

**XTL2002**

**48.000000 MHz**  
**Crystal Unit**



**SM1210-4**

## Features:

- Surface Mount Hermetic Package
- Excellent Reliability Performance
- Good Frequency Perturbation and Stability over temperature
- Ultra Miniature Package
- Moisture Sensitivity Level (MSL) : Level-1

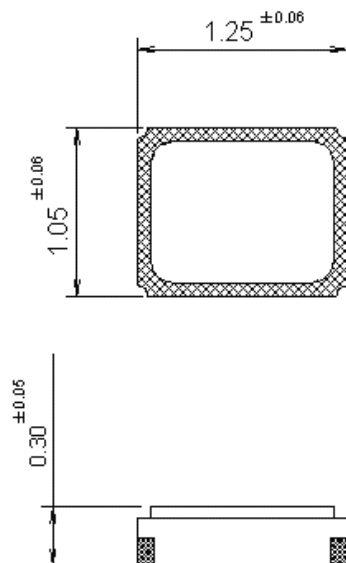
## Description and Applications:

Surface mount 1.2mmx1.0mm crystal unit for use in wireless communications devices, especially for a need of ultra miniature package for mobility.

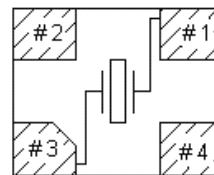
## Electrical Specifications:

| <b>XTL2002</b>                                                                                   | <b>Specification</b> |             |     |      |
|--------------------------------------------------------------------------------------------------|----------------------|-------------|-----|------|
| Characteristic                                                                                   | Min                  | Nom         | Max | Unit |
| Nominal Frequency                                                                                |                      | 48.000000   |     | MHz  |
| Mode of Oscillation                                                                              |                      | Fundamental |     | °C   |
| Storage Temperature Range                                                                        | -40                  |             | 125 | °C   |
| Operating Temperature Range                                                                      | -40                  |             | 105 | °C   |
| Frequency Stability over Operating Temperature Range -40°C~100°C (referred to the value at 25°C) | -15                  |             | 13  | ppm  |
| Frequency Make Tolerance(@ 25°C +/- 3°C)                                                         | -1                   |             | 5   | ppm  |
| IR Reflow(2 times)                                                                               | -1                   |             | 1   | ppm  |
| Aging(5 years)                                                                                   | -2                   |             | 0   | ppm  |
| Frequency perturbation(ppm)                                                                      | -1                   |             | 1   | ppm  |
| Total Budget(ppm)                                                                                | -20                  |             | 20  | ppm  |
| Equivalent Series Resistance (ESR)                                                               | 10                   | 17          | 25  | Ω    |
| Nominal Drive Level                                                                              | 0.01                 | 200         | 300 | uW   |
| Motional Inductance                                                                              | 4.3                  | 5.3         | 7.0 | mH   |
| Load Capacitance (CL) (Measure by Saunders(S&A) Network Analyzer 250B)                           |                      | 9.9         |     | pF   |
| Motional Capacitance                                                                             | 1.5                  | 2.5         | 4.0 | fF   |
| Shunt Capacitance                                                                                | 0.3                  | 0.7         | 1.0 | pF   |
| Insulation Resistance(DC 100V)                                                                   | 500                  |             |     | MR   |

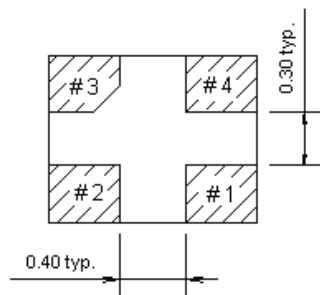
## Mechanical Dimensions (mm):



Internal Connections  
(Top View)

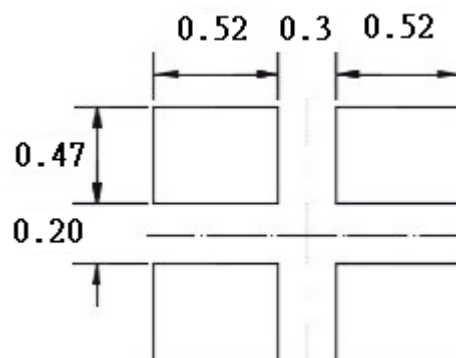


[NOTE] #2 =NC, #4 is connected with a metal cover



|        | Pin Connection |
|--------|----------------|
| #1 Pin | IN/OUT         |
| #2 Pin | NC             |
| #3 Pin | IN/OUT         |
| #4 Pin | GND            |

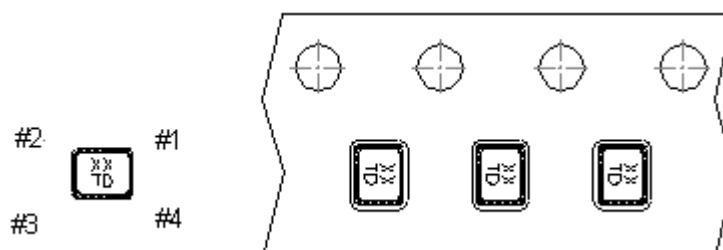
## Recommended Land Pattern: (unit: mm)



## Marking:

Line 1: XX; Frequency (48)

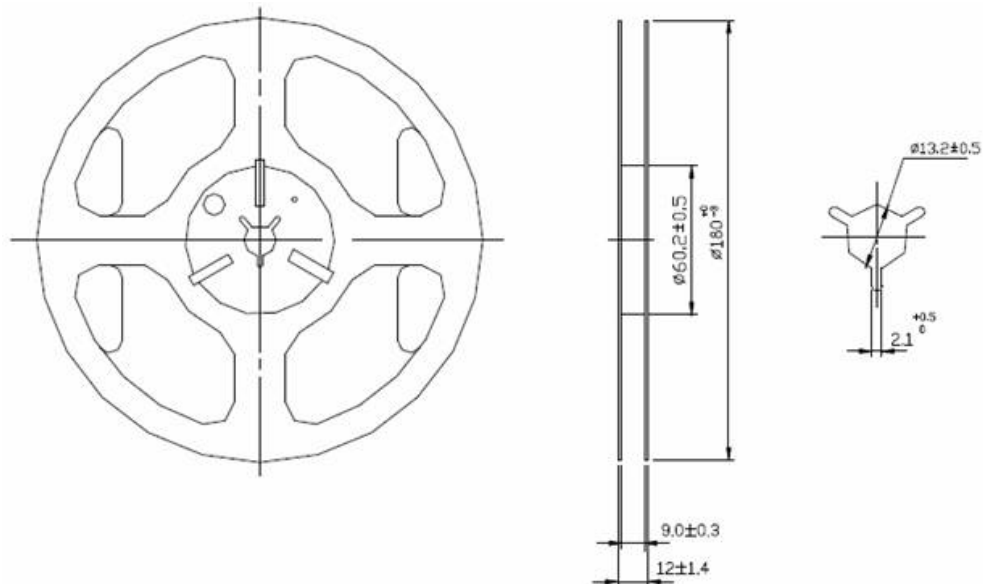
Line 2: T; Traceable Code + D; date Code of Year/Month



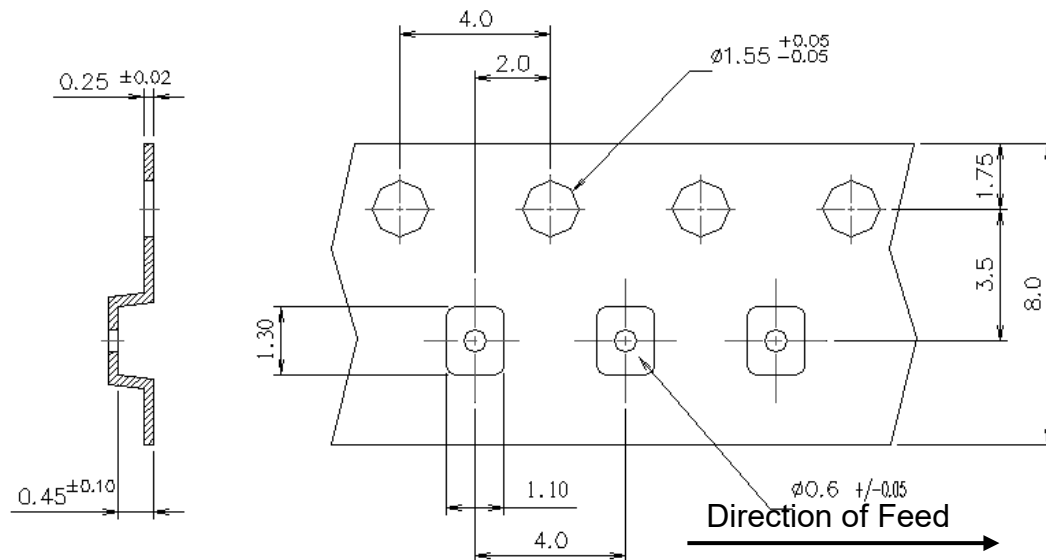
**Date Code Table: Year/Month**

| Year/Month | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|------------|---|---|---|---|---|---|---|---|---|----|----|----|
| 2012       | a | b | c | d | e | f | g | h | i | j  | k  | m  |
| 2013       | n | p | q | r | s | t | u | v | w | x  | y  | z  |
| 2014       | A | B | C | D | E | F | G | H | J | K  | L  | M  |
| 2015       | N | P | Q | R | S | T | U | V | W | X  | Y  | Z  |
| 2016       | a | b | c | d | e | f | g | h | i | j  | k  | m  |
| 2017       | n | p | q | r | s | t | u | v | w | x  | y  | z  |
| 2018       | A | B | C | D | E | F | G | H | J | K  | L  | M  |
| 2019       | N | P | Q | R | S | T | U | V | W | X  | Y  | Z  |
| 2020       | a | b | c | d | e | f | g | h | i | j  | k  | m  |
| 2021       | n | p | q | r | s | t | u | v | w | x  | y  | z  |
| 2022       | A | B | C | D | E | F | G | H | J | K  | L  | M  |
| 2023       | N | P | Q | R | S | T | U | V | W | X  | Y  | Z  |
| 2024       | a | b | c | d | e | f | g | h | i | j  | k  | m  |
| 2025       | n | p | q | r | s | t | u | v | w | x  | y  | z  |

**Reel Dimensions (mm):**



## Tape Dimensions (mm):

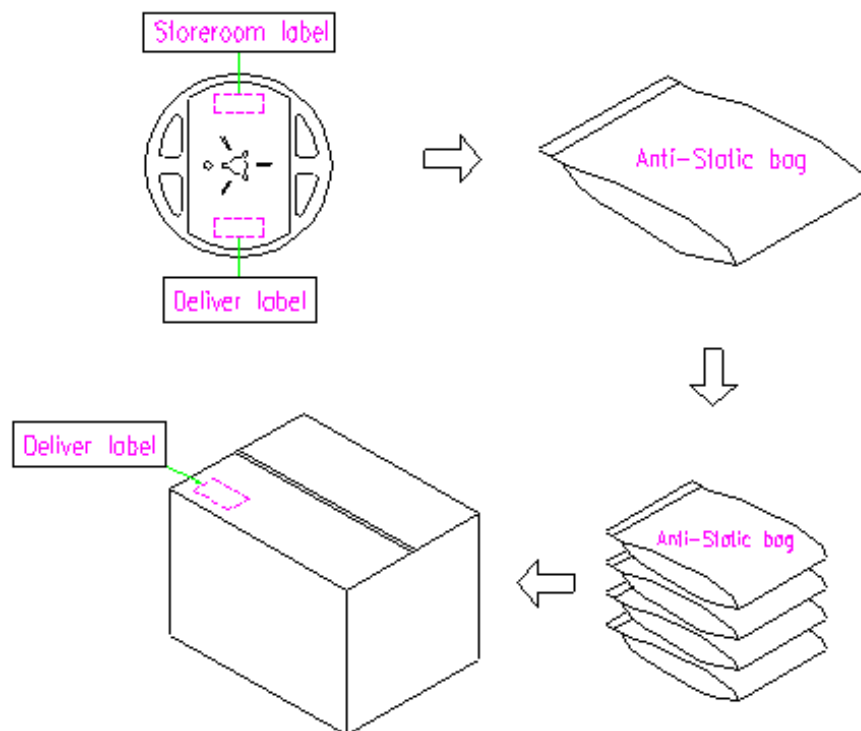


### [NOTE]:

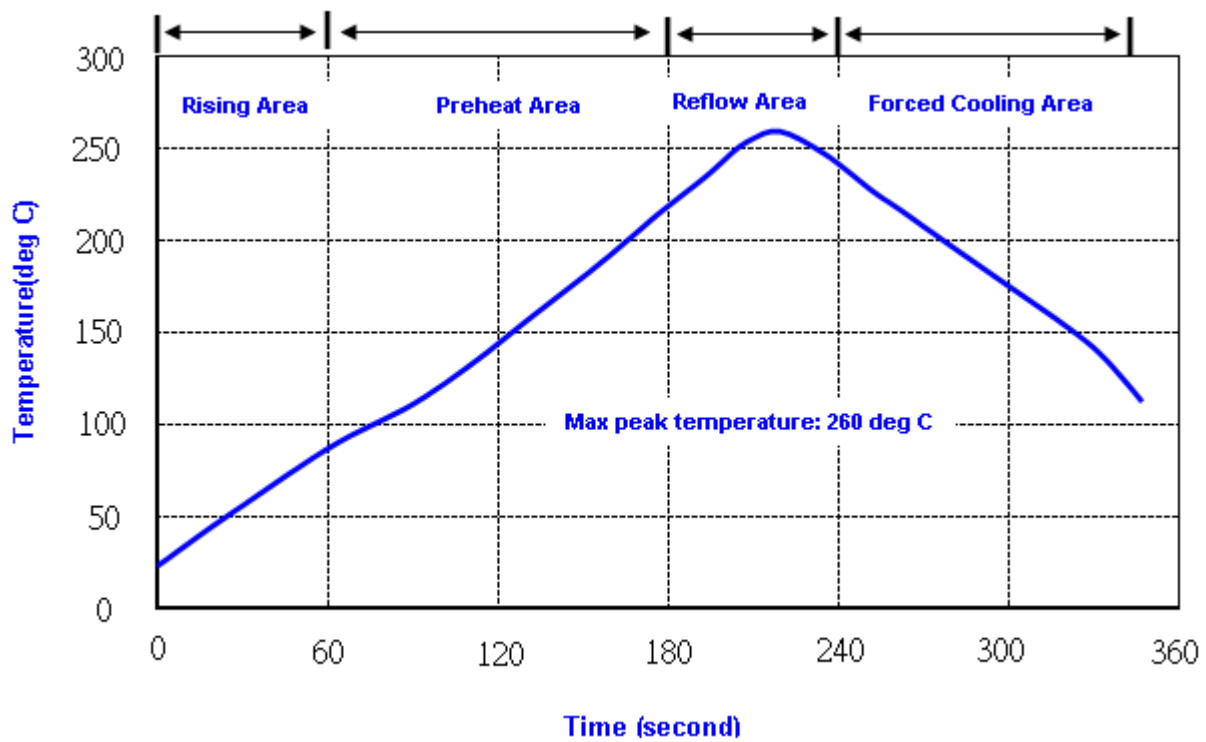
1. Unless otherwise specified tolerance on dimension  $\pm 0.1$  mm.
2. Material: conductive polystyrene with color black.
3. 10 pitch cumulative tolerance  $\pm 0.2$  mm.

## Packing Quantity/Packing:

**3K pcs maximum per reel**



## Reflow Profile:



Note: 1. Max peak temperature: 260 $\pm$ 5 deg C; Time: 10 $\pm$ 2 sec  
2. Temperature: 217 $\pm$ 5 deg C; Time: 90~100 sec

## Reliability Specifications

| Test name                                | Test process / method                                                                                                                                                          | Reference standard            |
|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| <b>Mechanical characteristics</b>        |                                                                                                                                                                                |                               |
| resistance to Soldering heat (IR reflow) | Temp./ Duration : 265°C / 10sec ×2 times<br>Total time : 4min.(IR-reflow)                                                                                                      | EIAJED-4701<br>-300(301)M(II) |
| Vibration                                | Total peak amplitude : 1.5mm<br>Vibration frequency : 10 to 2000 Hz<br>Sweep period : 20 minute<br>Vibration directions : 3 mutually perpendicular<br>Duration : 2 hr / direc. | MIL-STD 202G<br>method 204    |
| Mechanical Shock                         | directions : 3 impacts per axis<br>Acceleration : 3000g's, +20/-0 %<br>Duration : 0.3 ms (total 18 shocks)<br>Waveform : Half-sine                                             | MIL-STD 202G<br>method 213    |
| Solderability                            | Solder Temperature: 265±5°C<br>Duration time: 5±0.5 seconds.                                                                                                                   | J-STD-002                     |
| <b>Environmental characteristics</b>     |                                                                                                                                                                                |                               |
| Thermal Shock                            | Heat cycle conditions<br>-40 °C (30min) ↔ 85 °C (30min)<br>* cycle time : 10 times                                                                                             | MIL-STD 883G<br>method 1010.8 |
| Humidity test                            | Temperature : 85 ± 2 °C<br>Relative humidity : 85%<br>Duration : 96 hours                                                                                                      | MIL-STD 202G<br>method 103    |
| Dry heat<br>( Aging test )               | Temperature : 125 ± 2 °C<br>Duration : 168 hours                                                                                                                               | MIL-STD 202G<br>method 108A   |
| Cold resistance<br>(Low Temp Storage)    | Temperature : -40 ± 2 °C<br>Duration : 96 hours                                                                                                                                | IEC 60068-2-1                 |



**CAUTION: Electrostatic Sensitive Device. Observe precautions for handling.**

1. The design, manufacturing process, and specifications of this device are subject to change.
2. US or International patents may apply.
3. RoHS compliant from the first date of manufacture.