

APPROVAL SHEET

Product Name: Quartz Thermistor Crystal

P/N.: ECS-192-7-37TC-CZY-TR

Customer's Name: _____

Specification Sheet#: _____

Date: 12/30/2020

Draw: A. Anderson

Check: D. Kelly

Customer Confirmation: _____



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ECS Inc. International

■ REVISION HISTORY

NO.	DATE	EDITION	DRAW
1	12/30/2020	First Edition	A. Anderson
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1. SCOPE

This specification relates to the Quartz Crystal to be supplied by ECS Inc. International.

2. SPECIFICATION

2-1. ELECTRICAL SPECIFICATION

Parameter	Value	Condition
Nominal Frequency	19.200000 MHz	
Mode of Vibration	AT-cut fundamental	
Operating Temperature Range	-30 ~ +85°C	
Storage Temperature Range	-40 ~ +105°C	
Drive level	10uW Typ., 100uW Max.	
Loading Capacitance	7 pF	
Test Set	250B PI-Network	
Initial Frequency Tolerance	±10 ppm Max.	TA= +25°C
Tolerance Over Temperature	±12 ppm Max.	TA= -30 ~ +85°C
Aging	±0.7ppm Max.	Per Year
Equivalent Series Resistance	80Ω Max.	
Quality Factor	75000 Min.	
Spurious Mode Resistance	1100Ω Min.	±1MHz
Motional Capacitance	1.2 fF ~ 3.1fF.	
Shunt Capacitance	0.3 pF ~ 1.3pF.	
Insulation resistance	500 MΩ Min	
Inflection Point	32 ±1.5°C	
Coefficient range (referenced to 32°C) Note1	C1: -0.40 ~ -0.10ppm/°C C2: $-4.5 \times 10^{-4} \sim 4.5 \times 10^{-4}$ ppm/°C C3: $8.5 \times 10^{-5} \sim 11.5 \times 10^{-5}$ ppm/°C	
Thermistor Resistance(25°C)	100 Kohms ±1%	TA= +25°C
Thermistor B-constant (25~50°C)	4250 K ±1%	TA= +25 ~ +50°C



Note1

The FT curve of an AT-cut crystal can be modeled as a third -order polynomial.

C0, C1, C2, and C3 are coefficients that need to be defined are calculated in the order specified by Qualcomm's 80-V9690-23 Rev D

$$f(t) = c_3(\theta)(t - t_0)^3 + c_2(\theta)(t - t_0)^2 + c_1(\theta)(t - t_0) + c_0$$

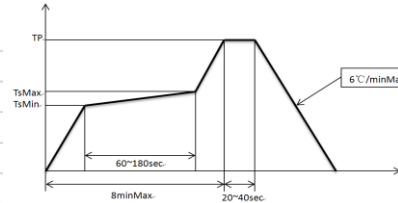
C0, C1, C2, and C3 are coefficients that need to be defined.

C1: First-order Curve Fitting Parameter

C2: Second-order Curve Fitting Parameter

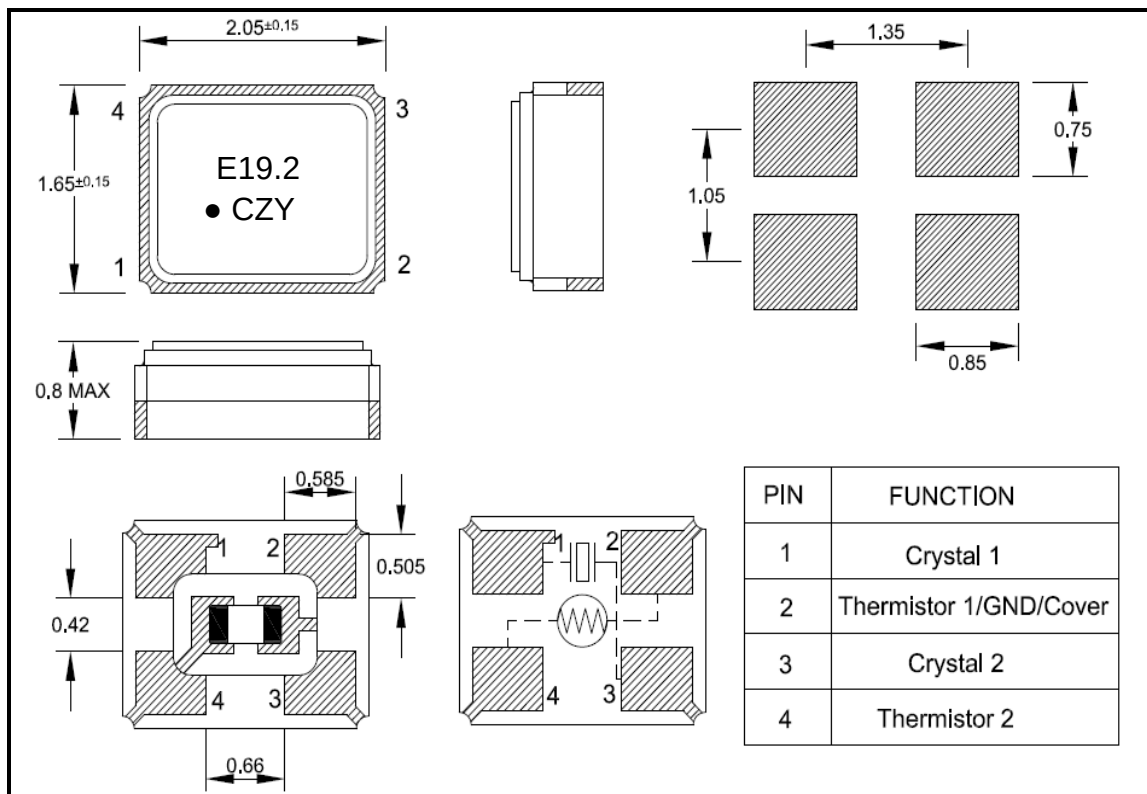
C3: Third-order Curve Fitting Parameter/T0=+32°C

2-2. RELIABILITY TEST

NO	ITEM	CONDITIONS	BASIS OF VERDICT
1	HIGH	Temperature: 85°C	$\Delta FL \leq \pm 10$ ppm
	TEMPERATURE	Times: 1000 hours	$\Delta RS \leq 5 \Omega$ or $\pm 20\%$
	STORAGE	The test was conducted 24 $\pm$ 2 hours at the end of the test (no charge)	(Whichever is Larger)
2	CONSTANT	Temperature: 85°C $\pm$ 2°C; Humidity: 85%; Time: 1000 hours	$\Delta FL \leq \pm 10$ ppm
	HUMIDITY	The test was conducted 24 $\pm$ 2 hours at the end of the test	$\Delta RS \leq 5 \Omega$ or $\pm 20\%$ (Whichever is Larger)
3	LOW	Temperature: -40°C	$\Delta FL \leq \pm 10$ ppm
	TEMPERATURE	Time: 1000 hours	$\Delta RS \leq 5 \Omega$ or $\pm 20\%$
	STORAGE	The test was conducted 24 $\pm$ 2 hours at the end of the test	(Whichever is Larger)
4	TEMPERATURE	-55°C $\pm$ 2°C (5 min) $\rightarrow$ 125°C $\pm$ 2°C (5 min); For 1000 cycles	$\Delta FL \leq \pm 10$ ppm
	CYCLING	Maximum conversion time: 5 min	$\Delta RS \leq 5 \Omega$ or $\pm 20\%$
		High/Low temperature holding time: 30 min	(Whichever is Larger)
5	DROP	Height: 1m; 3 times	$\Delta FL \leq \pm 10$ ppm
			$\Delta RS \leq 5 \Omega$ or $\pm 20\%$ (Whichever is Larger)
6	MECHANICAL	Peak: 100g's	$\Delta FL \leq \pm 10$ ppm
	SHOCK	Duration: 6ms	$\Delta RS \leq 5 \Omega$ or $\pm 20\%$
		Waveform: Half-sine	(Whichever is Larger)
		Velocity Change: 12.3 ft / sec	
		Direction: +X, -X, +Y, -Y, +Z, -Z	
7	VIBRATION	Frequency: 10~2000Hz; Acceleration: 5g/s	$\Delta FL \leq \pm 10$ ppm
		Direction: X, Y, Z	$\Delta RS \leq 5 \Omega$ or $\pm 20\%$
		Duration: 20min/direction. Times: 12次	(Whichever is Larger)
8	WELDING	 TP: 260°C Max TsMax: 200°C TsMin: 150°C CYCLE TIME: 2次	$\Delta FL \leq \pm 10$ ppm
	HEAT		$\Delta RS \leq 5 \Omega$ or $\pm 20\%$
	RESISTANT		(Whichever is Larger)
9	SOLDER	Pretreatment before test: 155°C high-temperature store 4 hours	Solder Coverage $\geq$ 95%
		Temperature: 260°C $\pm$ 5°C, immersion	
10	TERMINAL	1.8kg, of the tangential thrust (60 s)	No Rupture Observed
	STRENGTH	1.8kg of the perpendicular tension (60 s)	

3. Appearance

3.1 Outline Dimensions and Recommended Land Pattern



3.2 Marking Information



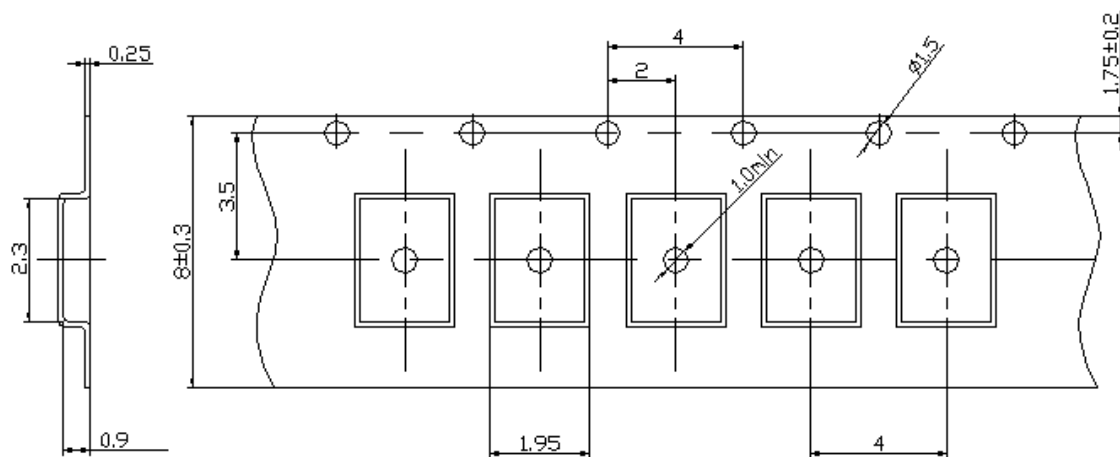
ITEM	Marking	REMARK
①	E	ECS Inc. International
②	19.2	19.200 MHz
③	CZY	Spec ($\pm 10/12$ ppm $-30 \sim +85^{\circ}\text{C}$)
④	●	1# PIN

4. TAPE AND REEL PACKING

4-1. TAPING SPECIFICATION

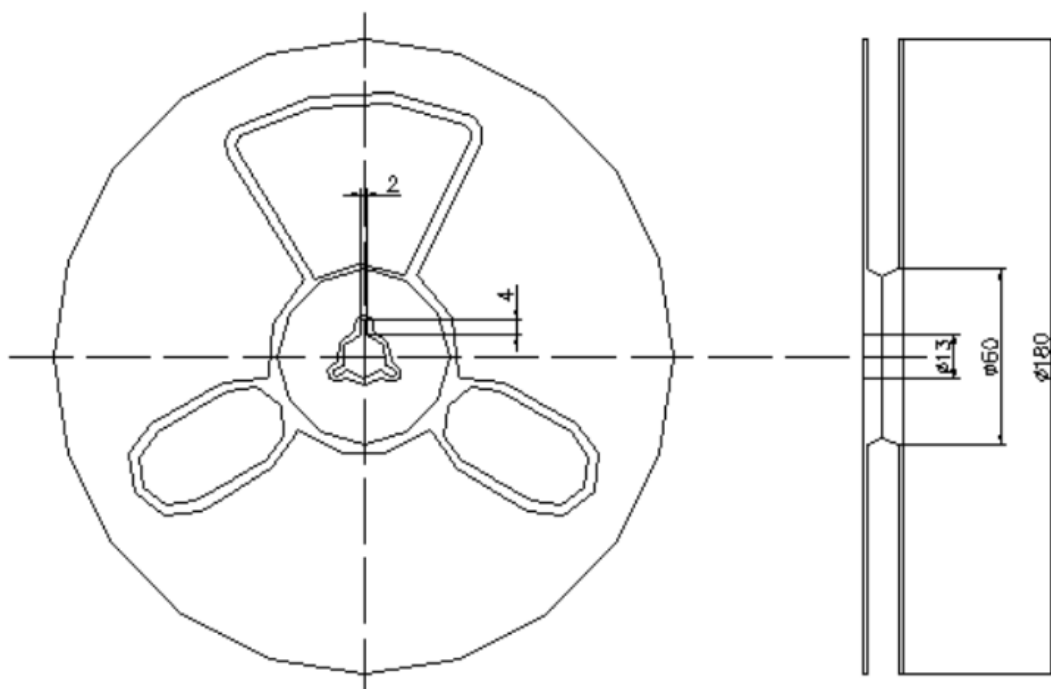
(1) Tape Dimensions

Material of Carrier Tape: Black conductive PS

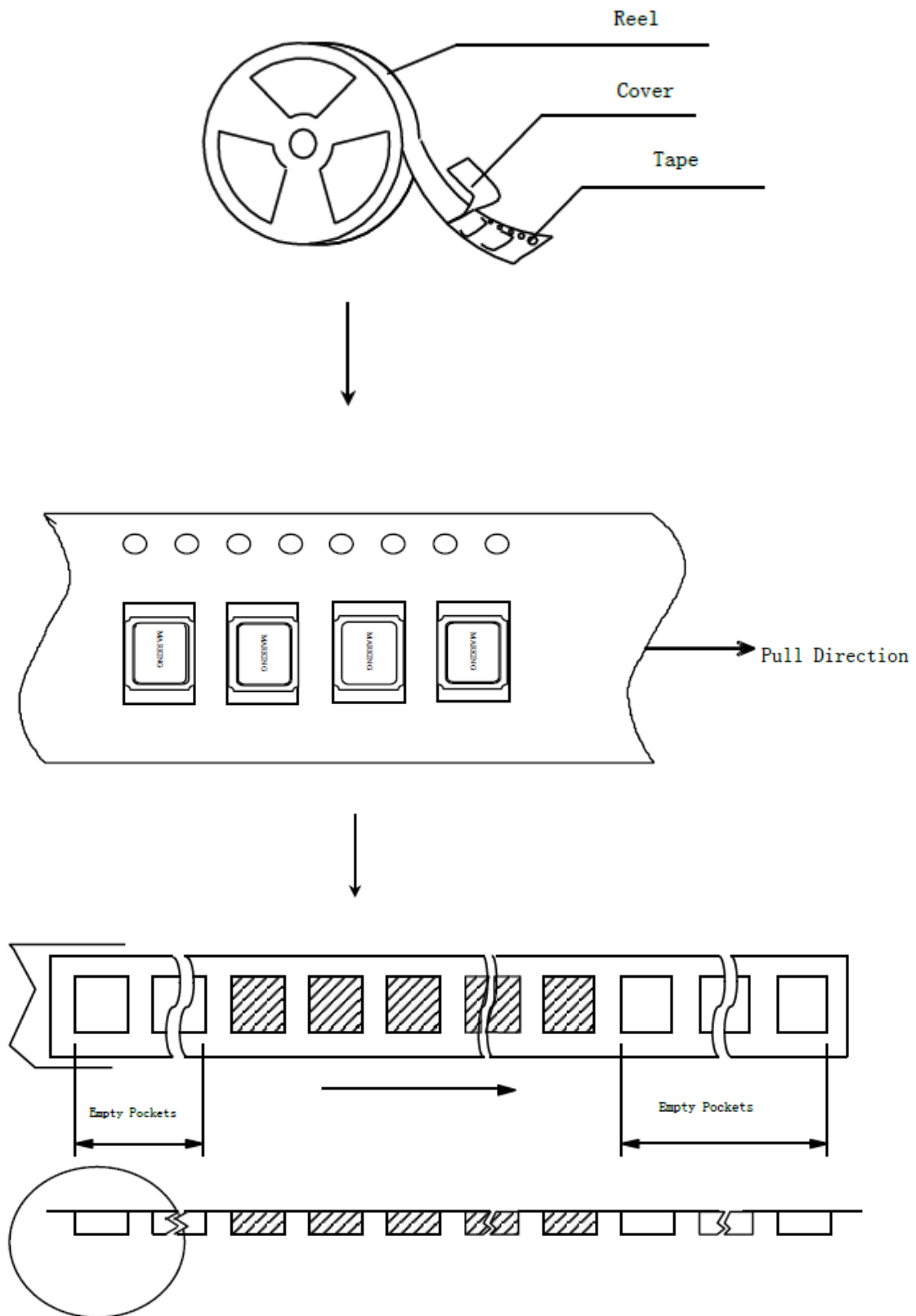


(2) Reel Dimensions

Material of the Reel: PS



(3) Taping Method





3-2. Warehouse Condition

(1) Temperature: -10 ~ +40°C

(2) Humidity: 45% ~ 75%