

SPECIFICATION FOR APPROVAL

CN: _____

CUSTOMER : _____

PRODUCT TYPE : SMD TSX 2.0x1.6

NOMINAL FREQ. : 38.400000MHz

TXC P/N : AF38470002

REVISION : S2

CUSTOMER P/N : _____

PM / SALES : _____

DATE : _____

CUSTOMER CONFIRMATION : _____
(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.

**MSL:Level 1
RoHS Compliant**

(for glass crystal only : Pb used in sealing glass material is exempt from EU directive)



PRODUCT SPECIFICATION SHEET

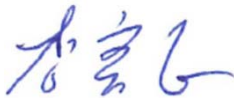
CN: _____

PRODUCT TYPE : SMD TSX 2.0x1.6

NOMINAL FREQ. : 38.400000MHz

TXC P/N : AF38470002

REVISION : S2

PE/RD	QA	MFG
 Darken Lee		
10-Mar-20		

NOTE:

- (1) The green product standard set by TXC is based upon the international standards. Related information is publicly described on the TXC's Website, and updated regularly. The document is compliant with the latest green product quality system directives at the time.
- (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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RoHS Compliant**

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Crystal Specifications

Standard atmospheric conditions

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

Ambient temperature : 25±10°C Relative humidity : 40%~70%

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

Ambient temperature : 25±3°C Relative humidity : 40%~70%

Measure equipment

Electrical characteristics measured by S&A 250B or equivalent.

Weight:

0.0086g / piece(TYP), 26 ± 1.3 g /3 kpcs(regardless of tape weight)

	Parameters	Electrical Spec.				Notes
		Min.	Typ.	Max.	Units	
1	Operating frequency	38.400000			MHz	-
2	Mode of vibration	Fundamental			-	-
3	Initial frequency tolerance	-	-	±10	ppm	Frequency tolerance: 25°C ± 3°C
4	Tolerance over temperature	-	-	±12	ppm	-30°C to +85°C; below -30°C and above 85°C tolerance over temperature, bound by a third-order coefficient range in note 1 (Section A5) and below the ±30 ppm limit
		-	-	±30	ppm	-40°C to +105°C
5	Aging	-	-	±0.7	ppm/year	-
6	Frequency drift after reflow	-	-	±2	ppm	After two reflows
7	Operating temperature	-40	~	+105	°C	-
8	Storage temperature	-40	~	+105	°C	-
9	Equivalent series resistance	-	-	50	Ω	-
10	Quality factor (Q)	75000	-	-	-	Minimum Q value calculated from ESR and L is smaller than this specification
11	Spurious mode series resistance	1100	-	-	Ω	±1MHz
12	Pullability	7	~	16	ppm/pF	-
13	Load capacitance	8			pF	The load capacitance is measured according to IEC Standard #60444-8
14	Inflection point	27.5	~	30.5	°C	$t = (t_0 - \frac{C^2}{3C^3})$
15	C1, first-order curve fitting parameter	-0.4	-	-0.1	ppm/°C	The curve fitting parameter is obtained from the QTI crystal curve fitting algorithm using the temperature inflection point t0 = 29°C.
16	C2, second-order curve fitting parameter	-4.5	0	4.5	x10 ⁻⁴ ppm/°C ²	
17	C3, third-order curve fitting parameter	8.5	10	11.5	x10 ⁻⁵ ppm/°C ³	
18	Drive level	10	-	200	uW	-
19	Insulation resistance	500	-	-	MΩ	-

Specification for DLD measurement of the crystal

Item	Max - min	Repeatability	Condition
Drive level dependency	Freq	< 6 ppm	0.01 uW to 200 uW to 0.01 uW
	ESR	< 20%	

Notes: Number of points: 15 points up and 15 points down = 29 total data points.

GPS Quality Specifications

Item	Condition	Specification (maximum values)	Unit
Residual Frequency stability slope	Ta = -30°C~+85°C	±50	ppb/°C
	Ta = -40°C~-30°C & +85°C~+105°C	±100	ppb/°C
5°C small orbit hysteresis 1*	Ta = -30°C~+85°C	±50	ppb/°C
	Ta = -40°C~-30°C & +85°C~+105°C	±250	ppb/°C

Notes: * Must meet the 1A and 1B conditions:

Condition 1A – Test condition (continuous temperature rate change of ~1.0°C/min):

- Measure FT points every 1°C, heating up from -40 to +105°C, subtract a fifth-order polynomial best fit and then calculate the slope of the residual.
- The residual slope should be within ±50 ppb/°C (Ta = -30 to +85°C). See GPS Quality Specifications for extreme temperature specifications.

Condition 1B – Hysteresis 1 test condition (continuous temperature rate change of ~1.0°C/min):

- Measure FT points every 0.5°C while cycling temperature over a 5°C small temperature orbit; an example 5°C small orbit temperature cycle is +30°C to +35°C to +30°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 ±50 ppb/°C (Ta = -30 to +85°C). See GPS Quality Specifications for extreme temperature specifications.

Crystal perturbation specification 2

Item	Condition	Specification (magnitude)	Unit
5°C small orbit hysteresis 2**	Ta = -30°C~+85°C	100	ppb pk-pk
	Ta = -40°C~-30°C & +85°C~+105°C	400	ppb pk-pk

Notes: ** Must meet condition 2:

Condition 2 – Hysteresis 2 test condition (continuous temperature rate change of ~1.0°C/min):

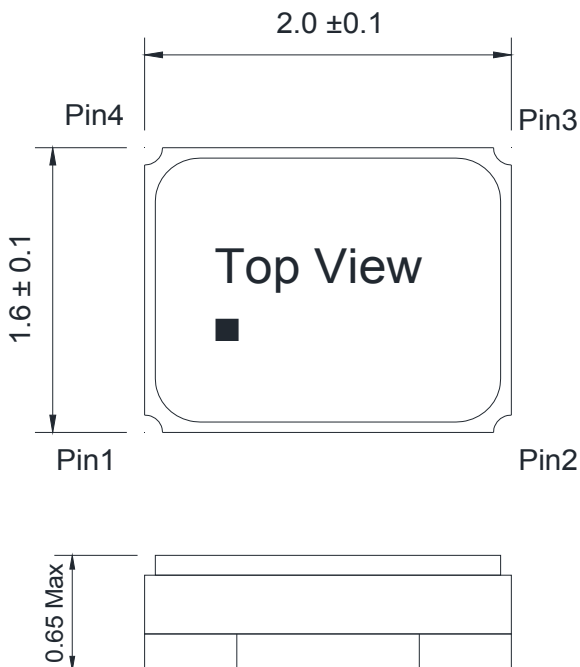
- Measure FT points every 0.5°C while cycling temperature over a 5°C small temperature orbit; an example 5°C small orbit temperature cycle is +30°C to +35°C to +30°C.
- During every individual heating/cooling cycle there should be 11 points; discard the first and last point of each heating and cooling 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.

■ Thermistor specifications

Parameters	Min.	Typ.	Max.	Units	Notes
Resistance (25 °C)	100±1%			kΩ	25°C
B-Constant (25-50 °C)	4250±1%			K	25°C-50°C
Operating temperature	-40	~	105	°C	-

■ DIMENSIONS

(Unit:mm)

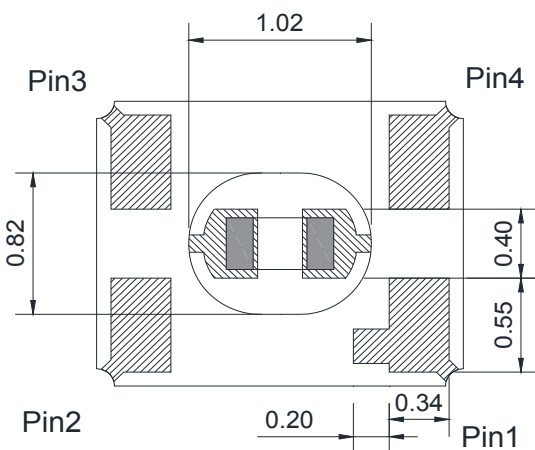
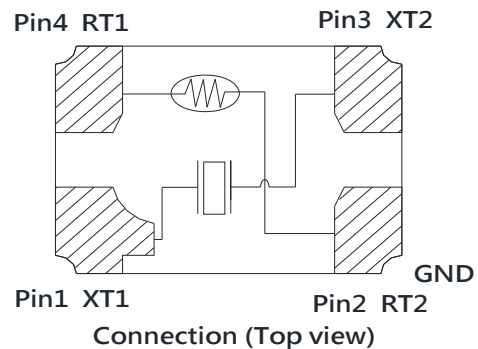


■ PIN FUNCTION

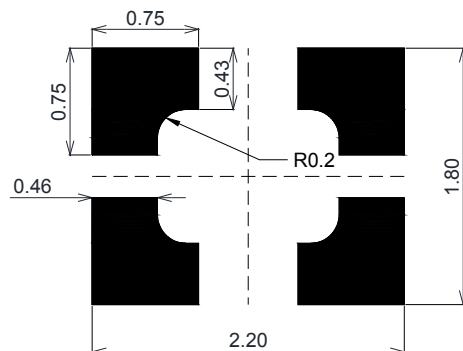
	Symbol	Function
Pin 1	XT1	XTAL Terminal 1
Pin 2	RT2	Thermistor Terminal 2
Pin 3	XT2	XTAL Terminal 2
Pin 4	RT1	Thermistor Terminal 1

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

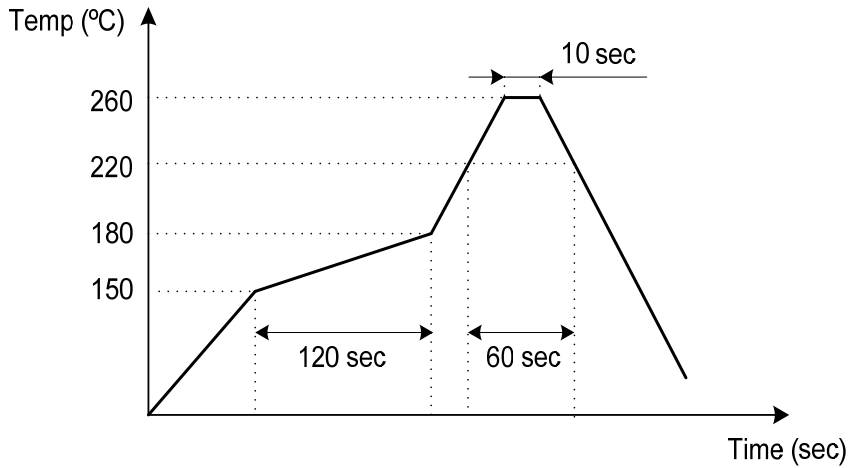
■ BLOCK DIAGRAM



■ SUGGESTED LAYOUT

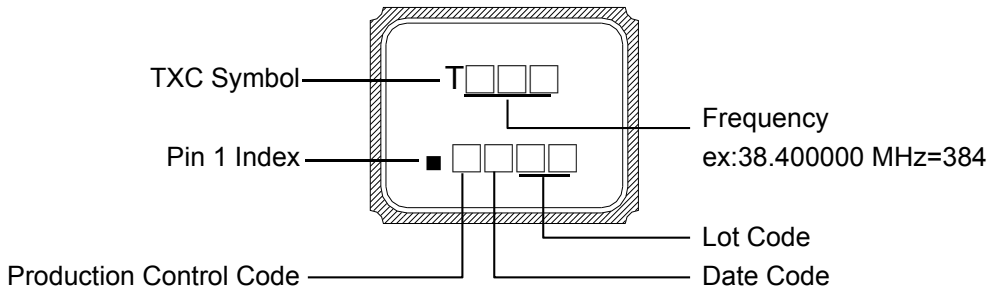


■ SUGGESTED REFLOW PROFILE



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

■ MARKING



Date Code:

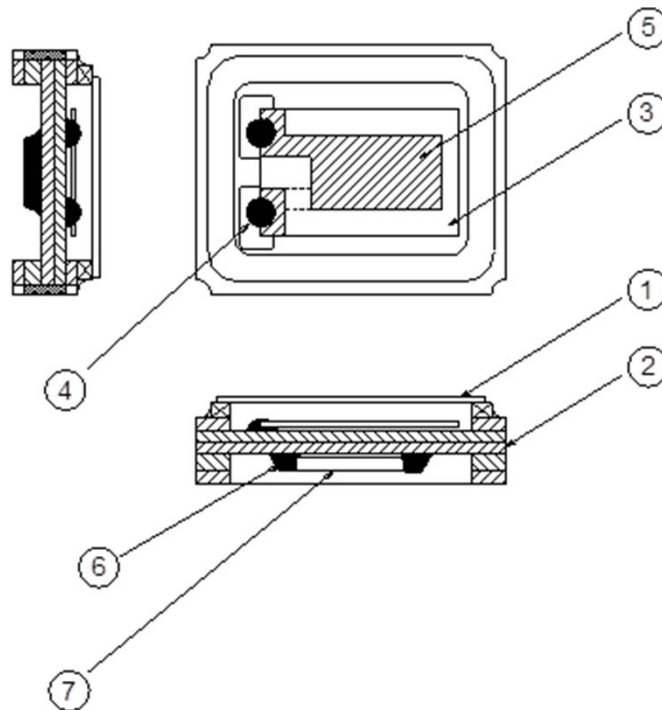
YEAR					MONTH											
					JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2005	2009	2013	2017	2021	A	B	C	D	E	F	G	H	J	K	L	M
2006	2010	2014	2018	2022	N	P	Q	R	S	T	U	V	W	X	Y	Z
2007	2011	2015	2019	2023	a	b	c	d	e	f	g	h	j	k	l	m
2008	2012	2016	2020	2024	n	p	q	r	s	t	u	v	w	x	y	z

*This date code will be cycled every four years

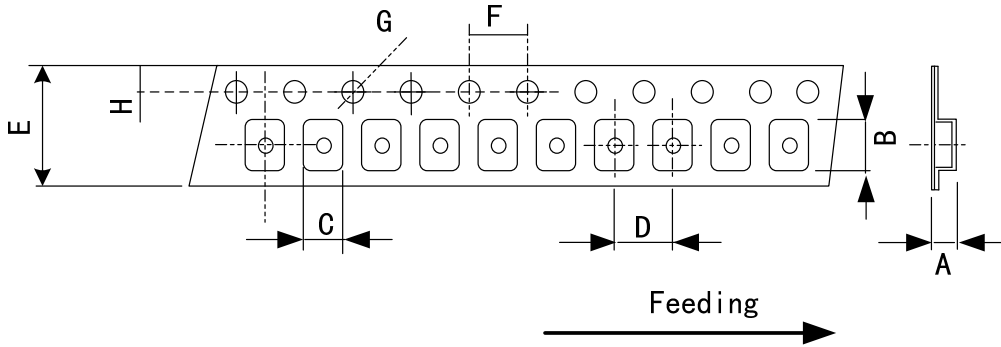
Production location: Taiwan

■ STRUCTURE ILLUSTRATION

Crystal Enclosure Seal : Seam Welding

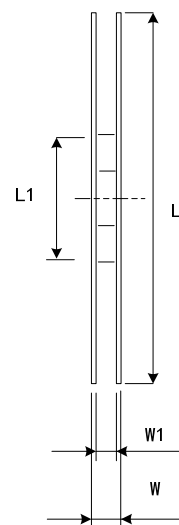
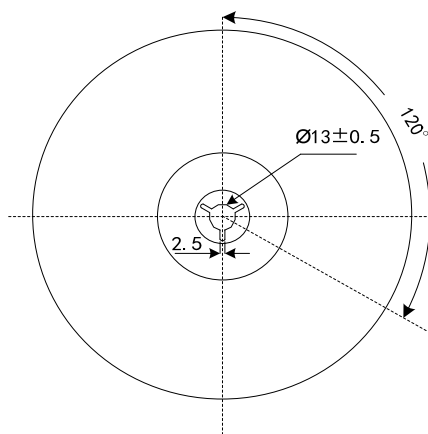
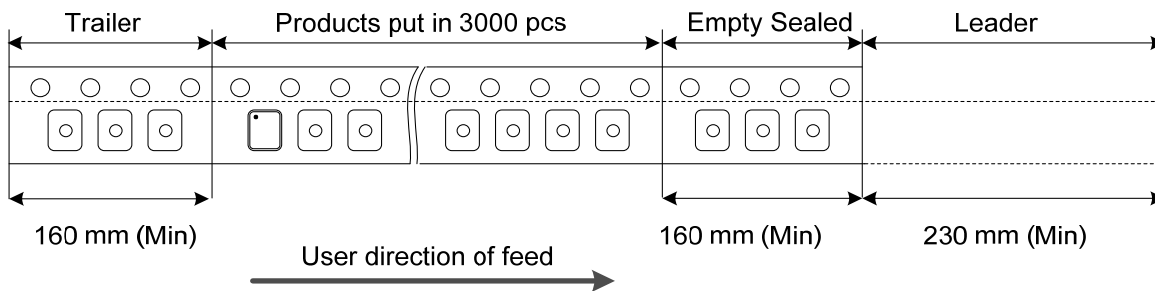


NO	COMPONENTS	MATERIALS	FINISH/SPECIFICATIONS
1	Lid	Metal (Fe+Co+Ni)	-
2	Base(Package)	Ceramic (Al ₂ O ₃) + Kovar (Fe+Co+Ni)+Pad (Au)	Alumina ceramics
3	Crystal blank	SiO ₂	-
4	Conductive adhesive	Ag	Silicone resin
5	Electrode	Noble Metal	-
6	Solder	Sn	-
7	Thermistor	Al ₂ O ₃ , Ag, Ni	-

PACKING


DIMENSIONS	A	B	C	D	E	F	G	H	(UNIT:mm)
	1.20 ±0.10	2.30 ±0.10	1.90 ±0.10	4.00 ±0.10	8.00 ±0.20	4.00 ±0.10	1.55 ±0.05	1.75 ±0.10	

REMARK :



DIMENSIONS	L	L1	W	W1	Standard Reel Quantity is 3,000 pcs per reel (UNIT:mm)
	178 ±1.00	60.2 ±0.50	11.5 ±0.2	8 +1/-0	

■ RELIABILITY SPECIFICATIONS (AEC-Q200 Compliant)

1. Mechanical Endurance

No.	Test Item	Methods	REF.DOC
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. 0.5m sec. duration time	MIL-STD-202
1.3	Vibration	Frequency range 10 ~ 2000 Hz Amplitude 1.52 mm/20G 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: 2kg / cm ²	MIL-STD-883
1.5	Fine Leak	Helium Bombing 4.5 kg/ cm ² for 2 Hrs	
1.6	Solder ability	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	Methods	REF. DOC
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	EIA-JESD22

单击下面可查看定价，库存，交付和生命周期等信息

[>>TXC\(台湾晶技\)](#)