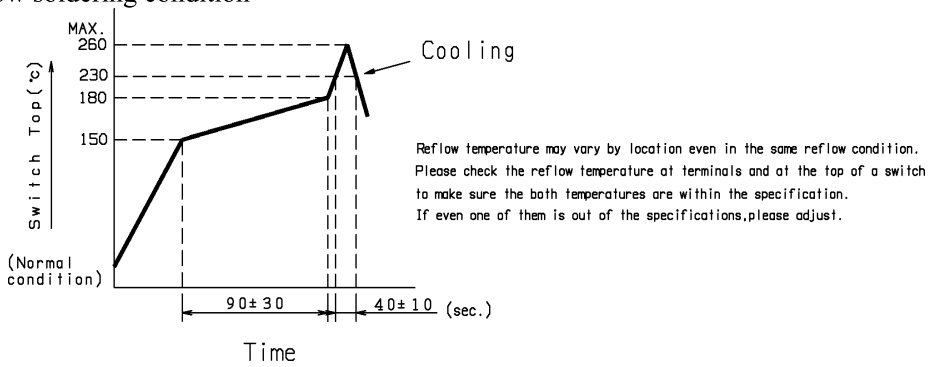
No.	ITEM	TEST CONDITION	PERFORMANCE
5.2.1	Operation force		Push force $2.55\ ^{+0.8}_{-0.8}$ N Return force 0.1 N min
5.2.2	Travel to closure		$0.15\ ^{+0.1}_{-0.1}$ mm
5.2.3	Click ratio	Measurement condition:No.5.2.1  Click ratio = (a-c)/a×100%	Click ratio 30 % min. (before reflow soldering)
5.2.4	Push strength	50 N for 60 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. 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 (Switching action)	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 : 100,000 times	Contact resistance 20 Ω max. Bouncing : 10 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.

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. Design inclination of key top 4 deg. max. as fig-2.
   Deviation between center of key top and switch should be within 0.3 mm.
   (Recommended operation condition)

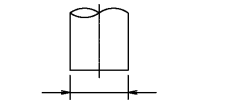


fig-1

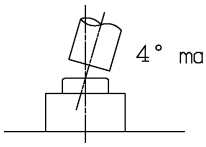


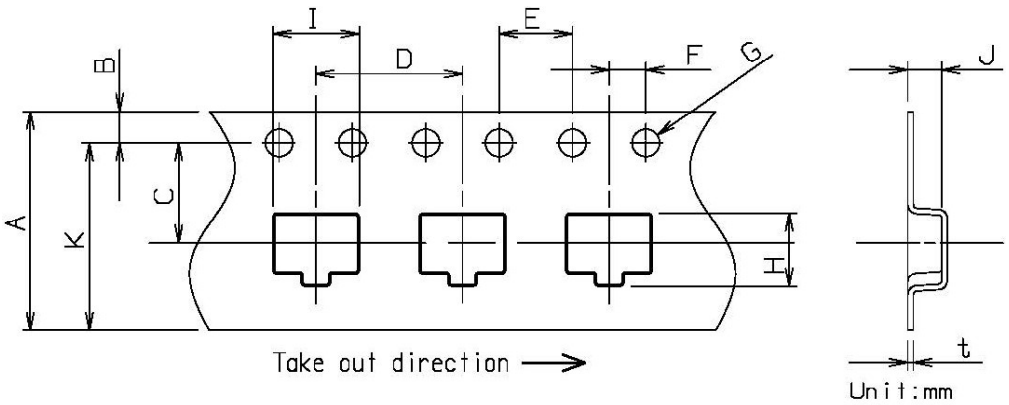
fig-2

6.3 Note

1) Please be cautions not to give excessive static load or shock to switches.
2) To prevent a bad contact caused by foreign particles (dust particles of P.W.B., dust particles of flux) into the inside of the switch, pay attention to handle the P.W.B. after mounting.
   And do not pile up the P.W.B..
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.

7. Packing specification

Carrier tape

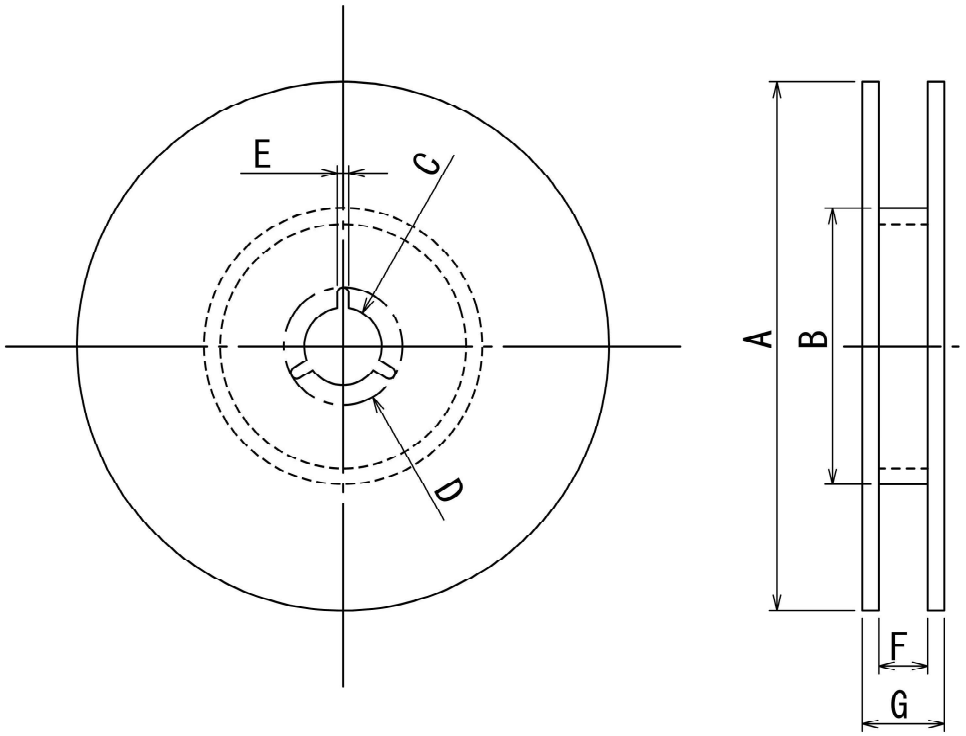


Unit:mm

A	B	C	D	E	F	G	H	I	J	K	t
±0.3	±0.1	±0.1	±0.1	±0.1	±0.1	$\pm^{0.1}_{0}$	±0.2	±0.2	±0.2	(10.25)	±0.1
12	1.75	5.5	8	4	2	1.5	4.5	5.05	2.65		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(4000 pcs./reel)



A	B	C	D	E	F	G
$\pm^{2}$ Φ380	$\pm^{1}$ Φ80	±0.2 Φ13	±0.8 Φ21	±0.5 2	$\pm^{1}$ 13.4	$\pm^{1}$ 17.4

Unit:mm

<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.
- Please do not use the product in any location or circumstances where spreading fire may occur, or take necessary measures against spreading fire if used in such location or circumstances.

【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.,

1. 通知事项

1.1 适用的法律及规则

① 本产品，在使用部材的制造工序中，不使用蒙特利尔议定书中限制破坏臭氧层的物质。

② 本产品，符合RoHS（电气电子机器中含有特定物质限制使用）[2011/65/EU as amended by (EU)2015/863]指令。

③ 本产品的使用材料，根据「化学物质的审查、制造等规制的相关法律」，是作为即存物质记载的材料。

④ 本产品输出时，依据外国贸易法等的输出关联法规办理输出手续。

1.2 用途限定

・本产品，设计、制造用于家电、事务机器、情报・通信机器等一般电子机器上，由于本产品的故障和误动作有可能对人命或财产产生危害等现象，对于研讨高信赖性・安全性要求高的用途时，根据用途，需要另行协议交货规范。

・宇宙・航空机器，防灾・防范仪器，医疗机器，运输机器（汽车・火车・船舶等），公共性高的信息处理机器，其它于上述同等的机器

・不论用途，应用在高安全性要求的机器时，请设置保护电路或冗余电路来实现机器安全性。同时，拜托实施安全测试。

1.3 本参考图的使用

本式样书的内容有可能发生变更。在产品使用前，拜托先申请纳入式样书并按照式样书的内容进行使用研讨。

1.4 生产工厂

生 产 国：中国　　生产工厂：中国青岛松下电子部品有限公司

2. 概要

2.1 本式样书，适用于以下类型的开关。「按压导通式 单极单投 1回路1接点」

2.2 本式样书，为贵社与松下机电株式会社之间缔结的交易相关的契约构成文件。

2.3 本式样书中未注明事项，依据JIS规格进行操作。

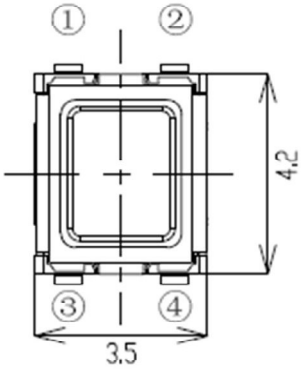
3. 外形尺寸・回路图・表示

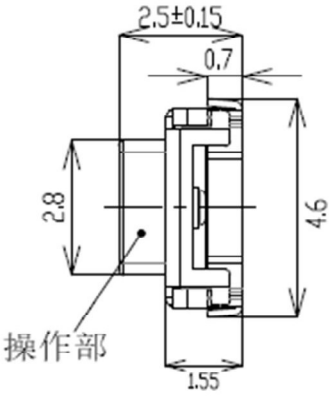
在产品上表示出制造年月。

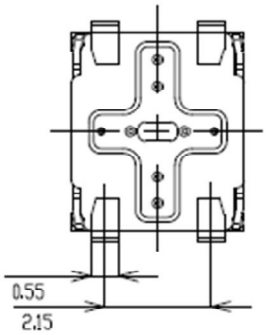
参 考 图

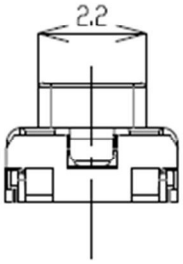
普通尺寸公差：±0.2

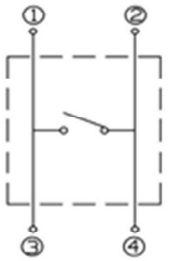
（ ）尺寸为参考尺寸。







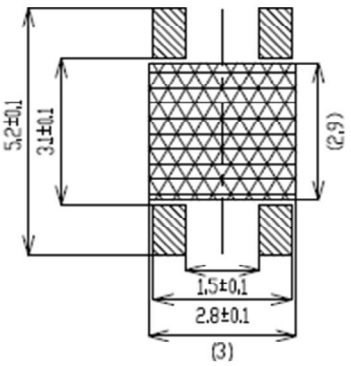




电路图

操作部颜色：黑色

焊锡厚度：t=0.15±0.03



焊 盘

：推荐焊盘区域

：禁止焊锡区域

如设置焊盘或导线时，为避免金属部分露出，请进行绝缘涂层等处理。

金属部分露出的话，通过焊锡球有可能和开关背面的端子发生短路。

并且，由于铜箔的厚度、焊盘的布局等不同，产生凹凸的段差，有可能会对开关倾斜、和焊锡的接合状态、助焊剂侵入等问题产生影响。

因此，使用前请进行事前验证。

4. 基本事项

4.1 额定电压、电流 最大 DC 15 V 20 mA 最小 DC 2 V 10 μA

4.2 使用温度范围 -40 ～ + 85 ℃

4.3 保存温度范围 单 品 状 态 - 40 ～ + 85 ℃
编 带 品 状 态 - 20 ～ + 60 ℃

4.4 实验・测定状态

在实验及测定项目中,如无特殊规定在下述标准状态下实施:

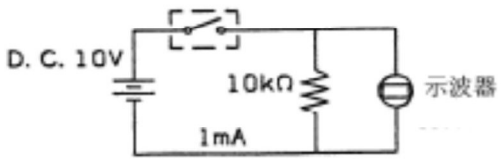
温 度：5 ～ 35 ℃
相对湿度：45 ～ 85 %
气 压：86 ～ 106 kPa

然而若对据上述条件下测定值所作判断发生疑问时,请按下列条件测量:

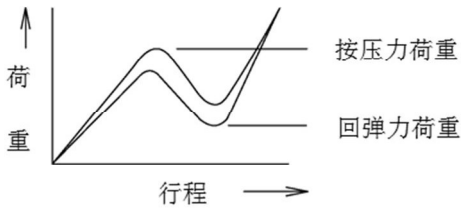
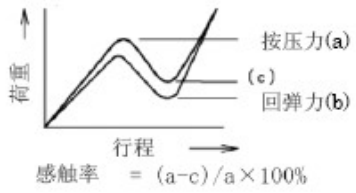
温 度：20 ± 2 ℃
相对湿度：65 ± 5 %
气 压：86 ～ 106 kPa

5. 性能

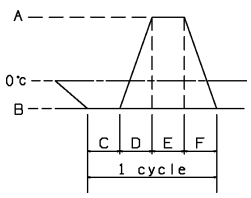
5.1 电气性能

	项 目	实 验 条 件	规 格
5.1.1	接触电阻	测定时的负荷：操作方向动作力规格之中心值的2倍。 测 定 器：微电流接触电阻计 （测定电流 10 μA～10 mA）	500 mΩ以下
5.1.2	绝缘电阻	DC 100 V （異極端子間）	100 MΩ以上
5.1.3	耐電圧	AC 250 V 1分間 （异极端子间）	无绝缘破坏。
5.1.4	触点抖动	操作速率 3～4 次/秒  触点抖动测定回路	ON时 10 ms以下 OFF时 10 ms以下

5.2 机械特性

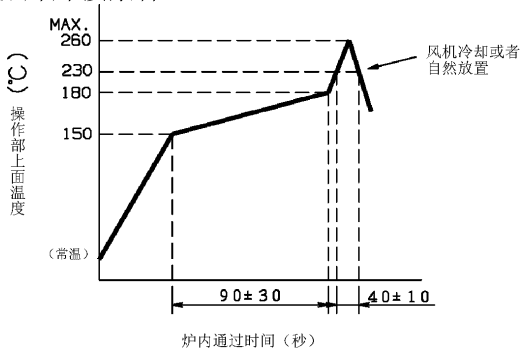
	项　目	试　验　条　件	规　格	
5.2.1	动作力	垂直设定开关的操作方向。如下图，测定按压时的按压力(最大值)和复归时的回弹力(最小值)。  	按压力	2.55 $^{+0.8}_{-0.8}$ N
			回弹力	0.1　N以上
5.2.2	动作行程	垂直设定开关的操作方向，测定开关到ON为止的操作部移动距离。	0.15 $^{+0.1}_{-0.1}$ mm	
5.2.3	感触率	测定方法请参照5.2.1  	感触率 30 %以上 (回流焊接前)	
5.2.4	操作部按压强度	将开关实装到基板，向开关操作方向施加下记静荷重。 50 N, 60 秒	电气、机械性能无异常。	
5.2.5	耐振性	振动数范围：10 ～ 55 Hz 全　振　幅：1.5 mm 扫 描 时 间：10—55—10Hz　约1分钟 振 动 方 向：X,Y,Z（3方向） 振 动 时 间：X,Y,Z 各2小时	满足5.1项、5.2.1～5.2.2项。	
5.2.6	耐焊接热	将开关实装在基板上，回流焊处理2次 （参考6.1项回流焊条件） 常温常湿放置1小时以上,外观无附着物的状态下测定。	接触电阻 500 mΩ以下 满足5.1.2～5.1.4项、5.2.1～5.2.2项。	
5.2.7	可焊性	涂布助焊剂，按下记条件浸渍焊锡。 焊　　锡：M705/Sn-3.0Ag-0.5Cu（千住金属） 助　焊　剂：CF-110VH-2A（Tamura化研） 焊 锡 温 度：260 ± 5 ℃ 浸 渍 时 间：2 ± 0.5 秒	95%或更多的浸渍面积能被新焊锡覆盖。 （但是破断面除外）	

5.3 耐候性能

	项 目	试 验 条 件	规 格
5.3.1	耐寒性	下记实验后，在常温常湿放置1小时后测定。 周围温度 --- -40±2 ℃ 实验时间 --- 500 小时	接触电阻 1000 mΩ以下 满足 5.1.2～5.1.4项、 5.2.1～5.2.2项
5.3.2	耐热性	下记实验后，在常温常湿放置1小时后测定。 周围温度 --- 85±2 ℃ 放置时间 --- 500 小时	接触电阻 1000 mΩ以下 满足 5.1.2～5.1.4项、 5.2.1～5.2.2项
5.3.3	热冲击性	用下记条件进行20次循环实验后，在常温常湿中放置1小时后测定。  A:+85±2℃ B:-40±2℃ C:1小时 D:5分钟以内 E:1小时 F:5分钟以内	接触电阻 1000 mΩ以下 满足5.1.2～5.1.4项、 5.2.1～5.2.2项。
5.3.4	耐湿性 （稳定状态）	下记实验后，在常温常湿放置1小时后测定。 周围温度 --- 60±2 ℃ 相对湿度 --- 90～95 % 实验时间 --- 500 小时	接触电阻 1000 mΩ以下 满足 5.1.2～5.1.4项、 5.2.1～5.2.2项
5.3.5	动作寿命	DC 15 V 20 mA 电阻負荷 动作速度 --- 2～3 次/秒 按压力 --- 按压力规格上限 动作次数 --- 100,000 次	接触电阻 20 Ω以下 触点抖动 10 ms以下 (ON,OFF时) 按压大初期值±30% 满足5.1.2项、5.2.2项
5.3.6	耐H_2S	下记实验后，在常温常湿放置1小时后测定。 气体浓度 --- 3±1 ppm 周围温度 --- 40±2 ℃ 相对湿度 --- 80～85% 实验时间 --- 24 時間	接触电阻 1000 mΩ以下 满足 5.1.2～5.1.4项、 5.2.1～5.2.2项

6. 使用注意事项

6.1 回流焊焊接条件



1） 回流焊次数限定同一基板侧最多2次。

2） 利用烙铁进行手工修正时，烙铁前端在不直接接触端子的状态下使用60W以下的烙铁，温度350℃以下、3秒以内的条件下限定进行1次。

6.2 整机设计上的注意事项

1） 基板的式样请使用外形尺寸图中记载的尺寸。

2） 整机操作部形状请如图-1设计。
并且，倾斜请设定在4度以内。（图-2）
和开关的偏心请保证在0.3mm以下使用。

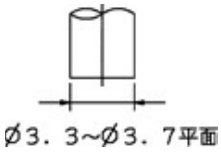


图-1

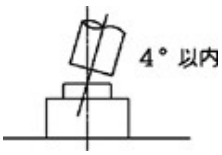


图-2

6.3 其他注意事项

1） 为了避免端子变形、接触不良、动作不良等情况，
请不要对产品施加过大负荷。

2） 为了防止开关内部异物（P.W.B基板的粉末、助焊剂的粉末等）入侵发生接触不良，
实装后的P.W.B基板请小心拿取。
并且，请避免堆积存放P.W.B基板等情况。

3） 产品保管时，请避免高温高湿、腐蚀性气体的环境。
特别是长时间保存时，请不要从包装箱内取出，避免单品状态的保存。

4） 避免使用尖锐物体按压盖膜。

5） 关于洗净
・如果焊接时助焊剂或焊锡飞散到基板表面及接点部时，
有可能会损坏本产品的机能。
・不允许在产品焊接后进行清洗。

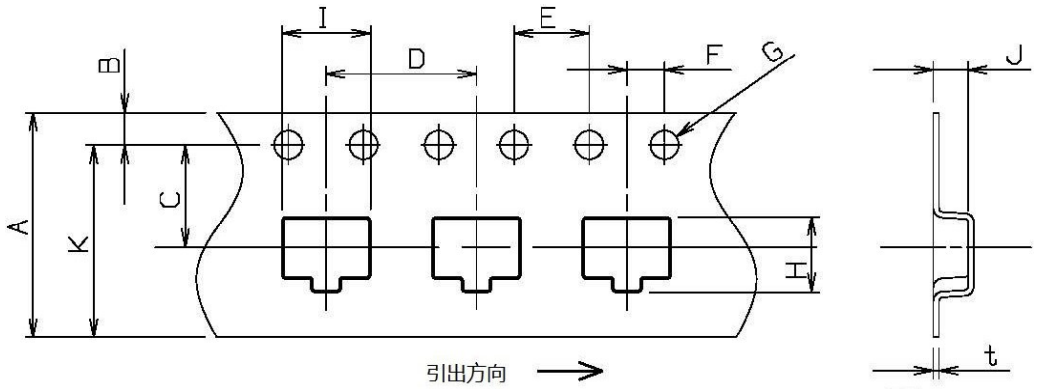
6） 请避免开关长时间处于ON状态。

7） 如果在开关附近使用大量的焊锡，有可能导致开关内部出现助焊剂侵入。
因此请使用本式样书中推荐的焊盘设计，并且请避免在开关的近旁追加焊盘。

式样书名	参 考 图	式样书编号 20220326
品 名 4.2mm×3.5mmSMD 轻触开关	型 号 EVPBMAC2A000	15 / 16

7. 包 装 规 范

载体编带



单位 ：mm

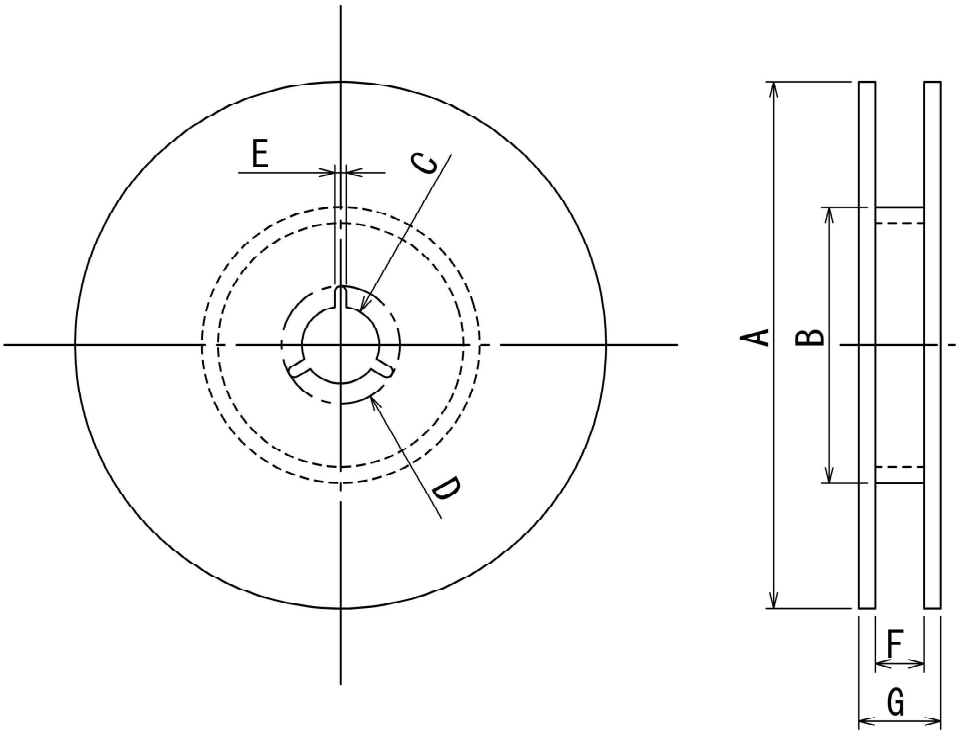
A	B	C	D	E	F	G	H	I	J	K	t
±0.3	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.2	±0.2	±0.2		±0.1
12	1.75	5.5	8	4	2	1.5	4.5	5.05	2.65	(10.25)	0.3

顶部薄膜剥离强度0.2~1.0N。（剥离角度：165° ）

编带状态：编带中产品脱落最多1个，但应该确保1卷内产品数量。

编带连接：每卷盘内接头数最多1个。

卷盘（ 4000 个/卷）



A	B	C	D	E	F	G
±2	±1	±0.2	±0.8	±0.5	±1	±1
Φ380	Φ80	Φ13	Φ21	2	13.4	17.4

单位:mm

＜请严格遵守下述禁止事项及注意事项＞

【可能引发冒烟、火灾的禁止事项】

・绝对禁止超出开关的额定范围使用，那样可能引发火灾。
当错用或非常使用在电压超出额定值的场合，要采用正确的措施，如加电流熔断器作为保护电路等。

・禁止在易发生延烧的场所使用，或者事先进行延烧防止对策。

【对安全性有要求的机器的拜托事项】

・尽管高度保证重视开关的质量，但性能劣化、短路、断路不能说是完全不发生的。
在设计重视安全性的机器时，针对本产品单一故障要事先研讨对机器的影响

・设计保护回路、保护装置，实现系统上的安全性
・设计一套冗余回路等增强系统安全性解决个别故障造成的危险
确保安全性。

【关于保管条件的注意事项】

・当产品保存在下列环境和条件下，可能会影响性能劣化和焊接性等性能，应避免在下列条件下保存：

(1)温度-10 ℃以下、+40 ℃以上、湿度85 %以上的环境。
(2)有腐蚀性气体的环境。
(3)产品到达后，长期保存 6 个月以上。
(4)阳光直射的场所。

・在不施加荷重且在包装的状态下保存。。
・请尽快使用，建议期限 3 个月，允许期限 6 个月。
・内箱包打开装使用后，若有剩余请用防潮、防气等适合方法进行包装。