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## 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	

金 龙 公 司	文件编号/Spec No.	KOTL-1840B-A-3.6	版本	1.0A
	品名描述 Product Description	声波电机 Sonic Motor		
	型号/Part No.	KOTL-BL1840B-001		
	送样日期/Date			
	设计/Designed by	审核/Checked by	批准/Approved by	
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	2017.11.09	2017.11.09	2017.11.09	

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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 KBL1840B-A-3.6 系列。

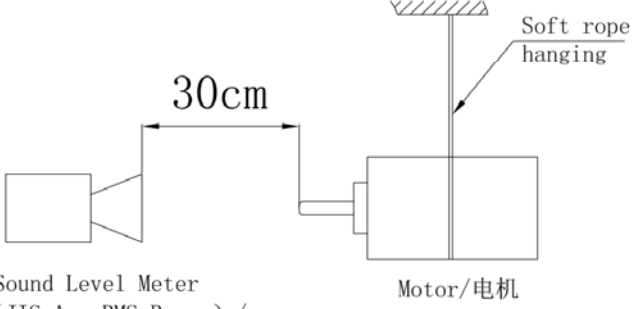
This specification applies to electric toothbrush BLDC motors model KBL1840B-A-3.6

## 3.使用条件/Operating Conditions

项目/Item	规格/Specifications
3-1	额定电压 Rated voltage 3.6V DC
3-2	使用电压范围 Operating voltage 3.0~5.0V DC
3-3	使用频率范围 Operating frequency 170~350Hz
3-4	额定频率 Rated frequency 270Hz (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。

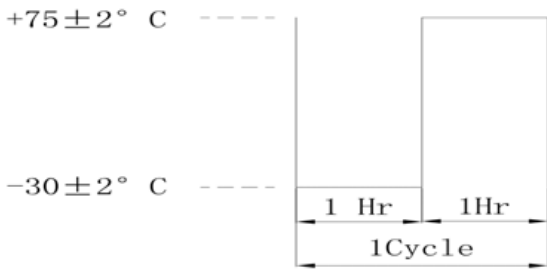
## 4.电特性/ Electrical characteristics

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	270Hz	270Hz	At rated voltage and rated load and rated frequency and 44%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、44%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	480mA±10%	478mA	
4-3	No load current 空载电流	485mA±10%	482mA	At rated voltage and NO load and rated frequency and 44% Duty cycle relative to half cycle. 额定电压、无负荷、额定频率、44%占空比相对于半周期
4-4	Stall current 堵转电流	860mA ±10%	856mA	At rated voltage 3.6VDC, no driving PCB 额定电压, 直接连接直流电源, 不带驱动 PCB
4-5	Torque 力矩	250gf.cm min	270gf.cm	At rated voltage 额定电压、平衡位置的扭力 额定电压 3.6V、平衡位置的扭力

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" style="margin-left: auto; margin-right: auto;"> <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 style="text-align: center;">Sound Level Meter (JIS-A, RMS Range) / 声级计 (A计权)</p> <p style="text-align: center;">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
	3.6VDC	0	485mA±10%	5.2° min	At rated voltage and rated load and rated frequency and 44%Duty cycle relative to half cycle. 额定电压、额定负荷、额定频率、44% 占空比相对半周期
		300g 砝码 (牙刷头吊重 300g)	480mA±10%	5.2° min	
4-10	轴扁位的偏角 0±5°				Condition-Remark 条件-备注  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

## 5.信赖性/ Reliability

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: 3.6V DC Rated Load/额定负荷 Environment/环境条件: Normal temperature and humidity 3-8 / 常温、常湿 3-8 270Hz 频率/Frequency, 44%占空比/Duty cycle relative to half cycle, 连续工作 /Working life 5000H.	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: $-30 \pm 2^{\circ}\text{C}$ 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: $75 \pm 2^{\circ}\text{C}$ Time /时间: 48hours	
5-4	Humidity exposure 湿度放置	Temperature /温度: $40 \pm 2^{\circ}\text{C}$ Humidity /湿度: $90 \pm 5\% \text{Rh}$ Time /时间: 48hours	
5-5	Thermal shock 热冲击	 <p>Test cycle/试验循环周期数: 25cycles</p>	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: $\pm x, \pm y, \pm z$ 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: $35 \pm 2^{\circ}\text{C}$ 盐雾沉降量/Salt spray deposition: 1--2ml/80cm <sup>2</sup> *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

## 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	36g±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

8-1 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。

8-2 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.

8-3 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.

2017.11.09	说明书/Specification	编号/ KOTL-1840B-A-3.6	6/7
项目/Item	规格/Specification		判定标准/Judgment

### 9. 驱动方式/ Drive mode

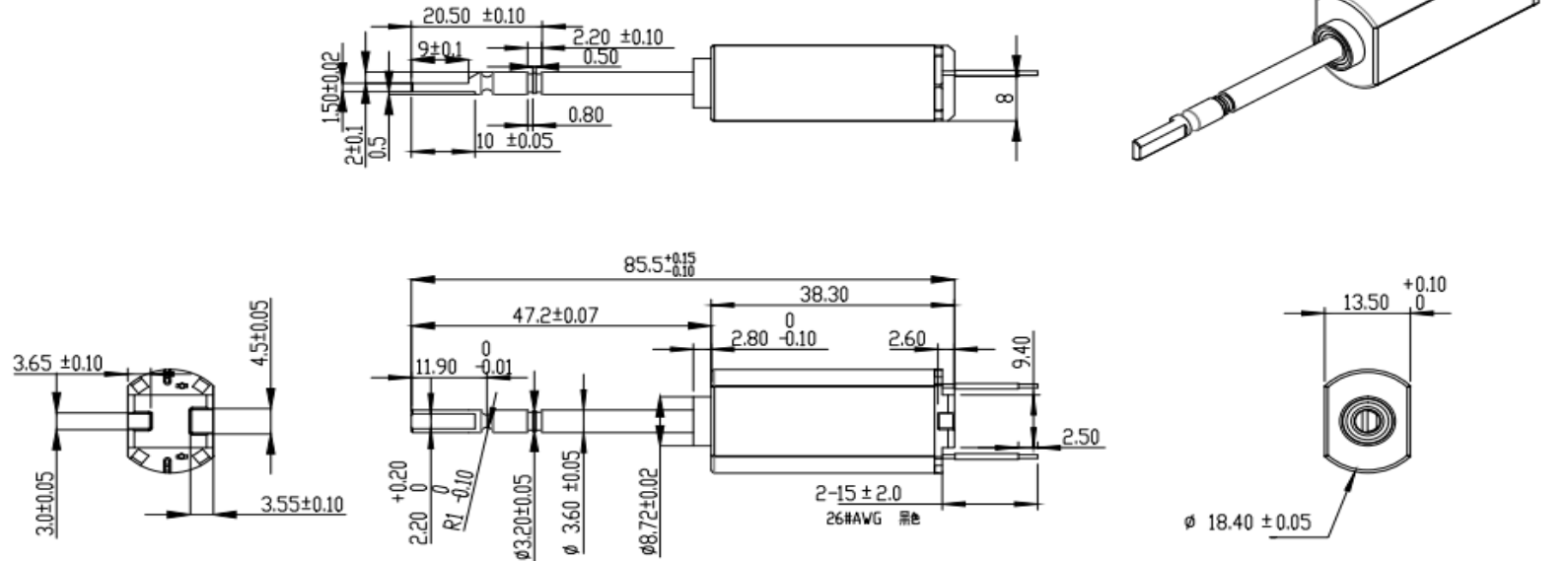
如下图，正反两个方向交替供电，供电频率控制 170Hz~350Hz 的范围内，可按照实际需求控制占空比大小



- 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，这时电机会工作在堵转状态，会持续发热，且不会动作。即当不需要电机振动是，电机两端的供电应完全切断。



“图样代号”



备注:

1. 引线为26#AWG规格线，线色为黑色。
2. 引线焊接朝内，端子高度不能大于端面。
3. 电源线和漆包线焊接需穿孔焊线。

						外形图			KOTL	
标记	处数	分区	更改文件号	签名	年月日	阶段标记	质量	比例	KBL1840B	
设计			标准化				0.012			
审核			工艺							
主管设计			审核							
			批准			共 张	第 1 张	版本	替代	

零件代号
借(通)用件登记
旧底图总号
底图总号
签字
日期