广东惠伦晶体科技股份有限公司
GUANGDONG FAITH LONG CRYSTAL TECHNOLOGY Co.,Ltd.
NO.68 Huangjiang Donghuan Road，Huangjiang Town，Dongguan City，Guangdong Province，China
TEL :+86(0)769-38879888 Fax :+86(0)769-38879889 E-mail : yl@dgylec.com

PRODUCT SPECIFICATION SHEET

CUSTOMER	:	
PRODUCT TYPE	:	SMD X'TAL 3.2*2.5(4PAD)
NOMINAL FREQ.	:	12.000000 MHz
FL P/N	:	3Y12000013
REVISION	:	S0
CUSTOMER P/N	:	

CUSTOMER'S APPROVAL&DATE

FL CORPORATION

APPROVED	CHECKED	DESIGNED
Liu Feng	Liao Xiaohua	Li Xiang

MSL1
RoHS Compliant
AEC-Q200 Certified

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ATTACHMENT（optional）

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

Attention

- If you intend to use products on the controlling equipment that relate to medical, aeronautical, aerospace, military science, space and etc, please make sure to let us know your intentions in advance.

- Ultrasonic related process may cause damage to crystal blank by resonance itself.
  If ultrasonic related process is used, we strongly recommend to assess the damage risk under related ultrasonic conditions before use in production.

SPECIFICATION REVISION RECORD SHEET

Rev.	Revise page	Revise Contents	Date	Ref. No.	Reviser
S0	N/A	Initial released	1-Aug-23	N/A	Li Xiang

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.

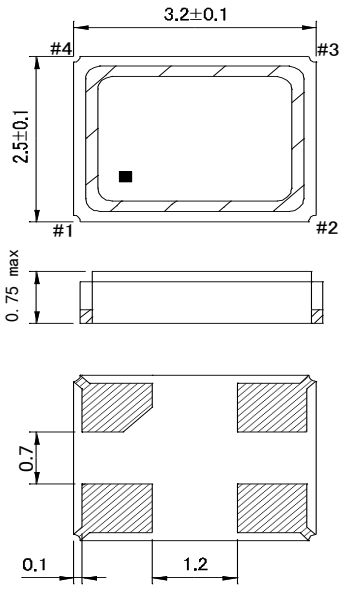
Crystal cutting type

The crystal is using AT CUT (thickness shear mode)

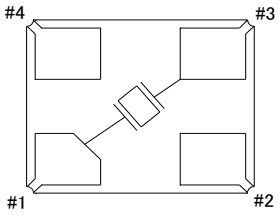
ELECTRICAL SPECIFICATIONS

No.	Items	Electrical Spec.					Remarks
		Symbol	Min	Typ	Max	Units	
1	Nominal Frequency	FL	-	12	-	MHz	-
2	Oscillation Mode	-	Fundamental			-	-
3	Load Capacitance	CL	12.0			pF	-
4	Frequency Tolerance	-	±10			ppm	at 25±2℃
5	Frequency Stability	-	±25			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	-	105	℃	-
10	Equivalent series resistance	ESR	-	-	80	ohms	-
11	Insulation Resistance	IR	500	-	-	M-ohms	at DC 100V
12	ESD	-	HBM＞4000V			-	ANSI/ESDA/JEDEC JS-001
13	MSL	-	Level 1			-	J-STD-020
14	Drive Level	DL	-	-	100	uW	-

DIMENSIONS unit:mm

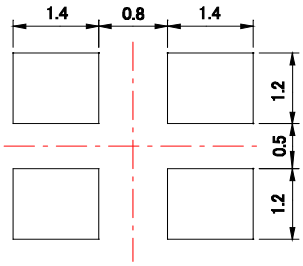


CONNECTION DIAGRAM (TOP VIEW)

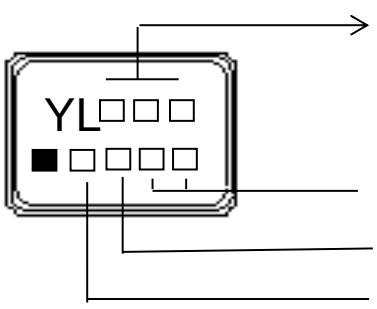


Pin	Function
#1	Xtal terminal (Input)
#2	GND terminal
#3	Xtal terminal (Output)
#4	GND terminal

LAND PATTERN unit:mm



MARKING



Frequency
EX: 12.000MHz = 120

lot (2 digits)

year month code

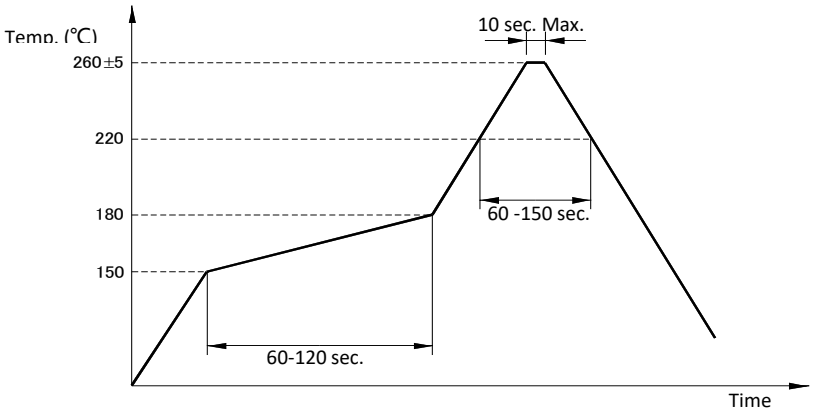
Administrative Symbo

year \ month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021	2025	A	B	C	D	E	F	G	H	J	K	L	M
2022	2026	N	P	Q	R	S	T	U	V	W	X	Y	Z
2023	2027	a	b	c	d	e	f	g	h	j	k	l	m
2024	2028	n	p	q	r	s	t	u	v	w	x	y	z

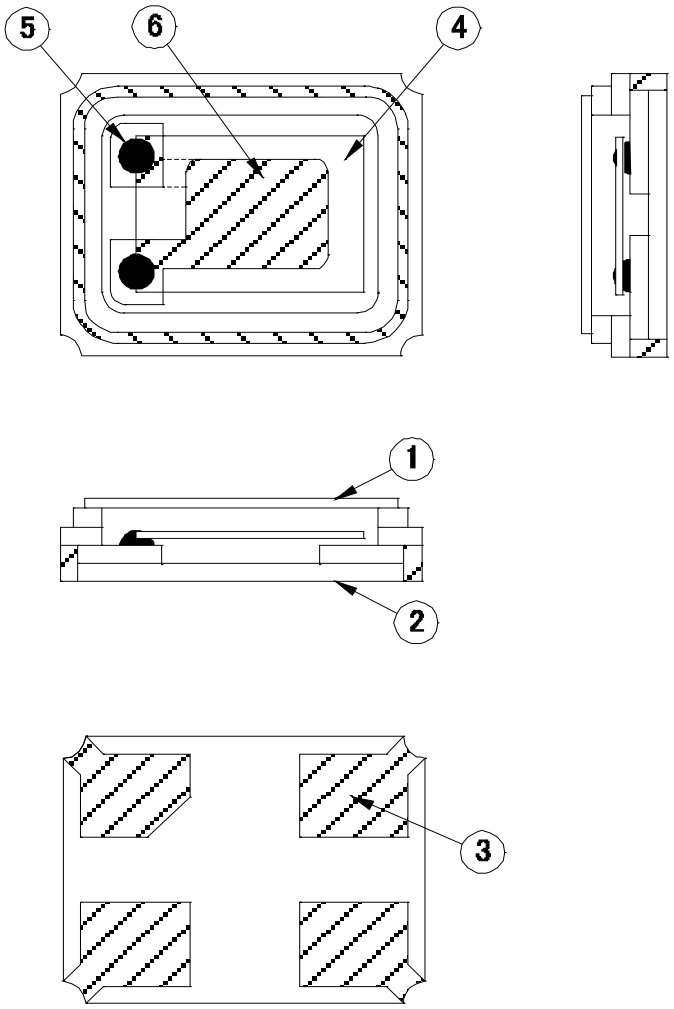
SUGGESTED REFLOW PROFILE

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	2	Silicone resin
6	Electrode	Noble metal	2	-

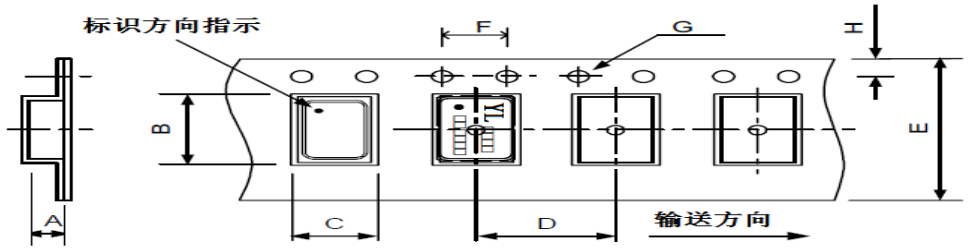
RELIABILITY SPECIFICATIONS

1.ENVIRONMENTAL ENDURANCE (AEC-Q200)

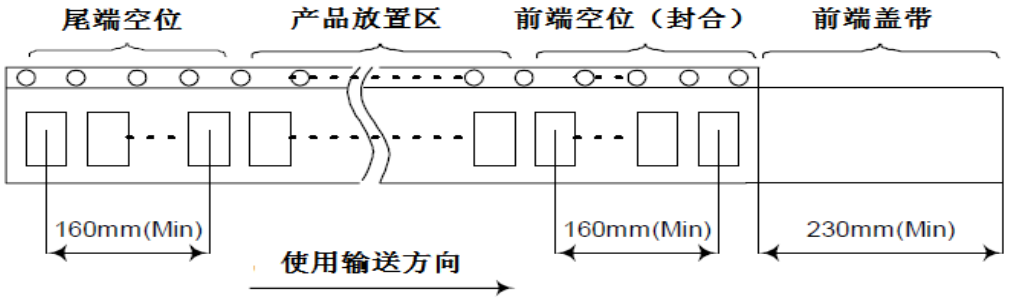
No.	Test Item	Test Methods	
1	High Temperature Exposure	1000 hours at 85℃.	AEC-Q200 TEST 3, MIL-STD-202 Method 108
2	Temp. Cycling	Temperature Cycling 1000 cycles. (-40℃ to 125℃ for 30 minutes each).	AEC-Q200 TEST 4, JESD22 Method JA-104
3	Biased Humidity	1000 hours at 85℃ & 85%RH with V_{DD} applied.	AEC-Q200 TEST 7, MIL-STD-202 Method 103
4	Operational Life	1000 hours at 125℃ with V_{DD} applied.	AEC-Q200 TEST 8, MIL-STD-202 Method 108
5	Resistance to Solvents	3 minutes of immersion and 10 strokes of brush cleaning,for 3 cycles.	AEC-Q200 TEST 12, MIL-STD-202 Method 215
6	Mechanical Shock	100g's,6msec,half-sine,for 3 cycles each in 6 directions	AEC-Q200 TEST 13, MIL-STD-202 Method 213
7	Vibration	10Hz-2000Hz,5g for 20 minutes,12 cycles in each of 3 orientations.	AEC-Q200 TEST 14, MIL-STD-202 Method 204
8	Resistance to Soldering Heat	260℃±5℃,10sec±1sec.	AEC-Q200 TEST 15, MIL-STD-202 Method 210
9	Solderability	260℃±5℃,5sec±1sec, immersing depth:≥0.5mm.	AEC-Q200 TEST 18, J-STD-002
10	Board Flex	Board bending: 2.5mm,bending time: 60s.	AEC-Q200 TEST 21, AEC Q200-005
11	Terminal Strength	Force:1.8kg,force time:60s.	AEC-Q200 TEST 22, AEC Q200-006

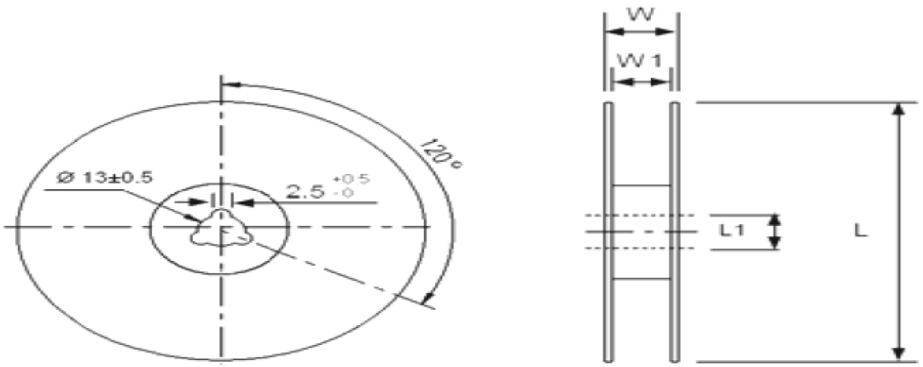
PACKING :

8mm-4mm，3000pcs / reel，φ178；



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

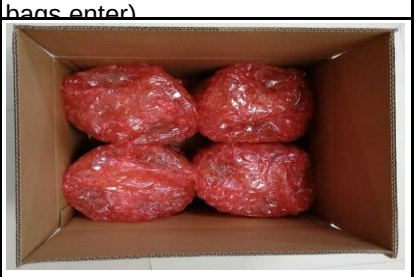




Dimension	L	L1	W	W1	Unit：mm
	178	13	11.5	8	3000pcs / reel

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