广东惠伦晶体科技股份有限公司
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PRODUCT SPECIFICATION SHEET

CUSTOMER	:	
PRODUCT TYPE	:	SMD X'TAL 3.2*2.5(4PAD)
NOMINAL FREQ.	:	24.000000 MHz
FL P/N	:	3Y24000002
REVISION	:	S0
CUSTOMER P/N	:	

CUSTOMER'S APPROVAL&DATE

FL CORPORATION

APPROVED	CHECKED	DESIGNED
Jay Lee	Jin Qi	Huang HuiFang

MSL1

RoHS Compliant

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ATTACHMENT（optional）

- ELECTRICAL CHARACTERISTICS TEST A ☐ YES ☑ NO
- TEMPERATURE CHARACTERISTICS TEST B ☐ YES ☑ NO

SPECIFICATION REVISION RECORD SHEET

Rev.	Revise page	Revise Contents	Date	Ref. No.	Reviser
S0	N/A	Initial released	9-Mar-22	N/A	Huang HuiFang

PRODUCT DESCRIPION

Standard atmospheric conditions

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

Ambient temperature : 25±2℃
Relative humidity : 40%~70%

If there is no doubt the results, measurement shall be made within the following limits:

Ambient temperature : 25±2℃
Relative humidity : 40%~70%

Measure equipment

Electrical characteristics measured by S&A250B or equivalent.

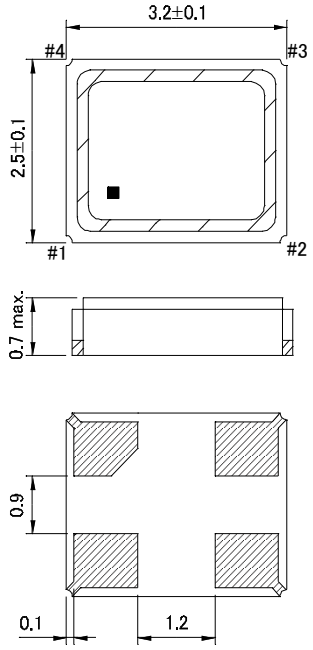
Crystal cutting type

The crystal is using AT CUT (thickness shear mode)

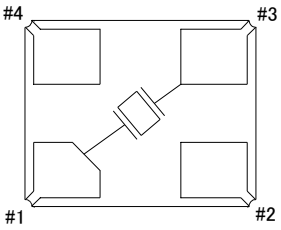
ELECTRICAL SPECIFICATIONS

No.	Items	Electrical Spec.					Remarks
		Symbol	Min	Typ	Max	Units	
1	Nominal Frequency	FL	-	24	-	MHz	
2	Oscillation Mode	-	Fundamental			-	
3	Load Capacitance	CL	12.0			pF	
4	Frequency Tolerance	-	±10			ppm	at 25±2℃
5	Frequency Stability	-	±20			ppm	at -40～+105℃ (reference 25℃)
6	Shunt Capacitance	C0	-	-	3	pF	
7	Aging (/1 year)	-	±3			ppm/year	at 25±2℃
8	Operating Temperature	-	-40	-	105	℃	
9	Storage Temperature	-	-40	-	125	℃	
10	Equivalent series resistance	ESR	-	-	50	ohms	
11	Insulation Resistance	IR	500	-	-	M-ohms	at DC 100V
12	ESD	-	HBM＞4000V			-	JESD22-A114-B
13	MSL	-	LEVEL 1			-	IPC/JEDEC J-STD-033C
12	Drive Level	DL	-	100	-	uW	

DIMENSIONS unit:mm

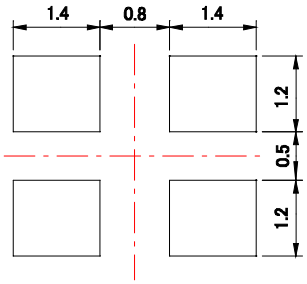


CONNECTION DIAGRAM (TOP VIEW)

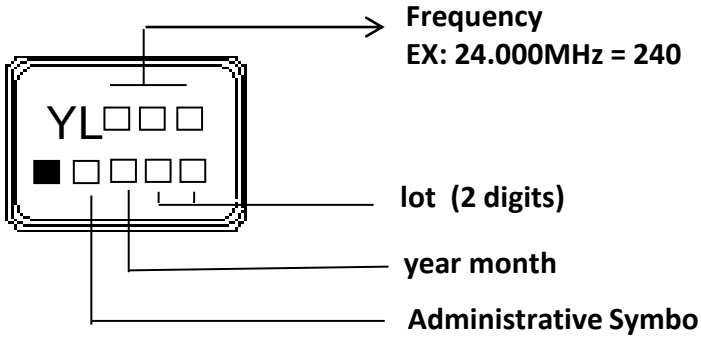


Pin	Function
#1	Xtal terminal (Input)
#2	GND terminal
#3	Xtal terminal (Output)
#4	GND terminal

LAND PATTERN unit:mm



MARKING

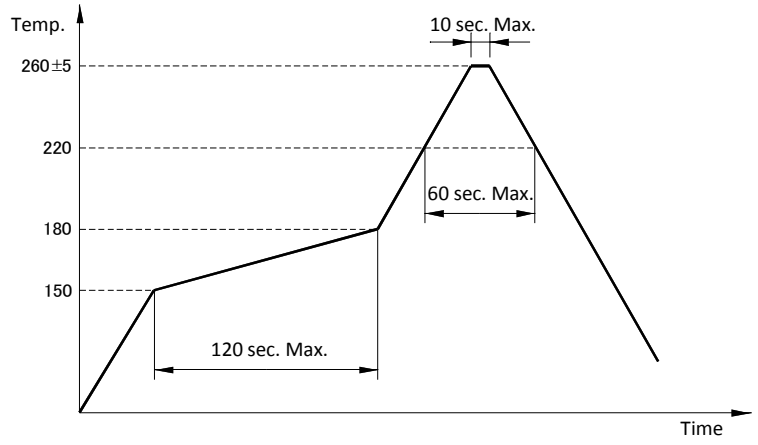


month / year		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2017	2021	A	B	C	D	E	F	G	H	J	K	L	M
2018	2022	N	P	Q	R	S	T	U	V	W	X	Y	Z
2019	2023	a	b	c	d	e	f	g	h	j	k	l	m
2020	2024	n	p	q	r	s	t	u	v	w	x	y	z

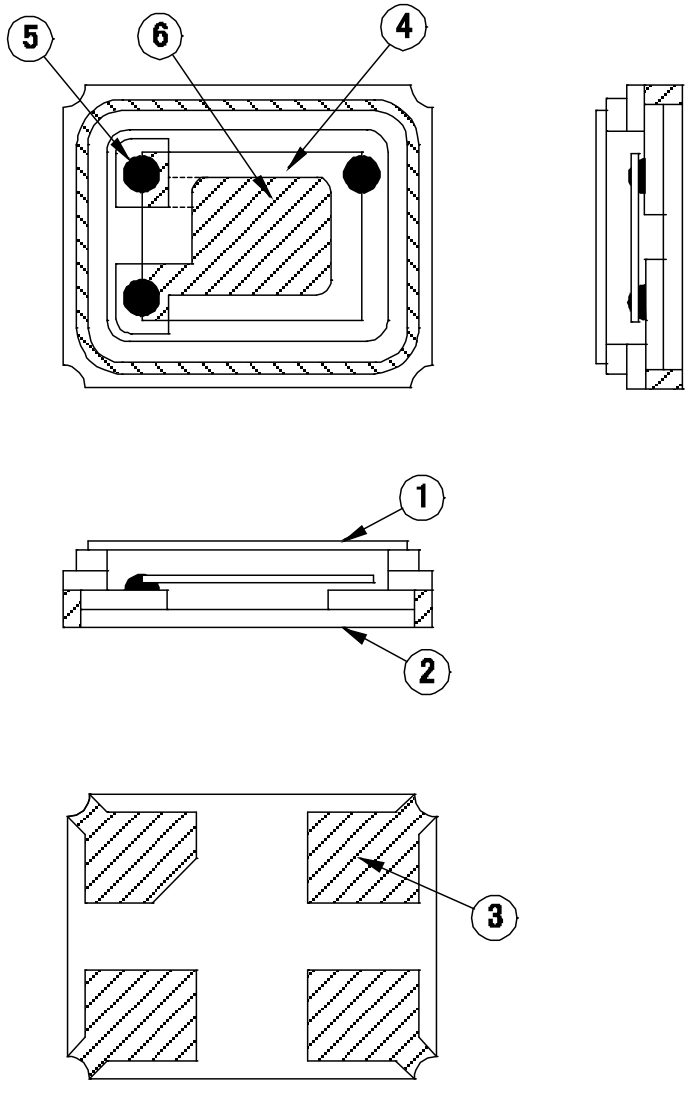
SUGGESTED REFLOW PROFILE

Total time : 360 sec. Max.

Solder melting point : 225 °C



STRUCTURE ILLUSTRATION



NO	COMPONENTS	MATERIALS	QTY	FINISH/SPECIFICATIONS
1	Cap(Lid)	Kovar(Fe+Co+Ni)	1	Ni plating
2	Base(Package)	Almina Ceramics (Al_2O_3)	1	
3	Pad(Package)	Ni + Au	4	Ni+Au plating
4	Crystal blank	SiO_2	1	-
5	Conductive adhesive	Ag	3	Silicone resin
6	Electrode	Noble metal	2	-

RELIABILITY SPECIFICATIONS

1.ENVIRONMENTAL ENDURANCE (AEC-Q200)

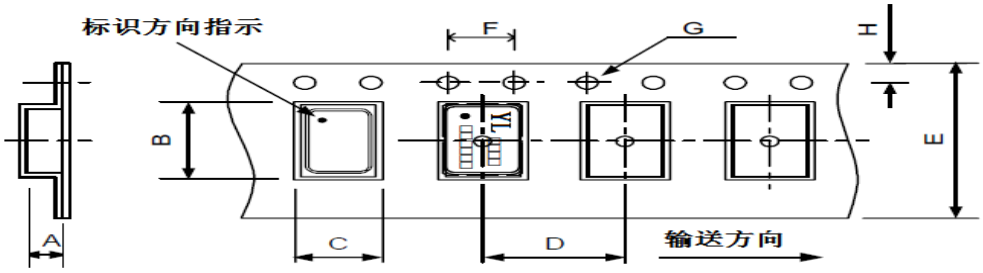
No.	Test Item	Test Methods	
1	Gross Leak	Standard Sample For Automatic Gross Leak Detector Test Pressure 2kg/cm2	MIL-STD-883E
2	Fine Leak	Helium Bombing 4.5kgf/cm2 for 2 hr	MIL-STD-883E
3	High Temperature Exposure	1000 Hours, 85°C, Unpowered. Measurement at 24±4 hours after test conclusion	MIL-STD-202 Method 108
4	Temp. Cycling	1000 cycles at -40°C to 125°C, 30min. max. of dwell time at eac temperature extreme, 1 min. max. of transition time. Measurement at 24±4 hours after test conclusion	JESD22 Method JA-104
5	Biased Humidity	1000 hours at 85°C/85%RH, Rated VDD applied. Measurement at 24±4 hours after test conclusion	MIL-STD-202 Method 103
6	Operational Life	1000 hrs at 125°C, Rated VDD applied. Measurement at 24±4 hours after test conclusion	MIL-STD-202 Method 108
7	Resistance to Solvents	Solvent 3(Terpene difluxer), 3 cycles of "3 min. Immersion" to "10 strokes Brush cleaning". Inspection at 3x max. for marking, at 10x max. for part damage.	MIL-STD-202 Method 215
8	Mechanical Shock	Half-Sine pulse with 6ms 100g, 3 strucks in each of 3 conditions	MIL-STD-202 Method 213
9	Vibration	10 to 2000Hz, 5g's for 20 min., 12 cycles each of 3 orientations	MIL-STD-202 Method 204
10	Resistance to Soldering Heat	10s of 260℃ solder dipping	MIL-STD-202 Method 210
11	Solderability	260°C, 16 hours of Steam, then Flux and 10s of 260°C solder dipping. Inspection at 50x Magnification for appearance.	J-STD-002 Method D
12	Flammability	V-0 or V-1 Acceptable	UL-94
13	Board Flex	2.5mm, 60s holding time	AEC-Q200-005
14	Terminal Strength	1.8kg, 60s holding time	AEC-Q200-006

*Storage conditions： 18 months

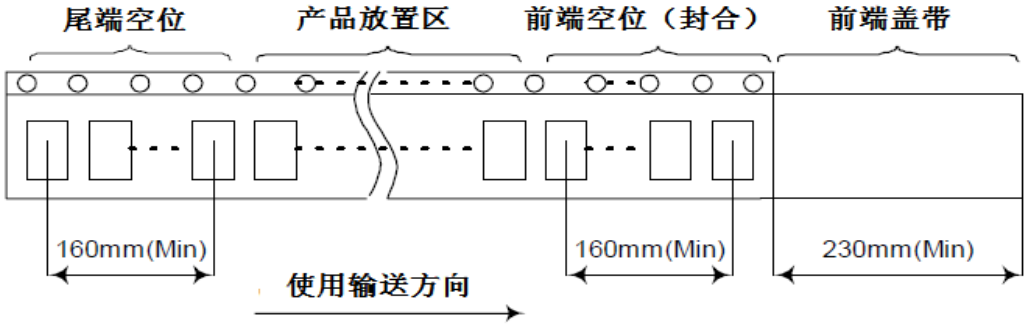
*Constant humidity： 40~70%

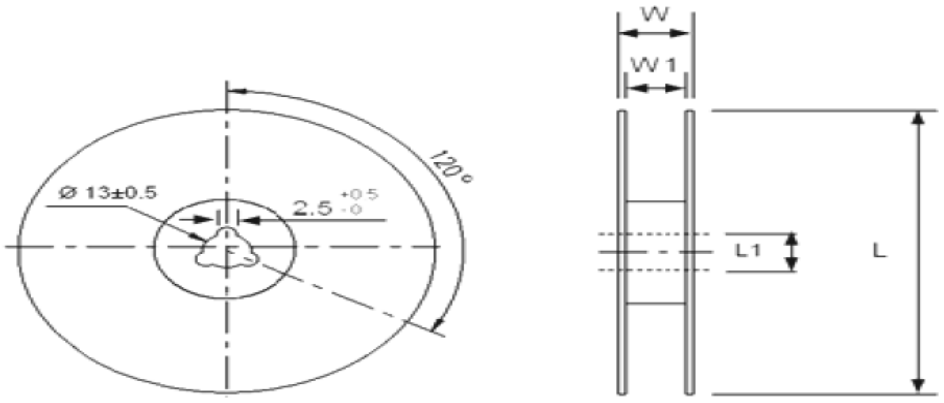
PACKING :

8mm-4mm，3000pcs / reel，φ178；



	A	B	C	D	E	F	G	H	
Dimension	1.40 ±0.1	3.40 ±0.1	2.70 ±0.1	4.00	8.00	4.00	1.50	1.75	Unit：mm

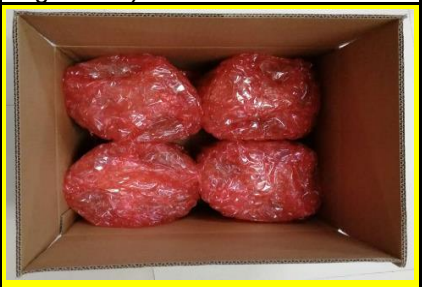




	L	L1	W	W1	
Dimension	178	13	11.5	8	Unit：mm 3000pcs / reel

SMD PRODUCT PACKING STANDARD

Out-going packing instruction

Reel Packing	Inner Packing	Carton
name：reel standard：diameter 18cm material：plastics	name：Bubble Wrap standard：430×330+20mm material：HDPE(15 reels enter)	name：carton standard：400×400×280mm material：AB corrugated paper(4 bags enter)
		
		

The label instruction

Label Drawing	Mark	Name of Article	Spec.	Size	Printing
	L1	条码标签 Bar Code Label (Chintz Paper)	1.Part No. 2.Lot No. 3.Q'ty 4.Freq	70x50mm	White
	L2	条码标签 Bar Code Label (Chintz Paper)	1.Part No. 2.Date Code 3.Q'ty 4.Freq	70x50mm	White

Remark

Specifications on the label is for the use of templates with different product specifications may vary.
If customer specified requirements for labels packaging. please provide the operation procedure.

Range	Products	Packing Material
Banned Substances	**Maximum concentration ppm(mg/kg)**	**Maximum concentration ppm(mg/kg)**
1.镉及镉化合物 Cadmium and cadmium compounds	100	100
2.铅及铅化合物 Lead and lead compounds	1000	100
3.汞及汞化合物 Mercury and mercury compounds	1000	100
4.六价铬化合物 Hexavalent-Chromium VI (Cr+6)	1000	100
5.聚溴联苯 PBB Polybrominated biphenyls	1000	N/A
6.聚溴二苯醚 PBDE Polybrominated diphenyl ethers	1000	N/A
7.邻苯二甲酸二(2-乙基己基)酯 DEHP Di (2-ethylhexyl) phthalate	1000	N/A
8.邻苯二甲酸丁苄酯 BBP Butyl Benzyl Phthalate	1000	N/A
9.邻苯二甲酸二丁酯 DBP Dibutyl Phthalate	1000	N/A
10 邻苯二甲酸二异丁酯 DIBP Diisobutyl Phthalate	1000	N/A
11. 氟（F）、氯（Cl）、溴（Br）、碘（I） Fluorine、Chlorine、 Bromine、Iodine	900、900、900、900 注：Br+Cl＜1000	N/A
12.包装材料中重金属(汞、镉、六价铬、铅、PBB、PBDE)之总量 Heavy metals (mercury, cadmium, lead, Cr+6,PBB and PBDE) in packing materials	N/A	100 铅(Pb) + 镉(Cd) + 汞(Hg) + 六价铬(Cr+6) <100ppm
13.高度关注物质 SVHC-Substances of Very High Concern	1000	N/A


惠伦晶体
FAITH LONG CRYSTAL