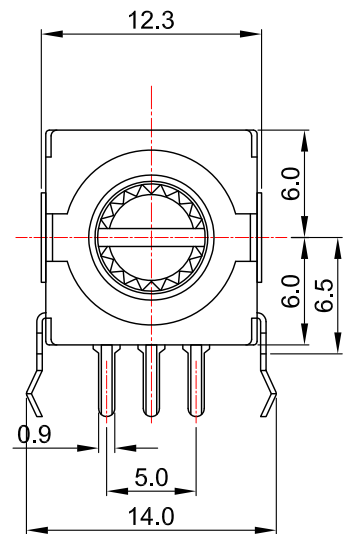
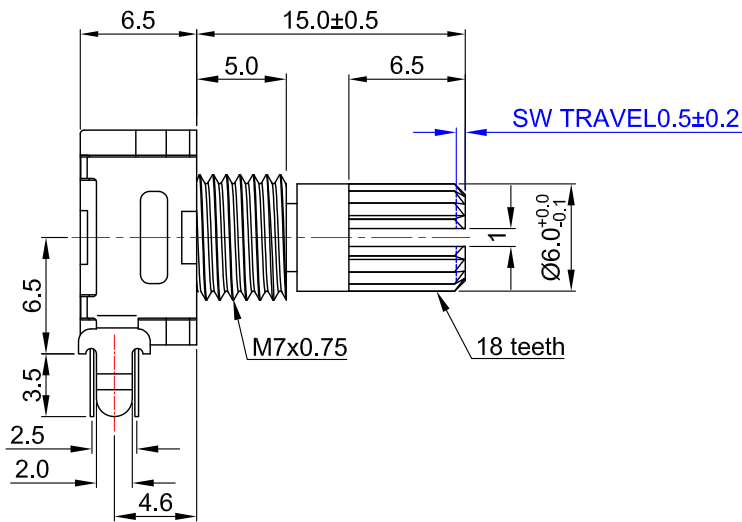
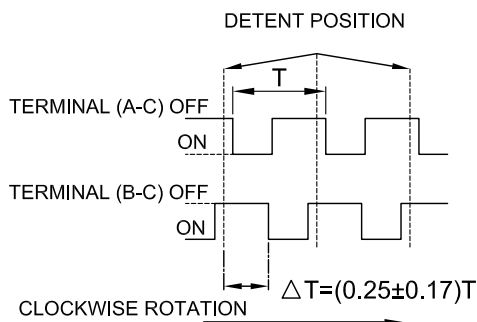


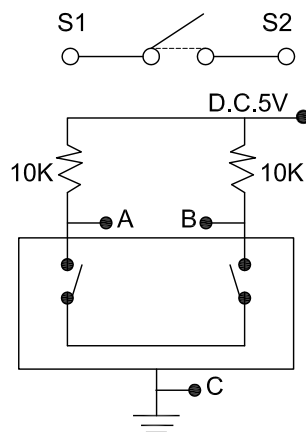
外形图 Mechanical Dimensions



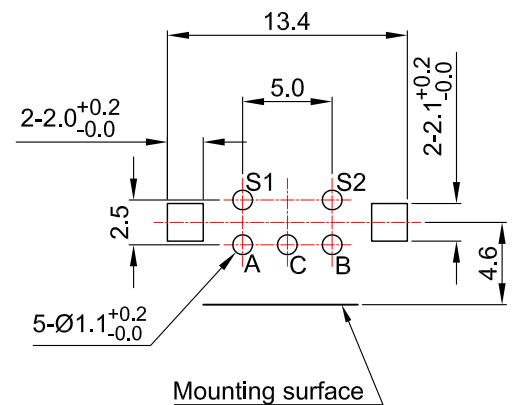
输出信号
Output signal format



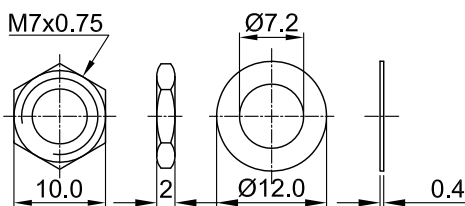
接线图
Circuit explanation



安装孔位图
P.C.B. mounting hole detail



Attached parts: nut & washer



● Detent & Pulse type

Y	Detent	PULSE
20C20P	20	20
30C15P	30	15
20P	/	20
15P	/	15

3				PRODUCT NAME	Switch Encoder		
2				MODEL NAME	RD111ECS-15KQ5A1-C-P-V81		
1				APPROVED BY	CHECKED BY	DRAWN BY	
NO	DATE	DESCRIPTION					
		DIMENSION	TOLERANCE	SCALE			
		$\int \leq 10$	± 0.2	UNIT	mm		
		$10 < \int \leq 30$	± 0.5	VER.	A0		
		$30 < \int \leq 100$	± 1.0	DATE	2015/03/02		
		All Angles	$\pm 5^\circ$				



YU WAH (D G) CO.,LTD

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 11 mm 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: -10°C to 70°C

1-4. 保存温度范围

Storage temperature range: -40°C to $+85^{\circ}\text{C}$

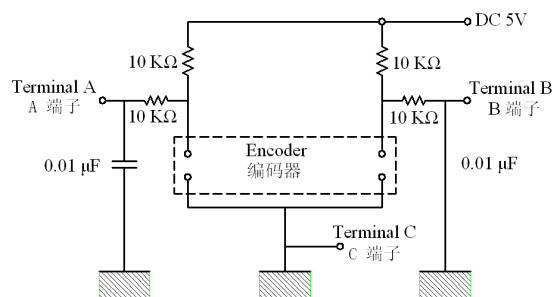


图1

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

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 consult fig.5-1. Therefore make the A phase the reference at the soft ware design stage.

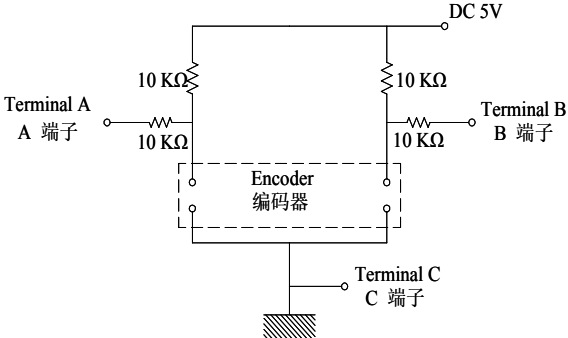
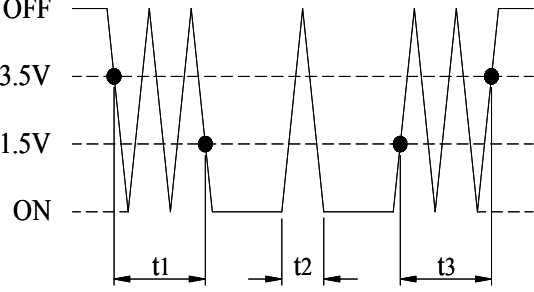
4-4. 在设计时要考虑到杂讯, 建议使用C/R滤波电路, (图1)

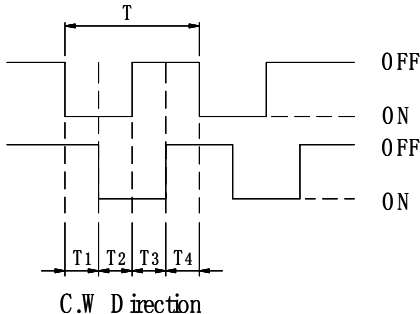
At design of the pulse count process. Using the C/R filter circuit is Recommended (fig.1)

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 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	输出波形 Output
	顺时针方向 C.W	图 2 fig. 2 图 3 fig. 3
	逆时针方向 C.C.W	
5-2. 分解能力 Resolution	回转360°的输出脉冲数. Number of pulses in 360° rotation.	<input type="checkbox"/> 15个脉冲/360° (图2) 15Pulsrs/360° (fig2) for each phase <input checked="" type="checkbox"/> 20个脉冲/360° (图3) 20Pulsrs/360° (fig3) 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。 Measurement shall be made under the condition as follows . Shaft rotational speed : 360° /S Test circuit : (fig .4) 图4<fig .4>  图5<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)	$t_1, t_3 \leq 5\text{ms}$
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 t 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	$t_2 \leq 5\text{ms}$
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.	3.5 V 以上 3.5 V min

5. 电气性能 ELECTRICAL CHARACTERISTICS		
项目 ITEM	条件 CONDITIONS	规格 SPECIFICATIONS
5-4. 相差 Phase difference	<p>下(图6)所示回路,轴以$360^{\circ}/S$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> <p>A信号(A~C)间 signal A</p> <p>B信号(B~C)间 signal B</p> 	<p>$T1, T2, T3, T4 \geq 4ms$ 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>100MΩ 以上 100MΩ Min</p>
5-6. 耐电压 Dielectric strength	<p>在端子和轴间施加 AC 300 V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>1Ω 以下 1Ω Max</p>
6. 机械性能 Mechanical characteristics		
6-1. 全回转角度 Total rotational angle		<p>360° (无止档点) 360° (End less)</p>
6-2. 定位点力矩 Deten 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 $-10^{\circ}C \sim +5^{\circ}C$ 但在$-10^{\circ}C \sim +5^{\circ}C$轴勉强可转动</p>
6-3. 定位点数及位置 Number of detent and position	<p>只适用于附卡点装置 Only suitable for C.C, equipment.</p>	<p>30detents (Step angle :$12^{\circ} \pm 2^{\circ}$) □30点定位(间隔角度$12^{\circ} \pm 2^{\circ}$) 20detents (Step angle :$18^{\circ} \pm 2^{\circ}$) ✓20点定位(间隔角度$18^{\circ} \pm 2^{\circ}$)</p>
6-4. 轴的推拉强度 Push -pull strength of shaft	<p>在轴端,沿轴向施加(推5Kg/拉 3Kg)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 (Push 5Kg/Pull 3Kg) shall be applied to be shaft in the axial direction for 10s. (After soldering of the PC board)</p>	<p>轴无破损,回转无异常,电气性能无异常。 No play in shaft. NO excessive abnormality in rotational feeling . And. electrical characteristics and be satisfied.</p>
6-5. 轴摆动 Shaft wobble	<p>在轴前端5mm处,沿径向瞬间施加 50mN.m (500gf.cm) 的力。 A momentary load of 50mN.m (500gf .cm) shall be applied at the point 5mm from the tip of the shaft in a direction perpendicular to the axis of shaft.</p>	<p>0.8xL/30mm p-p以下(L:指安装平面到轴的柄端的距离) 0.8x1/30mm p-p Max或(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>

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周/小时速度回转30,000周。 The shaft of encoder shall be rotated to 30,000 cycles at a speed of 600cycles/H without electrical load ,after with measurements shall be made.	端子间接触阻抗200Ω 以下。 Contact resistance 200 Ω Max 尚余有轻微定位感 Vibration t1,t3≤5mS 振荡t1,t3≤5mS Bounce t2≤5mS 突跳 t2≤5mS Detent feeling has to remains
7-2. 耐湿性 Damp heat	温度40±2℃,湿度90~95%的恒温恒湿湿槽中放置48 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±2℃ with relative humidity of 90% to 95% for 48H 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。 The encoder shall be stored at a temperature of 80±3℃ for 48H 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 .
7-4. 低温特性 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。 The encoder shall be stored at a temperature of -25±3℃ for 48H 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 Specications in clause all items is shall be satisfied .
7-5. 焊锡性 Solder ability	端子在260℃±5℃温度的焊锡槽内浸锡3秒±0.5秒。 The terminals shall be immersed into solder bath at 260℃ for 3s±0.5s in the same manner as para.	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.
7-6. 耐焊接热 Resistance to Soldering heat	手工焊接 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. 槽焊 Dip soldering . 使用基板: t=1.6mm的单面覆铜板。 Printed wiring board :single -stded 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 min 焊接:温度260±5℃或以下,时间3秒以内。 Soldering :Solder temperature:260±5℃ or less Immersion time :within 3s	不得有绝缘体的破坏、变形、接触无异常。 Electrical characteristics shall be satisfied No mechanical abnormality.

推动开关部分 Push Switch Portion

备注:以下规格适用于R11ECS编码带开关系列.

No: The following specification is only suitable for the one type with switch construction of R11EC 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



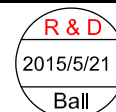
项目 ITEM	条件 CONDITIONS	规格 SPECIFICATIONS
2-1. 接触电阻 Contact resistance	用 DC 5V 1mA 电压测定. Voltage test at DC 5V 1mA.	100mΩ less ≤ 100mΩ
2-2. 绝缘阻抗 Insulation resistance	在端子和安装板间施加电压250V DC. Measurement shall be made under the condition which a voltage of 250V DC is applied between individual terminals and bushing and bushing and plank	100MΩ 以上 100MΩ 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)	10ms or less ≤ 10ms
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 force of switch	在轴端,沿轴向施加的按压力. Push static load to the shaft in the axial direction.	200~800gf.cm
3-3. 开关动移动量 Travel of switch		0.5±0.3mm

4 耐久性能 Endurance Characteristics

回转寿命 Rotational life	The shaft of encoder shall be push to 20,000 cycles at a speed of 600 cycles/H without electrical load ,after with measurements shall be made.	接触电阻:≤200mΩ . 其它应满足初期规格. Contact resistance : 200mΩ or less Specification in clause shall be satisfied.
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