SPEC. NO.: S999-311

CRYSTAL SPECIFICATION

Customer :

Customer P/N :

Agent :

Agent Code :

SIWARD P/N : XTL721-S999-311

Customer Approval :

希華晶體科技股份有限公司
SIWARD CRYSTAL TECHNOLOGY CO., LTD.

業務部/ SALE DEPARTMENT
TEL: (04)25347909
FAX: (04)25327885 / 25337396
URL HTTP://www.siward.com.tw

品質保證部/ QUALITY ASSURANCE DEPT.
TEL: (04)25347909 EXT 1340/1341

研發部/R & D DEPT.
TEL: (04)25347909 EXT 1534

DATE : 2026/05/29

Approved By : Steve Chen

Checked By : Tom Tang

Designer : Sally Lin

Address:1-1,LANE 111,JUNG-SHAN RD.,SEC.3, TANTZU HSING,TAICHUNG 427,TAIWAN,R.O.C.

SPEC. NO.: S999-311

Rev.	Description of Revision History	Date	Designer	Checked By
1	New Publication	2012/08/08	Sally Lin	Steve Chen
2	Dimension: SX-3215 become to SF-3215.(101K1209-017)	2012/09/24	Sally Lin	Steve Chen
3	Freq. vs Temp. Coefficient Before Changed : - 0.025 MIN; - 0.035 TYP ; - 0.045 MAX .(K1312-017)	2014/01/02	Sally Lin	Tom Tang
4	C0 Before Changed : 2 pF Max ; C1 Before Changed:3 fF MIN. (K1601-006)	2016/01/15	Sally Lin	Tom Tang
5	Packing Style Changed TP-175 to TP-1040.(101K2012-008)	2021/02/23	Sally Lin	Tom Tang

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CRYSTAL SPECIFICATION

1. Description : Quartz Crystal
2. Nominal Frequency : 32.768 KHz
3. Center Frequency : 32.768 KHz
4. Dimension & Drawing No. : SF-3215 ; SXD-00281
5. Oscillation Mode : Fundamental
6. Cutting Mode : TF
7. Packing Style : TP-1040
8. Measurement Instrument : S&A 250B(Calculated FL)
9. Electrical Characteristics :

[1] Operating Conditions :

Item	Symbol	MIN.	TYP.	MAX.	Unit	Condition
Operating Temperature Range	Topt	-40		85	℃	
Storage Temperature Range	Tstg	-55		125	℃	
Load Capacitance	CL		12.5		pF	
Drive Level	DL		0.1	0.5	μW	

[2] Frequency Stability :

Item	Symbol	MIN.	TYP.	MAX.	Unit	Condition
Tolerance	dF/Fo	-20		20	ppm	Refer to Center Frequency @25±3℃ DL = 0.1μW
Freq. vs Temp. Coefficient	dF/dT	-0.02	-0.03	-0.04	ppm/℃^2	Values are calculated by frequencies at 10 ℃ , 25 ℃ , and 40 ℃
Turnover Temperature	TT	20	25	30	℃	
Aging	dF/F25	-3		3	ppm	Per Year

dF/Fo: Frequency Deviation Refer to Center Frequency

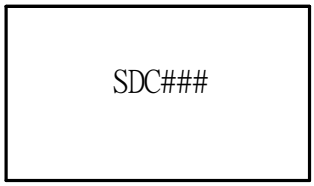
dF/F25: Frequency Deviation Refer to 25 ℃ Frequency

[3] Electrical Performance :

Item	Symbol	MIN.	TYP.	MAX.	Unit	Condition
Equivalent Series Resistance	ESR			70000	Ω	@Series
Shunt Capacitance	C0		1.1		pF	
Motional Capacitance	C1		4.7		fF	
Quality Factor	Q	13			K	
Insulation Resistance	IR	500			MΩ	@DC 100 Volt

10. Marking : Laser

*MARKING : D ->YEAR C -> MONTH
YEAR : 1 2 3 4 5 6 7 8 9 0
CODE : A B C D E F G H J K
MONTH: 1 2 3 4 5 6 7 8 9 10 11 12
CODE : A B C D E F G H J K L M
* S -> SIWARD * ### -> Lot No



11. Remark :

＊The component complies with Moisture Sensitivity Level(MSL)-Level 1 defined on JEDEC J-STD-020 standard.
＊Compliant with RoHS and Siward QAD-S-116 Standard.

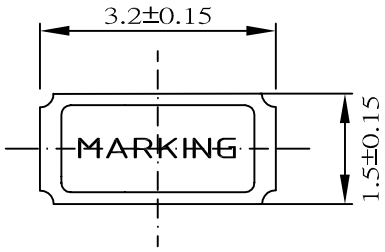
■Note

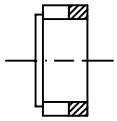
1.Tuning fork products oscillate at frequency bands that are close to the washing frequency of ultrasonic cleaning machine, which may cause resonance deteriorating the electrical characteristics in devices, and even damaging the overall structure of devices. Therefore, using ultrasonic cleaning machine to clean tuning fork devices should be avoided. If the use of this method to clean tuning fork devices is required, it's suggested to check the functionality of devices before and after the cleaning process.

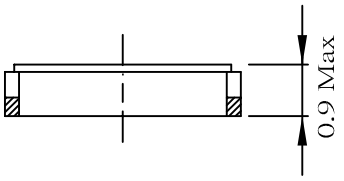
2.Avoid mounting and processing by Ultrasonic welding this method has a possibility of an excessive vibration spreading inside the crystal products and becoming the cause of characteristic deterioration and not oscillating.

3.Manual soldering heat resistance

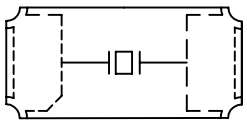
Pressing a soldering iron of 400°C on the terminal electrode for four seconds (twice).

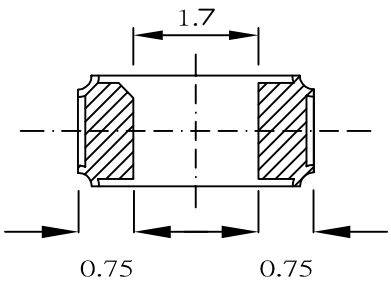




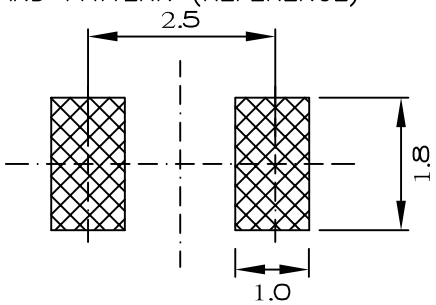


TOP VIEW



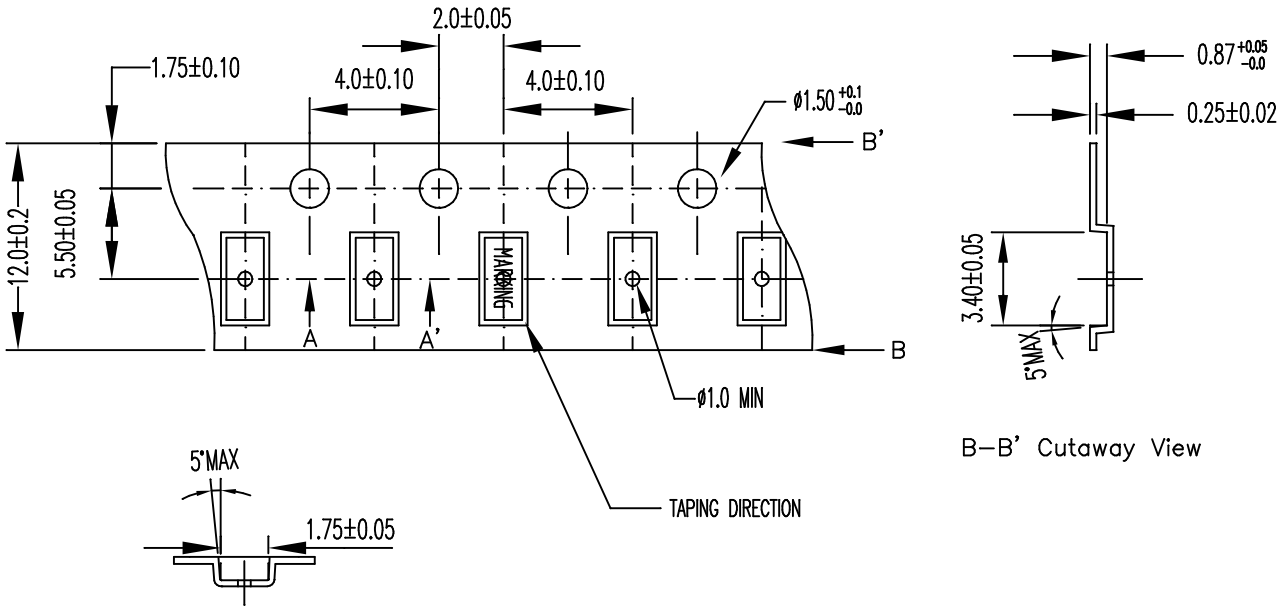


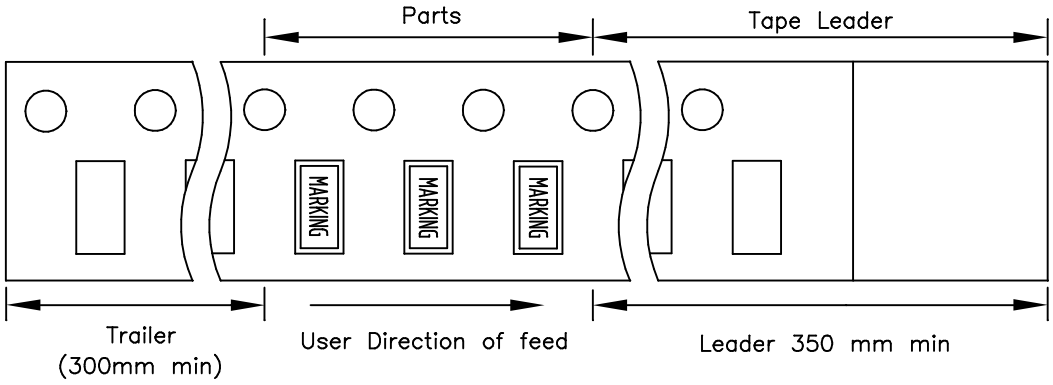
LAND PATTERN (REFERENCE)



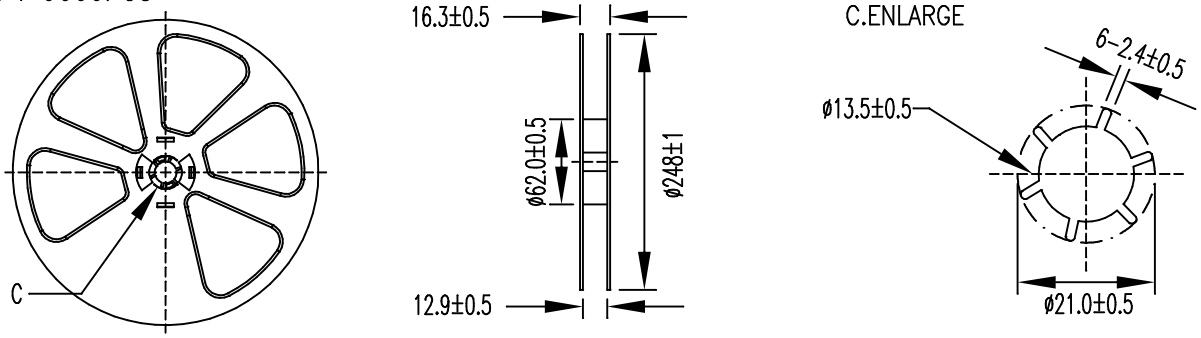
NO.	MODIFY CONTENTS	DATE				
5	MODIFY DRAWING NAME	'12.10.11	DRAWING NAME	SF-3215		
4	ADD PAD SIZE =>0.75	'10.08.04	DRAWING NO.	SXD-00281		
1	NEW EDITION	'07.07.19	SCALE		UNIT	mm
			APPROVE	Jason	DESIGNER	Benson

1.CARRIER TYPE





2.REEL : 9000PCS



			DRAWING NAME	SF-3215/CSF-3215 REEL PACKING			
2	MODIFY REEL DIAMETER	'23.12.07	DRAWING NO.	TP-1040			
1	NEW EDITION	'21.02.19	SCALE		UNIT	mm	
NO.	MODIFY CONTENTS	DATE	APPROVE	Andy	DESIGNER	Wade	

SIWARD
TND
2023/12/20
ver. 02

■RELIABILITY SPECIFICATION

1. ENVIRONMENTAL PERFORMANCE

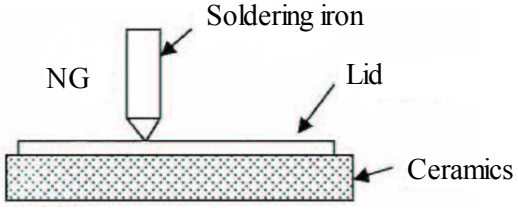
ITEM	CONDITION
1. HIGH TEMPERATURE STORAGE	STORED AT 85±2℃ FOR 500±12H. (If Customer's temperature request is higher than the standard,Temperature test must be done for customer requirements.) THEN 25±2℃ OVER 2H BEFORE TESTING.
2. LOW TEMPERATURE STORAGE	STORED AT –40±2℃ FOR 500±12H. (If Customer's temperature request is lower than the standard,Temperature test must be done for customer requirements.) THEN 25±2℃ OVER 2H BEFORE TESTING.
3. HIGH TEMP. & HUMIDITY	STORED AT 60±2℃ AND HUMIDITY 90～95% FOR 500±12 H. THEN 25±2℃ OVER 2H BEFORE TESTING.
4. TEMPERATURE CYCLE	THE CRYSTAL UNIT SHALL BE SUBJECTED TO 100 SUCCESSIVE CHANGE OF TEMPERATURE CYCLES, THEN 25±2℃ OVER 2 H BEFORE TESTING, EACH CYCLE AS BELLOW： TEMPERATURE — DURATION 1. -40+0/-6℃ — 30±3 MINUTES 2. 25℃±2℃ — 2～3 MINUTES 3. 85+4/-0℃ — 30 ±3 MINUTES 4. 25℃±2℃ — 2～3 MINUTES

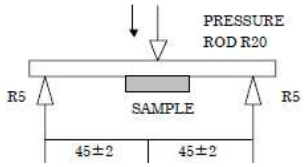
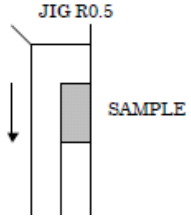
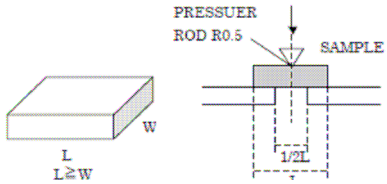
2. MECHANICAL PERFORMANCE

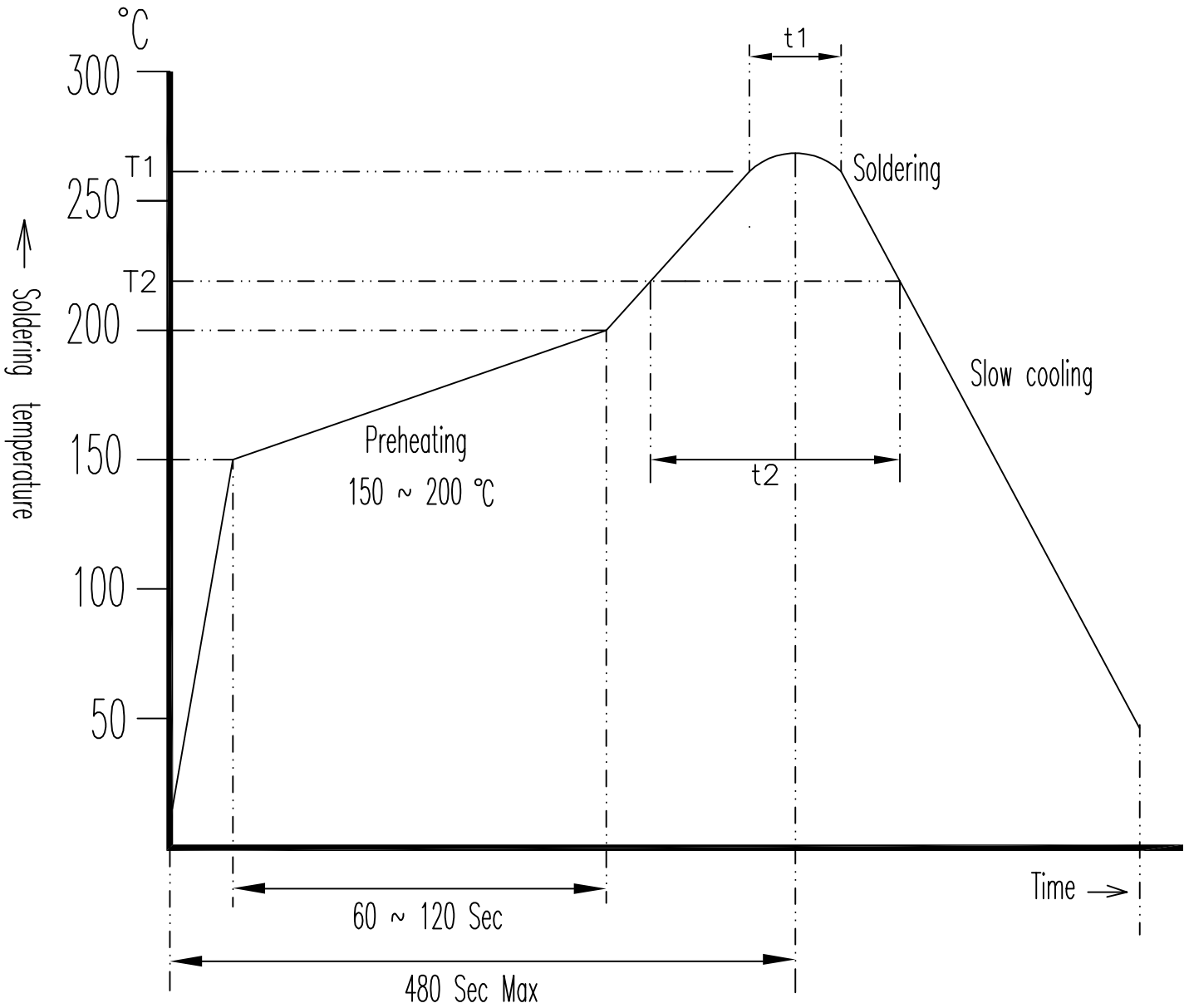
ITEM	CONDITION
5. RESISTANCE TO SOLDERING HEAT	REFLOW CHART AS ATTACH SHEET. TWICE PASS.
6. DROP	Dumy：150 g, Height：180 cm, Dropped Cycle：3 Cycle, DROP IT ONTO A CONCRETE BOARD FOR 6 DIRECTIONS (XX',YY'ZZ'). THIS SHOULD BE 1 CYCLE.
7. VIBRATION	FREQUENCY：10～60Hz, AMPLITUDE (TOTAL EXCURSION)：1.5mm±15%, SWEEP TIME(PERIOD)：2~3 min, 3 DIRECTION (X, Y, Z) EACH FOR 2 Hrs.
8. FINE LEAK	HELIUM BOMBING 5.0～5.5 Kgf / cm^2 FOR 2 HOURS.

(Remark)

Please note that parts should specify above test condition each by each article not all at once. Also the variation of series resistance should ±20% min or ±15kΩ min which ever big value on above test. Please do not touch by hot soldering iron and do not put shock on top lid.



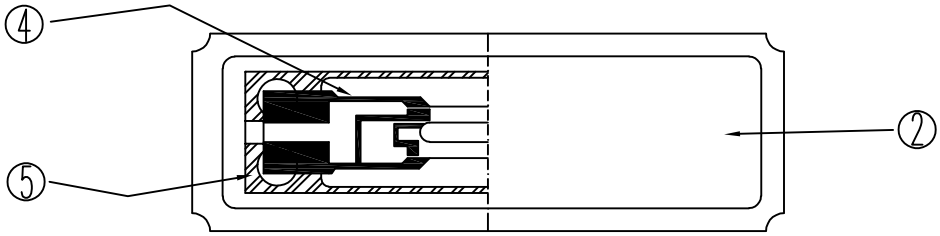
9. TERMINAL STRENGTH	SHALL BE PRESSURIZED AT A SPEED OF APPROX.0.5mm/sec IN THE DIRECTION INDICATED BY THE ARROW UNTIL THE BENDING WIDTH REACHES 3mm AND HELD FOR 5 SECONDS. 
10. STICKING TENDENCY	A R0.5 JIG SHALL BE USED TO APPLY A 10N DEAD LOAD IN THE DIRECTION INDICATED BY THE ARROW TO THE ELEMENT AND RETAIN IT FOR 10 SECONDS. 
11. ELEMENT ASSEMBLY STRENGTH	A R0.5 PRESSURIZED BAR SHALL BE USED TO APPLY A 10N LOAD IN THE CENTER OF ELEMENT AND RETAIN IT FOR 10 SECONDS. 

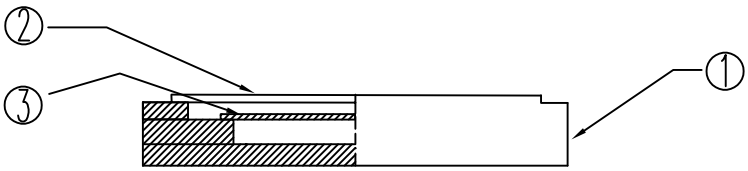


Application \ Temperature/Time	T1/t1	T2/t2
Lead Free	260±5°C/10±5 Sec	217°C Min/60~150 Sec
Non Lead Free	240±5°C/10±5 Sec	183°C Min/60~150 Sec

NO.	MODIFY CONTENTS	DATE
6	MODIFY Preheating&Temperature/Time	'13.08.29
5	MODIFY DRAWING NAME	'07.07.06
1	NEW ISSUANCE	'99.12.10

DRAWING NAME	QUARTZ DEVICE SMD REFLOW CHART		
DRAWING NO.	FLOW-004		
SCALE		UNIT	
APPROVE	John	DESIGNER	Benson





PART NAME		MATERIAL	PART NAME		MATERIAL
1	BASE	CERAMIC	4	ELECTRODE	Metal
2	LID	KOVAR	5	ADHESIVES	SILVER GLUE
3	BLANK	QUARTZ			

NO.	MODIFY CONTENTS	DATE				
			DRAWING NAME	SF-3215/CSF-3215 CUTAWAY VIEW		
2	MODIFY DRAWING NAME	'22.02.10	DRAWING NO.	CUT-X-034		
1	NEW EDITION	'12.08.09	SCALE		UNIT	
			APPROVE	Andy	DESIGNER	Wade

SIWARD TND 2022/03 ver. 00