

SPECIFICATION FOR APPROVAL

CUSTOMER : _____

PRODUCT TYPE : SMD TSX 2.5 × 2.0

NOMINAL FREQ. : 19.2 MHz

TXC P/N : OZ19270001

REVISION : A2

CUSTOMER P/N : _____

PM / SALES : _____

DATE : _____

CUSTOMER SIGNATURE & DATE
: _____

- (1) TXC requires one copy returned with signature and title of authorized individual that signifies acceptance of the attached specifications.
- (2) Orders received and accepted by TXC after return of signed copy of specification will be produced per these specifications.
- (3) Any changes to these specifications must be agreed upon by both parties and new revision of the Product Specification Sheet will be issued.
- (4) Any issuance of purchase order prior to consigning back the Approval page of "Specification Sheets" from customers will be regarded as the agreement on the contents of these specifications.

Attachment(s):

- 1. Product Specification Sheet
- 2. Testing Report(Electrical & Temperature)
- 3. Reliability Report

RoHS Compliant

PRODUCT SPECIFICATION SHEET

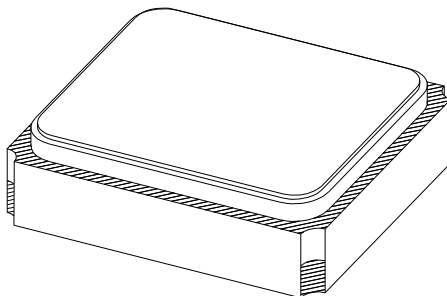
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| PE/RD | QA | MFG |
|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
|  Mike Chiu |  Alex Huang |  Rick Lo |
| 20-Jan-14 | 20-Jan-14 | 20-Jan-14 |

NOTE:

- (1) Lead Free Products are " Directive 2002 / 95 / EC of The European Parliament of 27 January 2003 on the restriction of the use of certain hazardous substances (RoHS) in electrical and electronic equipment" Compliant (Attachment: SGS Test Report).
- (2) Revision "Sx" is for engineering samples only. PE/RD's approval required.
- (3) Revision "Ax" is production ready. PE, QA and MFG's approval required.

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■ CRYSTAL ELECTRICAL SPECIFICATIONS

Standard Atmospheric Conditions

Unless otherwise specified, the standard range of atmospheric conditions for making measurement and tests are as follow:

Ambient temperature : 30±10°C

Relative humidity : 40%~70%

If there is any doubt about the results, measurement shall be made within the following limits:

Ambient temperature : 30±3°C

Relative humidity : 40%~70%

Measurement Equipment

Electrical characteristics measured by HP E5100A or equivalent

Crystal Cutting Type

The crystal is using AT CUT (thickness shear mode)

| | Parameters | Symbol | Condition | Electrical Spec. | | | | Note |
|----|--------------------------------------|----------------|--------------|------------------|------|------|------------------------------------------|------|
| | | | | Min. | Typ. | Max. | Units | |
| 1 | Nominal Frequency | FL | | 19.200000 | | | MHz | |
| 2 | Oscillation Mode | - | | Fundamental | | | | |
| 3 | Load Capacitance | CL | | | 7 | | pF | 1 |
| 4 | Frequency Tolerance | - | +30°C ± 3°C | | | ±10 | ppm | |
| 5 | Tolerance Over Temperature | - | -30 to +85°C | | | ±12 | ppm | 2 |
| 6 | Frequency Drift After Reflow | - | two reflows | | | ±2 | ppm | |
| 7 | Operating Temperature | - | | -30 | | +105 | °C | |
| 8 | Aging | - | | | | ±0.7 | ppm/Year | |
| 9 | Drive Level | DL | | 10 | | 100 | μW | |
| 10 | Effective Resistance R _r | R _r | | | | 70 | Ω | |
| 11 | Shunt Capacitance C ₀ | C ₀ | | 0.3 | | 1.3 | pF | |
| 12 | Motional Capacitance C ₁ | C ₁ | | 1.8 | | 3.1 | fF | |
| 13 | Insulation Resistance | - | at DC 100 V | 500 | | | MΩ | |
| 14 | Storage Temperature Range | - | - | -40 | | +105 | °C | |
| 15 | Spurious Mode Series Resistance | - | ±1 MHz | 1100 | | | Ω | |
| 16 | Q Factor | Q | | 75000 | | | | 3 |
| 17 | First-order Curve Fitting Parameter | - | | -0.4 | | -0.1 | ppm/°C | 4 |
| 18 | Second-order Curve Fitting Parameter | - | | -4.5 | 0 | 4.5 | x10 ⁻⁴ ppm/°C ² | 4 |
| 19 | Third-order Curve Fitting Parameter | - | | 8.5 | 10 | 11.5 | x10 ⁻⁵ ppm/°C ³ | 4 |
| 20 | Residual frequency stability slope | - | | | | ±50 | ppb/°C | 5 |
| 21 | 5°C small orbit hysteresis 1 | - | | | | ±50 | ppb/°C | 6 |
| 22 | 5°C small orbit hysteresis 2 | - | | | 100 | | ppb pk-pk | 7 |

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| | Parameters | Symbol | Condition | Electrical Spec. | | | | Note |
|----|--------------------------|--------|-----------|------------------|------|------|-------|------|
| | | | | Min. | Typ. | Max. | Units | |
| 23 | DLD Freq (Max-Min) | - | | | | 3.0 | ppm | 8 |
| 24 | DLD Freq (Repeatability) | - | | | | 0.7 | ppm | 8 |
| 25 | DLD ESR (Max-Min) | - | | | | ±20 | % | 8 |
| 26 | DLD ESR (Repeatability) | - | | | | ±10 | % | 8 |

Note 1 The load capacitance is measured according to IEC Standard #60444-7

Note 2 Above 85°C tolerance over temperature bound by third-order coefficient range

Note 3 Minimum Q value calculated from ESR and L is smaller than this specification

Note 4 The curve fitting parameter is obtained from the Qualcomm crystal curve fitting algorithm, $t_0=30\text{ }^\circ\text{C}$
(Refer to Curve Fitting Calculation Table: 80-V9690-23)

Note 5 Condition 1A – Test condition (continuous temperature rate change of $\sim 1.0\text{ }^\circ\text{C}/\text{min}$):

- Measure FT points every $1\text{ }^\circ\text{C}$, heating up from -30 to $+85\text{ }^\circ\text{C}$, subtract a fifth-order polynomial best fit and then calculate the slope of the residual.
- The residual slope should be within $\pm 50\text{ ppb}/^\circ\text{C}$.

Note 6 Condition 1B – Hysteresis 1 test condition (continuous temperature rate change of $\sim 1.0\text{ }^\circ\text{C}/\text{min}$):

- Measure FT points every $0.5\text{ }^\circ\text{C}$ while cycling temperature over a $5\text{ }^\circ\text{C}$ small temperature orbit; an example $5\text{ }^\circ\text{C}$ small orbit temperature cycle is $+30\text{ }^\circ\text{C}$ to $+35\text{ }^\circ\text{C}$ to $+30\text{ }^\circ\text{C}$.
- During every individual heating/cooling cycle there should be 11 points; discard the first point of each heating and cooling cycle; this leaves 10 points for each heating and cooling cycle. Subtract the fifth-order polynomial best fit from 1A for each of the 10 points, and then calculate the slope of the residual for each of these heating and cooling 10 point curves.
- The residual slope should be within $\pm 50\text{ ppb}/^\circ\text{C}$.

Note 7 Hysteresis 2 test condition (continuous temperature rate change of $\sim 1.0\text{ }^\circ\text{C}/\text{min}$):

- Measure FT points every $0.5\text{ }^\circ\text{C}$ while cycling temperature over a $5\text{ }^\circ\text{C}$ small temperature orbit; an example $5\text{ }^\circ\text{C}$ small orbit temperature cycle is $+30\text{ }^\circ\text{C}$ to $+35\text{ }^\circ\text{C}$ to $+30\text{ }^\circ\text{C}$.
- During every individual heating/cooling cycle there should be 11 points; discard the first and last point of each heating and cooling cycle, which results in 9 temperature points. Calculate the average measured peak-to-peak frequency difference for these 9 temperature points.
- The average difference is the magnitude of the small orbit hysteresis 2.

Note 8 $0.01\text{ }^\mu\text{W}$ to $100\text{ }^\mu\text{W}$ to $0.01\text{ }^\mu\text{W}$, number of points: 15 points up and 15 points down = 29 total data points

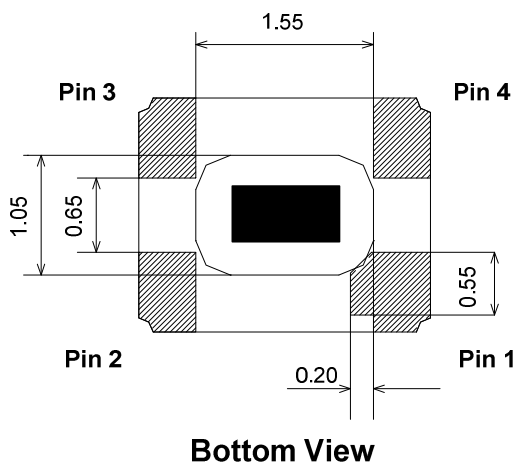
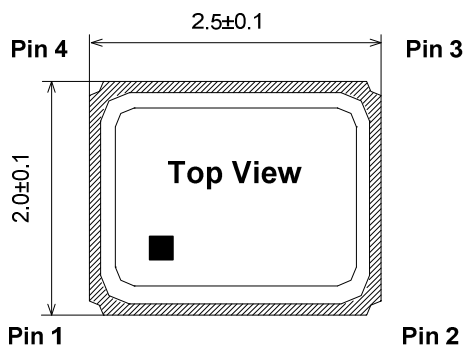
Note 9 This crystal specification complies to Qualcomm Mini-Specification 80-V9690-24 Rev. D

NTC THERMISTOR ELECTRICAL SPECIFICATIONS

| | Parameters | Symbol | Condition | Electrical Spec. | | | | Note |
|---|-----------------------|--------|-----------|------------------|------|------|-------|------|
| | | | | Min. | Typ. | Max. | Units | |
| 1 | Resistance (25 °C) | | | 100k ± 1% | | | Ω | |
| 2 | B-Constant (25-50 °C) | | | 4250 ± 1% | | | K | 1 |
| 3 | Operating Temperature | | | -30 | | +105 | °C | |

Note 1 The B constant is calculated using the zero-power resistance values measured at 25°C and 50°C

DIMENSIONS



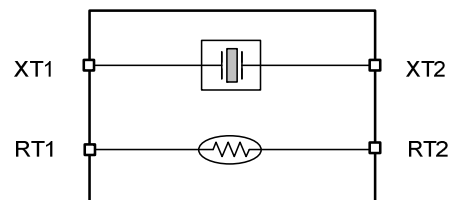
Unit:mm

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 |

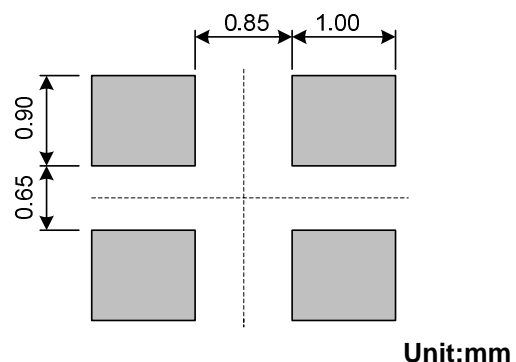
Note: Pin 2 is connected to the metal lid and thermistor
Pin 4 is connected to the thermistor only

BLOCK DIAGRAM



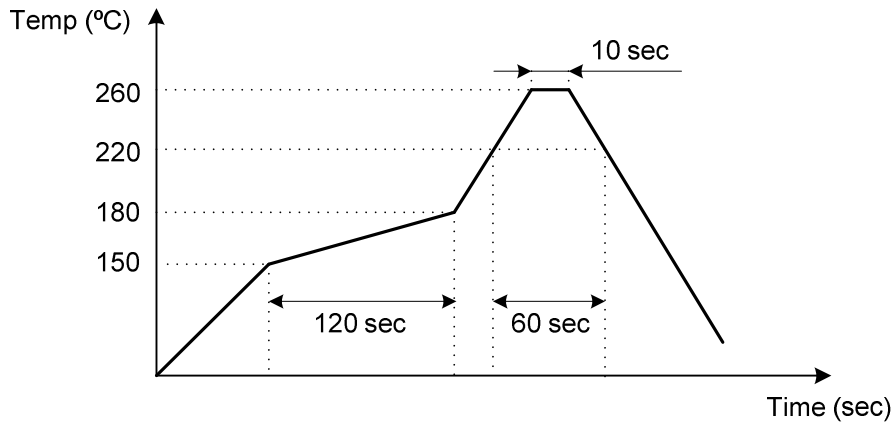
Note: RT2 shall be connected to GND is recommended

SUGGESTED LAYOUT



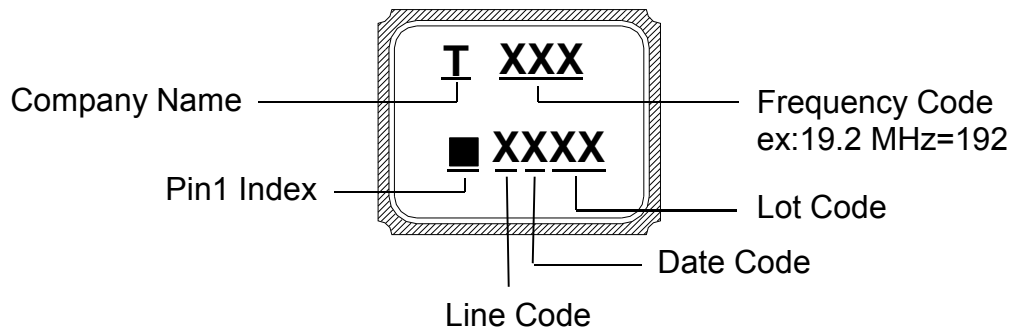
Unit:mm

■ SUGGESTED REFLOW PROFILE



Note : Total Time: 200 sec. Max., Solder Melting Point: 220°C

■ MARKING

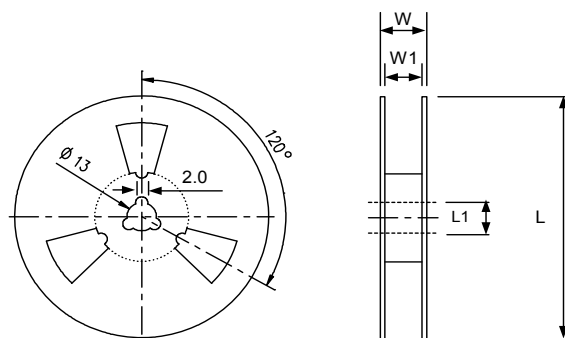
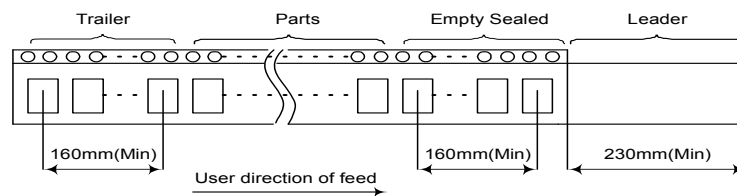
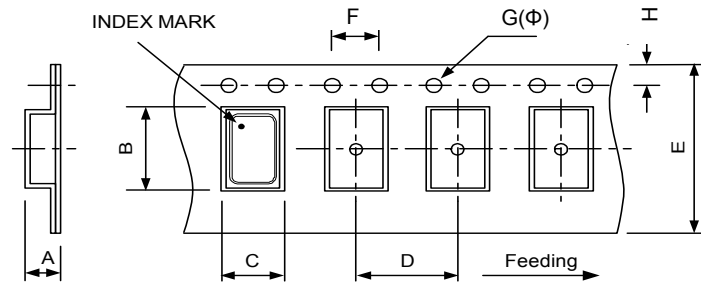


DATE CODE

| MONTH | | | | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|-------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| YEAR | | | | | | | | | | | | | | | |
| 2005 | 2009 | 2013 | 2017 | A | B | C | D | E | F | G | H | J | K | L | M |
| 2006 | 2010 | 2014 | 2018 | N | P | Q | R | S | T | U | V | W | X | Y | Z |
| 2007 | 2011 | 2015 | 2019 | a | b | c | d | e | f | g | h | j | k | l | m |
| 2008 | 2012 | 2016 | 2020 | n | p | q | r | s | t | u | v | w | x | y | z |

Note: This date code will be cycled every four years

■ **PACKING :**



Unit: mm

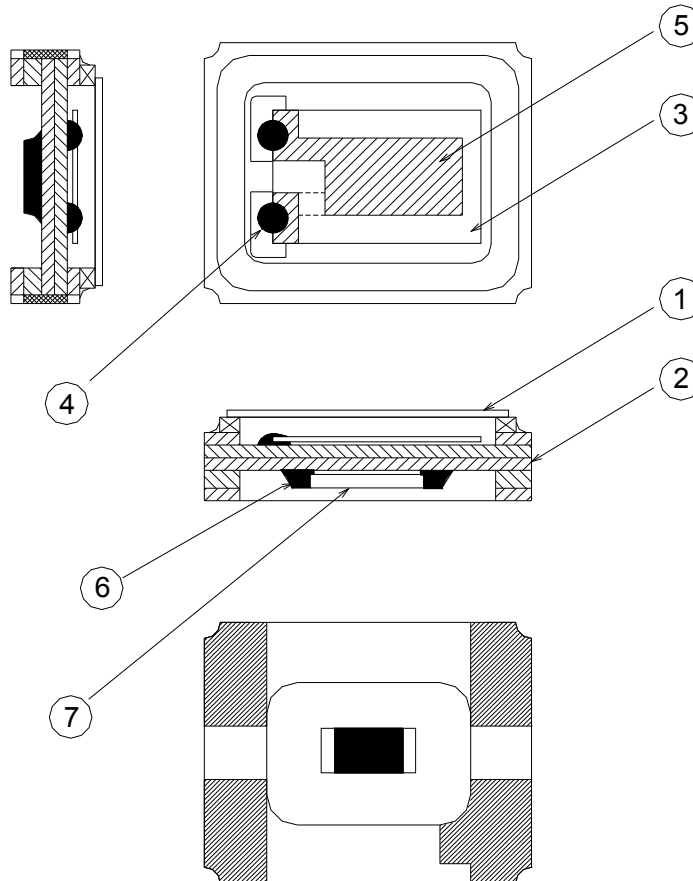
| DIMENSIONS (mm) | A | B | C | D | E | F | G | H | L | L1 | W | W1 | Standard Reel Quantity is 3,000 pcs per reel |
|-----------------|------|------|------|------|------|------|------|------|-----|------|------|-----|----------------------------------------------|
| | 1.15 | 2.70 | 2.25 | 4.00 | 8.00 | 4.00 | 1.55 | 1.75 | 178 | 13.0 | 11.6 | 8.4 | |

■ **WEIGHT**

0.0135 g / piece(TYP), 40 ± 2 g / 3 kpcs(regardless of tape weight)

■ **STRUCTURE ILLUSTRATION**

Crystal Enclosure Seal : Seam Welding



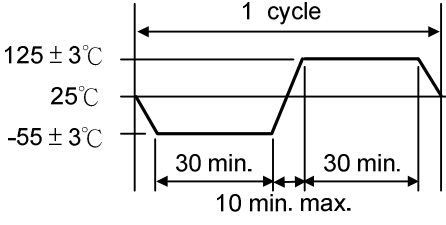
| No. | COMPONENTS | MATERIALS | FINISH/SPECIFICATIONS |
|-----|---------------------|----------------------------------------------------------------------|-----------------------|
| 1 | Lid | Metal (Fe+Co+Ni) | - |
| 2 | Base (Package) | Ceramic (Al ₂ O ₃) + Kovar (Fe+Co+Ni) + Ag/Cu | Alumina Ceramics |
| 3 | Crystal Blank | SiO ₂ | - |
| 4 | Conductive Adhesive | Ag | Silicone Resin |
| 5 | Electrode | Noble Metal | - |
| 6 | Solder | Sn | - |
| 7 | Thermistor | Al ₂ O ₃ , Ag, Ni | - |

RELIABILITY SPECIFICATIONS

1. Mechanical Endurance

| No. | Test Item | Test Methods | Reference |
|-----|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 1.1 | Drop Test | 150 cm height, 3 times on concrete floor. | JIS C6701 |
| 1.2 | Mechanical Shock | Device are shocked to half sine wave (1000 G) three mutually perpendicular axes each 3 times. 0.5 msec. duration time | MIL-STD-202 |
| 1.3 | Vibration | Frequency range 10 ~ 2000 Hz Amplitude 1.52 mm/20 G Sweep time 20 minutes Perpendicular axes each test time 4 Hrs (Total test time 12 Hrs) | MIL-STD-883 |
| 1.4 | Gross Leak | Standard sample for automatic gross leak detector Test pressure: 2 kg / cm ² | MIL-STD-883 |
| 1.5 | Fine Leak | Helium bombing 4.5 kg/ cm ² for 2 Hrs | |
| 1.6 | Solderability | Temperature 245°C ± 5°C Immersing depth 0.5 mm minimum Immersion time 5 ± 1 seconds Flux Rosin resin methyl alcohol solvent (1 : 4) | MIL-STD-883 |

2. Environmental Endurance

| No. | Test Item | Test Methods | Reference |
|-----|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 2.1 | Resistance To Soldering Heat | Pre-heat temperature 125°C Pre-heat time 60 ~ 120 sec. Test temperature 260 ± 5°C Test time 10 ± 1 sec. | MIL-STD-202 |
| 2.2 | High Temp. Storage | + 125 °C ± 3 °C for 500 ± 12 Hrs | MIL-STD-883 |
| 2.3 | Low Temp. Storage | - 40°C ± 3°C for 500 ± 12 Hrs | |
| 2.4 | Thermal Shock | Total 100 cycles of the following temperature cycle  | MIL-STD-883 |
| 2.5 | High Temp & Humidity | 85°C ± 3°C, RH 85% , 500 Hrs | JIS C5023 |

单击下面可查看定价，库存，交付和生命周期等信息

[>>TXC\(台湾晶技\)](#)