



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 TUNING FORK 3.2X1.5
NOMINAL FREQ. : 32.768000 KHz
FL P/N : 3SQ3270002
REVISION : S1
CUSTOMER P/N : _____

CUSTOMER'S APPROVAL&DATE

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FL CORPORATION

APPROVED	CHECKED	DESIGNED
Liu Feng	Zhou Xueming	Li Xiang

MSL1
RoHS Compliant



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ATTACHMENT (optional)

- | | | | |
|------------------------------------|---|------------------------------|--|
| • ELECTRICAL CHARACTERISTICS TEST | A | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| • TEMPERATURE CHARACTERISTICS TEST | B | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> 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.



PRODUCT DESCRIPTION

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

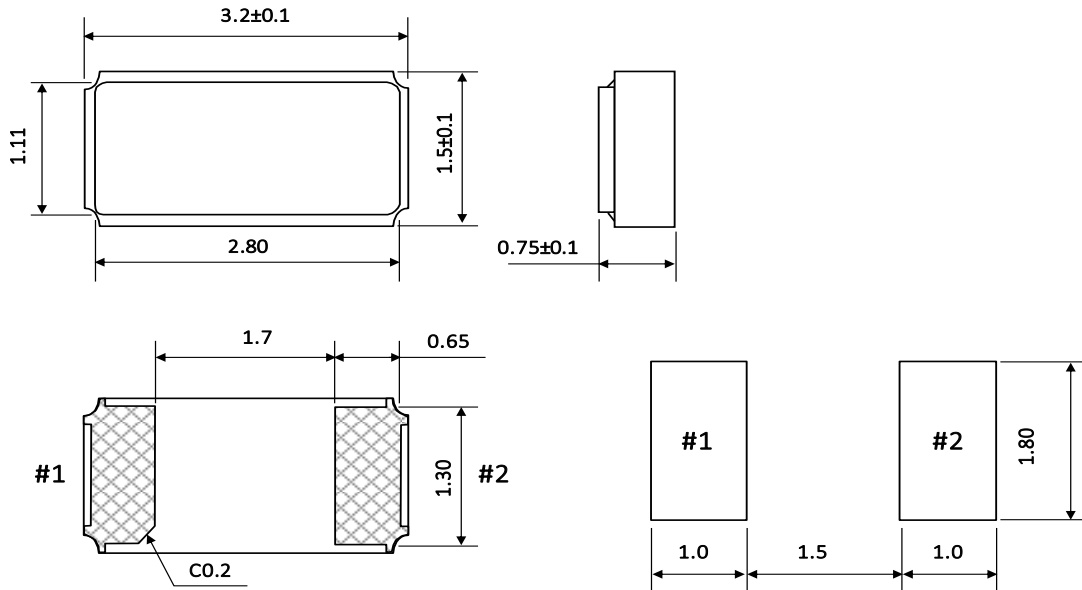
Electrical characteristics measured by S&A250B or equivalent.

ELECTRICAL SPECIFICATIONS

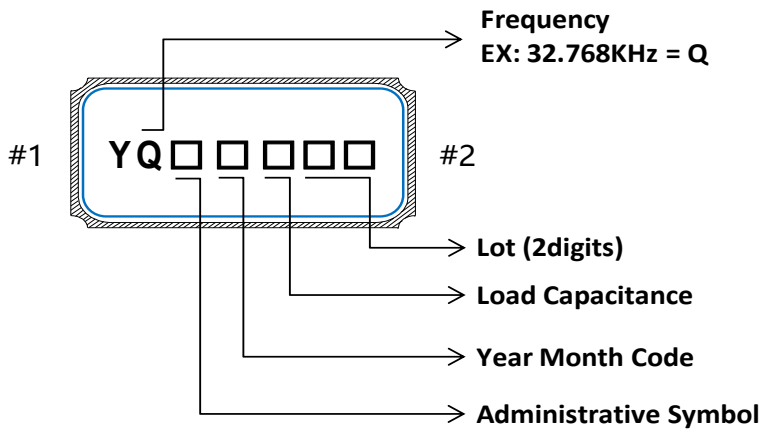
No.	Items	Electrical Spec.				Units	Remarks
		Symbol	Min	Typ	Max		
1	Nominal Frequency	f_nom	32.768000			KHz	-
2	Load Capacitance	CL	12.5			pF	-
3	Frequency Tolerance	f_tol	±20			ppm	at 25±3℃,DL=0.5uW
4	Turnover Temperature	Ti	20	25	30	℃	Measure this coefficient at 5 points of -40℃, -20℃, 25℃, 60℃, 85°. using S&A W2200
5	Freq. vs Temp. Coefficient	B	-0.03±0.01			ppm/℃ ²	
6	Shunt Capacitance	C0	-	1.2	-	pF	-
7	Motional Capacitance	C1	-	4.7	-	fF	-
8	Aging (1st year)	f_age	±3			ppm/year	at 25±3℃,DL=0.5uW
9	Operating Temperature	-	-40	-	85	℃	-
10	Storage Temperature	-	-40	-	125	℃	-
11	Equivalent series resistance	ESR	-	-	70	kΩ	-
12	Insulation Resistance	IR	500	-	-	M-ohms	at DC 100V
13	Drive Level	DL	0.1	0.5	1.0	uW	-



DIMENSIONS unit:mm



MARKING

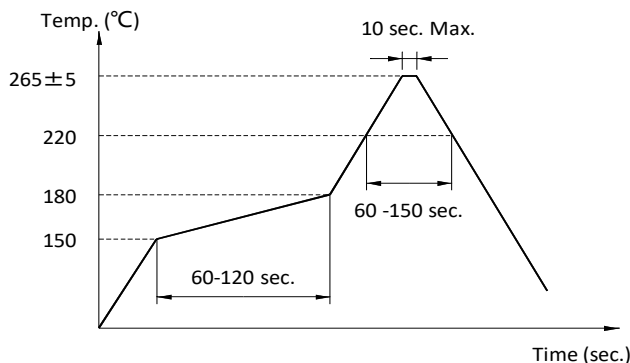


		month											
year		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021	2025	A	B	C	D	E	F	G	H	J	K	L	M
2022	2026	N	P	Q	R	S	T	U	V	W	X	Y	Z
2023	2027	a	b	c	d	e	f	g	h	j	k	l	m
2024	2028	n	p	q	r	s	t	u	v	w	x	y	z

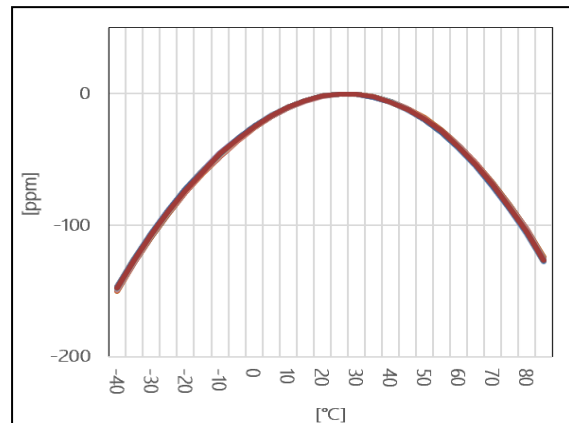
Load Capacitance	7.0pF	9.0pF	12.5pF	6.0pF
	A	B	C	D

SUGGESTED REFLOW PROFILE

Total time : 360 sec. Max.
Solder melting point :225 °C



TEMPERATURE V.S FREQUENCY CURVE





RELIABILITY SPECIFICATIONS

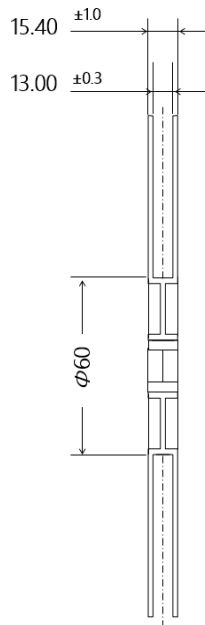
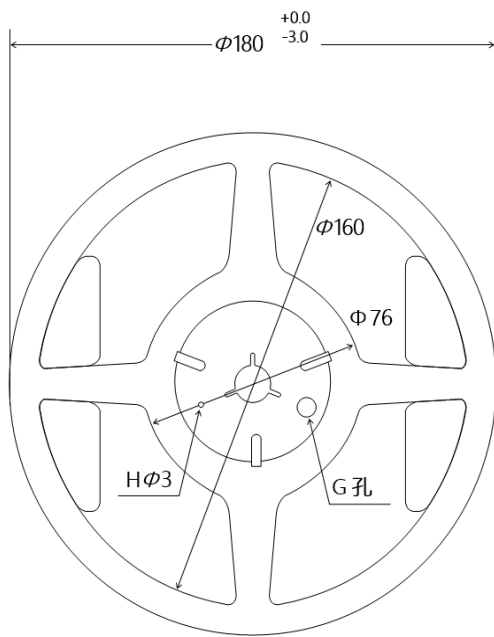
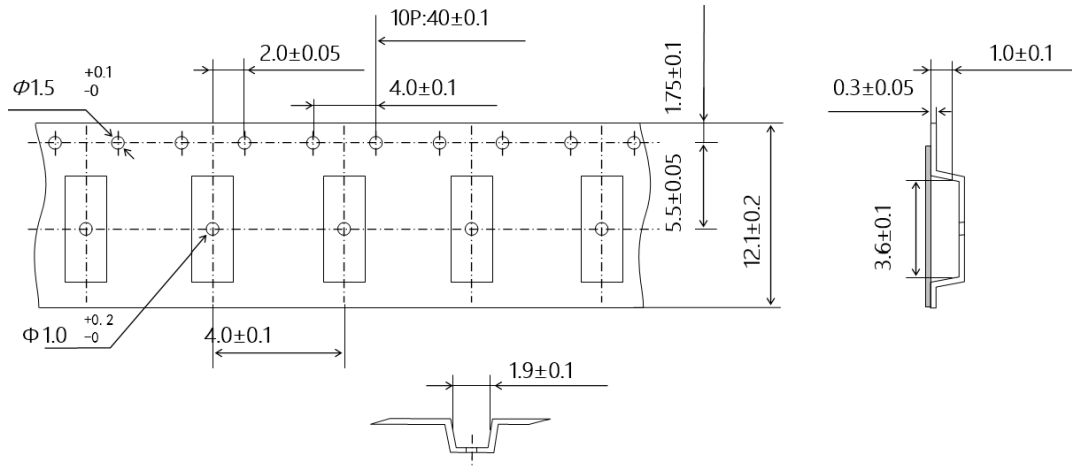
No.	Item	Specification	Conditions	Note
1	High temperature storage	$\Delta F/F = \pm 10 \times 10^{-6}$	After storage under $125 \pm 3^\circ\text{C}$ for 1000 hours, measure at room temperature. IEC60068-2	*1 *3
2	High temperature storage	$\Delta F/F = \pm 7 \times 10^{-6}$	After storage under $85 \pm 3^\circ\text{C}$ for 1000 hours, measure at room temperature. IEC60068-2	*1 *3
3	Low temperature storage	$\Delta F/F = \pm 10 \times 10^{-6}$	After storage under $-55 \pm 3^\circ\text{C}$ for 1000 hours, measure at room temperature. IEC60068-2	*1 *3
4	High temperature and high humidity storage	$\Delta F/F = \pm 10 \times 10^{-6}$	After storage under $+85 \pm 3^\circ\text{C}$, 85 % RH for 1000 hours, measure at room temperature. IEC60068-2	*1 *3
5	Temperature cycle	$\Delta F/F = \pm 10 \times 10^{-6}$	Measure at room temperature after 100 cycles. $-55 \pm 3^\circ\text{C} \leftrightarrow +125 \pm 3^\circ\text{C}$ for 30 minutes. IEC60068-2	*1 *3
6	Mechanical shock resistance	$\Delta F/F = \pm 8 \times 10^{-6}$	Measure after 100g-dummy drop from 1500mm height on the concrete 3directions 10times.	*2
7	Vibration resistance	$\Delta F/F = \pm 3 \times 10^{-6}$	10Hz ~ 55Hz, 0.75mm 55Hz ~ 500Hz, 98m/s^2 , 3 direction (X, Y, and Z axis) each for 2 hours. IEC60068-2	*2
8	AIR Reflow	$\Delta F/F = \pm 5 \times 10^{-6}$	Measure after 3 time reflow under reflow profile specified in page 4 IEC60068-2	*1
9	Shear strength	No peeling-off	Pressuring force $20\text{N} \times 10 \pm 1\text{sec}$. IEC60068-2	*2
10	Bending test	No peeling-off	Bending: $3\text{mm} \times 5 \pm 1\text{sec}$. Thickness of the testing board: 1mm IEC60068-2	*2
11	Solderability test	$\geq 95\%$ Coated	$235^\circ\text{C} \pm 5^\circ\text{C}$, $5\text{sec} \pm 1\text{sec}$, Immersing depth $\geq 0.5\text{mm}$. IEC 60068-2	*2

Note:

1. Each test shall be done independently. (not in series tests)
 2. *1: Measure after 24 hours left at room temperature.
 3. *2: Measure after 2 hours left at room temperature.
 4. *3: Pre conditions
- (1)AIR Reflow : 2 times
(2) Initial values shall be measured after 24 hours at room temperature.
5. Shift in series resistance after the above tests shall be less than $\pm 20\%$ or less than $\pm 15\text{k}\Omega$.
- In case of resistance to AIR reflow and high temperature storage ($\pm 125^\circ\text{C}$ for 1000 hours), shift in series resistance after the above tests shall be less than $\pm 30\%$ or $\pm 20\text{k}\Omega$.



PACKING :



Item	Specification	Unit
Materials	PS(anti statics)	-
inside reel wise W1	13.0 ± 0.3	mm
outside reel wise W2	15.4 ± 1.0	mm

Unit = mm



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

