



全彩 SMD LED 防潮使用指南

RGB SMD LED Moisture-proof User Instructions

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A. 产品上线贴片前注意事项

Precautions before SMT Processing

1、保存环境温度要求低于 30℃，湿度低于 60%RH。

The LEDs shall be stored in an environment with temperature below 30℃ and humidity below 60%RH.

2、所有产品储存有效期为 2 年。

All LEDs have a storage life of 2 years.

3、所有产品上线前均按要求进行烘烤除湿，烘烤条件如下：

All LEDs shall be subjected to baking before SMT, with the baking conditions shown below.

表 1: 烘烤条件

Table 1: Baking Conditions

产品系列 (常规产品) Product series (regular products)	2 个月以内 (未受潮) Within 2 months (Undamped)	2-6 个月 (未受潮) 2-6 months (Undamped)	确认已受潮或客户库存超过 6 个月 Confirmed to have been damped /Storage time over 6 months
小间距 Fine Pixel Pitch (FC/NH -0808/1010 等)	(60±5) °C*12h	(60±5) °C*24h	(60±5) °C*24h
Mini 产品 Mini Series (IMD-F15/F12/M09T/M07/M05A/M0x 等)	(60±5) °C*12h	(60±5) °C*24h	(60±5) °C*24h
户内产品 Indoor Series (FM/NH-1212/1515/2020 等)	(70±5) °C*12h	(70±5) °C*24h	(70±5) °C*48h
户外产品 Outdoor Series (FM/NH-1415/1921/2727/3535 等)	(70±5) °C*12h	(70±5) °C*24h	(70±5) °C*48h
ReeStar 产品 ReeStar Series (RS-1212/1515/1415/1921/2727/3535 等)	(70±5) °C*12h	(70±5) °C*24h	(70±5) °C*48h

注：烘烤温度范围务必在±5℃误差范围内

The tolerance of baking temperatures shall be controlled within a range of ±5℃.

4、产品开封前请检查包装袋是否破损或漏气，如果发现包装袋破损或漏气，均判为产品受潮，必须按照上述表格中对应的烘烤条件进行烘烤后才可使用。

Before unpacking the packaging bags, please check if they are broken and blown. If so, the products shall be judged as damped and shall not be used unless they are baked according to the conditions given in Table 1.

5、开封后检查湿度卡（15% 10% 5%）的颜色，如果 10%及以上（10%、15%）已全部变色，表示产品已



受潮，则必须按要求进行烘烤。请注意湿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 Indicator Card (15%, 10%, and 5%) after unpacking the bags, and discoloration of 10% and more (10% and 15%) means that the products are damped and must be baked as required. Please note that the Humidity Indicator Card is quite sensitive, and serves only as one of the inspection items. The air tightness of packaging bags shall be preferred for confirming whether the products are damped since all products of our company meet the baking requirements before delivery.

6、检查包装袋与料盘上标签信息是否完全一致，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。

Label information on each reel shall comply with those indicated on the foil vacuum bag so as to avoid color difference caused by material mixing. Meanwhile, keeping and recording labels are good practices for searching and tracing.

7、产品来料光电参数测试：由于双方的测试系统、样品管、校正系数不一致，往往造成实测值与标称值之间存在差异。建议双方建立测试系数，并定期更新样品管（由我司提供样品）。

Optoelectronics parameters testing on incoming materials: due to inconsistency of the test systems, sample tubes and correction coefficients of both Parties, it's often the case that there is difference between the measured value and the nominal value. So it is recommended that both parties set up test coefficients and update the sample tubes regularly (samples provided by NATIONSTAR RGB).

B. 产品上线贴片时注意事项

Precautions during SMT Processing

1、SMT 贴片环境要求温度 20°C~30°C，湿度 40%RH~60%RH。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。

The SMT shall be conducted in an environment with temperature of 20°C~30°C and humidity of 40%RH~60%RH. In addition, direct contact with the external environment shall be avoided for the workshop, which may result in out-of-control and noncompliance of certain conditions.

2、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）。同档不同批的灯珠需要按照一定比例打散进行混贴，两个同档不同批的灯珠不可单独贴片然后再拼屏，这样容易导致整块模组色差不良。

In order to reduce the possible color difference and ensure the chromaticity uniformity of LED products, it is recommended to perform surface mounting in a mixed way, such as the mixed mounting of products from different bins and different cabinets or setting mixed mounting way of SMT machine. LEDs of the same bins taken from different lots shall be dispersed as per a certain proportion for mixed mounting. Two different LEDs of different lots and same grade shall not be mounted separately then assembled into one screen / system, since it will easily lead to recognizable color difference of the whole module.

3、产品上机贴片时从烘箱或干燥柜中取出，不同产品的上线使用时间与存放时间要求不一致，原则上使用时间越短越好。干燥柜存放要求温度低于 30℃，湿度低于 30%RH。具体如下表 2：（下表中“存放周期”：在此时间内产品完成贴片和过炉，超过此时间需要重新烘烤）。

Upon surface mounting on the machine, take the product out of the oven or drying cabinet. The on-line service time and storage time of different products are not the same. In principle, the shorter the service time, the better. For storage in the drying cabinet, the temperature shall be below 30℃ and the humidity below 30%RH. The details are shown as below in Table 2: ("Storage Period" in the following table means that the surface mounting and baking in furnace shall be completed within this period, and it shall be baked again if this period is exceeded).

表 2：上限使用周期及存放周期

Table 2: Time control for SMT and storage period

产品系列(已开封/已烘烤) Product Items (Opened/ Baked)	上限使用周期 Max SMT period	存放周期 (≤30℃, ≤30%RH 条件保存) Max. Storage period (temperature≤30℃ and humidity≤30%RH)
小间距 Fine Pixel Pitch (FC/NH -0808/1010等)	24h	48h
Mini 产品Mini Series (IMD-F15/F12/M09T/M07/M05A/M0x等)	24h	48h
户内产品Indoor Series (FM/NH-1212/1515/2020等)	8h	16h



超|级|事|业|部
R G B D I V I S I O N

户外产品 Outdoor Series (FM/NH-1415/1921/2727/3535等)	12h	24h
ReeStar 产品 ReeStar Series (RS-1212/1515/1415/1921/2727/3535等)	24h	REESTAR 户内产品 RS Indoor Series: 24h
		REESTAR 户外产品 RS Outdoor Series: 48h
备注 Note	如开封烘烤后超出存放周期未使用, 上线前需进行烘烤 If actual storage period exceeds the above mentioned hours limit, baking should be done again before SMT.	

4、建议生产过程中不备料, 当使用时从干燥柜中取出。

It is recommended that materials not be reserved during production but be taken out from the drying cabinet immediately before use.

5、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 1 中已受潮品的烘烤要求。

Residual materials, tails or products exposed in the air for a long time shall be vacuumed again for storage. Be sure to bake it before reuse, with the baking requirements shown in Table 1 above specified for the damped products.

6、产品的烘烤次数不宜超过三次, 高温对料盘与载带等辅料有影响, 贴片时有可能造成抛料。

It is suggested that the product should not be baked for over three times, since high temperature will affect the tray, carrier tape and other accessories, and may cause material discarding during surface mounting.

7、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: 1) 员工佩戴静电手环与穿着防静电工作服; 2) 车间铺设防静电地板并做好接地, 使用防静电工作台垫; 3) 各机台设备需接地良好, 交流阻抗应小于 1 欧姆; 4) 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。

Anti-static measures shall be taken for all the workers and equipment that are in direct contact with the LEDs during the whole process: 1) the staff shall wear anti-static bracelets and overalls; 2) anti-static floors shall be laid in the workshop, sound grounding shall be provided and the worktable shall be covered with anti-static pad; 3) each machine/bench equipment shall be well grounded, and the AC impedance shall be smaller than 1 ohm; 4) check regularly whether the machine/bench parameters and power output are acceptable, and whether the test instrument and the driving power supply suffers from creep age.



8、产品异物检查，请参照我司产品“外观检查标准”，对于不接触芯片与金线，不遮挡芯片，直径小于 0.4mm 且不多于一个的异物或缺损均判为合格品。此情况不影响产品的使用与可靠性，故不建议维修。

For the foreign matter inspection, please refer to Appearance Inspection Standard for our products. For a product with no more than one foreign matter or defect in a diameter smaller than 0.4mm which does not contact with the chip and metal wire and does not screen the chip, it shall be considered as acceptable. These conditions will not affect the application and reliability of the product, so repair is not recommended.

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。

In the case of material discarding during SMT processing, it is recommended to check the carrier tapes and the cover tapes first and see if there is any deformation, abnormal dimension, wiredrawing or easiness to break, and whether the LED lamp is laid sideways or reversed. Please feedback immediately in the case of any abnormality, otherwise it is suggested to check the feeder, speed rate, nozzle height and accuracy of the SMT machine and adjust it accordingly.

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。

In the case of poor soldering during surface mounting, it's suggested to confirm whether there are any abnormalities such as foreign matter, deformation and oxidation on the LED pins and the PCB pad firstly and then whether the solder paste and the furnace temperature are normal. Poor soldering may be improved if the furnace temperature is increased properly.

11、回流焊接只能进行一次，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。

Reflow soldering can only be performed once. During the reflow soldering, please do not apply any pressure to the LED. Other processing may be performed only after the product is soldered and the temperature drops to room temperature.

关于回流焊炉温曲线，建议如下几点：

Regarding the reflow soldering oven temperature curve, suggestions are as follows:

1) 要求最高焊接温度不超过 255°C (IMD-M07/M05 及以下尺寸产品最高焊接温度区间为 225°C~235°C)。

The maximum soldering temperature shall not exceed 255 °C. (The maximum soldering temperature range of IMD-M07/M05 and other smaller sizes products is 225°C to 235°C) .

2) 预热区炉温上升不能过快，焊接区温度大于 217°C的时间不超过 60s。

The furnace temperature rise in the preheating zone shall not be too fast, and the time during which the temperature of the weld area is greater than 217 °C shall be no more than 60 s.

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°C，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°C，可能造成模组之间色差的现象。

If the fluctuation of reflow furnace is too big, it will easily cause color difference affect the display. For example, if the maximum temperature difference is more than 5°C in module of different positions at the same time, it may cause the dim color difference at edge of the module. Therefore, it is recommended that ensure the fixture is edge hollow and ventilation. If the temperature different of the reflow furnace is over than 5°C in different time, it will cause the color different of the module at different positions and different time periods.

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。

As for specific temperature and time, maximum slope and other requirements for each temperature zone, customers need to refer to the data provided by solder paste manufacturer.

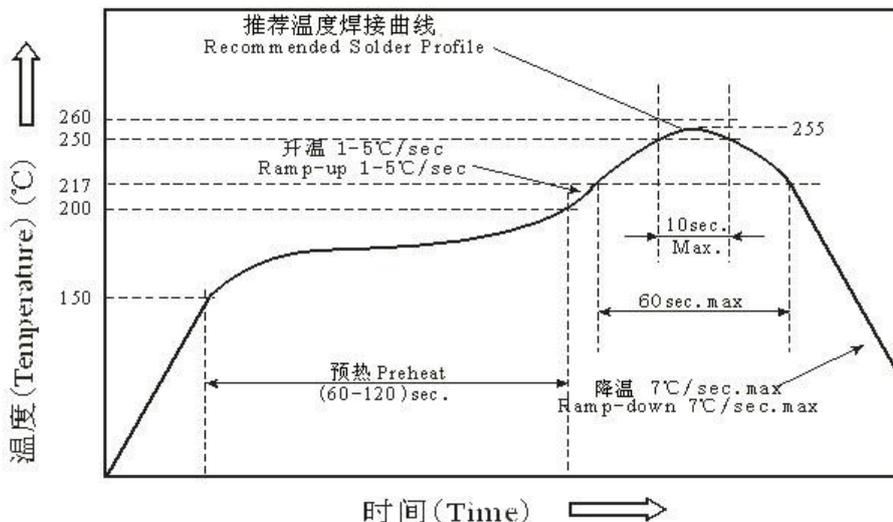


图 1: 推荐温度焊接曲线

Figure 1: Recommended Temperature Curve for Welding

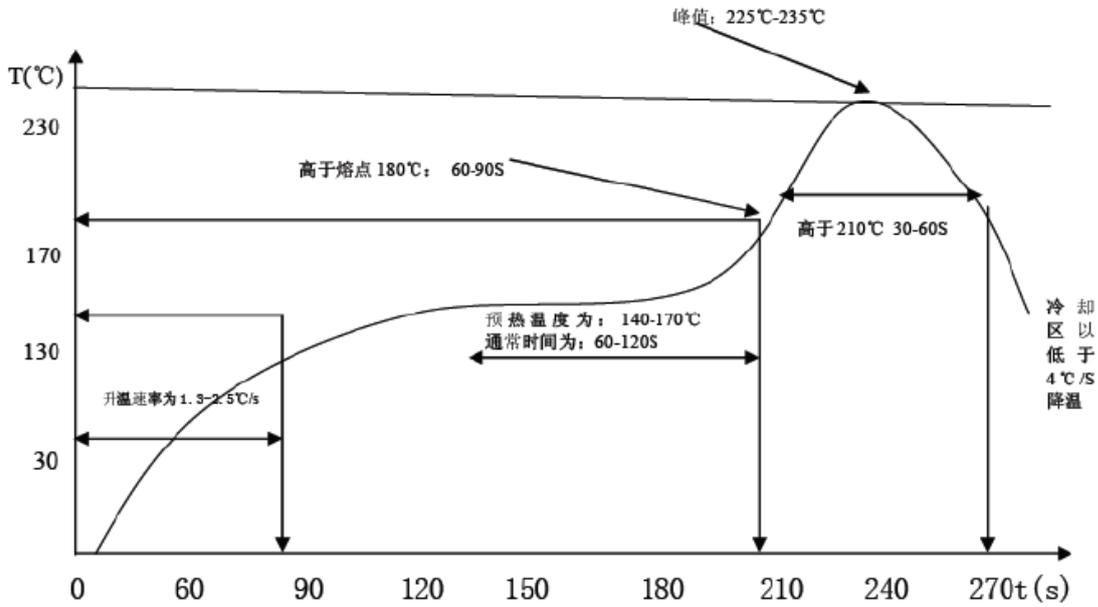


图 2: IMD-M07/M05 及以下尺寸产品推荐温度焊接曲线

Figure 2: Recommended Soldering Temperature Curve for IMD-M07/M05 and Other Smaller Size Products

5) 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 the LED frame material PPA has the characteristic of yellowing at high temperature, all conditions for reflow soldering shall be consistent (including to use the same reflow oven for soldering, furnace temperature change curve, chain speed, etc.), to avoid the overall appearance difference due to different processes.

12、模组周转过程中注意保护灯面, 防止灯面与工作台磨擦造成出光减弱, 如加保护垫等。

During the process of module turnover, pay attention to protect the LED surface to prevent the LED surface from rubbing against the working table to reduce the light, such as adding a protective pad.

C. 产品老化注意事项

Precautions on Aging

1、建立完善的显示屏老化规范流程 (分户内应用与户外应用两种标准)

Establish a sound standard process for display screen aging (for indoor use and outdoor use respectively)

2、老化条件常见两种: 常规视频循环老化与加严老化。(加严老化方案: 白平衡 200 灰度*2H+断电*1H, 模拟简单的冷热冲击效果)



Two common aging conditions: regular cycle aging and tightened aging by playing videos. (Scheme for tightened aging: to simulate the simple thermal shock effect under the conditions of white balance with gray scale of 200 * 2h + power off * 1h)

3、老化方式常见三种：(a) 户内应用产品：前期模组老化 1~2 天，箱体或整屏老化 3~5 天；(b) 户外应用产品：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。

Three common methods of aging: (a) indoor products: early module aging takes 1~2 days and cabinet or whole screen aging takes 3~5 days; (b) outdoor products: early module aging takes 1~2 days, cabinet aging after potting takes 2 days and whole screen aging takes 3~5 days; (c) outdoor products: early module aging takes 1~2 days, cabinet aging after potting takes 2 days and assembled screen outdoor aging takes 3~5 days (subject to special requirements of the customer); the specific aging method can also be selected or formulated by the customer.

4、禁止长时间满灰度的白平衡点亮，以免加剧灯珠光衰；

It's not recommended to light it up with the white balance at full gray scale for a long time, otherwise it will aggravate the light attenuation of the LED;

5、老化过程中若出现异常（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），其次排查虚焊或 IC 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。

In case of abnormalities (such as burn out or serial lighting up) during the aging process, it is recommended to determine the causes of the LED by yourself first (such as via taking a bare LED test, changing the position of the defective LED, etc.), and then check if it is caused by pseudo soldering or IC; in addition, perform aging observation with tightened conditions recommended by NATIONSTAR RGB. In case of instability during the aging process, further tightened conditions shall be adopted for aging and prompt feedback to our company are required for timely handling.

6、若屏体出现色差现象，可对面罩、电阻、IC、灯珠进行排查（灯珠方面排查如换位、产品标签追溯、贴片方式跟踪等），不良与灯珠相关则反馈我司；若色差表现为角度性、有规律的不良，则主要原因为贴片不良造成，如某吸嘴高度或 IC 规格设置不一致，贴片位移，PCB 焊盘不匹配等。

In case of color difference of the screen, it is recommended to check the cover, resistor, IC and LED (such as by transposition, product label tracing, SMT tracking, etc.). If the defect turns out to be relevant with the LED, please feed back to our company; if the color difference turns out to be angular and regular detect, then the main reason would be poor surface mounting, such as inconsistency of certain nozzle height or IC specification setting, displacement of SMD, PCB pad mismatching, etc.



D. 半成品及成品应用注意事项（出货前）

Application Instructions to Semi-finished and Finished Products (Before Delivery)

LED 产品属于潮湿敏感性元件（无论户内产品还是户外产品），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 belong to humidity susceptibility component (indoor and outdoor product), the LED frame material PPA has the characteristic of absorption of moisture. Moisture absorption will happen before SMT or after patching into a screen.

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。

下面几个概念的解释有助于更好的理解。

Moisture-proof before SMT is preventing the water steam expanded cause by high temperature of the fluctuation, and the internal stress will cause epoxy peeling, which is possible to lead to LED life reduction or failure. Moisture-proof after SMT is preventing the chip failure and electrochemical reaction cause by the electrifying in the moist environment.

The explanation of the following concepts helps to better understand.

1、LED 防水与防潮区别：

一般来说，吸水和吸潮都是物理变化，但吸水和吸潮是有区别的，吸水指材料在水中吸收水份，且质量增加的过程；吸潮指干燥的物质吸收空气中的水分子而变得潮湿。当灯珠直接接触水时，水并不能直接进入灯珠内部，灯珠也不会立即受潮，随着时间的推移，水汽缓慢渗透到灯珠内部，从而使灯珠受潮，最终发生电化学腐蚀反应导致失效。

In general, both water absorption and moisture absorption are physical changes, but they are different. Water absorption refers to the process in which material absorbs moisture in water along with increase in mass; moisture absorption refers to the process in which dry substance absorbs water molecules in the air and turns wet.

在水蒸汽（潮气）中“水”以单个的 H_2O 分子形式存在，在液态水中，经常是几个水分子通过氢键



结合起来，形成 $(H_2O)_n$ 。所以水蒸汽中的水分子和液态中水分子虽然一样大，但水蒸汽中分子之间的间隔比液态中水分子之间的间隔要大很多（大概十倍）。

In the water vapor(Moisture),"Water" exists as a single H_2O molecule, but in the liquid water, water molecules are combined by hydrogen bonding and becoming H_2O . Therefore,water molecules in water vapor as big as liquid water molecule, but the interval between molecules in water vapor is much larger than the interval between water molecules in the liquid (about tenfold).

水蒸汽中的水分子（潮气）布朗运动速度快，运动范围大，分子间作用力非常弱，分子势能大，穿透能力强；而液态水中的水分子布朗运动速度慢，运动范围较小，分子势能小，分子间作用力较强，其穿透能力较弱。

Brownian motion of the water molecules in water vapor(moisture) moving in fast speed and large range, inter-molecular force weakly, molecular of the potential energy is large, penetration ability is high. Brownian motion of the water molecules in liquid water moving in low speed and smaller range, molecular of the potential energy is large, inter-molecular force weakly, penetration ability is weakly.

此外，显示屏模块使用的灌密封胶为硅胶，其为疏松结构，中间有很多空隙。因此：潮气水分子可以缓慢渗透其中，而液态水分子在短时间内不容易穿透。

Screen modules use silica as potting glue, which is loose construction with lots of void inside. Therefore, the water vapor can slowly penetrate into the inside structure of LED, while liquid water molecule can not penetrate into the LED in the short time.

2、烧伤、金属迁移原理

Burn, Metal chip migration

(1) 芯片烧伤

Burn of the chip

水汽进入到灯珠内部，当通电时，芯片表面会发生电化学反应，发光区出现 ITO 烧伤现象。

The water vapor will penetrates into the inside of the LED, when LED is turned on, chip will cause electrochemical corrosion and light emitting area get ITO burned phenomenon.

(2) 芯片金属迁移

Metal migration of the chip

当有水汽渗入到芯片表面的情况下，电极的金属元素容易被电解形成金属离子，若有加正向电压 P+、N-，P 电极电解出的金属离子会沿着电场方向迁移，若加逆向电压 P-、N+，N 电极电解出的金属离子会沿着电场方向迁移，最后造成短路漏电或者掉电极失效。

In the situation of the vapor infiltration to the chip surface, the metal elements of the electrode will be easily electrolysis into metal ions. If apply forward voltage P+,N-,the electrolysis metal ions by P-electrode will migration along the direction of the electric field. If apply reverse voltage P-,N+,N the electrolysis metal ions by N-electrode will migration along the direction of the electric field, which will lead to short circuit, electricity leakage and electrode degradation.

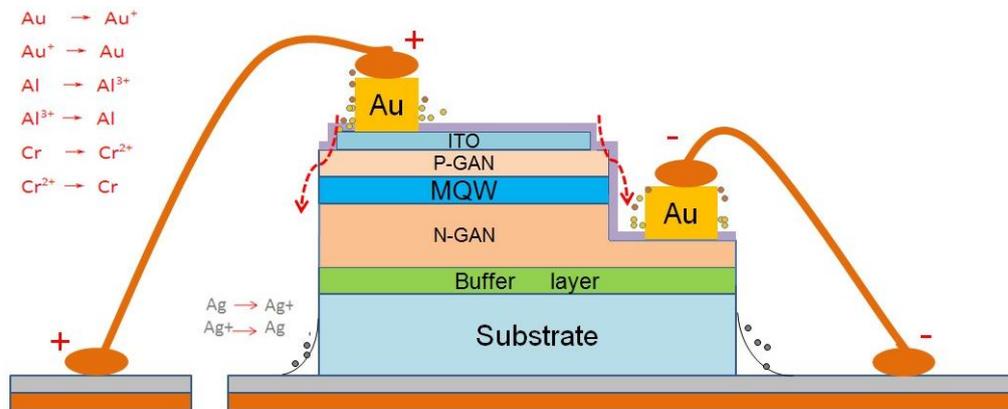


图 3：金属迁移原理图

Figure 3: Metal Migration

3、注意事项如下：（Precautions as follow）

(1)、产品在出厂前（客户厂内），如果半成品/成品存放超过 5 天，要求对产品密封保存（抽真空）；如果产品不能密封保存，要求客户每天点亮屏体 2 小时除潮，或每周取出屏体采取逐级增加灰度的方式（见下文 E 部分第 1 条应用要求）进行点亮除湿。

Before delivery (in the screen manufacturer's), if storage time of the semi-finished products/finished is more than 5 days, then the products shall be sealed (vacated) for storage; if it is not practical to seal the products for storage, then the factory shall turn on the screen for 2 hours every day for dehumidification , or take the screen out every week for dehumidification by turning on the screen with gray level increased level by level (see the application requirements of item 1 in part E below).

(2)、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，灌胶高度要求如下：

Glue filling protection: to protect the products from moisture more effectively, outdoor products must be filled with glue (to be finished within 48 hours after SMT processing and protect the product from absorbing excessive moisture before glue filling, and it will not easily discharge after glue filling). The height of the glue must be over covered with the pins. For the outdoor LED products, the requirements for glue filling height are listed as below:

1415 Package $\geq 0.02\text{mm}$ (PCB Pin Structure), or $\geq 0.60\text{mm}$ (Bent Pin Structure) ;

1921 Package $\geq 0.75\text{mm}$;

2727 Package $\geq 0.9\text{mm}$;

3535 Package $\geq 1.5\text{mm}$, details as following;

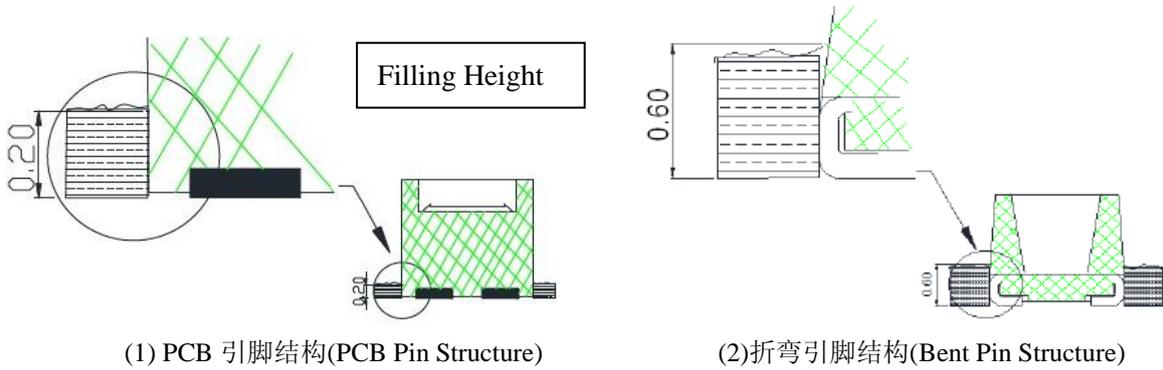


图 4: 1415 灌胶高度图

Figure 4: Figure for Filling Height of 1415 Package

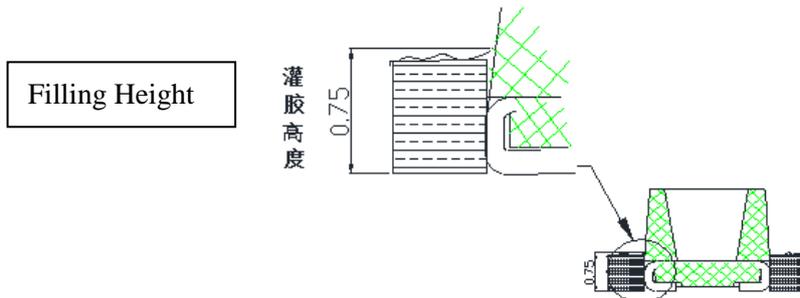


图 5: 1921 灌胶高度图

Figure 5: Figure for Filling Height of 1921 Package

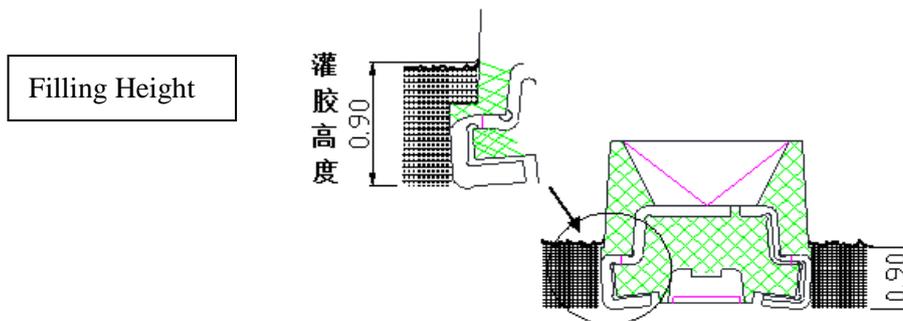


图 6: 2727 灌胶高度图

Figure 6: Figure for Filling Height of 2727 Package

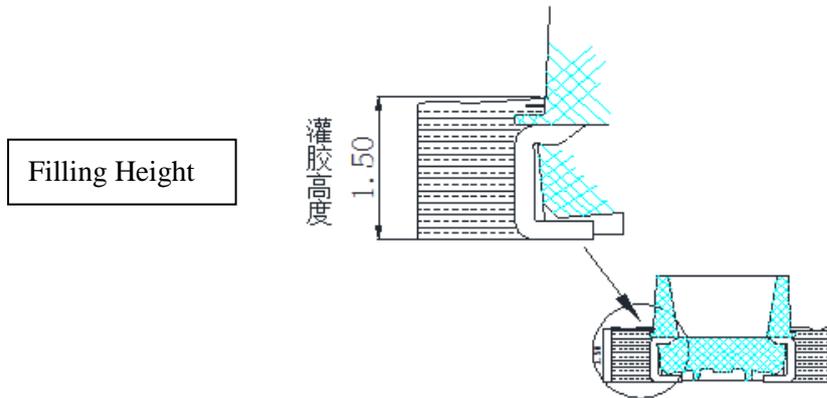


图 7：3535 灌胶高度图

Figure 7: Figure for Filling Height of 3535 Package

(3)、成品箱体的储存：对于因各种原因（如长距离运输、交货日期变更等）导致屏体未能及时使用的，要求使用抽真空密封的包装方式进行保存，避免长期（超过 5 天）暴露于空气中导致产品吸潮。

Storage for finished cabinet: for screens that are not used in time due to various reasons (such as long-distance transport, change of delivery date, etc.), they shall be stored in seal so as to avoid long-term (more than 5 days) exposure to the air and getting wet.

(4)、成品箱体运输：若屏体运输周期超过一周时间，运输过程必须对模组或箱体进行真空密封处理，并使用航空箱储存，航空箱内保持干燥，运输过程中确保成品防震、防撞。（对于小间距产品，无论周期长短，均要求对模组或箱体真空密封处理）

Transport for finished cabinets: in case the transport period of screens is more than one week, the module or cabinets must be vacuumed and sealed during transport, and stored in the flight cases. The flight cases shall be kept dry, and make sure that the finished products are free from vibration and collision. (For fine-pitch products, all the modules or cabinets shall be vacuumed and sealed regardless of the length of the cycle)

(5)、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。在设计时要控制反向电压，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 the LED is very small, which will not affect the normal use of the LED; however, if the LED is subjected to overloaded reverse voltage impact, it will cause accelerated electrochemical corrosion, in which case, the LED will be damaged, and the reverse leakage current will increase rapidly, which will cause serial lighting up of the display screen. During design, the reverse voltage shall be controlled to minimize the impact of high frequency back voltage on the LED chip in the circuit.



(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℃，灯脚温度不超过 75℃。

Temperature protection: at high temperature, the attenuation speed of the LED will be accelerated, and its stress will be increased for the same. The LED is prone to be failed if it is exposed in a high temperature for a long time. It is recommended to use the screen at an ambient temperature of (-30~50)℃. During usage of the screen, the temperature of the LED surface shall not exceed 55℃, and that of the LED pins shall not exceed 75℃.

若客户模组或箱体存放时间较长（超过 5 天），最优方案：屏体正常老化前将模组放入烘箱中烘烤除湿（70℃*16 小时）从而彻底除湿。

If the modules or cabinets storage time is too long (more than 5 days), the best scheme: Before the screen normal aging, the module should be putted into drying cabinet to baking and completely dehumidification (70℃*16 hours).

E、终端客户应用注意事项

Usage Instructions to End Consumers

1、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、气候等因素判定），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，通过缓慢升温去除累积潮气。例如采用以下方式：

Application requirements: the display screen shall be run frequently (During the application period, chip in the LED will heat and the moisture cannot enter.). If the display screen is off for a long time ,(5~10 days in general, with the exact period to be determined by the application environment and climate, etc.). Dehumidification is necessary before using the screen again. A recommended method of dehumidification through heating up gradually is to edit a simple program to bring up brightness from low to normal. For example, with steps as below:

0-2 (H) 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→6-8 (H)) 采用 30 级亮度点亮状态→8-10 (H) ，采用 40 级亮度点亮状态→10-12 (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）。



0-2 (h) energize but with screen off

→ 2-4 (h) turn up the screen to brightness level 10

→ 4-6 (h) turn up the screen to brightness level 20

→ 6-8 (h) turn up the screen to brightness level 30

→ 8-10 (h) turn up the screen to brightness level 40

→ 10-12 (h) turn up the screen to brightness level 50

→ 12-14 (h) turn up the screen to brightness level 70

→ 14-16 (h) turn up the screen to brightness level 90

→ 16-18 (h) turn up the screen to brightness level 120

→ 18-20 (h) turn up the screen to brightness level 150

→ 20-22 (h) turn up the screen to brightness level 200

(The operation time can be properly extended or shorten according to the actual application environment, climate and screen-off duration).

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。

Due to different degree of humidification in the product, this method can not necessarily dehumidify completely. Therefore, it is recommended that customers turn on the screen every day if possible for dehumidification.

同时，需要客户通过软件记录显示屏的运行状态（如运行日记一样，记录每一次的使用时间、关屏时间、暖屏时间、室内温湿度等），以便进行追溯。

At the same time, the customers shall set a program to record the operation status of the screen (as if an operation diary, including usage time, turn-off time, warm-up time, indoor temperature and humidity, etc.) for traceability

案例 1：客户 A 在显示屏主控电脑、屏体硬件上设置，通过软件自动实现定期开机回温除潮，具体如下：

当检测到显示屏 5 天没有开启（干燥地区为 10 天）时，软件会自动控制显示屏从低灰开始慢慢往上加灰度级别（即慢慢预热把水份烘干，避免受潮失效），预热持续时间达到 22 小时。

Case 1: customer A achieves automatic regular starting to rewarm for dehumidification by software, with settings on the master computer of display screen and screen hardware. See below for the details:



When it is detected that the display screen has not been turned on for 5 days (or 10 days in dry areas), the software will control the display screen automatically by gradually increasing the gray scale level, which is to preheat slowly to dry the moisture and avoid failure caused by humidification. The preheating time lasts for 22 hours.

2、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、酸碱性的环境中，避免产品遭受到不可逆的破坏，导致寿命减短。

Requirements for application in special environment: the indoor and outdoor screens shall be used properly and accordingly. It is suggested that the screen not be used in environment of high humidity and high acidity and alkalinity, in which the product is possible to get irreversibly damaged, shortening its lifespan.

1) 禁止屏体提前安装在正在装修环境中（必须在大楼装修基本完成后再装屏），装修带来的潮湿及碱性高的环境，容易加剧灯珠不良。如果装屏时间必须与室内装修同时进行，屏体安装完成后，需要使用幕布将屏体盖住，并且每天至少 2 个小时视频老化，从而去除灯珠表面的湿气。春节前后更应该做好防潮，要持续点亮除潮，不可长时间断电关屏（间隔不超过 5 天）。若固装屏体半个月未点亮且一直用幕布包裹，使用前需先进行缓慢除湿处理（使用 E 部分第 1 点除湿方案），然后再视频点亮 1~2 天（此部分时间可鉴于这几个月的天气情况而定）。

Please avoid installing the screen when the building is still under renovation and it must be installed after the building renovation is completed, because the environment with high humidity and acidity and alkalinity resulting from the renovation will easily aggravate LED failure risk. If screen installation must be carried out simultaneously with the interior finish, the screen shall be wrapped by curtain after assembly and runs at least 2 hours a day for aging by playing videos in order to remove moisture from surface of the LED. In addition, before or after Spring Festival in China, it's necessary to take moisture-proof measures by running the screen and avoid power-off of the screen for a long time (time interval not more than 5 days). Before running a fixedly-installed screen which has been off for half a month and wrapped with curtain, it must be dehumidified by slow preheating (with the dehumidification scheme specified in item 1, part E), after which, play videos on the screen for 1~2 days (such duration may be determined depending on the weather of recent months).

案例 2：2017 年 3 月，客户 B 使用我司 2020 系列产品在终端安装调试过程出现串亮、死灯现象。该项目用于某一正在装修的大楼一楼，且靠近海边，室内装修与屏体安装同时进行，且屏体断电时间较长，再次开屏时出现大量死灯、串亮，老化难以稳定，无法修复，导致整个屏体报废（见下图）。

Case 2: in March 2017, Customer B used our 2020 series product which suffered from serial lighting up and dead LED light during installation and debugging. The screen was installed on the first floor of a building under renovation which is located near the sea. The interior finish and screen installation were carried out at the same time and the screen was powered off for quite a long time. When the screen was turned on again, dead LED light and serial lighting up occurred in large scale, aging was difficult to stabilize, and it can't be repaired, resulting in the scrapping of the entire screen (see the picture below).

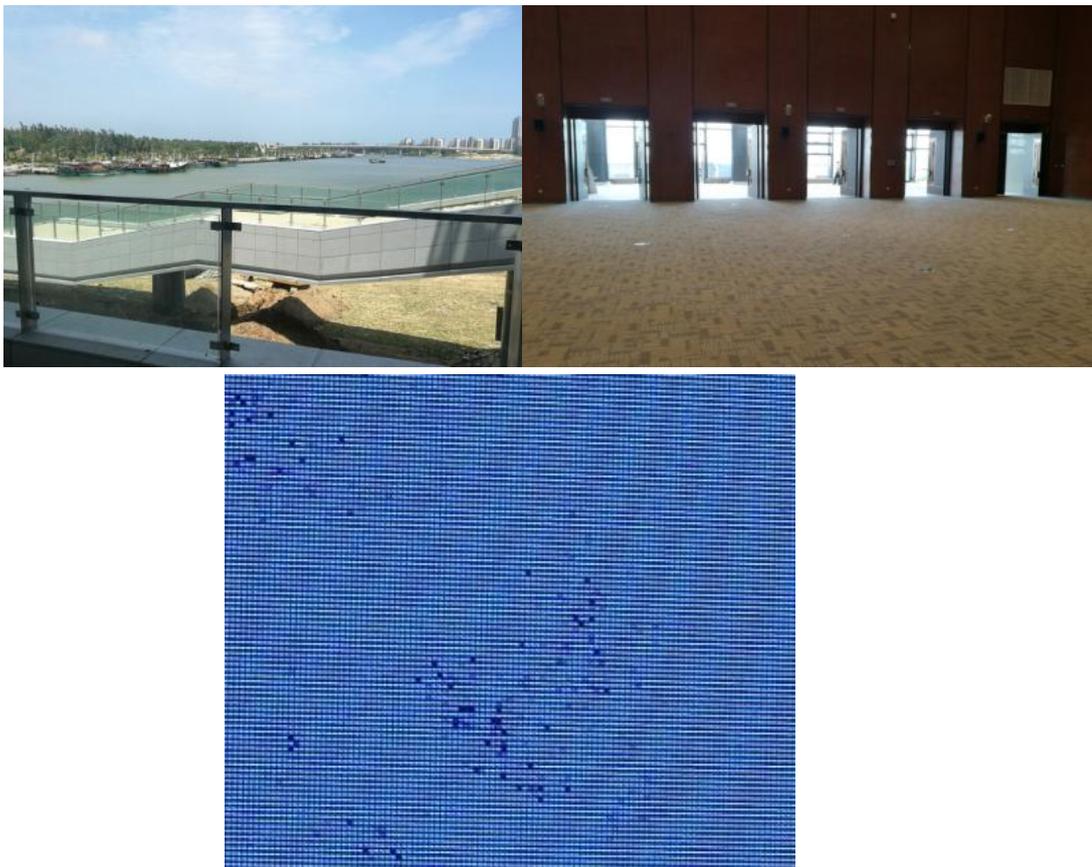


图 8: 终端客户现场环境及局部不良屏体

Figure 8: End Customer Site Environment and Locally Undesirable Screen

案例分析：显示屏被安装在靠近海边的地方，环境湿度较大，其次装修环境湿度更大，期间没有做好防潮管控，从而导致灯珠受潮死灯严重。

Case analysis: the display screen is installed near the sea where the environment humidity is high and the renovation environment humidity is even higher. Improper damp control during the period has caused severe dead LED light for humidification of the LED.



2) 禁止屏体正面受空调直吹;

The screen must not be directly blown by air conditioner at the front.

3) 如屏体应用于游泳馆、游乐园等可能接触水的地方,屏体应做好特殊保护(如使用防水玻璃隔绝)。

If the screen is used in swimming pools, amusement parks and other places where water is accessible, the screen shall be specially protected (e.g. with waterproof glass for isolation).

4) 租赁屏体遭遇雨水时,活动结束后,先对屏体进行清洁、除湿(防止异物和雨水残留在屏体上),再装进航空箱,航空箱内需放置干燥剂,下次活动开始时,提前取出屏体,采取逐级增加灰度的方式(见上文 E 部分第 1 条应用要求)进行点亮除湿,禁止储存在仓库不做处理。

If a rented screen gets wet in the rain, after the event, it shall be cleaned and dehumidified (avoid leaving foreign matter and rain on the screen) before being put in the flight case in which desiccant shall be available. Before the next event, take out the screen in advance and increase the gray scale level by level (see the application requirements of item 1 in part E above) for dehumidification by lighting up, storing in warehouse without any processing is prohibited.

3、禁止在 LED 仓储、生产和使用环境下使用强氧化类消毒剂,如含卤消毒剂(84 消毒液、漂白粉、含氯消毒粉和含氯泡腾片等)和过氧化物类消毒剂(二氧化氯、过氧化氢和过氧乙酸等)。这类消毒液均有强氧化性,均可能对 LED 显示屏和灯珠产生腐蚀。

Using strong oxidizing disinfectant such as Halogenated disinfectant (84 disinfectant, bleaching powder, chlorine-containing disinfectant and chlorine-containing effervescent tablets, etc) and peroxide disinfectant (Chlorine dioxide, hydrogen peroxide and peracetic acid, etc) in environment of LED storage, production and using are prohibited. These kinds of disinfectants have strong oxidizability, which may cause corrosion to LED display screen and LED lamp.

补充说明:即便是同一规格 LED,在实际应用领域其可靠性与整体系统设计水平、作业方式、使用条件均息息相关,使用手册中的内容不可能涵盖客户使用过程中可能碰到的所有问题,部分内容虽然涵盖,但可能没有提供非常详细的说明,由此带来的不便,敬请谅解!为此,我们将根据您在实际使用过程中的典型案例和相关信息反馈,不定期更新使用手册,期间如发生相关信息更改,请以最新版本为准。



Supplementary description: even for LEDs of the same specification, their reliability in actual application field is closely related to the overall system design level, operation mode and usage conditions. It is impossible for the contents in the manual to cover all the problems that may be encountered during the customer's use and there may also be contents without a very detailed explanation. We apologize for any inconvenience that may have caused and thanks for your understanding! To this end, we will update the User Instructions from time to time based on the typical cases and related information feedback during your actual use. In case of any relevant information changes during the period, please refer to the latest version.

F. 联系我们

Contact Us

感谢您使用我司的产品，您也可以发邮件到 rgbxiaoshou@nationstar.com，或通过我司的网站 (<http://www.nationstar.com>) 上的联系方式与我们联系：

Thanks for using our products. You can contact us directly through email rgbxiaoshou@nationstar.com, or through the contact methods shown in our website (<http://www.nationstar.com>).

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防伪鉴定中心

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**在产品使用过程中如遇到相关问题, 请保留不良品, 并按以下方式填写信息后, 随样品一起反馈给我们。

**If you face related issues in products using process, please keep the defective products, and fill in the information in below form and send it with samples to us.



客户提供不良样品信息反馈表

Information Feedback Form of Customer Provided Defective Samples

客户名称Customer name			
产品型号Product model			
发货数量、及批次信息 Quantity and batch information for shipment			
使用点间距、及当前使用数量 pixel pitch, and the number of current using			
不良率、及不良表现 Defective rate, and defective issues			
不良原因的初步分析与诉求 Preliminary analysis and request of defective causes		<input type="checkbox"/> 停线 Stop production <input type="checkbox"/> 改善 Improve <input type="checkbox"/> 退货 Return <input type="checkbox"/> 现场处理On-site processing	
发生不良的阶段 Stage of defective happening		<input type="checkbox"/> 来料检查 Incoming materials inspection <input type="checkbox"/> 厂内炉后点亮 Lighten after SMT in factory <input type="checkbox"/> 厂内试验Testing in factory <input type="checkbox"/> 厂内老化 Aging in factory <input type="checkbox"/> 终端使用Using in end-user <input type="checkbox"/> 其它Others	
已使用同批次产品目前的状况 Current status of the products using same batch		<input type="checkbox"/> 已反馈不良 Already feedback defective issue <input type="checkbox"/> 无异常反馈 No defective issue feedback	
提供不良样品数量(见下备注要求) Number of provided defective samples (See requirements below)			不足数量原因 (Reason of insufficient quantity)
厂内失效 Failure in factory <input type="checkbox"/>	上线前是否有烘烤 Baking before SMT	<input type="checkbox"/> 是Y <input type="checkbox"/> 否N	终端失效 Failure in end-user <input type="checkbox"/>
	试验条件或方式 Test conditions or methods (试验失效时提供) (Provided if test failure)		开始发现异常的时间 Time of defective issue found
			出厂前是否有反馈过不良 Whether there is any feedback before shipping from factory
			<input type="checkbox"/> 是 Y <input type="checkbox"/> 否 N
			屏体使用地点、环境 Place of screen using, environment
			屏体的使用频率 Screen Using frequency



备注: Note

1、提供不良样品时需填写表格中相关信息，□为选择项，如有对应则打“√”。

Provide bad Please fill in the relevant information in form when providing the defective samples, □ is optional item, enter "√" if it is choose.

2、根据灯珠颗数统计不良率，不良样品提供数量要求：

Calculate the defective rate according to the LED quantity, below is the quantity requirement of defective samples providing.

	不良率(Defective rate) ≤10ppm	10ppm<不良率(Defective rate)≤50ppm	不良率(Defective rate) >50ppm
需提供不良品数量 Number of defective products required	≥5pcs	≥10pcs	≥20pcs
注：特殊情况不满足数量要求时，需填写文字说明原因。 Note: If the quantity can not meet the requirements due to special circumstances, please explain the reasons.			

3、正常使用时如非特殊情况或单一不良类型≤10ppm时，建议对不良灯珠先分类搜集后，再统一提供我司分析。

If not special situation appear in normal using or a single defective type does not exceed 10 ppm, it is recommended that customers provide the samples for our analysis after collecting and classifying the defective LEDs.

4、不良样品需尽量保持完整、清洁。

Defective samples should be kept as complete and clean as possible.

5、对有规律性表现的问题点，建议客户优先排查分析。

For the problems with regular issues, it is recommended that the customer inspect and analyze by themselves first.