

- 表示重点管控尺寸
- Key control dimensions

P. C. B. MOUNTING DETAIL

| | | | | | | | |
|---------|--|------------------|---------------------------------------|-----------------------------|-------|----------------------------|-------|
| VERSION | 东莞市长泰尔电子有限公司 DONG GUAN CHANG TAI ER ELECTRONICS CO., LTD. | | MODEL: ED121220-FB20B7.0-C24-100-G219 | | | DRAW | SCALE |
| | | | DRAWING NO: | | | 研发工程部 2023.08.08 彭先炎 | |
| ISSU. | DATE | REVISION | DESIGN | TOL. UNLESS OTHERWISE SPEC. | | CHKD | UNIT |
| 00 | 2022/1/10 | ORIGINAL DRAWING | 侯志强 | BASIC DIMENSIONS | TOL. | 研发工程部 2023.08.08 喻钊 | mm |
| 01 | | | | L ≤ 10 | ± 0.3 | APPD | |
| 02 | | | | 10 < L | ± 0.5 | | |
| 03 | | | | 100 ≤ L | ± 0.8 | 研发工程部 2023.08.08 赵海晓 | 第 1 页 |
| 04 | | | | ANGLE | ± 5° | | |

ED12正向系列规格书

ED12 FORWARD DIRECTION SERIES SPECIFICATION

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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12型回转型编码器。

This specification applies to 12mm 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 design of the microcomputer software into consideration.

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.

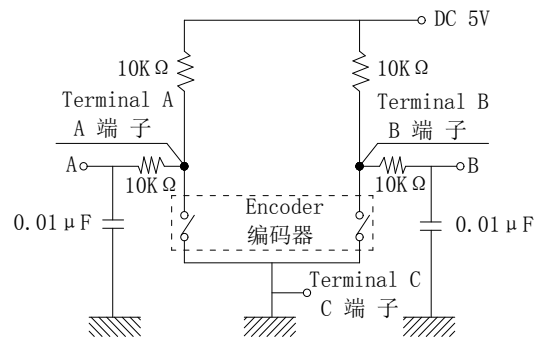
4-4. 在设计时要考虑到杂讯，建议使用R/C滤波电路，(图1)

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.

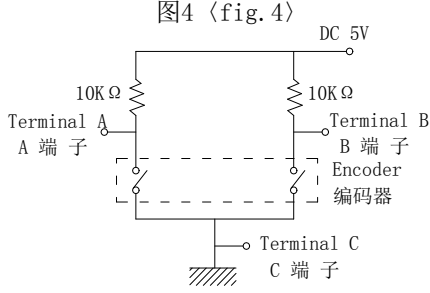
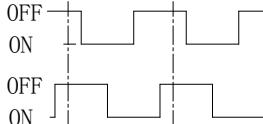
图1 fig. 1



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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 | 输出波形 Output 图2 fig.2 图3 fig.3 | |
| | 顺时针方向 C. W | A(A-C端子间) A(TerminalA-C) | OFF ON | OFF ON |
| | | B(B-C端子间) B(TerminalB-C) | OFF ON | |
| 逆时针方向 C. C. W | A(A-C端子间) A(TerminalA-C) | OFF ON | OFF ON | |
| | B(B-C端子间) B(TerminalB-C) | OFF ON | | OFF ON |
| 5-2. 分解能力 Resolution | 回转360° 的输出脉冲数。 Number of pulses in 360° rotation. | | 12 个脉冲/360° (图2) 12pulses/360° (fig.2) ■ 24个脉冲/360° (图3) 24pulses/360° (fig.3) | |
| 5-3. 开关特性 Switching characteristics | <p>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)</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>图4 (fig.4)</p>  </div> <div style="text-align: center;"> <p>图5 (fig.5)</p>  </div> </div> <p>(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).</p> | | | |
| 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) | | $t_1, t_3 \leq 3\text{mS}$ | |
| 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. | | $t_2 \leq 2\text{mS}$ | |

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| 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 |
| 5-4. 相位差 Phase difference | <p>下(图6)所示回路,轴以360°/S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> | T1、T2、T3、T4 ≥ 0.08T 见图6 (fig.6) |
| 5-5. 绝缘阻抗 Insulation resistance | 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. | 100MΩ 以上 100MΩ Min |
| 5-6. 耐电压 Dielectric strength | 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. | 不得有绝缘破坏 Without arcing or breakdown. |
| 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. | 1Ω 以下 1Ω Max |
| 6. 机械性能 Mechanical Characteristics | | |
| 6-1. 全回转角度 Total rotational angle | | 360° (无止档点) 360° (Endless) |
| 6-2. 定位点力矩 Detent torque | 只适用于附卡点装置 Only suitable for C.C, equipment. | 10~25mN.m. (100~250gf.cm) |
| 6-3. 定位点数及位置 Number and position of detent | 只适用于附卡点装置 Only suitable for C.C, equipment. | □12点定位间隔角度30° ±2° 12detents Step angle:30° ±2° |
| | | ■24点定位间隔角度15° ±2° 24detents Step angle:15° ±2° |
| 6-4. 轴的推拉强度 Push-pull strength of shaft | 在轴端,沿轴向施加 8Kg 的静负荷力推和拉各10秒钟 (产品焊锡固定在PCB上。) Push and pull static load of 8Kg shall be applied to the shaft in the axial direction for 10s. (After soldering of the PC board) | 轴向虚位间隙0.4以内 Shaft play in axial direction 0.4 Max |
| 6-5. 端子强度 Terminal strength | 在端子的先端施加5N (500g) 的力1分钟。 A static load of 5N(500g)be applied to the tip of terminals for 1 minute in any direction. | 端子无损坏,无过度的松动.允许变形. Without damage or excessive looseness of terminals. terminal bend is permitted. |
| 6-6. 轴套螺纹紧固强度 Bushing Nut Tighten Strength | | 7.0kgf.cm以上 7.0kgf.cm Min |
| 6-7. 轴向间隙 Shaft play in axial direction | | 0.4mm 以下 0.4mm Max |
| 6-8. 轴摆动 Shaft wobble | 在距离轴顶端5MM处,沿径向瞬间施加50mN.m(500gf.cm)的力测试 A momentary load of 500gf.cm should be applied at the point 5mm from the tip of the shaft in a direction perpendicular to the axis of shaft. | 0.7*L/30mm p-p 以下 (L:指安装平面到轴的柄端的距离。) 0.7*L/30mm p-p Max L:Distance between mounting surface and measuring point on the shaft |
| 6-9. 轴的回转方向摆动 Shaft play in rotational wobble | 用角度板测定。 Testing by angle board. | 5° 以下 5° Max |

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7 耐久性能 Endurance Characteristics

| 项目 ITEM | 条件 CONDITIONS | 规格 SPECIFICATIONS |
|--|--|---|
| 7-1. 回转寿命 Rotational life | 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.) | □在力矩≤100gf. cm时20,000±200周 20,000±200cycles per below 100gf. cm. ■在力矩>100gf. cm时15,000±200周。 15,000±200cycles per above 100gf. cm. 振荡 t1, t3≤5mS. 突跳 t2≤3mS. 尚余有轻微定位感。 端子间接触阻抗200Ω以下 Chattering t1, t3≤5mS. Bounce t2≤3mS. Detent feeling has to remains Contact resistance 200Ω Max |
| 7-2. 耐湿性 Damp heat | 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。 The encoder shall be stored at temperature of40 ±2℃ with relative humidity of 90% to95% for96±4H 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±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。 The encoder shall be stored at a temperature of 85±3℃for 96±4H 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±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。 The encoder shall be stored at a temperature of -40±3℃for 96±4H 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=1.6mm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℃以下, 时间1分钟以内。 Preheating:1. Surface temperature of board:100℃. or less 2. Preheating time:within 1 minute. 焊接:温度230±5℃或以下, 时间3秒以内。 Soldering:Solder temperature:230±5℃ or less Immersion time:within 3S 手焊 Manual soldering. 温度300℃以下, 时间3秒以内。 Bit temperature of soldering iron:300℃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℃±5℃温度的焊锡槽内浸锡3秒±0.5秒。 The terminals shall be immersed into solder bath at 230℃for 3S±0.5S. | 浸渍面须有75%以上焊锡附着 A new uniform coating of solder shall cover75% minimum of the surface being immersed. |

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推动开关部分 Push Switch Portion 无 (N O) 有 (Y E S)

备注：以下规格适用于EC12编码器带开关系列。

Note: The following specification is only suitable for the one type with switch construction of EC12 encoder series.

1. 额定值 Rating

1-1. 额定电压

Rated voltage:DC 5V

1-2. 最大额定电流 (阻抗负载)

Maximum operating current (resistive load):10mA Max

2. 电气性能 Electrical Characteristics

| 项目 ITEM | 条件 CONDITIONS | 规格 SPECIFICATIONS |
|------------------------------------|--|--|
| 2-1. 接触电阻 Contact resistance | 用DC 5V 1mA 电压测定. Voltage test at DC 5V 1mA. | $\leq 100m\Omega$ 100m Ω or less |
| 2-2. 绝缘阻抗 Insulation resistance | 在端子和安装板间施加电压 250V DC. Measurement shall be made under the condition which a voltage of 250V DC is applied between individual terminals and bushing and plank. | 100M Ω 以上 100M Ω Min |
| 2-3. 振荡 Bouncing | 以1秒钟1往返 (OFF-ON-OFF) 按压动作. Shaft shall be push at 1 cycles/s(OFF-ON-OFF) | $\leq 10mS$ 10mS or less |
| 2-4. 耐电压 Dielectric strength | 在端子和安装板间施加AC300V电压1分钟 A voltage of 300V AC shall be applied for 1 minute between individual terminals and bushing and plank. | 不得有绝缘破坏 Without arcing or breakdown. |

3 机械性能 Mechanical Characteristics

| | | |
|--|---|---|
| 3-1. 开关电路 接点数 Switch circuit and number of pulse | | 单极单投 (按压ON) Single pole and single throw (push ON) |
| 3-2. 开关动作力 Operation fore of switch | 在轴端, 沿轴向施加的按压力. Push static load to the shaft in the axial direction | <input type="checkbox"/> 500 \pm 200gf <input type="checkbox"/> 1000 \pm 200gf |
| 3-3. 开关移动量 Travel of switch | | 0.5 \pm 0.3 mm |

4 耐久性能 Endurance Characteristics

| | | |
|------------------------|---|---|
| 4-1. 按压寿命 Push-life | 在无负荷条件下沿轴向施以1Kg以下的力, 以600次/小时的速度按压。 Push 1Kg to the shaft of encoder in the axial direction under non-load conditions, and with a speed of 600 times/hour. | <input type="checkbox"/> 20,000 \pm 200次. (0.5行程) 20,000 \pm 200cycles. (0.5 Travel) 接触电阻: $\leq 200m\Omega$. 其它应满足初期规格. Contact resistance:200m Ω or less. Specification in clause shall be satisfied. |
|------------------------|---|---|

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