



力臻股份有限公司
LJ DEVICE CO., LTD.

零件規格書 / 承認書
SPECIFICATION FOR APPROVAL

CUSTOMER : _____

DESCRIPTION : _____ VIBRATOR _____

MODEL : _____ : ; !H \$, && \$?%* - 6 _____

CUSTOMER PART NO : _____

APPROVED SIGNATURES

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Rev	Date	Description	Designed	Checked	Approved
A	20&&/1/+	Release		Dc ``7\ Yb	




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Dsgd 设计	Chkd 审核	Appd 批准	Part No: FG-T4082230K1669B				
			料号				
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1. SCOPE

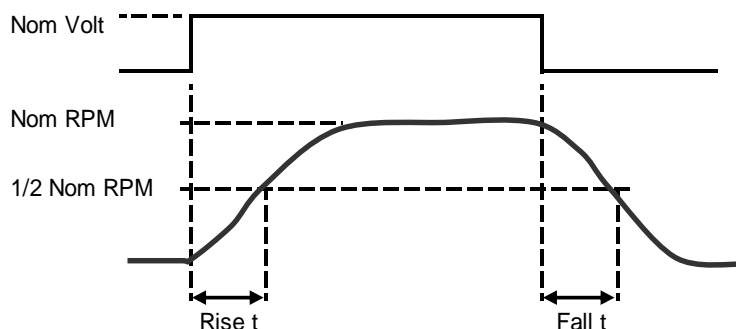
This document contains specific electrical and mechanical characters, critical characteristics, reliability tests, packaging condition, quality assurance, reflow profile and etc..

2. MECHANICAL CHARACTERISTIC

- | | | |
|------|---|-----------------------|
| 2.1. | Mechanical drawing | See appendix 2 |
| 2.2. | Axial play of shaft | 0.3 mm Max |
| 2.3. | Counter weight density: | 17.0 g / cc Min |
| 2.4. | Mechanical noise of motor operating at rated speed: | 50 dB Max A-weighting |
| | Background noise 26dB. (Measured distance 10 cm, see appendix 1). | |

3. ELECTRICAL CHARACTERISTICS

- | | | |
|-------|--|------------------------------|
| 3.1. | Vibrator positioning: | Horizontal |
| 3.2. | Operating voltage: | 3.0 V |
| 3.3. | Operating voltage range: | 2.6– 3.6 V |
| 3.4. | Load current at operating voltage: | 110 mA Max |
| 3.5. | Starting current at operating voltage: | 130 mA Max |
| 3.6. | Insulation resistance and voltage breakdown: | at 50V DC, 1MΩ Min and above |
| 3.7. | Terminal resistance: | 28.0±15%Ω |
| 3.8. | ◆Load speed: | 11000±2500 rpm |
| 3.9. | Rotation direction: | C.W. & C.C.W |
| 3.10. | RPM Rise time (see picture 1) | 80ms Max |
| 3.11. | RPM Fall time (see picture 1) | 100ms Max |



Picture 1 RPM rise and fall time

- 3.12 Standard loaded starting voltage: Under standard loaded condition, towards C.W. rotor shall move in all position at 2.6V (counterweight should be turned slowly at 360°)

All mechanical and electrical measurements should measured at room temperature and ordinary humidity.

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4. ADDITIONAL INFORMATION

- 4.1. Vibrator weight 0.85g
- 4.2. Pull out strength of counter weight and shaft 50N Min
- 4.3. Acceleration level at nominal RPM (Grms) (test jig mounted in freely suspended)
- 4.4. Speed and current variation (function of temperature, -20°C to +70°C)

5. CRITICAL CHARACTERISTICS

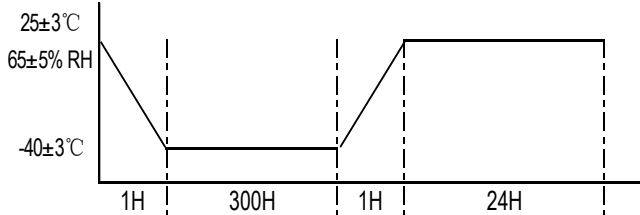
- 5.1. Functional dimensions
- 5.2. Rated current at specified rotating speed
- 5.3. Operating speed at operating voltage
- 5.4. Starting current at operating voltage
- 5.5. Min. starting Voltage




6. ENVIRONMENTAL CHARACTERISTICS

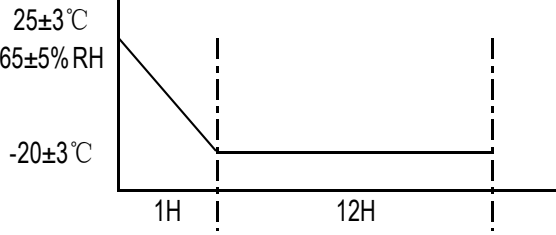
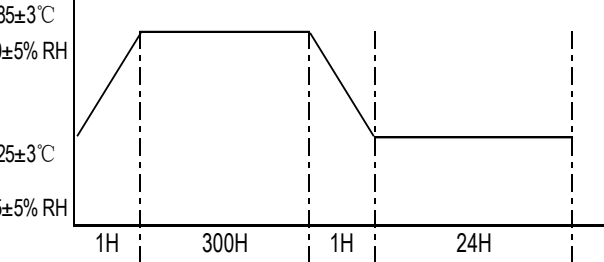
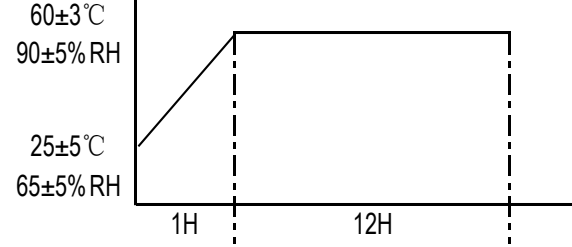
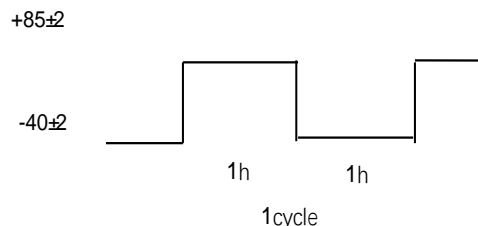
- 6.1. Operating temperature ranges: -20°C to +70°C
- 6.2. Storage temperature ranges: -40°C to +85°C




7. RELIABILITY TESTS

7.1. We have already performed reliability tests and measure nom rotation speed, nom load current, nom resistance, nom starting currents and nom starting voltage before and after tests, please check following table1 for detail reliability test information. Each test we use at least 10 samples for verification.

Items	Test conditions	Judgment
7.2 Cold	Storage test -40±3°C /300h. 65±5%RH, Recovery 24 h Measurements with test jig 	No mechanical damage. Normal performance of vibrator. (Max +/-30% variation of nom RPM)

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7.3	Cold	<p>Operational test Apply operating voltage, $-20\pm 3\text{ }^{\circ}\text{C}$ /12h. $65\pm 5\%\text{RH}$ No recovery. Measurements with test jig.</p> 	<p>No mechanical damage. Normal performance of vibrator. (Max +/-30% variation of nom RPM)</p>
7.4	Dry heat	<p>Storage test $+85\pm 3\text{ }^{\circ}\text{C}$ /300h. $60\pm 5\%\text{RH}$. Recovery 24h. Measurements with test jig.</p> 	<p>No mechanical damage. Normal performance of vibrator. (Max +/-30% variation of nom RPM)</p>
7.5	Damp heat	<p>Operational test Apply operating voltage, $+60\pm 3\text{ }^{\circ}\text{C}$ /12h. $90\pm 5\%\text{RH}$, No recovery. Measurements with test jig.</p> 	<p>No mechanical damage. Normal performance of vibrator. (Max +/-30% variation of nom RPM)</p>
7.6	Thermal Shocktest	<p>Temperature:$-40^{\circ}\text{C}\sim 85^{\circ}\text{C}$ 1Time:2h Circle cycle:20cycles</p> 	<p>No mechanical damage. Reduced performance of vibrator. (Max +/-30% variation of nom RPM)</p>

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7.7	Lifetime test	Operational test. Temperature: 20±2°C, 60%-70%%RH, 0.5s On / 0.5s Off: 400000 cycles. Recovery 4h. Measurements with test jig.	No mechanical damage. Normal performance of vibrator. (Max +/-30% variation of nom RPM)
7.8	Free Fall	Mount the vibrator in the dummy box.(dummy box weight 100g), Drop height 1.5 m onto concrete. 3 times in each 6 directions. All Measurements with test jig.	No mechanical damage. Normal performance of vibrator. (Max +/-30% variation of nom RPM)
7.9	Packing fall	Drop the packing condition from 0.6m onto the concrete floor. 1 time in 6 directions, 1 corner and 3 edges.	No mechanical damage. Normal performance of vibrator. (Max +/-30% variation of nom RPM)
7.10	vibration test	10 ~60 Hz, 2.1G ~80Hz, 1.4G ~100Hz, 0.7G 5min, X,Y each 2h,Z,4h ~125Hz, 0.4G Measurements with test jig.	No mechanical damage. Normal performance of vibrator. (Max +/-30% variation of nom RPM)
7.11	Packing vibration	5~50Hz, 1.56G 9Hz/min, X,Y,Z each 2H	No mechanical damage. Normal performance of vibrator. (Max +/-30% variation of nom RPM)

Table1 Reliability test




8. EXPECTED SHIPPING AND STORAGE CONDITIONS

- | | | |
|------|-------------------------------|------------------------|
| 8.1. | Relative humidity | 15%~70% |
| 8.2. | Temperature | -5°C ~40°C |
| 8.3. | Sulphur dioxide average | 0.3 mg/m ³ |
| 8.4. | Sulphuretted hydrogen average | 0.1 mg/ m ³ |
| 8.5. | Maximum storage period | 12 months |

(Vibrator has to be rotated at least once within 12 mouths from the date of receipt)

9. QUALITY ASSURANCE

All critical parameters are 100% in control. The symbols "◆" apply to all parameters identified as critical

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parameters in all process. And before mass production approval, we use Process Capability Study (PCS) to conduct all critical parameters in mass production. Based on PCS the final quality controls will be agreed.

Quality assurance for mass production:

- Lot acceptance rate (LAR)
- First pass yield (FPY)
- Outgoing quality level

Each final packing containing Out-going inspection data sheet (n=35pcs)

Inspection item: Load speed
 Load current
 Starting current
 Starting voltage
 Coil resistance

- Customer reject material rate
- Customer satisfaction
- Cpk/Cp control for all critical parameters (except starting voltage)




10. MATERIALS

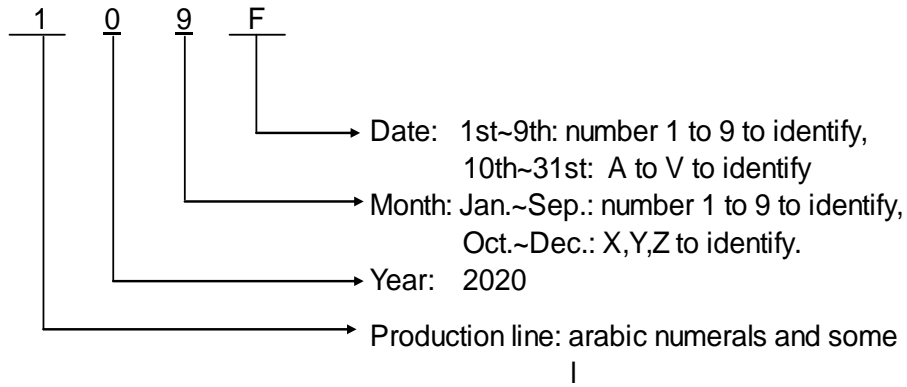
- Counterweight
- Brush
- Commutator
- Case
- Terminal
- Bracket
- Washer
- End cover
- Bearing
- Magnet
- Copper wire
- Shaft
- Core
- Varistor (optional)

P.S.: All the materials included in vibrator can meet RoHS requirement.

11. LOT NO. INDICATION ON THE VIBRATOR

Following markings are the definition of lot no. indication on the vibrator, which including production code and date code; please see picture 2 as below for detail information:

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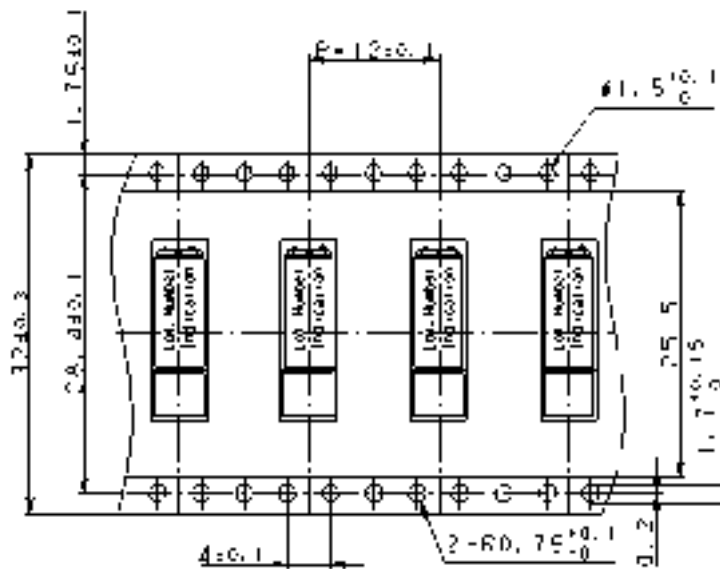
Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Lot No. Indication	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G	H	I	G	K
Date	21	22	23	24	25	26	27	28	29	30	31									
Lot No. Indication	L	M	N	O	P	Q	R	S	T	U	V									
Production line code	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20
	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G	H	I	G	K

Picture 2 Lot No. indication

12. PACKAGING CONDITION

A detailed mechanical drawing for packing condition as followed with dimensions and tolerances:

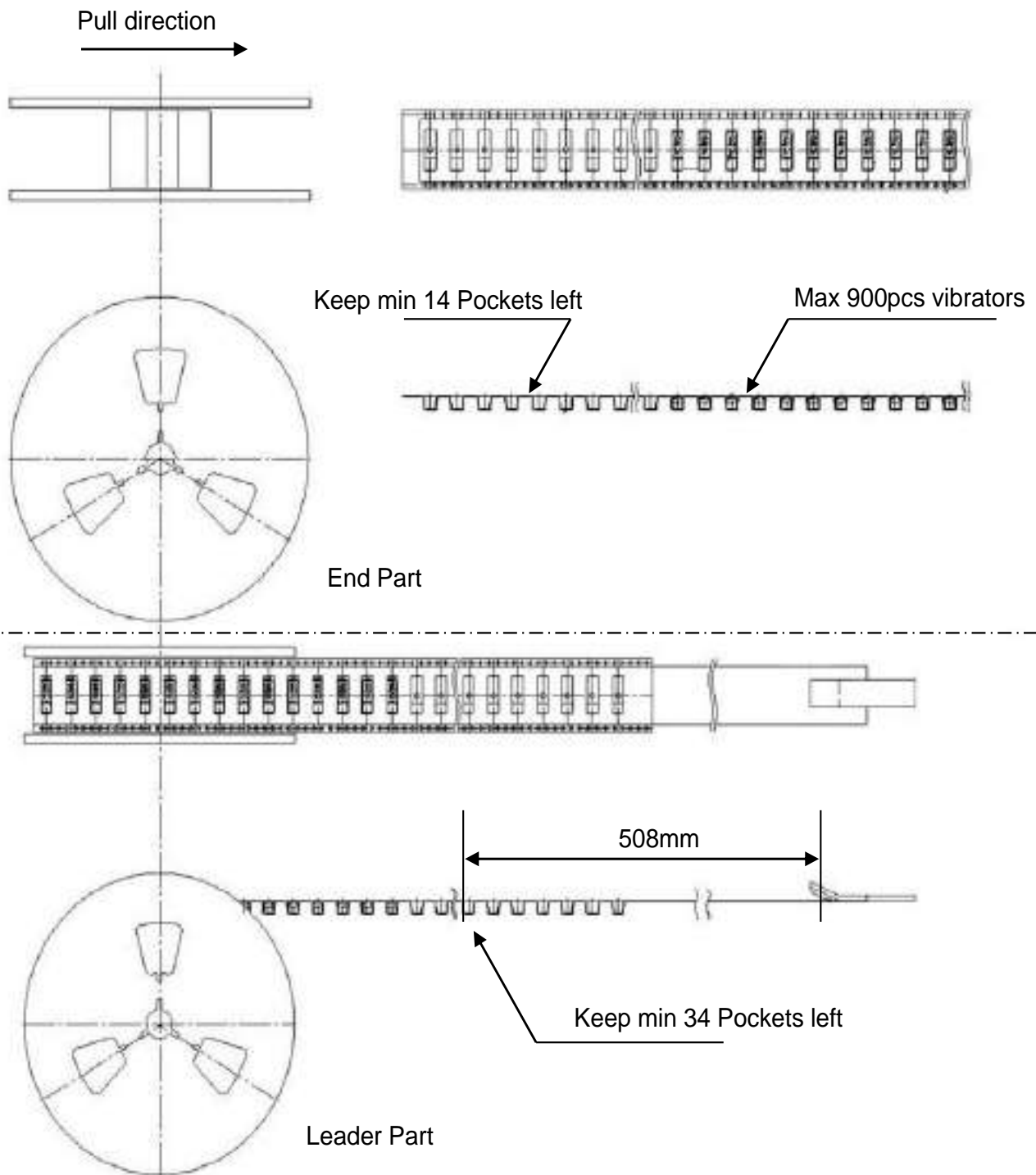
12.1 Smallest packing



Picture 3 Smallest packing condition

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12.2 Reel packing condition

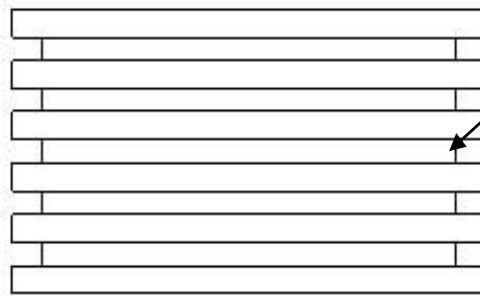


Picture 4 Reel packing condition

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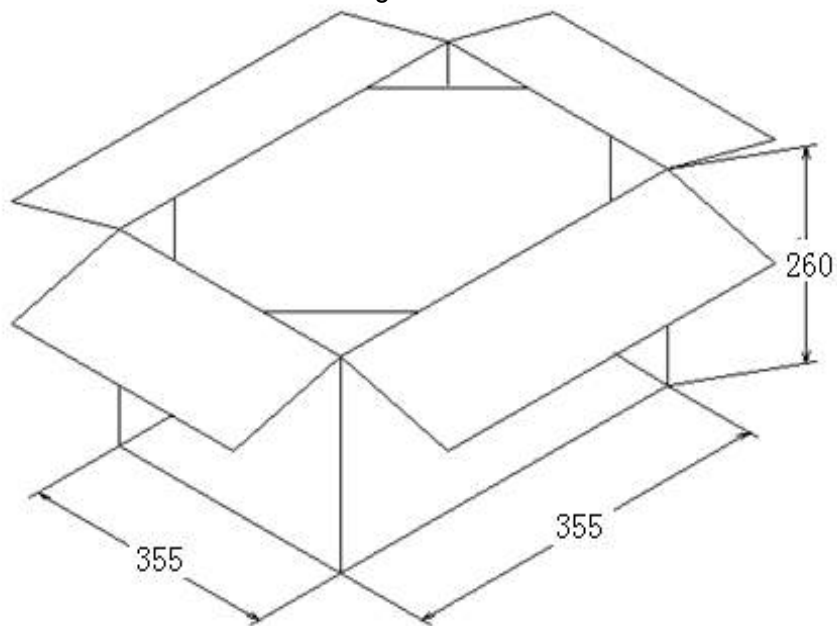
12.3 Final packing condition

900pcs/reel X 6reel= total 5400pcs



During the vibrator handle or shipping, counterweight must be faced to upper side.

Double wall corrugated cardboard



Picture 5 Final packing condition

12.4 Accessories included in final package

Out-going inspection data sheet (n=35pcs) will be attached for each lot, we do implemented inspection after reflow. Inspection item including:

- Load speed
- Load current
- Starting current
- Starting voltage
- Coil resistance

13. RECOMMENDED REFLOW PROFILE FOR VIBRATOR

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13.1 Definitions

Reflow Profile = Time vs. temperature plot

Peak temperature = Maximum temperature reached on the component

Convection = Forced air heating

13.2 Recommended temperature check method of reflow furnace

The reflow furnace used should be 100% convection reflow. Thermocouples should be securely attached to the top surface of vibrator to insure the temperature exposure is met. Profile should be recorded by data acquisition for future reference.




13.3 Recommended reflow Profile

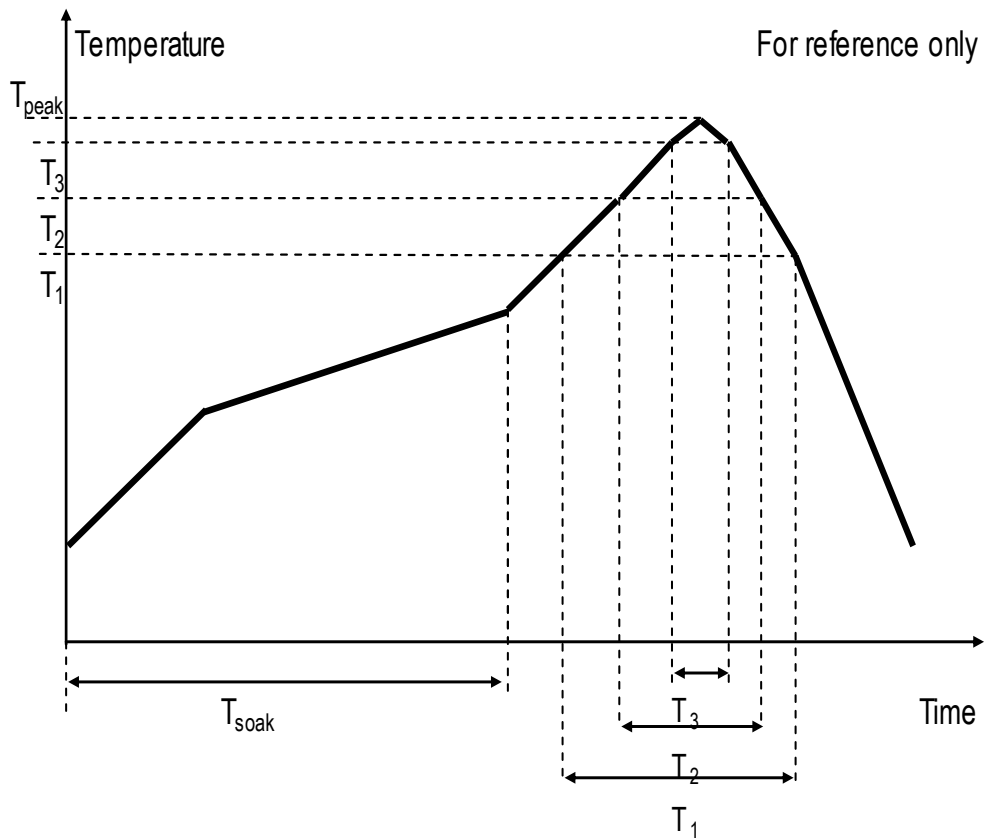
The reflow profile specified in this section describes expected maximum heat exposure of vibrators during the reflow process. This test must meet or exceed all times shown as following. All temperatures shown are +5/-0°C. Ramp-up rate to 217°C shall be no quicker than 3°C/second at any time, so parts must with stand this rate of rise in any zone.

All vibrators have to tolerate at least this profile two times without affecting electrical performance, mechanical performance or reliability. Please see Pb-free reflow profile requirement for soldering heat resistance on table 2 and Reflow profile for soldering heat resistance testing picture 6 :

Pb-free reflow profile requirements for soldering heat resistance		
Parameter	Reference	Specification
Average temperature gradient in preheating		2.5°C/s
Soak time	Tsoak	2-3 mins
Time above 217 °C	t1	Max 60s
Time above 230 °C	t2	Max 50s
Time above 245 °C	t3	Max 10s
Peak temperature in reflow	T peak	250°C (-0/+5°C)
Temperature gradient in cooling		Max-5°C/s

Table 2 Pb-free reflow profile requirement for soldering heat resistance

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Picture 6 Reflow profile for soldering heat resistance testing

14. NOTES ON USE

- 14.1 Pay attention to the voltage and current ranges which applied to the vibrator, and use the vibrator in accordance with this specification, otherwise, it will reduce the life and performance of the vibrator.
- 14.2 Do not use hot gun to puff the surface of vibrator from PCB directly.
- 14.3 Do not locking the motor with current applied for long time, which may cause the motor to overheat and short circuit.
- 14.4 Do not exert pressure the terminals, otherwise, it will result in terminal deformation.
- 14.5 Do not bring magnetized objects near or contact with the surface of vibrator, which will demagnetize the magnetism of vibrator and result in noise failure.

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Appendix 1

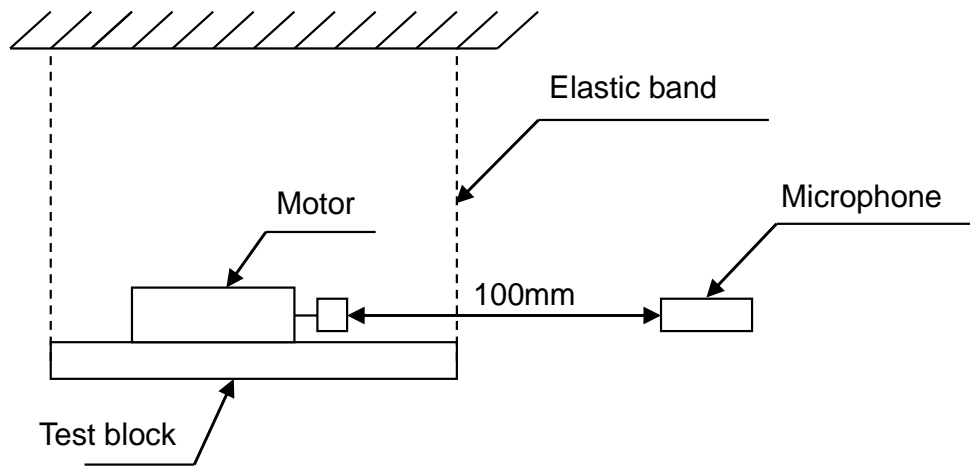


Figure 1.

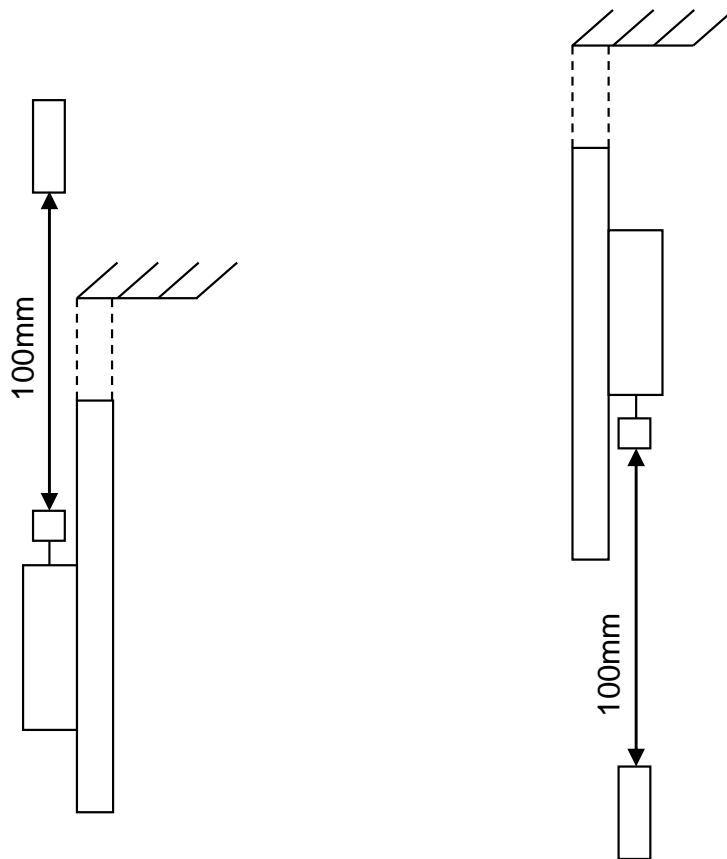


Figure 2.

Figure 3.

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设计	张		2020.04.27	
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审核	张		2020.04.27	
工艺				
阶段标记			比例	外形图
共	页	第	页	