# PRODUCT SPECIFICATION SHEET




| | | | |
|---|---|---|---|
| Customer | – | | |
| Customer P/N | TBA | | |
| Product Type | Temperature Compensated Crystal Oscillator | | |
| Part Number | 9T52000006 | Version | S1 |
| Part Description | SMD TCXO 2.0 x 1.6 | | |
| Nominal Frequency | 52.000000MHz | | |

| | |
|---|---|
| Prepared | Li Xiang |
| Reviewed | Jin Zhe |
| Approved | Xing Yue |
| Date | 2023/8/25 |

Customer's Approval & Date：

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RoHS COMPLIANT

Pb Lead-Free

Moisture Sensitivity Level 1

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ATTENTION

[1] If you intend to use products on the controlling equipment that relate to medical, aeronautical, aerospace, military science, space and etc., please make sure to let us know your intentions in advance.

[2] Ultrasonic related process may cause damage to crystal blank by resonance itself. If ultrasonic related process is used, we strongly recommend to assess the damage risk under related ultrasonic conditions before use in production.

## 1. History of Specification Revision

| Ver. | Contents | Date | Reviser | Remark |
|---|---|---|---|---|
| S0 | Initial release | 2022/11/10 | Li Xiang | |
| S1 | Add attention information | 2023/8/25 | Li Xiang | |
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## 2. Electrical Specifications

### 2.1 Operation conditions

| # | Parameters | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|
| 1 | Nominal frequency | | 52.000000 | | MHz | - |
| 2 | Supply voltage ($V_{DD}$) | 1.68 | - | 3.63 | V | - |
| 4 | ESD | | HBM＞2000V | | - | JESD22-A114-B |
| 5 | MSL | | Level 1 | | - | IPC/JEDEC J-STD-033C |
| 6 | Current consumption | - | - | 2.0 | mA | - |
| 7 | Operating temperature range | -40 | - | +85 | °C | - |
| 8 | Storage temperature range | -40 | - | +90 | °C | - |

### 2.2 Output characteristics

| # | Parameters | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|
| 1 | Output type | | Clipped sine wave | | - | Decoupling capacitor is required in external circuit |
| 2 | Standard output Load | | 10 KΩ//10 pF | | - | - |
| 3 | Output level | 0.8 | - | - | $V_{pp}$ | - |
| 4 | Duty cycle | 40 | 50 | 60 | % | Ground level |
| 5 | Harmonics | - | - | -5 | dBc | - |
| 6 | Start-up time vs. frequency | - | - | 2.0 | ms | Within ±0.5 ppm |
| 7 | Start-up time vs. output level | - | - | 2.0 | ms | ≥90% of Vpp |

### 2.3 Frequency characteristics

| # | Parameters | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|
| 1 | Nominal frequency | | 52.000000 | | MHz | - |
| 2 | Frequency tolerance after reflow | -2.0 | - | +2.0 | ppm | At 25±2℃ after 2 times reflow, refer to nominal frequency |
| 3 | Frequency stability vs. temperature | -0.5 | - | +0.5 | ppm | Refer to frequency at 25° C within operating temperature range |
| 4 | Frequency stability vs. supply voltage | -0.1 | - | +0.1 | ppm | ±5% $V_{DD}$ variation |
| 5 | Frequency stability vs. load variation | -0.2 | - | +0.2 | ppm | ±10% load variation |
| 6 | Frequency Aging | -1.0 | - | +1.0 | ppm/First year | - |

## 2. Electrical Specifications (Cont.)

2.4 Phase noise characteristics

| # | Parameters | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|
| 1 | Phase noise at 1Hz offset | - | -62 | - | dBc/Hz | - |
| 2 | Phase noise at 10Hz offset | - | -88 | - | dBc/Hz | - |
| 3 | Phase noise at 100Hz offset | - | -114 | - | dBc/Hz | - |
| 4 | Phase noise at 1kHz offset | - | -136 | - | dBc/Hz | - |
| 5 | Phase noise at 10kHz offset | - | -153 | - | dBc/Hz | - |

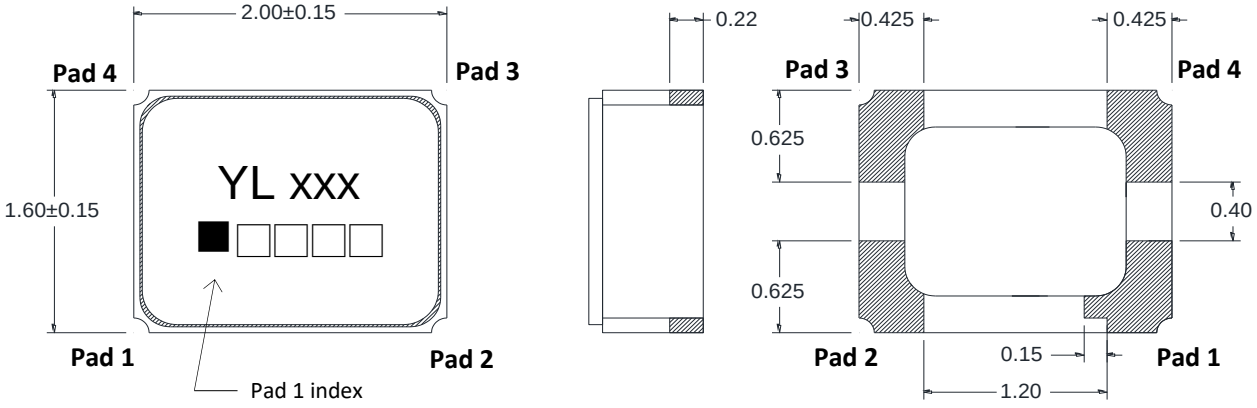
## 3. Product Design

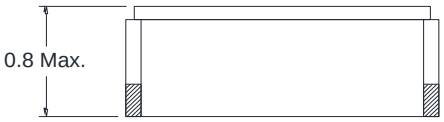
### 3.1 Package dimensions and pad functions

Top view

Unit : mm

Bottom view

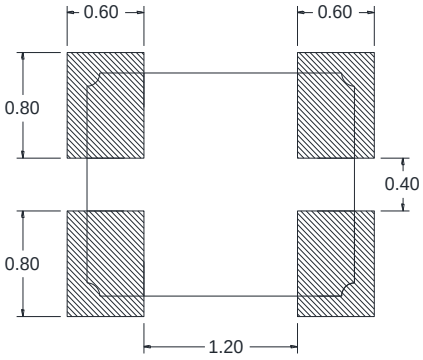



Lateral view

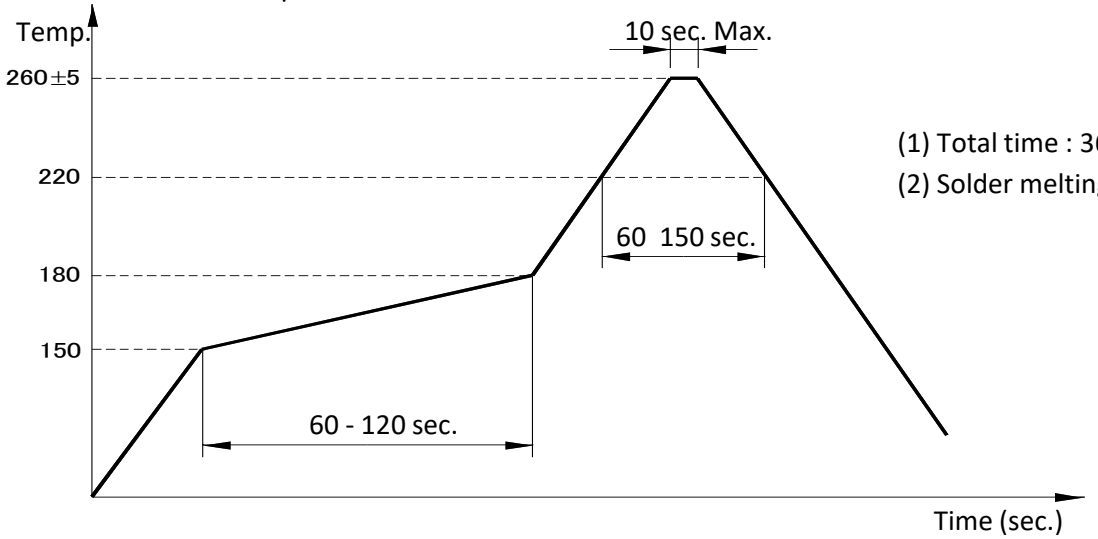
| Pad | Function | Symbol |
|---|---|---|
| 1 | NC or GND (Ground recommended) | NC |
| 2 | Ground | GND |
| 3 | Output | OUT |
| 4 | Supply voltage | $V_{DD}$ |

### 3.2 Recommended land pattern



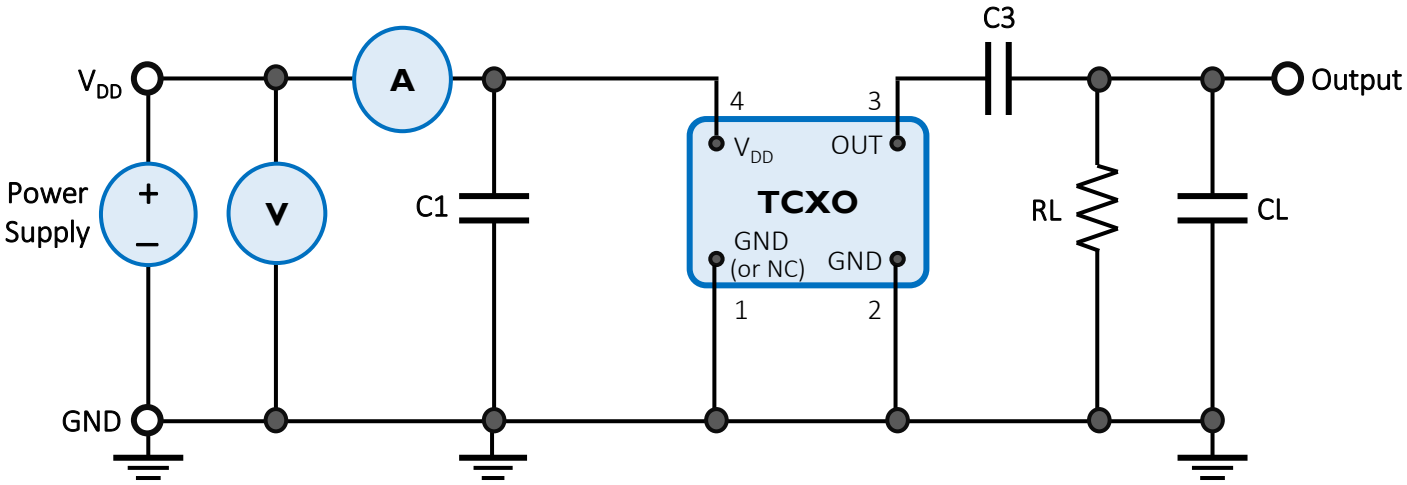

Unit : mm

### 3.3 Recommended reflow profile




(1) Total time : 360 sec. Max.
(2) Solder melting point : 225℃

## 4. Testing Circuit




External Components:

| Parts | Function | Recommended |
|---|---|---|
| C1 | AC noise bypass for $V_{DD}$ | 10nF |
| C3 | DC block for output | 10nF |
| RL | Load resistance | 10KΩ |
| CL | Load capacitance | 10pF |