承　认　书

SPECIFICATION FOR APPROVAL

客户名称：Customer _____

货　　名：Description SMD TSX2.5*2.0 （热敏晶振）

客户料号：Part No _____

物料编号：Code No TSX22260000781040

频　　率：Frequency 26.000MHz

日　　期：Date 2020-05-26

备　　注：RoHS compliance with Directive (EU) 2015/863

制作(Prepare by)	检查(Check by)	批准（Approve by）
江丹娜	甘瑛	张刚

客户批准 Approve by customer	
批准日期 Approval date	

Add:广东省深圳市华发北路桑达工业区桑达雅苑 7P

7 P Sangda Yayuan Huafa North Road, Futian District, Shenzhen, Guangdong

Tel：86-755-83048260　　86-755-83048290

Fax：86-755-83048280

■ ELECTRICAL SPECIFICATIONS

Standard atmospheric conditions

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

Ambient temperature : 25±5℃

Relative humidity : 40%~70%

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

Ambient temperature : 25±3℃

Relative humidity : 40%~70%

Measure equipment

Electrical characteristics measured by S&A250B or equivalent.

Crystal cutting type

The crystal is using AT CUT (thickness shear mode).

■ ELECTRICAL SPECIFICATIONS

ELECTRICAL SPECIFICATIONS

NO.	Parameters	Symbol	Condition	Electrical Spec.				Note
				Min.	Typ.	Max.	Units	
1	Nominal Frequency	FL	-	26.000000			MHz	
2	Oscillation Mode	-	-	Fundamental				
3	Load Capacitance	CL	-	-	9	-	pF	
4	Frequency Tolerance	-	+25℃ ± 3℃	±10			ppm	
5	Frequency Stability Over Operating Temp. Range(Reference 25°C)	-	-25°Cto +85°C	±10			ppm	
6	Aging	-	first year	-	-	±1.0	ppm/year	
		-	second year	-	-	±1.5	ppm/2year	
		-	after 5 years	-	-	±2.5	ppm/5year	
		-	after 10 years	-	-	±5.0	ppm/10year	
7	Frequency drift after reflow (After two reflows)	-	-	-	-	±2	ppm	After two reflows (0.5Hr freq. drift substruct 168Hr freq. drift
8	Drive Level	DL	-		50		μW	
9	Equivalent Series Resistance	ESR	-	-	-	40	Ω	
10	Spurious Mode Resistance	-	±1 MHz	500	-	-	Ω	
11	Insulation Resistance	-	at DC 100V	500	-	-	MΩ	
12	Operating Temperature	-		-30	-	+85	℃	
13	Storage Temperature Range	-		-40	-	+85	℃	
14	Pulling Sensitivity	TS		25.2	28	30.8	ppm/pF	CL=7.0pF
15	Motional inductitance	L1		3.24	10.4	9.36	mH	

■ ELECTRICAL SPECIFICATIONS

NO.	Parameters	Symbol	Condition	Electrical Spec.				Note
				Min.	Typ.	Max.	Units	
16	Shunt capacitance	C0		0.9	1.0	1.1	pF	
17	Motional capacitance	C1		3.24	3.6	3.96	fF	
18	1st order coefficient	C1		-0.1		-0.35	ppm/℃	(Note 1)
19	2nd order coefficient	C2		-5.0		-12.0	ppm/℃2	
20	3rd order coefficient	C3		8.7		11.0	ppm/℃3	
21	Frequency stability slope 1	-		-0.05	-	0.05	ppm/℃	at -10～+60℃ (Note 2)
22	Frequency stability slope 12	-		-0.1	-	0.1	ppm/℃	at -30～+85℃ (Note 2)
23	G Sensitivity			-2.0		2.0	ppb/G	
24	Full Cycle Temperature Hysteresis	-		-0.5	-	0.5	ppm/℃	at -40～+85℃ (Note 3)
25	Small Cycle Temperature Hysteresis	-		-0.05	-	0.05	ppm/℃	(Note 4)
26	Perturbation	-		-0.5	-	0.5	ppm/℃	(Note 5)
29	DLD Freq (Max-Min)	FDLD		-	-	2.0	ppm	(Note 6)
30	DLD Freq (Repeatability)	FDLDH		-	-	0.7	ppm	
31	DLD ESR (Max-Min)	DLD2		-	-	2.5	ohms	
32	DLD ESR (Repeatability)	DLDH2		-	-	1.5	ohms	

Note 1 S curve (FL) 3rd order curve fitting coefficient requirement over operation temperature under 2℃ test. [F(T) = C3(T-To)3 + C2(T-To)2 + C1(T-To) + C0; To = 25℃] ;

Note 2 Frequency slope error between measured S curve (FL) data and 3rd order curve fitting data over temperature under per 2℃ test. (Continuous temperature rate change of 1.0°C/min) ;

Note 3 Difference in frequency measurement at any temperature when undergoing a thermal cycle over the entire operation temperature range from -40℃ to 85℃ per 2℃ test;

Note 4 Difference in frequency measurement at any temperature when undergoing a thermal cycle of a temperature range of 5℃ per 1℃ test;

Note 5 Residual error from the frequency vs. temperature curve fit 5th order. Minimum of frequency reading every 3℃ over operation temperature;

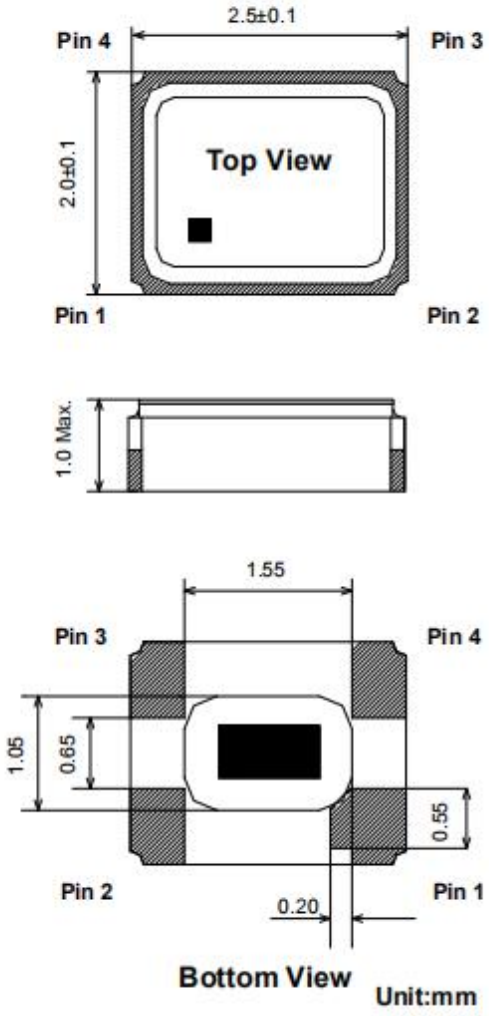
Note 6 DLD Sweep: 10nW to 100uW to 10nW

■ NTC THERMISTOR SPECIFICATIONS TABLE

NO.	Parameters	Symbol	Condition	Electrical Spec.				Note
				Min.	Typ.	Max.	Units	
1	Resistance (25 ℃)			100k ± 1%			Ω	
2	B-Constant (25-50 ℃)			4250 ± 1%			K	1
3	Tolerance			-1		1	%	

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

■ DIMENSIONS

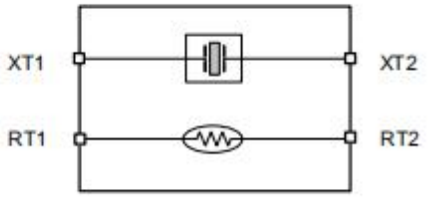


■ PIN FUNCTION

	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

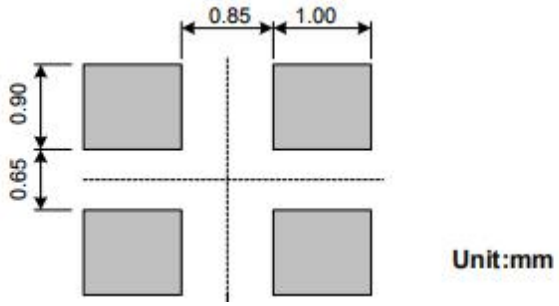
Note: Pin 2 is connected to the metal lid and thermistor
Pin 4 is connected to the thermistor only

■ BLOCK DIAGRAM



Note: RT2 shall be connected to GND is recommended

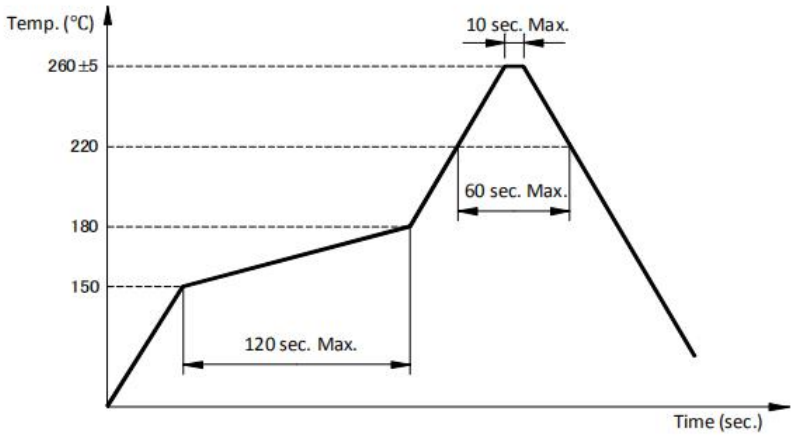
■ SUGGESTED LAYOUT



■ SUGGESTED REFLOW PROFILE

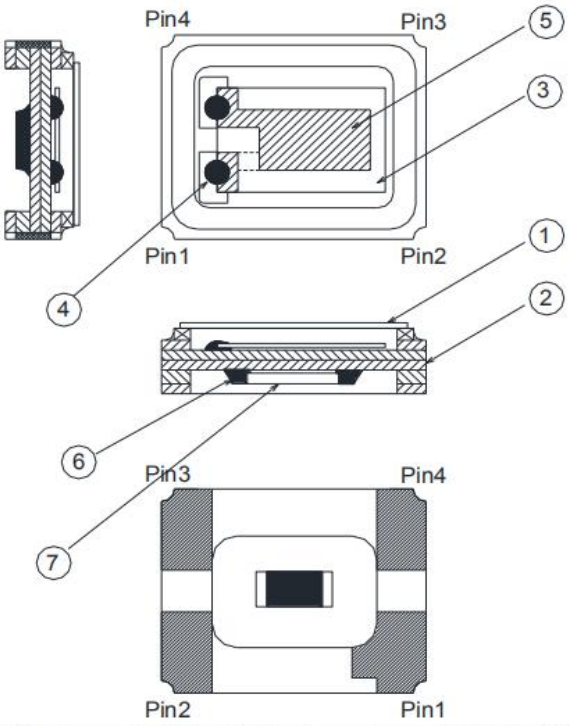
Total time : 360 sec. Max.

Solder melting point :225 °C



■ STRUCTURE ILLUSTRATION

Crystal Enclosure Seal : Seam Welding



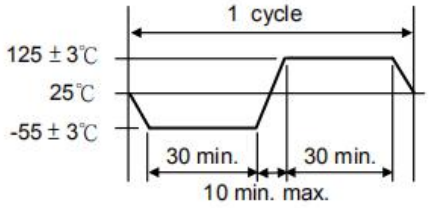
No.	COMPONENTS	MATERIALS	FINISH/SPECIFICATIONS
1	Lid	Metal (Fe+Co+Ni)	-
2	Base (Package)	Ceramic (Al_2O_3) + Kovar (Fe+Co+Ni) + Ag/Cu	Alumina Ceramics
3	Crystal Blank	SiO_2	-
4	Conductive Adhesive	Ag	Silicone Resin
5	Electrode	Noble Metal	-
6	Solder	Sn	-
7	Thermistor	Al_2O_3, Ag, Ni	-

■ 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℃ ± 5℃ 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℃ Pre-heat time 60 ~ 120 sec. Test temperature 260 ± 5℃ Test time 10 ± 1 sec.	MIL-STD-202
2.2	High Temp. Storage	+ 125 ℃ ± 3 ℃ for 500 ± 12 Hrs	MIL-STD-883
2.3	Low Temp. Storage	- 40℃ ± 3℃ 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℃ ± 3℃, RH 85% , 500 Hrs	JIS C5023