# XO SPECIFICATION

Customer：

Customer P/N：

TKD P/N： XO25F024000GEHE001

Part Name： SMD XO 2520

Product Description： 24.000000MHz

Issue Date： 2023/8/8

## CUSTOMER'S APPROVAL

**(PLEASE RETURN A COPY WITH APPOVAL )**

TKD Science and Technology Co.,Ltd
泰 晶 科 技 股 份 有 限 公 司

| Approved | Checked | Designer |
|---|---|---|
| Zhong Yuan Hua | Zhan Chao | Li Yan |

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| Rev. | Description of Revision History | Date | Designer | Checked By |
|---|---|---|---|---|
| A | New Revision | 2021/10/19 | Li Yan | Zhan Chao |
| B | Add The Product Reliability | 2023/8/8 | Li Yan | Wang Peng |

# XO SPECIFICATION

**1.Description** : SMD Simple Packaged Xtal Oscillator 2520

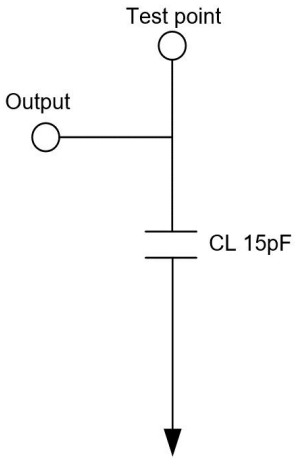
**2.Nominal Frequency** : 24.000000MHz

**3.Electrical Specifications** :

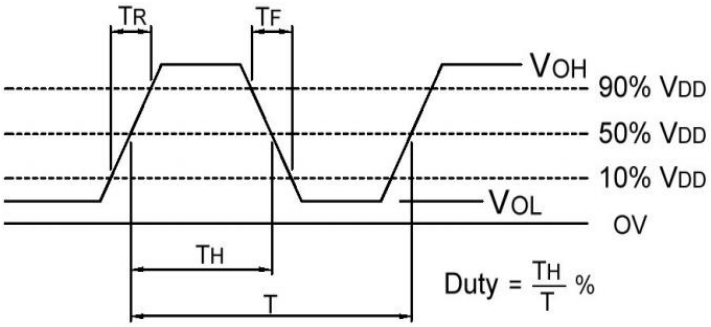
| Item | Parameters | Condition | Electrical Specifications | | | |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Units |
| 1 | Nominal Frequency | | 24.000000 | | | MHz |
| 2 | Frequency Tolerance | Note1 | -25 | | 25 | ppm |
| 3 | Operating Temperature Range | | -40 | | 85 | ℃ |
| 4 | Supply Voltage | | 3.3±10% | | | V |
| 5 | Current Consumption | Operating | | | 10 | mA |
| | | Standby | | | 10 | uA |
| 6 | Output Waveform | | CMOS | | | |
| 7 | Output Load | | 15 | | | pF |
| 8 | Duty Cycle | | 50±10% | | | % |
| 9 | Output Rise/Fall Time | | | | 5 | ns |
| 10 | High Output Voltage | | 0.9Vdd | | | V |
| 11 | Low Output Voltage | | | | 0.1Vdd | V |
| 12 | Enable | | Vdd*70% | | | V |
| 13 | Disable | | | | Vdd*30% | V |
| 14 | Aging | Frist year | -3 | | 3 | ppm |
| 15 | Start Time | | | | 5 | ms |
| 16 | Storage Temperature | | -55 | | 125 | ℃ |

Note1 Frequency stability includes frequency tolerance@25℃ and frequency stability vs. operating temperature range and voltage variance and first year aging

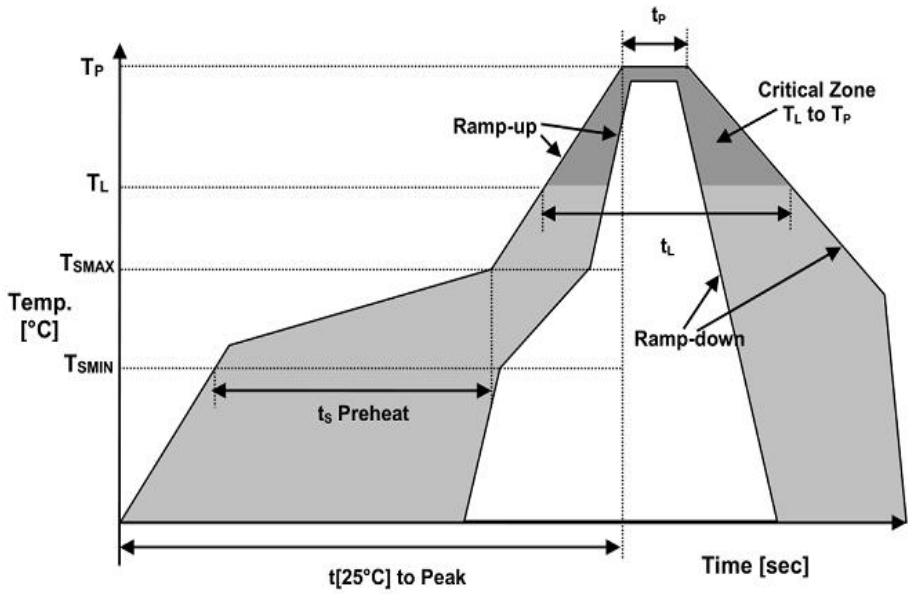
## 4.Test Circuit (CMOS Load)




## 5.Output Waveform (CMOS Load)



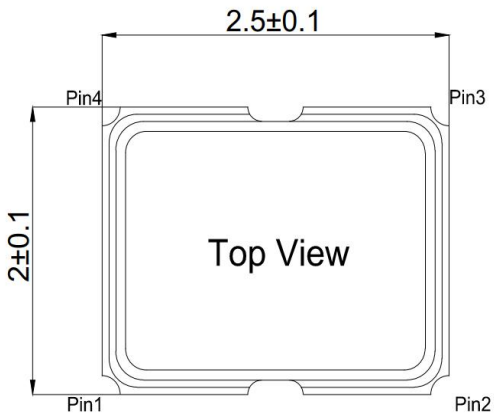

## 6.Recommended Reflow Profile

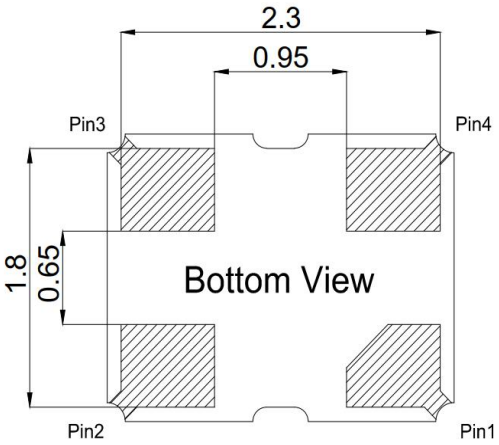


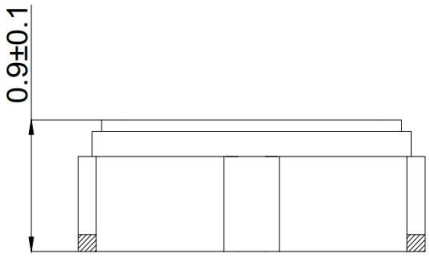

| Reflow Profile | | |
|---|---|---|
| Temperature MIN Preheat | $T_{SMIN}$ | 150℃ |
| Temperature MAX Preheat | $T_{SMAX}$ | 200℃ |
| Time（$T_{SMIN}$ -$T_{SMAX}$） | $t_S$ | 60-180sec |
| Temperature | $T_L$ | 217℃ |
| Peak Temperature | $T_P$ | 260℃ |
| Ramp-up Rate | $R_{UP}$ | 3℃/sec max |
| Ramp-Down Rate | $R_{DOWN}$ | 6℃/sec max |
| Time within 5℃ of Peak Temperature | $t_P$ | 10sec |
| Time t(25℃) to Peak Temperature | t(25℃)to Peak | 480sec |
| Time | $t_L$ | 60-150sec |

## 7.Product Dimensions

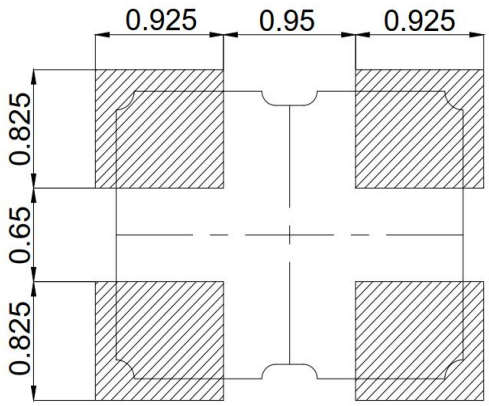
Unit：mm




Side View




Recommened Soldering Pattren

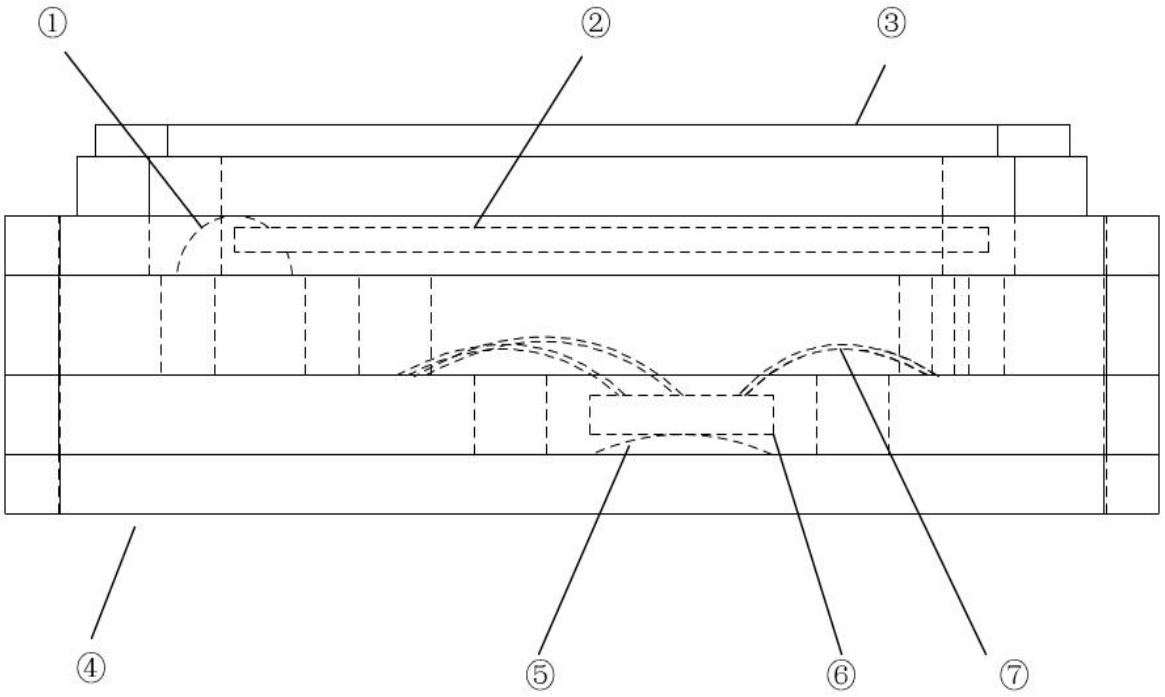
### Pin Connection

| Name | Connection |
|---|---|
| pin 1 | Tri-State |
| pin 2 | GND |
| pin 3 | Fout |
| pin 4 | Vdd |

### Function

| Pin1 Input | Pin3 Output |
|---|---|
| High level | Oscillation Out |
| Open | |
| Low level | High Z |

## 8.Structure illustration




| No. | Components | Materials |
|---|---|---|
| ① | Conductive Adhesive | Ag+Silicone resin |
| ② | Crystal Blank | $SiO_2$ |
| ③ | Lid | Fe-Ni-Co Alloy |
| ④ | Base | Ceramic+Noble Metal |
| ⑤ | Conductive Adhesive of Solid IC | Ag+Epoxy resin |
| ⑥ | IC | Si |
| ⑦ | Gold wire | Au |

## 9.Product Identification (Marking)

T： TKD Logo

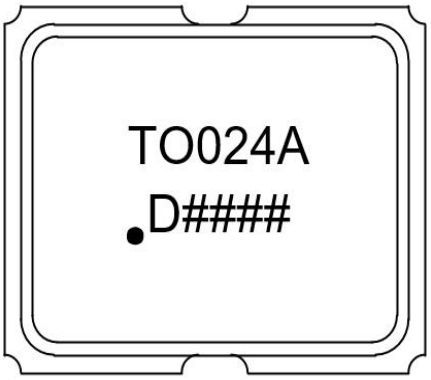
O： Oscillator Code

024A： Frequency Code

●： Pin1 Index

D： Date Code

####： XO Lot Code

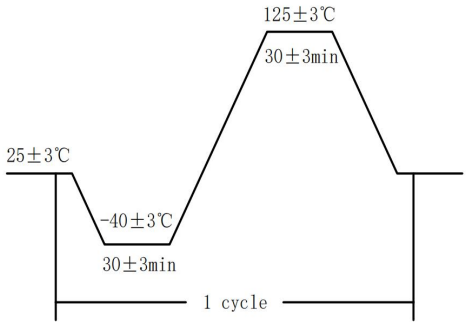
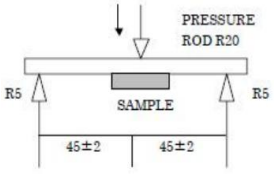



Date Code

| | | | | | |
|---|---|---|---|---|---|
| Year | | 2019 | 2020 | 2021 | 2022 |
| | | 2023 | 2024 | 2025 | 2026 |
| | | 2027 | 2028 | 2029 | 2030 |
| | | 2031 | 2032 | 2033 | 2034 |
| Month | JAN | a | n | A | N |
| | FEB | b | p | B | P |
| | MAR | c | q | C | Q |
| | APR | d | r | D | R |
| | MAY | e | s | E | S |
| | JUN | f | t | F | T |
| | JUL | g | u | G | U |
| | AUG | h | v | H | V |
| | SEP | j | w | J | W |
| | OCT | k | x | K | X |
| | NOV | l | y | L | Y |
| | DEC | m | z | M | Z |

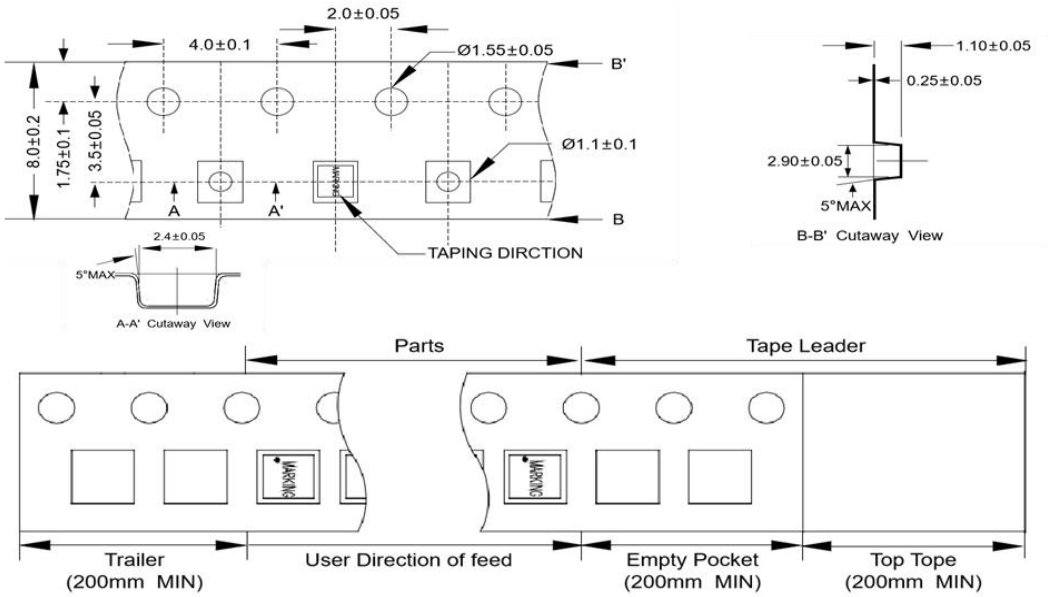
This date code will be cycled every four years.

## 10.Reliability

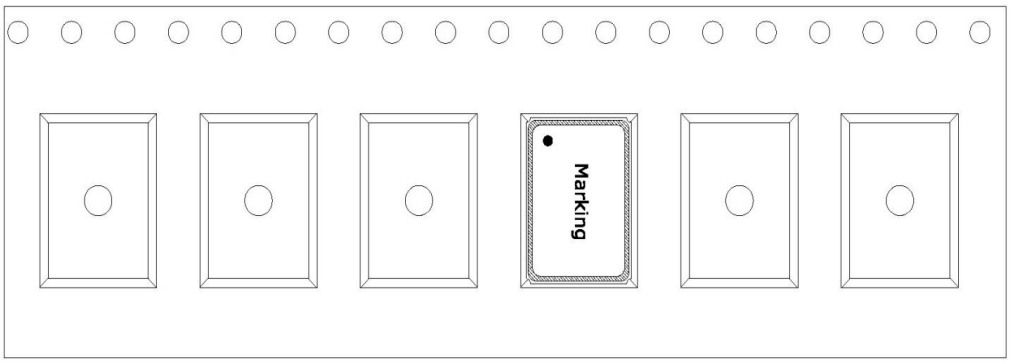
| No. | Item | Test Methods | Criteria |
|---|---|---|---|
| 1 | Low Temperature Storage | Temperature：-40℃ ± 3℃（or the specification shall prevail）<br>Duration：500 hours | ±5.0 ppm |
| 2 | High temperature and humidity | Temperature：85ºC ± 2ºC<br>Humidity：RH 85%<br>Duration：500 hours | ±5.0 ppm |
| 3 | Thermal Shock | <br>Temperature：-40℃~125℃（or the specification shall prevail）<br>Duration：100 cycles | ±5.0 ppm |
| 4 | High Temperature Operating Life | Temperature ：85℃ （or the specification shall prevail）<br>Duration：1000 hours<br>Vdd Applied | ±10.0 ppm |
| 5 | Vibration | Duration ： 2 hours/each direction<br>Frequency range：10～55 Hz<br>Direction：3 axis | ±5.0 ppm |
| 6 | Mechanical Shock | Acceleration：100 g<br>Duration：6.0 ms<br>Test cycles：3 times for all 6 axis，half sina | ±5.0 ppm |
| 7 | Drop Test | Height：100 cm<br>Test cycles：3 times | ±5.0 ppm |
| 8 | Solderability | Soldering bath temperature：245℃ ± 5℃<br>Duration：2±0.6 second | 95% Coated |
| 9 | Resistance to Soldering Heat | Soldering temperature：260℃ ± 10℃<br>Duration：15±5 second | ±5.0 ppm |
| 10 | Board Flex | Height：3.0 mm<br>Duration：5 second<br>Speed：0.5mm/sec  | ±5.0 ppm |

## 11.Package Information

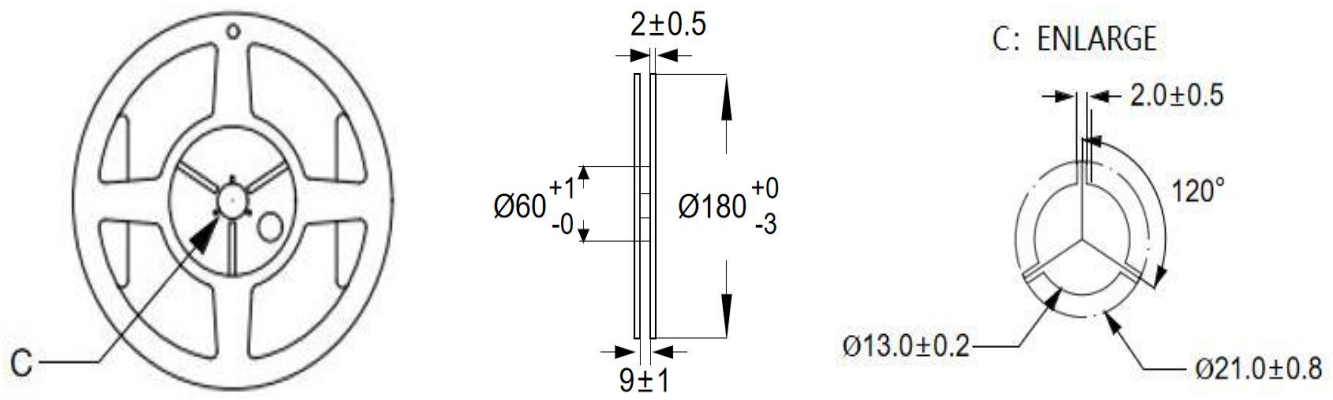
Tape (Carrier) Dimensions Unit：mm




The Direction of Packing




Reel Dimensions Unit：mm



# Handling Instructions

## 1. Cautions for Handling

a) Prevention against electrostatic breakdown

Your full attention to static electricity is still requested.

b) Direction

Before mounting the crystal oscillator on board, Please confirm the direction to make sure the GND terminal and the terminal of power supply are not taken wrongly.

## 2. Prevention against Vibration and Shock

While the product is being transported or mounted onto board, if undue hock and vibration exceeding the specification is put on, there is risk hat the built-in crystal blank is broken.

When undue shock and vibration exceeding the specification is put on the product,please be sure to make confirmation of the product's characteristics.

## 3. Soldering

In order to assure the reliability of the crystal oscillator, please use the product under the recommended conditions.

## 4. Surface mounting

a)This product is surface-mounting device.

So, Please pay attention to the following things.

b)Extreme deformation of board may make pattern off, the electrode of terminals off and solder broken.Full attention is requested especially when splitting the board with the oscillator mounted where the camber of the board occurs.

c)In case that automatic mounter is used, please choose the type with small shock generation and make confirmation of the shock before use.

## 5. Cleaning

Because cleaning will cause change to all characteristics, cleaning is forbidden.

## 6. Store keeping (method and duration)

Long-time storage in the high/low temperature and high humidity leads to deterioration of solderability. So, please keep the product in the temperature of +5~+35 and humidity of 45~70%.

Moreover, please keep the product in the circumstance with measures against static electricity.

Please use it within 168 hours afterthe pack is opened.

(Please keep it with desiccator etc. when you exceed 168 hours after the bag is opened. Please use it after confirming the product solderability.)