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Kinglight®晶台光电

贴片式LED全彩应用注意事项

SMD LED Cautions for full-color application

Kinglight®

专注于LED半导体显示封装研发与制造

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Part 1 »

包装注意事项
Kinglight package announcements

1、为避免产品在运输及储存中吸湿,SMD LED的包装是用防潮的铝包装袋包装，并且包装袋里面含有干燥剂，干燥剂主要起到控制包装袋里的湿度。

To avoid moisture absorption in transportation and storage, SMD LED packaging of SMD LED is made of moisture-proof aluminum bags, which contains desiccant. The desiccant mainly controls the humidity in packing bags.

2、开封后检查湿度卡（10%/20%/30%/40%/50%/60%），如果打开包装后发现包装内部的湿度卡指示已达30%，表示产品已受潮，则必须按要求进行烘烤。请注意温度卡属于十分敏感的材料，它仅是检查项目之一；因我司产品出货前均满足所有烘烤除湿要求，故应优先以包装密封性确认是否受潮。

Check the color of humidity card (10%/20%/30%/40%/50%/60%) after opening. If you open the package and find that the humidity card inside the package indicates that it has reached 30%,it means that the product has been damp,it must be baked as required.Please note that humidity card is a very sensitive material, it is only one of the inspection items. Since all products of our company meet all the requirements of baking and dehumidification before shipment, it is preferred to confirm the moisture resistance of the package.

3、标签说明：

label description

颜色:	IV(mcd)	HUF(nm)	VF(v)
R(10mA)	40-65	600-625	1.7-2.4
G(5mA)	110-200	510-535	2.4-3.4
B(5mA)	18-45	455-480	2.4-3.4

3.1: 使用我公司SMD 产品生产时请仔细核对我司产品型号是否一致, 避免因混料造成色差问题; 建议养成保存或记录标签的习惯, 便于查找与追溯;

When using our SMD products, please check carefully whether our products models are consistent to avoid color difference problems caused by mixtures. It is suggested to form the habit of preserving or recording labels for easy searching and tracing.

3.2: 不同型号产品不能混用;

Different models product cannot be mixed.

3.3: 不同装带拌料号不建议使用于同一块显示屏 (型号相同和参数相同也不能用在同一显屏)。

It is not recommended to use the same display screen with different mounting strip mixing numbers (the same model and parameters can not be used in the same screen).

Part 2 » 产品贴片作业注意事项
Products SMD Working attentions

1、未开封的产品需储存于:温度:30℃以内/湿度:60%RH以下的环境,且3个月内用完。

Unopened products need to be stored in the environment of temperature below 30℃/humidity below 60% RH and used up within 3 months.

2、在开包装之前, 请先检查包装袋有无漏气, 如果有漏气现象, 请退回我司重新烘烤除湿包装后再使用。

Before opening the package, please check the bag for air leaks. If there is any air leakage, please return it to our company and package again after dehumidify by baking before your second using.

3、包装袋开启后,产品必须:

After opening the package, the product must:

3.1:在12HR内焊接完毕;

Be soldered in 12HR

3.2:要在规定环境条件中使用: 温度:30℃以内 湿度:60%RH以下,同时避免车间直接与外界接触,造成局部环境无法管控,超出规定;

Be used in the specified environmental conditions: below 30 °C temperature and 60% RH or less humidity, while avoiding direct contact between the outside surroundings and the workshop, resulting in local environment uncontrollable, exceeding the regulations;

3.3:材料拆装后使用时间超过12HR未用完,需重新烘烤后才可使用,烘烤条件参照下述表中烘烤条件;

Unpacking material is not used up for more than 12 HR. It needs to be re-baked before its using. The baking conditions refer to the baking conditions in the table below.

3.4:未使用完的需存储需于温度:25℃以内 湿度:30%RH以下的环境,且必须在24HR内用完;

Unused material should stored up in the environment of temperature: humidity below 25℃: 30% RH, and must be used up within 24HR.

产品贴片作业注意事项
Products SMD Working attentions

4、烘烤条件:

Baking Conditions

产品型号 Product Model	开封前受潮 Damp before Opening	开封前未受潮 Not damp before opening	
		<60天 Below 60 days	>60天 Above 60 days
Chip系列:0808/1010/4093	返厂处理 Return to factory	60℃/12HR	60℃/24HR
Top户外系列:3535/2727/2525/1921/1820/1515	返厂处理 Return to factory	85℃/6HR	85℃/12HR
Top户内系列:1415/2020/1212/1010	返厂处理 Return to factory	60℃/12HR	60℃/24HR
备注 Remarks	1.开封前受潮:①.包装漏气.②.打开包装后发现包装内部湿度卡指示已达30%. Damp before opening: ①Packing leaks, ②After opening the package, it was found inside indication of humidity card has reached 30% or more. 2.针对”60天< X <90天”以包装标签上包装日期为基准. For "60 days < X <90 days" based on the packaging date on the packaging label.		

注:烘烤范围务必在±5℃误差范围内

Note: The baking range must be within ±5 °C error range

5、建议生产过程中不备料，余料、尾料或暴露空气中时间过长的产品，需重新抽真空保存，再次使用前务必进行烘烤，烘烤条件见上述表中二、4烘烤条件。

It is suggested that do not prepare materials during production process. The remaining materials, tailings or products exposed to the air for a long time need to be vacuumed and stored. Be sure to bake before re-use. The baking conditions are shown in Table 2 and 4 above.

6、产品的烘烤次数不宜超过两次，高温对料盘与载带等辅料有影响，贴片时有可能造成抛料、断带、拉丝等现象。

Products should not be baked exceed two times. Loading tray, carrier tape and other accessories will be impacted by the high temperature causing throwing, breaking, drawing and other phenomena when SMT.

7、静电放电

Electro-Static discharge

7.1 静电放电（ESD），可能会损害SMD LED。

SMD LED may be damaged by ESD.

7.2 整个工序所有与LED直接接触的员工与设备都要做好防静电措施：员工必须佩戴静电手腕，穿静电鞋或抗静电手套后，才可以进行SMD LED 生产。

All employees and equipment that are in direct contact with the LEDs should be equipped with anti-static measures: employees must wear an electrostatic wristband and wear static shoes or antistatic gloves before they can produce SMD LEDs.

7.3 所有的机械设备必须接地。
1）车间铺设防静电地板并做好接地，使用防静电工作台垫；
2）各机台设备需接地良好，交流阻抗应小于1欧姆；
3）定期检查机台参数、电源输出是否处于合格状态，检查测试仪器、驱动电源是否存在漏电；

All mechanical equipment must be grounded.
1) Lay the anti-static floor in the workshop and make grounding, use anti-static workbench pad;
2) The equipment of each machine should be well grounded, the AC impedance should be less than 1 ohm;
3) Periodically check whether the machine parameters and power output are in a qualified state, check whether there is leakage of testing instruments and driving power supply;

8、为降低色差隐患，保证LED产品出光一致性，建议上机贴片时采用混贴方式，如不同盘不同箱的混贴，贴片机台设置混贴程序等；对档次不同的产品不能同时混贴（包括库存尾数等），建议同一块显示屏，使用同一贴片机贴片，过同一回流焊炉.

To reduce the hidden danger of chromatic aberration and ensure the consistency of light output of LED products, it is suggested to use mixed mounting method when SMT, such as mixing different discs with different boxes, setting up mixing mounting procedures on the machine, etc. It is recommended that products of different grades should not be mixed at the same time (including the tail of inventory), and the same display screen should be used with the same mounting machine to paste through the same reflow soldering furnace.

9、如果在SMT过程中出现抛料，建议优先排查载带、盖带等是否存在形变、尺寸异常、拉丝、易断，灯珠是否存在侧放、反放；若存在异常则及时反馈，反则建议排查贴片机的飞达、速率、吸嘴高度、精度等并进行调整。

If throwing material occurs in SMT process, it is suggested to check whether there are deformation, abnormal size, wire drawing, easy breaking of carrier belt and cover belt, and whether there are side-laying and back-laying of LED dip. If there are abnormalities, timely feedback should be given. On the contrary, it is suggested to check and adjust the feeder, suction, nozzle height and precision of the placement machine.

9.1:吸嘴大小:选取合适的吸嘴是提高产品品质的关键所在，客户在SMT时直径尽量选择比LED（胶体）发光面大的吸嘴，防止吸嘴下压高度设置的不当直接压到LED胶体表面造成胶体变形而致使LED内部发生断线从而引致死灯。

Nozzle size: Choosing the right nozzle is the key to improve product quality. Customers try to choose a suction nozzle larger than the luminous surface of LED (colloid) when SMT, so as to prevent the inappropriate setting of the suction nozzle pressure height from directly pressing on the colloid surface of the LED causing colloid deformation, which makes a broken wire inside the LED resulting in dead light.

9.2:吸嘴高度设置:在正面发光二极管SMT时吸嘴下压高度是影响LED品质的直接因素，因吸嘴下压太深会压迫LED胶体导致内部金线变形或断裂，造成LED不亮或闪烁及品质问题；
LED的焊盘刚好接触最好。

nozzle height setting: When light emitting diodes surface mounted the nozzle height is a direct factor affecting the quality of the LED. Because the nozzle is pressed too deep, it will compress the LED colloid and cause the internal gold wire to deform or break, causing the LED to not light or flicker or quality issues. The best situation is LED pads just touching.

10、对于贴片过程出现的上锡不良，可优先确认LED管脚与PCB板焊盘是否存在异物、形变、氧化等异常，其次确认锡膏与炉温是否异常。适当提高炉温，上锡不良能够得到改善。

For the defect on soldering process, it is preferable to confirm whether there are any abnormalities such as foreign matter, deformation, oxidation on the LED pin and PCB pads, and then confirm whether the solder paste and the furnace temperature are abnormal. Proper raising of temper temperature can reduce defective tin soldering.

11、本产品回流焊接最多只可回流焊两次,且在首次回焊后须冷却至室温之后方可进行第二次回流焊，在回流焊接过程中，请不要对LED施加任何压力；等产品完成焊接，温度下降到室温以后，再进行其他处理。

This product can be reflow soldering twice at most, and can be reflow soldered only after the first is cooled to room temperature. During reflow soldering, do not put any pressure on the LED. After the product finishing soldering and the temperature lowering room temperature, do other treatment.

12、因灯珠支架材料PPA有高温黄化的特性，故回流焊接时所有条件需一致（同一订单只使用同一回流炉焊接，炉温变化曲线、链速等均需一致），避免不同工艺造成整体外观差异。

Because LED dip holder PPA is yellowing at high temperature, all the conditions of reflow soldering should be same (the same order products must be made in no differences surrounding which means reflux furnace soldering, furnace temperature change curve, chain speed are all same) to avoid the overall appearance difference.

13、关于回流焊炉温曲线，建议如下几点:

Regarding the temperature curve of the reflow oven, the following points are recommended.

13.1有铅焊接温度不超过235°C，无铅焊接温度不超过250°C；

leaded soldering temperature does not exceed 235°C , lead-free soldering temperature does not exceed 250°C ；

13.2预热区炉温上升不能过快，温度过高对LED 产品有非常严重的热损伤，请确保回流区实测最高温度不能超过250度，且不能超过10 秒钟；

The furnace temperature in the preheating zone should not rise too fast. Excessive temperature will cause serious thermal damage to the LED products. Please ensure the max temperature in the reflux zone can not exceed 250°C and the time can not exceed 10sec;

13.3如果回流炉的温度上下波动过大，则容易造成灯珠色差不一致现象，影响灯珠显示效果。比如：过炉时同一模组不同位置最高温度之间差值超过5℃，可能造成模组局部偏暗色差现象，因此需保证夹具边缘镂空，上下通风；回流炉不同时间段最高温度差值超过5℃，回流时间时差超过7秒，可能造成模组之间色差的现象；

If the temperature of the reflow furnace fluctuates too much, it will easily cause color difference of LED dip, which will affect the display effect. For example, the difference between the highest temperatures at different positions of the same module is more than 5°C, which may cause the module partially dark chromatic aberration. Therefore, hollowing out the edge of the clamp and ventilation should be guaranteed. The max temperature difference of the reflow furnace at different time periods is more than 5°C, The time difference of reflux time is more than 7 seconds. which may cause color difference phenomenon of modules;

13.4具体各温区的温度和时间、最高斜率等要求，还需客户参考锡膏厂家提供的数据；

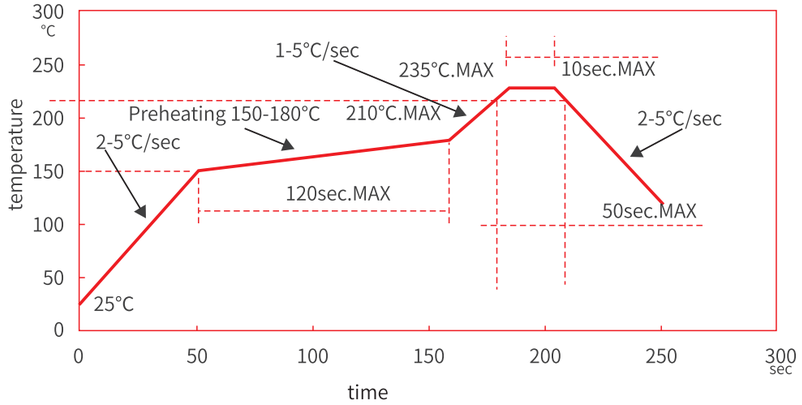
About specific temperature and time, maximum slope and other requirements of each temperature zone, customers need to refer to the data provided by solder paste manufacturers;

13.5附图推荐温度焊接曲线:

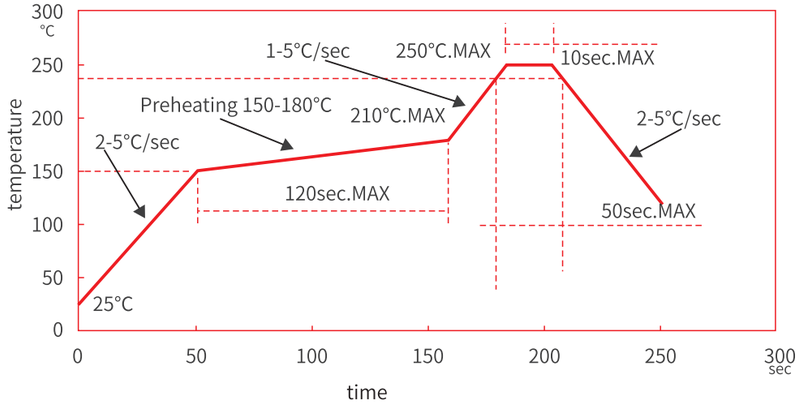
Recommended temperature soldering curve as attached drawing:

<table>
<tr><td colspan="3">回流焊焊接
Reflow soldering</td><td colspan="2">手工焊接
Manual soldering</td></tr>
<tr><td>项目
project</td><td>有铅/Leaded</td><td>无铅/Lead-free</td><td rowspan="3">焊接温度
Soldering temperature</td><td rowspan="3">300°C.MAX</td></tr>
<tr><td>预热温度
Preheating temperature</td><td>150-180°C</td><td>150-180°C</td></tr>
<tr><td>预热时间
Preheating time</td><td>120sec.MAX</td><td>120sec.MAX</td></tr>
<tr><td>峰值温度
Peak temperature</td><td>235°C.MAX</td><td>250°C.MAX</td><td rowspan="2">焊接时间
Soldering time</td><td rowspan="2">3sec.MAX</td></tr>
<tr><td>焊接时间
Soldering time</td><td>10sec.MAX</td><td>10sec.MAX</td></tr>
<tr><td>具体条件
Specifics</td><td colspan="4">参照下图
The flowing figure for reference</td></tr>
</table>

有铅回焊
Leaded Reflow Soldering



无铅回焊
Lead-free Reflow Soldering



注:如非必要,请尽量使用有铅焊接。
Note: If not necessary, please use leaded soldering as much as possible

14、关于手动焊接产品使用手法。

Manual Soldering Products using.

14.1请勿徒手使用本产品，有可能会弄污表面，影响其光学特性，也可能造成变型或引到内部断线；（见错误示例一）

Do not use this product by hand, it may stain the surface, which affects its optical properties or may cause deformation and internal disconnection. (Wrong example 1 for reference).

14.2使用镊子时请勿对产品造成过大压力。有可能会令树脂刮花，剥落，或使产品变形，内部断线等，可能引致死灯；（见错误示例二）

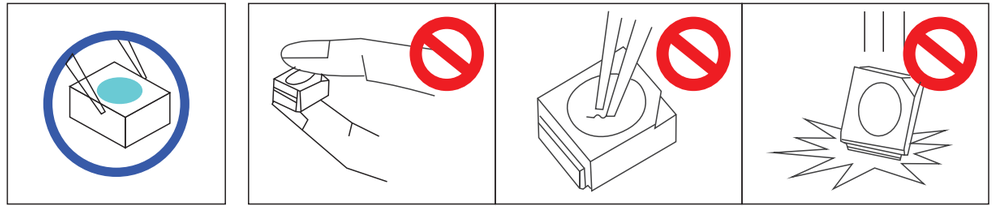
Do not put too much pressure on the product when using tweezers. It may cause resin scratching, peeling off, deformation of the product or internal wire breakage which may cause dead light. (Wrong example 2 for reference).

14.3跌落可能会使LED变形，请多加注意；（见错误示例三）

Dropping may cause LED deformation so please pay attention to it. (Wrong example 3 for reference).

14.4手动维修焊接时，为避免局部灯珠亮度光衰过大，禁止风机直吹，应从失效灯珠侧面保持合适角度吹热风，取失效灯珠时不可用力过猛，防止维修工具撞坏其它灯珠。

When manually soldering repairing, in order to avoid excessive brightness of the part LED dip. it is forbidden to direct blowing of fan. The hot air should be blown from the side of the failed dip. When the failed lamp bead is taken, it is not necessary to use strong force to prevent the repair tools from crashing other lamp beads. the force is too strong to prevent the repair tools from crashing other LED dip.



正确手法
Correct operating

错误示例一
Wrong operating

错误示例二
Wrong operating

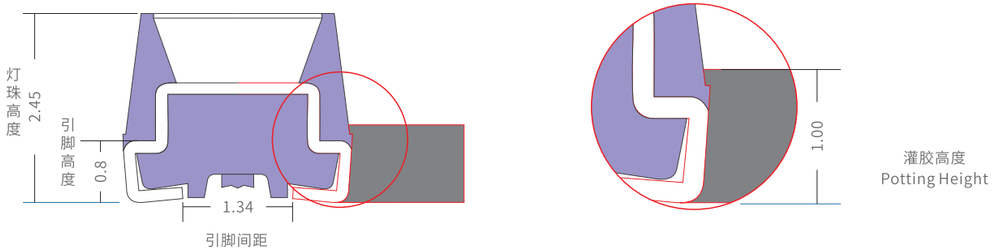
错误示例三
Wrong operating

15、在焊接后推荐使用酒精（无水乙醇）进行清洗，在温度不高于30°C的条件下持续3分钟，不高于50°C的条件下持续30秒，使用其它类似有机溶剂清洗前，请先确认使用的溶剂不会对LED的封装和环氧树脂部分造成损伤、腐蚀等现象。

Alcohol is recommended for cleaning after welding, lasting for 3 minutes at a temperature not higher than 30 °C and for 30 seconds at a temperature not higher than 50 °C.Before cleaning with other similar organic solvents, please make sure that the solvents used will not cause damage or corrosion to the packaging of LED and epoxy resin parts.

16、模组灌胶保护：为了更有效地对产品进行防潮，户外产品必须灌胶保护（SMT后48小时内完成灌胶工序，避免灌胶前吸入过多潮气灌胶后不易排出），灌胶高度务必盖过管脚，对于我司户外产品，灌胶高度参考要求详见我司各产品规格书。（如下示意图）。

Module potting protection: in order to more effectively protect the product from moisture, outdoor products must be filled with glue protection (the glue-filling process should be completed within 48 hours after SMT avoiding the inhalation of excessive moisture before filling, it is hard to discharge) The height of the glue must be over the pins. For our outdoor products' potting height, please refer to the product specifications. (As shown below).



灌胶高度示意图
Drawing of glue filling height

Part 3 » 应用与老化注意事项
Application and aging considerations

1、LED产品属于潮湿敏感性元件（无论户内还是户外产品），灯珠所用支架PPA（或BT料）及封装环氧树脂（高分子材料）均有吸潮特性；无论是贴片前，还是在贴片组屏后，均会吸收湿气。

LED products are moisture sensitive components (whether indoor or outdoor). LED dip PPA (or BT) and packaging epoxy resin (polymer material) have moisture absorption characteristics. No matter before or after SMT, it will absorb moisture.

2、贴片前防潮是为了防止过回流炉时高温使水汽膨胀，应力造成环氧剥离，导致LED寿命下降或失效；贴片后防潮是为了防止芯片在潮湿环境中通电发生电化学反应而失效。

Moisture-proof before patch is to prevent water vapor which results in the stress to make epoxy peeled off from expanding at high temperature. epoxy peeling off will lead to the decrease or failure of LED life. Moisture-proof after patch is to prevent the chip from failure due to electrochemical reaction in humid environment.

3、老化方式常见三种：
(a) 户内产品：前期模组老化1-2天，箱体或整屏老化3-5天；
(b) 户外产品前期模组老化1-2天，灌胶后箱体老化2天，整屏老化3-5天；具体老化方式也可以由客户自行选择或制定，禁止长时间满灰度的白平衡点亮，以免加剧灯珠光衰。

There are three common types of aging:
(a) Indoor products: aging for 1-2 days in the previous module, 3-5 days for the box or the whole screen; (b) outdoor products: aging for 1-2 days in the early module stage, 2 days for the box aging after glue filling, and the whole screen is aged for 3-5 days. The specific aging method can also be selected or formulated by the customer. It is forbidden to light the white balance of the full gray scale for a long time to avoid aggravating light decay of LED dip.

4、老化过程中若出现其他异常（如不亮、串亮），优先自行判断灯珠原因（可通过裸灯测试、不良灯更换位置等方法判断），其次排查虚焊的情况；同时使用我司建议的加严老化方案进行老化观察。若老化过程中出现不稳定，需继续加严老化并及时反馈我司处理。

If an abnormality occurs during the aging process (such as no light or string light), it is preferred to ensure LED dip broken or not (LED dip testing or NG LED DIP position exchanging) and then check soldering situation. At the same time, the aging observation is carried out by using the strict aging scheme proposed by our company. If there is instability during the aging process, it is necessary to continue to strengthen the aging and promptly feedback to our company.

5、淋雨老化后务必及时挂屏老化，禁止储存在仓库不做处理。

After rain aging, it is necessary to hang screen aging in time. It is forbidden to store in the warehouse without treatment.

6、温度保护：LED在高温条件下衰减会加速，自身应力也会增大；若长期处于高温状态，容易出现失效；建议屏体使用环境温度为（-30-50）℃。在屏体使用过程中，灯面温度不超过55°C，灯脚温度不超过75°C。

Temperature protection: LED decay will accelerate at high temperature, and its stress will increase. If it is in high temperature for a long time, it is easy to fail. It is suggested that the ambient temperature of the screen should be (-30-50) °C . During the use of the screen, LED surface temperature does not exceed 55°C, and LED pins temperature does not exceed 75°C.

7、反压保护：通常LED的反向漏电流很小，不会影响正常使用，如果LED遭受较大的反向电压冲击时，将会加速电化学腐蚀，LED会被损伤，反向漏电流会迅速增大，引起显示屏串亮；在设计时要注意控制反向电压，建议加在LED上的反向电压值不超过1.5V，尽量减少电路中高频反压冲击LED芯片。

Reverse voltage protection: Generally the reverse leakage current of LED is very small, which will not affect the normal use. A large reverse voltage impulse will accelerate the electrochemical corrosion and damage LED which causes reverse leakage current increasing rapidly and display screen aligned. In the design, please pay attention to control the reverse voltage, and it is suggested that the reverse voltage added to the LED should not exceed 1.5V to minimize the high-frequency back pressure impact LED chip in the circuit.

应用与老化注意事项
Application and aging considerations

8、特殊环境使用要求：户内与户外产品应合理区别使用，避免应用于环境湿度大、酸碱性大的环境中，避免产品遭受到不可逆的破坏，导致寿命减短。

Special environmental using requirements: indoor and outdoor products should be reasonably used differently to avoid being used in environments with high humidity, acidity and alkalinity which avoids irreversible damage to products, resulting in shortened service life.

9、若客户模组或箱体存放时间较长未及时装屏，最优方案：屏体正常老化前将模组放入烘箱中烘烤除湿（70°C*24小时）从而彻底除湿。

If the customer's module or box has not been installed in time for a long time storage, the best solution is to put the module into the oven to bake and dehumidify (70°C * 24 hours) before the normal aging of the screen, so as to thoroughly dehumidify it.

10、终端客户应用要求：终端客户对显示屏要经常点亮使用（屏体点亮使用期间，灯珠内部芯片发热，潮湿气体无法进入），若显示屏长时间未使用（一般为5-10天，具体需根据使用环境气侯等因素判定），使用前应先进行除湿处理；如编辑简单程序，逐渐增加亮度的方法，通过缓慢升温去除景积潮气。例如采用以下方式:

End-user application requirements: terminal customers should often turn on LED screen (During the use of screen, the chip is heated so steam can not enter). If screen is not used for a long time (usually 5-10 days and specific time need to refer to the using environment and other factors) dehumidification treatment should be carried out before using. For example, gradually increasing brightness by editing simple procedure which can remove cumulative tide by slowly warming up. Specific operations is as follows.

10.1 采用通电黑屏状态→2-4（H），采用10级亮度点亮状态4-6（H），采用20级亮度点亮状态68（H））采用30级亮度点亮状态8-10（H），采用40级亮度点亮状态→1012（H），采用50级亮度点亮状态→12-14（H）采用70级亮度点亮状态14-16（H），采用90级亮度点亮状态→16-18（H），采用120级亮度点亮状态→18-20（H））采用150级亮度点亮状态，→20-22（H））采用200级亮度点亮状态（根据实际使用环境、气候及关屏时间适当缩小或延长时间）。

The power-on black screen state → 2-4 (H), using 10 levels of brightness to illuminate state 4-6 (H), using 20-level brightness lighting state 6-8 (H), using 30-level brightness lighting state 8-10 (H), using 40-level brightness lighting state → 10-12 (H), using 50-level brightness lighting state → 12-14 (H), using 70-level brightness lighting state 14-16 (H), using 90-level brightness lighting State → 16-18 (H), using 120 levels of brightness lighting state → 18-20 (H), using 150 levels of brightness lighting state→20-22 (H), using 200 levels of brightness lighting state (Please reduce or extend the time properly according to the actual using environment, climate and closing time).

10.2 由于产品受潮的程度不同，此方法并不一定能彻底除湿，因此，建议客户尽量每天都点亮屏体使用除湿，同时，需要客户通过软件记录显示屏的运行状态。

Due to the degree of moisture in the product, this method may not completely dehumidify. Therefore, it is recommended that customers turn on screen as much as possible every day for dehumidify. At the same time, customers need to record the running status of the screen through software.

*注意事项

1.本文档中包含的信息反映了具有代表性的使用场景，仅供技术参考。
2.本文档中提到的产品型号和规格如有更改或改进，恕不另行通知。在生产使用之前，客户应参考产品规格书的最新数据表。
3.在使用本文档中引用的产品时，请确保产品在数据手册中规定的环境和电气限制范围内运行。如果客户使用超过指定的限制，晶台将不会对任何后续问题负责。
4.本文档中的信息适用于LED应用中的典型用法。如有任何特殊用途，请向晶台咨询，以获得进一步的帮助。
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