

APPROVAL SPECIFICATIONS

Title: Micro Switch

Product Model: MS15A-A

Customer's Part NO: _____

Customer's Model: _____

Customer's Approval Requested.

Please return this copy as a certification of your approval.

Checked by: _____ **Date:** _____

Approved by: _____ **Date:** _____

APPROVE	REVIEW	POLT
杨光华	黄崇武	谢有根

Shenzhen Gangyuan Microkey Technology Co.,ltd



CUSTOMER	CUSTOMER'S P/N	GYE'S P/N	PRODUCT	REVISION
		MS15A-A	TACT SWITCH	A/01

1、概述

GENERAL

1.2 适用范围

APPLICATION

此规格书适用于微动开关的相关要求

This specification is applied to the requirements for Micro switch

1.3 工作温度范围

Operating Temperature Range

-40℃~85℃(在标准大气压、标准湿度条件下)

-40℃~85℃ (Normal humidity, normal air pressure)

1.4 贮藏温度范围

Storage Temperature Range

-40℃~85℃(在标准大气压、标准湿度条件下)

-40℃~85℃ (Normal humidity, normal air pressure)

1.5 测试条件

Test Conditions

在没有其它特定的条件下，应该在以下的条件下进行测试和测量：

Unless otherwise specified, tests and measurement shall be made in the following standard conditions:

常温.....5℃~35℃

Normal temperature.....5℃~35℃

标准湿度.....相对湿度 25%~85%

Normal humidity.....relative humidity 25%~85%

标准大气压.....86KPa~106Kpa

Normal air pressure.....86Kpa~106Kpa

在制造过程中，测试和测量应该在以下的条件下进行：

If any doubt arise from the judgment, tests shall be conducted at the following conditions:

温度.....20℃±2℃

Temperature.....20℃±2℃

相对湿度.....65%±5%

Relative humidity.....65%±5%

环境气压.....86KPa~106Kpa

Air pressure.....86KPa~106Kpa

1.6 防护结构 protective structure

相当于 IP67 (防尘/防水性能符合 IP67，但端子部除外)

Equivalent to IP67 (except for the terminal part, the dust-proof / waterproof performance is compliance with IP67)



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2、 详细说明

Detailed specification

2.1 外观：应无影响、降低产品性能的缺陷；

Appearance: There should be no defects that affect the serviceability of product.

2.2 结构尺寸和安装尺寸：应符合装配图要求；

Style and dimension: shall conform to the assemble drawings.

2.3 TIMING（切换时限）：NON-SHORTING

2.4 开关结构：双回路双输出(具体的触点结构在装配图中已绘出)；

Contact arrangement: 2 pole, 2throw

(Details of contact arrangement are given in the assembly drawings.)

2.5 开关工作额定值：DC 18V, 50mA（最大值） DC 5V, 50 μ A（最小值）

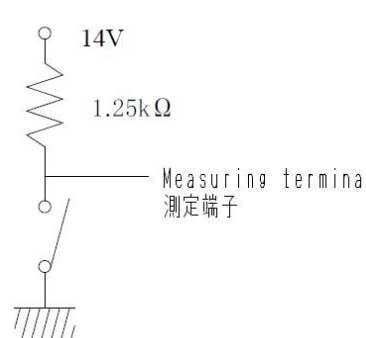
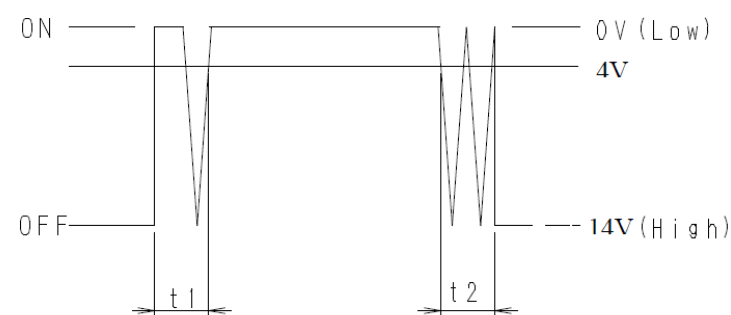
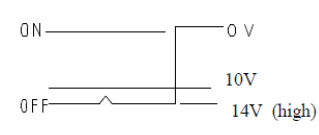
Ratings: 18V DC, 50mA (Max) 5V DC, 50 μ A (Min)

3. 电气性能：

ELECTRICAL SPECIFICATION

项 目 ITEM		试 验 条 件 TEST CONDITIONS	要 求 REQUIREMENTS
1	接触电阻 Contact Resistance	在以 50mA, 20mV 的直流电源或不低于 1KHz 的交流电源的电路中，以一个等于 2 倍按力的静负荷施加于手柄中心 Applying a static load of 2 times operating force to the center of the stem, measurements shall be made by 20mV DC 50mA or more than 1KHZ AC small-current contact resistance meter.	$\leq 75m\Omega$
2	绝缘电阻 Insulation Resistance	在端子之间施加 DC 500V /1min 的条件下，测量端子之间底座、盖板的电阻值 Measurement shall be made following application of 500V DC potential, across terminals, and across terminals and cover, for one minute.	$\geq 100M\Omega$
3	介质耐压 Dielectric voltage proof	在端子之间施加 500V AC (50HZ 或 60HZ) /1min 500V AC (50HZ or 60HZ) shall be applied across terminals, for one minute.	无击穿、无飞弧 There should be no breakdown and flashover



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项目 ITEM	试验条件 TEST CONDITIONS			要求 REQUIREMENTS		
4	触点抖动 Bounce	运行速度0.5mm / 1s, 14V直流11.2mA (电阻负载) Measured at the operation speed of 0.5mm / 1s, 14V DC 11.2mA (Resistive load).  			定义 t1、t2 电压波动时间超过 4v。 t1, t2 shall be defined the voltage fluctuation time exceeding 4 V. 接触弹跳 t1, t2 最大 15ms。 Contact bouncing t1, t2 15ms max. 	
5	同步性 synchronism	在 0.5mm / 1s, 14V 直流 11.2mA(电阻负载)的运行速度下测量。 Measured at the operation speed of 0.5mm / 1s, 14V DC 11.2mA (Resistive load). Resolution of measuring equipment shall be 50 μs. 测量设备分辨率为 50μs。			15ms 同步时间。 15ms synchronization-time.	
4. 机械性能: MECHANICAL SPECIFICATION						
1	操作力 Operating Force	开关垂直于操作方向放置，在开关驱动件顶端中心逐渐施力，测量开关导通所需的最大力度。 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.			130gf±50gf	



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项目 ITEM		试验条件 TEST CONDITIONS			要求 REQUIREMENTS
2	端子强度 Terminal strength	<p>将 3N 的静态负载按要求的方向加在端子尖上 1 分钟。每个端子做一次测试。 A static load of 3N shall be applied to the tip of terminal in a desired direction for 1 min. The test shall be done once per terminal.</p>			<p>端子无损坏或显著松动，但是端子允许弯曲。 Without damage or excessive looseness of terminals. Terminal bend is permitted.</p>
3	手柄强度 Robustness of Actuator	<p>工作方向应承受 20n 的静态载荷 15 秒 A static load of 20 N shall be applied in the operating direction of actuator for 15 s</p>			<p>无明显的摆动、变形和机械异常。 Shall be free from significant wobble, deformation, and mechanical abnormalities.</p>
		<p>拉动方向上施加 20n 的静态负载 15 秒 A static load of 20 N shall be applied in the pull direction of actuator for 15 s</p>			
		<p>顶端垂直运行方向施加 5n 的静载荷 15 秒。 A static load of 5 N shall be applied in the perpendicular direction of operation at the tip of actuator for 15 s.</p>			
4	轴摆动 Wobble of actuator	<p>跳动(P-P)应通过在致动器尖端的垂直操作方向上施加 1 N 的静态负载来测量。 Run-out(P-P) shall be measured by applying a static load of 1 N in the perpendicular direction of operation at the tip of actuator.</p>			P-P: <u>1</u> mm MAX
5	振动 Vibration	<p>根据以下给定条件进行测试： Measurement shall be made following the test set forth below: (1) 振动频率范围：10~55~10Hz Vibration frequency range: 10 to 55 to 10Hz (2) 振幅（峰—峰）：1.5mm / Amplitude: 1.5mm (3) 振动方向：包括手柄行程方向在内的三个相互垂直的方向 Direction of vibration: Three mutually perpendicular direction including the direction of stem travel (1) 测试时间：每次 2hours / Duration: Each 2hours.</p>			<p>接触电阻：≤200mΩ Contact resistance: ≤200mΩ 项目 3,4.1 Item 3,4.1 在测试过程中不允许接触颤振。 Contact chattering is not allowed during test.</p>
6	冲击 Shock	<p>开关应在实验后测量 Switch shall be measured after following test. 1. 安装方法：正常安装 Mounting method: Normal mounting method 2. 加速 490 m/s² (50G) Acceleration: 490 m/s² (50 G) 3. 持续时间：11 ms Duration: 11 ms 4. 测试方向：6 个方向 Test direction: 6 directions 5. 冲击次数：每个方向 3 次 (18 次计) Number of shocks: 3 times per direction (18 times in total)</p>			<p>接触电阻：≤200mΩ Contact resistance: ≤200mΩ 项目 3,4.1 Item 3,4.1 无机械异常。 Shall be free from mechanical abnormalities.</p>



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项目 ITEM		试验条件 TEST CONDITIONS			要求 REQUIREMENTS
7	自由落体试验 Free fall test	将开关从 1 米的高度落在混凝土地板上。 Drop switch on concrete floor from height of 1m. (1) 测试方向 Test direction: 3 轴 3 axis (2) 试验次数 Number of shocks: 各方向各两回 2 times per each direction			接触电阻: $\leq 200\text{m}\Omega$ Contact resistance: $\leq 200\text{m}\Omega$ 项目 3,4.1 Item 3,4.1 无机械异常。 Shall be free from mechanical abnormalities.
8	可焊性 Solderability	在以下设定条件下进行测量: Measurements shall be made following the test set forth below: (1) 焊接温度: $245\pm 5^\circ\text{C}$ Solder temperature : $245\pm 5^\circ\text{C}$ (2) 浸入时间: $2\text{s}\pm 0.5\text{s}$ Immersion time: $2\text{s}\pm 0.5\text{s}$ 对于其它步骤参考《GB 5095.6—86》试验 12a The other steps please refer to 《GB 5095.6-86》 TEST 12a			除边缘外涂层应均匀覆盖 90% 以上 Except for the edge, the coating should cover a minimum 90%
5、极限电气性能:					
ENVIRONMENTAL SPECIFICATION					
1	低温测试 Resistance to low temperature	样品应以下列实验条件进行测试, 实验后样品应放在常温及标准湿度的环境中 1 小时后做性能测试: Following the test set forth below the sample shall be left in normal temperature and humidity conditions for 1 h before measurements are made: (1) 温度: $-40\pm 2^\circ\text{C}$ Temperature : $-40\pm 2^\circ\text{C}$ (2) 时间: 500h Time: 500h			接触电阻: $\leq 200\text{m}\Omega$ Contact resistance: $\leq 200\text{m}\Omega$ 项目 3,4.1 Item 3,4.1 无外观和结构异常 No abnormalities shall be recognized in appearance and construction.
2	高温测试 Heat resistance	样品应以下列实验条件进行测试, 实验后样品应放在常温及标准湿度的环境中 1 小时后做性能测试: Following the test set forth below the sample shall be left in normal temperature and humidity conditions for 1 h before measurements are made: (1) 温度: $90\pm 2^\circ\text{C}$ temperature: $90\pm 2^\circ\text{C}$ (2) 时间: 500h time: 500h			接触电阻: $\leq 200\text{m}\Omega$ Contact resistance: $\leq 200\text{m}\Omega$ 项目 3,4.1 Item 3,4.1 无外观和结构异常 No abnormalities shall be recognized in appearance and construction.

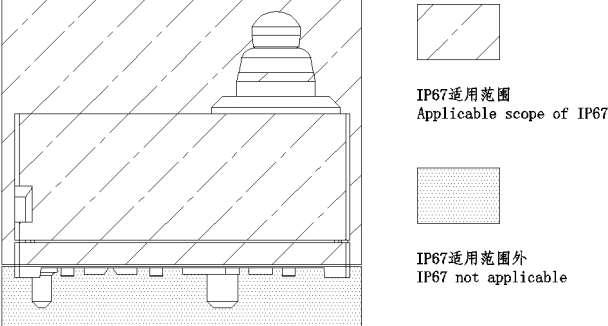


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项目 ITEM	试验条件 TEST CONDITIONS			要求 REQUIREMENTS
3	温度周期性测试 Change of temperature	<p>根据下面的测试要求进行 100 次循环的温度周期性测试，实验后样品应放在常温及标准湿度的环境中 1 小时后做性能测试。测试期间样品应保持干燥。</p> <p>After 100 cycles of following conditions, the sample shall be allowed to stand under normal temperature and humidity conditions for 1 h. and measurements shall be made. During the test water drops shall be removed.</p> <p>The graph shows a temperature cycle. The upper temperature is $85 \pm 2^\circ\text{C}$ and the lower temperature is $-40 \pm 3^\circ\text{C}$. The cycle consists of a 30min dwell at the upper temperature, a 10~15min transition to the lower temperature, a 30min dwell at the lower temperature, and a 10~15min transition back to the upper temperature. This sequence is labeled as '1 cycle'.</p>		接触电阻: $\leq 200\text{m}\Omega$ Contact resistance: $\leq 200\text{m}\Omega$ 项目 3.1,3.2,3.5,4.1 Item 3.1,3.2,3.5,4.1 无外观和结构异常 No abnormalities shall be recognized in appearance and construction.
4	湿温测试 Moisture resistance	<p>样品应按照以下实验条件进行测试，实验后样品应放在常温及标准湿度的环境中 1 小时后做性能测试：</p> <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:</p> <ol style="list-style-type: none"> (1) 温度: $60 \pm 2^\circ\text{C}$ temperature: $60 \pm 2^\circ\text{C}$ (2) 相对湿度: 90%~95% relative humidity: 90% to 95% (3) 时间: 500h time: 500h 		接触电阻: $\leq 200\text{m}\Omega$ Contact resistance: $\leq 200\text{m}\Omega$ 项目 3,4.1 Item 3,4.1 无外观和结构异常 No abnormalities shall be recognized in appearance and construction.



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5	混合流气体试验 Mixed flow gas exposure	<p>样品应按照以下实验条件进行测试, 实验后样品应放在常温及标准湿度的环境中 1 小时后做性能测试: Following the test set forth below the sample shall be left in normal temperature and humidity conditions for 1 h before measurements are made:</p> <p>(1) RH: 80±5 % (2) Temperature 温度: 25±3 °C (3) Compound of gass ガス構成: SO2 0.2 ppm / NO2 0.2 ppm / H2S 0.01 ppm / Cl2 0.01 ppm (4) Air flow 流速: 1 m2 / h</p> <p>试验实施前如 6.1 项所示, 在常温下, 按其工作寿命的 5% 开关工作。 试验时间:10 日(试验槽的混合气体作为适当浓度) 在测试期间, 开关应该处于关闭位置, 不要操作。 Before exposure to the mixed flow gas, the switch has to be activated 5% of its durability cycles at room temperature as per Section 6.1. Test time: ten days after Mixed Flow Gas Chamber is at the right gas concentration. During the test, the switch should be in OFF position and NOT operated.</p>		<p>接触电阻: ≤200mΩ Contact resistance: ≤200mΩ 项目 3.1,3.2,3.5,4.1 Item 3.1,3.2,3.5,4.1 无外观和结构异常 No abnormalities shall be recognized in appearance and construction.</p>
6	盐雾试验 Salt Mist	<p>在以下设定条件下进行测量: The switch shall be checked after following test:</p> <p>(1) 温度: 35°C±2°C temperature: 35°C±2°C (2) 盐溶液浓度: 5±1% (质量百分比) salt solution : 5±1%(solids by mass) (3) 时间: 100h±1h Time: 100h±1 hour</p> <p>实验后的盐沉积物后水冲掉 After test, salt deposit shall be removed by running water.</p>		<p>金属件上没有腐蚀斑点 No remarkable corrosion shall be recognized in metal part.</p>
7	保护机构 Protection structure	<p>IEC 规格 IP67 标准 Switch shall satisfy IP67 of IEC standard</p> 		<p>接触电阻: ≤200mΩ Contact resistance: ≤200mΩ 项目 3.1,3.2, 3.3,3.4,3.5, Item 3.1,3.2, 3.3,3.4,3.5, 操作力: 初值的 ±10% Operating Force: initial value±10% 无外观和结构异常 No abnormalities shall be recognized in appearance and construction.</p>



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6、极限机械性能:

ENDURANCE SPECIFICATION

项目 ITEM		推荐条件 Recommended conditions	
1	无负载寿命 Operation life Without load	<p>根据下面的测试要求进行测试: Measurement shall be made following the test set forth below:</p> <p>(1) 按动速率: 15~20 次/分 Rate of operation: 15~20 times/mim.</p> <p>(2) 按力: 按力的 1.5 倍 Operating Force: Operating Force1.5 倍</p> <p>(3) 寿命: 200,000 次 Life: 200,000cycles</p>	<p>接触电阻: $\leq 200\text{m}\Omega$ Contact resistance: $\leq 200\text{m}\Omega$</p> <p>项目 3.1,3.2, 3.3,3.4,3.5, Item 3.1,3.2, 3.3,3.4,3.5, 操作力: 初值的 $\pm 10\%$ Operating Force: initial value$\pm 10\%$ 无外观和结构异常 No abnormalities shall be recognized in appearance and construction.</p>
2	负载寿命 (A) Operation life With load(A)	<p>样品应以下列实验条件进行测试, 实验后样品应放在常温及标准湿度的环境中 1 小时后做性能测试: Following the test set forth below the sample shall be left in normal temperature and humidity conditions for 1 h before measurements are made:</p> <p>(1) 开关应连续运行 15 万次, 15~20 次/分钟,带负载 DC 14v 11.2 mA。 Switch shall be operated 150,000 cycles continuously at 15~20 cycles/min with 14 V DC 11.2 mA.(Resistive load)</p> <p>9,000 cycles at -40℃ 115,000cycles at 23 ℃ 26,000 cycles at 85 ℃/85%RH</p>	<p>接触电阻: $\leq 200\text{m}\Omega$ Contact resistance: $\leq 200\text{m}\Omega$</p> <p>项目 3.1,3.2, 3.3,3.4,3.5, Item 3.1,3.2, 3.3,3.4,3.5, 操作力: 初值的 $\pm 10\%$ Operating Force: initial value$\pm 10\%$ 无外观和结构异常 No abnormalities shall be recognized in appearance and construction.</p>
3	负载寿命 (B) Operation life With load(B)	<p>根据下面的测试要求进行测试: Measurement shall be made following the test set forth below:</p> <p>(1) DC 18V, 50mA 带负载 / DC 18V, 50mA resistive load</p> <p>(2) 按动速率: 15~20 次/分 Rate of operation: 15~20 times/mim.</p> <p>(3) 按力: 按力的 1.5 倍 Operating Force: Operating Force1.5 倍</p> <p>(4) 寿命: 200, 000 次 Life: 200,000cycles</p>	<p>接触电阻: $\leq 200\text{m}\Omega$ Contact resistance: $\leq 200\text{m}\Omega$</p> <p>项目 3.1,3.2, 3.3,3.4,3.5, Item 3.1,3.2, 3.3,3.4,3.5, 操作力: 初值的 $\pm 10\%$ Operating Force: initial value$\pm 10\%$ 无外观和结构异常 No abnormalities shall be recognized in appearance and construction.</p>



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7. 焊接条件:

SOLDERING CONDITIONS:

项目 ITEM	推荐条件 Recommended conditions
7.1 手工焊接 Hand soldering	<p>请按以下条件进行焊接: Please practice according to below conditions:</p> <p>(1) 焊锡温度: $\leq 350^{\circ}\text{C}$ / Soldering temperature: 350°C Max.</p> <p>(2) 连续焊接时间: $\leq 3\text{ s}$ / Continuous soldering time: 3 s Max.</p>
7.2 回流焊 Conditions for reflow	

说明: 1.1 开关浸焊后, 注意不要用溶剂清洗。
After switches were soldered, please be careful not to clean switches with solvent.

1.2 在使用烙铁的情况下, 焊锡温度应在 350°C 以下、3 秒以内。
In the case of using soldering iron, soldering conditions shall be 350°C max and 3 sec. max.

1.3 浸焊后, 注意不要在顶部施加负荷。
Right after switches were soldered; please be careful not to load to on the knobs of switches.

2 设计中应注意的事项(Design instructions):
2.1 印刷基板的安装孔尺寸参见产品图。
Follow recommended P.W.B. piercing plan in outside drawing page.

3 注意点(Note):
3.1 注意不要施加超负荷的压力或晃动开关
Please be cautions not to give excessive static load or shock to switches.

3.2 开关浸焊后, 印刷基板注意不要叠放。
Please be careful not to pile up P.W.B. after switches were soldered

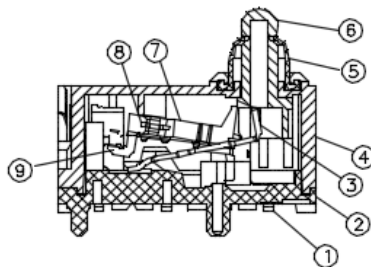
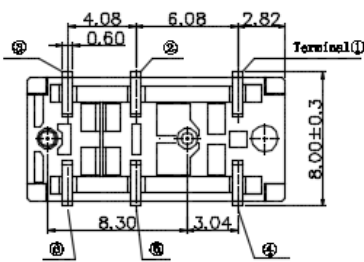
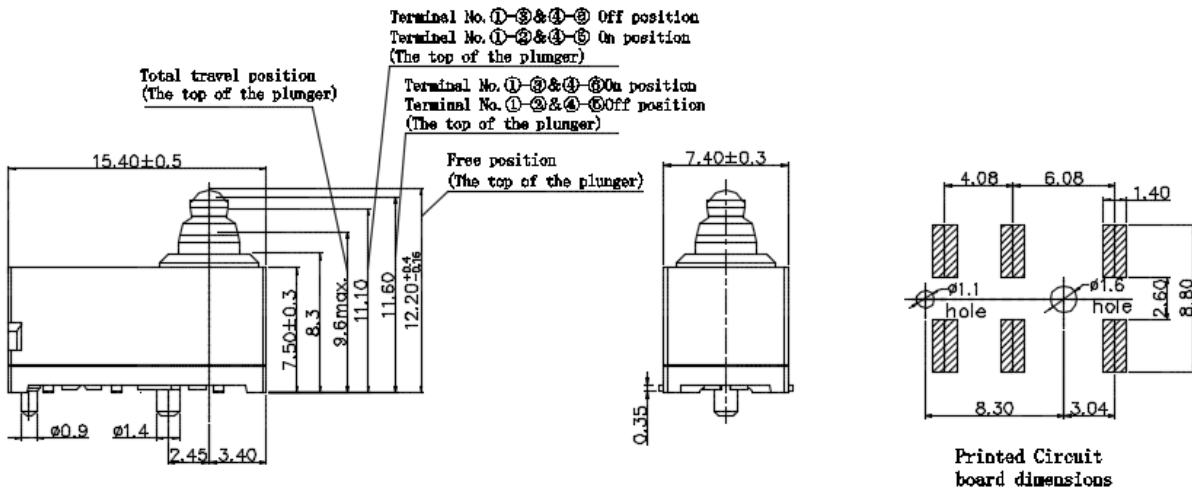
3.3 保管时尤其应注意避开高湿高温和有腐蚀性气体的环境。如需要长时间保存, 请不要打开包装箱。Preservation under high temperature and high high humidity or corrosive gas should be avoided
Especially . When you need to preserve for a long period ,do not open the carton .



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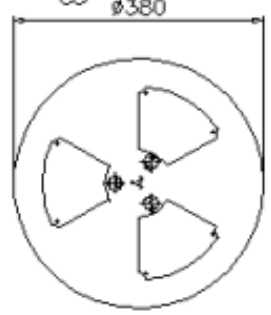
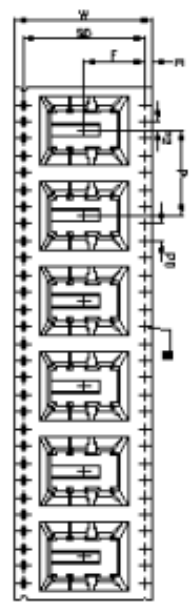


电路图

General tolerance: $\pm 0.2\text{mm}$

NO.	NAME	MATERIAL	QTY	FINISHING
1	Terminal	Brass	6	Ag Plated
2	Case	PPA	1	Natural
3	Stent	Brass	1	
4	Cover	PA	1	Black
5	Ring	Silicone	1	Grey
6	Knob	PPA	1	Black
7	Swing Rod	PA	1	Black
8	Connect Rod	Brass	1	Ag Plated
9	Contact	PBS	2	Ag Plated
10	Tension Spring	SUS	1	

ITEM	W	A0	B0	B0	P	F	E	D0	P0	S	P2	T	15"
DIM	32	9.35	15.75	14.2	20	14.2	1.75	1.5	4.0	28.40	2.0	0.5	元件/盘
TOLR	±0.3	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.05	300PCS



ITEM NO. PCS
 QTY: KG
 N. W: KG
 G. W: KG
 MEAS: 400*395*390MM

Outside box3,000pcs
 (10 reels)

1. 本圖係指零件之規格，零件之規格請參閱本圖之註釋。
2. 本圖係指零件之規格，零件之規格請參閱本圖之註釋。
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深圳市港源微鍵技术有限公司

REV.	REV. NO./DESCRIPTION	修改	DATE	DATE	REV.	REV.	REV.	REV.	REV.	REV.	REV.	REV.	REV.
1													

1 2 3 4 5 6

单击下面可查看定价，库存，交付和生命周期等信息

[>>Gangyuan\(港源\)](#)