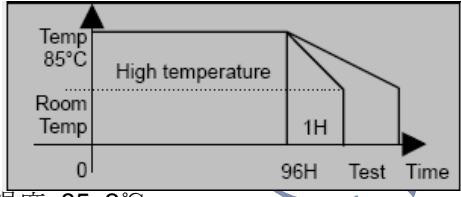
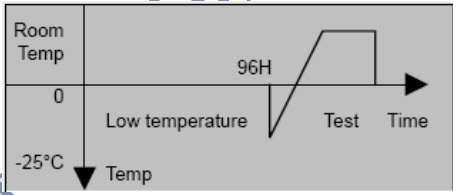
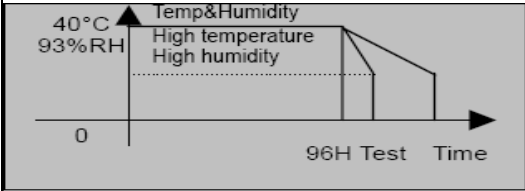
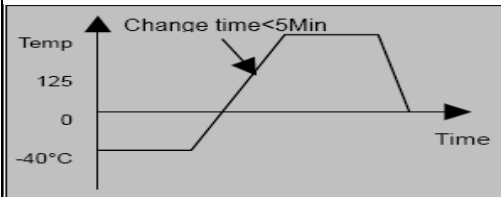


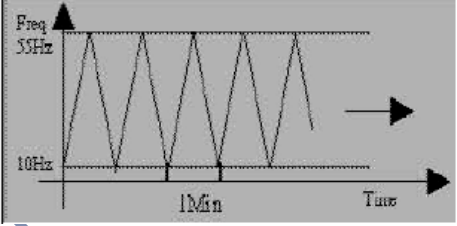
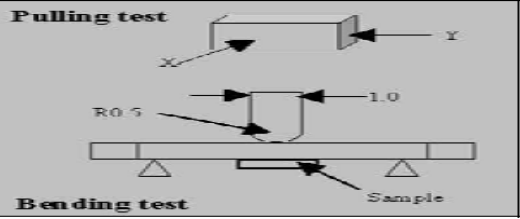
MINIATURE SMD CHIP CHOKE COILS

FOR SMT /SMD Products

Environmental tests (环境试验)	Item(项目)	Required Characteristics (要求)	Test Method / Condition (测试方法)
	High temperature Storage test Reference documents: MIL-STD-202G Method 108A 高温储存试验	1.No case deformation or change in appearance. 2. $\Delta L/L \leq 10\%$ 3. $\Delta Q/Q \leq 30\%$ 4. $\Delta DCR/DCR \leq 10\%$ 1.无明显的外观缺陷 2.感值变化不超过10% 3.质量因数变化不超过30% 4.直流电阻变化不超过10%	Temperature: $85 \pm 2^\circ\text{C}$ Time : 96 ± 2 hours Tested not less than 1 hour, nor more than 2 hours at room temperature.  温度: $85 \pm 2^\circ\text{C}$ 时间: 96 ± 2 小时 样品在室温下放置1小时, 不超过2小时必须测试。
	Low temperature Storage test Referenced documents: IEC 68-2-1A 6.1 6.2 低温储存试验	1.No case deformation or change in appearance. 2. $\Delta L/L \leq 10\%$ 3. $\Delta Q/Q \leq 30\%$ 4. $\Delta DCR/DCR \leq 10\%$ 1.无明显的外观缺陷 2.感值变化不超过10% 3.质量因数变化不超过30% 4.直流电阻变化不超过10%	Temperature: $-25 \pm 2^\circ\text{C}$ Time : 96 ± 2 hours Tested not less than 1 hour, nor more than 2 hours at room temperature.  温度: $-25 \pm 2^\circ\text{C}$ 时间: 96 ± 2 小时 样品在室温下放置1小时, 不超过2小时必须测试。
	Humidity Test Reference documents: MIL-STD-202G Method 103B 湿度测试	1.No case deformation or change in appearance. 2. $\Delta L/L \leq 10\%$ 3. $\Delta Q/Q \leq 30\%$ 4. $\Delta DCR/DCR \leq 10\%$ 1.无明显的外观缺陷 2.感值变化不超过10% 3.质量因数变化不超过30% 4.直流电阻变化不超过10%	1. Dry oven at a temperature of $40^\circ \pm 5^\circ\text{C}$ for 24 hours. 2. Measurements At the end of this period 3. Exposure: Temperature: $40 \pm 2^\circ\text{C}$, Humidity: $93 \pm 3\% \text{RH}$ Time : 96 ± 2 hours 4. Tested while the specimens are still in the chamber 5. Tested not less than 1 hour, nor more than 2 hours at room temperature.  1.样品必须先先在 $40^\circ \pm 5^\circ\text{C}$ 条件下干燥24小时 2.干燥后测试 3.暴露: 温度: $40 \pm 2^\circ\text{C}$, 湿度: $93 \pm 3\% \text{RH}$ 时间 : 96 ± 2 hours 4.暴露结束后, 在试验箱中进行测试。 5.样品在室温下放置1小时, 不超过2小时必须测试。
	Thermal shock test Reference documents: MIL-STD-202G Method 107G 热冲击测试	1.No case deformation or change in appearance. 2. $\Delta L/L \leq 10\%$ 3. $\Delta Q/Q \leq 30\%$ 4. $\Delta DCR/DCR \leq 10\%$ For T: weight $\leq 28\text{g}$: 15Min; $28\text{g} \leq \text{weight} \leq 136\text{g}$: 30Min 1.无明显的外观缺陷 2.感值变化小于10% 3.质量因数变化小于30% 4.直流电阻变化小于10%	First -40°C for T time, next $+125^\circ\text{C}$ T time as 1 cycle. Go through 20 cycles.  从 -40°C 作用 T 分钟, 然后温度冲击到 125°C 作用 T 分钟, 作为一个循环, 共作用 20 次。

MINIATURE SMD CHIP CHOKE COILS

FOR SMT /SMD Products

Environmental tests (环境试验)	Item(项目)	Required Characteristics (要求)	Test Method / Condition (测试方法)
	Solderability test Reference documents: MIL-STD-202G Method 208H IPC J-STD-002B 可焊性测试	Terminals area must have 95% min. Solder coverage 端子必须有95%以上着锡	1. Dip pads in flux then dip in solder pot at 245±5°C for 5seconds. 2. Solder: Sn(96)/Ag(4) 3. Flux: rosin flux 1. 端子侵入着焊剂,然后侵入245±5°C锡炉中5秒 2. 焊料: Sn(96)/Ag(4) 3. 助焊剂: 松香助焊剂
	Heat endurance of Reflow soldering Reference documents: IPC J-STD-020B 过再流焊测试	1. No case deformation or change in appearance. 2. $\Delta L/L \leq 10\%$ 3. $\Delta Q/Q \leq 30\%$ 4. $\Delta DCR/DCR \leq 10\%$ 1. 无明显的外观缺陷 2. 感值变化不超过10% 3. 质量因数变化不超过30% 4. 直流电阻变化不超过10%	1. Refer to the next page reflow curve Go through 3 t times 2. The peak temperature : 245±5°C 1.参照下页回流焊曲线过三次 2.峰值温度为: 245±5°C
	Vibration test Reference documents: MIL-STD-202G Method 201A 振动测试	1.No case deformation or change in appearance. 2. $\Delta L/L \leq 10\%$ 3. $\Delta Q/Q \leq 30\%$ 4. $\Delta DCR/DCR \leq 10\%$ 1.无明显的外观缺陷 2.感值变化不超过10% 3.质量因数变化不超过30% 4.直流电阻变化不超过10%	Apply frequency 10~55Hz. 0.75mm amplitude in each of perpendicular direction for 2 hours.(total 6 hours)  用10~55Hz 振动频率0.75mm振幅沿X,Y,Z方向各振动2小时.(共6小时)
	Drop test Reference documents: MIL-STD-202G Method 203C 落下试验	1.No case deformation or change in appearance. 2. $\Delta L/L \leq 10\%$ 3. $\Delta Q/Q \leq 30\%$ 4. $\Delta DCR/DCR \leq 10\%$ 1.无明显的外观缺陷 2.感值变化不超过10% 3.质量因数变化不超过30% 4.直流电阻变化不超过10%	Packaged & Drop down from 1m with 981m/s2(100G) attitude in 1 angle 1 ridges & 2 surfaces orientations. 将产品包装后从1米高度自然落下至试验板上1角1棱2面
	Terminal strength push test Reference documents: JIS C 5321:1997 端子强度试验	Pulling test: Define: A: sectional area of terminal $A \leq 8mm^2$ force $\geq 5N$ time:30sec $8mm^2 < A \leq 20mm^2$ force $\geq 10N$ time: 10sec $20mm^2 < A$ force $\geq 20N$ time: 10sec Bending test: Soldering the products on PCB, after the pulling test and bending test ,terminal should not pull off 定义: A: 焊接端子截面积 $A \leq 8mm^2$ 推力 ≥ 5 牛顿 时间: 30秒 $8mm^2 < A \leq 20mm^2$ 推力 ≥ 10 牛顿 时间: 1秒 $20mm^2 < A$ 推力 ≥ 5 牛顿 时间: 10秒 弯折测试: 将产品焊于PCB上,分别经过推力测试弯折测试后,端子不会发生松脱	Bend the testing PCB at middle point, the deflection shall be 2mm  将PCB对中弯折,到达挠度2mm

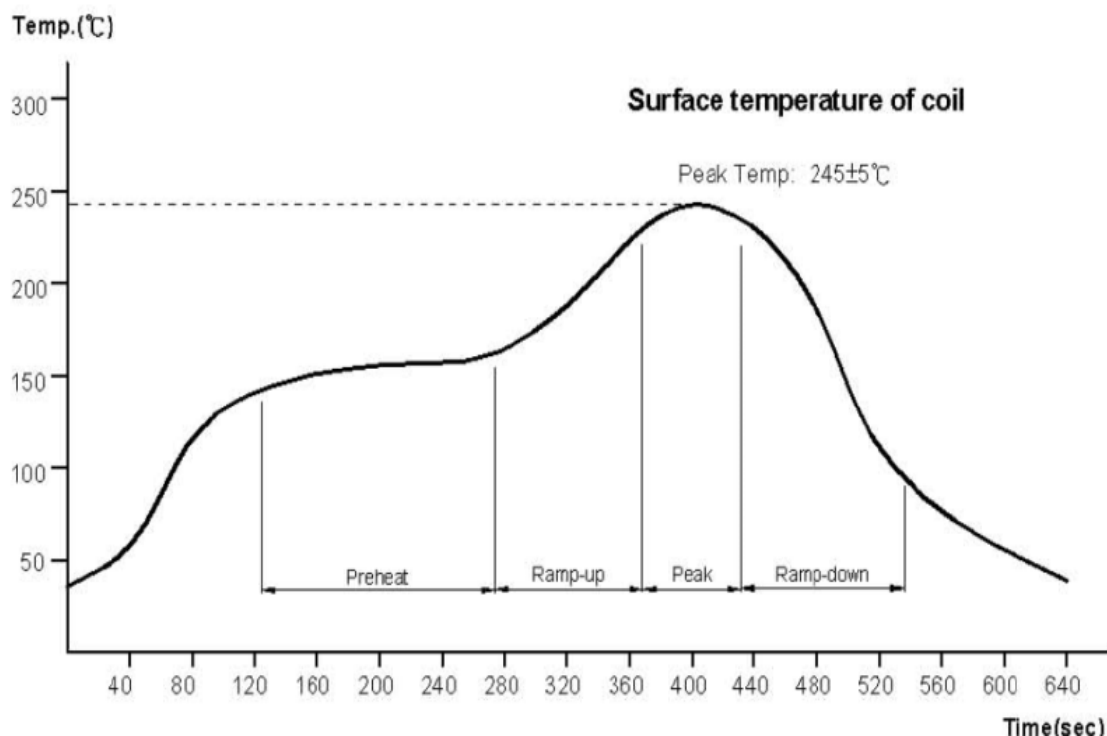
MINIATURE SMD CHIP CHOKE COILS

Resistance to solvent test Reference documents: IEC 68-2-45:1993 耐溶剂性试验	No case deformation or change in appearance or obliteration of marking 无外观破坏及标记破损	To dip parts into IPA solvent for 5 ± 0.5 Min, then drying them at room temp for 5Min, at last, to brushing making 10 times. 在 IPA 溶剂中浸泡 5 ± 0.5 分钟, 室温下干燥 5 分钟, 然后擦拭 10 次.
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FOR SMT /SMD Products

Item(项目)	Required Characteristics (要求)	Test Method / Condition (测试方法)
Electronic characteristic test Of major products 主要产品电特性测试	Refer to catalogue of specific products 参照具体产品目录页	efer to catalogue of specific products 参照具体产品目录页书
Overload test Reference documents: JIS C5311-6.13 过负荷试验	1. During the test no smoke, no peculiar, smell, no fire 2. The characteristic is normal after test 1. 试验过程中无冒烟, 异味, 着火等, 2. 试验后产品特性正常.	Apply twice as rated current for 5 minutes. 通两倍额定电流 5 分钟
voltage resistance test Reference documents: MIL-STD-202G Method 301 绝缘耐压测试	1. During the test no breakdown 2. The characteristic is normal after test 1. 试验过程中无击穿 2. 试验后产品特性正常	1. For parts with two coils 2. DC1000V, Current: 1mA, Time: 1Min. 1. 只针对 SMT 二绕组以上 2. 电压 DC1000V, 电流 1mA, 时间 1 分钟

Curve of Heat endurance of Reflow soldering test



A test is made under the conditions mentioned above. And it is left 1 hour in the normal temperature and humidity. After that, no mechanical and electrical defeat should be found out. The reflow condition is according to the machine used by .

MINIATURE SMD CHIP CHOKE COILS

Application Notice (应用须知)

1. Storage Conditions (储存条件)

To maintain the solderability of terminal electrodes:

- (1) Temperature and humidity conditions: Less than 40°C and 70% RH.
- (2) Recommended ceramic chip inductors should be used within 6 months from the time of delivery.
- (3) The packaging material should be kept where no chlorine or sulfur exists in the air.

为了维持端面电极的焊锡性:

- (1) 温度及湿度条件: 小于40°C and 70% RH。
- (2) 建议陶瓷芯片电感最好货到6个月内使用。
- (3) 包装材料应避免含氯及硫的环境。

2. Handling (搬运)



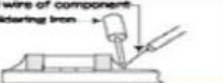





- (1) The use of tweezers or vacuum pick ups is strongly recommended for individual components.
- (2) Bulk handling should ensure that abrasion and mechanical shock are minimized.
- (3) Chip multilayer ceramic inductors should be handled with care to avoid damage or contamination from perspiration and skin oils.

- (1) 使用的镊子及真空组件拾取头建议于其它组件分开。
- (2) 散装搬运时应注意将摩擦及机械冲击减至最低。
- (3) 芯片陶瓷电感应小心搬运以避免破损和皮肤出油的污染。

3. Design of Land Pattern (Land Pattern的设计)

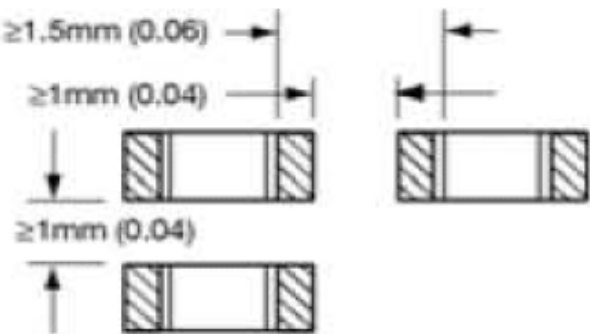
Component pads should be designed to achieve good solder fillets and minimize component movement during reflow soldering. Pad designs are given below for the most common sizes of multilayer ceramic inductors for both wave and reflow soldering. The basis of these designs is:

- (1) Pad width equal to component width. It is permissible to decrease this to as low as 85% of component width but it is not advisable to go below this.
- (2) Pad overlap 0.5mm beneath component.
- (3) Pad extension 0.5mm beyond components for reflow and 1.0mm for wave soldering.
- (4) Example of good and bad solder application.

Items	Mixed mounting of SMD and leaded components	Component placement close to the chassis	Hand-soldering of leaded components near mounted components	Horizontal component placement
Bad				
Good				

5) Components Spacing.

For wave soldering components, must be spaced sufficiently far apart to avoid bridging or shadowing(inability of solder to penetrate properly into small spaces).This is less important for reflow soldering but sufficient space must be allowed to enable rework should it be required.



电极的焊接衬垫的设计应能达到良好的焊料涂布及减少组件在回焊时的移动。以下是对一般最

MINIATURE SMD CHIP CHOKE COILS

常見的积层陶瓷电感尺寸在波焊或回焊时的焊接衬垫设计。这些设计的基本如下：

- (1) 焊接衬垫的宽度与组件的宽度相同。减少至组件宽度的85%是允许的，但减的更多并不明智。
- (2) 焊接衬垫与组件底部交迭0.5mm。
- (3) 对回焊而言，焊接衬垫延伸出组件0.5mm；波焊则多出1.0mm。
- (4) 良好与不良的锡料运用的例子
- (5) 组件间隔：

对于波焊的组件，必须有足够的间隔以避免bridging及shadowing (焊料无法完全穿透狭小的空间)。

间隔对回焊较不那么重要，但仍要有足够的间隔以防有重工之需。

4. Preheat (预热)

It is important to avoid the possibility of thermal shock during soldering and carefully controlled preheat is therefore required. The rate of preheat should not exceed $4^{\circ}\text{C} / \text{second}$ and a target figure $2^{\circ}\text{C} / \text{second}$ is recommended. Although an 80°C to 120°C temperature differential is preferred, recent developments allow a temperature differential between the component surface and the soldering temperature of 150°C (Maximum) for component of 1210 size and below with a maximum thickness of 1.25mm. The user is cautioned that the risk of thermal shock increases as chip size or temperature differential increases.

在焊接中避免热冲击的可能性是很重要的，因此预热是必须的。预热的温度上升不应超过 $4^{\circ}\text{C}/\text{秒}$ ，建议值是 $2^{\circ}\text{C}/\text{秒}$ 。虽然一个 80°C 到 120°C 的温度差是常用的，但近来的研究显示，对一个1210尺寸、厚度小于1.25mm的组件，组件的表面温度和焊接温度相差最大至 150°C 是可行的。使用者需注意热冲击会随着组件尺寸或温度差增加而增加。

5. Solderability (焊锡性)

Terminations to be well soldered after immersion in a 60/40 tin/lead solder bath at $235 \pm 5^{\circ}\text{C}$ for 2 ± 1 seconds. 端面浸入 $235 \pm 5^{\circ}\text{C}$ 60/40锡/铅的锡爐中 2 ± 1 秒即能获得良好的焊接。

6. Selection of Flux (助焊剂的选择)

Since flux may have a significant effect on the performance of component, it is necessary to verify the following conditions prior to use;

- (1) Flux used should be with less than or equal to 0.1 wt% (equivalent to chlorine) of halogenated content. Flux having a strong acidity content should not be applied.
- (2) When soldering component on the board, the amount of flux applied should be controlled at the optimum level.
- (3) When using water-soluble flux, special care should be taken to properly clean the boards.

由于助焊剂对组件的表现影响很大，所以使用前应先确认以下的条件：

- (1) 助焊剂的用量应小于或等于卤化物（相等于氯含量）重含量的0.1%。助焊剂内含强酸应避免使用。
- (2) 在焊接组件至基板时，助焊剂的使用量应控制在最佳水平。
- (3) 在使用水溶性的助焊剂时，应特别注意基板的清洁。

7. Soldering (焊接)

Mildly activated rosin fluxes are preferred. The minimum amount of solder to give a good joint should be used. Excessive solder can lead to damage from the stresses caused by the difference in coefficients of expansion between solder, chip and substrate. 3L terminations are suitable for all waves and reflow soldering systems. If hand soldering cannot be avoided, the preferred technique is the utilization of hot air soldering tools.

活化温和的松香助焊剂是受欢迎的。在能获的良好结合之下，尽可能使用最少量的助焊剂。

过量的焊料会因焊料、芯片及基板间膨胀系数的不同而导致应力造成损坏。三禮的端面适合波焊及回焊系统。如果手工焊接是无可避免，最好是使用利用热风的焊接工具。

8. Soldering (焊接)

(1) Solder Reflow (回焊):

Recommended temperature profiles for reflow soldering are shown in Figures 1.

建议的回焊温度曲线如图表一。

(2) Solder Wave (波焊):

Wave soldering is perhaps the most rigorous of surface mount soldering processes due to the steep rise in temperature seen by the circuit when immersed in the molten solder wave, typically at 240°C. Wave soldering of ceramic chip inductors larger than 1812 size is discouraged due to the risk of thermal damage to the inductor. Recommended temperature profile for wave soldering is shown in Figure 2.

波焊或许是最严苛的表面黏着焊接制程，因为当浸入熔融的焊波时会有陡峭的温升，一般是240°C。

大于1812尺寸的陶瓷积层电感的波焊，因为会有热冲击造成电感损坏的风险，

所以并不鼓励，建议的波焊温度曲线如图表二。

(3) Soldering Iron (Figure 3.) 烙铁 (图表三)

Ceramic capacitor attachment with a soldering iron is discouraged due to the inherent process control limitations. In the event that a soldering iron must be employed the following precautions are recommended.

陶瓷电感以烙铁焊接并不鼓励，因其受制于固有的制程控制限制。如果一定要使用烙铁时，建议应先注意以下几点。

- Preheat circuit and capacitors to 150°C.
- 预热线路及电阻至150°C.
- Never contact the ceramic with the iron tip.
- 烙铁的尖端绝对不可碰触陶瓷.
- Use a 20 watt soldering iron with tip diameter of 1.0mm.
- 使用功率20瓦、烙铁尖端直径为1.0mm的烙铁.
- 280°C tip temperature (max).
- 烙铁尖端最高温度为280°C.
- 1.0 mm tip diameter (max).
- 烙铁尖端直径最大为1.0mm.
- Limit soldering time to 3 sec.
- 焊接时间不超过三秒.