# SUBMISSION OF SPECIFICATION

**PRODUCT NAME:** 步进电机

**PRODUCT MODEL:** 28BYJ48

**CUSTOMER PART NUMBER:** 28BYJ48

<table>
<thead>
<tr>
<th>编制</th>
<th>校对</th>
<th>审核</th>
<th>用户确认</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRAWN</td>
<td>CHECKED</td>
<td>APPROVED</td>
<td>ACKNOWLEDGEMENT</td>
</tr>
</tbody>
</table>

**SUPPLIER:**

**CUSTOMER:**

确认记载项目:

1. 电性能及参数: ETECTRIC PERFORMANCE AND PROPERTIES
2. 机械性能: MECHANICAL PERFORMANCE AND PROPERTIES
3. 环境性能: ENVIRONMENTAL PERFORMANCE AND PROPERTIES
4. 使用寿命试验: ENDURANCE TEST
5. 摩擦耐久试验: FRICTION MECHANISM ENDURANCE TEST

**ACKNOWLEDGEMENT DATE:** 于____年____月____日确认此规格书

**ACKNOWLEDGED:**

**SEALLED:**

**DATE /MONTH /DAY /YEAR**
### 电性能及参数 (ELECTRICAL PERFORMANCE AND PROPERTIES)

<table>
<thead>
<tr>
<th>序号</th>
<th>参数</th>
<th>值</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1</td>
<td>相数</td>
<td>4相</td>
</tr>
<tr>
<td>1-2</td>
<td>驱动方式</td>
<td>1-2 相励磁单极驱动</td>
</tr>
<tr>
<td>1-3</td>
<td>步距角</td>
<td>5.625°/64（输出轴）, 减速比1/64</td>
</tr>
<tr>
<td>1-4</td>
<td>电压</td>
<td>5VDC (电机端子)</td>
</tr>
<tr>
<td>1-5</td>
<td>线圈电阻</td>
<td>50Ω ±7%/相 25℃</td>
</tr>
<tr>
<td>1-6</td>
<td>最大空载牵出频率</td>
<td>&gt;900pps</td>
</tr>
<tr>
<td>1-7</td>
<td>最大空载牵入频率</td>
<td>&gt;500pps</td>
</tr>
<tr>
<td>1-8</td>
<td>牵入转距</td>
<td>&gt;300gf.cm / 5VDC 100pps</td>
</tr>
</tbody>
</table>

#### 绝缘电阻 (Insulation resistance)
在引接线和外壳之间施加500VDC，测得绝缘电阻大于10MΩ。

#### 电气强度 (Dielectric breakdown of insulation)
在引接线和外壳之间施加50/60Hz 600VAC，时间1秒钟，泄漏电流设置为1mA（或50/60Hz 500VAC，时间1分钟，泄漏电流设置为1mA），应无击穿或闪络。

<table>
<thead>
<tr>
<th>应用电压</th>
<th>时间</th>
<th>泄漏电流</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 VAC 50/60Hz</td>
<td>1 秒</td>
<td>1 mA</td>
</tr>
<tr>
<td>500 VAC 50/60Hz</td>
<td>1 分钟</td>
<td>1 mA</td>
</tr>
</tbody>
</table>

#### 电机绕阻温升 (Temperature rise of motor bobbin coil)
电机在5VDC 100Hz, 空载运行条件下，电机温升达到稳定状态时，用电阻法测量电机温升应不大于60K。

### 机械特性 (MECHANICAL PERFORMANCE AND PROPERTIES)

<table>
<thead>
<tr>
<th>序号</th>
<th>参数</th>
<th>值</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-1</td>
<td>外观 (Outside view)</td>
<td>电机在规定使用状态下，应无影响使用的生锈，变形等缺陷。</td>
</tr>
</tbody>
</table>

Outside view shall be free from any damage and discoloration which may cause failure at rated operating conditions.
规格书（Specification）

用户（USER）：林先生
型号（MODEL）：28BYJ48
图号（DWG.No.）：28BYJ48

2-2 电机结构及尺寸（Motor structure and size）
电机外形，结构及尺寸应符合图纸要求
Outside view, structure and size shall match the drawing.

2-3 重量（Weight）
电机重约45克
Product shall weight about 45 g.

2-4 输出轴摩擦力矩（Frictional torque of output shaft）
输出轴摩擦力矩为1000－2000gf.cm.
Frictional torque shall be as follows 1000－2000gf.cm

2-5 噪音（Noise level）
电机在5VDC/100Hz条件下空载运行，距电机10cm处测得噪音值不大于40dB（A计权）
Noise level of motor shall be less than 40 dB energized with 5 VDC and 100 pps in no load condition, measured 10 cm from motor.

2-6 输出轴强度（Shaft Strength）
径向强度 承载2kgf以上历时10秒。
Radial strength more than 2 kgf without failure for 10 sec.
抗拉强度 承载2kgf以上历时10秒。
Pull out strength more than 2 kgf without failure for 10 sec.
抗压强度 承载2kgf以上历时10秒。
Push out strength more than 2 kgf without failure for 10 sec.

2-7 引出线抗拉强度（Leadwire pulling strength）
电机和引出线之间 承载大于1kgf历时10秒（初回，静负荷）
Motor and leadwire more than 1kgf/strand.
引出线和端子之间 承载大于1kgf历时10秒（初回，静负荷）
Leadwire and connector more than 1kgf/strand.

2-8 齿轮运行强度（Gear post strength）
30个循环耐久试验后，齿轮应无阻滞，卡死等现象。1个循环包括输出轴以180°/秒的速率旋转，齿轮应无机械失效通过30周期的 endurance test.1 cycle comprised of 180° back and forth rotation of output shaft at speed of 1 second.

2-9 自定位转矩（Detent torque）
电机在不通电状态下自定位转矩应大于450gf.cm
Static detent torque shall be more than 450gf.cm measured with pulley weight method.

(3) 环境性能（ENVIRONMENTAL PERFORMANCE AND PROPERTIES）

3-1 使用条件（Operating conditions）
使用条件如下（Operating condition shall be as follows）：

<table>
<thead>
<tr>
<th>温度（Temperature）</th>
<th>-5℃～40℃</th>
</tr>
</thead>
<tbody>
<tr>
<td>相对湿度（Relative Humidity）</td>
<td>35%～85%</td>
</tr>
</tbody>
</table>

在此条件下，电机应能满足1-5, 1-9, 1-10, 1-11, 2-1, 2-3, 2-5, 的要求。
Motor shall satisfy requirements in 1-5, 1-9, 1-10, 1-11, 2-1, 2-2, 2-3, 2-5 in operating conditions.

3-2 保存条件（Storage conditions）
保存温度-20℃～60℃或80℃小于48小时
Storage temperature -20℃～60℃, or 80℃, Less than 48H
3-3 标准状态如下（Test conditions shall be as follows）．

<table>
<thead>
<tr>
<th>温度 (Temperature)</th>
<th>20±2℃</th>
</tr>
</thead>
<tbody>
<tr>
<td>相对湿度 (Relative Humidity)</td>
<td>65±5%</td>
</tr>
</tbody>
</table>

电机在5～35℃，相对湿度为45%～85%RH的环境中测试应能满足1-5,1-9,1-10,2-1,2-2
These condition is applied to requirements in 1-5,1-9,1-10,2-1,2-2 and 2-3．和2-3的要求。
Actual test conditions of 5℃～35℃, 45%～85% applicable as far as test results are reliable.

3-4 环境试验（Environmental test）

环境试验后电机应能满足1-8,1-10,2-1,和2-5，2-7的要求。
Motor shall satisfy requirements in 1-8～1-10,2-1 and 2-5～2-7 after environmental test.

3-4-1 耐湿试验（Humidity test）

电机在温度为40℃，相对湿度为90%～95%的环境中置放48小时，然后取出在常
Motor stored in ambient condition of 40℃ 90%～95% relative humidity for
温下置放30分钟。
48 hours then retrieved and stored in normal ambient condition for 30 minutes.

3-4-2 耐高温试验（High temperature storage test）

电机在温度为80℃，相对湿度为90%～100%的环境中置放48小时，然后取出在常
Motor stored in ambient condition of 80℃,less than 50% relative humidity
温下置放30分钟。
for 48 hours then retrieved and stored in normal ambient condition for 30 minutes.

3-4-3 耐低温试验（Low temperature storage test）

电机在温度为-20℃，的环境中置放48小时，然后取出在常温下置放30分钟。
Motor stored in ambient condition of -20℃ for 48 hours then retrieved and stored in normal ambient condition for 30 minutes.

3-4-4 热冲击试验（Thermal shock test）

5个循环的热冲击试验。1个循环包括：在60℃温度下连续置放2小时，然后取
5 cycles of thermal shock cycles. 1 cycle consists of successional storage
出在常温下置放30分钟；再在-10℃的温度下置放2小时，然后取出在常温下置
in 60℃ for 2 hours,storage in normal conditions,stored in -10℃ for 2
放30分钟，电机测试应在电机在常温下置放30分钟后进行。
hours and finally in normal condition again. Measurement shall be made after storage in
normal ambient condition for 30 minutes.

3-4-5 振动试验（Vibration test）

全振幅±2 mm，振动数1000 c.p.m.的正弦波，在电机X，Y，Z三个方向分别进行振动，电机
Motor shall withstand vibration test when subjected to a vibration of 1000
test in three directions respectively.
### 规格书（Specification）

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#### 3-4-6冲击或跌落试验（Shock or Dropping test）
电机在X, Y, Z三个方向分别承受80g的冲击力各1次；或电机在装箱状态下，从75cm高处，以80G impact force 1 time, X, Y and Z direction respectively, or dropped 1 time in X, Y, and Z direction from height of 75 cm to the concrete floor with motor in packaged condition.

#### 寿命试验（ENDURANCE TEST）
电机在5 VDC 50 Hz, 150 gf.cm 的负荷状态下, 经过10000小时90°正反方向旋转, 电机应能Motor shall satisfy requirements in 1-8, 1-9, 1-10 and 2-5 after 10,000 hours of 90°respectively, or dropped 1 time in X, Y, and Z direction from height of 75 cm to the concrete floor with motor in packaged condition.

#### 摩擦机构耐久试验（FRICTION MECHANISM ENDURANCE TEST）
电机输出轴在经过1000次耐久循环试验后, 摩擦力矩在800~2500gf.cm , 1个循环包括180°正反两个方向旋转（1个循环约1.5秒）Frictional torque of output shaft shall be from 800gf.cm to 2500gf.cm after 1000 cycles back and forth rotation of output shaft and clutch mechanism must be slipped through this test.
Rated voltage: 5VDC
Number of Phase: 4
Speed Variation Ratio: 1/64
Stride Angle: 5.625°/64
Frequency: 100Hz
DC resistance: 500Ω±7% (25°C)
Idle In-traction Frequency: >600Hz
Idle Out-traction Frequency: >1000Hz
In-traction Torque: >34.3mN.m (120Hz)
Self-positioning Torque: >34.3mN.m
Friction torque: 800-1200 gf.cm
Pull in torque: 300 gf.cm
Insulated resistance: >10MΩ (500V)
Insulated electricity power: 600VAC/1mA/1s
Insulation grade: A
Rise in Temperature: <40K (120Hz)
Noise: <35dB (120Hz, No load, 10cm)
Model: 28BYJ-48 – 8V

Dimensions:

- AWG#: 26 UL 106TX5
- PVC
- JST XHP-5(m)
  - SXH-001T-P0.6

- Dimensions in millimeters: