

← CCW → CW

□ 30 DETENTS/ 15 PULSE

宏彦科技（东莞）有限公司 HongYan Technology (Dongguan) Co., Ltd.				品名	EC3501 C15H15P3		
未标注尺寸公差				变更记录			
图号: EC35-001		比例: 1:1					
L≤10	±0.3	单位	mm	核准	审核	制图	
10<L≤100	±0.5						
100≤L	±0.8						
角度	±5°						

## 1. 一般事项General

### 1-1. 适用规格 Scope

本规格书适用于微小电流回路的电子设备, 属35型回转型编码器.

This specification applies to 35mm size low-profile rotary encoder(incremental type) for microscopic current circuits , used in electronic equipment.

### 1-2. 标准状态Standard atmospheric conditions

除另有规定外, 测量应在以下状态下进行:

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

温 度 Ambient temperature : 15°C to 35°C

相对湿度 Relative humidity : 25% to 85%

气 压 Air pressure :86kpa to 106kpa

如果对在上述所提到的条件中所做的实测值有疑问的话, 应使用以下条件进行测量:

If doubt arises on the decision based on the measured values under the above-mentioned conditions,the following conditions shall be employed:

温 度 Ambient temperature : 20±1°C

相对湿度 Relative humidity : 63% to 67%

气 压 Air pressure :86kpa to 106kpa

### 1-3. 使用温度范围

Operating temperature range :-30°C to+80°C

### 1-4. 保存温度范围

Storage temperature range : -40°C to+85°C

## 2. 构造Construction

### 2-1. 尺寸 Dimensions

见所附成品图 Refer to attached drawing

## 3. 额定值 Rating

3-1. 额定电压 Rated voltage:DC 5V

3-2. 最大额定电流 (阻抗负载)

Maximum operating current (resistive load)

各相导线 Each lead: 0.5mA (Max 5mA;Min 0.5mA)

公共导线Common lead:1mA (Max 10mA;Min 0.5mA)

## 4. 使用上的事项Application Notes

4-1. 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.

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.

4-2. 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.

The encoder pulses count method should be designed with taking operating speed, sampling time and esign of the microcomputer software into cosideration.

4-3. 此产品在定位点的输出波形参照 (5-1), 因此在设计软体时请留意其状态, 推荐以A相位为参考基准.

With this products the detent position output consult fig.5-1.Therefore make the A phase the reference at the soft ware design stage.Recommended that use A output signal for the reference.

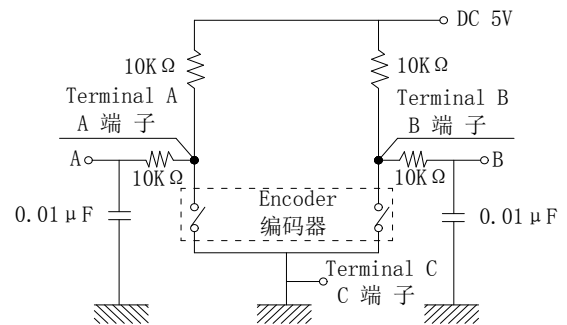
4-4. 在设计时要考虑到杂讯, 建议使用R/C滤波电路, (图1)

At design of the pulse count process.Using the C/R filter circuit is Recommended. (fig .1)

4-5. 本产品请勿碰触到水, 可能会导致输出波形的异常.

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

图1 fig.1



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**5. 电气性能 Electrical Characteristics**

项目 ITEM	条件 CONDITIONS	规格 SPECIFICATIONS
5-1. 输出信号 Output signal format	A、B两信号输出相位差，输出波形详细见（图2/3）（虚线表示带卡点装置的上擎子处位置） 2 Phase-different signals (signal A, signal B) Details shown in<fig.2/3> (The broken line shows detent position.)	
	轴回转方向 Shaft rotational direction	信号 Signal
	顺时针方向 C. W	A(A-C端子间) A(TerminalA-C) B(B-C端子间) B(TerminalB-C)
	逆时针方向 C. C. W	A(A-C端子间) A(TerminalA-C) B(B-C端子间) B(TerminalB-C)
		输出波形 Output 图2 fig.2
5-2. 分解能力 Resolution	回转360° 的输出脉冲数. Number of pulses in 360° rotation.	15 个脉冲/360° (图2) 15pulses/360° (fig.2)
5-3. 开关特性 Switching characteristics	下（图4）所示回路，轴以360° /S的速度转动测定。 Measurement shall be made under the condition as follows. Shaft rotational speed : 360° /S      Test circuit : (fig.4)	
		（注）编码OFF指输出电压3.5V以上的状态 (fig.5). Code-OFF area :The area which the voltage is 3.5V or more(fig.5). 编码ON指输出电压1.5V以下的状态 (fig.5). Code-ON area : The area which the voltage is 1.5V or less(fig.5).
5-3-1. 振荡 Chattering	编码从OFF→ON或ON→OFF时，输出1.5V~3.5V的通过时间. 应符合规定Specified by the signal' s passage time from 1.5V to 3.5V of each switching position(code OFF~ON or ON~OFF)	$t_1, t_3 \leq 3mS$
5-3-2. 滑动杂讯 (突跳)Sliding noise (Bounce)	编码ON部份的1.5V以上的电压变动时间在振荡t1, t3之间会产生1mS以上, 1.5V以下的ON部份. 另外, 如果各突跳1.5V以下的范围在1mS以上时, 则判定为另一个突跳. 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.	$t_2 \leq 2mS$
5-3-3. 滑动噪音 Sliding noise	编码OFF部份的电压变动。 The voltage change in code-OFF area.	3.5V以上 3.5Vmin

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5-4. 相位差 Phase difference	<p>下（图6）所示回路，轴以<math>360^\circ/S</math>的速度转动测定。 Measurement shall be made under the condition which the shaft is rotated at 60r/min</p> <div style="text-align: center;">  <p>图6 fig.6</p> </div> <p>A信号(A~C间) signal A</p> <p>B信号(B~C间) signal B</p>	<p><math>T_1, T_2, T_3, T_4 \geq 0.08T</math></p> <p>见图6 (fig.6)</p>
5-5. 绝缘阻抗 Insulation resistance	<p>在端子和支架间施加电压 250V DC。 Measurement shall be made under the condition which a voltage of 250V DC is applied between individual terminals and frame.</p>	<p>100M<math>\Omega</math> 以上 100M<math>\Omega</math> Min</p>
5-6. 耐电压 Dielectric strength	<p>在端子和支架间施加AC300V电压1分钟 A voltage of 300V AC shall be applied for 1 minute between individual terminals and frame.</p>	<p>不得有绝缘破坏 Without arcing or breakdown.</p>
5-7. 端子间接触阻抗 Contact resistance	<p>输出信号处于ON时安定状态条件下测定。 Measurement shall be stable condition which a output signal is ON.</p>	<p>1<math>\Omega</math> 以下 1<math>\Omega</math> Max</p>
<b>6. 机械性能 Mechanical Characteristics</b>		
6-1. 全回转角度 Total rotational angle		<p>360<math>^\circ</math> (无止档点) 360<math>^\circ</math> (Endless)</p>
6-2. 定位点力矩 Detent torque	<p>只适用于附卡点装置 Only suitable for C.C, equipment.</p>	<p>10~30mN. m. (100~300gf. cm)</p>
6-3. 定位点数及位置 Number and position of detent	<p>只适用于附卡点装置 Only suitable for C.C, equipment.</p>	<p>30点定位间隔角度<math>12^\circ \pm 2^\circ</math> 30detents Step angle: <math>12^\circ \pm 2^\circ</math></p>
6-4. 轴的回转方向摆动 Shaft play in rotational wobble	<p>用角度板测定。 Testing by angle board.</p>	<p>5<math>^\circ</math> 以下 5<math>^\circ</math> Max</p>
<b>7 耐久性能 Endurance Characteristics</b>		
项目 ITEM	条件 CONDITIONS	规格 SPECIFICATIONS
7-1. 回转寿命 Rotational life	<p>在无负荷条件下轴以600~1000周/小时速度回转，一日连续5000~8000次。 The shaft of encoder shall be rotated at a speed of 600~1000cycles/H without electrical load, after with measurements shall be made. (5000 to 8000 continuous cycles for 24 hours.)</p>	<p>30,000<math>\pm</math>200周 30,000<math>\pm</math>200cycles 振荡 <math>t_1, t_3 \leq 5mS</math>. 突跳 <math>t_2 \leq 3mS</math>. 尚余有轻微定位感。 端子间接触阻抗200<math>\Omega</math> 以下 Chattering <math>t_1, t_3 \leq 5mS</math>. Bounce <math>t_2 \leq 3mS</math>. Detent feeling has to remains Contact resistance 200<math>\Omega</math> Max</p>

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7-2. 耐湿性 Damp heat	温度 $40 \pm 2^{\circ}\text{C}$ , 湿度90~95%的恒温恒湿槽中放置 $96 \pm 4$ 小时后, 在常温、常湿中放置1.5小时后测试。 The encoder shall be stored at temperature of $40 \pm 2^{\circ}\text{C}$ with relative humidity of 90% to 95% for $96 \pm 4\text{H}$ in a thermostatic chamber. And the encoder shall be subjected to standard atmospheric conditions for 1.5H, After which measurements shall be made.	所有项应满足初期规格 Specifications in clause all items is shall be satisfied.			
7-3. 耐热性 Dry heat	温度 $85 \pm 3^{\circ}\text{C}$ 的恒温箱中放置 $96 \pm 4$ 小时, 常温、常湿放置1.5小时后测试。 The encoder shall be stored at a temperature of $85 \pm 3^{\circ}\text{C}$ for $96 \pm 4\text{H}$ in a thermostatic chamber. And then the encoder shall be subjected to standard atmospheric conditions for 1.5H, After which measurements shall be made.	所有项应满足初期规格。 Specifications in clause all items is shall be satisfied.			
7-4. 低温特性 Cold	温度 $-40 \pm 3^{\circ}\text{C}$ 的恒温箱中放置 $96 \pm 4$ 小时, 常温、常湿放置1.5小时后测试。 The encoder shall be stored at a temperature of $-40 \pm 3^{\circ}\text{C}$ for $96 \pm 4\text{H}$ in a thermostatic chamber. And then the encoder shall be subjected to standard atmospheric conditions for 1.5H, After which measurements shall be made.	所有项应满足初期规格。 Specifications in clause all items is shall be satisfied.			
7-5. 焊锡耐热性 Resistance to Soldering heat	槽焊 Dip soldering. 使用基板: $t=1.6\text{mm}$ 的单面覆铜板。 Printed wiring board: single-sided copper clad laminate board with thickness of 1.6mm. 预热: 基板表面温度 $100^{\circ}\text{C}$ 以下, 时间1分钟以内。 Preheating: 1. Surface temperature of board: $100^{\circ}\text{C}$ . or less 2. Preheating time: within 1 minute. 焊接: 温度 $230 \pm 5^{\circ}\text{C}$ 或以下, 时间3秒以内。 Soldering: Solder temperature: $230 \pm 5^{\circ}\text{C}$ or less Immersion time: within 3S 手焊 Manual soldering. 温度 $300^{\circ}\text{C}$ 以下, 时间3秒以内。 Bit temperature of soldering iron: $300^{\circ}\text{C}$ less than Application time of soldering iron: within 3S	不得有绝缘体的破损、变形、接触无异常。 Electrical characteristics shall be satisfied No mechanical abnormality.			
7-6. 焊锡性 Solderability	端子在 $230^{\circ}\text{C} \pm 5^{\circ}\text{C}$ 温度的焊锡槽内浸锡 $3\text{s} \pm 0.5\text{s}$ 。 The terminals shall be immersed into solder bath at $230^{\circ}\text{C}$ for $3\text{S} \pm 0.5\text{S}$ .	浸渍面须有75%以上焊锡附着 A new uniform coating of solder shall cover 75% minimum of the surface being immersed.			
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