



石英晶体元件规格书
Quartz crystal specification

提交号(NO): CSPXO-2020082001



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待承认者: 深圳市鹏飞科技有限公司-晶体事业部

制品名称: 石英晶体谐振器

制品料号: HC-49/CSA-C20QSA-24.0000MHz

送待承认样: /PCS

责任担当		技术担当	
营业担当	余志权	检定担当	李淑梅

承认者: GKK LIMITED

承认结果	资材担当	技术担当	承认担当	承认评定
检定问题点				

※通过承认请将承认书首页回传一份给本公司备档, 谢谢支持!

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石英晶体谐振器规格书

Specification quartz crystal resonators

电性能参数 Electrical Characteristic

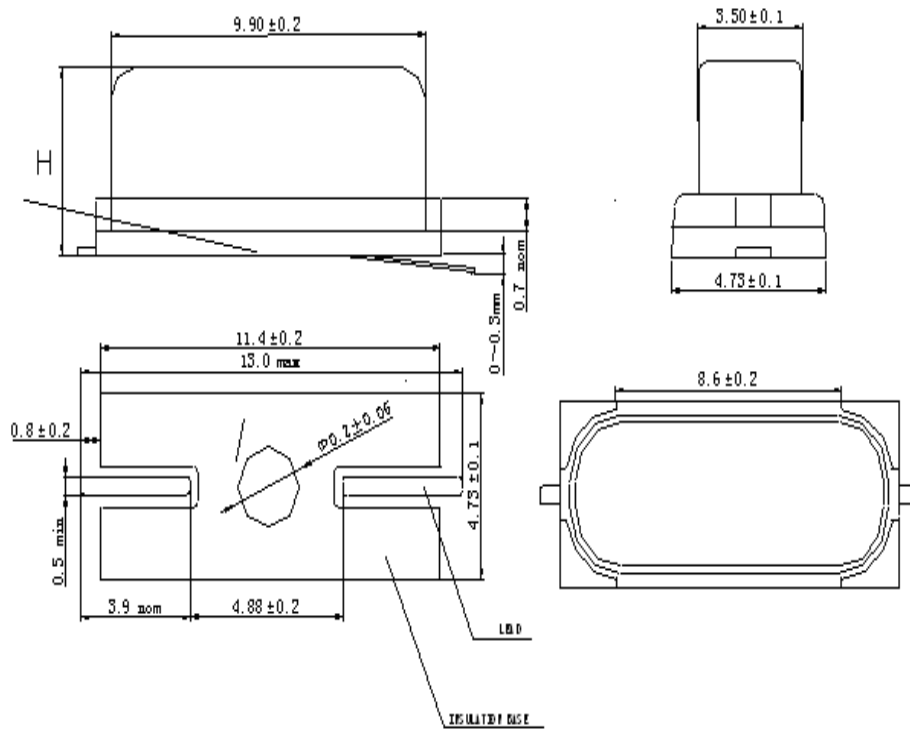
提交号:  2020082001

1	型号 Model No	HC-49/CSA
2	标称频率 Nominal Frequency	24.0000MHz
3	调整频差 Frequency Tolerance(Tol)	±20 ppm (± 25℃± 2℃)
4	振动模式 Oscillation Mode	<input checked="" type="checkbox"/> 基频 Fund <input type="checkbox"/> 3rd 泛音 <input type="checkbox"/> 5th 泛音
5	工作温度 Operation Temperature	(-20 ℃) to (+70 ℃)
6	温度频差 Frequency Stability	±30ppm max
7	负荷电容 load capacitance(CL)	20 pF ±0.2pF
8	等效阻抗 Equivalent resistance(R ₁)	40 Ω max
9	静态电容 Shunt Capacitance (C ₀)	5pF max.
10	激励电平 Maximum Drive Level	50μW
11	绝缘电阻 Insulation Resistance	500MΩ MIN / DC100±15V
12	老化 Aging Rate per Year	±3ppm/year
13	测试仪器 Test Equipment	150C D KH1200 2200 USA350A

环境情况 Environment Characteristic

1	贮存温度 Storage Temperature Range	(- 40℃) to (+ 85℃)
2	贮存湿度 Storage Humidity	0-94%

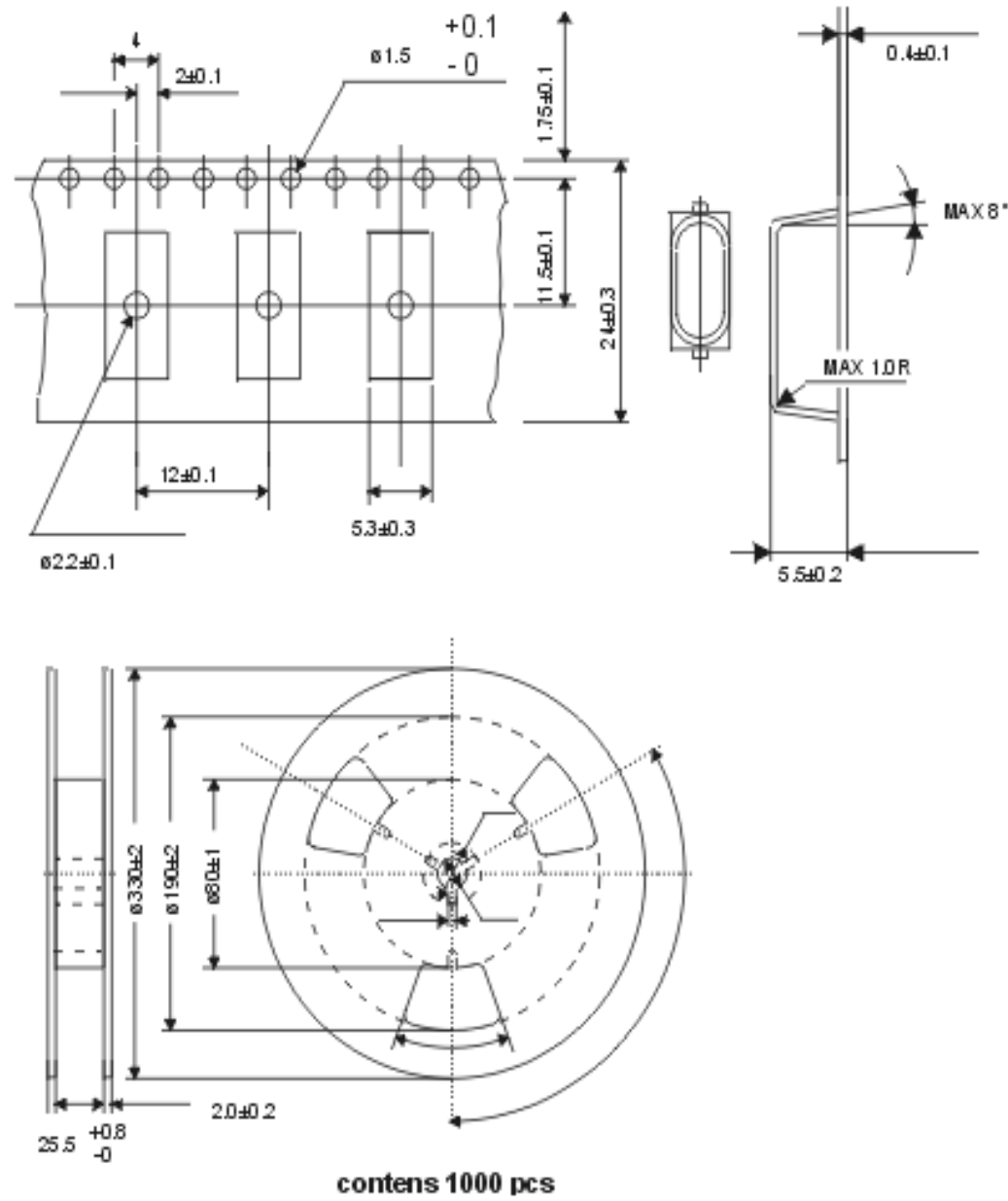
外型尺寸 DIMENSIONS (mm)



唛印 Mark India	T24.000M
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型号	H	单位 (mm)
HC-49/CSA	4.200 Max	
HC-49/CSB	3.200 Max	

包装图样 Packaging design



制图	审核	批准	名称	HC-49CSB	编号	单位
王纯林				包装图 PACKING DRAWING	SYTD-US-003	mm

石英晶体检验规范

Inspection standard quartz crystal

本标准为国际电工委员会 IEC1178-1: 1993QC6800000 和国标 GB/T12273-1996 汇编而成。

This standard is defined in accordance with IEC1178-1:1993QC6800000 and GB/T12273-1996.

一、机械特性(Mechanical Features)

1.自由跌落（破坏性的）[Drop Test (Destructive)]

借助引出端将晶体悬挂于 1000mm 高处，自由跌落到 10mm 硬质杉木板上两次，要求 $|\Delta f| \leq 10\text{ppm}$ ， $|\Delta R| \leq 15\%$

A sample of crystal, hung by the terminal lead, is to be dropped randomly from the height of 1000mm onto the 10mm wood floor two times. At the conclusion of the test, the sample crystal must meet $|\Delta f| \leq 10\text{ppm}$, $|\Delta R| \leq 15\%$

2.正弦振动（破坏性的）[Sine-Vibration (Destructive)]

用频率为 10-55Hz、振幅 0.75mm 正弦振动，沿 X、Y、Z 三个方向各振 30min 后，要求 $|\Delta f| \leq 10\text{ppm}$ ， $|\Delta R| \leq 15\%$

The sample crystal is to vibrate in each direction of X, Y, Z for 30 minutes, when the frequency is 10-55Hz and the amplitude is 0.75mm. At the conclusion of the test, the sample crystal must meet $|\Delta f| \leq 10\text{ppm}$, $|\Delta R| \leq 15\%$

3.引出端强度（破坏性的）[Lead Wire Strength (Destructive)]

引线拉力为 10 牛顿，作用 30 秒后，距晶体组件本体 $2.5 \pm 0.5\text{mm}$ 处，用 5.0 牛顿的力弯曲引线 3.0 次，引线不断裂，要求 $|\Delta f| \leq 5\text{ppm}$ ， $|\Delta R| \leq 2.0\Omega$ 。

The terminal lead is to be pulled with a force of 10 for 30 seconds at a distance of $2.5 \pm 0.5\text{mm}$ from the crystal's main body and then be twisted with 5.0. At the conclusion of the test, the sample crystal must meet $|\Delta f| \leq 5\text{ppm}$, $|\Delta R| \leq 2.0\Omega$, and the lead wire must not be broken.

4.锡焊(可焊性和耐焊性)(破坏性的) [Soldering Test (Destructive)]

在温度为 $230 \pm 10^\circ\text{C}$ 的焊槽内将引线浸锡 3 ± 0.5 秒(浸至本体 2mm 处)，包锡面不小于 90%，再在 $350 \pm 10^\circ\text{C}$ 锡槽中浸锡 3.5 ± 0.5 秒后，要求 $|\Delta f| \leq 10\text{ppm}$ ， $|\Delta R| \leq 15\% \Omega$ 。

The terminal lead wire is to be soaked in a $230 \pm 10^\circ\text{C}$ tin trough for 3 ± 0.5 second, as to make the tin over the wire not smaller than 90%, and then soaked in the tin trough $350 \pm 10^\circ\text{C}$ for 3.5 ± 0.5 seconds. At the conclusion of the test, the sample crystal must meet $|\Delta f| \leq 10\text{ppm}$, $|\Delta R| \leq 15\% \Omega$.

5.密封性试验（非破坏性的）[Leakage Test (Non-destructive)]

将晶体浸入酒精中，加压 $25\text{N}/\text{cm}^2$ 20 分钟，取出吹风干燥后检测，晶体引线对外壳的绝缘电阻应大于 $500\text{M}\Omega$ ，否则为泄漏。

The sample crystal is to be soaked in the alcohol and enforced with the pressure of $25\text{N}/\text{cm}^2$ for 20 minutes. Next, the sample shall be tested after being taken out and dried with a dryer. At the conclusion of the test, the insulate resistance between the wire and the shell must be more than $500\text{M}\Omega$, otherwise, the crystal is regarded to have a leakage.

二、气候特征(Climatic Features)

1.干热（非破坏性）[Dryness & Heat (Non-destructive)]

晶体在 $85 \pm 2^\circ\text{C}$ 的环境中受热 16 小时以后恢复至室温至少 1 小时后测试，要求 $|\Delta f| \leq 5\text{ppm}$ ， $|\Delta R| \leq 5\Omega$ 。

The sample crystal is to be tested after being heated at $85 \pm 2^\circ\text{C}$ for 16 hours and then cooled to room temperature no less than 1 hour. At the conclusion of the test, the crystal must meet $|\Delta f| \leq 5\text{ppm}$, $|\Delta R| \leq 5\Omega$.

2.寒冷（非破坏性）Coldness (Non-destructive)

将晶体放入 $-40 \pm 3^\circ\text{C}$ 的环境下 2 小时后再恢复到常温下测试，要求 $|\Delta f| \leq 5\text{ppm}$ ， $|\Delta R| \leq 5\Omega$ 。

The sample crystal is to be tested after being placed in the environment of $-40 \pm 2^\circ\text{C}$ for 2 hours, and then recovered to room temperature, At the conclusion of the test, the crystal must meet $|\Delta f| \leq 5\text{ppm}$, $|\Delta R| \leq 5\Omega$.

3. 浸渍（破坏性的）[Soaking Test (Destructive)]

将晶体在软化水或去离子水中（电阻率大于 $500\Omega\cdot m$ ）浸渍 5 ± 0.5 分钟，再取出干燥 10 ± 0.5 分钟后，用脱脂棉擦拭标志区域 10 次（每平方厘米 $5\pm 0.5N$ 的力），标志保持清晰可辨。

The sample crystal is to be soaked in the softener or the ionization solution (resistance rate $\geq 500\Omega\cdot m$) for 5 ± 0.5 minutes. Next, take it out and dry it for 10 ± 0.5 minutes and then use the cotton to cleanse the mark ten times (with the force of $5\pm 0.5N$). At the conclusion of the test, the mark must keep clear.

4. 温度循环[Thermo-cycle Test]

温度曲线设置为 $25^{\circ}C$ (15min) $\rightarrow 85^{\circ}C$ (30min) $\rightarrow 25^{\circ}C$ (15min) $\rightarrow -12^{\circ}C$ (20min) $\rightarrow 25^{\circ}C$ (15min)，晶体经过三个循环后恢复至室温（至少保持 1 小时）测试，要求 $|\Delta f| \leq 5ppm$ ， $|\Delta R| \leq 5\Omega$ 。

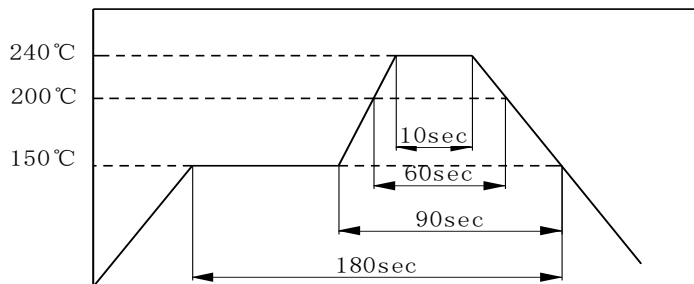
The temperature curve shall be subjected to the following degrees: $25^{\circ}C$ for 15 minutes, $85^{\circ}C$ for 30 minutes, $25^{\circ}C$ for 15 minutes, $-12^{\circ}C$ for 20 minutes, $25^{\circ}C$ for 15 minutes. After three cycles, the crystal is to be returned to the room temperature and be tested (no less than 1 hour). At the conclusion of the test, the crystal must meet $|\Delta f| \leq 5ppm$, $|\Delta R| \leq 5\Omega$.

5. 回流焊性能(Re-flow soldering condition)

在经下述曲线的回流焊两次后，要求 $|\Delta f| \leq 10ppm$ ， $|\Delta R| \leq 15\%$ 。

Frequency and resistance are satisfied with $|\Delta f| \leq 10ppm$ ， $|\Delta R| \leq 15\%$ after re-flow twice.

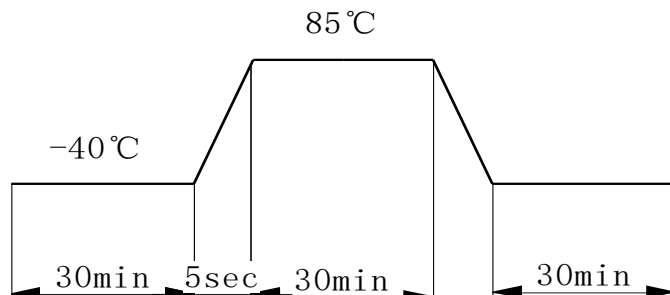
reflow profile



6. 热冲击(Thermal shock)

在经历下图 10 次后，晶体性能满足 $|\Delta f| \leq 10ppm$ ， $|\Delta R| \leq 15\Omega$ 。

After 10 cycles thermal shocks, the crystal must meet $|\Delta f| \leq 10ppm$ ， $|\Delta R| \leq 15\Omega$.



7. 环保要求 (Environmental protection)

在使用和加工过程中，不产生对臭氧层有害物质。

This product doesn't use the class IODS at any of production process, such as Assembly and component.