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产 品 规 格 书

Product specification

Product Name (产品名称): LINEAR VIBRATOR/线性振动器

Product Model (产品型号): TSL-ELV208-175S

Customer name (客户名称)	
Item of customer (客户项目)	
Customer part no. (客户料号)	
Customer approved (客户承认)	

拟 制

Drawn

审 核

Check

批 准

Approve

PRODUCT SPECIFICATION

Model: TSL-ELV208-175S

Document NO. : 202230920-01

Revised record

修订记录

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1. Operating scope 适用范围

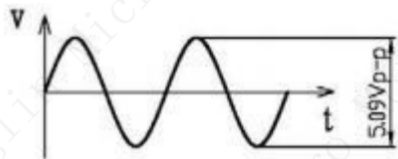
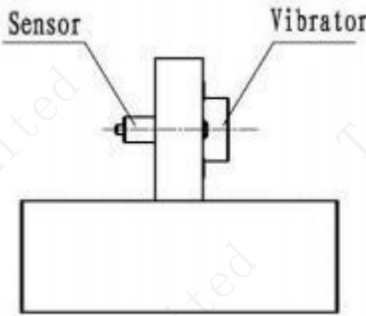
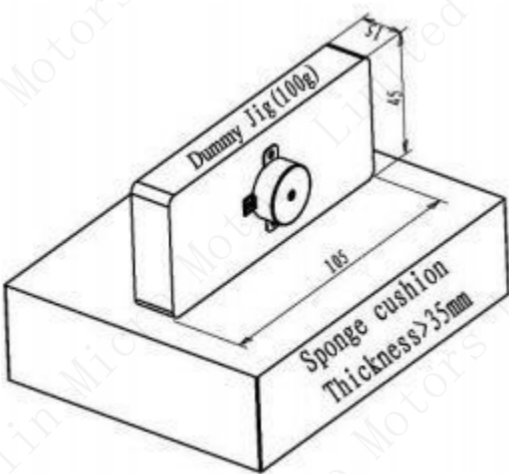
This specifications apply to TSL MOTOR linear vibrator model TSL-ELV208-175S.

本规格书适用于TSL-ELV208-175S线性振动器。

2. Storage, Operating temperature / Humidity conditions (储存、使用温度/湿度条件)

No	Items (项目)	Conditions (条件)
2-1	Operating Environmental 使用环境	Temperature / 温度: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$ Humidity / 湿度: $5 \sim 95\%\text{RH}$
2-1	Storage Environmental 储存环境	Temperature / 温度: $-40^{\circ}\text{C} \sim +120^{\circ}\text{C}$ Humidity / 湿度: $5 \sim 95\%\text{RH}$

3. Standard measurement conditions (标准测试条件)

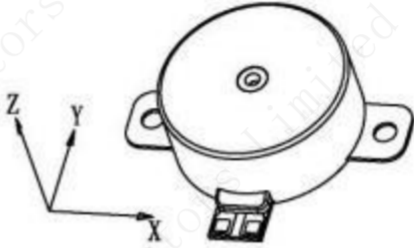
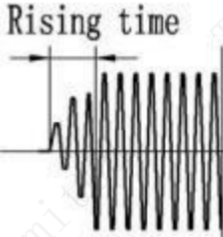
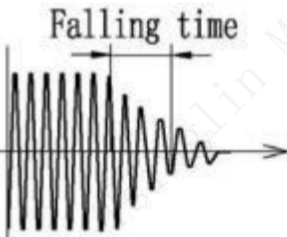
NO	ITEMS/项目	SPECIFICATION/规定
3-1	Temperature/温度	$20 \pm 5^{\circ}\text{C}$
3-2	Humidity/湿度	$(65 \pm 20\%)\text{RH}$
3-3	Rated voltage 额定电压	Sinewave $1.8 \pm 0.05\text{Vrms}$ ($V_{p-p} = 5.09\text{V}$) 
3-4	Operating Frequency 工作频率	@F0 ($F0 \in 175 \pm 10\text{Hz}$)
3-5	Measuring method 测量方法	Place Vibrator As shown in the following figure (Lock the Vibrator on a 100g dummy jig) 振动器如下图所示放置 (固定在 100 克的测试夹具上) The direction of the sensor as same as the direction of Vibrator vibration (As item 4-2) 传感器检测方向和振动器振动方向保持一致。(参见项目 4-2) 

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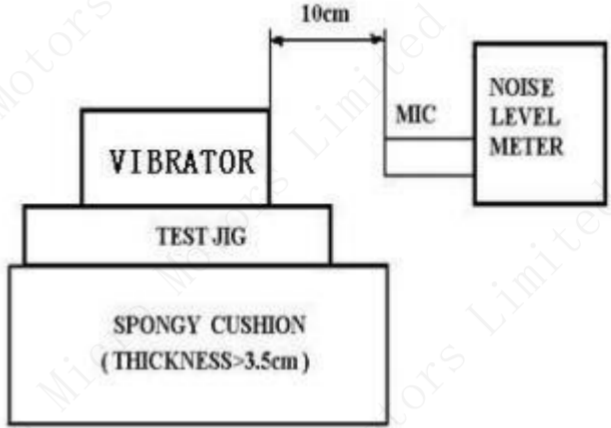
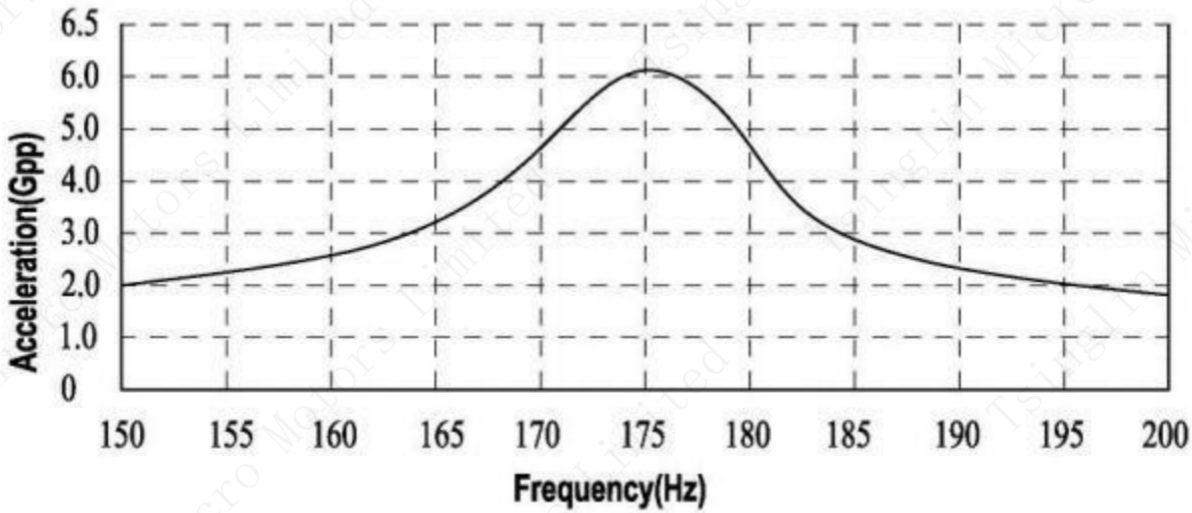
4. Product performance (制品性能)

NO	Items(项目)	Requirements (要求)	Conditions Or Remark (条件/备注)
4-1	Shape size 外形尺寸	$\phi 20*8$ (mm) not included welding position of lead wire and Mounting arm 不包含引线焊接部位 和安装臂	Details refer to page 8 
4-2	Vibration direction 振动方向	Z axis	
4-3	Weight/重量	$10.8 \pm 0.5g$	/
4-4	Resonant Frequency 谐振频率	$175 \pm 10Hz$	@ Sine wave 1.8Vrms
4-5	Operating voltage 工作电压	Maximum 2.0Vrms	Sine wave, Continuous Vibrate Mode/连续振动模式
		Maximum 9.0Vp_p	Sine wave, Boost Impulse Mode, Duration less than 30ms and interval time is greater than 70ms/升压冲击模式, 脉冲持续时间小于 30ms, 间隔时间大于 70ms
4-6	Acceleration 振动加速度	$6.0 \pm 1Gpp$	@ F0 Sinewave 1.8Vrms (5.09Vp_p)
4-7	Rise time 启动时间	$\leq 50ms$	Rise to 70% of the nominal acceleration 加速度上升到典型值的 70% 
4-8	Falling time 断开时间	$\leq 50ms$	 Down to 30% of the nominal acceleration 加速度下降到典型值的 30%
4-9	Terminal resistance 端子电阻	$9.0 \pm 1\Omega$	AT 20°C
4-10	Rated current 额定电流	$\leq 150mA_{rms}$	@F0 Sinewave 1.8Vrms
		$\leq 200mA_{rms}$	@other frequency Sinewave 1.8Vrms
4-11	Insulation resistance 绝缘电阻	$10M\Omega$ (Min)	100V DC, Between the vibrator terminal and case. 测试电压 DC100V, 端子和外壳间。

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4-12	Operating Attitude 工作姿态	All direction (全方向)	
4-13	Mechanical Noise 机械噪音	60dB-A (MAX)	At rated voltage and load; F0 , Background noise 35dB-A (MAX)/在额定电压, 额定负载下测试, 背景噪音不超过 35dB. 
4-14	Frequency – Acceleration Characteristics (@sinewave 1.8Vrms) 频率-加速度特性曲线 (电压: 正弦波 1.8Vrms) 		

5. External performance (外观性能)

it should not remarkable wound and deleterious defect, No distortion、rust、stain, etc.
不应有明显的划伤、有害缺陷, 无变形、锈蚀、污迹等。

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6. Reliability test 可靠性试验

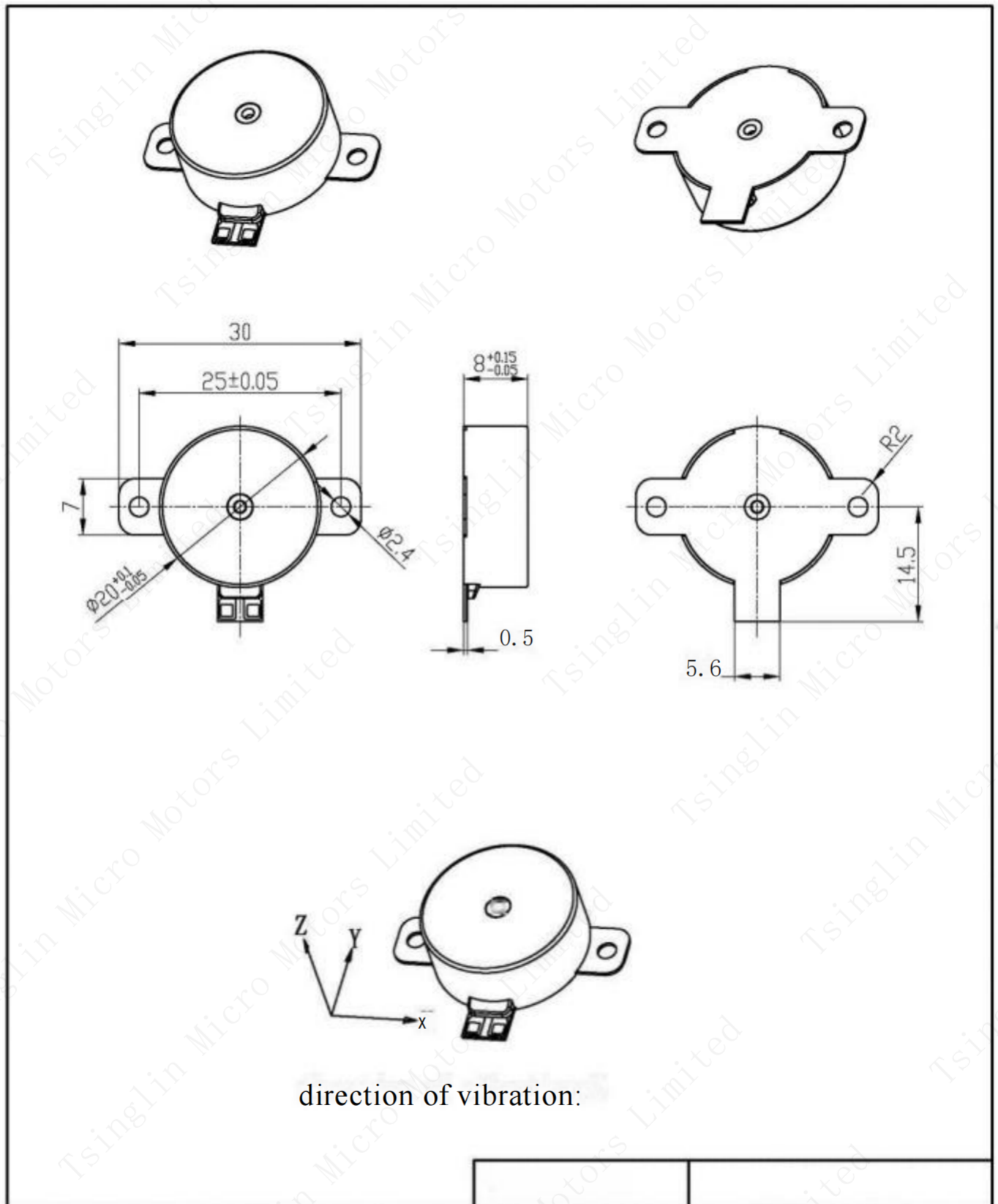
NO	Items(项目)	Standard test conditions(标准试验条件)	Judgment (判定)
6-1	Life test 寿命试验	Lock the vibrator on a test fixture (100g JIG) 振动器固定在 100g 的测试夹具上。 Temperature/温度: 85±2℃ Humidity/湿度: 65±20%RH Sinewave 1.8Vrms, f=175Hz 正弦交流电 1.8Vrms, 频率 150Hz Test model/试验形式: 0.5s ON 0.5s OFF Total times:2,000,000(约 555.6 小时/23.2Days)	After the test, vibrator shall be satisfy with specified in item 6-8 试验结束后, 振动器应满足 6-8 中规定的要求。
6-2	Low temp Storage 低温存放试验	Temperature (温度): -40±2℃ Test time (试验时间): 168hours	After the test, After 2 hours placed in ordinary temperature and humidity, vibrator shall be satisfy with specified in item 6-8 试验结束后, 在常温常湿中放置 2 小时后, 振动器应满足 6-8 中规定的要求
6-3	High temp Storage 高温存放试验	Temperature (温度): 120±2℃ Test time (试验时间): 168 hours	
6-4	Heat shock 温度冲击	-40℃/+120℃ 2hours/cycle, 15cycles. transition time ≤5minutes 低温-40℃, 高温+120℃, 2 小时切换, 15 个循环 切换时间间隔≤5 分钟	
6-5	Humidity storage 湿热存放试验	Temperature (温度): 50±2℃ Humidity (湿度): 95%RH Test time (试验时间): 120hours	
6-6	Drop test 跌落试验	Dummy JIG 200g, drop to the granite floor. 治具 200g, 自由落下到花岗岩板上 Height/高度: 1.2m Direction/方向: 6 faces and 12 sides of the JIG . Times/次数:Each direction 1 drop, totaling 18 times. 每方向跌落 1 次, 共计 18 次	After the test, vibrator shall be satisfy with specified in item 6-8
6-7	Vibration Test 振动试验	JIG/治具: 160g Acceleration /加速度: 2.2G Sweep frequency /扫频: 10～55Hz/min Direction/方向: X、Y、Z axis Duration/持续时间: 10min in each direction	试验结束后, 振动器应满足 6-8 中规定的要求。
6-8	AFTER TEST REQUIREMENTS/试验后特性判定		
	1、Acceleration change rate within ±30% from initial./加速度变化在初始值的±20%以内;		
	2、Resonant frequency(f0) change rate within ±10% from initial./ 谐振频率 (f0) 变化在初始值的±10%以内;		
	3、Insulation resistance within±20% from initial./绝缘电阻变化在初始值的±20%内;		
	4、Terminal resistance within±20% from initial./ 端子电阻变化在初始值的±20%内;		
	5、There should be no abnormalities in appearance and structure.外观和结构应无异常;		

7. Outline drawing (外形图)

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8. Encoding rules 编码规则

To be determined according to customer's requirements

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依据客户需求确定

9. Packaging requirements 包装要求

50 pcs per box, 5 boxes per bundle, 2 bundles per box, 500 total.

每盒 50PCS, 每捆 5 盒, 每箱 2 捆, 共 500PCS

10. Caution for Use 使用注意事项

- 10-1. Please use vibrator in the specification of this specification. Otherwise the service life and performance of the vibrator will be affected. 请在本规格书规范内使用振动器, 否则会影响振动器的使用寿命和性能。
- 10-2. Make arrangement to limit the storage period to 6 months or less. 请在 6 个月内使用。
- 10-3. please do not push the load of 15N or more on the surface of the vibrator, when exceeding 20N, it causes the trouble. 振动器表面承载压力不得超过 20 牛顿, 否则可能会导致功能故障。
- 10-4. Vibrators should be firmly fixed in the direction of vibration (Recommended Installation Force 5-8N), Otherwise it will be prone to noise. 振动器应牢牢固定在振动方向上(推荐安装力 5-8N), 否则容易产生噪声。
- 10-5. Please lay the vibrators carefully in transportation to avoid any serious damage to the vibrator body or its electric function because of collision. 在运输过程中应小心轻放, 避免振动器碰撞受损
- 10-6. when soldering FPCB, The soldering iron temperature does not exceed 350 degrees and the soldering time per spot does not exceed 3 seconds. 焊接 FPCB 时, 电烙铁温度不超过 350°, 每个点焊接时间不超过 3 秒。
- 10-7. Vibrators can't be used in high temperature, High humidity and corrosive gas environment. 振动器不能在高温、高湿度和有腐蚀性气体环境中使用。
- 10-8. The vibrator has a strong magnet, So please be aware that it has a magnetic force on the surface of the bracket. 振动器有一个强的磁铁, 因此请注意, 它的支架表面有磁力。
- 10-9. Under the conditions of meeting this specification, our company can change the material、size and shape of parts to improve quality、performance or production efficiency. 在满足本规范的前提下, 我司可以改变零件材料、尺寸及形状来改善品质、性能或生产效率。
- 10-10. If there is any argument on vibrator performance and/or life, judgment is to be made base on this specification only. 如对振动器的性能和(或)寿命有任何争议, 仅基于此规格书作出判断。
- 10-11. In order to avoid mechanical noise caused by boosting impact, please set a clearance hole in the axial direction of the vibrator during installation, as shown in the following figure 为避免升压冲击时产生机械噪音, 安装时请在振动器的轴向设置让位孔, 参见下图

