



**TROQ Electronic Co.,Ltd.**  
**CRYSTAL UNIT SPECIFICATIONS**

|                        |                            |
|------------------------|----------------------------|
| <b>Customer</b>        |                            |
| <b>Production Name</b> | <b>Tuning Fork 3.2*1.5</b> |
| <b>TROQ P/N</b>        | <b>RNE32768069</b>         |
| <b>Revision</b>        | <b>A</b>                   |
| <b>Print Date</b>      | <b>2023/6/17</b>           |

| <b>Drawn</b> | <b>Checked</b> | <b>Approved</b> |
|--------------|----------------|-----------------|
|              |                |                 |



RoHS Compliant

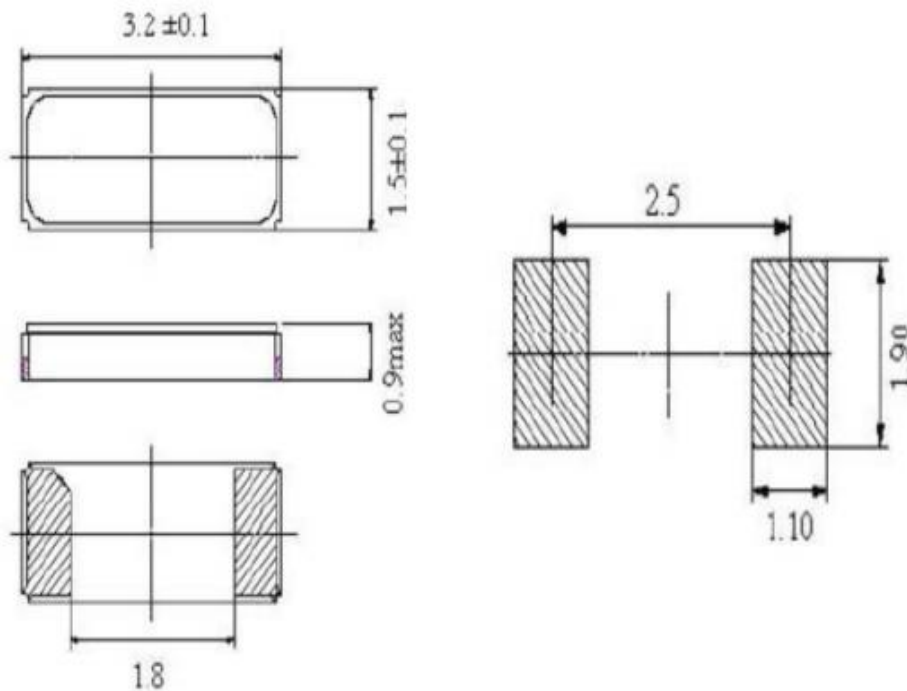


TROQ P/N: RNE32768069 REV: A

● ELECTRICAL PARAMETERS

| 谐振器产品技术指标                                    | Min  | Max | Units                  |
|--|--|-----|------------------------|
| 1. Holder Type(型号规格)                         | Tuning Fork 3.2*1.5  |     |                        |
| 2. Mode of Oscillation (振动模式)                | Fundamental  |     |                        |
| 3. Frequency (标称频率)                          | 32.768000  |     | KHz                    |
| 4. Load Capacitance (CL) (负载电容)              | 9  |     | pF                     |
| 5. Shunt Capacitance (Co) (静态电容)             | 0  | 2   | pF                     |
| 6. Equivalent Resistance (谐振电阻)              |  | 70  | kΩ                     |
| 7. Frequency Tolerance at 25°C (调整频差)        | -20  | 20  | ppm                    |
| 8. Temperature Coefficient (K) (温度系数)        | -0.04  |     | ppm/(Δ°C) <sup>2</sup> |
| 9. Insulation Resistance (at DC 100V) (绝缘电阻) | 500  |     | MΩ                     |
| 10. Drive Level (激励功率)                       | 1  |     | uw                     |
| 11. Operating Temperature Range (工作温度范围)     | -40  | 85  | °C                     |
| 12. Storage Temperature Range (储存温度范围)       | -55  | 125 | °C                     |
| 13. Aging (老化率)                              | ± 3  |     | ppm/year               |
| 14. Other(其他)                                | *Note 1: $F(T) = K * (T-t_0) * (T-t_0)$ ; $t_0=25^{\circ}\text{C}$ |     |                        |

OUTLINE DIMENSIONS(UNIT:mm) 外形尺寸 (单位: mm)



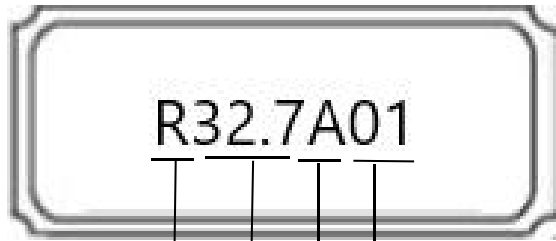
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<http://www.troq.com>



TROQ P/N: RNE32768069 REV: A

● Marking (标记)



TROQ代码  
标称频率

生产批号  
负载电容

● 负载电容

|           |   |   |   |      |  |  |  |
|-----------|---|---|---|------|--|--|--|
| 负载电容 (CL) | 6 | 7 | 9 | 12.5 |  |  |  |
| 代码        | A | B | C | D    |  |  |  |



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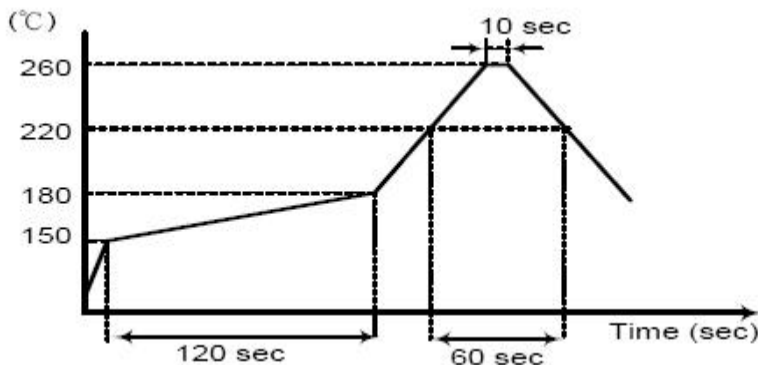
REV: A

● SUGGESTED REFLOW PROFILE (回流焊曲线图)

Total time:200sec.Max. (总时间: 200秒 最大)

Solder melting point:220℃ (熔点220℃)

| Profiles Feature (特性)                         |              | Pb-Free Assembly |
|---|--------------|------------------|
| Average Ramp-up Rate(Ts max to Tp)            | 平均升温速度       | 3℃/second Max    |
| Preheat                                       | 预热           |                  |
| ■ Temperature Min (Ts min)                    | 最低温度         | 125℃             |
| ■ Temperature Max (Ts max)                    | 最高温度         | 200℃             |
| ■ Time (ts min to ts max)                     | 从最低到最高时间     | (60~180) seconds |
| Time maintained above                         | 维持上述时间       |                  |
| ■ Temperature(T1)                             | 温度           | 217℃             |
| ■ Time(tp)                                    | 时间           | (60~150) seconds |
| Peak/Classification Temperature(Tp)           | 最高点温度        | 260℃             |
| Time within 5℃ of actual Peak Temperature(tp) | 高温维持时间       | (20~40) seconds  |
| Ramp-down rate                                | 降温速度         | 6℃/second max    |
| Time 25℃ to Peak Temperature                  | 从25℃到最高温度的时间 | 8 minutes max    |
| Suggest reflow times                          | 建议 reflow次数  | 3 Times max      |

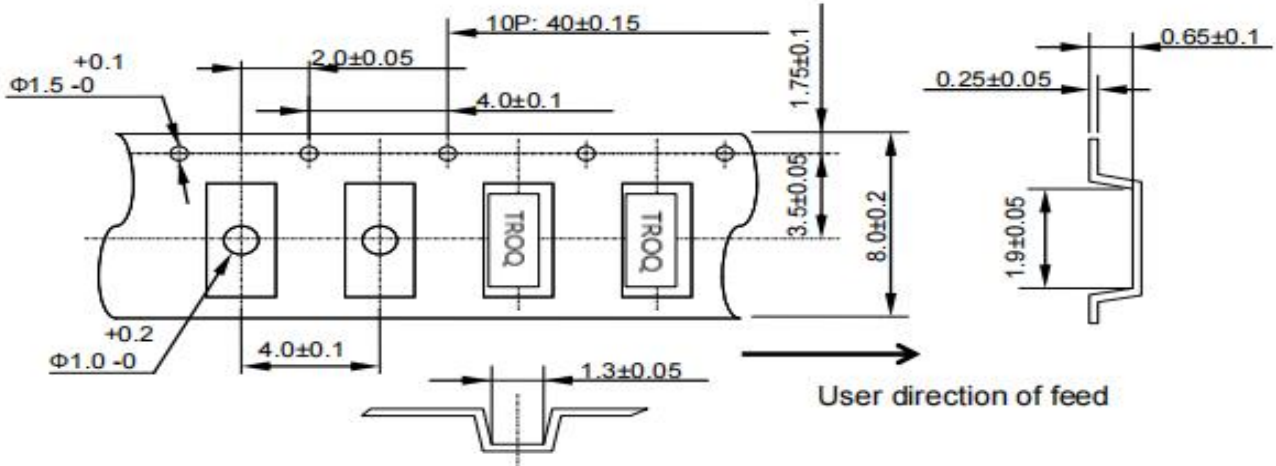


● PACKING (包装) 3Kpcs/REEL

(1) Tape dimensions TE1204L

Material of the Carrier Tape : PS  
Material of the Top Tape : PET+PE

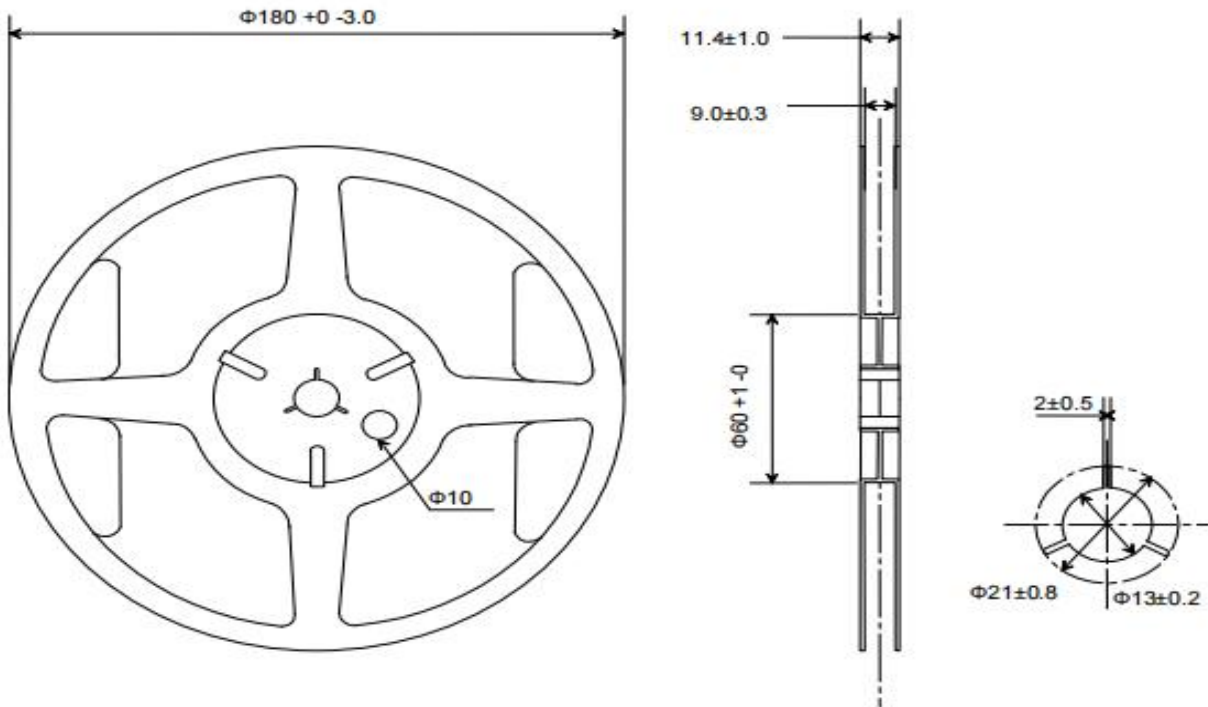
Unit: mm



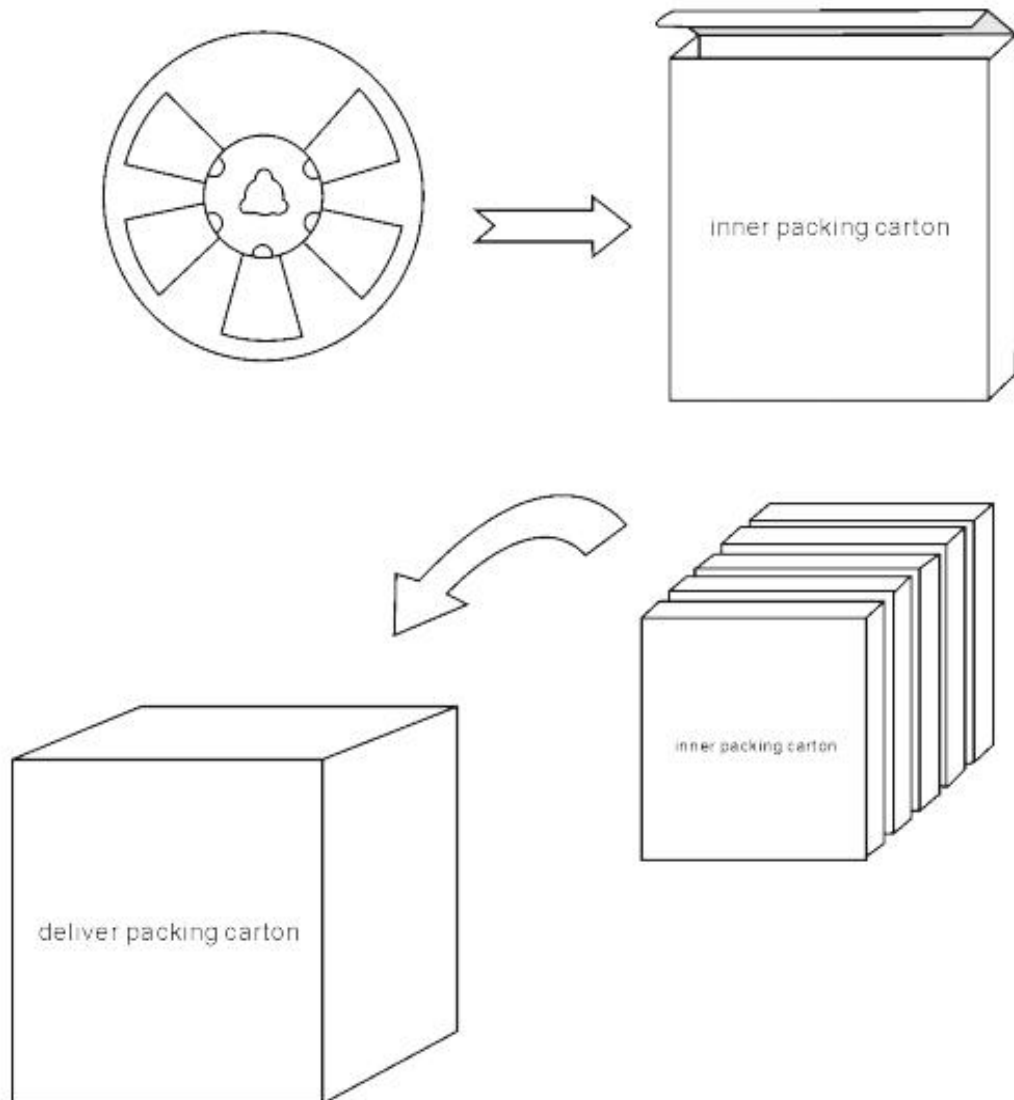
(2) Reel dimensions

Material of the Reel : PS

Unit: mm



### PACKING SPECIFICATION



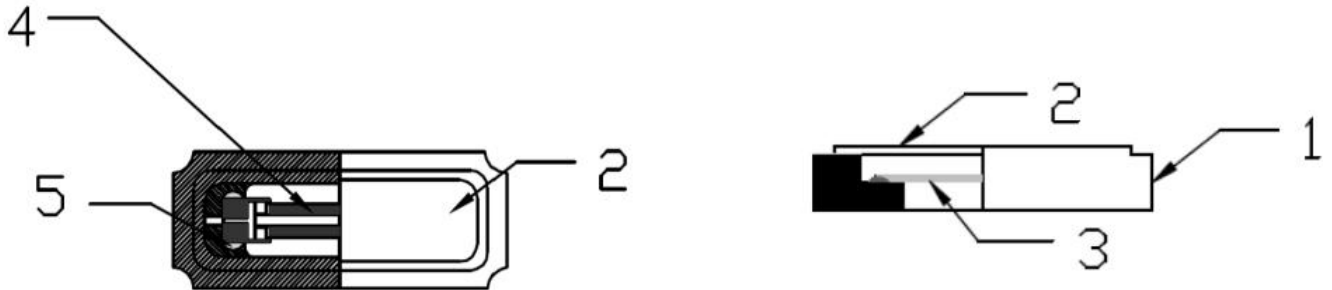
备注：每盘3000pcs

每箱10盘（30000pcs）

产品外箱包装以实际为准。

● BOM List (材质清单)

### INSIDE STRUCTURE



| No. | 组件<br>COMPONENTS     | 材料成份<br>MATERIALS                               |
|-----|----------------------|---|
| 1   | 基座<br>Package        | 陶瓷<br>Ceramic (Al <sub>2</sub> O <sub>3</sub> ) |
| 2   | 外壳<br>LID            | KV 合金<br>KV (Fe/Co/Ni)                          |
| 3   | 水晶片<br>Crystal blank | 二氧化硅<br>SiO <sub>2</sub>                        |
| 4   | 电极<br>Electrode      | Ag<br>银   |
| 5   | 接着剂<br>Adhesive      | 树脂、银粉<br>Resin、Ag                               |

● RELIABILITY SPECIFICATIONS (信赖度试验)

| No | Test Item (测试项目)                                  | Test Conditions (测试条件)   | Reference (参考)                         |
|----|---|--|--|
| 1  | High Temperature High Humidity Storage (高温、高湿、储存) | Temperature: 85°C±3°C<br>温度: 85°C±3°C<br>Relative Humidity: 85%RH<br>相对湿度: 85%RH<br>Time: 96 Hours<br>时间: 96小时   | JIS C5023                              |
| 2  | High Temperature Storage (高温储存)                   | Temperature: 125°C±3°C<br>温度: 125°C±3°C<br>Time: 96 Hours<br>时间: 96小时  | MIL-STD-883E<br>Method 1005.8          |
| 3  | Low Temperature Storage (低温储存)                    | Temperature: -40°C±3°C<br>温度: -40°C±3°C<br>Time: 96Hours<br>时间: 96小时   | MIL-STD-883E<br>Method 1013            |
| 4  | Thermal Shock (温度冲击)                              | Temperature1: -55°C±5°C<br>温度1: -55°C±5°C<br>Temperature2: 85°C±5°C<br>温度2: 85°C±5°C<br>Temperature change between T1 and T2 5 min<br>T1和T2温度在5分钟内改变<br>10cycles maintain T1 and T2 for 30 minutes each mone<br>每次循环30分钟共10次 | MIL-STD-202F<br>Method 107 Condition A |
| 5  | RESISTANCE TO SOLDER HEAT (耐焊接热)                  | Solder Temperature: 265°C±5°C<br>焊槽温度: 265°C±5°C<br>Time: 10±1 Seconds<br>时间: 10±1秒  | MIL-STD-202F<br>Method 210E            |
| 6  | Solderability(可焊性)                                | The solder pot temperature is 245±5°C , dwell time 5±0.5sec<br>245±5°C焊锡槽浸润5±0.5秒  | J-STD-002B                             |
| 7  | Drop Test (落下试验)                                  | 3 Times Free Fall from 50cm height table to 3cm thickness hard wood board<br>从50cm高度3次跌落到3cm厚硬质木板上   | JIS C6701                              |
| 8  | MECHANICAL SHOCK (机械冲击)                           | Half sine wave, 1000 G<br>半正弦波, 加速度1000G<br>3 Times for all 3 directions<br>X、Y、Z 三个相互垂直方向各三次  | MIL-STD-202F<br>Method 213B            |
| 9  | Vibration (机械振动)                                  | Frequency Range: 10Hz~55Hz<br>频率范围: 10Hz~55Hz<br>Amplitude: 0.75mm<br>振幅: 0.75mm<br>2 Hours in each direction, total 6 Hours<br>X、Y、Z 三个相互垂直方向各振动2小时   | MIL-STD-883E<br>Method 2007.3          |
| 10 | Leakage Test (气密性)                                | Take measurements with a helium Leakage detector<br>氦质检漏<br>Leakage Rate ≤ 1×10 <sup>-3</sup> Pa cm <sup>3</sup> /s<br>漏率 ≤ 1×10 <sup>-3</sup> Pa cm <sup>3</sup> /s   | MIL-STD-883E                           |



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