

**TAI-SAW TECHNOLOGY CO., LTD.**

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## Product Specifications Approval Sheet

Product Description: SMD TSX 1.6X1.2mm 76.8MHz

(Temperature Sensing Crystal)

TST Part No.: TM0021AAAI61

Customer Part No.: \_\_\_\_\_

Customer signature required

Company: \_\_\_\_\_

Division: \_\_\_\_\_

Approved by : \_\_\_\_\_

Date: \_\_\_\_\_

Checked by: \_\_\_\_\_ Tom Liu *Tom*

Approved by: \_\_\_\_\_ Kelly Huang *Kelly Huang*

Date: \_\_\_\_\_ 05/10/2022

1. Customer signed back is required before TST can proceed with sample build and receive orders.
2. Orders received without customer signed back will be regarded as agreement on the specifications.
3. Any specifications changes must be approved upon by both parties and a new revision of specifications shall be released to reflect the changes.



MODEL  
TM0021AAAI61

REV. NO.: 1

| Rev. | Rev. Page | Rev. Account    | Date      | Ref. No. | Revised by |
|------|-----------|-----------------|-----------|----------|------------|
| 1    | N/A       | Initial release | 05/10/22' | N/A      | Tom Liu    |



## TAI-SAW TECHNOLOGY CO., LTD.

### SMD TSX 1.6x1.2 76.8MHz

MODEL  
TM0021AAAI61

NO.:

REV. NO.: 1

### Features:

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

RoHS Compliant

Lead-free soldering

### Description and Applications:

Surface mount 1.6mmx1.2mm crystal unit for use in wireless communications devices, especially for a need of ultra miniature package for mobility.

### Electrical Specifications:

| TM0021AAAI61                            | Specification                             |
|-----------------------------------------|-------------------------------------------|
| Nominal Frequency                       | 76.800000 MHz                             |
| Mode of Oscillation                     | AT-cut Fundamental                        |
| Storage Temperature Range               | -40°C to +105°C                           |
| Operating Temperature Range             | -30°C to +105°C                           |
| Frequency Stability over -30°C to +85°C | +/-12 ppm (referred to the value at 25°C) |
| Frequency Make Tolerance (FL)           | +6+/-16 ppm @ 25°C +/- 3°C                |
| Equivalent Series Resistance (ESR)      | 30 Ω max                                  |
| Frequency Drift After Reflow            | +/- 2 ppm after two times reflow          |
| Aging                                   | +/-0.7 ppm / year                         |
| Pulling Sensitivity(TS)                 | 10~15 ppm/pF                              |
| Load Capacitance (CL)                   | 7 pF                                      |
| Insulation Resistance                   | 500 MΩ min                                |
| Spurious Mode Series Resistance         | 1100Ω Min. (@ +/- 1MHz)                   |

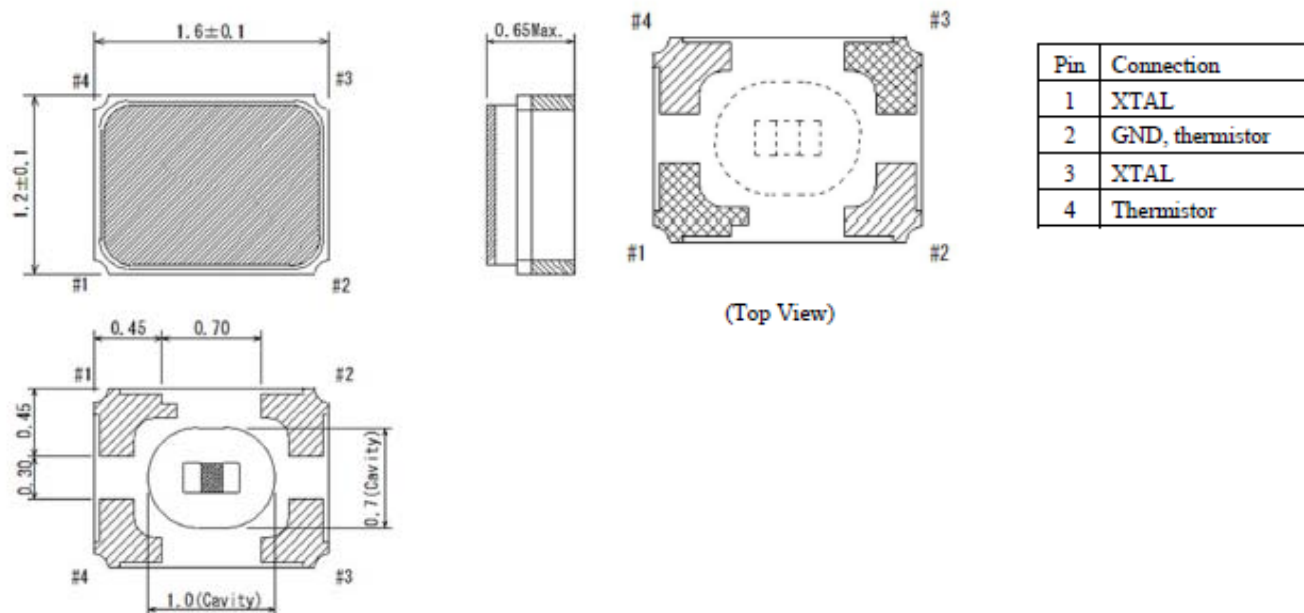


|                                                               |                                                                                                      |
|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Nominal Drive Level                                           | 10uW min<br>200uW typical<br>250uW max                                                               |
| Q Factor                                                      | 50K min                                                                                              |
| <b>Drive level dependency<br/>(0.01uW to 250uW to 0.01uW)</b> |                                                                                                      |
| Frequency (max - min)                                         | 6 ppm max                                                                                            |
| Frequency (repeatability)                                     | 0.7 ppm max                                                                                          |
| ESR (max - min) / ESR min                                     | 10%                                                                                                  |
| ESR                                                           | 30 $\Omega$ max                                                                                      |
| <b>Thermistor Characteristics</b>                             |                                                                                                      |
| Storage Temperature Range                                     | -40°C to +105°C                                                                                      |
| Operating Temperature Range                                   | -30°C to +105°C                                                                                      |
| Resistance Value(at 25°C)                                     | 100K $\Omega$ +/- 1%                                                                                 |
| Beta Constant                                                 | 4250K +/- 1%                                                                                         |
| Rated Power(at 25°C)                                          | 100mW Max                                                                                            |
| <b>Specification(Crystal curve fitting)</b>                   |                                                                                                      |
| Inflection Temperature                                        | +24.5°C +/- 2°C                                                                                      |
| First-order Curve Fitting Parameter (C <sub>1</sub> )         | -0.40 to -0.10 ppm/°C                                                                                |
| Second-order Curve Fitting Parameter (C <sub>2</sub> )        | -6.0 to +6.0 x10 <sup>-4</sup> ppm/°C <sup>2</sup>                                                   |
| Third-order Curve Fitting Parameter (C <sub>3</sub> )         | +8.5 to +11.5 x10 <sup>-5</sup> ppm/°C <sup>3</sup>                                                  |
| Residual frequency stability slope                            | +/-100 ppb /°C @ -30°C to -15°C<br>+/-50 ppb /°C @ -15°C to +70°C<br>+/-100 ppb /°C @ +70°C to +85°C |
| 5°C small orbit hysteresis1                                   | +/-100 ppb /°C @ -30°C to -15°C<br>+/-50 ppb /°C @ -15°C to +70°C<br>+/-100 ppb /°C @ +70°C to +85°C |
| 5°C small orbit hysteresis2                                   | 100 ppb /pk-pk max @ -30°C to +85°C                                                                  |

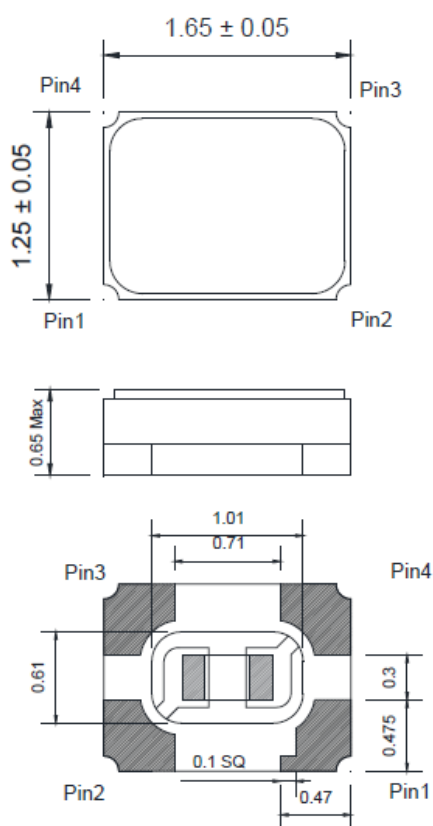


## Mechanical Dimensions (mm):

Base1:



Base2:



### PIN FUNCTION

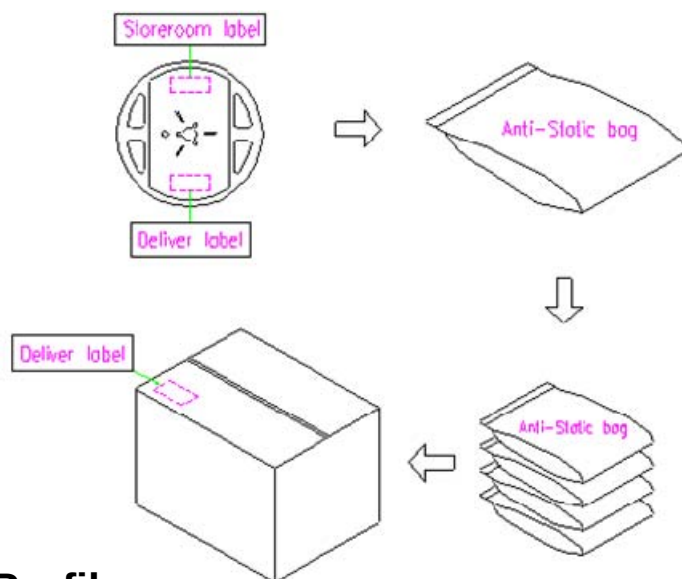
|       | Symbol | Function              |
|-------|--------|-----------------------|
| Pin 1 | XT1    | XTAL Terminal 1       |
| Pin 2 | RT2    | Thermistor Terminal 2 |
| Pin 3 | XT2    | XTAL Terminal 2       |
| Pin 4 | RT1    | Thermistor Terminal 1 |

Note: Pin 2 is connected to the metal lid and thermistor  
Pin 4 is connected to the thermistor only

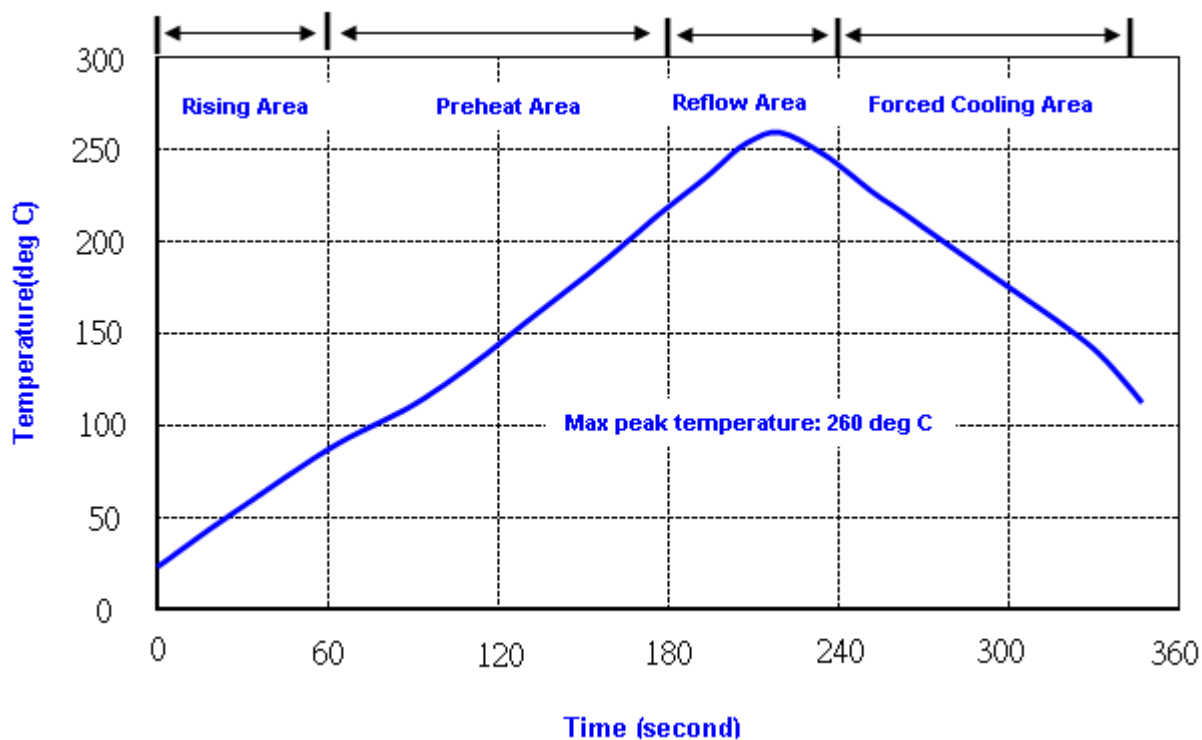




## Packing Quantity/Packing:



## 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 : 260°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 55 Hz<br>Sweep period : 1.0 minute<br>Vibration directions : 3 mutually perpendicular<br>Duration : 2 hr / direc. | MIL-STD 202F<br>method 201A                  |
| 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 202F<br>method 213C                  |
| Solderability                            | Solder Temperature:265±5°C<br>Duration time: 5±0.5 seconds.                                                                                                                   | MIL-STD 883G<br>method 2003                  |
| <b>Environmental characteristics</b>     |                                                                                                                                                                               |                                              |
| Thermal Shock                            | Heat cycle conditions<br>-55 °C (30min) ↔ 125 °C (30min)<br>* cycle time : 10 times                                                                                           | MIL-STD 883G<br>method 1010.7                |
| Humidity test                            | Temperature : 70 ± 2 °C<br>Relative humidity : 90~95%<br>Duration : 96 hours                                                                                                  | MIL-STD 202F<br>method 103B                  |
| Dry heat ( Aging test )                  | Temperature : 125 ± 2 °C<br>Duration : 168 hours                                                                                                                              | MIL-STD 883G<br>method 1008.2<br>condition C |
| PCT test                                 | Pressure: 2.06kg/cm <sup>2</sup> (2.03*10 <sup>5</sup> pa)<br>Temperature : 121 ± 2 °C<br>Relative humidity : 100%<br>Duration : 24 hours                                     | EIAJED-4701-3<br>B-123A                      |

