

# Itead Studio

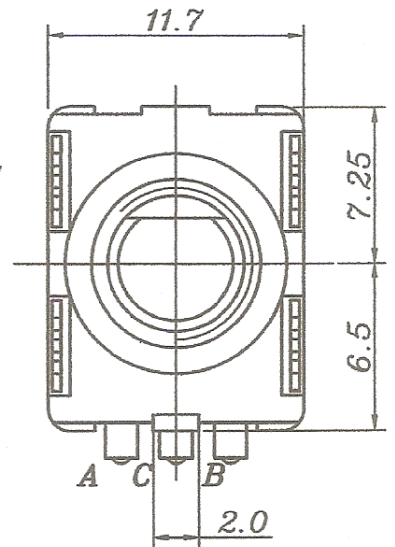
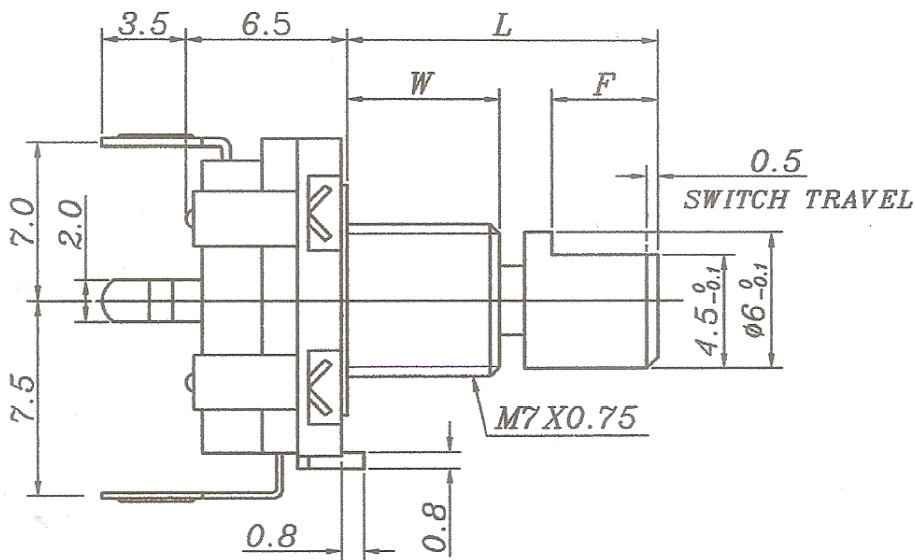
---

EC11P20L15F7

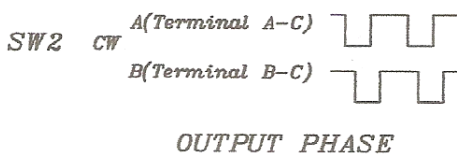
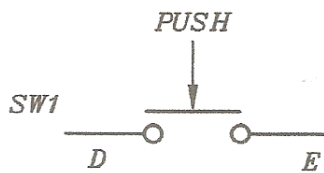
---

[www.iteadstudio.com](http://www.iteadstudio.com)

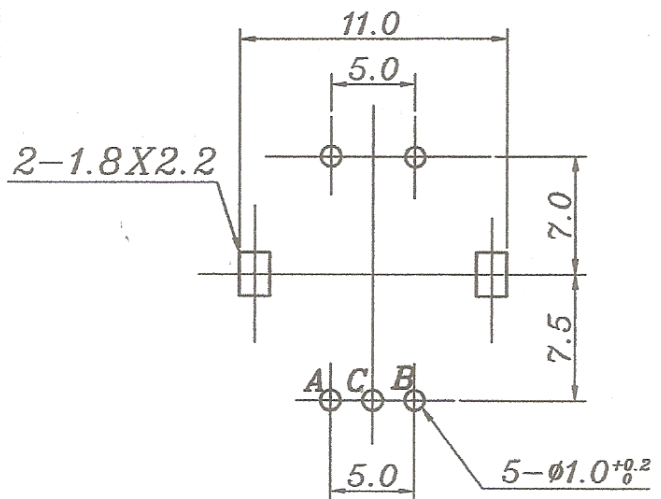
---



☒	5	7
W	E	F



OUTPUT PHASE



P.C.B MOUNTING HOLE DETAIL

L	15	15	20	25	30
F	5	7	10	12	12

		批 准	審 核	繪 圖
△				未注尺寸公差
△				基本尺寸 公差
標號	變更描述	日期	承辦人	L≤10 ±0.3
產品規格		版本	00	10<L<100 ±0.5
圖 號		比例	X.X: 1	100≤L ±0.8
		單位	mm	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11型回转型编码器.

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

#### 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)

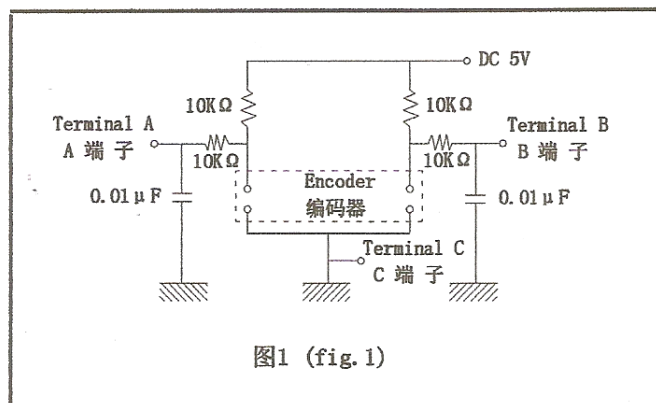


图1 (fig. 1)

### 4. Application Notes 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件等考虑进去.

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), 因此在设计软件时请留意其状态.

With this products the detent position output consult 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.

## EC11系列规格书

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，输出波形详见（图2/3）（虚线表示带卡点装置的上攀子处位置） 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
	顺时针方向 C. W	(A-C端子间) A(Terminal A-C) B(B-C端子间) B(Terminal B-C)	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>图2 fig. 2</p> </div> <div style="text-align: center;"> <p>图3 fig. 3</p> </div> </div>
	逆时针方向 C. C. W	A(A-C端子间) A(Terminal A-C) B(B-C端子间) B(Terminal B-C)	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>图2 fig. 2</p> </div> <div style="text-align: center;"> <p>图3 fig. 3</p> </div> </div>
5-2. 分解能力 Resolution	回转360° 的输出脉冲数。 Number of pulses in 360° rotation.		<input checked="" type="checkbox"/> 15个脉冲/360°(图2) 15 pulses/360° (fig.2) for each phase  <input type="checkbox"/> 20个脉冲/360° (图3) 20 pulses/360°(fig.3) for each phase
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)		
<div style="display: flex; justify-content: space-around;"> <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>			
（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. 滑动杂音(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, 如果各突跳间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

# 远锦电子有限公司

## EC11系列规格书

3/5

<b>5. 电气性能 ELECTRICAL CHARACTERISTICS</b>		
项目 ITEM	条件 CONDITIONS	规格 SPECIFICATIONS
5-4 相差位 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 图6 fig.6</p> <div style="text-align: center;"> </div> <p>A信号(A~C间) signal A</p> <p>B信号(B~C间) signal B</p> <p style="text-align: center;">C.W Direction</p>	<p><math>T_1, T_2, T_3, T_4 \geq 4\text{mS}</math> 见图6 (fig.6)</p>
5-5. 绝缘阻抗 Insulation resistance	<p>在端子和轴间施加电压 250V DC。 Measurement shall be made under the condition which a voltage of 250V DC is applied between individual terminals and bushing</p>	<p>100M<math>\Omega</math> 以上 100M<math>\Omega</math> Min</p>
5-6. 耐电压 Dielectric strength	<p>在端子和轴间施加AC300V电压1分钟 A voltage of 300V AC shall be applied for 1 minute between individual terminals and bushing</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>出力信号处于ON时安定状态条件下测定。 Measurement shall be made under 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° (无止档点) 360° (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>3~20mN.m. (30~200gf.cm) Shaft rotatable at -10°C~+5°C 但在-10°C~+5°C轴勉强可转动</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>30detents (Step angle: 12° <math>\pm</math> 2°) <input checked="" type="checkbox"/> 30点定位(间隔角度12° <math>\pm</math> 2°) 20detents (Step angle: 18° <math>\pm</math> 2°) <input type="checkbox"/> 20点定位(间隔角度18° <math>\pm</math> 2°)</p>
6-4. 轴的推拉强度 Push-pull strength of shaft	<p>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)</p>	<p>轴向虚位间隙0.4以内 Shaft play in axial direction 0.4 MAX</p>
6-5. 轴摆动 Shaft wobble	<p>在轴前端30mm处,沿径向瞬间施加50mN.m (500gf.cm)的力.摆动按以下计算 Bending moment of 50mN.m (500gf.cm) to be applied to the shaft at 30mm from the mounting surface be calculated as right formula</p>	<p>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</p>
6-6. 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° 以下 5° MAX</p>

# 远锦电子有限公司

## EC11系列规格书

4/5

7 耐久性能 ENDURANCE CHARACTERISTICS		
项目 ITEM	条件 CONDITIONS	规格 SPECIFICATIONS
7-1. Rotational life 回转寿命	The shaft of encoder shall be rotated to 30000 cycles at a speed of 600~1000 cycles/H without electrical load, after with measurements shall be made. 在无负荷条件下轴以600~1000周/小时速度回转30000周。	Chattering $t_1, t_3 \leq 5\text{mS}$ 振荡 $t_1, t_3 \leq 5\text{mS}$ Bounce $t_2 \leq 3\text{mS}$ 突跳 $t_2 \leq 3\text{mS}$ Detent feeling has to remains 尚余有轻微定位感 Contact resistance $200\Omega$ Max 端子间接触阻抗 $200\Omega$ 以下
7-2. Damp heat 耐湿性	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. 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。	Specifications in clause all items is shall be satisfied. 所有项应满足初期规格
7-3. Dry heat 耐热性	The encoder shall be stored at a temperature of $80 \pm 3^\circ\text{C}$ 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. 温度 $80 \pm 3^\circ\text{C}$ 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。	Specifications in clause all items is shall be satisfied. 所有项应满足初期规格
7-4. Cold 低温特性	The encoder shall be stored at a temperature of $-25 \pm 3^\circ\text{C}$ 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. 温度 $-25 \pm 3^\circ\text{C}$ 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。	Specifications in clause all items is shall be satisfied. 所有项应满足初期规格
7-5. Solder ability 焊锡性	The terminals shall be immersed into solder bath at $260^\circ\text{C}$ for $3\text{s} \pm 0.5\text{s}$ in the same manner as para. 端子在 $260^\circ\text{C} \pm 5^\circ\text{C}$ 温度的焊锡槽内浸锡 $3\text{s} \pm 0.5\text{s}$ 。	A new uniform coating of solder shall cover 75% minimum of the surface being immersed. 浸渍面须有 75% 以上焊锡附着
7-6. Resistance to Soldering heat 耐焊接热	Manual soldering 手工焊接 Bit temperature of soldering iron: $300^\circ\text{C}$ less than Application time of soldering iron: within 3s 温度 $300^\circ\text{C}$ 以下, 时间 3 秒以内。 Dip soldering. 槽焊 Printed wiring board: single-sided copper clad laminate board with thickness of 1.6mm. 使用基板: $t=1.6\text{mm}$ 的单面覆铜板。 Preheating: 1. Surface temperature of board: $100^\circ\text{C}$ or less. 2. Preheating time: within 1 min. 预热: 基板表面温度 $100^\circ\text{C}$ 以下, 时间 1 分钟以内。 Soldering: Solder temperature: $260 \pm 5^\circ\text{C}$ or less Immersion time: within 3S 焊接: 温度 $260 \pm 5^\circ\text{C}$ 或以下, 时间 3 秒以内。	Electrical characteristics shall be satisfied No mechanical abnormality. 不得有绝缘体的破损、变形、接触无异常。

# 远锦电子有限公司

## EC11系列规格书

5/5

### 推动开关部分 Push Switch Portion

Note: The following specification is only suitable for the one type with switch construction of S11 Self-return switch series.

备注: 以下规格适用于S11复位开关带开关系列.

#### 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. Contact resistance 接触电阻	Voltage test at DC 5V 1mA. 用DC 5V 1mA 电压测定.	200mΩ or less ≤200mΩ
2-2. Insulation resistance 绝缘阻抗	Measurement shall be made under the condition which a voltage of 250V DC is applied between individual terminals and bushing and plank. 在端子和安装板间施加电压 250V DC.	100MΩ 以上 100MΩ Min
2-3. Bouncing 振荡	Shaft shall be push at 1 cycles/s (OFF-ON-OFF) 以1秒钟1往返 (OFF-ON-OFF) 按压动作.	10ms or less ≤10ms
2-4. Dielectric strength 耐电压	A voltage of 300V AC shall be applied for 1 minute between individual terminals and bushing and plank. 在端子和安装板间施加AC300V电压1分钟	Without arcing or breakdown. 不得有绝缘破坏

#### 3 机械性能 Mechanical characteristics

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 (按压ON)
3-2. Operation force of switch 开关动作力	Push static load to the shaft in the axial direction 在轴端, 沿轴向施加的按压力.	<input checked="" type="checkbox"/> 500±150gf <input type="checkbox"/> 300±150gf <input type="checkbox"/> 400±150gf
3-3. Travel of switch 开关移动量		<input checked="" type="checkbox"/> 0.5±0.3/-0.2 mm <input type="checkbox"/> 2.0±0.5 mm

#### 4 耐久性能 ENDURANCE CHARACTERISTICS

Push life 按压寿命	The shaft of encoder shall be push to 30000 cycles at a speed of 600cycles/H without electrical load, after with measurements shall be made. 在无负荷条件下轴以600次/小时速度按压往返30000周.	Contact resistance: 200mΩ or less Specification in clause shall be satisfied. 接触电阻: ≤200mΩ. 其它应满足初期规格.

制定日期	2006-4-8	DSG. 主办	CHKD. 审查	APPD. 核准	TITLE 标题:
版本号: 00	变更记录				ENCODER 编码器
					DOCUMENT No. 文号:
					E11