

规格书编号

SPEC NO :

# 产品规格书

# SPECIFICATION

CUSTOMER 客 户: \_\_\_\_\_

PRODUCT 产 品: \_\_\_\_\_ TUNING FORK \_\_\_\_\_

MODEL NO 型 号: \_\_\_\_\_ TF38-32.768-12.5-10-LF \_\_\_\_\_

PREPARED 编 制: \_\_\_\_\_ LEO \_\_\_\_\_ CHECKED 审 核: \_\_\_\_\_ YORK \_\_\_\_\_

APPROVED 批 准: \_\_\_\_\_ LIUMING \_\_\_\_\_ D A T E 日 期: \_\_\_\_\_ 2014-6-20 \_\_\_\_\_

|                         |             |         |
|-------------------------|-------------|---------|
| 客户确认 CUSTOMER RECEIVED: |             |         |
| 审核 CHECKED              | 批准 APPROVED | 日期 DATE |
|                         |             |         |

无锡市好达电子股份有限公司  
Shoulder Electronics Limited

更改历史记录

History Record

| 更改日期<br>Date | 规格书编号<br>Spec No | 产品型号<br>Part No | 客户产品型号<br>Customer No | 更改内容描述<br>Modify Content | 备注<br>Remark |
|--------------|------------------|-----------------|-----------------------|--------------------------|--------------|
|              |                  |                 |                       |                          |              |
|              |                  |                 |                       |                          |              |
|              |                  |                 |                       |                          |              |
|              |                  |                 |                       |                          |              |
|              |                  |                 |                       |                          |              |
|              |                  |                 |                       |                          |              |
|              |                  |                 |                       |                          |              |
|              |                  |                 |                       |                          |              |
|              |                  |                 |                       |                          |              |
|              |                  |                 |                       |                          |              |
|              |                  |                 |                       |                          |              |
|              |                  |                 |                       |                          |              |
|              |                  |                 |                       |                          |              |
|              |                  |                 |                       |                          |              |
|              |                  |                 |                       |                          |              |
|              |                  |                 |                       |                          |              |
|              |                  |                 |                       |                          |              |
|              |                  |                 |                       |                          |              |

## CRYSTAL SEPECIFICATION

1. Description: Tuning Fork Quartz Crystal
  2. Nominal Frequency: 32.768KHz
  3. Oscillation Mode: Fundamental
  4. Cutting Mode: AT cut
  5. Measurement Instrument: S&A 250B(Measured FL)
  6. Electrical Characteristics:
- [1]Operation Conditions:

| Item                        | Symbol | MIN. | TYP. | MAX. | Unit | Condition |
|-----------------------------|--------|------|------|------|------|-----------|
| Operating Temperature Range | Topt   | -10  |      | 60   | °C   |           |
| Storage Temperature Range   | Tstg   | -40  |      | 85   | °C   |           |
| Load Capacitance            | CL     |      | 12.5 |      | pF   |           |
| Drive Level                 | DL     |      | 0.1  | 1    | uW   |           |

### [2]Frequency Stability:

| Item                       | Symbol | MIN. | TYP.   | MAX. | Unit                | Condition                        |
|----------------------------|--------|------|--------|------|---------------------|----------------------------------|
| Tolerance                  | dF/Fo  | -10  |        | 10   | ppm                 | Refer to Center Frequency@25±3°C |
| Stability Over Temperature | dF/F25 |      | -0.036 |      | ppm/°C <sup>2</sup> | Refer to Operating Temperature   |
| Aging                      | dF/F25 | -5   |        | 5    | ppm                 | Per Year                         |

dF/Fo:Frequency Deviation Refer to Center Frequency

dF/F25:Frequency Deviation Refer to 25°C Frequency

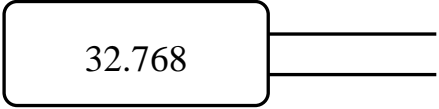
### [3]Electrical Performance:

| Item                         | Symbol | MIN. | TYP. | MAX. | Unit | Condition    |
|------------------------------|--------|------|------|------|------|--------------|
| Equivalent Series Resistance | ESR    |      |      | 50   | KΩ   | @Series      |
| Shunt Capacitance            | C0     |      | 1    | 5    | pF   |              |
| Insulation Resistance        | IR     | 500  |      |      | MΩ   | @DC 100 Volt |

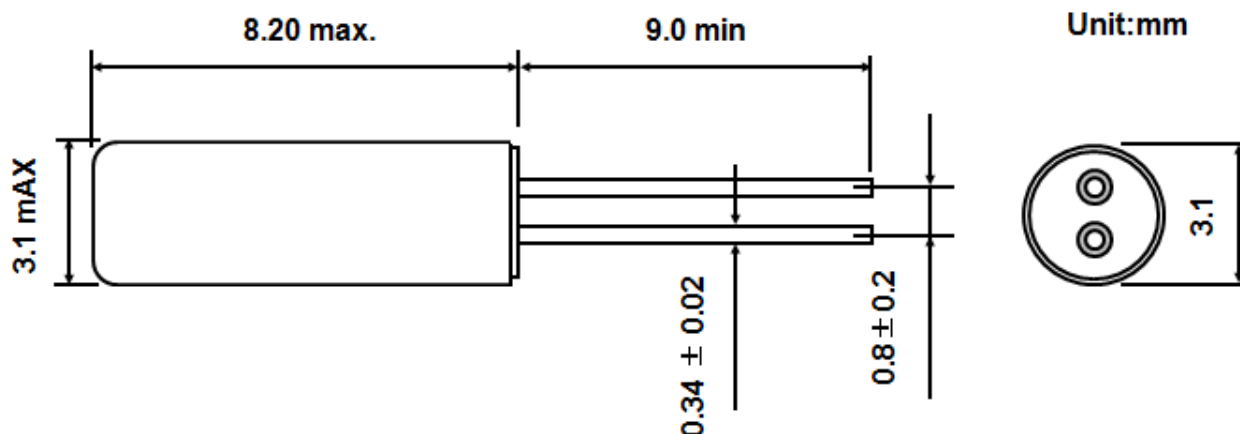
### 7. Marking:Laser

Marking Generally for empty. Refer to with Customer's requirement.

32.768

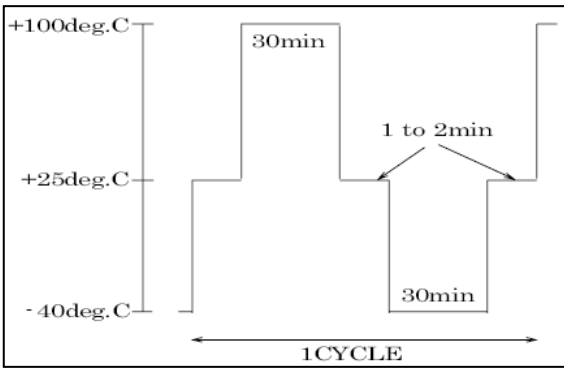


8. Outline drawing (unit : mm)



9. Reliability Specification

| Test Items       | Test Method and Condition   | Requirements  |
|------------------|---|---|
| Vibration        | (1)Vibration Frequency 10 to 55Hz<br>(2)Vibration Amplitude 1.5mm<br>(3) Cycle Time 1-2min(10-55-10Hz)<br>(4)Direction X.Y.Z<br>(5)Duration 2h/each direction                                 | Frequency Change:±10ppm Max.<br>Resistance Change:±15% or 5kohm Max.                              |
| Shock            | 3 Times free drop from 75cm height to hard wooden board of thickness more than 30mm   | Frequency Change:±10ppm Max.<br>Resistance Change:±15% or 5kohm Max.                              |
| Hermetic seal    | Helium leak detector<br>Checked:before the molded crystal units   | less than $1 \times 10^{-7}$ mbar.l/sec.  |
| Solder ability   | Dip the leads of crystal units into the solution (7-10%) of rosin 3±0.5s,then dip it into the tank 5-10s.<br>Temperature of solder melted tank is $245^{\circ}\text{C} \pm 5^{\circ}\text{C}$ | The dipped surface of the leads should be at least 95% covered with continuous new solder coating |
| High temperature | 240 hours at $+85^{\circ}\text{C} \pm 2^{\circ}\text{C}$<br>After 1-2hours past at room temperature from following  | Frequency Change:±10ppm Max.<br>Resistance Change:±25% or 10kohm Max.                             |
| Low temperature  | 240 hours at $-20^{\circ}\text{C} \pm 2^{\circ}\text{C}$<br>After 1-2hours past at room temperature from following test.  | Frequency Change:±10ppm Max.<br>Resistance Change:±15% or 5kohm Max.                              |
| Humidity         | 240 hours at $+40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ,relative humidity 90-95%<br>After 1-2hours past at room temperature from following  | Frequency Change:±10ppm Max.<br>Resistance Change:±25% or 10kohm Max.                             |

|                   |   |   |
|-------------------|---|---|
| Temperature cycle | <p>After supplying the following temperature cycle (50cycles)</p>  | <p>Frequency Change:±10ppm Max.<br/>Resistance Change:±25% or 10kohm Max.</p> |
|-------------------|---|---|

#### 10. Handling Notice for Standard Tuning Fork Crystal (Cylindrical Type)

##### 1. Shock resistance

It may deteriorate the characteristics or cause of no oscillation if excess physical shock given. Please be careful not to drop. Please use under condition to minimize the shocks as much as possible.

Please review the conditions if it is used by auto mounting or after the conditions are changed.

##### 2. Heat and humidity resistance in storage

Storing the crystal products under higher or lower temperature or high humidity for a long period may deteriorate the characteristics of crystal units.

Please store and use the crystal products at the normal temperature and humidity.

##### 3. Solder heat resistance

Standard type crystal products use Material have a 230°C melting point.

Heating up the package more than 210°C may deteriorate the characteristics or cause of no oscillation the products. If the crystal products need to be soldered at temperature of more than +210°C, please study heat-resistance products or SMD products.

Please review the condition or consult us about flow solder process.

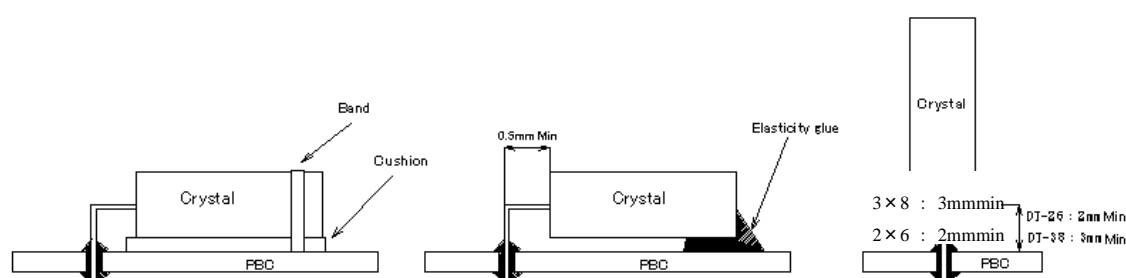
Our soldering condition is under 280°C within 5sec or 260°C within 10sec for lead parts. Please don't solder the crystal unit (case) directly. It may cause of deteriorate the characteristics.

##### 4. Mounting method to PCB

When the crystal products need to be lay down please fix to PCB securely.

If the crystal is used with mechanical vibration location, please put cushion in between PCB or fix with elasticity glue (Silicon etc) as shown in below figure. Please don't gluing hermetic seal grass.

When the crystal products need to be mounted vertically, gap between crystal units and PCB more than 3mm for 3×8 type , more than 2mm for 2×6 type is recommended.



##### 5. Lead process

When the lead needs to be cut please maintenance the cutter.

When the lead needs to be bent or repaired please be careful not to giving excess pressure at the root of the lead to avoid crack of the hermetic seal glass. Also please be careful not to giving excess pressure at sealing to avoid sealing tightness deteriorate.

Leave more than 0.5 mm of lead from the case.

Ultrasonic cleaning and ultrasonic soldering

Soldered by ultrasonic cannot be guaranteed, because crystal may be sympathetic vibrated and may damage.

Please study at your side about ultrasonic cleaning.

#### 6. Drive level

Applying excessive drive level to the crystal units may cause deterioration of characteristics or damage. Less than  $1.0\mu\text{W}$  is recommended to this products. More than  $2.0\mu\text{W}$  cannot be guaranteed.

#### REVIEW OF SPECIFICATION

When something get doubtful with this specifications, we shall jointly work to get an agreement.

#### 11. Packing Description

1000pcs/bag

10000pcs/box (175\*120\*65)

100000pcs/big box (300\*180\*600)