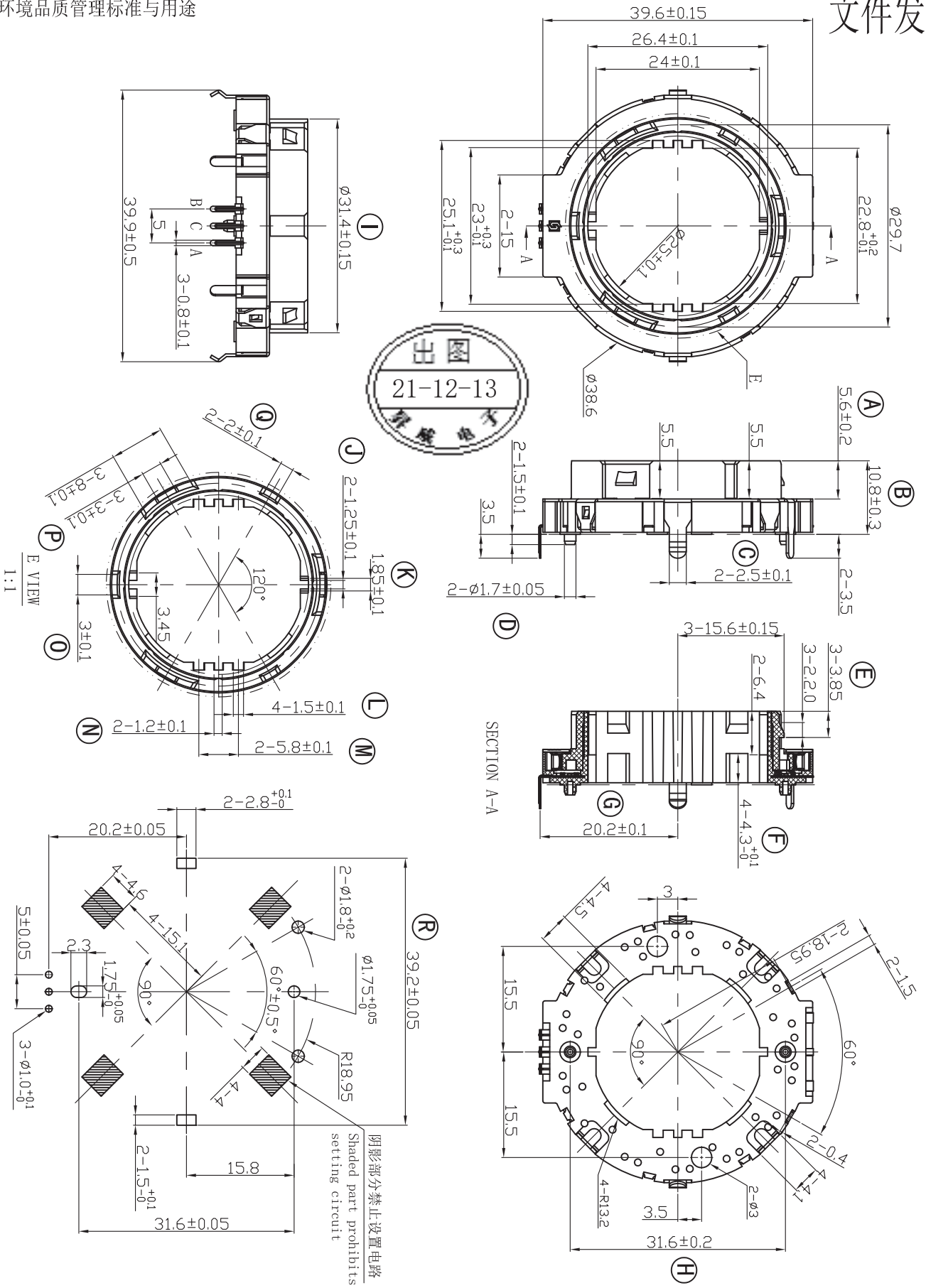


注：品管重点管控尺寸 A - R .



P.C.B Mounting Detail (T=1.6MM)

01				03	
00	ORIGINAL DRAWING		2021-12-13	02	
ISSU.	REVISION		DATE	ISSU.	
毛智培	HUNG KAM PIU	HUNG KAM PIU	TOL. UNLESS OTHERWISE SPEC.	SOUNDWELL	SOUNDWELL ELECTRONICS
DSGD.	CHKD.	APPD.	BASIC DIMENSIONS	TITLE:	中空编码器
	SCALE		$L \leq 10$	MODEL:	EC400201X2A-HA1-000
	UNIT	mm	$10 < L$	SPECIFICATION:	14P13
			$100 \leq L$		
			ANGLE		

阴影部分禁止设置电路
Shaded part prohibits setting circuit

EC4002 SERIES SPECIFICATION

EC4002 系列规格书

1/5P

1、General 一般事项

1-1、Scope 适用规格

This specification applies to 40mm size low-profile thin rotary encoder (incremental type) for microscopic current circuits used in electronic equipment.

本规格书适用于电子设备用微小电流回路40型回转式编码器。

1-2、Standard atmospheric conditions标准状态

Unless otherwise specified ,the standard range of atmospheric conditions for making measurements and test is as following limits:

除另有规定外，测量应在以下状态下进行：

Ambient temperature温度：15°C to 35°C

Relative humidity相对湿度：25% to 85%

Air pressure气压：86kPa to 106kPa

1-3、Operating temperature range

工作温度范围：-40°C to 85°C

1-4、Storage temperature range

储存温度范围：-40°C to 85°C

2、Construction 构造

2-1 Dimensions 尺寸

Refer to attached drawing 见所附成品图

3、Rating 额定值

3-1、Rated voltage 额定电压: DC 5V

3-2、Maximum operating current (resistive load)最大额定电流（阻抗负载）：10mA (1mA MIN)

4、Application Notes 使用上的事项

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.

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.

4-2. The encoder pulses count method should be designed with taking operating speed ,sampling time and design of the microcomputer software

into cosideration.

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.

4-3、At design of the pulse count process. Using the C/R filter circuit is Recommended.

在设计时要考虑到杂讯,建议使用C/R滤波电路.

4-4、Care must be taken not to expose this product to water or dew to prevent possible problem in pluses output waveform.

本产品请勿碰触到水,可能会导致输出波形的异常.

EC4002 SERIES SPECIFICATION

EC4002 系列规格书

5、ELECTRICAL CHARACTERISTICS 电气性能		
ITEM 项目	CONDITIONS 条件	SPECIFICATIONS 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 positions. 注意事项：输出信号方式是1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。	
	Shaft rotational direction 轴回转方向	Signal 信号
	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)
		Details shown in (fig.1) (The broken line shows detent position.) 卡点位置如下图所示：(虚线表示带卡点装置的上攀子处位置。)
		Output 输出波形 图1
5-2、Resolution 分解能力	Number of pulses in 360° rotation. 回转360°的输出脉冲数。	14 pulses/360° 14 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.2)	
图2		(fig.3) 图3
(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。		
5-3-1、Chattering 振荡	Specified by the signal's passage time from 1.5V~3.5V of each switching position (code OFF~ON or ON~OFF) 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。	t1, t3 ≤ 3ms
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1.5V以上的电压变动时间在振荡t1, t3之间会产生1毫秒以上1.5V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 ≤ 2ms

EC4002 SERIES SPECIFICATION

EC4002 系列规格书

5、 ELECTRICAL CHARACTERISTICS 电气性能		
ITEM 项目	CONDITIONS 条件	SPECIFICATIONS 规格
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 <div style="text-align: center; margin: 10px 0;"> </div> A信号(A~C间) Signal A B信号(B~C间) Signal B	T1、 T2、 T3、 T4 ≥ 5ms In(fig.4) 见图4
5-5、 Insulation resistance 绝缘阻抗	Measurement shall be made under the condition which a voltage of 250V DC 1min is applied between individual terminals and bushing. 在端子和安装板间施加电压 250V DC 1分钟。	Between individual terminals and bushing 100MΩ MIN. 端子安装板间电阻100MΩ以上。
5-6、 Dielectric strength 耐电压	A voltage of 300V AC shall be applied for 1 minute between individual terminals and bushing. 在端子和安装板间施加 AC 300V电压1分钟。	Without arcing or breakdown. 不得有绝缘破坏。
5-7、 端子间接触阻抗 Contact resistance	出力信号处于ON时安定状态条件下测定 Measurement shall be stable condition which a output signal is ON	500mΩ以下 500mΩ Max
6、 Mechanical characteristics 机械性能		
ITEM 项目	CONDITIONS 条件	SPECIFICATIONS 规格
6-1、 Total rotational angle 全回转角度		360°(Endless) 360°(无止挡点)
6-2、 Rotation torque 旋转力矩		45±15mN.m (450±150gf.cm)
6-3、 Number and position of detent 定位点数及位置		14 detents(Step angle:25.71°±3°) 14点定位 (间隔角度25.71°±3°)
6-4、 Terminal strength 端子强度	A static load of 3N(300gf) shall be applied to the tip of terminals for 1 minute in any direction. 端子前端的任意方向施加3N(300gf)的静负荷力1分钟。	Without excessive play in terminal or poor contact. 端子不得有明显松动及接触不良。
6-5、 Shaft wobble 轴摆动	A momentary load of 5N(500 gf) shall be applied at the point 5mm from the tip of the shaft in a direction perpendicular to the axis of shaft. 在轴前端5mm处,沿径向瞬间施加5N (500 gf)的力。	0.25mm以下 0.25mmMax
6-6、 Shaft play in axial direction 轴向间隙	The pull / push load of 5 N(500 gf) shall be imposed on the shaft. 在轴上施加5 N(500 gf)的推力或拉力。	0.3 mm Max. 0.3mm以下。
6-7、 Push-pull strength of spindle 轴向推拉强度	Push and pull static load of 100N (10Kgf) shall be applied to the shaft in the axial direction for 10 seconds (after soldered to the PC board). 在轴端,沿轴向施加100N (10Kgf)的静负荷力推和拉各10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 shall be satisfied 轴无破损,回转无异常;电气性能无异常。
6-8、 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
6-9、 Side thrust strength of shaft 轴的垂直押引强度	A load of 5 N (0.5Kgf) 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(0.5Kgf)的静负荷力10秒钟。	Without excessive play of bending in shaft. No mechanical abnormality. 轴不得有明显松动及接触不良。

EC4002 SERIES SPECIFICATION


EC4002 系列规格书

7、Endurance characteristics耐久性能		
ITEM 项目	CONDITIONS 条件	SPECIFICATIONS 规格
7-1、Rotational life 回转寿命	<p>The shaft of encoder shall be rotated to 30,000 cycles at a speed of 600~1000 cycles/H without electrical load,after which measurements shall be made.</p> <p>在无负荷条件下轴以600~1000周/小时速度回转 30,000 周。</p>	<p>Torque: Relative to the previously specified value: 50%</p> <p>力矩：衰减小于原始值的 50%</p> <p>Specifications in clauses 5-1~5-4、6-1~6-3must be satisfied.</p> <p>试验后5-1~5-4，6-1~6-3应符合要求。</p> <p>Contact resistance Max 10Ω</p> <p>试验后接触阻抗小于10Ω</p>
7-2、Damp heat 耐湿性	<p>The encoder shall be stored at temperature of 85±2°C with relative humidity of 90% to 95% for 48±10H in a thermostatic chamber .And the encoder shall be subjected to standard atmospheric conditions for 1.5H, After which measurements shall be made.</p> <p>温度85±2°C,湿度90~95%的恒温恒湿槽中放置48±10小时后， 在常温、常湿中放置1.5小时后测试。</p>	<p>Specifications in clauses 5-1~5-4、6-1~6-3must be satisfied.</p> <p>试验后5-1~5-4，6-1~6-3应符合要求。</p>
7-3、Resistance to heat 耐热性	<p>The encoder shall be stored at a temperature of 85±3°C for 96±10h in a thermostatic chamber.And then the encoder shall be subjected to standard atmospheric conditions for 1.5h .After witch measurement shall be made.</p> <p>温度85±3°C的恒温箱中放置96±10小时, 在常温、常湿放置1.5小时后测试。</p>	
7-4、Resistance to cold 耐寒性	<p>The encoder shall be stored at a temperature of -40±3°C for 96±10h in a thermostatic chamber.And then the encoder shall be subjected to standard atmospheric conditions for 1.5h .After witch measurement shall be made .</p> <p>温度-40±3°C的恒温箱中放置96±10小时, 在常温、常湿放置1.5小时后测试。</p>	
7-5、brine test 盐雾试验	<p>The encoder shall be Stored at condition of brine gas 5% as volumetric concentration temperature of 35±2°C for 168±2 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.</p> <p>温度 35±3°C，在装有浓度为5%的盐水气体的恒温恒湿槽中放置168小时后， 在常温、常湿中放置1.5小时后测试。</p>	
7-6、Vibration resistan 耐振性	<p>The entire frequency range,from 10 Hz to 55 Hz and return to 10 Hz, shall be transverse in 1 min. Amplitude(total excursion):1.5 mm.This motion shall be applied for a period of 2 h in each of 3 mutually perpendicular axes(A total of 6 h).</p> <p>频率范围：10 Hz~55Hz~10 Hz，1分钟1个周期；振幅1.5 mm。</p> <p>振动方向:XYZ三个相互垂直的方向，每方向各2小时，共计6小时。</p>	<p>Specifications in clauses 5-1~5-4 6-1~6-3 must be satisfied.</p> <p>No abnormalities shall be recognized in appearnce and construction.</p> <p>试验后5-1~5-4，6-1~6-3应符合要求。</p> <p>表面无变形且操作无异常。</p>

EC4002 SERIES SPECIFICATION

EC4002 系列规格书

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7、Endurance characteristics耐久性能																
ITEM 项目	CONDITIONS 条件			SPECIFICATIONS 规格												
7-7、Temperature cycling test 温度循环试验	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Temperature</td> <td style="text-align: center;">Duration of test</td> </tr> <tr> <td style="text-align: center;">-40 °C ±2°C</td> <td style="text-align: center;">30 Minutes</td> </tr> <tr> <td style="text-align: center;">85 °C ±2°C</td> <td style="text-align: center;">30 Minutes</td> </tr> <tr> <td colspan="2">Transition time: More than 3 min</td> </tr> <tr> <td colspan="2">1 cycle</td> </tr> <tr> <td colspan="2">test cycle: 50 cycles</td> </tr> </table> <p>After leaving in the normal temperature and humidity for 1.5 hours. 按上述条件试验后置于常温常湿环境下1.5小时后测试。</p>			Temperature	Duration of test	-40 °C ±2°C	30 Minutes	85 °C ±2°C	30 Minutes	Transition time: More than 3 min		1 cycle		test cycle: 50 cycles		<p>Specifications in clauses 5-1~5-4、6-1~6-3 must be satisfied. 试验后5-1~5-4, 6-1~6-3应符合要求。</p>
Temperature	Duration of test															
-40 °C ±2°C	30 Minutes															
85 °C ±2°C	30 Minutes															
Transition time: More than 3 min																
1 cycle																
test cycle: 50 cycles																
7-8、Solder ability 焊锡性	<p>The terminals shall be immersed into solder bath at 250°C±5°C for 3s±1s in the same manner as para. 端子在250°C±5°C温度的焊锡槽内浸锡3秒±1秒。</p>			<p>A new uniform coating of solder shall cover 90% minimum of the surface being immersed.浸渍面须有90%以上焊锡附着</p>												
7-9、Resistance to soldering heat 耐焊接热	<p> Manual soldering手工焊接 Bit temperature of soldering iron: 350°C less than Application time of soldering iron: within 3s 温度350°C以下, 时间3秒以内。 </p> <p> Dip soldering槽焊 1. Printed wiring board : single-sided copper clad laminate board with thickness of 1.6mm. 使用基板: t=1.6mm的单面覆铜板。 </p> <p> 2. Solder flux: Flux of 0.82 specific weight in bubbling type, solder flux coating apparatus shall be used and bubbling surface height shall be defined substantially as half thickness of substrate, Flux shall not flow up on substrate surface; 助焊剂: 使用发泡式比重0.82以上的焊剂, 发泡面高大致在基板厚度一半的位置, 而且助焊剂不可流入基板表面上。 </p> <p> 3. Preheating : 1、 Surface temperature of board: 100°C or less. 2、 Preheating time : within 2 min. 预热: 1、 基板表面温度100°C以下。 2、 时间2分钟以内。 </p> <p> 4. Soldering : Solder temperature : 260±5°C or less Immersion time : within 5±1s 焊接: 温度260±5°C或以下, 时间5±1秒以内。 </p> <p>Apply the above soldering process for 1 or 2 times 按上述的焊接方法适用于1-2次</p>			<p>Electrical characteristics shall be satisfied No mechanical abnormality. 不得有绝缘体的破损、变形、接触无异常。</p>												
文控编号: EC-202	制定日期															
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变更记事	变更时间															
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