

# MHz Crystal Oscillator

■ 3CA / 5CA / 7CA

**SCTF**<sup>®</sup>

## Feature

- Miniature Ceramic surface mount with Metal Lid
- CMOS compatible logic levels
- Tri-state function available
- Supply voltage : 5V
- RoHS Compliant / Pb Free

## Applications

- Wireless Devices
- Internet of Things (IoT) devices
- Ethernet/Gigabit Ethernet
- Audio, Video, Gaming products
- Micro base station

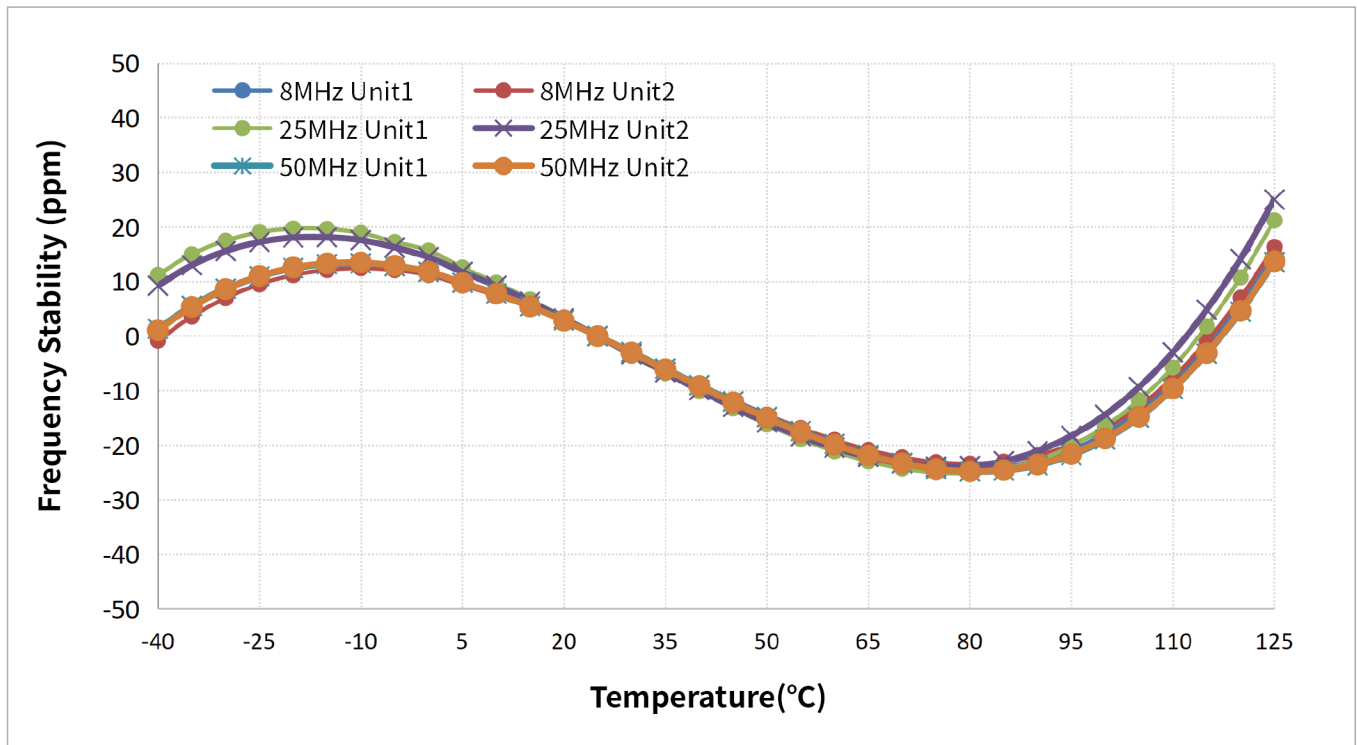


## Electrical Specifications

| Item                      | Symb.                           | Min.               | Typ. | Max.               | Unit | Notes                                                                                       |
|---------------------------|---------------------------------|--------------------|------|--------------------|------|---------------------------------------------------------------------------------------------|
| Frequency Range           | Freq.                           | 1                  | —    | 160                | MHz  |                                                                                             |
| Operating Temperature     | T <sub>use</sub>                | -40                | —    | +85                | °C   |                                                                                             |
|                           |                                 | -40                | —    | +105               | °C   |                                                                                             |
|                           |                                 | -40                | —    | +125               | °C   |                                                                                             |
| Storage Temperature Range | T <sub>stg</sub>                | -55                | —    | +155               | °C   |                                                                                             |
| Supply Voltage            | V <sub>dd</sub>                 | 4.5                | 5.0  | 5.5                | V    |                                                                                             |
| Output Load(CMOS)         | L <sub>CMOS</sub>               |                    | 15   |                    | pF   |                                                                                             |
| Current Consumption       | I <sub>cc</sub>                 | —                  | —    | 10                 | mA   | 1MHz ≤ Freq. < 40MHz, L <sub>CMOS</sub> = 15pF                                              |
|                           |                                 | —                  | —    | 20                 |      | 40MHz ≤ Freq. < 80MHz, L <sub>CMOS</sub> = 15pF                                             |
|                           |                                 | —                  | —    | 40                 |      | 80MHz ≤ Freq. < 160MHz, L <sub>CMOS</sub> = 15pF                                            |
| Duty Cycle                | SYM                             | 45                 | —    | 55                 | %    | 50% V <sub>dd</sub> level, L <sub>CMOS</sub> ≤ 15pF                                         |
| Output Voltage            | V <sub>OH</sub>                 | 0.9V <sub>dd</sub> | —    | —                  | V    |                                                                                             |
|                           | V <sub>OL</sub>                 | —                  | —    | 0.1V <sub>dd</sub> |      |                                                                                             |
| Enable Voltage High       | V <sub>IH</sub>                 | 0.7V <sub>dd</sub> | —    | —                  | V    | Output will be disable if OE is Logic"0"<br>Output will be enable if OE is Logic"1" or open |
| Disable Voltage Low       | V <sub>IL</sub>                 | —                  | —    | 0.3V <sub>dd</sub> |      |                                                                                             |
| Rise / Fall Time          | T <sub>R</sub> / T <sub>F</sub> | —                  | —    | 5                  | nS   | 10% V <sub>dd</sub> to 90% V <sub>dd</sub> level                                            |
| Start-up time             | T <sub>str</sub>                | —                  | —    | 5                  | mS   | To 90% of Final Amplitude                                                                   |
| Aging                     | f <sub>age</sub>                | -3                 | —    | +3                 | ppm  | at 25°C ± 3°C. First Year                                                                   |

## Electrical Specifications Cont.

• Table 1: Frequency Stability VS. Temperature

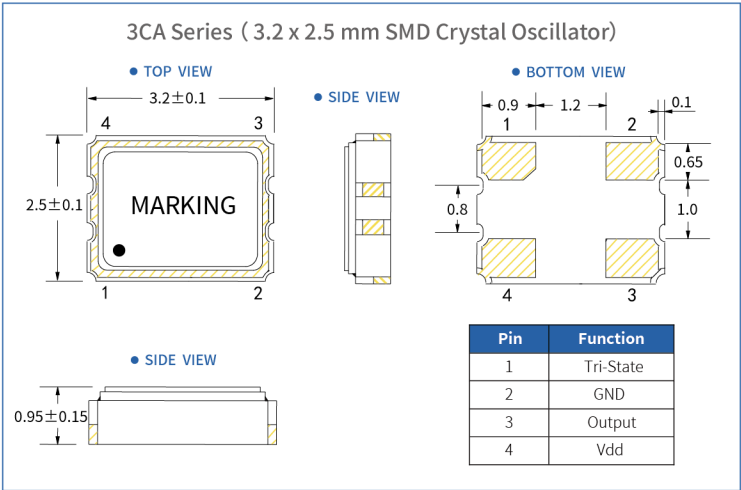


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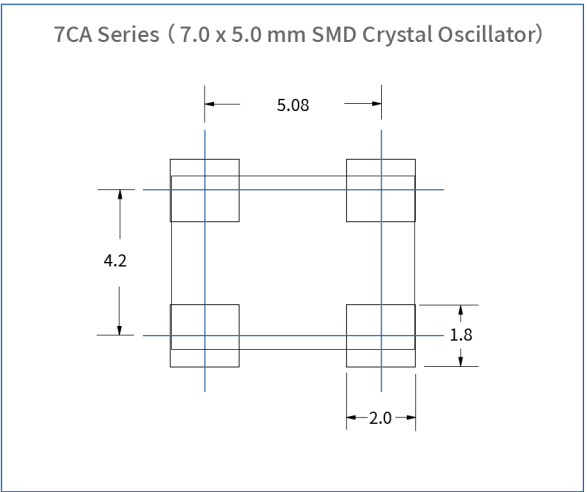
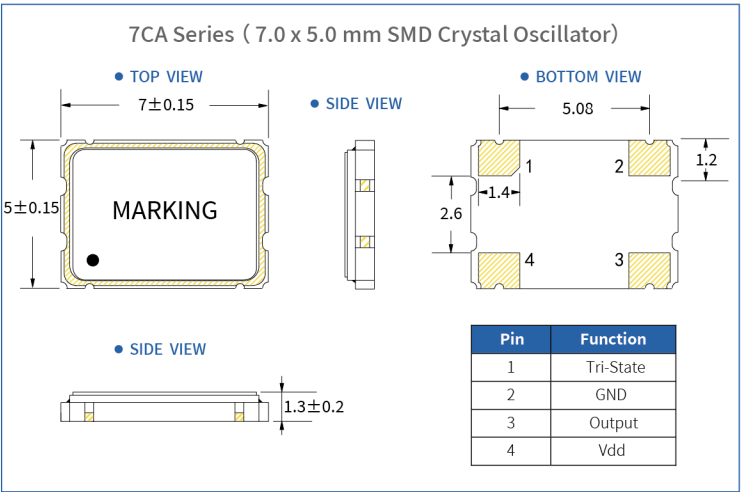
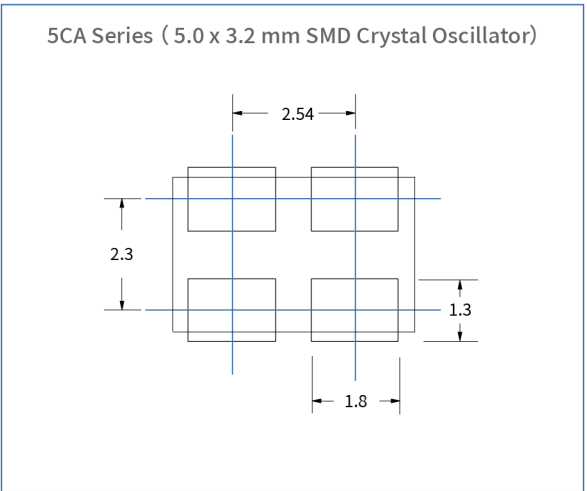
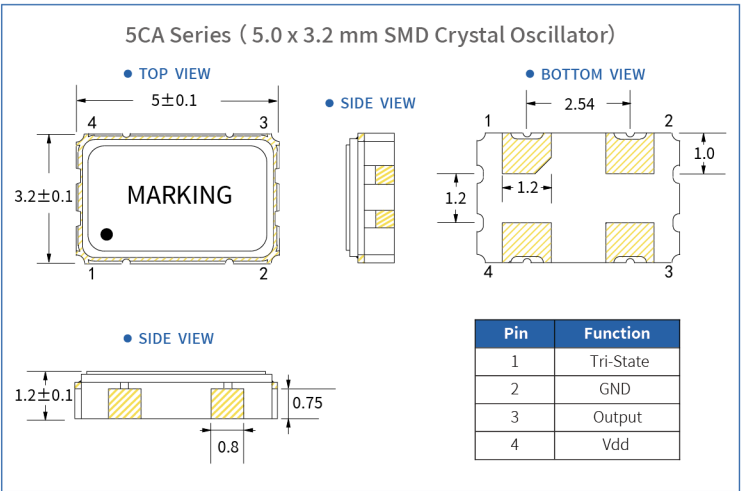
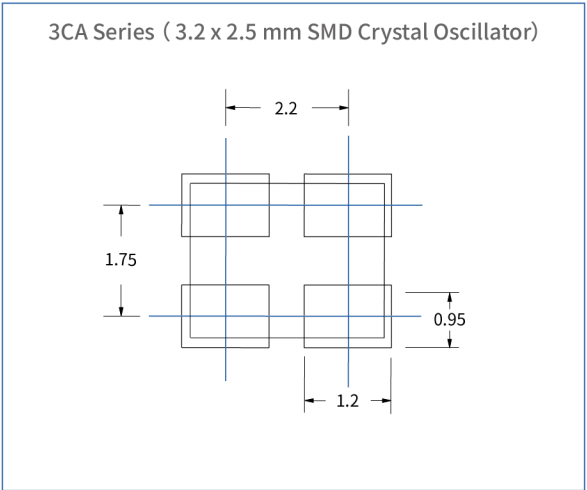
3CA / 5CA / 7CA



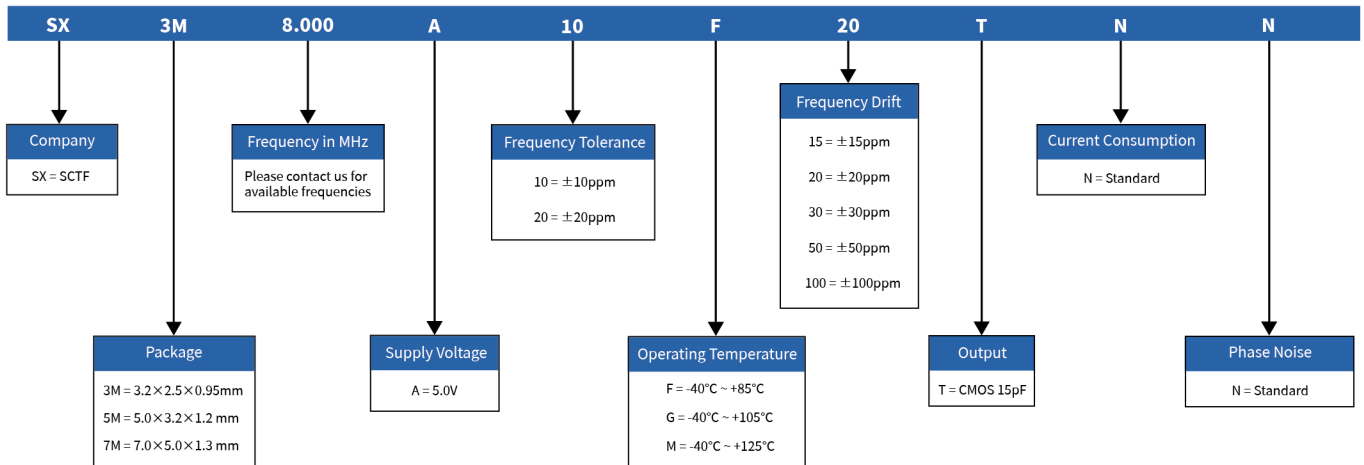
## Dimensions (UNIT:mm)



## Solder pad layout (UNIT:mm)



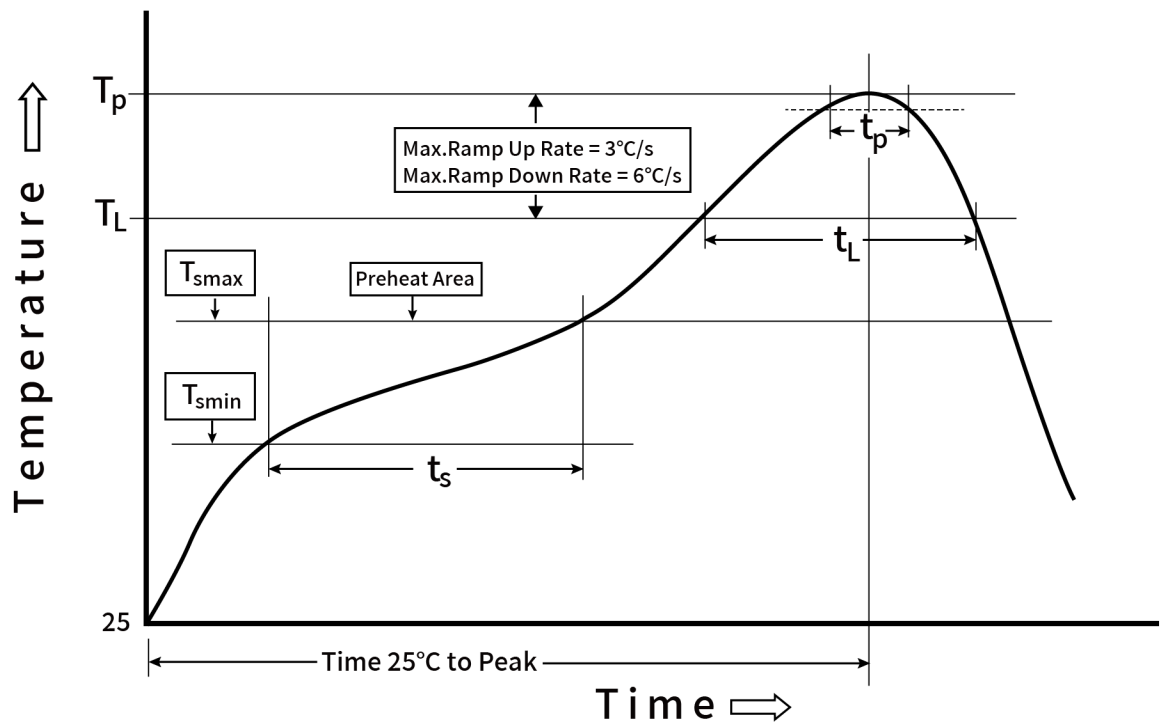
## Options and Part Identification



## List of available part numbers

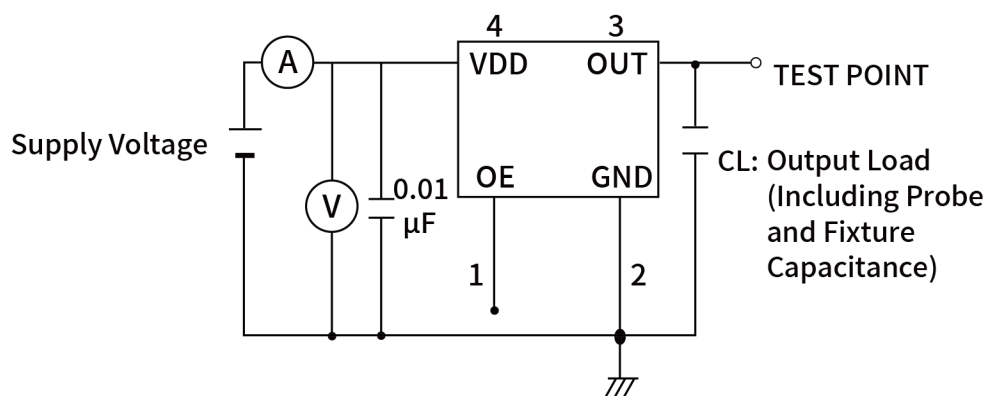
| Part NO#            |                     |                     |                     |
|---------------------|---------------------|---------------------|---------------------|
| SX3M8.000A10F20TNN  | SX3M12.000A10F20TNN | SX3M16.000A10F20TNN | SX3M24.000A10F20TNN |
| SX3M25.000A10F20TNN | SX3M27.000A10F20TNN | SX3M50.000A10F20TNN |                     |
| SX5M8.000A10F20TNN  | SX5M12.000A10F20TNN | SX5M16.000A10F20TNN | SX5M24.000A10F20TNN |
| SX5M25.000A10F20TNN | SX5M27.000A10F20TNN | SX5M50.000A10F20TNN |                     |
| SX7M8.000A10F20TNN  | SX7M12.000A10F20TNN | SX7M16.000A10F20TNN | SX7M24.000A10F20TNN |
| SX7M25.000A10F20TNN | SX7M27.000A10F20TNN | SX7M50.000A10F20TNN |                     |

## Reflow Profile



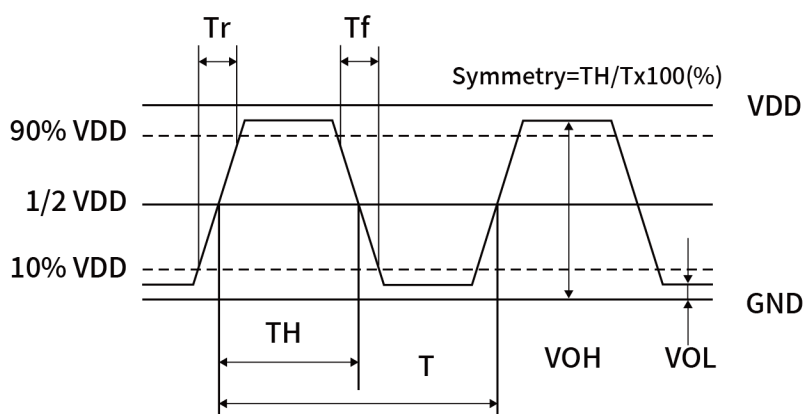
| Profile Feature                                                                                                                                                                                                                  | Sn - Pb Eutectic Assembly        | Preheat / Soak                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|----------------------------------|
| Preheat / Soak <ul style="list-style-type: none"><li>● Temperature Min ( <math>T_{smin}</math> )</li><li>● Temperature Max ( <math>T_{smax}</math> )</li><li>● Time ( <math>T_{smin}</math> to <math>T_{smax}</math> )</li></ul> | 100°C<br>150°C<br>60-120 seconds | 150°C<br>200°C<br>60-120 seconds |
| Ramp - up rate ( $T_L$ to $T_p$ )                                                                                                                                                                                                | 3°C/ second max.                 | 3°C/ second max.                 |
| Time maintained above <ul style="list-style-type: none"><li>● Liquidous temperature ( <math>T_L</math> )</li><li>● Time ( <math>t_L</math> ) maintained above <math>T_L</math></li></ul>                                         | 183°C<br>60-150 seconds          | 217°C<br>60-150 seconds          |
| Peak package body temperature ( $T_p$ )                                                                                                                                                                                          | 235°C                            | 260°C                            |
| Time within 5° C of the specified classification temperature ( $T_p$ )                                                                                                                                                           | 20 seconds                       | 30 seconds                       |
| Ramp - down rate ( $T_p$ to $T_L$ )                                                                                                                                                                                              | 6°C/ second max.                 | 6°C/ second max.                 |
| Time 25° C to peak temperature                                                                                                                                                                                                   | 6 minutes max.                   | 8 minutes max.                   |
| <b>Suggest reflow times</b>                                                                                                                                                                                                      | <b>2 Times max.</b>              |                                  |

## Testing Circuit



Notes: PIN 1 connected to Vdd or floating, the product is working properly; connected to GND, stops working.

## Waveform Conditions

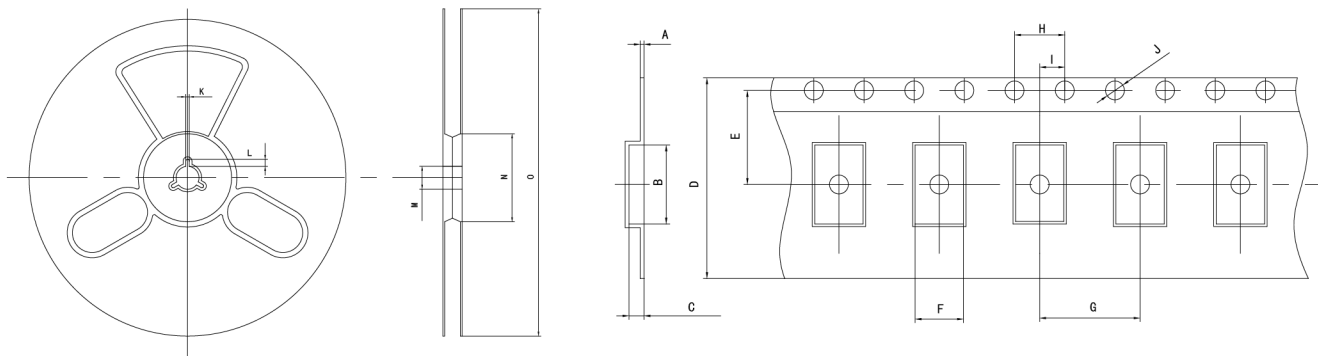


Waveform measurement system should have a min. bandwidth of 5 times the frequency being tested.

## Reliability Specification

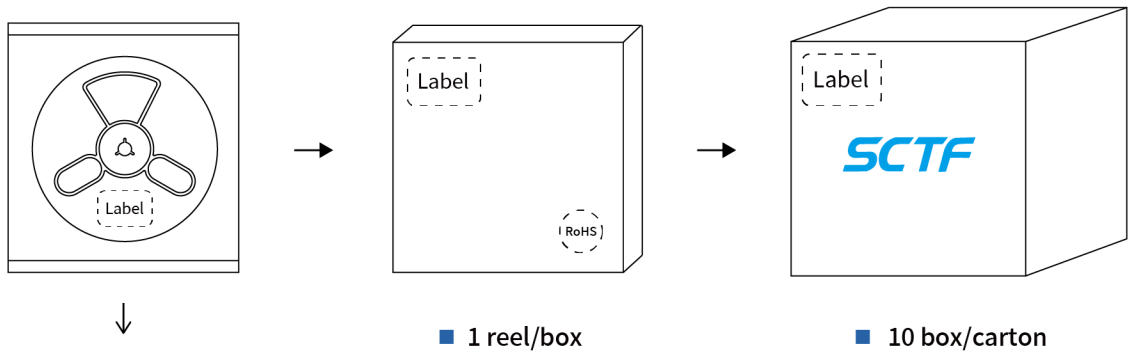
| NO. | Item                         | Conditions                                                                                                                                                          | Basis of Verdict                    |
|-----|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 1   | Drop                         | High:100cm;Thickness:3cm;3 times.                                                                                                                                   | $\Delta FL \leq \pm 5 \text{ppm}$   |
| 2   | Vibration                    | Frequency:10~500HZ<br>speed:11min/cycle<br>Amplitude:1.5mm(10~55Hz)<br>acceleration rate:200m/s <sup>2</sup> (55~500Hz)<br>Direction:X,Y,Z                          | $\Delta FL \leq \pm 5 \text{ppm}$   |
| 3   | Low Temperature Storage      | Temp:-40°C $\pm$ 2°C;Times:96h                                                                                                                                      | $\Delta FL \leq \pm 5 \text{ppm}$   |
| 4   | High Temperature Storage     | Temp:125°C $\pm$ 2°C;Times:96h                                                                                                                                      | $\Delta FL \leq \pm 5 \text{ppm}$   |
| 5   | High Temp.&Humidity          | Temp:80°C $\pm$ 2°C;<br>Humidity:85% $\pm$ 5%;Times:1000h                                                                                                           | $\Delta FL \leq \pm 5 \text{ppm}$   |
| 6   | Thermal Shock                | -40°C $\pm$ 2°C (30min) $\longleftrightarrow$ 85°C $\pm$ 2°C (30min) ;<br>For 100 cycles                                                                            | $\Delta FL \leq \pm 5 \text{ppm}$   |
| 7   | Resistance to Soldering Heat | Keep 150 °C $\pm$ 5 °C 120s and then rose to 265 °C $\pm$ 5 °C for 10s,warming and holding time is less than the 200s, placed at room temperature 1 ~ 2h after test | $\Delta FL \leq \pm 5 \text{ppm}$   |
| 8   | Aging                        | Temp:85°C;Times:30days                                                                                                                                              | $\Delta FL \leq \pm 5 \text{ppm}$   |
| 9   | Soldering Test               | Dipping in solder bath at 245deg.C $\pm$ 5deg.C for 3 $\pm$ 0.5 sec.                                                                                                | Soldering tin rate greater than 95% |

## Taping Specifications



| Series | A         | B       | C        | D       | E       | F        | G       | H       | I       | J        | K       | L       | M       | N     | O      |
|--------|-----------|---------|----------|---------|---------|----------|---------|---------|---------|----------|---------|---------|---------|-------|--------|
| 3CA    | 0.25±0.05 | 3.5±0.1 | 1.4±0.1  | 8.0±0.1 | 3.5±0.1 | 2.70±0.1 | 4.0±0.1 | 4.0±0.1 | 2.0±0.1 | φ1.5±0.1 | 2.0±0.2 | 4.0±1.0 | φ13±0.5 | φ60±1 | φ180±1 |
| 5CA    | 0.3±0.05  | 5.5±0.1 | 1.25±0.1 | 12±0.1  | 5.5±0.1 | 3.6±0.1  | 8.0±0.1 | 4.0±0.1 | 2.0±0.1 | φ1.5±0.1 | 2.0±0.2 | 4.0±1.0 | φ13±0.5 | φ60±1 | φ180±1 |
| 7CA    | 0.3±0.05  | 7.6±0.1 | 2.0±0.1  | 16±0.3  | 7.5±0.1 | 5.4±0.1  | 8.0±0.1 | 4.0±0.1 | 2.0±0.1 | φ1.5±0.1 | 2.0±0.2 | 4.0±1.0 | φ13±0.5 | φ60±1 | φ180±1 |

## Packaging specifications



| Series | Packaging      |
|--------|----------------|
| 3CA    | 3,000 pcs/reel |
| 5CA    | 1,000 pcs/reel |
| 7CA    | 1,000 pcs/reel |