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 : FG-T4082230K1669B

CUSTOMER PART NO : _____

APPROVED SIGNATURES

Rev	Date	Description	Designed	Checked	Approved
A	2025/8/15	Release		Po Chen	

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TABLE OF CONTENTS

1. SCOPE

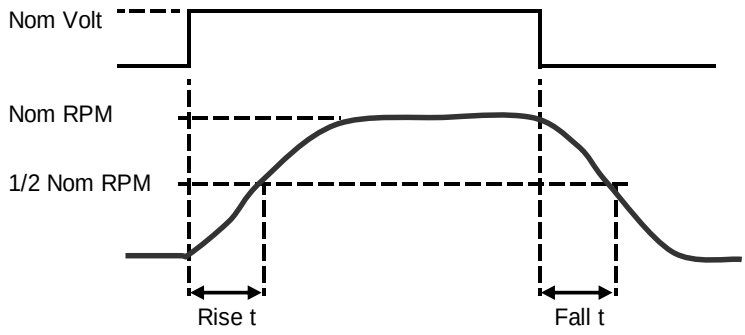
This document contains specific electrical and mechanical characters, critical characteristics, reliability tests, packaging condition, quality assurance, reflow profile and etc..

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°)

3.13 Motor inductance 200uH Max

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

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

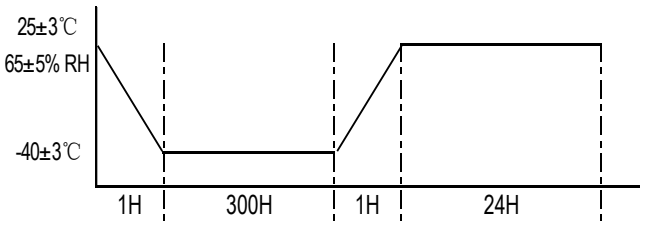
5.1. Functional dimensions
5.2. Rated current at specified rotating speed
5.3. Operating speed at operating voltage
5.4. Starting current at operating voltage
5.5. Min. starting Voltage

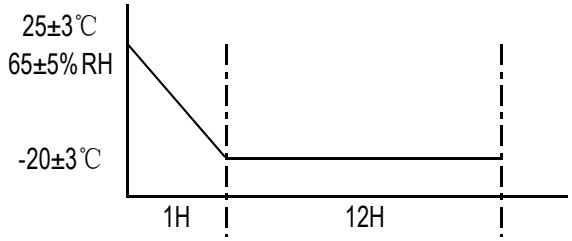
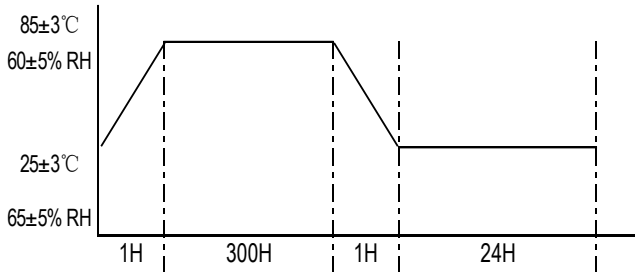
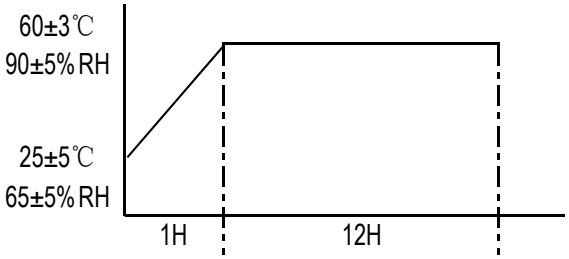
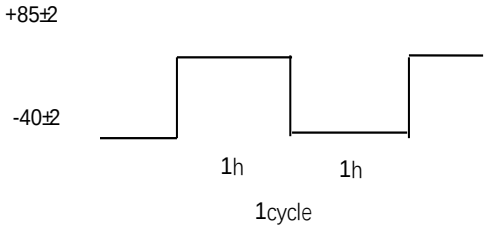
6. ENVIRONMENTAL CHARACTERISTICS

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℃ /300h. 65±5%RH, Recovery 24 h Measurements with test jig 	No mechanical damage. Normal performance of vibrator. (Max +/-30% variation of nom RPM)

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

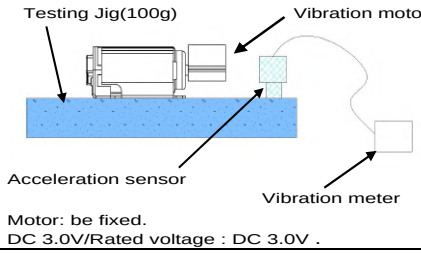
7.7	Lifetime test	Operational test. Temperature: 20±2℃, 60%-70%%RH, 0.5s On / 0.5s Off: 400000 cycles. Recovery 4h. Measurements with test jig.	No mechanical damage. Normal performance of vibrator. (Max +/-30% variation of nom RPM)
7.8	Free Fall	Mount the vibrator in the dummy box.(dummy box weight 100g), 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 Strength	Gms 0.7 MIN Gp 0.95 MIN 	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℃ ~40℃
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

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）

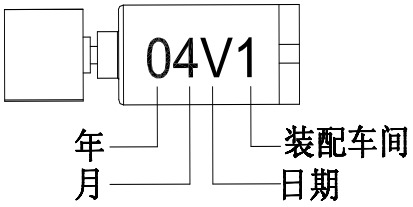
10. MATERIALS

- 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:



1. 字体为方正姚体，字高2mm，颜色为黑色
2. "年"表示：取未位数字（例如0表示2020年、以此类推）
3. "月"表示：［1-9月份用该月数字、10月用"A"表示、11月用"B"表示、12月用"C"表示］
4. 装配车间（一）用"1"表示、以此类推；
5. 日期的表示见下表：

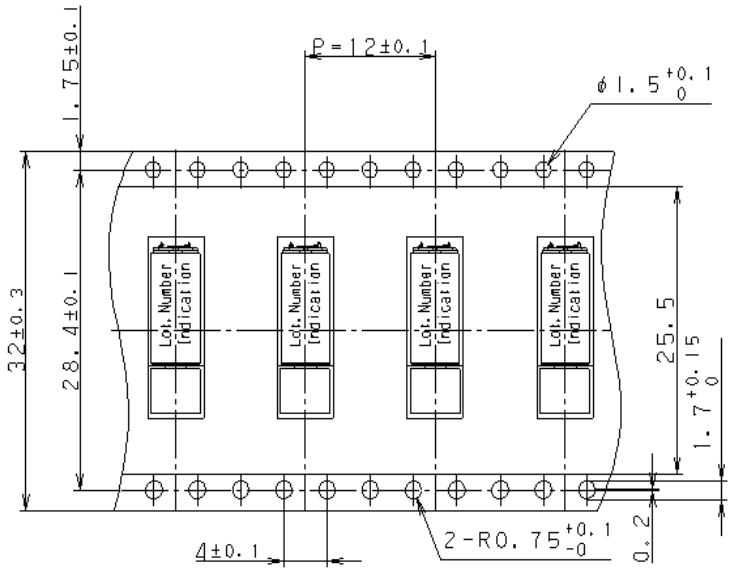
印字	1	2	3	4	5	6	7	8
日期	1	2	3	4	5	6	7	8
印字	9	E	F	G	H	I	J	K
日期	9	10	11	12	13	14	15	16
印字	L	M	N	O	P	Q	R	S
日期	17	18	19	20	21	22	23	24
印字	T	U	V	W	X	Y	Z	
日期	25	26	27	28	29	30	31	

Picture 2 Lot No. indication

12. PACKAGING CONDITION

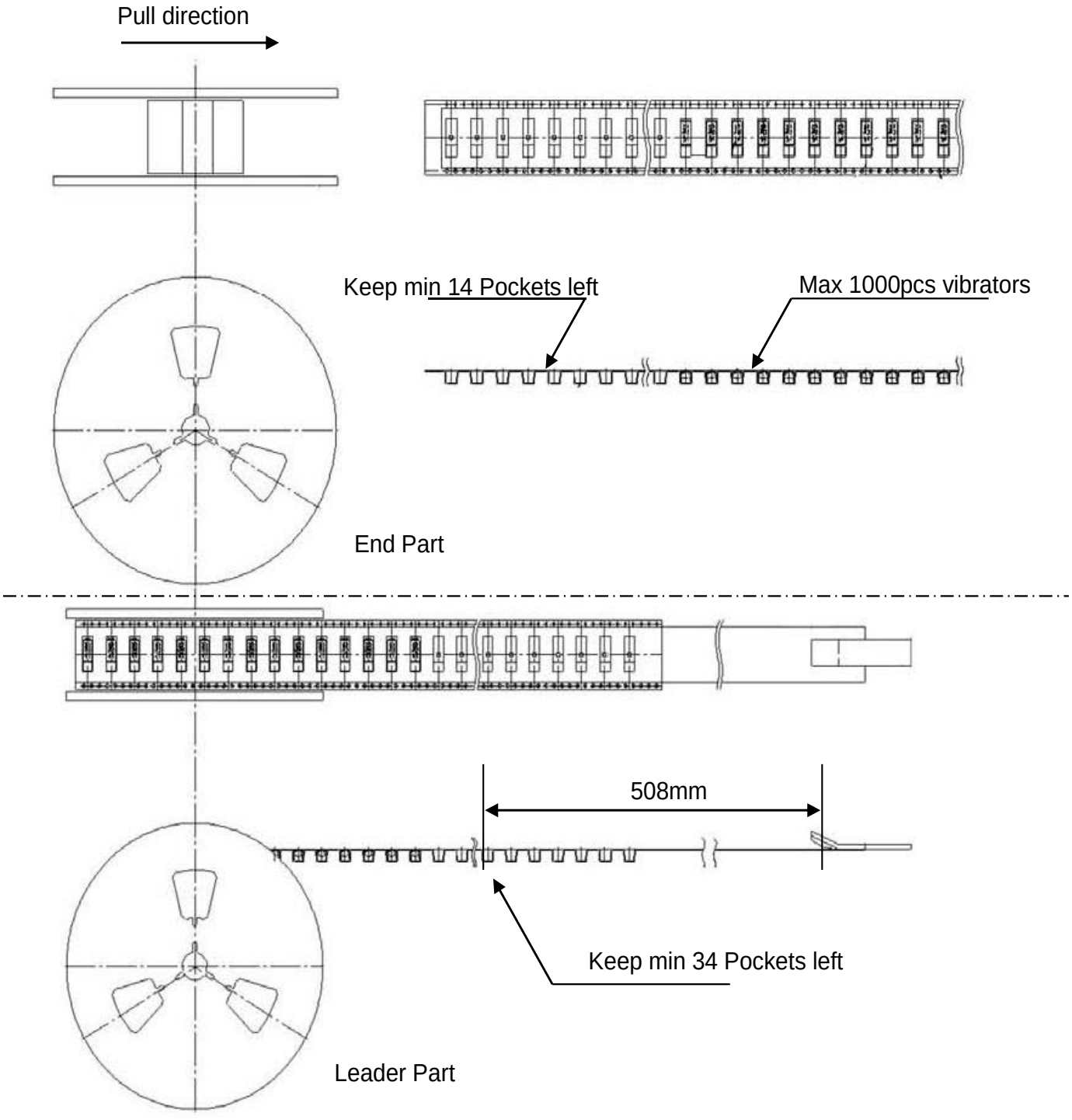
A detailed mechanical drawing for packing condition as followed with dimensions and tolerances:

12.1 Smallest packing



Picture 3 Smallest packing condition

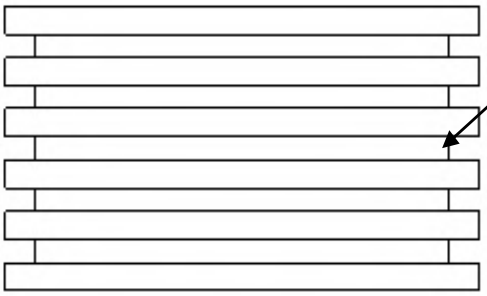
12.2 Reel packing condition



Picture 4 Reel packing condition

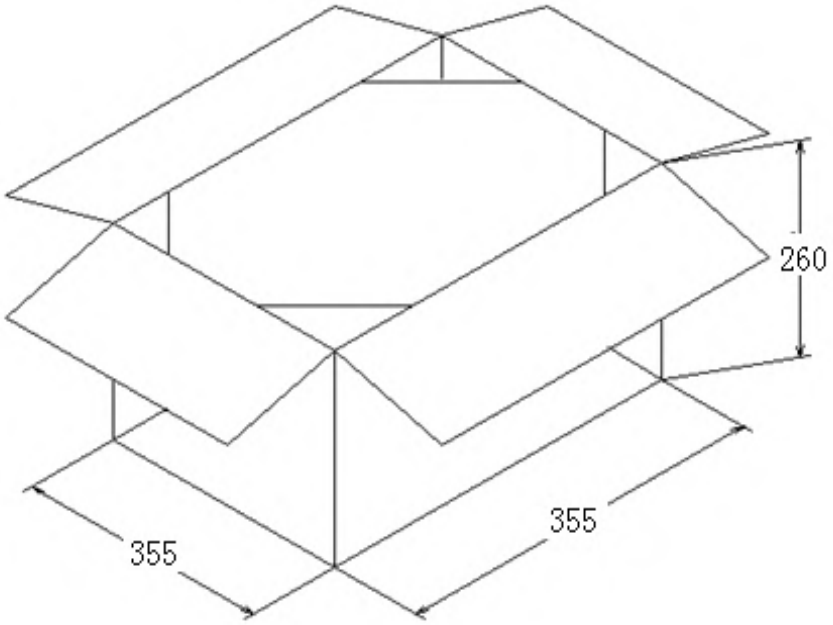
12.3 Final packing condition

1000pcs/reel X 5reel= total 5000pcs



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

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.

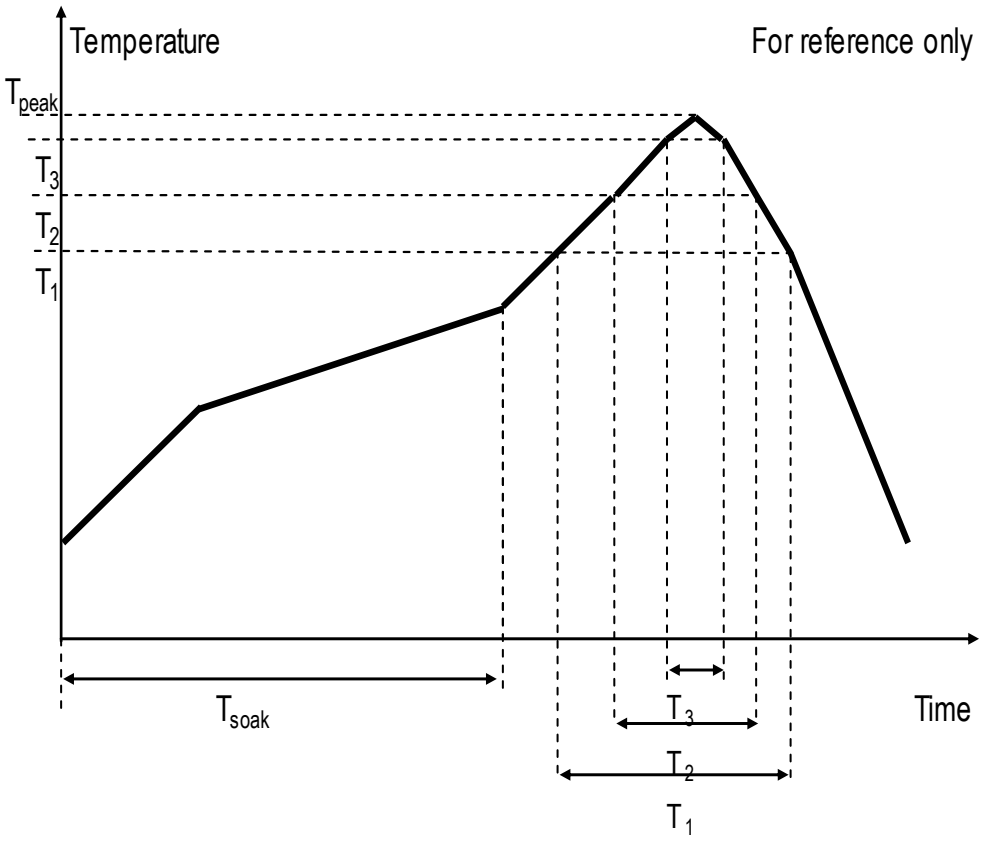
13.3 Recommended reflow Profile

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℃. Ramp-up rate to 217℃ shall be no quicker than 3℃/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℃/s
Soak time	Tsoak	2-3 mins
Time above 217 ℃	t1	Max 60s
Time above 230 ℃	t2	Max 50s
Time above 245 ℃	t3	Max 10s
Peak temperature in reflow	T peak	250℃(-0/+5℃)
Temperature gradient in cooling		Max-5℃/s

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



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.

Appendix 1

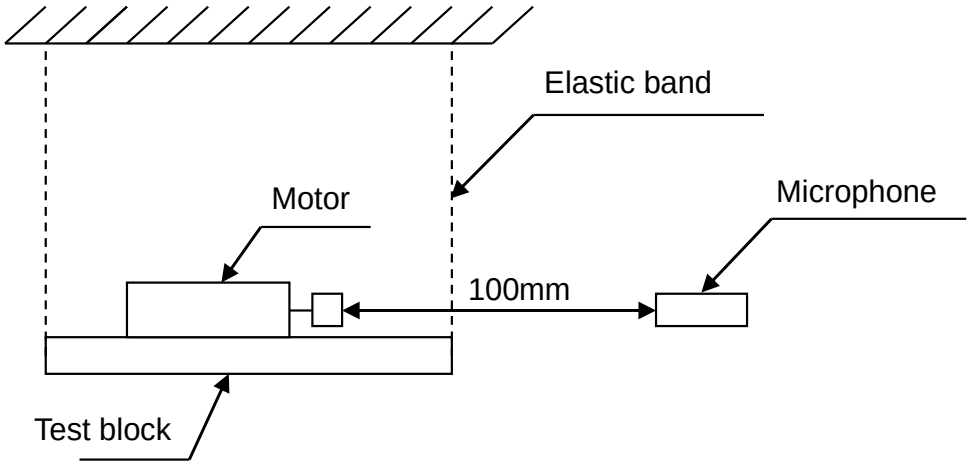


Figure 1.

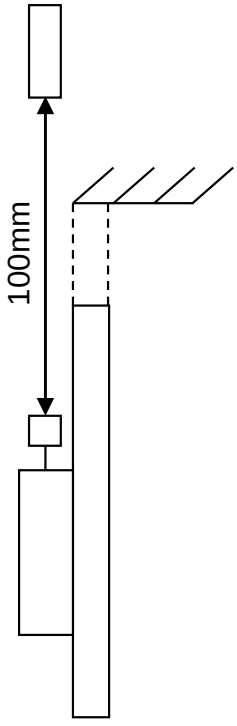


Figure 2.

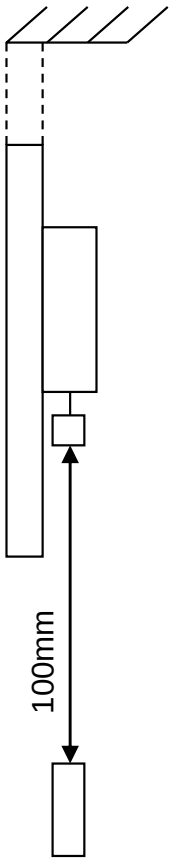
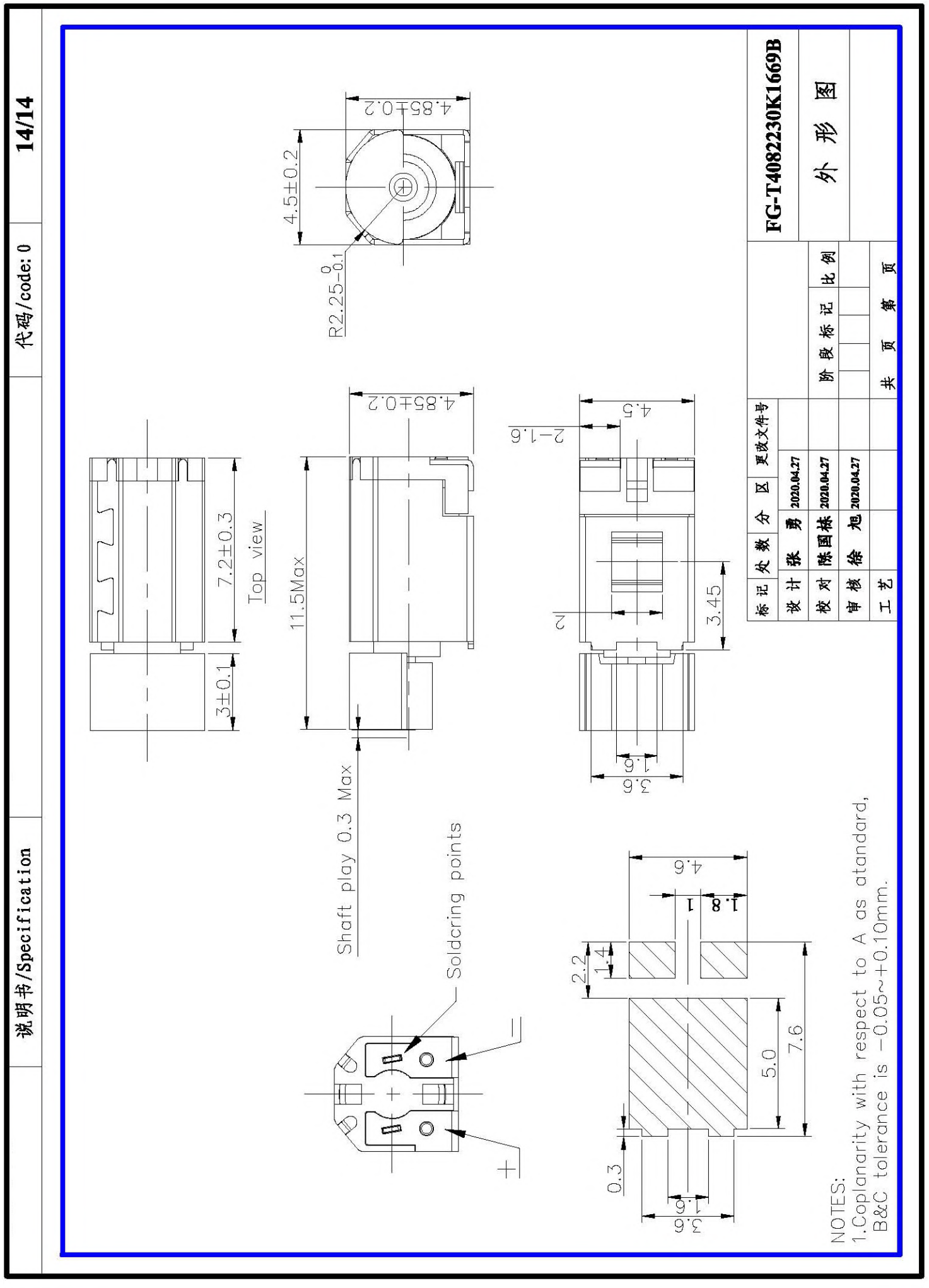


Figure 3.

Appendix 2


说明书/Specification
代码/code: 0
14/14
FG-T4082230K1669B
外 形 图
标记 处数 分区 更改文件号
设计 张勇 2020.04.27
校对 陈国栋 2020.04.27
审核 徐旭 2020.04.27
工艺
阶段标记 比例
共 页 第 页
4.85±0.2
4.5±0.2
R2.25 0 -0.1
7.2±0.3
3±0.1
Top view
11.5Max
Shaft play 0.3 Max
Soldering points
2-1.6
4.5
2
3.45
1.6
1.6
4.6
1.8
1
2.2
1.4
5.0
7.6
0.3
1.6
1.6
NOTES:
1.Coplanarity with respect to A as atandard,
B&C tolerance is -0.05~+0.10mm.