

APPROVAL SPECIFICATIONS

Title: ENCODER

Product Model: GE1103D5F17.7-5-4H10B

Customer' s Part NO.

Customer' s Model:

Customer' s Approval Requested.

Please return this copy as a certification of your approval.

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APPROVE	REVIEW	POLT
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Shenzhen Gangyuan Micro key Technology Co.,ltd

		FILE NO. 文件编号	
		DATE 发布日期	2022年8月1日
TYPE 类型	ENCODER PRODUCT SPECIFICATION 编码器产品承认书	VERSION: 版本	A版 第0次修订
NAME 名稱	11 SERIES SPECIFICATION 11 系列规格书	PART NO. 料號	GE1103D5F17. 7-5-4H10B

1、General 一般事项

- 1-1、Scope 适用规格
This specification applies to 11mm size low-profile thin rotary encoder (incremental type) for microscopic current circuits, used In electronic equipment.
本规格书为11mm小型回转式编码器（增量型），适用于电子设备内微小电子电路。
- 1-2、Standard atmospheric conditions标准状态
Unless otherwise specified ,the standard range of atmospheric conditions for making measurements and test is as following limits:
除另有规定外，测量应在以下状态下进行：
Ambient temperature温度：15°C to 35°C
Relative humidity相对湿度：25% to 85%
Air pressure气压：86kPa to 106kPa
- 1-3、Operating temperature range
使用温度范围：-40°C to 85°C
- 1-4、Storage temperature range
保存温度范围：-40°C to 90°C

2、Construction 构造

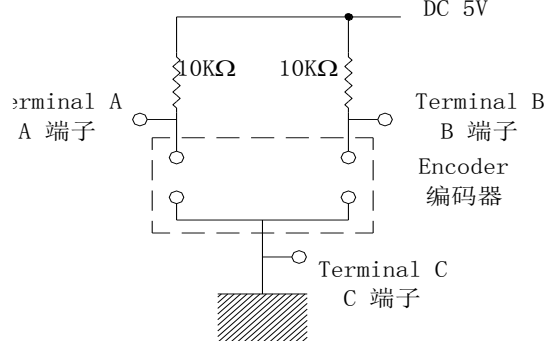
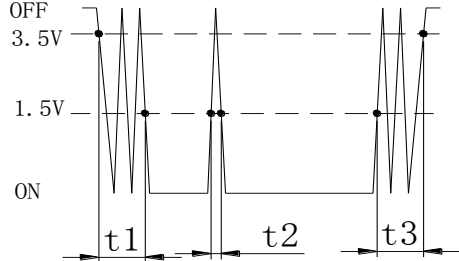
- 2-1 Dimensions 尺寸
Refer to attached drawing 见所附成品图

3、Rating 额定值

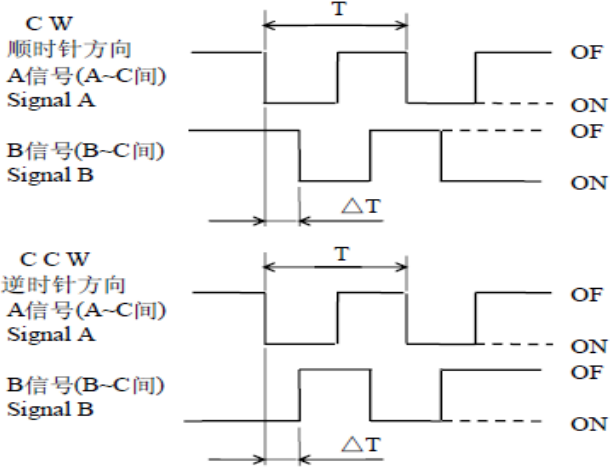
- 3-1、Rated voltage 额定电压: DC 5V
- 3-2、Maximum operating current (resistive load)最大额定电流（阻抗负载）
Each lead 各相导线：0.5mA(Max 10mA; Min 0.5mA)
Common lead 公共导线：1mA(Max 10mA; Min 0.5mA)

4、Application Notes 使用上的事项

- 4-1. 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.
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
- 4-2. The encoder pulses count method should be designed with taking operating speed ,sampling time and design software into cosideration.
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。
- 4-3. With this products ,detent positon will always be aligned with A-OFF or ON phase. Therefore make the A phase of the microcomputer the reference at the soft ware design stage.
此产品在定位点状态时A相波形是处于OFF或ON状态,因此在设计软体时请留意此现象。
- 4-4. At design of the pulse count process. Using the R/C filter circuit is Recommended.
在设计时要考虑到杂讯,须使用R/C滤波电路。
- 4-5. Care must be taken not to expose this product to water or dew to prevent possible problem in pluses output waveform.
本产品请勿碰触到水,可能会导致输出波形的异常。
- 4-6.When encoder are used, the speed is suitable for controlling with 360°/s. The highest speed will lead that IC doesn't obtain signal.Mean while,the slide contact in the inside of product can be divorced form in order to be poor conatct.
在使用编码品时速度宜控制在360°/s 内，转速过快会导致IC抓取不到信号及产品内部的接触刷会瞬间脱离产生接触不良。

5、 ELECTRICAL CHARACTERISTICS电气性能			
ITEM 项目	CONDITIONS 条件	SPECIFICATIONS 规格	
5-1、 Output signal format 输出信号	Note: Output signal is 1 pulse per 2 detents. And terminal A-C is pulse ON or OFF at detent position. No specified output of termial B-C at detent position. 注意事项：输出信号方式是2个定位1个脉冲。在定位点位置时A-C端子处于ON或OFF状态，而B-C端子间不作特定要求。		
	Shaft rotational direction 轴回转方向	Signal 型号	
	C.W. 顺时针方向	A(Terminal A-C) A(A-C端子间)	OFF ON
		B(Terminal B-C) B(B-C端子间)	OFF ON
	C.C.W 逆时针方向	A(Terminal A-C) A(A-C端子间)	OFF ON
		B(Terminal B-C) B(B-C端子间)	OFF ON
5-2、 Resolution 分解能力	Number of pulses in 360° rotation。 回轉360°的輸出脈衝數。	20个脉冲/360° 20 pulses/360°	
5-3、 Switching characteristics 开关特性	Measurement shall be made under the condition as follows. 1)Shaft rotational speed : 360° /S 2)Test circuit : (fig.2) 下（图2）所示回路，轴以360° /秒的速度回转测定 (fig 2)  (Note) Code-OFF area :The area which the voltage is 3.5V or more. Code-ON area :The area which the voltage is 1.5V or less. (注) 编码器OFF指输出电压3. 5V以上的状态。 编码器ON指输出电压1. 5V以下的状态。 (fig 3) 		
5-3-1、 Chattering 振荡	Specified by the signal's passage time from 1.5V to 3.5V of each switching position (code OFF-ON or ON-OFF) (Fig.3) 编码从OFF → ON 或 ON → OFF时，输出1.5V~3.5V通过的时间应符合规定。(图3)	On the case within detent, B signal will be irregular oscillation. 帶卡点时,在卡点位置上的B信号振荡无规定。 t1,t3 ≤ 3ms	
5-3-2、 Sliding noise(Bounce) 滑动杂音(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. 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1毫秒以上1. 5V以下的ON部分. 另外, 如果各突跳间1. 5V以下的范围在1毫秒以上时, 则判定为另一个突跳.	t2≤2ms	

5、 ELECTRICAL CHARACTERISTICS电气性能

ITEM 项目	CONDITIONS 条件	SPECIFICATIONS 规格
5-3-3、Sliding noise 滑动噪音	The voltage change in code - OFF area. 编码OFF部分的电压变动。	3.5V MIN 3.5V 以上
5-4、Phase difference 相位差	Measurement shall be made under the condition which the shaft is rotated in 360°·S-1 (constant speed).以360°/s的速度测量。 (Fig.4)图4 	$\Delta T \geq 6\text{ ms}$ In(fig.4) 见图4
5-5、Insulation resistance 绝缘电阻	Measurement shall be made under the condition which a voltage of 250V DC 1min is applied between individual terminals and bushing. 在端子和安装板间施加电压 250V DC 1分钟。	Between individual terminals and bushing 100 MΩ Min 端子安装板间电阻100 MΩ以上。
5-6、Dielectric strength 耐电压	A voltage of 300V AC shall be applied for 1 minute between individual terminals and bushing. 在端子和安装板间施加 AC 300V电压1分钟。	Without arcing or breakdown. 不得有绝缘破坏。
5-7、Contact resistance 端子间接触阻抗	Measurement shall be stable condition which a output signal ia ON 出力信号处ON位置时，安定状态条件下测定	500 mΩ Max 500 mΩ以下

6、 Mechanical characteristics 机械性能

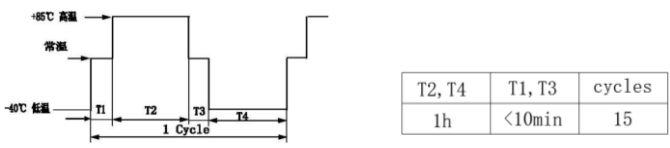
6-1、Total ratational angle 全回转角度		360°(Endless) 360°(无止挡点)
6-2、Detent Torque 定位点力矩	Only suitable for C.C, equipment. 只适用于附卡点装置	9.8±0.35 mN.m. (100±35 gf.cm)
6-3、Number and position of detent 定位点数及位置	Only suitable for C.C, equipment. 只适用于附卡点装置	20detents(Step angle:20°±2°) 20点定位（间隔角度20°±2°）
6-4、Push-pull stren-gth of shaft 轴推拉强度	Pull static load of 98 N(10 kgf) for 20s and push static load of 98 N （10 Kgf)for 10s shall be applied to the shaft in the axial direction (After soldering of the PC board) 在轴端，沿轴向施加98 N(10 kgf)的静负荷力拉力20秒钟和施加98 N （10 Kgf)推力10秒钟(焊锡固定在PCB上）。	Without damage or excessive play in shaft . No excessive abnormality in rotationalfeeling.And electrical characteristics shaft besatisfied. 轴无破损，旋转、电气性能无异常。
6-5、Terminal strength 端子强度	A static load of 4.9N(0.5kgf) shall be applied to the tip of terminals for 1 minute in any direction. 端子前端的任意方向施加4.9N(0.5kgf)的静负荷力1分钟。	Without excessive play in terminal or poor contact. 端子不得有明显松动及接触不良。

6、 Mechanical characteristics 机械性能

ITEM 项目	CONDITIONS 条件	SPECIFICATIONS 规格
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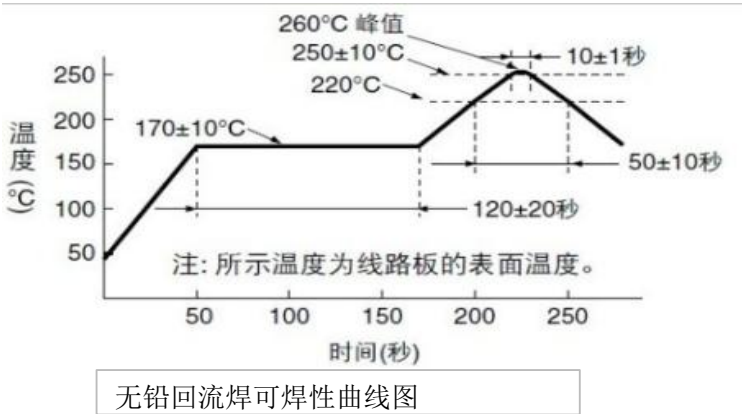
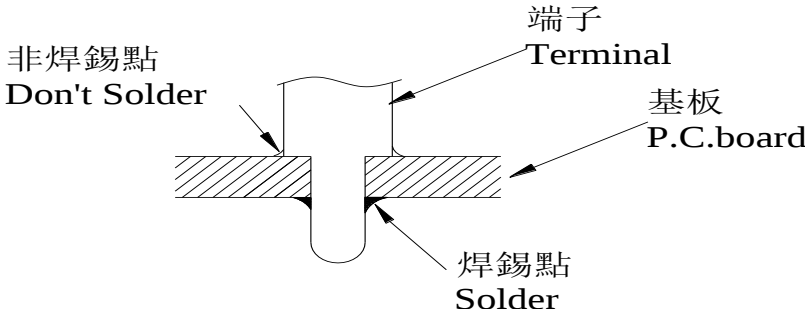
6-6、Shaft wobble 轴摆动	A momentary load of 4.9N(500 gf) shall be applied at the point 2mm from the tip of the shaft in a direction perpendicular to the axis of shaft 在轴前端2mm处,沿径向瞬间施加4.9N (500 gf)的力. L:Distance between mounting surface and measuring point on the shaft. L: 安装面到轴芯顶面之间的距离	Bushing length Wobble 轴套长（mm） 摆动(mmp-p less ■ 5 0.3*L/20 □ 7 0.25*L/20 □ 10以上 0.2*L/25
6-7、Side thrust strength of shaft 轴的垂直押引强度	A load of 80N(8Kgf) shall be applied at the point 5mm from the tip of the shaft in a direction perpendicular to the axis of shaft for 10 s. 在轴前端5 mm处加80 N(8 Kgf)的静负荷力10 s.	Without excessive play of bending in shaft. No mechanical abnormally. 轴不得有明显松动及接触不良.
6-8、Shaft play in rotational wobble 轴的回转方向摆动	Testing by angle board. 用角度板测定.	2° Max 2° 以下
6-9、Shaft play in axial direction 轴向间隙	The pull / push load of 0.5N(51gf) shall be imposed on the shaft. 在轴上施加0.5N(51gf)的推力或拉力.	0.4mm Max. 0.4mm以下.

7、Endurance characteristics耐久性能

7-1、Rotational life 回转寿命	The shaft of encoder shall be rotated at a speed of 600~1000cycles/H(clockwise for 360° , and then counter-clockwise for 360° as one cycle),without electrical after with measurements shall be made.load,(5000 to 8000 continuous cycles for 24 hours.) 在无负荷条件下轴以600~1000周/小时速度回转（顺时针旋转360°，再逆时针旋转360°为一周）一日连续5000~8000次	50000 cycles Min Rotation torque change rate shall be within +10%-50% against initial value. Chattering t1,t3≦5ms.Bounce t2≦3ms. Contact resistance 200 Ω Max The performance requirements specified in item 5-1,5-2,5-4,5-5,5-6 shall be satisfied 50000周以上，力矩变化率为初始值的+10%-50%振荡t1,t3 ≦5ms. 突跳 t2≦3ms. 端子间接触阻抗200Ω以下 其它性能符合第5-1， 5-2， 5-4， 5-5， 5-6条的要求
7-2、High temperature and high humidity preservation test 高温高湿保存试验	The encoder shall be stored at temprature of 60±2°C with relative humidity of 90% to 95% for 240±10H 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60±2°C,湿度90~95%的恒温恒湿槽中放置240±10小时后,在常温、常湿中放置1.5小时后测试	Contact resistance 100Ω Max; Switch contact resistance:200mΩ or less;Rotation torque change rate shall be within ±50% against initial value; Operation force of switch change rate shall be within ±40% against initial value; The performance requirements specified in item 5-1~5-6 shall be satisfied 端子间接触阻抗100Ω以下； 开关接触阻抗200mΩ以下； 力矩变化率为初始值的±50%； 按压力变化率为初始值的±40%； 其它性能符合第5-1~5-6
7-3、Dry heat 耐热性	The encoder shall be stored at a temperature of 85±3°C for 240±10H in a thermostatic chamber.And then the encoder shall be subjected to standard atmospheric conditions for 1.5H .After witch measurement shall be made.温度85±3°C的恒温箱中放置240±10小时,常温、常湿放置1.5小时后测试.	
7-4、Cold 低温特性	The encoder shall be stored at a temperature of -40±3°C for 240±10H in a thermostatic chamber.And then the encoder shall be subjected to standard atmospheric conditions for 1.5H .After witch measurement shall be made .温度-40±3°C的恒温箱中放置240±10小时,常温、常湿放置1.5小时后测试。	
7-5、Cold and hot shock test 冷热冲击试验	After setting the temperature and holding time according to the temperature curve and time required in the chart, the cold and hot shock test is carried out. The test is carried out for 15 cycles, and then the test is carried out at room temperature for more than 1 hour. 按如下图表要求的温度曲线及时间进行温度及保持时间设置后进行冷热冲击试验，试验进行15个周期，试验后置室温下恢复1小时以上进行测试 	

7-6、Salt atnospheres 盐雾试验	1.The encoder shall be checked after the following test: (1)Temperature:35±2℃; (2)Salt solution:5±1%(Solids by mass) (3)Salt deposit shall be removed by running water (4)Duration time:4 hours 2.Prior to examination and measurements,the devices shall be prepared in the following manner,Salt deposits shall 37.8℃ and a light burshing using a soft hair or plastic bristle brush. 3.The PH shall be maintained between 6.5 and 7.2 when measured at a temperature between 33.9℃ and 36.9℃ 1.试件在下述实验后测量： （1）温度： 35±2℃； （2）盐溶剂化物浓度： 5±1%（质量百分比）； （3）盐沉积物用水冲掉； （4）时间： 4小时； 2.观查测量之前，应把样品浸泡在温度低于37.8℃的水中，用冲软毛刷清洗盐沉积物。 3.在室温为33.9℃到36.1℃之间的室内测量，且PH值应保持在6.5到7.2之间	1.There is not evidence of destructive corrosion over more than 5% of the area of the finish and base metal of any package element(1e.Lid, lead, or cap),missing leads,and without corrosion that completely crosses the element when viewed with a magnification of 10% to 20% 2.Contact resistance:200 Ω Max 3.Switch contact resistance:200m Ω or less 4.Insulation resistance:100MΩ Min 5.The performance requirements specified in item 5-1~5-6、6-1、6-2shall be satisfied 1.放大10到20倍观察，腐蚀面积不超过5% 2.端子间接触阻抗200Ω以下 3.开关接触阻抗200mΩ以下 4.绝缘电阻： 10MΩ Min 5.其它性能符合第5-1~5-6、6-1、6-2
7-7、Solder ability 焊锡性	The terminals shall be immersed into solder bath at 260℃±5℃ for 3s±1s in the same manner as para. 端子在260℃±5℃温度的焊锡槽内浸锡3秒±1秒	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

Push switch portion 推动开关部分			
Note: The following specification is only suitable for the one type with switch construction of EC11 encoder series. 注：以下规格只适用于此GE11编码器系列带开关结构。			
1-1、Rated capacity (Resistance load): DC 5V 10mA (1mA Min) 额定容量（电阻负荷）：DC 5V 10mA (1mA 以上)			
1-2 Electrical characteristics电气性能			
ITEM 项目		CONDITIONS 条件	SPECIFICATIONS 规格
1-2-1、Contactresist- -ance接触电阻		Voltage step-down test at DC 5V 1mA 用DC 5V 1mA 电压测定.	100 mΩ Max 100 mΩ 以下
1-2-2、Bouncing 振荡		Shaft shall be rotated at 1 cycles/s (OFF-ON-OFF) 以1秒钟1往返（OFF-ON-OFF）按压动作	10 ms Max 10 ms 以下
1-2-3、Insulationres- -istance绝缘电阻		Measurement shall be made under the condition which a voltage 250V DC 1min±5S is applied between individual terminals and tracked 在端子与安装板间施加电压DC 250V 1分钟±5秒。	Between individual terminals and bracket 100 MΩ Min. 在端子安装板间100 MΩ以上
1-2-4 Dielectric strength 耐电压		A voltage of 300V AC shall be applied for 1minute between individral terminals and bushing and plank. 在端子与安装板间施加AC 300V 1分钟	Without arcing or breakdown. 不得有绝缘损坏。
1-3 Mechanical characteristics机械性能			
1-3-1、Switch circuit and number of pulse 开关电路、接点数			Single pole and single throw (push on) 单极单投（推ON）
1-3-2、Travel of switch开关移动量			0.5±0.2 mm
1-3-3、Operating force of switch 开关作动力			4.9±2 N (500±200gf)
1-4 Endurance characteristics耐久性能			
Push operating life 寿命特性		The encoder's shall be pushed to 50,000 cycles at a speed of 800-1200/H without electrical load.(shaft push load: 1 kgf Max.) 在无负荷条件下,对轴以每小时800-1200次的速度推动50,000次，压力1 kgf 以下).	Contact resistance : 200mΩ max. Specification in clause 1-2-2~4,1- 3-1~2 shall be satisfied. Operating force:Before test +10%-30%. 接触电阻：200mΩ以下。 1-2-2~4,1-3-1~2 满足初期规格。 开关动作力为寿命前的+10%- 30%.
8、OLDERING CONDITION耐焊锡条件			
Item	Content 项目	Test Condition 測試條件	Specification 規格
8.1	Manual soldering 手工焊锡	Bit temperature of soldering iron : 350 ± 10°C or less Application time of soldering iron : within 3 s. 温度350 ± 10°C以下，時間3+1-0秒以內.	A new uniform coating of solder shall cover 95% minimmm of the surface being 浸渍面须有95%以上焊锡附着

8.2	Dip soldering 自動焊錫	Printed wiring board :Both-sided copper clad laminate board with thickness of 1.6mm 使用基板: t=1.6mm的雙面銅泊積層板 Flux: Specific gravity : 0.82 or more. Flux shall be applied to the board using a bubble foaming type fluxer. The board shall be soaked in the flux bubble only to the 2/3 of its thickness. 助焊劑: 發泡式助焊機內置比重0.82以上的助焊劑, 發泡面高度為基板板厚的2/3. Please practice according to below conditions. (1) Preheat : Temperature on the copper foil surface should reach 170 °C, 120±20 seconds after the PCB entered into the soldering equipment (2) Soldering heat : Temperature on the copper foil surface should reach the peak temperature of 260 °C within 10±1seconds after the PCB entered into soldering heat zone 預熱條件: 基板表面溫度170°C-以下, 時間120±20s以內. 焊錫爐條件:溫度260±5°C, 時間10s±1s秒. Apply the above soldering process for 1 or 3times. 以上工程以1次或3次為宜. 	There shall be no deformation or cracks in molded part. No excessive abnormality in rotational feeling. 不可發生絕緣體變形, 破損以及感觸異常.
9.1	Flux penetrating 焊劑滲入	Please avoid soldering on upper (component side surface) of the PC board as shown below. 請避免焊錫作業時將焊劑滲入(元件側面的表面)PCB的表面.請參考圖3. 	
9.2	Clean 清除汙物	Please avoid cleaning of PC board because the flux used during the dip soldering process may enter the encoder and cause poor contact. 請清除汙物,因為基板浸入焊劑作業過程中,汙物會滲入編碼器內部,造成接觸不良.	

