

# 乐清昊奇电机有限公司

YUEQING CURIOSITY MECHANICAL AND ELECTRICAL CO., LTD.

## 产品规格书

## PRODUCT SPECIFICATION

客 户 信 息	客户名称/ Buyer Name	
	客户料号/Buyer's Part No.	
	客户承认签章 /Buyer's Approval & Signatures	

昊 奇 电 机	文件编号/Spec No.	FET2038-1	版本	1.0
	品名描述	声波电机		
	Product Description	Sonic Motor		
	型号/Part No.	FET2038		
	送样日期/Date			
	设计/Designed by	审核/Checked by	批准/Approved by	

## 规格书内容/ Contents

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## 2.适用范围/General Scope of Application

本说明书适用于电动牙刷无刷电机FET2038 系列.

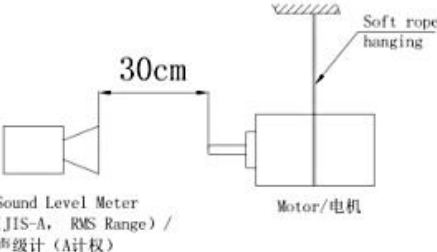
This manual is suitable for electric toothbrush brushless motor FET2038 series

## 3.使用条件/Operating Conditions

项目/Item	规格/Specifications
3-1 额定电压 Rated voltage	3.7V
3-2 使用电压范围 Operating voltage	3.0~5.0V
3-3 使用频率范围 Operating frequency	170~350Hz
3-4 额定频率 Rated frequency	255Hz (Type/代表值)
3-5 额定负载 Rated load	4.4g (刷头重量)
3-6 使用姿势 Motor Position	全方向 Any positions
3-7 Temperature 、 Humidity Range 使用温度、湿度范围	1) Working temperature: -10℃~60℃, Humidity: ≤90 %RH 工作环境温度、湿度 2) Storage temperature: -30℃~75℃, Humidity: ≤80 %RH 保存温度、湿度
3-8 Measuring condition 测定条件	Normal temperature and humidity if there is any doubt about judgment , measurements shall be made within 20±3℃ 60±5%RH 在常温常湿下测试,若对结果有任何异议,均以 20±3℃,相对湿度 60±5%环境下的测试数据为准
3-9 Appearance 外观	There shall be no evidence of mechanical damage, and shall not have inadequate corrosion and so on. 目视无机械损伤、无锈蚀。

## 4.电特性/ Electrical characteristics

NO. 序号	Item/项目	Specification/ 规格	Type/ 代表值	Condition-Remark/ 条 件 - 备注
4-1	Rated frequency 额定频率	255Hz	255Hz	At rated voltage and rated load and rated frequency and 68%Duty cycle relative to half cycle. The load is a toothbrush head with 300g weight 额定电压、额定负荷、额定频率、68%占空比相对于半周期，负载带牙刷头上带 300g 砝码。
4-2	Rated current 额定电流	330mA±10%	322mA	
4-3	No load current 空载电流	280mA±10%	280mA	At rated voltage and NO load and rated frequency and 68% Duty cycle relative to half cycle. 额定电压、无负荷、额定频率、68%占空比相对于半周期

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4-6	Starting voltage 启动电压	3.0V DC Min	3.0VDC							
4-7	Insulation resistance 绝缘电阻	10MΩ Min	At 100V DC between motor terminal and case 直流电压 100V，测电机端子与 机壳间绝缘阻抗							
4-8	Mechanical Noise 机械噪音	<table border="1"><tr><td>45dB(A) Max</td><td>42dB(A)</td></tr><tr><td colspan="2">At rated voltage and No load 额定电压下，空载</td></tr><tr><td colspan="2">Back ground noise/背景噪音 30dB(A) Max</td></tr></table>  <p>Sound Level Meter (JIS-A, RMS Range) / 声级计 (A计权)</p> <p>30cm</p> <p>Soft rope hanging</p> <p>Motor/电机</p>			45dB(A) Max	42dB(A)	At rated voltage and No load 额定电压下，空载		Back ground noise/背景噪音 30dB(A) Max	
45dB(A) Max	42dB(A)									
At rated voltage and No load 额定电压下，空载										
Back ground noise/背景噪音 30dB(A) Max										

4-9	Rated Voltage/ frequency 额定电压/频率	Torque/扭矩	Current/电流	Angle/角度	Condition-Remark 条件-备注
	3.7V	0	280mA±10%	5.2° min	At rated voltage and rated load and rated frequency and 68%Duty cycle relative to half cycle. 额定电压、额定负荷、额定频率、 68% 占空比相对半周期
		300g 砝码 (牙刷头吊重 300g)	330mA±10%	5.2° min	
4-10	轴扁位的偏角				Condition-Remark 条件-备注
	0±5°				the angle between Vertical line of casing flat and Vertical line of shaft flat 电机壳平面的中心法线为基准 0 位，轴 扁位法线与基准 0 位的夹角

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<b>5、信赖性/Reliability</b>				
NO. 序号	Item 项目	Test condition 试验条件	Requirements 判定基准	
5-1	Life 寿命	Voltage/电压: 3.7V Rated Load/额定负荷 Environment/环境条件: Normal temperature and humidity 3-8 / 常温、常湿 3-8 255 Hz 频率/Frequency: 68% 占空比/Duty cycle relative to half cycle, 连续工作 /Working life 500 H.	After the test ,motors shall be approved as specified in item 6-1 试验后, 马达能满足 6-1 的规定	
5-2	Low temp exposure 低温放置	Temperature /温度: -30±2℃ Time /时间: 48hours	After 4 hours exposure in ordinary temperature and humidity ,motors shall be approved as specified in item 6-2 常温常湿条件下放置 4 小时后, 马达满足 6-2 的规定	
5-3	High temp exposure 高温放置	Temperature /温度: 75±2℃ Time /时间: 48hours		
5-4	Humidity exposure 湿度放置	Temperature /温度: 40±2℃ Humidity /湿度: 90±5%Rh Time /时间: 48hours		
5-5	Thermal shock 热冲击	<div style="text-align: center;">  </div>	After 4 hours exposure in ordinary temperature and humidity ,motors shall be approved as specified in item 6-3 常温常湿条件下放置 4 小时后, 马达满足 6-3 的规定	
5-6	Free fall 自然落下	Set the motors in the carton; Drop the motors with carton on the concrete floor from 100cm in height. Drop once in each of the six perpendicular plants, totally 6 times. 将产品在出荷包装状态距混凝土地面高度为 100cm 处自然落下。6 个面各作一次共 6 次。 Height /高度: 100cm Direction / 方向: ±x, ±y, ±z Number of times /次数: Each 1 times	After the test , motors shall be approved as specified in item 6-1 试验终止后, 马达能满足 6-1 项的判定基准	
5-7	盐雾试验 Salt spray test	浓度/Concentration: 5% NaCl 溶液/ 5% NaCl solution PH 值/PH value: 6.5--7.2 试验槽温度/Test chamber temperature: 35±2 °C 盐雾沉降量/Salt spray deposition: 1--2ml/80cm2*h 试验时间/Time: 8H (Shaft /电机轴 96H)	试验后恢复 2h, 马达外壳不可出现不可擦拭的锈迹 After 2 hours exposure in ordinary temperature and humidity, non-wipe-able rust on the case is not allowed	

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6.判定基准/ Requirements

NO./ 序号	Item/项目	Requirements/判定基准
6-1	TABLE A(5-1、 5-6)	1) Rated speed/额定转速: Initial data/初始值±50%Max 2) Rated current/额定电流: Initial data/初始值±50%Max 3) Insulation resistance/绝缘阻抗: 1 MΩ Min 4) Starting voltage/起动电压: 3.5V DC Max
6-2	TABLE B(5-2、 5-3、 5-4)	1) Rated speed/额定转速: Initial data/初始值±30%Max 2) Rated current/额定电流: Initial data/初始值±30%Max
6-3	TABLE C (5-5)	1) Rated speed/额定转速: Initial data/初始值±35%Max 2) Rated current/额定电流: Initial data/初始值±35%Max

7. 机械特性/ mechanical characteristics

NO./ 序号	Item/项目	Specification /规格	Condition remark/条件备注
7-1	Configuration 外形尺寸	As specified in outline drawing 参照外形图	
7-2	Mass 质量	32g±5g(Approx . )	
7-3	Shaft press fit force/主轴最大 承受压入力	≥10kgf	
7-4	Max Transient Torque/瞬间容 许最大扭矩	≥5kgf.cm (0.5Nm)	

8. 注意/Cautions

Do not press the shaft with a excessive force to avoid any damage to the gear body。在输出轴部不可施加过大的外力，避免减速器内部受损。

Soldering/焊接

To avoid damaging terminals or lead wires, soldering time should be completed within 1-2 seconds.  
焊接应在 1-2 秒内完成,以免损坏端子或导线.

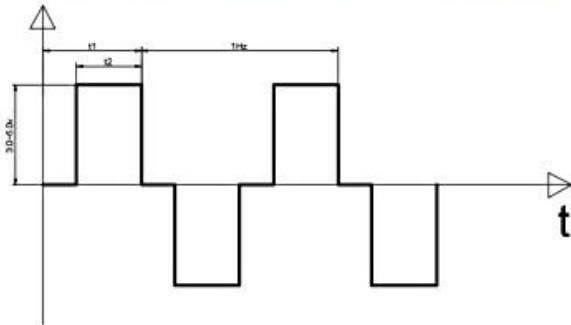
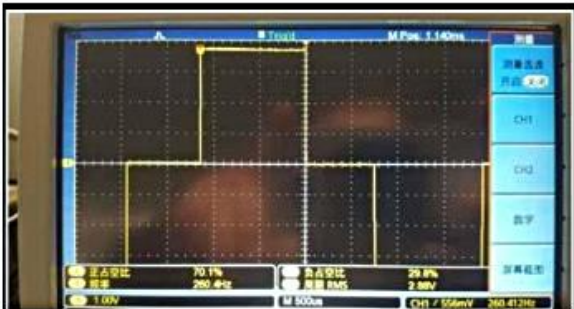
Storage/储存

Avoid storing in high temperature, high humidity and corrosive gas environment ,Not to be stored without running for more than 6 months.  
应避免存放在高温,高湿腐蚀性气体的环境中,连续存放不应超过 6 个月.

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项目/Item	规格/Specification			判定标准/Judgment

### 9. 驱动方式/ Drive mode

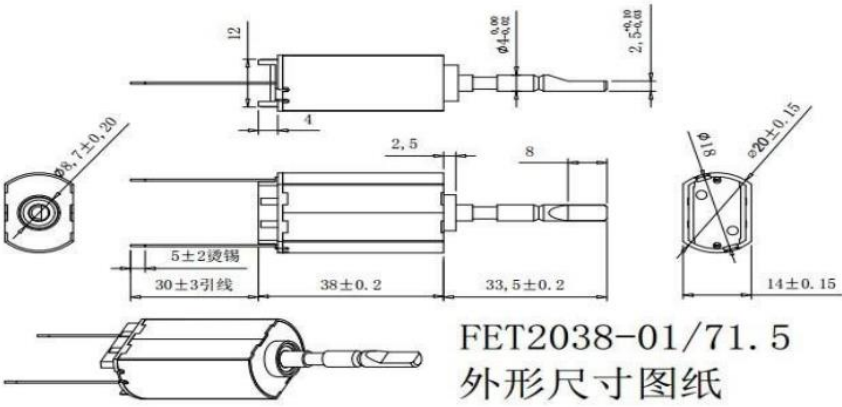
如下图，正反两个方向交替供电，供电频率控制 170Hz~350Hz 的范围内，可按照实际需求控制占空比大小



- 注意：1、因为电机做的是左右摆动运动，正反两个方向的通电时长需调节成一致，这样会有最佳的振动力及振幅。
- 2、不能在电机上供直流电压，这时电机工作在堵转状态，会持续发热，且不会动作。即当不需要电机振动时，电机两端的供电应完全切断。



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FET2038-01/71.5  
外形尺寸图纸