Dimension Diagrams

① 7.6±0.2
5.7±0.2
2.7
Ø2.1
1.6
2.5±0.1 ②
3.2
4.4±0.2 ③
3-0.65±0.1
④

⑤ 2.7±0.2
⑥ 0⁺0.1₋0.05
0.4

Shaft hole Diagram

⑧ 2.4±0.05
3-1.73⁺0.03₋0 ⑦
2.7±0.05 ⑩
3.9±0.05 ⑨
4-Ø0.6⁺0₋0.05 ⑪
2   2

Ø2.1
1.3
3-1.73⁺0.03₋0
3-1.72⁺0.03₋0.2
6-60°

Circuit Board Welding Diagram

1.7   5.9   1.7
3
R0.3max
2.6
3.6
3
2.7
2-Ø0.62⁺0.1₋0
2.1
A   C   B
1.3
2.4
3-1.5

CW ROTATION

A-C OFF / ON
B-C OFF / ON

12 pulse 12 click

A   C   B
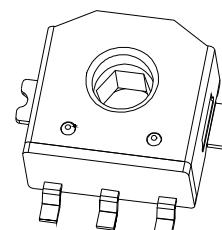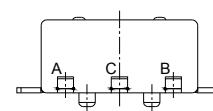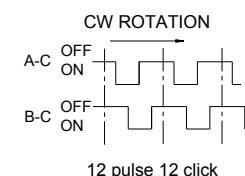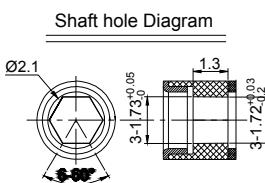
Material list

Items	Name	Material
1	Cover	Copper Alloy
2	Ancho Plate	Stainless Steel Strips
3	Wheel gear	Engineering plastics
4	Base	Engineering plastics
5	Contact Spring	Copper Alloy
6	Terminal	Copper Alloy

Specifications

No	Items		Standard	No	Items	Standard
1(1.2)	Operating Temperature Range		-40°C to +85°C	19(7.1)	Mechanical Life	
2(1.3)	Operating Relative Humidity		≤85% RH	20(7.2)	Electronics Life	100,000 cycles(30 t/min,Torque attenuation<30%)
3(3)	Ratings		DC 5V 0.5mA	21(8.1)	Cold Proof	-40±2°C 96h
4(4.1)	Contact Resistance		200mΩ Max(Initial status)	22(8.2)	Hot Proof	85±2°C 96h
5(4.2)	Insulation Resistance		50MΩ Min	23(8.3)	Moisture Resistance	40±2°C 96h，90-95%RH 96h
6(4.3)	Dielectric Voltage		AC50V,60s	24(8.4)	Temperature Cycling	-40~85°c，change 5 cycles
7(4.4)	Output Signal Format	C.W.	12pulse/360°,A(A~C),B(B~C)	25(8.5)	Salt Mist	
		C.C.W	12pulse/360°,B(B~C),A(A~C)	26(8.6)	Vulcanization test	
8(4.4)	Phase-Different		T1,T2,T3,T4≥4mS		Dimension	
9(4.5)	Chattering		t1,t3≤3mS	1	Solder Foot Width	7.6±0.2
10(4.5)	Bounce		t2≤2mS	2	Top height	2.5±0.1
11(5.1)	Detent Points		12detent points,each angle:30°±3°	3	Tip dimensions of pin foot	4.4±0.2
12(5.3)	Rotational Force		15±10gf.cm(initial status)	4	Width of Pin	3-0.65±0.1
13(5.4)	Tooth Intensity Value		/	5	Body thicknes	2.7±0.2
14(5.4)	Tooth Sense Consistency		/	6	Flatness	0⁺0.1₋0.05
15(5.5)	Axial Swing Strength		1N,60S	7	Square Hole Size	1.73⁺0.05₋0
16(5.6)	Terminal Strength		1N,60S	8	Distance of column	2.4±0.1
17(6.2)	Solder Heat Resistance	SMT Soldering	250°C Max 3S Max，230°C Min 40S Max	9	Distance of column	3.9±0.1
		Manual Soldering	350°C Max，3S Max	10	Distance of hole to column	2.7±0.1
18(6.1)	Solder Ability		250°C Max，3S Max	11	Column Size	Ø0.6⁺0₋0.05

品赞科技 ®
b-Switch

G-Switch Electronic (HongKong) CO.,Ltd.

1. General Characteristics 一般特性：

1.1 Application: This specification is applied to rotary encoder used for general application.
   适用范围：该承认书适用于旋转编码开关的一般使用范围。

1.2 Operating Temperature Range: -40℃to +85℃
   使用温度范围：　　　　　　　-40℃to +85℃

1.3 Operating Relative Humidity: ≤85% RH
   相对湿度：　　　　　　　　　≤85%RH

1.4 Test Conditions: Unless otherwise specified, the atmospheric conditions for making measurements and tests are as follows:
   实验条件：若没有特别说明，则试验大气条件如下：

   Environment Temperature:　　　　　5~35℃
   环境温度：　　　　　　　　　　　5~35℃
   Relative Humidity:　　　　　　　45~85%
   相对湿度：　　　　　　　　　　　45~85%
   Atmospheric Pressure:　　　　　　86~106Kpa（860~1060mbar）
   大气压力：　　　　　　　　　　　86~106Kpa（860~1060mbar）

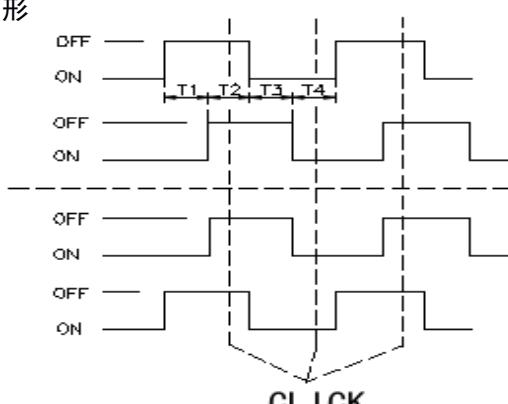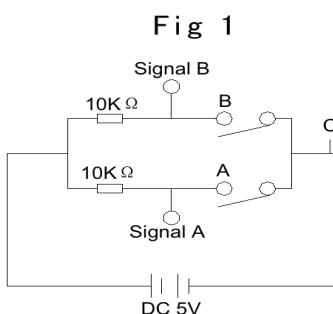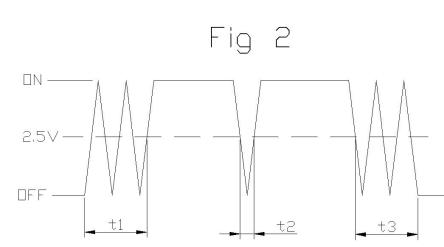# 2. Appearance, Structure and Dimensions 外观，结构及尺寸：

2.1 Appearance:　　　　　　　The encoder shall have good finishing, and no rust, crack or plating
   外观：　　　　　　　　　　defects.
   　　　　　　　　　　　　　产品外观良好，无锈蚀、裂纹和镀层缺陷。

2.2 Structure & Dimensions:　Refer to individual product drawing.
   结构及尺寸：　　　　　　　参见产品图纸

2.3 Markings:　　　　　　　　Refer to individual product drawing.
   标识：　　　　　　　　　　参见产品图纸。
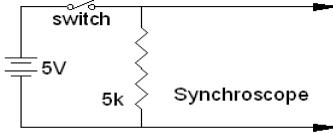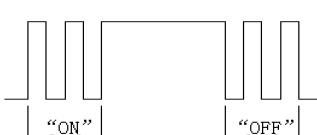
3. Ratings 额定负荷: MAX：5VDC 1.5mA MIN:1VDC 100uA

4. Electrical Characteristics 电气特性:

No.	Item 项目	Criteria 标准	Test Method 实验方法
4.1	Contact Resistance 接触电阻	Encoder：500mΩ Max.	Using the micro resistance tester with error less than 5% for testing. 使用误差小于5%的微电阻测试仪进行测试。
4.2	Insulation Resistance 绝缘电阻	50MΩ Min.	Using the insulation resistance tester.setting parameters to DC100V, The insulation resistance between the terminal and the cover,the terminal and the terminal is test, time is 60 seconds. 使用绝缘电阻测试仪，设置参数为DC100V,测试端子与外壳,端子与端子之间的绝缘阻抗,时间60s
4.3	Dielectric Voltage 抗电强度	Nodielectric breakdown shall occur. 无击穿现象发生。	Using the voltage resistance tester, set the parameters to the AC100V, test the voltage resistance between the terminal and cover or terminal and terminal,time is 60s. 使用耐电压测试仪，设置参数为AC100V，测试端子和外壳或端子与端子之间的耐电压、时间60s。
No.	Item 项目	Tandard 标准	Test Method 测试方法
4.4	Output signal format 输出信号	T1, T2, T3, T4≥4mS	2 Phase-different signals （signalA,signalB)Derails shown in （The broken line shows detent position.） A、B两信号输出相位差，输出波形详细见图，卡点位置如下图所示（虚线表示带卡点装置的上擎子处位置）

品赞科技 b-Switch®

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PRODUCT SPECIFICATION

Shaft rotational direction 轴回转方向	Signal(Between terminals) 信号(端子之间)	Output 输出波形
C.W.	A(A～C)	
	B(B～C)	
C.C.W.	A(A～C)	
	B(B～C)	

CLICK

No.	Item 项目			
4.5	Switching characteristics 切换特性	Chattering 振动 Fig.2 t1, t3 <3ms	The encoder is connected to the circuit in Figure 1. The encoder rotates 360 degrees per second. When the circuit is switched from ON to OFF , test circuit from high voltage 5V to low voltage2.5V generates vibration time ,when every times. 将编码器按图1的电路接在示波器一上,编码器每秒钟转动360度,当电路从ON到OFF的瞬间,每次转换时,测试电路从高电压5V转换到低电压2.5V时, 产生振动的时间.	
		Sliding noise (Bounce) 跳动 Fig.2 t2 <2ms	The encoder is connected to the circuit in Figure 1. The encoder rotates 360 degrees per second, when the circuit in the ON region, test circuit generation time of jitter. Beating position acquisition should be in the ON region of voltage change more than 2.5V voltage position. In the ON region, In the ON region, the voltage change more than 2.5V phenomenon occurs more than 2 times, it is considered to be continuous beating. 将编码器按图1的电路接在示波器上,编码器每秒钟转动360度,当电路在ON区域时,测试电路产生跳动的时间.跳动位置的获取应在ON区域,电压变化超过2.5V电压的位置。 在ON区域,电压变化超过2.5V的现象出现2次以上的,被认为是连续跳动。	
No.	Item 项目	tandard 标准	Test Method 测试方法	

Fig 1

Signal B

10KΩ   B

10KΩ   A   C

Signal A

DC 5V

Fig 2

ON

2.5V

OFF

t1   t2   t3

| 4.6 | Bounce 抖动 （带开关功能适用） | ON bounce: 10ms max. OFF bounce: 10ms max. ON 抖动时间:10ms max. OFF 抖动时间:10ms max. | Lightly striking the center of the stem at a rate encoutered in normal use (3 to 4 operations per sec.) bounce shall be tested at "ON" and "OFF". 以 3-4 次/sec 的速度按压 |

5. Mechanical Characteristics　机械特性

No.	Item　项目	tandard 标准	Test Method　测试方法
5.1	Detent points 执子点数与位置	12 detent points each detent angle:30°±3° 12 点执子 每点角度：30°±3°	
5.2	Output waves 输出波形数	12pulse/360° 12 脉波/360°	
5.3	Rotational force 旋转力矩	Reference spec drawing sheet 参见图纸	The test head is inserted into the rotating shaft, rotates according to the rotation direction of the shaft, and the experiment is carried out with the uniform rotation force. 把测试头插入转轴中，沿轴的转动方向，使用均匀的旋转力进行测试。
5.4	Operating Force 操作力（带开关功能适用）	Reference spec drawing sheet 参见图纸	Apply a tension load on the midpoint of the actuator (or 1mm to the tip of the shaft) to supply a pressure vertically from its free position to operating position. 在操作元件中间（或在离操作元件末端 1mm 处）沿操作方向均匀施加静载荷，使操作元件转换到动作位置。
5.5	Releasing Force 回复力（带开关功能适用）	Reference spec drawing sheet 参见图纸	The value to which the force in the actuator midpoint (or 1mm to the tip of the shaft) must be reduced to allow the contact to the normal position. 在操作元件末端沿操作方向均匀减少静载荷,使操作元件从动作位置转换到自由位置。
No.	Item　项目	tandard 标准	Test Method　测试方法

5.6	Pre Travels 行程（带开关功能适用）	Reference spec drawing sheet 参见图纸	The distance vertically through, which the midpoint of the actuator (or tip of the shaft) trip move from its free position to operating position. 从自由位置到动作位置的距离。
5.7	Shaft play in axial direction 轴向摆动	Shall be free from terminal looseness, damage and insulator breakage. The electrical performance requirements specified shall be satisfied. 端子无松动，损坏及绝缘层的破裂。 电气性能应符合要求。	The encoder is welded on the printed circuit board, according to the vertical direction of the shaft, and apply FxL=50mN.m rotating force ,times is 5s. 该编码器焊接在印刷电路板上，根据轴的垂直方向，并施加 FxL=50mN.m 力，时间 5s。
5.8	Terminal Strength 端子强度	Shall be free from terminal looseness, damage and insulator breakage. The electrical performance requirements specified shall be satisfied. 端子无松动，损坏及绝缘层的破裂。 电气性能应符合要求。	A static load of 3N shall be applied to the tip of terminals for 10s in any direction. 任意方向施加 3N 作用力于接线端末端，持续时间 10s.
5.6	Vibration Proof 振动	After test, Contact resistance:5 Ω Max. Insulation resistance:10M Ω Min. The electrical performance requirements specified shall be satisfied. No abnormalities shall be recognized in appearance and construction. 实验后： 接触电阻： 5Ω Max. 绝缘电阻： 10MΩ Min. 电气性能应符合要求。 表面及结构无明显变形。	Encoder shall be secured to a testing machine by a normal mounting device and method. Encoder shall be tested according to the following request:: Vibration frequency range = 10~55 Hz Total amplitude =1.5mm Sweep ratio: 10~55~10Hz Approx. 1 min Method of changing the sweep vibration frequency: linear Direction of vibration: Three perpendicular directions including actuating direction. (6) Duration: 2 hours (6 hours in total) 编码器采用常规的安装方法牢固地安装在试验设备上，并在下述参数条件下进行试验： (1) 振频=10-55Hz (2) 振幅 1.5mm (3) 振动变化速率：10-55-10Hz 大约 1 分钟 (4) 变频方法：线性型式 (5) 振动方向：三个相互垂直的方向，其中一个方向应是促动元件运动的方向。 (6) 时间：每个方向 2 小时（共 6 小时）。

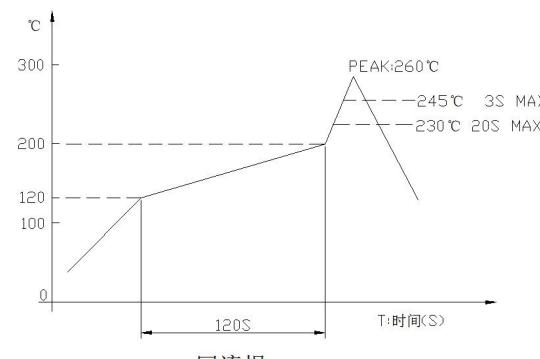|			
5.7	Mechanical Shock 冲击	After test, Contact resistance: 5 Ω Max. Insulation resistance:10M Ω Min. The Electrical performance requirements specified shall be satisfied. Shall be free from mechanical abnormalities. 实验后： 接触电阻：5ΩMax. 绝缘电阻： 10MΩ Min. 电气性能应符合要求。 表面无变形且操作无异常。	Encoder shall be tested according to the following request: Mounting Method: Normal Acceleration: 490m/s² (50G) Duration: 11ms Test Direction: 6 directions (5)Number of shocks: 3 times per direction (18 times in total) 编码器在下述参数条件下进行试验： (1) 安装方法：常规方法 (2) 加速度：490m/ s² (50G) (3) 时间：11ms (4) 实验方向：图示6方向 (5) 冲击次数：每个方向3次（总共18次）

6. Solding Characteristics 焊接性能

No.	Item 项目	tandard 标准	Test Method 测试方法
6.1	Solder Ability 可焊性	Dip area should be more than 85% 浸锡面积应该超过85%	Encoder shall be tested according to the following request: Solder: Normal Flux: Rosin Flux having a nominal composition of 25% solids by mass of water white rosin in methyl alcohol solution. Soldering Temperature: 245± 5° C Immersing Time: 3 ± 1s Flux immersing time shall be 5 ˜10s in normal room temperature. Immersion Depth: Immersion depth shall be at copper plating portion of PCB after mounting. (Thickness of PCB=1.6mm) 编码器在下述参数条件下进行试验： (1) 焊料：常规 (2) 焊剂：焊剂，质量百分比为25%松香，75%甲醇的无色透明溶液。 (3) 焊接温度：245±5℃ 浸渍时间：3±1s 焊剂浸渍时间：5-10s (4) 浸渍深度：接线端应浸到离开关根部1.6mm处。

| 6.2 | Solder Heat Resistance 耐焊接热 | No abnormalities shall be observed in appearance and operation. 无外观及功能损坏。 | Encoder shall be tested according to the following request:
Solder: Normal
Flux: Rosin Flux having a nominal composition of 25% solids by mass of water white rosin in methyl alcohol solution.
Soldering Temperature & Immersing Time
Dip Soldering: 230℃ 20s max, 245℃ 3s max.
Manual Soldering:330±5℃ 3s max
(4)Immersion Depth: (For Dip Soldering) Immersion depth shall be at copper plating portion of PCB after mounting.
(Thickness of PCB=1.6mm)
编码器在下述参数条件下进行试验：
(1) 焊料：常规
(2) 焊剂：焊剂，质量百分比为25%松香，75%甲醇的无色透明溶液。
(3) 焊接温度及浸渍时间：
自动焊接 230℃ 20s max, 245℃ 3s max.
手工焊接 330±5℃ 3s max
(4) 浸渍深度：（对于手动焊接）
接线端应浸到离开关根部1.6mm处。 |

回流焊

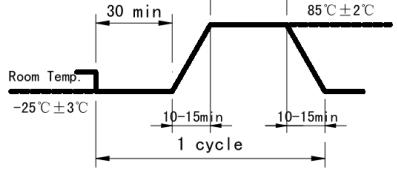# 7. Durability characteristics 耐久性能

No.	Item 项目	tandard 标准	Test Method 测试方法
7.1	Encoder Life 编码器寿命	After test Contact resistance: 5Ω Max. Insulation resistance:10MΩ Min. Phase-difference：T1, T2, T3, T4>2mS The decay of the operating force should be within + 30%. The electrical performance requirements specified shall be satisfied. 实验后： 接触电阻：10Ω Max. 绝缘电阻：10MΩ Min. 相位差：T1, T2, T3, T4>2mS 操作力衰变应在±30%以内。电气性能应符合要求。	Operation shall be performed continuously at a rate of 30 cycles per minute without load, (Cycles reference drawing) 在不带负荷的条件下，速度为30次/分，在寿命试验设备上连续转换，(次数参见图纸)

产 品 承 认 书
PRODUCT SPECIFICATION

7.2	Switch Life 开关寿命（带开关功能适用）	After test Contact resistance: 5Ω Max. Insulation resistance:10MΩ Min. The decay of the operating force should be within + 30%. The electrical performance requirements specified shall be satisfied. 实验后：接触电阻：10Ω Max. 绝缘电阻：10MΩ Min. 操作力衰变应在±30%以内。电气性能应符合要求。	Operation shall be performed continuously at a rate of 30 cycles per minute load as follow, (Cycles reference drawing) 1.5mA 5VDC 在带以下负荷的条件下，速度为 30 次/分，在寿命试验设备上连续转换（次数参见图纸） 1.5mA 5VDC

8. Weather Proof Characteristics   耐候性能：

No.	Item 项目	tandard 标准	Test Method 测试方法
8.1	Cold Proof 低温		After testing at -40± 2°C for 240 hours, the encoder shall be allowed to stand under normal temperature and humidity conditions for 1 hour, and measurement shall be made within 1 hour after that. Water drops shall be eliminated. 试件在-40±2℃的温控箱内保持 240 小时，然后在正常温度和湿度下恢复 1 小时，并在此后 1 小时内对试品进行测量，水滴应消失。
8.2	Hot Proof 高温	After test, Contact resistance: 5ΩMax. Insulation resistance: 10MΩ Min. The Electrical performance requirements specified shall be satisfied. 实验后： 接触电阻：5Ω Max. 绝缘电阻： 10MΩ Min. 电气性能应符合要求。	After testing at 85 ± 2°C for 240 hours, the encoder shall be allowed to stand under normal temperature and humidity conditions for 1 hour, and measurement shall be made within 1 hour after that. 试件在 85±2℃的温控箱内保持 240 小时，然后在正常温度和湿度下恢复 1 小时，并在此后 1 小时内对试品进行测量，水滴应消失。
8.3	Moisture Resistance 恒定湿热		After testing at 40± 2°C, 90~95% RH for 240 hours, the encoder shall be allowed to stand under normal temperature and humidity conditions for 1 hour, and measurement shall be made within 1 hour after that. Water drops shall be eliminated. 试件在 40±2℃，90-95%RH 的温控箱内保持 240 小时，然后在正常温度和湿度下恢复 1 小时，并在此后 1 小时内对试品进行测量，水滴应消失。
8.4	Temperature Cycling 温度转换		After 240 cycles of following conditions, the encoder shall be allowed to stand under normal temperature and humidity conditions for 1 hour, and measurement shall be made within 1 hour after that. Water drops shall be eliminated. 试件按下述实验条件试验 240 次，然后在正常温度和湿度下恢复 1 小时，并在此后 1 小时内对试品进行测量，水滴应消失。

8.5	Salt Mist 盐雾实验	No remarkable corrosion effecting product function shall be recognized in metal part. 在金属件上没有影响产品性能的腐蚀斑点。	The encoder shall be checked after the following test: Temperature: 35± 2° C Salt Solution: 5±1% (Solids by mass). Salt deposit shall be removed by running water. (4) Duration: 24 hours 试件在下述实验后测量： (1) 温度：35±2℃ (2) 盐溶液浓度：5±1%（质量百分比）。 (3) 盐沉积物用水冲掉。 (4) 时间：24 小时

9. Management of environmental hazardous substances 环境危害物质管理

This product complies with the ″√″ hook under the environmental hazardous substances management standard selection.
本产品符合下方"√"勾选的环境危害物质管理标准。

√	本产品符合欧盟 ROHS 2.0 标准要求.
	本产品符合 HF 标准要求.
	本产品符合 REACH 标准要求.

10. Storage condition 贮存条件:

10.1 In order to protect the switch performance and the soldering conditions, it should keep the switch under the following conditions:
为防止本产品的性能劣化和耐焊性等性能受到影响，请保管在以下的条件和环境下：

10.1.1. Temperature of -40℃ to +80℃, with humidity lower than 85%RH;
温度 -40℃ 以上，+80℃ 以下，湿度85% 以下的环境。

10.1.2. Avoid storing in the environment containing corrosive gas;
避免保存在含有腐蚀性气体等的空气中。

10.1.3. Avoid keeping it in the location with direct sunlight.
避免保存在日光能直射的场所。

10.1.4. Store using the standard packing without exerting force.
在不施加负重外力的包装状态下进行保管。

10.2 The standard storage period is 6 months before opening the package. Preferably to be used as soon as possible. After opening the package, you should put the remaining switches in a plastic bag to prevent from damp and corrosive gas with maximum up to 3 months.
产品未打开包装的保存标准期限为 6 个月。打开包装后有剩余品时，应将剩余部分以胶袋包装好以同外界隔离，请进行合适的防湿，防腐蚀气体等处理后进行保管，保存期限为 3 个月。

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