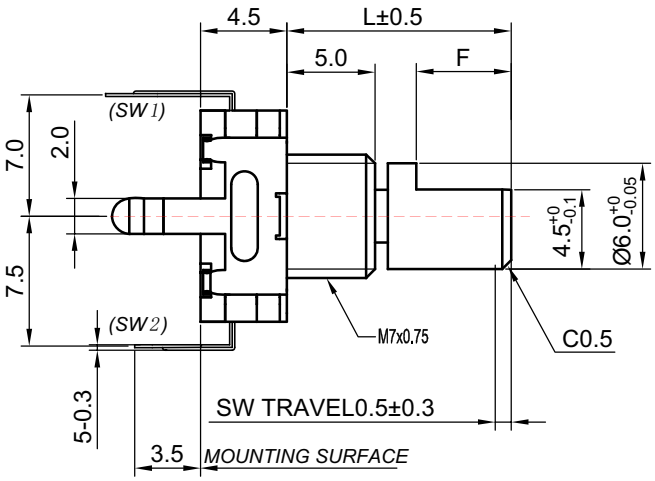
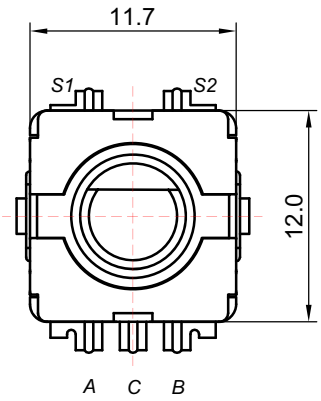
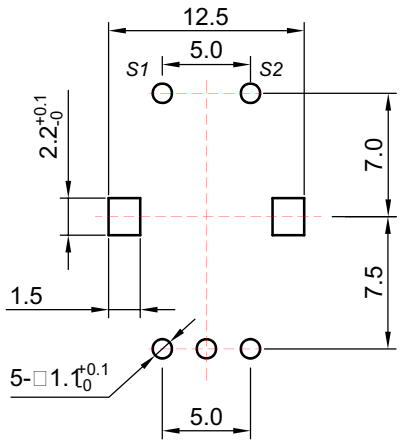
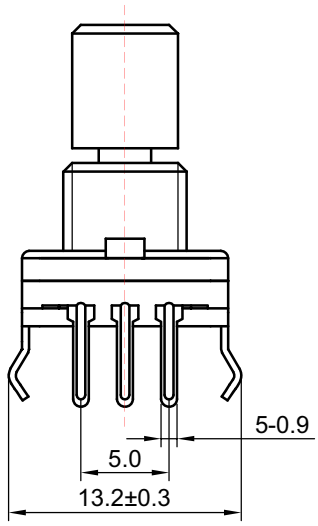


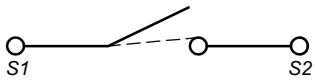




P.C.B. mounting hole detail




*S.P.S.T.*




*SWITCH CIRCUIT DIAGRAM*

| X | L | F |
|---|---|---|
| 15F7 | 15 | 7.0 |
| 12.5F6 | 12.5 | 6.0 |
| 10F4 | 10 | 4.0 |
| 11.5F5 | 11.5 | 5.0 |
| 20F10 | 20 | 10 |
| 15F5.5 | 15 | 5.5 |
| 15F7 | 15 | 7.0 |
| 26F12 | 26 | 12 |
| 15F5 | 15 | 5.0 |
| 20F12 | 20 | 12 |

| X | L | F |
|---|---|---|
| 18F10 | 18 | 10 |
| 9F3 | 9.0 | 3.0 |
| 15F6 | 15 | 6 |
| 15.5F5 | 15.5 | 5 |
| 13F5 | 13 | 5 |
| 12.5F5 | 12.5 | 5 |
| | | |
| | | |

*Pulse type*

| Y | C. C | PULSE |
|---|---|---|
| 20C20P | 20 | 20 |
| 30C15P | 30 | 15 |

| MARK | DATE | REVISION | SIGN |
|---|---|---|---|
| 7 | | | |
| 6 | | | |
| 5 | | | |
| 4 | | | |
| 3 | | | |
| 2 | | | |
| 1 | | | |

比 例 4:1
版 次 A1

未注尺寸公差
<10 10±0.3
10-30±0.5
30-100±1.0
所有角度 ±5°

核 准 | 核 对 | 制 图

| | |
|---|---|
| 产品名称 | 带开关编码器 |
| 客户料号 | |
| 料 号 | EC11S-H4.5B1-X-Y |
| 系列名称 | 11mm超薄编码器 |
| 图纸编号 | 090608001 |

# EC11 SERIES SPECIFICATION EC11S系列规格书

## 1.一般事项General

**1.1**适用规格**Scope**

本规格适用于微小电流回路的电子设备,属**11**型回转编码器.

**This specification applies to 11mm size low-profile rotary encoder(incremental type) for microscopic current circuits,used in electronic equipment**

**1.2**标准状态**Standard atmospheric conditions**

除另外有规定外,测量应在以上状态下进行:

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

温 度**Ambient temperature: 15**℃ **to 35**℃

相对湿度**Relative humidity : 25% to 85%**

气 压**Air pressure : 86kpa to 106kpa**

**1.3**使用温度范围

**Operating temperature range: -10**℃ **to 70**℃

**1.4**保存温度范围

**Storage temperature range : -40**℃ **to +85**℃

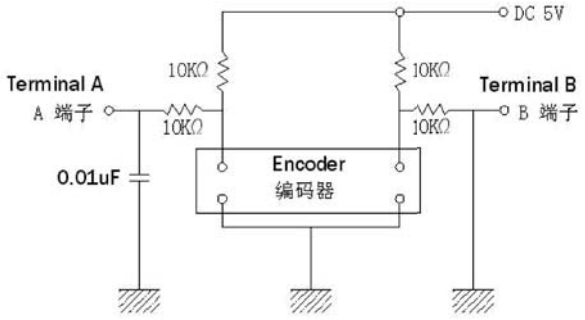



FIG1《图1》

## 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:lmA(MAX 10mA; MIN 0.5mA)**

## 4.Application Nots 使用上的事项

**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存于防潮的环境下.

**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 rimainder left after packing is opened,please store it with proper moistureprooting,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 softwae into cosideration.**

**4.3**此产品在定位点的输出阻抗波形参照**(5-1)**,因此在设计软体时请留意其状态.

**With this products the detent position output consnlt fig.5–1.Therefore make the A phase the reference at the soft ware design stage.**

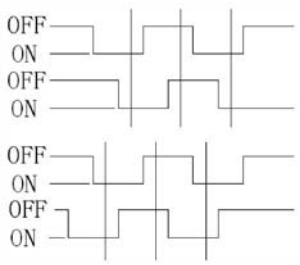
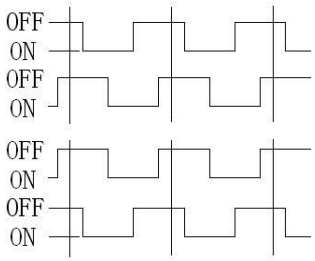
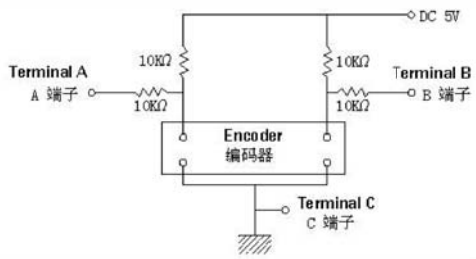
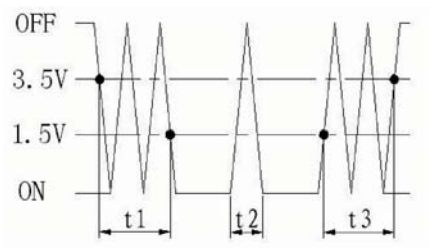
**4.4**在设计时要考虑到杂讯,建议使用**C/R**滤波电路(图**1**).

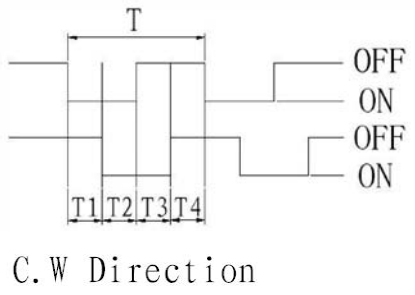
**At design of the pulse count process.Using the C/R filter circuit is Recommended.(fig.1)**

**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**

## 5.电气性能 ELECTRCAL CHARACTERISTICS

| 项目 ITEM | 条件 CONDITIONS | | | 规格 SPECICATIONS |
|---|---|---|---|---|
| 5.1 输出信号 Output signal format | A、B两信号输出相位差,输出波形说细见(图2/3)(虚线表示带卡点位置的上擎子处位置)<br>2 phawe different signals(signal A,signal B)Details shown in(fig.2/3)<br>(the broken line shows detent position.) | | | |
| | 轴回转方向 Shaft rotati-onal direction | 信号 Signal | 输出波形 Output<br>图2 fig.2 | 图3 fig.3 |
| | 顺时针方向 C.W | A(A-C端子间) A(Terminal A-C)<br>B(B-C端子间) B(Terminal B-C) |  |  |
| | 逆时针方向 C.C.W | A(A-C端子间) A(Terminal A-C)<br>B(B-C端子间) B(Terminal B-C) | <br>15P编码器信号图 | <br>20P编码器信 |
| 5.2分解能力 Resolution | 回转360°的输出脉冲数.<br>Number of pulses in 360° rotation. | | | □15个脉冲/360°（图2)<br>15Pulsrs/360° fig2 for each phase<br>√□ 20个脉冲/360°(图3)<br>20Pulsrs/360° fig2 for each phase |
| 5.3开关特性 Switching characteristics | 下(图4)所示回路,轴以360°/sec的速度转动测定.<br>Measureent shall be made under the condition aw follows.<br>Shaft rotational speed:360°/S Test circuit:(fig.4)<br>图4(fig.4)<br>  <br>图5(fig.5)<br>  <br>(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)<br>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OFF→ON或ON→OFF时,输出1.5~3.5V 通过时间应符合规定.<br>Specified by the signal' spassage time from 1.5V to 3.5V of each switching position(code OFF~ON or ON~OFF) | | | t1,t3≤5ms |
| 5.3.2滑动杂音(突跳) Sliding noise (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1ms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1ms以上时,则判定为另一个突跳.<br>Specified by the time of voltage change exceed 1.5V in code-ON area. when the bounce has code-ON tie sess than 1ms between chattering (t1 or t3).the voltage change shall be regarded aw a part of chattering. when the code-ON time between 2 bounces is less than 1ms.they are regarded as 1 linded bounce. | | | t2≤3ms |

| 5.电气性能 ELECTRCAL CHARACTERISTICS | | |
|---|---|---|
| 项目 ITEM | 条件 CONDITIONS | 规格 SPECICATIONS |
| 5.3.3滑动噪音<br>Sliding noise | 编码OFF部份的电压变动.<br>The voltage change in code-OFF area. | 3.5V以上<br>3.5V min |
| 5.4相位差<br>Phase difference | 下(图6)所示回路,轴以360°/sec的速度转动测定.<br>Measurement shall be made under the condetion which the shaft is rotated at 60r/min 图6 fig.6<br>A信号(A C)间<br>signal A<br>B信号(B C)间<br>signalB<br>  | T1、T2、T3、T4≥4ms<br>见图6(fig.6) |
| 5.5绝缘阻抗<br>Insulation resistance | 在端子和轴间施加电压250V DC.<br>Measurement shall be made under the condition which a voltage of 250V DC is applied between individual terminals and bushing. | 100MΩ以上<br>100MΩ Min |
| 5.6耐电压<br>Dielectric strength | 在端子和轴间施加AC 300V电压1分钟<br>A voltage of 300V AC shall be applied for 1 minute between individual terinals and bushing | 不得有绝缘破坏<br>Without arcing or breakdown |
| 5.7端子间接触阻抗<br>Contact resistance | 编码讯号处于ON时安定状态条件下测定.<br>Measurement shall be stalbe condition which a output signal is ON. | 1Ω以下<br>1Ω Max |
| 6.机械性能 Mechanical characteristics | | |
| | | 360°(无止档点)<br>360°(Endless) |
| 6.2定位点力拒<br>Deten torque | 只适用于附卡点装置<br>Onlt suitable for C.C,equipment. | 3~20mN.m(30~200gf.cm)<br>Shaft rotatable at -10℃ +5℃<br>但在-10℃ +5℃轴勉强可转动 |
| 6.3定位点数及位置<br>Number of detent and position | 只适用于附卡点装置<br>Onlt suitable for C.C,equipment. | 30detents(Step angle:12°±2°)<br>□30点定位(间隔角度12° ±2° ) |
| | | 20detents(Step angle:18°±2°)<br>√□20点定位(间隔角度18° ±2° ) |
| 6.4轴的推拉强度<br>Push-pull strength of shaft | 在轴端,沿轴向施加8Kg的静负荷推和拉各10秒钟<br>(产品焊锡固定在PCB上).<br>Push and pull static load of 8Kg shall be applied to be shaft in the axial deirection for 10s.<br>(After soldering of the PC board) | 轴无破损,回转无异常,电气性能无异常<br>Without damage or excessive play in shaft.<br>NO excessive abnormality in rotational feeling.<br>And.electrical characteristics and be satisfied. |
| 6.5轴摆动<br>Shaft wobble | 在轴前端5mm处,沿径向瞬间施加50mN.m(500gf.cm)的力.<br>A momentary load of 50mN.m(500gf.cm)shall be applied at the point 5mm from the tip of the shaft in a derection perpendicular to the axis of shaft. | 0.7xL/30mm p-p以下(L:指安装平面到轴的柄端的距离<br>0.7xl/30mm p-p Max或(l:Distance between mounting surface and measuing point on the shaft) |

| 6.机械性能 Mechanical characteristics | | |
|---|---|---|
| 项目 ITEM | 条件 CONDITIONS | 规格 SPECICATIONS |
| 6.6轴的回转方向摆动 Shaft play in rotational wobble | 用角度板测定.<br>Testing by angle board. | 5°以下<br>5°MAX |
| **7.耐久性能 Endurance characteristics** | | |
| 7.1回转寿命<br>Rotational life | 在无负荷条件下轴以600周/小时速度回转30000周.<br>The shaft of encoder shall be rotated to 30000 cycles at a speed of 600cycles/H without electrical load,after with easurements shall be made. | 端子间接触阻抗200Ω以下.<br>Contact resistance 200Ω MAX.<br>尚余有轻微定位感<br>Vibration t1,t3≤5mS振荡t1,t3≤5mS<br>Bounce t2≤5mS突跳 t2≤5mS Detent feeling has to remains |
| 7.2耐湿性<br>Damp heat | 温度40±2℃,湿度90~95%的恒温恒湿槽中放置48小时后,在常温、常湿中放置1.5小时后测试.<br>The encoder shall be stored at temperature of 40±2℃ with relative humidity of 90% to 95% for 48H in a thermostatic chaber.And the encoder shall be subjected to standard atmospheric conitions for 1.5H After which measurements shall be made. | 所有项应满足初期规格<br>Specifications in clause all items is shall be satisfied. |
| 7.3耐热性<br>Dry heat | 温度80±3℃的恒温箱中放置48小时,然后在常温、常湿放置1.5小时后测试.<br>The encoder shall be stored at temperature of 80±3℃ for 48H in a thermostatic chamber.And the encoder shall be subjected to standard atmospheric condetions for 1.5H,After which measurements shall be made | 所有项应满足初期规格<br>Specifications in clause all items is shall be satisfied. |
| 7.4低温特性<br>Cold | 温度-25℃±3℃的恒温箱中放置48小时,常温、常湿放置1.5小时后测试.<br>The encoder shall be stored at temperature of -25℃±3℃ for 48H in a thermostatic chamber.And the encoder shall be subjected to standard atmospheric condetions for 1.5H,After which measurements shall be made | 所有项应满足初期规格<br>Specifications in clause all items is shall be satisfied. |
| 7.5焊锡性<br>Solder ability | 端子在235℃±5℃温度的焊锡槽内浸锡3±0.3秒.<br>The terminals shall be imersed into solder bath at 235℃ for 3±0.3s in the same manner as para. | 浸锡面积须有75%以上焊锡附着<br>A new uniform coating of solder shall cover 75% minimum of the surface being immersed. |
| 7.6耐焊接热<br>Resistance to Soldering heat | 手工焊接 Manual soldering<br>温度300℃以下,时间3秒以内.<br>Bit temperature of soldering iron:300℃ less than application time of slodering iron:within 3s<br>槽焊 Dip soldering<br>使用基板:T=1.6㎜的单面覆铜板.<br>Printed wiring board:single-stded copper clad laminate board with thickness of 1.6mm. | 不得有绝缘体的破坏、变形、接触无异常.<br>Electrical characteristics shall be satisfied<br>No mechanical abnormality |

| 7.耐久性能 Endurance characteristics | | |
|---|---|---|
| 项目 ITEM | 条件 CONDITIONS | 规格 SPECICATIONS |
| 7.6耐焊接热<br>Resistance to Soldering heat | 预热:基板表面温度100℃以下,时间1分钟以内.<br>Preheating: 1.Surface teperature of board:100℃ or less<br>2.preheating time:within 1 min.<br>焊接:温度235±5℃或以下,时间3秒以内<br>Soldering:Soleer tempeature:235±5℃ or less<br>Immersion time:within 3s | 不得有绝缘体的破坏、变形、接触无异常.<br>Electrical characteristics shall be satisfied<br>No mechanical abnormality |

推动开关部分 Push Switch Portion

备注:以下规格适用于EC11编码带开关系列.

No:The following specification is only suitable for the one type with construction of EC11 encoder series.

| 1.额定值 Rating | | |
|---|---|---|
| 1.1额定电压<br>Rated voltage: DC 5V<br>1.2最大额定电流(阻抗负载)<br>Maximum operating current(resistive load):10mA MAX. | | |
| 2.电气性能 Electrical Characteristics | | |
| 项目 ITEM | 条件 CONDITIONS | 规格 SPECICATIONS |
| 2.1接触电阻<br>Contact resistance | 用DC 5V 10mA电压测定<br>Voltage test at DC 5V 10mA. | 100mΩ or less<br>≤100mΩ |
| 2.2绝缘阻抗<br>Insulation resistance | 在端子和安装板间施加电压250V DC.<br>Measurement shall be made under the condition which a voltage of 250V DC is applied between individual terminals and bushing. and bushing and plank. | 100MΩ以上<br>100MΩ Min |
| 2.3振荡<br>Bouncing | 以1秒钟1往返(OFF-ON-OFF)按压动作.<br>Shaft shall be push at 1 cycles/s(OFF-ON-OFF). | 10ms or less<br>≤10ms |
| 2.4耐电压<br>Dielectric strength | 在端子和安装板间施加AC300V 电压1分钟<br>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<br>Without arcing or breakdown |
| 3.机械性能 Mechanical characteristics | | |
| 3.1开关电路.接点数<br>Switch circuit and number of pulse | | 单极单投(按压ON)<br>Single pole and single throw<br>(PUSH ON) |
| 3.2开关动作力<br>Operation fore of switch | 在轴端,沿轴向施加的按压力.<br>Push static load to the shaft in the axial direction | 400~600gf.cm |
| 3.3开关动移动量<br>Travel of switch | | 0.5(+0/-0.30)mm |
| 4.耐久性能 Endurance Characteristics | | |
| 按压寿命<br>push life | The shaft of encoder shall be push to 20000 cycles at a speed of 600 cycles/H without electrical load,after with measurements shall be made<br>在无负荷条件下轴以600次/小时速度按压往返20000周. | 接触电阻:≤200mΩ<br>其它应满足初期规格.<br>Contact resistance:200mΩ or less<br>Specifi cation in clause shall be satisfied |