



# 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.: TM0021AAA161

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

Customer signature required
Company: _____
Division: _____
Approved by : _____
Date: _____

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

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

Date: \_\_\_\_\_ 04/06/2023

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.



**TAI-SAW TECHNOLOGY CO., LTD.**  
**SMD TSX 1.6x1.2 76.8MHz**

MODEL NO.: TM0021AAAI61

REV. NO.: 2

**Revise:**

Rev.	Rev. Page	Rev. Account	Date	Ref. No.	Revised by
1	N/A	Initial release	05/10/22'	N/A	Tom Liu
2	5	Revise Base 2 & thickness	04/06/23'	ECN-202300154	Tom Liu

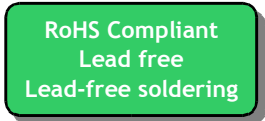


MODEL NO.: TM0021AAAI61

REV. NO.: 2

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

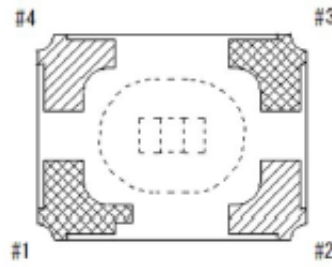
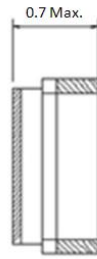
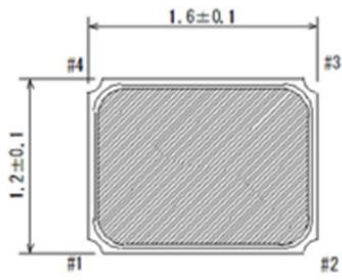
## Electrical Specifications:

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 200uW typical 250uW max
Q Factor	50K min

<b>Drive level dependency (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 +/-50 ppb /°C @ -15°C to +70°C +/-100 ppb /°C @ +70°C to +85°C
5°C small orbit hysteresis1	+/-100 ppb /°C @ -30°C to -15°C +/-50 ppb /°C @ -15°C to +70°C +/-100 ppb /°C @ +70°C to +85°C
5°C small orbit hysteresis2	100 ppb /pk-pk max @ -30°C to +85°C

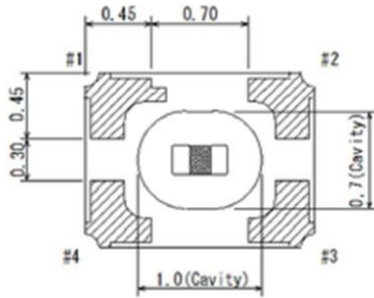
# Mechanical Dimensions (mm):

## Base1:

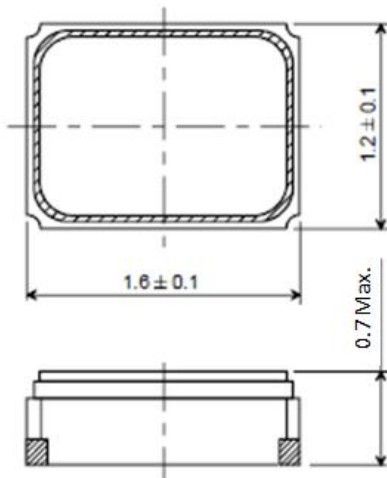


(Top View)

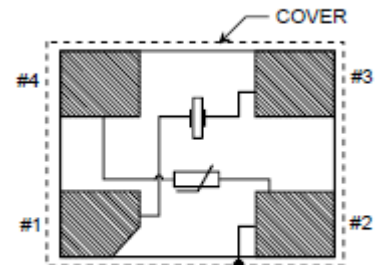
Pin	Connection
1	XTAL
2	GND, thermistor
3	XTAL
4	Thermistor



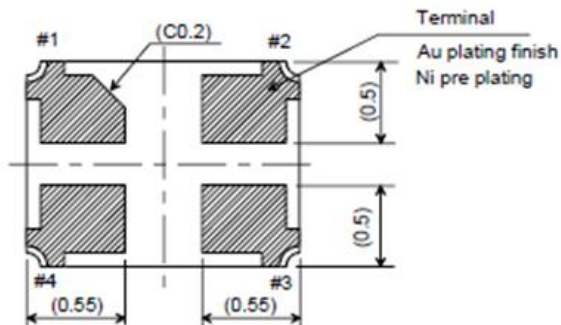
## Base2:



Terminal land connection (TOP VIEW)



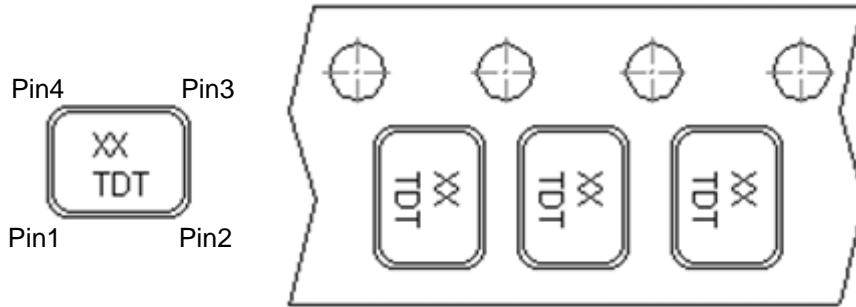
- #1: Crystal IN
- #2: Thermistor OUT and GND
- #3: Crystal OUT
- #4: Thermistor IN



# Marking:

Line 1: XX; Frequency (76)

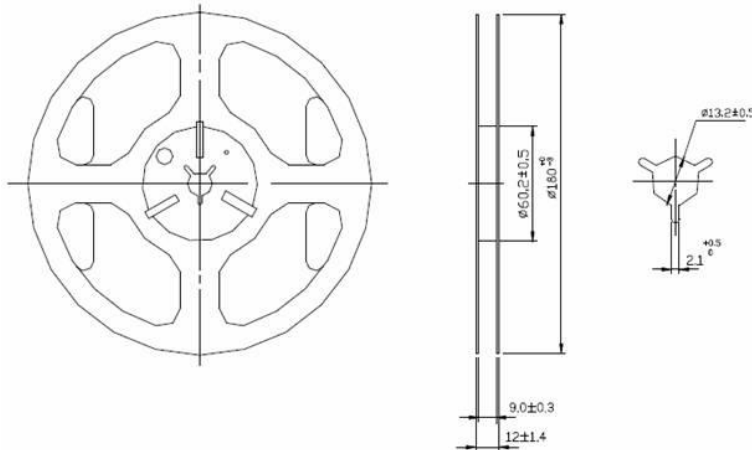
Line 2: T; Traceable Code + D; date Code of Year/Month+ T ; Traceability code (1 or no letter)



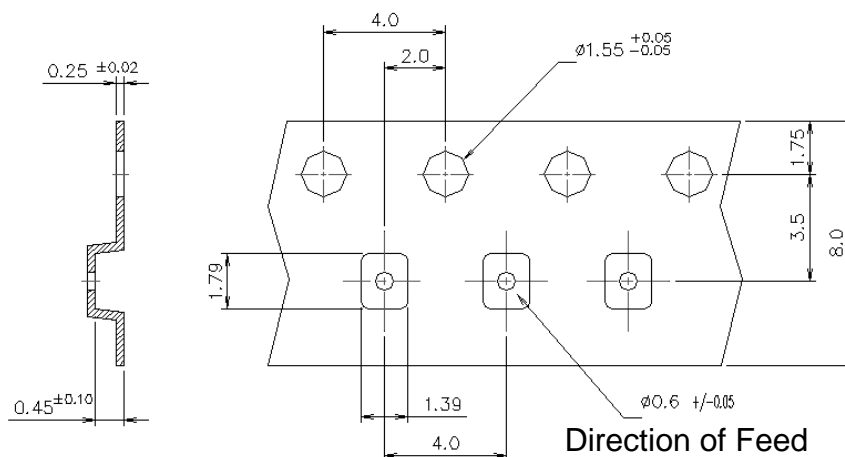
## Date Code Table: Year/Month

Year/Month	1	2	3	4	5	6	7	8	9	10	11	12
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

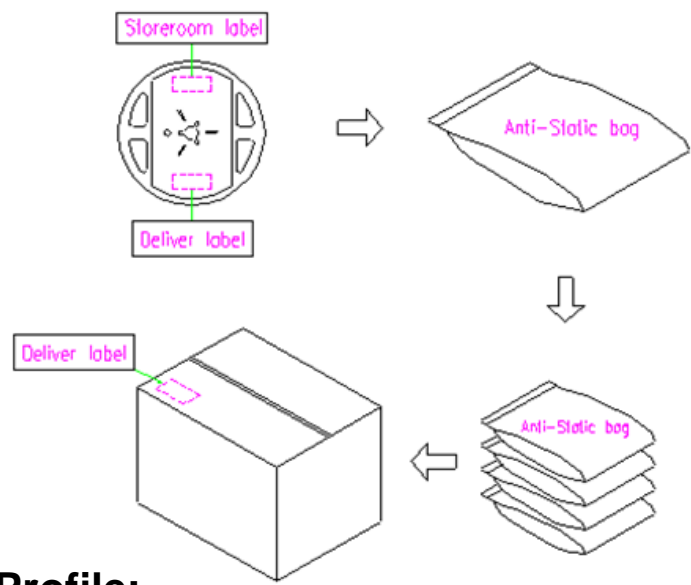
## Reel Dimensions (mm):



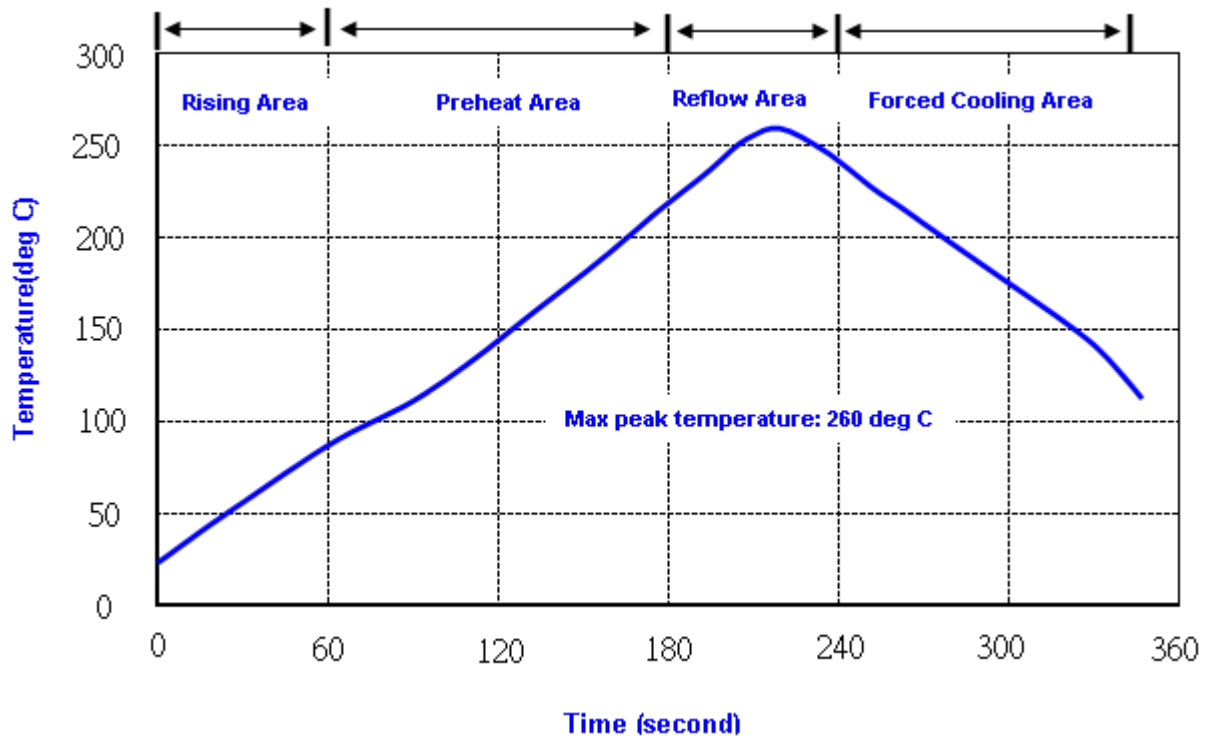
## Tape Dimensions (mm):



### Packing Quantity/Packing:



### Reflow Profile:



- Note: 1. Max peak temperature: 260+/-5 deg C; Time: 10+/-2 sec
- 2. Temperature: 217+/-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 x2 times Total time : 4min.(IR-reflow)	EIAJED-4701 -300(301)M(II)
Vibration	Total peak amplitude : 1.5mm Vibration frequency : 10 to 55 Hz Sweep period : 1.0 minute Vibration directions : 3 mutually perpendicular Duration : 2 hr / direc.	MIL-STD 202F method 201A
Mechanical Shock	directions : 3 impacts per axis Acceleration : 3000g's, +20/-0 % Duration : 0.3 ms (total 18 shocks) Waveform : Half-sine	MIL-STD 202F method 213C
Solderability	Solder Temperature:265±5°C Duration time: 5±0.5 seconds.	MIL-STD 883G method 2003
<b>Environmental characteristics</b>		
Thermal Shock	Heat cycle conditions -55 °C (30min) ↔ 125 °C (30min) * cycle time : 10 times	MIL-STD 883G method 1010.7
Humidity test	Temperature : 70 ± 2 °C Relative humidity : 90~95% Duration : 96 hours	MIL-STD 202F method 103B
Dry heat ( Aging test )	Temperature : 125 ± 2 °C Duration : 168 hours	MIL-STD 883G method 1008.2 condition C
PCT test	Pressure: 2.06kg/cm <sup>2</sup> (2.03*10 <sup>5</sup> pa) Temperature : 121 ± 2 °C Relative humidity : 100% Duration : 24 hours	EIAJED-4701-3 B-123A