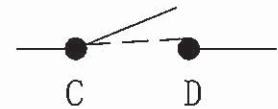
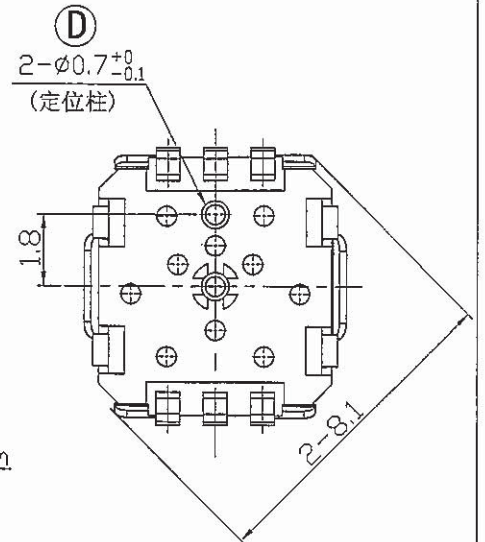
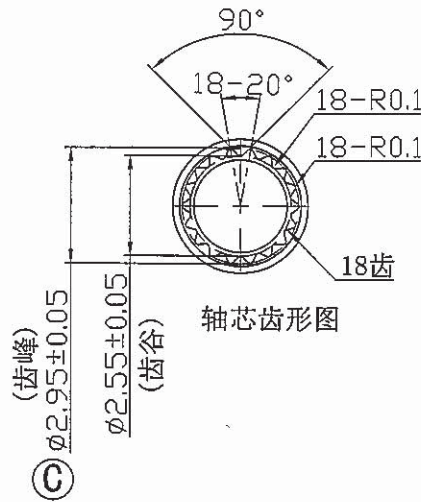
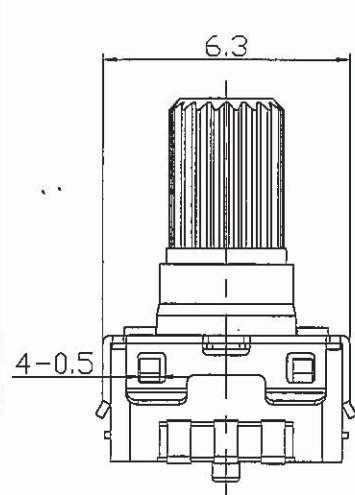
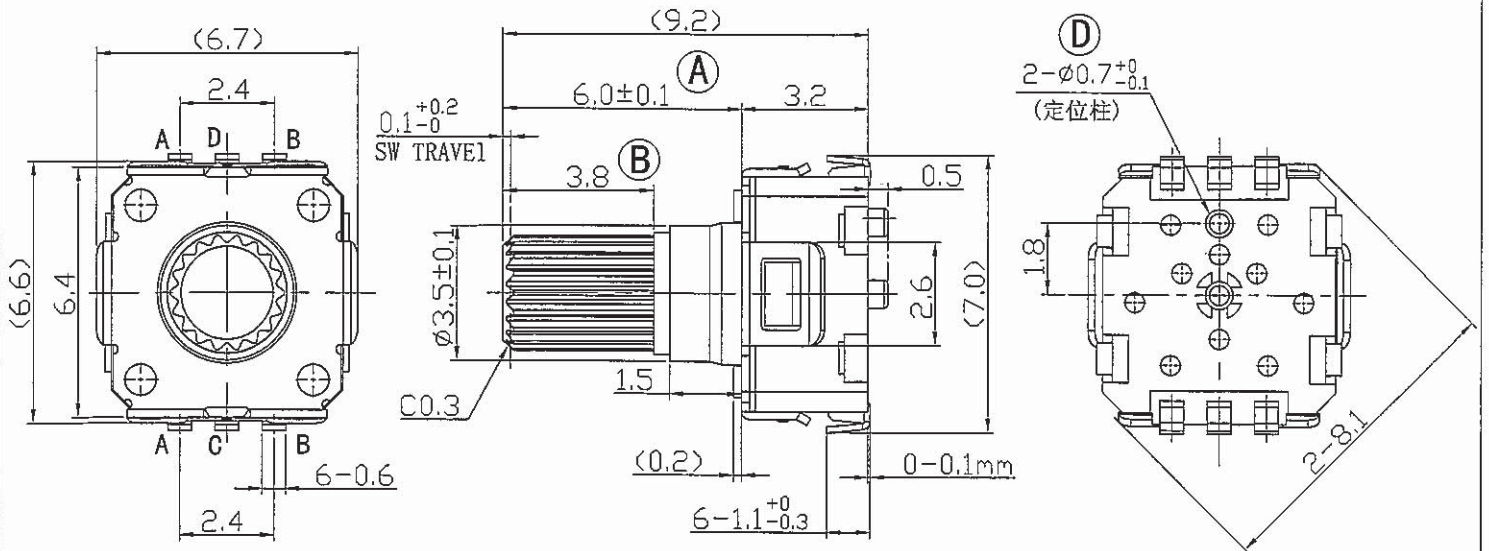
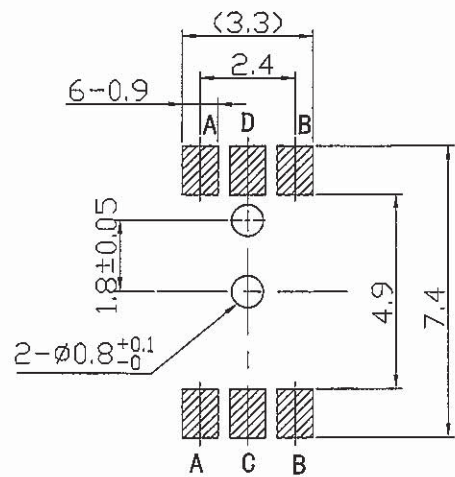


# 文件发行章



Switch Circuit



P.C.B Mounting Holes Detail



注：符合产品环境品质管理标准与用途  
重点管控尺寸 A - D。

04	增加扣位及变更尺寸	2018-07-24		
01	变更支架抽管尺寸及轴芯尺寸	2018-06-14	03	按客户要求变更轴芯齿形尺寸
00	ORIGINAL DRAWING	2018-06-11	02	更新C、D脚位位置和定位柱位置
ISSU.	REVISION	DATE	ISSU.	
毛智培	SOUNDWELL 2018-08-13 HUNG KAM PIU	SOUNDWELL 2018-08-13 HUNG KAM PIU	TOL. UNLESS OTHERWISE SPEC.	
			BASIC DIMENSIONS	TOL.
DSGD.	CHKD.	APPD.	L ≤ 10	± 0.3
			10 < L	± 0.5
			100 ≤ L	± 0.8
	SCALE		ANGLE	± 5°
	UNIT	mm		
			SOUNDWELL ELECTRONICS	
			TITLE: 编码器	
			MODEL: EC060101X0A-VH1-000	
			DRAWING NO: C-EC06XX-0001	
			NO:	

# EC06 SERIES SPECIFICATION


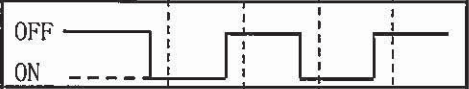

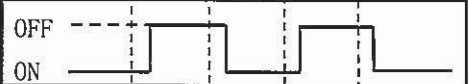
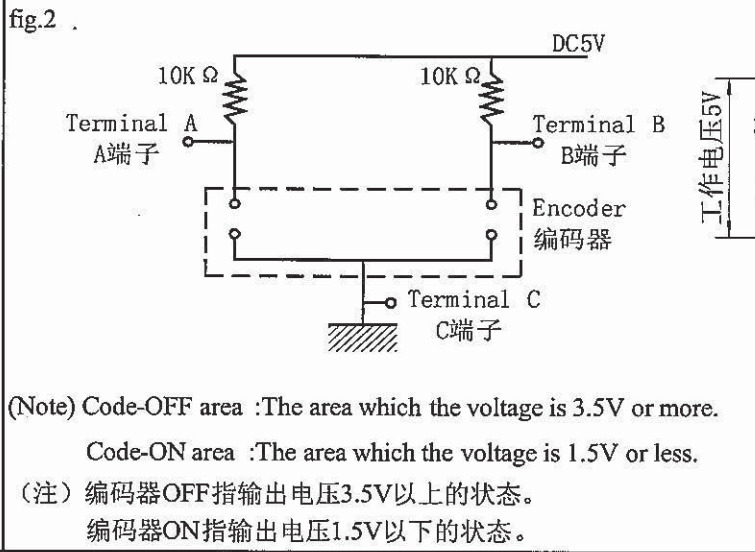
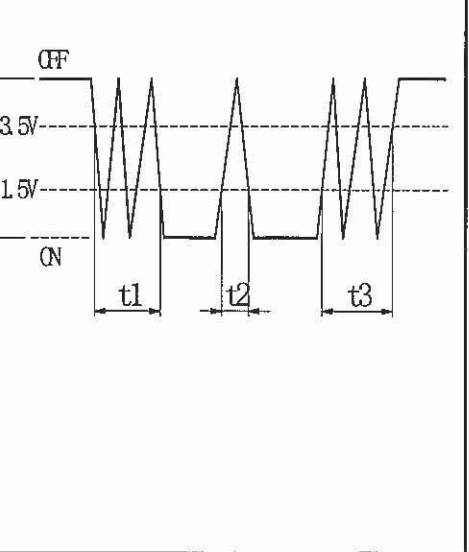
## EC06 系列规格书

文件发行章 1/6P

1、 General 一般事项	符合产品环境品质管理标准与用途
<p>1-1、 Scope 适用规格</p> <p>This specification applies to 6 mm size low-profile thin rotary encoder (incremental type) for microscopic current circuits, used in electronic equipment.</p> <p>本规格书为 <math>\Phi 6\text{mm}</math> 小型回转式编码器 (增量型), 适用于电子设备内微小电子电路。</p>	
<p>1-2、 Standard atmospheric conditions 标准状态</p> <p>Unless otherwise specified, the standard range of atmospheric conditions for making measurements and test is as following limits:</p> <p>除另有规定外, 测量应在以下状态下进行:</p> <p>Ambient temperature 温度: <math>15^{\circ}\text{C}</math> to <math>35^{\circ}\text{C}</math></p> <p>Relative humidity 相对湿度: 25% to 85%</p> <p>Air pressure 气压 : <math>86\text{kPa}</math> to <math>106\text{kPa}</math></p>	
<p>1-3、 Operating temperature range</p> <p>使用温度范围 : <math>-40^{\circ}\text{C}</math> to <math>85^{\circ}\text{C}</math></p>	
<p>1-4、 Storage temperature range</p> <p>保存温度范围 : <math>-40^{\circ}\text{C}</math> to <math>85^{\circ}\text{C}</math></p>	
<h3>2、 Construction 构造</h3>	
<p>2-1 Dimensions 尺寸</p> <p>Refer to attached drawing 见所附成品图</p>	
<h3>3、 Rating 额定值</h3>	
<p>3-1、 Rated voltage 额定电压: DC 5V</p>	
<p>3-2、 Maximum operating current (resistive load) 最大额定电流 (阻抗负载)</p> <p>Each lead 各相导线: 0.5 mA</p> <p>Common lead 公共导线: 1 mA</p>	
<h3>4、 Application Notes 使用上的事项</h3>	
<p>4-1. Avoid storing the products in a place at high temperature, high humidity and in Corrosive gases. Please use this product as soon as possible with 6 months limitation . If any remainder left after packing is opened, please store it with proper moistureproofing, gasproofing etc.</p> <p>避免储藏于高温, 潮湿及腐蚀的场所. 产品购入后尽可能在6个月内使用完. 拆包装后未使用完的剩余产品需储藏于防潮防毒的环境下.</p>	
<p>4-2. The encoder pulses count method should be designed with taking operating speed, sampling time and design software into consideration.</p> <p>编码器信号的计算方法应将操作的速度, 信号的取样时间及电子回路中的微电脑软体等考虑进去.</p>	
<p>4-3. With this products, detent position will always be aligned with A-OFF or ON phase. Therefore make the A phase of the microcomputer the reference at the soft ware design stage.</p> <p>此产品在定位点状态时A相波形是处于OFF或ON状态, 因此在设计软体时请留意此现象.</p>	
<p>4-4. At design of the pulse count process. Using the C/R filter circuit is Recommended.</p> <p>在设计时要考虑到杂讯, 须使用C/R滤波电路.</p>	
<p>4-5. Care must be taken not to expose this product to water or dew to prevent possible problem in pluses output waveform.</p> <p>本产品请勿碰触到水, 可能会导致输出波形的异常.</p>	
<p>4-6. When encoder are used, the speed is suitable for controlling with <math>360^{\circ}/\text{s}</math>. The highest speed will lead that IC doesn't obtain signal. Mean while, the slide contact in the inside of product can be divorced form in order to be poor conatct.</p> <p>在使用编制品时速度宜控制在<math>360^{\circ}/\text{s}</math>内, 转速过快会导致IC抓取不到信号及产品内部的接触刷会瞬间脱离产生接触不良.</p>	

5、 ELECTRICAL CHARACTERISTICS 电气性能

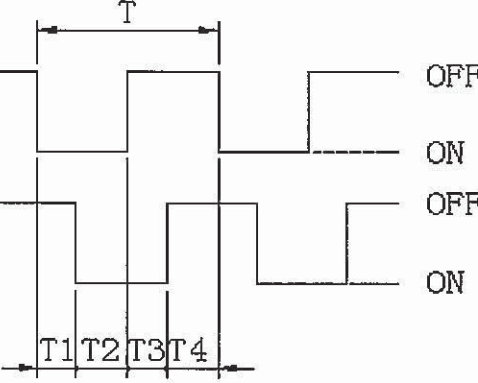
符合产品环境品质管理标准与用途

ITEM	CONDITIONS		SPECIFICATIONS
项目	条件		规格
5-1、 Output signal format 输出信号	Note: Output signal is 1 pulse per 2 detents. And terminal A-C is pulse ON or OFF at detent position. No specified output of terminal B-C at detent position. 注意事项：输出信号方式是2个定位1个脉冲。在定位点位置时A-C端子处于ON或OFF状态，而B-C端子间不作特定要求。		2 Phase-different signals (signal A, signal B) Details shown in (fig.1) (The broken line shows detent position.) A、B两信号输出相位差,输出波形详见(图1)。虚线表示带卡点装置的卡点处位置。
	Shaft rotational direction 轴回转方向	Signal 信号	Output (fig.1) 输出波形 (图1)
	C.W. 顺时针方向	A(Terminal A-C) A(A-C端子间)	
		B(Terminal B-C) B(B-C端子间)	
	C.C.W. 逆时针方向	A(Terminal A-C) A(A-C端子间)	
B(Terminal B-C) B(B-C端子间)			
5-2、 Resolution 分解能力	Number of pulses in 360° rotation. 回转360°的输出脉冲数。		6 pulses/360° for each phase 6 个脉冲/360°
5-3、 Switching characteristics 开关特性	Measurement shall be made under the condition as follows. 1) Shaft rotational speed : 360°/s 2) Test circuit : (fig.2) 下(图2)所示回路,轴以360°/秒的速度回转测定。		(fig.3) 图3
	 <p>fig.2</p> <p>(Note) Code-OFF area :The area which the voltage is 3.5V or more.                      Code-ON area :The area which the voltage is 1.5V or less.                      (注) 编码器OFF指输出电压3.5V以上的状态。                      编码器ON指输出电压1.5V以下的状态。</p>		 <p>工作电压5V</p> <p>OFF 3.5V 1.5V ON</p> <p>t1 t2 t3</p>
5-3-1、 Chattering 振荡	Specified by the signal's passage time from 1.5 V to 3.5 V of each switching position (code OFF~ON or ON~OFF) (Fig.3) 编码从OFF → ON 或 ON → OFF时,输出1.5V~3.5V通过的时间应符合规定。图三		On the case within detent, B signal will be irregular oscillation.带卡点时,在卡点位置上的B信号振荡无规定。 t1,t3 ≤ 3 ms

# EC06 SERIES SPECIFICATION

## EC06 系列规格书

文件发行章 3/6P

5、 ELECTRICAL CHARACTERISTICS 电气性能		符合产品环境品质管理标准与用途
ITEM	CONDITIONS	SPECIFICATIONS
项目	条件	规格
5-3-2、 Sliding noise (Bounce) 滑动杂音(突跳)	Specified by the time of voltage change exceed 1.5V in code-ON area. When the bounce has code-ON time less than 1mS between chattering (t1 or t3).the voltage change shall be regarded as a part of chattering. When the code-ON time between 2 bounces is less than 1mS.they are regarded as 1 linked bounce. 编码ON部分的1.5 V以上的电压变动时间在振荡t1,t3之间会产生1 mm以上1.5 V以下的ON部分. 另外, 如果各突跳间1. 5V以下的范围在1毫秒以上时, 则判定为另一个突跳。	$t2 \leq 2 \text{ ms}$
5-3-3、 Sliding noise 滑动噪音	The voltage change in code - OFF area. 编码OFF部分的电压变动。	3.5 V Min 3.5 V 以上
5-4、 Phase difference 相位差	Measurement shall be made under the condition which the shaft is rotated in speed 360°/s. 以360°/s的速度操作轴进行回转。 (Fig.4)图4  C W 顺时针方向 A信号(A~C间) Signal A  B信号(B~C间) Signal B  	$T1, T2, T3, T4 \geq 5 \text{ ms}$ In(fig.4) 见图4
5-5、 Insulation resistance 绝缘电阻	Measurement shall be made under the condition which a voltage 100V DC 60 s±5 s is applied between individual terminals and tracked 在端子与安装板间施加电压DC 110 V 60秒±5秒。	Between individual terminals and bracket 50 MΩ Min. 在端子安装板间50 MΩ以上
5-6、 Dielectric strength 耐电压	A voltage of 100V AC 60 s±5 s ( leak current 1mA) be applied between individual terminals and bracket.在端子与安装板间施加AC 110 V 60秒±5秒 (漏电流1mA)。	Without arcing or breakdown. 不得有绝缘损坏。
6、 Mechanical characteristics 机械性能		
6-1、 Total rotational angle 全回转角度		360°(Endless) 360°(无止挡点)
6-2、 Detent Torque 定位点力矩	Only suitable for C.C, equipment. 只适用于附卡点装置 3 s/ cycle 3秒一周的速度测试。	Initial(初期): 1.5~5mN.m (15~50gf.cm) After Reflow(回流焊后): 1~4mN.m (10~40gf.cm)
6-3、 Number and position of detent 定位点数及位置	Only suitable for C.C, equipment. 只适用于附卡点装置	12 detents(Step angle:30°±3°) 12点定位 (间隔角度 30°±3°)
6-4、 Push-pull strength of shaft 轴推拉强度	Pull static load of 20 N(2 kgf) for 5s and push static load of 20 N (2 Kgf)for 5s shall be applied to the shaft in the axial direction . (After soldering of the PC board) 在轴端, 沿轴向施加20 N(2 kgf)的静负荷力拉力5秒钟和施加20 N (2 Kgf)推力5秒钟(焊锡固定在PCB上)。	Without damage or excessive play in shaft . No excessive abnormality in rotational feeling.And electrical characteristics shaft be satisfied. 轴无破损, 旋转、电气性能无异常。

# EC06 SERIES SPECIFICATION 文件发行章 4/6P

## EC06 系列规格书

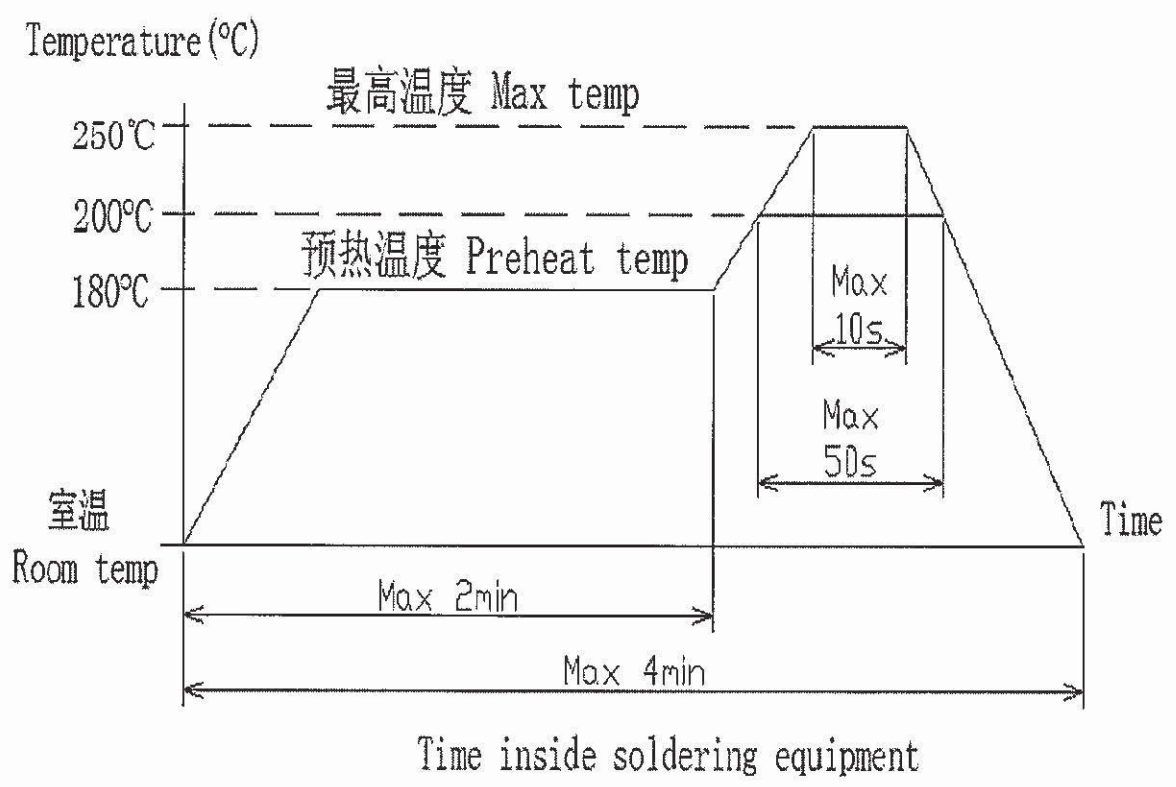
6、Mechanical characteristics 机械性能		符合产品环境品质管理标准与用途
ITEM	CONDITIONS	SPECIFICATIONS
项目	条件	规格
6-5、Shaft wobble 轴摆动	A momentary load of 30 mN.m(300 gf) shall be applied at the point 2mm from the tip of the shaft in a direction perpendicular to the axis of shaft. 在轴前端处,沿径向瞬间施加30 mN (300 gf)的力。	Less than 0.25mm 小于0.25 mm
6-6、Side thrust strength of shaft 轴的垂直押引强度	A load of 5 N (500gf) shall be applied at the point 1 mm from the tip of the shaft in a direction perpendicular to the axis of shaft for 10 s. 在轴前端1 mm处加5 N(500gf)的静负荷力10秒钟。	Without excessive play of bending in shaft. No mechanical abnormally. 轴不得有明显松动及接触不良。
6-7、Shaft play in rotational wobble 轴的回转方向摆动	Testing by angle board. 用角度板测定。	4° Max 4° 以下
6-8、Shaft play in axial direction 轴向间隙	The pull / push load of 0.5 N(50 gf) shall be imposed on the shaft. 在轴上施加0.5 N(50 gf)的推力或拉力。	0.2 mm Max. 0.2 mm以下。
7、Endurance characteristics 耐久性能		
7-1、Rotational life 旋转寿命	The shaft of encoder shall be rotated to 50,000 cycles at a speed of 600~800 cycles/h without electrical load,after which measurements shall be made. 在无负荷条件下轴以600~800周/小时速度旋转50,000 周。 1 cycle: rotate 360° CCW rotate 360° CW 1周指顺时针转360°逆时针转360°。	Chattering t1,t3≤4 ms 振荡 t1,t3≤4 ms Bounce t2≤3 ms 突跳 t2≤3 ms Detent torque:Initial torque 50%. 定位力矩: 不低于初期规格值的50%。 Shaft wobble should be within 150% of the specifications. 轴摆动为原始规格值的150%以内 Shaft play in rotational wobble:6° Max. 轴的回转方向摆动: 6°以内
7-2、Damp heat 耐湿性	The encoder shall be stored at temprature of 40±2 °C with relative humidity of 90% to 95% for 96±4 h in a thermostatic chamber .And the encoder shall be subjected to standard atmospheric conditions for 1.5 h, After which measurements shall be made. 温度40±2℃、湿度90~95%的恒温恒湿槽中放置96±4小时后, 在常温、常湿中放置1.5小时后测试。	Encoder characteristics item: 5-1、5-5、5-6、6-2 Push switch characteristics item: 1-2-3、1-2-4、1-3-2、1-3-3 The same as the initial specifications. 开关接触阻抗小于200mΩ。 编码器特性项目: 5-1、5-5、5-6、6-2 按压开关特性项目: 1-2-3、1-2-4、1-3-2、1-3-3应同原规格值相同。
7-3、Dry heat 耐热性	The encoder shall be stored at a temperature of 85±3 °C for 96±4 h in a thermostatic chamber.And then the encoder shall be subjected to standard atmospheric conditions for 1.5 h .After witch measurement shall be made.温度85±3℃的恒温箱中放置96±4小时, 常温、常湿放置1.5小时后测试。	
7-4、Cold 低温特性	The encoder shall be stored at a temperature of -40±3 °C for 96±4 h in a thermostatic chamber.And then the encoder shall be subjected to standard atmospheric conditions for 1.5 h .After witch measurement shall be made .温度-40±3 °C的恒温箱中放置96±4小时, 常温、常湿放置1.5小时后测试。	
7-5、Solder ability 焊锡性	The terminals shall be immersed into solder bath at 260 °C±5 °C for 3s±1s in the same manner as para. 端子在260℃±5℃温度的焊锡槽内浸锡3秒±1秒。	

# EC06 SERIES SPECIFICATION 文件发行章 5/6P

## EC06 系列规格书

### 7、Endurance characteristics 耐久性能 符合产品环境品质管理标准与用途

ITEM	CONDITIONS	SPECIFICATIONS
项目	条件	规格
7-6、Reflow soldering 回流焊	<p>Manual soldering: 手工焊接</p> <p>Bit temperature of soldering iron: 350 °C less than</p> <p>Application time of soldering iron: within 3s</p> <p>温度350 °C以下，时间3秒以内。</p> <hr/> <p>Reflow soldering :回流焊</p> <p>Preheat: Temperature on the copper foil surface should reach 180°C, 2±0.3minutes after the P.W.B entered into the soldering equipment.</p> <p>Soldering heat: Temperature on the copper foil surface should reach the peak temperature of 250°C ±3°C within 10 seconds after the P.W.B entered into soldering heat zone.</p> <p>预热: 在P.W.B板进入焊接装备之后，铜箔表面温度为180°C，时间为2±0.3分钟。</p> <p>浸锡: 在P.W.B板浸锡时，铜箔表面温度最高将达到250 °C ±3°C，时间为10秒。</p> <p>以上工程仅适用一次。</p> <p>Copper foil surface temperature(°C)</p>	<p>Electrical characteristics shall be satisfied</p> <p>No mechanical abnormality.</p> <p>不得有绝缘体的破损、变形、接触无异常。</p>



# EC06 SERIES SPECIFICATION 文件发行章

## EC06 系列规格书 6/6P

### Push switch portion 推动开关部分

符合产品环境品质管理标准与用途

Note: The following specification is only suitable for the one type with switch construction of EC06 encoder series.  
注：以下规格只适用于此EC06编码器系列带开关结构。

1-1、Rated capacity (Resistance load): DC 5 V 10 mA

额定容量 (电阻负荷): DC 5 V 10 mA

### 1-2 Electrical characteristics 电气性能




ITEM 项目	CONDITIONS 条件	SPECIFICATIONS 规格
1-2-1、Contact resistance 接触电阻	Voltage step-down test at DC 5 V 1 mA 用DC 5 V 1 mA 电压降下法测定。	100 mΩ Max 100 mΩ 以下
1-2-2、Bouncing 振荡	Shaft shall be rotated at 1 cycles/s (OFF-ON-OFF) 以1秒钟1往返 (OFF-ON-OFF) 回转运转。	10 ms Max 10 ms 以下
1-2-3、Insulation resistance 绝缘电阻	Measurement shall be made under the condition which a voltage 100V DC 60 s±5 s is applied between individual terminals and tracked 在端子与安装板间施加电压DC 110 V 60秒±5秒。	Between individual terminals and bracket 50 MΩ Min. 在端子安装板间50 MΩ以上
1-2-4 Dielectric strength 耐电压	A voltage of 100V AC 60 s±5 s (leak current 1mA) be applied between individual terminals and bracket. 在端子与安装板间施加AC 110 V 60秒±5秒 (漏电流1mA)。	Without arcing or breakdown. 不得有绝缘损坏。

### 1-3 Mechanical characteristics 机械性能

1-3-1、Switch circuit and number of pulse 开关电路、接点数		Single pole and single throw (push on) 单极单投 (推ON)
1-3-2、Travel of switch 开关移动量		0.1 <sup>+0.2</sup> <sub>-0</sub> mm
1-3-3、Operating force of switch 开关作动力		4±1 N (400±100gf)

### 1-4 Endurance characteristics 耐久性能

Push operating life 寿命特性	The encoder's shall be pushed to 50,000 cycles at a speed of 1800-2000/h without electrical load.(shaft push load: 400gf Max.) 在无负荷条件下, 对轴以每小时1800-2000次的速度推动50,000次, 施加压力400gf以下)。	Contact resistance : 200 mΩ max. Specification in clause 1-2-3, 1-2-4 shall be satisfied. Operating force: Before test 50%. 接触电阻: 200 mΩ 以下。 1-2-3, 1-2-4 满足初期规格。 开关作动力: 不低于寿命前的50%。
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文控编号: EC-192	编制时间				
版本号: 01	2018-6-9				
变更记事:	变更时间				
1、变更开关作动力	2018-8-10	DSGD.主办	CHKD.审查	APPD.核准	TITLE 标题:
		毛智培			ENCODER 编码器 EC06
					DOCUMENT No. 文号: