



产品规格书

SPECIFICATION

- ◆ 产品名称 (Product): GDS5908
- ◆ 产品型号 (Type): ICON2022
- ◆ 版本号 (Version No.): V.0

描述 Description:

- TOP 发光二极管 (TOP Light Emitting Diode)
- 胶体颜色 (Colloid Color): 雾状 (White diffused)
- 发光颜色 (Emission Color): 全彩 (Full Color)



1. 特性描述

Characteristic description

GDS5908ICON2022 是单线三通道 LED 恒流驱动专用电路，采用灯芯一体封装，内部集成有 MCU 单线数字接口、LED 恒流驱动、PWM 辉度控制、伽马校正等电路，可通过双通道输入和输出数字接口级联，外部控制器只需单线即可控制。备用通讯端口，实现级联中某颗芯片损坏而不影响后级的正常使用。

can control the chip with only one line. The standby communication port can realize the damage of a chip in the cascade without affecting the normal use of the later stage.

每个 OUT 驱动端口输出的恒流值与 PWM 辉度值均可通过命令单独设置。本产品性能优良，质量可靠。

The constant current value and PWM brightness value output by each out drive port can be set separately by command. This product has excellent performance and reliable quality

2. 功能特点

Functional features

- (1) 工作电压 4.5~5.5V
Working voltage 4.5-5.5v
- (2) 每个通道可独立设置电流，恒流驱动输出 2mA~25mA，128 级可调
Each channel can set current independently, constant current drive output 2ma-25ma, 128 levels adjustable
- (3) 通过程序设置 256 级辉度，同时具有 65536 级伽马校正。
256 level brightness is set by program, and 65536 level gamma correction is provided.
- (4) 精确的电流输出值
Accurate current output
(通道与通道) 最大误差: $\pm 3\%$
(channel and channel) maximum error: $\pm 3\%$
(芯片与芯片) 最大误差: $\pm 5\%$
(chip and chip) maximum error: $\pm 5\%$
- (5) 单线双通道串行级联接口: 芯片数据接口可通过命令配置 DIN 或 FDIN 脚输入，正常模式下输入接口相互切换，DIN 工作模式下由 DIN 脚输入数据，FDIN 工作模式下由 FDIN 脚输入数据，D0 脚转发。
Single line dual channel serial cascade interface: the chip data interface can be configured with DIN or fdin pin input by command. In normal mode, the input interfaces switch with each other.
In DIN working mode, the data is input by DIN pin, in fdin working mode, the data is input by fdin pin, and transmitted by D01 and D02 pin.
- (6) 发级联的数据，信号不因某颗芯片异常而影响其他芯片正常工作，保证可靠性
Send cascaded data, and the signal will not affect the normal operation of other chips due to the abnormality of one chip, so as to ensure the reliability
- (7) 振荡方式: 内置振荡并根据数据线上信号进行时钟同步，在接收完本单元的数据后能自动将后续数据再生并通过数据输出端发送至下级，信号不随级联变远而出现失真或衰减

Oscillation mode: built-in oscillation and clock synchronization according to the signal on the data line. After receiving the data of this unit, it can automatically

- (8) 内置上电复位电路，上电复位后所有寄存器初始化为零
Built in power on reset circuit, after power on reset, all registers are initialized to zero
- (9) 数据传输速率 1.2MHz
Data transmission rate 1.2MHz
- (10) 适用领域：LED 玻璃屏、柔性 FPC 屏、LED 超薄屏、纯晶屏、户内、外透明屏等
Application fields: LED glass screen, flexible FPC screen, led ultra thin screen, pure crystal screen, indoor and outdoor transparent screen, etc
- (11) 封装形式：灯芯一体封装（Chip 型 1010、0807；Top 型 2020、2727）
Package form: lamp core integrated package (chip 1010, 0807; top 2020, 2727)

3. 内部结构框图

Internal structure block diagram

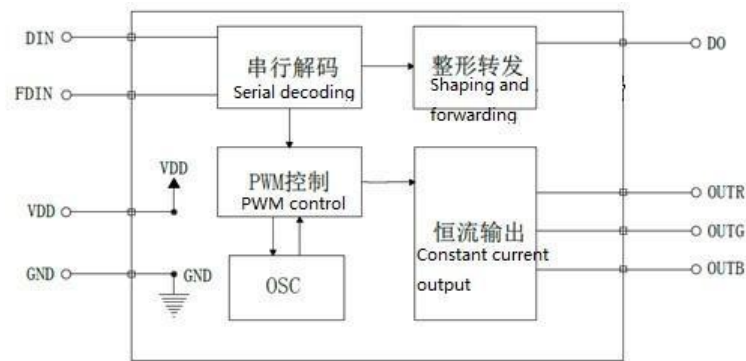


图1

4. 管脚功能

pin function

引脚名称 Pin name	I/O	功能说明 Function description
DIN	I	数据输入 data input
FDIN	I	备用数据输入 Spare data input
DO	O	数据级联转发输出 Data cascade forwarding output
NC	--	
GND	--	电源地 Power ground
VDD	--	电源正极 Positive pole of power supply

5. 输入输出等效电路

I / O equivalent circuit

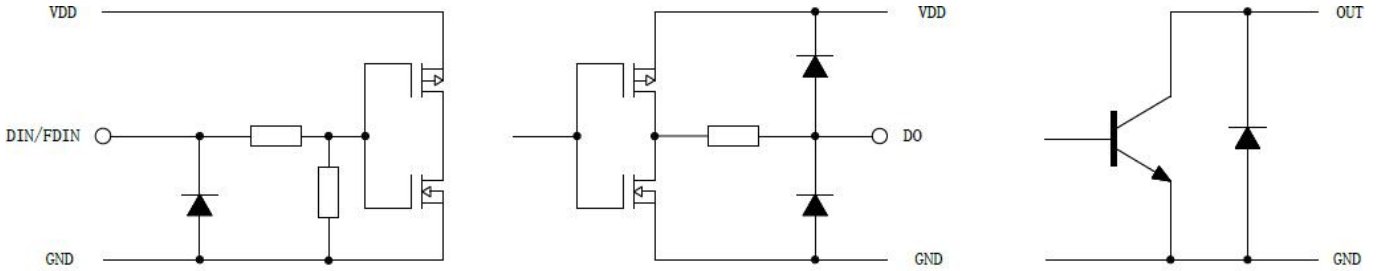


图2



集成电路系静电敏感器件，在干燥季节或者干燥环境使用容易产生大量静电，静电放电可能会损坏集成电路，建议采取一切适当的集成电路预防处理措施，不正当的操作和焊接，可能会造成 ESD 损坏或者性能下降，芯片法正常工作。Integrated circuit is an electrostatic sensitive device, which is easy to generate a lot of static electricity when used in dry season or dry environment. Electrostatic discharge may damage the integrated circuit. It is recommended to take all appropriate preventive measures for integrated circuit. Improper operation and welding may cause ESD damage or performance degradation, and the chip method works normally.

6. 电气特性

Electrical characteristics

在 VDD=4.5~5.5V 及工作温度-40~+85℃下测试，除非另有说明 Test under VDD = 4.5 ~ 5.5V and working temperature - 40 ~ + 85 °C, unless otherwise specified			GDS5908			单位 Company
参数名称 Parameter name	参数符号 Parameter symbol	测试条件 Testing conditions	最小值 minimum value	典型值 Typical value	最大值 Maximum value	
高电平输出电压 High level output voltage	Voh	Ioh=6mA	VDD-0.5			V
低电平输出电压 Low level output voltage	Vol	Iol=10mA			0.3	V
高电平输出电压 High level output voltage	Vih	VDD=5.0V	3		VDD	V
低电平输出电压 Low level output voltage	Vil	VDD=5.0V	0		1	V
高电平输出电压	Ioh	VDD=5.0V, Vdo=4.9V		1.4		V



High level output voltage						
低电平输出电压 Low level output voltage	I _{ol}	VDD=5.0V, V _{do} =4.9V		12		V
输入电流 Input current	I _{in}	DIN、FDIN 接VDD Din, Fdin to VDD		500		uA
静态电流 Quiescent current	IDD	VDD=4.0V, GND=0V, 其他端口悬空 VDD = 4.0V, GND = 0V, other ports are suspended		0.8		mA
OUT 输出电流 Out output current	I _{out}	R, G, B=ON, V _{out} =3.0V	2		25	mA
OUT 输出漏电流 Out output leakage current	I _{olk}	R, G, B=OFF, V _{out} =5V			0.3	uA
通道间恒流误差 Constant current error between channels	ΔI _{olc0}	R, G, B=ON, V _{out} =3.0V			±3	%
芯片间恒流误差 Constant current error between chips	ΔI _{olc1}	R, G, B=ON, V _{out} =3.0V			±5	%

7. 开关特性

Switching characteristics

在 VDD=4.5~5.5V 及工作温度-40~+85℃下测试，除非另有说明 Test under VDD = 4.5 ~ 5.5V and working temperature - 40 ~ + 85 °C, unless otherwise specified			GDS5908			单位 Company
参数名称 Parameter name	参数符号 Parameter symbol	测试条件 Testing conditions	最小值 minimum value	典型值 Typical value	最大值 Maximum value	
数据速率 Data rate	F _{in}			1.2		MHz
OUT PWM 输出频率 Out PWM output frequency	F _{out}	R, G, B		2		KHz
传输延迟时间 Transmission delay time	T _{pz1}	DIN→D0 FDIN→D0		150		ns
输入电容 Input capacitance	C _i				15	pF

8. 时序特性

temporal characteristic

参数名称 Parameter name	参数符号 Parameter symbol	测试条件 Testing conditions	最小值 minimum value	典型值 Typical value	最大值 Maximum value	单位 Company
输入 0 码, 高电平时间 Input 0 code, high level time	T0h	VDD=5.0V GND=0V	200	240	280	ns
输入 1 码, 高电平时间 Input 1 code, high level time	T1h		400	480	560	ns
输入 0 码, 高电平时间 Input 0 code, high level time	T0h'		200	240	280	ns
输入 1 码, 高电平时间 Input 1 code, high level time	T1h'		400	480	560	ns
0 码或 1 码周期 0 code or 1 code period	T0/T1				830	ns
Reset 码, 低电平时间 Reset code, low level time	Treset			80		us

(1) 0 码或 1 码周期在 830ns (频率 1.2MHz) 至 2.5 μ s (频率 400kHz) 范围内, 芯片均可正常工作, 但是 0 码

和 1 码高电平时间必须符合上表中相应数值范围:

The 0 code or 1 code cycle is in the range of 830ns (frequency 1.2MHz) to 2.5 μ s (frequency 400kHz), the chip can work normally, but the high level time of 0 code and 1 code must conform to the corresponding value range in the table above;

(2) 不需复位时, 字节之间的低电平时间不要超过 25 μ s, 否则芯片可能复位, 复位后又重新接收数据, 无法实现数据正确传送。

When there is no need to reset, the low-level time between bytes shall not exceed 25 μ s, otherwise the chip may reset, and receive data again after reset, so as to realize the correct data transmission.

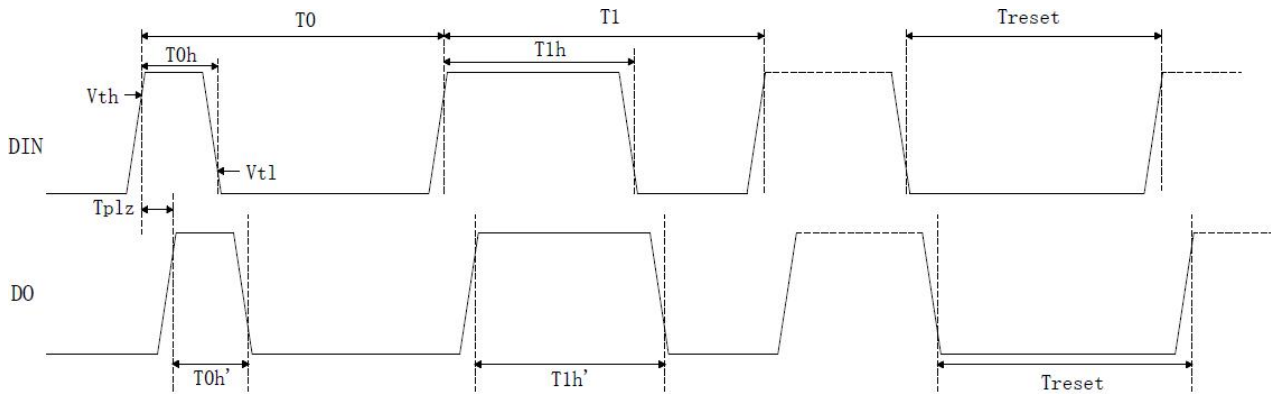


图3



9. 功能说明

Function description

1、 模式设置

Mode settings

为单线双通道通讯，采用归零码的方式发送信号。

The chip is a single line dual channel communication, using the way of return to zero code to send signals. 芯片接收显示数据前需要配置正确的工作模式，选择接收显示数据的方式。模式设置命令共 48bit，

Before the chip receives the display data, it needs to configure the correct working mode and select the way to receive the display data. The mode setting command is 48bit in total, 其中前 24bit 为命令码，后 24bit 为检验反码，芯片复位开始接受数据，模式设置命令共有如下 4 种：

The first 24bit is the command code, the last 24bit is the check inverse code, and the chip reset starts to accept data. There are four mode setting commands as follows:

(1) 0XFFFFFF_000000 命令：

0XFFFFFF_000000Command: 芯片配置为正常工作模式。在此模式下，首次默认 DIN 接收显示数据，芯片检测到该端口有信号输入则一直保持 该端口接收，如果超过 160ms 未接收到数据，则切换到 FDIN 接收数据，芯片检测到该端口有信号输入则一直保持 该端口接收，如果超过 160ms 未接收到数据，则再次切换到 DIN 接收显示数据。DIN 和FDIN 依次循环切换，接收显 示数据。

The chip is configured for normal operation mode. In this mode, for the first time, the display data is received by DIN by default. If the chip detects that there is a signal input to the port, it will keep the port receiving. If the chip detects that there is a signal input to the port, it will keep the port receiving. If the chip detects that there is a signal input to the port, it will keep the port receiving. If the chip detects that there is no signal input to the port, it will switch to DIN again to receive the display data. Din and fdin switch in turn to receive display data.

(2) 0XFFFFFFA_000005 命令：

0XFFFFFFA_000005command:

芯片配置为 DIN 工作模式，在此模式下，芯片只接收 DIN 端输入的显示数据，FDIN 端数据无效。

The chip is configured as DIN working mode. In this mode, the chip only receives the display data input from DIN terminal, and the data from fdin terminal is invalid.

(3) 0XFFFFFF5_00000A 命令：

0XFFFFFF5_00000A command:

芯片配置为 FDIN 工作模式，在此模式下，芯片只接收 FDIN 端输入的显示数据，DIN 端数据无效。

The chip is configured as fdin working mode. In this mode, the chip only receives the display data input by fdin, and the data input by DIN is invalid.

(4) 0XFFFFFF0_00000F 命令：

0XFFFFFF0_00000F command:

芯片配置为测试模式

Chip is configured as test mode

2、 显示数据

Display data

芯片上电复位并接收模式设置命令后，开始接收恒流值设置命令，然后接收显示数据，接收完 24bit 后， D0 端口开始转发 DIN 或 FDIN 端继续发来的数据，为下颗级联芯片提供显示数据。在转发数据



之前，D0 端口一直为低电平。如果 DIN 或 FDIN 端输入 Reset 复位信号，芯片 OUT 端口将根据接收到的 24bit 显示数据输出相应占空比的 PWM 波形，且芯片重新等待接收新的数据，在接收完开始的 24bit 数据后，通过 D0 端口转发数据，芯片在没有接收到 Reset 信号前，R、G、B 原输出保持不变。芯片采用自动整形转发技术，信号不会失真衰减。对于所有级联在一起的芯片，数据传输的周期是一致的。

After the chip is powered on and reset and receives the mode setting command, it starts to receive the constant current value setting command, and then receives the display data. After receiving 24bit, the ports of D0 start to forward the data from DIN or fdin to provide the display data for the next cascade chip. The do1 and D02 ports were low until the data was forwarded. If DIN or fdin input reset signal, chip out port will receive

The 24 bit display data output PWM waveform of corresponding duty cycle, and the chip waits for receiving new data again. After receiving the start 24 bit data, it forwards the data through the do port. Before the chip receives the reset signal, the original output of R, G and B remains unchanged. The chip adopts automatic shaping and forwarding technology, and the signal will not be distorted and attenuated. For all the chips connected together, the data transmission cycle is the same.

3、一帧完整数据结构

One frame complete data structure

C1	C2	C3	D1	D2	D3	D4	...	Dn	Reset	C1	C2	C3	D1	D2	D3	D4	...	Dn	Reset
----	----	----	----	----	----	----	-----	----	-------	----	----	----	----	----	----	----	-----	----	-------

C1、C2 为模式设置命令，各包含 24bit 数据位，每个芯片都会接收并转发 C1、C2，其中 0xFFFFF_000000 为正常工作模式命令，0xFFFFFA_000005 为 DIN 工作模式命令，0xFFFFF5_00000A 为 FDIN 工作模式命令，0xFFFFF0_00000F 为芯片测试模式命令，C3 为恒流值设置命令，每个芯片都会接收并转发 C1、C2、C3。

D1、D2、D3、D4、……、Dn 为各芯片的 PWM 设置命令。

Reset 表示复位信号，低电平有效。

C1 and C2 are mode setting commands, each containing 24 bit data bits. Each chip will receive and forward C1 and C2, of which 0xFFFFF , is the command of normal working mode, 0xfffffa , is the command of DIN working mode, 0xffff5 , is the command of fdin working mode, 0xffff0 f is the chip test mode command, C3 is the constant current setting command, and each chip will receive and forward C1, C2 and C3.

D1、D2、D3、D4、…… DN is the PWM setting command of each chip.

Reset means reset signal, low level is valid.

4、C3 的数据格式

Data format of C3

R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

C3 命令包含 $8 \times 3\text{bit}$ 数据位，高位先发，R7、G7、B7 固定设为 0。

C3 command contains $8 \times 3\text{bit}$ data bits, high bit first, R7, G7 and B7 are fixed to 0.

R[6:0]:用于设置 R 输出恒流值。全 0 码为 2mA，全 1 码为 25mA，128 级可调。

R [6:0]: used to set the constant current value of R output. 2mA for full 0 code, 25mA for full 1 code, 128 level adjustable.

G[6:0]:用于设置 G 输出恒流值。全 0 码为 2mA，全 1 码为 25mA，128 级可调。

G [6:0]: used to set the constant current value of G output. 2mA for full 0 code, 25mA for full 1 code, 128 level adjustable.

B[6:0]:用于设置 B 输出恒流值。全 0 码为 2mA，全 1 码为 25mA，128 级可调。

B [6:0]: used to set the constant current value of B output. 2mA for full 0 code, 25mA for full 1 code, 128 level adjustable.

5、Dn 的数据格式

Data format of DN

R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

每个 PWM 设置命令包含 8×3bit 数据位，高位先发。

Each PWM setting command contains 8 × 3bit data bits, high bit first. R[7:0]: 用于设置 R 输出的PWM 占空比。全 0 码为关断，全 1 码为占空比最大，256 级可调。

R [7:0]: used to set PWM duty cycle of R output. All 0 code is off, all 1 code is duty cycle maximum, 256 levels adjustable. G[7:0]:用于设置 G 输出的PWM 占空比。全 0 码为关断，全 1 码为占空比最大，256 级可调。

G [7:0]: used to set PWM duty cycle of G output. All 0 code is off, all 1 code is duty cycle maximum, 256 levels adjustable.

B[7:0]:用于设置 B 输出的 PWM 占空比。全 0 码为关断，全 1 码为占空比最大，256 级可调。

B [7:0]: used to set PWM duty cycle of B output. All 0 code is off, all 1 code is duty cycle maximum, 256 levels adjustable.

6、数据接收和转发

Data receiving and forwarding

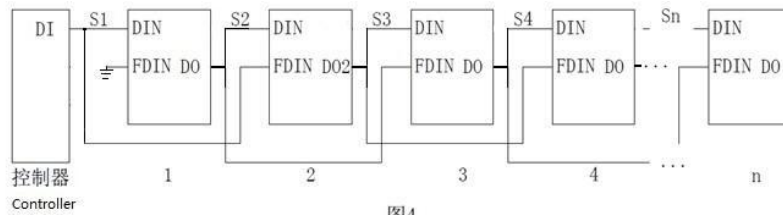


图4

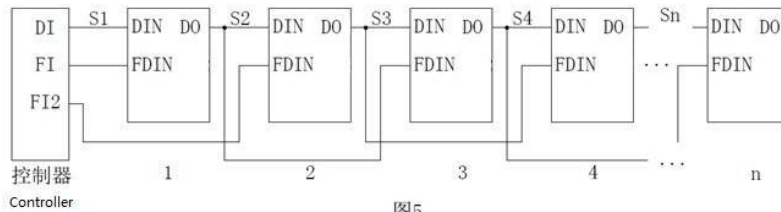


图5

其中 S1 为控制器 Di 端口发送的数据，S2、S3、S4、Sn 为级联 GDS5908 转发的数据。

S1 is the data sent by the di Port of the controller, S2, S3, S4 and Sn are the data forwarded by the cascade GDS5908.

控制器 Di 和 Fi2 端口数据结构: C1C2C3D1D2D3D4.....Dn;

Data structure of controller Di and fi2 port: c1c2c3d1d2d3d4 Dn;

控制器 Fi 端口数据结构: C1C2C3DxD1D2D3.....Dn;

Data structure of controller fi port: c1c2c3dxdl1d2d3 Dn;

其中, Dx 为任意 24bit 数据位。

Where DX is any 24 bit data bit.

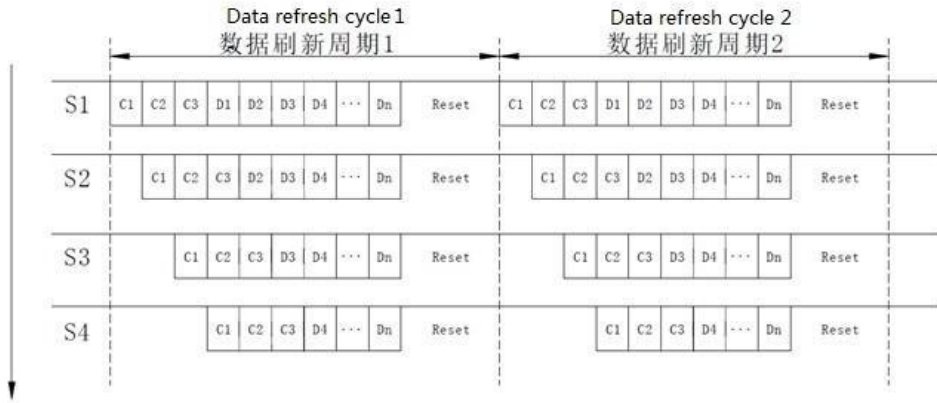


图6

芯片级联和数据传输并转发过程如下：控制器发送数据 S1，芯片 1 接收 C1,C2 和 C3 进行校验，如果命令正确，则转发 C1, C2 和C3，同时吸收 D1，如果此时没有 Reset 复位信号，芯片 1 将一直转发控制器继续发来的数据；芯片 2 也接收 C1, C2 和C3 进行校验，如果命令正确，则转发 C1, C2 和 C3，同时吸收 D2，如果此时没有 Reset 复位信号，芯片 2 将一直转发芯片 1 继续发来的数据。依此类推，直到控制器发送 Reset 复位信号，完成一个数据刷新周期，芯片又回到接收准备状态。Reset 低电平有效，保持低电平时间大于 80 μs，芯片复位。

The process of chip cascade and data transmission and forwarding is as follows: controller sends data S1, chip 1 receives C1, C2 and C3 are verified. If the command is correct, C1, C2 and C3 are forwarded and D1 is absorbed. If there is no reset signal at this time, chip 1 will always forward the data sent by the controller. Chip 2 also receives C1, C2 and C3 for verification. If the command is correct, then C1, C2 and C3 are forwarded and D2 are absorbed. If there is no reset signal at this time, chip 2 will always forward chip 1 Continue to send data. And so on, until the controller sends reset signal and completes a data refresh cycle, the chip returns to the receiving ready state. The reset low level is effective, and the time to keep the low level is greater than 80 μs, and the chip is reset.

The process of chip cascade and data transmission and forwarding is as follows: controller sends data S1, chip 1 receives C1, C2 and C3 are verified. If the command is correct, C1, C2 and C3 are forwarded and D1 is absorbed. If there is no reset signal at this time, chip 1 will always forward the data sent by the controller. Chip 2 also receives C1, C2 and C3 for verification. If the command is correct, then C1, C2 and C3 are forwarded and D2 are absorbed. If there is no reset signal at this time, chip 2 will always forward chip 1 Continue to send data. And so on, until the controller sends reset signal and completes a data refresh cycle, the chip returns to the receiving ready state. The reset low level is effective, and the time to keep the low level is greater than 80 μs, and the chip is reset.

10. 应用信息

Application information

1、双线级联典型应用电路

Two wire cascade typical application circuit

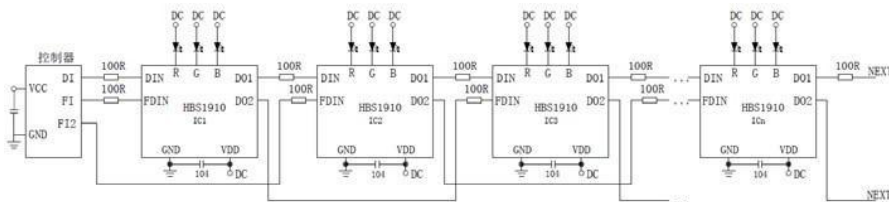


图7

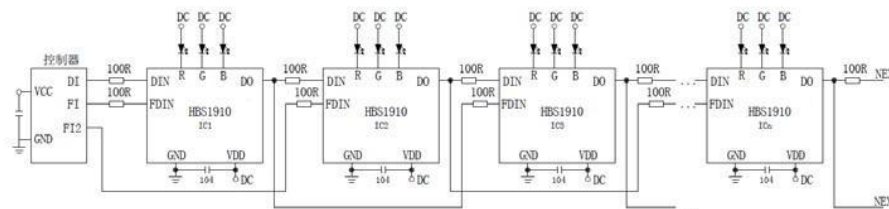


图8



为防止产品在测试时带电插拔产生的瞬间高压导致芯片信号输入输出引脚损坏，应该在信号输入及输出脚串接 $100\ \Omega$ 保护电阻。此外，图中各芯片的 104 退耦电容不可缺少，且走线到芯片的 VDD 和 GND 脚应尽量短，以达到最佳的退耦效果，稳定芯片工作。

In order to prevent the chip signal input and output pins from being damaged due to the instantaneous high voltage generated by the hot plug during the test, $100\ \Omega$ protective resistor should be connected in series at the signal input and output pins. In addition, the 104 decoupling capacitance of each chip in the figure is indispensable, and the Vdd and GND pins connected to the chip should be as short as possible to achieve the best decoupling effect and stabilize the chip operation.

2、如何计算数据刷新速率

How to calculate data refresh rate 数据刷新时间是根据一个系统中级联了多少像素点来计算的，一组 RGB 通常为一个像素（或一段），一颗 GDS5908 芯片可以控制一组 RGB。

按照正常模式计算：

1bit 数据周期为 830ns （频率 1.2MHz ），一个像素数据包括 R（8bit）、G（8bit）、B（8bit）共 24bit，传输时间为 $830\text{ns} \times 24 \approx 20\ \mu\text{s}$ 。如果一个系统中共有 1000 个像素点，一次刷新全部显示的时间为 $20\ \mu\text{s} \times 1000 = 20\text{ms}$ （忽略 C1、C2 和 Reset 信号时间），即一秒钟刷新率为： $1 \div 20\text{ms} = 50\text{Hz}$ 。

The data refresh time is calculated according to the number of connected pixels in a system. A group of RGB is usually a pixel (or a segment), and an GDS5908 chip can control a group of RGB. According to the normal mode, the period of 1 bit data is 830ns (frequency 1.2MHz), one pixel data including R (8bit), G (8bit), B (8bit) is 24bit in total, and the transmission time is $830\text{ns} \times 24 \approx 20\ \mu\text{s}$. If there are 1000 pixels in a system, the time of refreshing all the display is $20\ \mu\text{s} \times 1000 = 20\text{ms}$ (ignoring C1, C2 and reset signal time), that is, the refresh rate of one second is: $1 \div 20\text{ms} = 50\text{Hz}$.

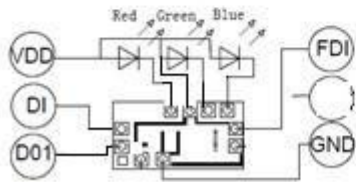
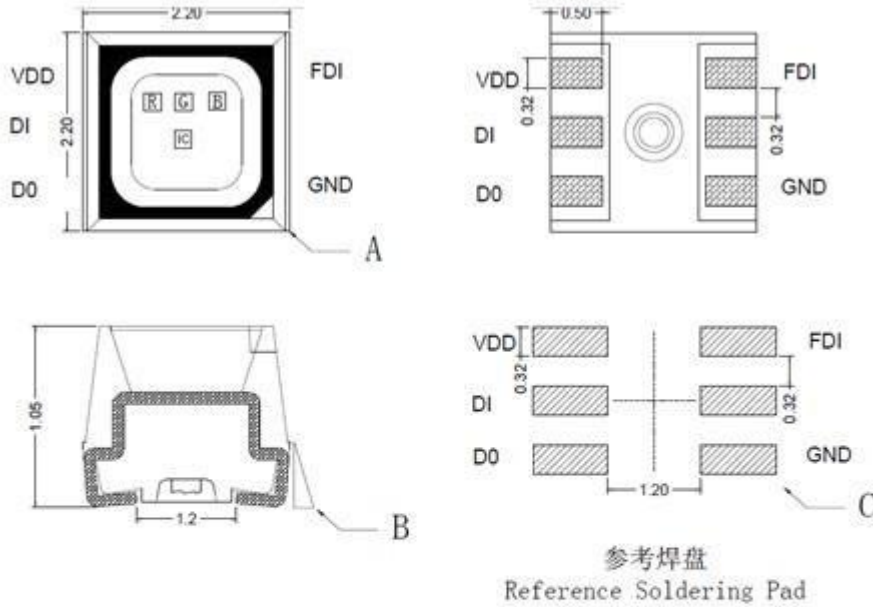
以下是级联点数对应最高数据刷新率表格：

The following table shows the highest data refresh rate corresponding to the number of cascade points:

正常模式 Normal mode		
像素点数 Pixel count	最快一次数据刷新时间 (ms) Fastest data refresh time (MS)	最高数据刷新率 (Hz) Maximum data refresh rate (Hz)
1~500	10 Ten	100 One hundred
1~1000	20 Twenty	50 Fifty
1~2000	40 Forty	25 Twenty-five

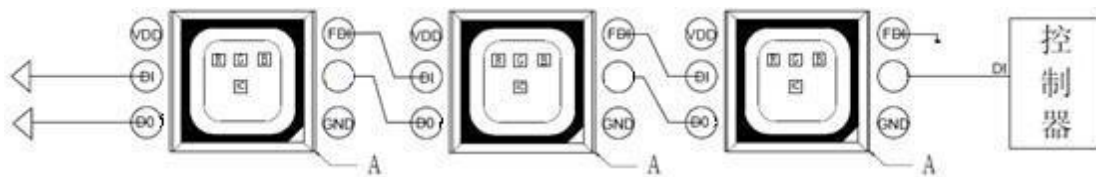
11. 外观尺寸及建议焊盘尺寸:

Appearance size and recommended pad size:



单颗电路

Single circuit



连接电路

Connection circuit

备注:

Note:

所有尺寸单位为 mm, 误差范围为±0.1mm

All size units are mm, the error range is 0.1 mm

12. 光电特性

Electrical-Optical Characteristics

(1) 最大限度额定值(温度=25±5°C)

Absolute Maximum Ratings (TA=25±5°C)

项目 Item	符号 Symbol	最大额定值 Absolute Maximum Rating			单位 Unit
		Blue	Green	Red	
正向电流 Forward Current	IF	20	20	30	mA
正向峰值电流 Pulse Forward Current	IFP	30	30	50	mA
功率消耗 Power Dissipation	PD	80	80	90	mW
反向电压 Reverse Voltage	VR	10			V
灯珠焊盘工作温度 LED Pad Operating Temperature	Topr	-30°C To +85°C			° C
贮藏温度 Storage Temperature	Tstg	-40°C To +85°C			° C
焊接温度 Soldering Temperature	Tsld	Reflow Soldering: 260°C Hand Soldering: 300°C			for 10sec. for 3sec.
逻辑电源电压 Logic supply voltage	VDD	-0.4~+7.0			V
DIN、FDIN 端口电压 Din, fdin port voltage	Vin	-0.4~ VDD+0.5			V
OUT 端口电压 Out port voltage	Vout	-0.4~+5.5			V
工作温度范围 Operating temperature range	Topr	-40~+85			° C
储存温度范围 Storage temperature range	Tstg	-50~+150			° C
静电 ESD Electrostatic ESD	人体模式 (HBM) Human body mode (HBM)	400			V

1/10 周期, 0.1 msec 脉宽

IFP Conditions: 1/10 Duty Cycle, 0.1 msec Pulse Width.

(2) 本产品光电参数(温度=25±5°C)

Initial Electrical/Optical Characteristics (TA=25±5°C)

符号 Symbol	项目 Item	单位 Units	发光颜色 Device	最小值 Min.	规格值 Typ.	最大值 Max.	测试条件 Test Conditions
VF	正向电压	V	Red	1.5		3	IF=20mA
			Green	2.5		4	IF=10mA



	Forward Voltage		Blue	2.5		4	IF=8mA
--	-----------------	--	------	-----	--	---	--------



IR	反向电流 Reverse Current	uA	-	-	-	0.5	VR=10V
$\Delta \lambda 1/2$	发光角度 Viewing Angle	°	-	-	110	-	IF=15/8/5mA
Iv	发光强度 Luminous Intensity	Mcd	Red	500		700	IF=20mA
			Green	600		900	IF=10mA
			Blue	130		170	IF=8mA
λD	主波长 Dominate Wavelength	Nm	Red	620		625	IF=20mA
			Green	510		535	IF=10mA
			Blue	458		475	IF=8mA

正向电压允许误差 $\pm 0.05V$

Tolerance of measurement of Vf is $\pm 0.05 V$.

亮度允许误差 $\pm 10\%$

Luminous Intensity Measurement allowance is $\pm 10\%$.

波长允许误差 $\pm 1nm$

Color Coordinates Measurement allowance is $\pm 1nm$.

以上发光强度最小值和最大值参数仅供参考，但批量出货亮度分光跨度范围为 1: 1.3 之内。

Above are the reference for minimum and maximum of luminous intensity which rank in the rate of 1:1.3 in the process of light splitting when manufacturing massively.

以上波长最小值和最大值参数仅供参考，但批量出货波长分光跨度范围为 R:5nm、G:3nm、B:3nm 之内

Above are the reference for minimum and maximum of wavelength, while it ranks as:R:5nm/G:3nm/B:3nm.when light splitting in mass manufacturing.

(3) 推荐工作条件

Recommended working conditions

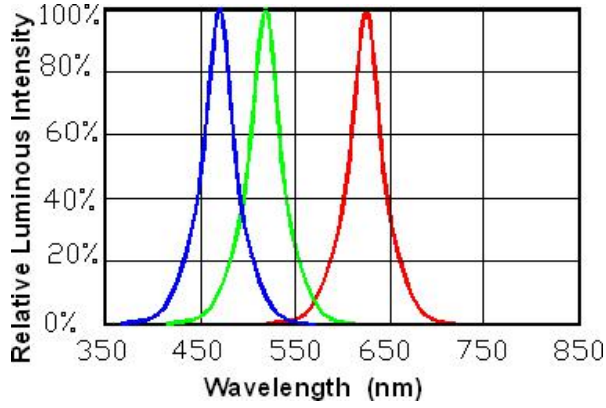
在-40~+85°C下测试，除非另有说明 Test at - 40 to + 85 ° C, unless otherwise noted			GDS5908			单位 Company
参数名称 Parameter name	参数符号 Parameter symbol	测试条件 Testing conditions	最小值 minimum value	典型值 Typical value	最大值 Maximum value	
电源电压 supply voltage	VDD		4.5	5	5.5	V
DIN、FDIN 端口电压 Din, Fdin port voltage	Vin	VDD=5V, DIN、FDIN 串接 1KΩ 电阻 VDD = 5V, DIN, fdin series 1K Ω resistance			VDD+0.4	V
D01、D02 端口电压 D01, D02 port voltage	Vdo	VDD=5V, D01、D02 串接 1KΩ 电阻 VDD = 5V, D01 and D02 are connected in series with 1K Ω resistance			VDD+0.4	V
OUT 端口电压 Out port voltage	Vout	OUT=OFF			5	V

13. 特性曲线

Characteristic Curve

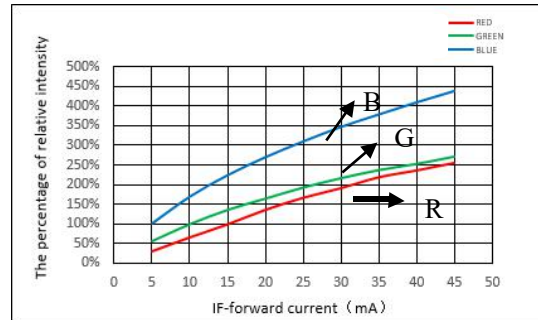
光谱分布特征曲线

Relative Spectral Distribution



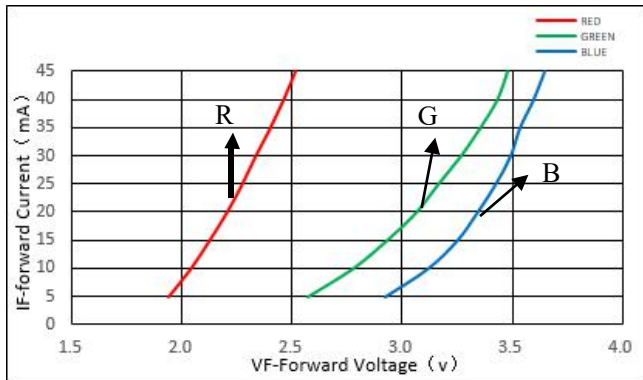
相对光强与正向电流特征

Relative Luminous Intensity VS Forward Current



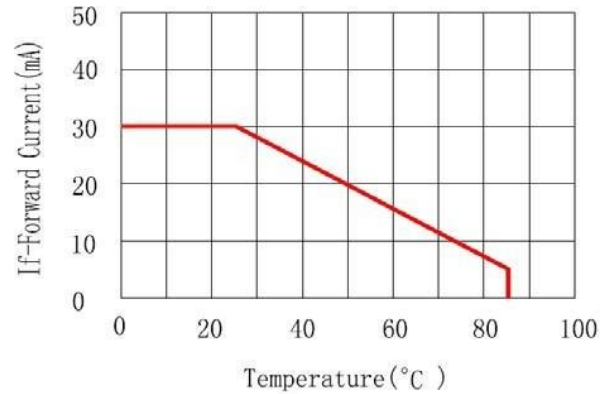
伏安特性

Electrical Characteristics



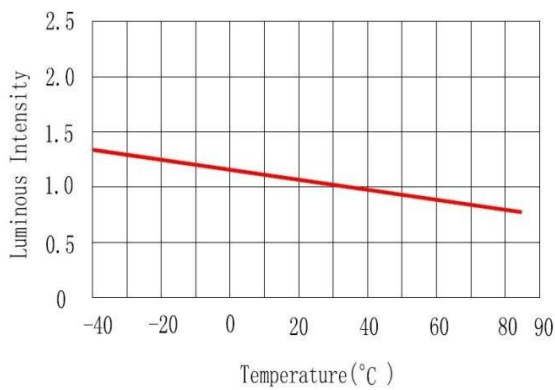
正向电流降额曲线

Forward Current Derating Curve



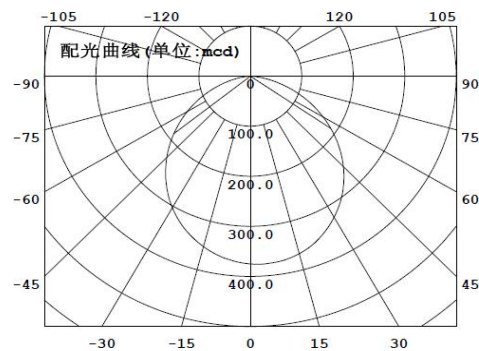
光强与环境温度曲线

Luminous Intensity VS Ambient Temperature



配光曲线

Light distribution curve



恒流曲线
Constant current

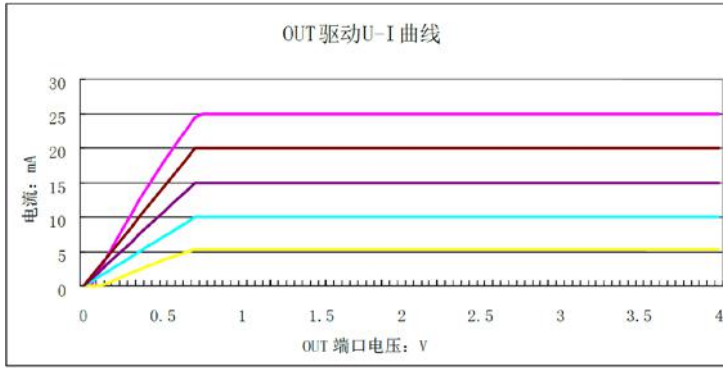


图9

14. 可靠性试验

Reliability Test

序号 NO.	试验项目 Test Items	参考标准 Reference	试验条件 Test condition		实验数 Laboratory number	允收水准 LTPD
1	温度循环保存 temperature cycling test	EIAJ ED-4701 100 105	-40℃~25℃~100℃~25℃ 30min ~5min ~30min~5min	100 cycles	22	0/22
2	冷热冲击保存 Thermal shock test	EIAJ ED-4701 300 307	-55℃~150℃ 15min~15min	500 cycles	22	0/22
3	高温储存 High temperature storage test	EIAJ ED-4701 200 201	Ta=125℃	1000 hrs	22	0/22
4	低温储存 Low temperature storage test	EIAJ ED-4701 200 202	Ta=-55℃	1000 hrs	22	0/22
5	常温寿命试验 Continuous operating test	EIAJ ED-4701 100 101	Ta=25±5℃ IF=1.5 倍分光电流	1000 hrs	22	0/22
6	高温高湿寿命试验 High temperature and humidity operating test	EIAJ ED-4701 100 102	Ta=85℃ RH=85% IF=额定分光电流	1000 hrs	22	0/22
7	耐焊性(回流焊) Soldering resistance test	EIAJ ED-4701 300 301	Pre treatment: Tsol=260℃, T=10s	3times	22	0/22
8	潮湿等级 3 MSL3	IPC/JEDEC J-STD-020D.1	1. 除湿 125℃/24H Except wet 125 °C/ 24 h 2. Ta=60℃ RH=60%吸湿 52H Ta=60℃RH=60% moisture absorption 52 h	1times	22	0/22



			3. T _{sol} =260℃, T=10s 回流焊 3 次 T _{sol} = 260 ℃, t = 10 s reflow soldering 3times		
备注 Comment	<p>以上试验项目如与客户试验要求存在差异的或者特殊客户特殊要求的可根据实际情况按照客户的要求进行试作, 客户未要求的按我司试验标准试作. 不同产品使用不同电流进行测试。</p> <p>All the tests such as with the customer requirements exist differences or special customer's special requirement, can according to the actual situation in accordance with the requirements of customers are trying, not required by the customer according to the standard of our test trial. Different products using different current test.</p>				

15. 注意事项

Cautions

15.1 焊接（包括手动和回流焊）

Soldering (Including manual and reflow soldering)

15.1.1 使用烙铁手动焊接

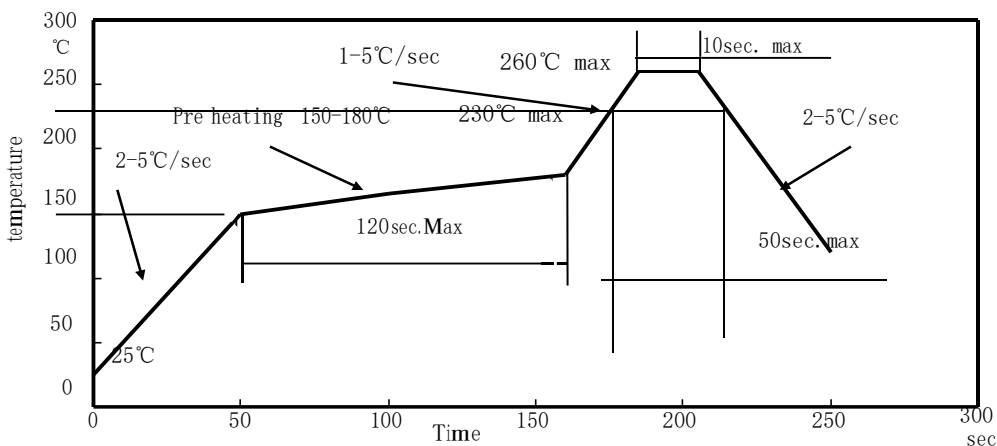
Hand Soldering

焊接时烙铁的温度必须保持在 300℃ 以下，且每个引脚只能进行一次焊接，每次焊接的持续时间不得超过3秒。因 LED 尺寸较小，采用手工焊接较难管控焊接温度及加锡时间的一致性，且易破坏灯体结构，严重时可能造成 LED 失效，所以请尽量使用回流焊机台作业。

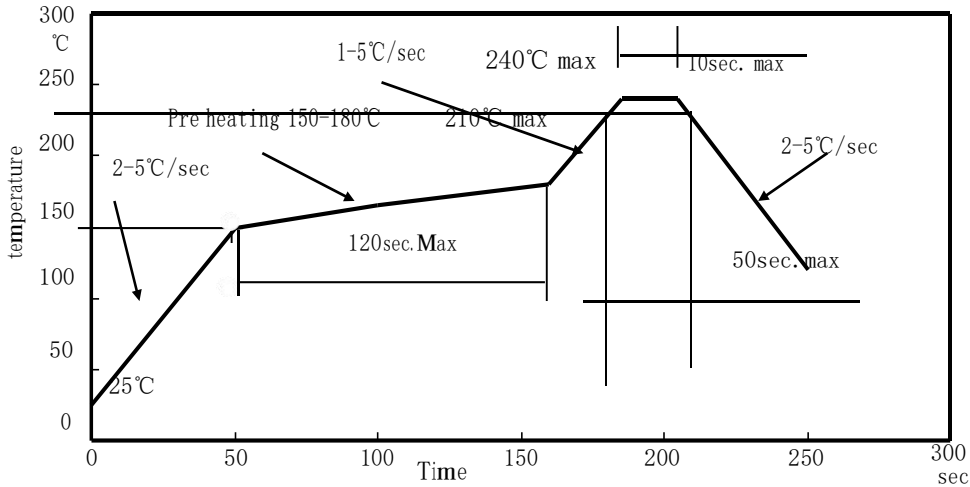
Welding when the temperature of the soldering iron must be kept below 300 ℃, and each can only make a welding electrode, the duration of each welding should not more than 3 seconds. Due to the small size of leds, the use of manual welding are harder to control welding temperature and tin time consistency, and easy to destroy the light body structure, serious when can cause the LED failure, so please use reflow welding machine operation.

15.1.2 无铅回流焊接

Lead-free reflow soldering



15.1.3 有铅回流焊接
With lead reflow soldering



备注:

note:

a. 建议 LED 贴板前对 PCB 板进行烘烤, 建议烘烤条件 110°C/4H。

Recommended LED board before the board to bake PCB, recommended baking conditions 110°C /4H.

b. 建议回流温度 240°C (±5°C)。最大的焊接温度应限制在 260°C。

Recommend the reflow temperature 240°C (±5°C).the maximum soldering temperature should be limited to 260°C.

c. 回流焊接最多只能进行两次, 在回流焊接升温过程中, 请不要对 LED 施加任何压力。在焊接完成后, 待产品温度下降到室温之后, 再进行其他处理。

The reflow soldering only twice, in the process of reflow soldering temperature, please don't impose any pressure on the LED.

After completion of welding, after the product after cooling to room temperature, and other processing.

15.2 储存

storage

本产品使用密封防潮抗静电铝箔袋包封并附有干燥剂, 搬运过程中应避免挤压、刺破包装袋的情况发生, 同时为避免产品受潮引发的可靠性失效问题, 需做好 LED 产品焊接前的储存与防潮措施, 如下:

This product use sealed moisture-proof anti-static aluminum foil bag bag with desiccant, handling should be avoided in the process of extrusion, prick bags happens, at the same time to avoid the reliability of the product be affected with damp be affected with damp cause failure problem, need to be LED products storage and moisture-proof measures before welding, are as follows:

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

Unopened product should be stored in: temperature: within 30 °C / humidity: 60% RH under environment, within 3 months and finished.

15.2.2 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 product package, please check whether there is any leakage on packaging, if there is a leak phenomenon,



please return to bake dehumidification packing before use.

15.2.3 包装袋开启后, 产品必须: 在规定环境温度 30℃以内、湿度 60%RH 以下的条件中使用; 并且需要在 12H 内焊接完毕; 未使用完的需存储于温度:25℃以内 湿度:30%RH 以下的环境, 且必须在 24H 内用完。

Bag after open, the product must be: within the prescribed environmental conditions within 30 °C temperature humidity below 60% RH; And need to be within 12 h after welding; Has not used up for storage for in temperature: within 25 °C, humidity: 30% RH under environment, and must be finished within 24 h.

15.2.4 材料拆装后使用时间超过 12H 未用完, 需重新烘烤后才可使用。烘烤条件如下表:

Materials used after disassembling time more than 12 h, not use up need to be available after baking. Baking conditions in the following table:

产品型号 Product model	开封前受潮 Dampness before Kaifeng	开封前未受潮 No damp before Kaifeng	
		<60 天 <60 day	>60 天 >60 day
2222	返厂处理	60°C/12HR	60°C/24HR
备注 Note	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%. Dampness before Kaifeng: ① packing air leakage. ②. after opening the package, found that the internal leakage rate of package reached 30%. 2. 针对">60 天"以包装标签上包装日期为基准. For " > 60 days" is based on the packaging date of the packaging label.		

15.3 静电防护

Electrostatic protection

15.3.1 静电和电涌会导致产品特性发生改变, 例如正向电压降低等, 如果情况严重甚至会损毁产品。所以对于整个工序 (生产、测试、包装等) 与 LED 直接接触的员工都要做好防止和消除静电措施。

Static and transient causes product characteristics change, such as forward voltage to reduce, if severe cases may even damage the product. So for the entire process (production, testing, packaging, etc.) in direct contact with the LED workers to make measures to prevent and eliminate static electricity.

15.3.2 所有相关的设备和机器都应该正确接地, 接地交流阻小于 1.0 欧姆, 工作台上需垫表面电阻为 106-109 Ω 的桌垫。

All related equipment and machines should be properly grounded, grounding ac resistance is less than 1.0 ohms, workbench to pad surface resistance is 106-109 Ω table mat.

15.3.3 在容易产生静电的环境与设备上, 还必须安装离子风扇, 作业过程中操作员需使用防静电手环, 防静电垫子, 防静电工作服、工作鞋、手套, 防静电容器等, 取放材料时尽可能拿胶体部分。

In easy to produce static environment and equipment, must also be installed ion fan, operator need to use anti-static bracelet in the process of operation, anti-static MATS, anti-static overalls, work shoes, gloves, anti-static container, etc., take put material with colloid part as much as possible.

15.4 其他事项

Other items

15.4.1 LED 产品的树脂封装部分相当脆弱，请勿用坚硬、尖锐的物体刮擦封装树脂部分，用镊子夹取 LED 时也应当小心注意。

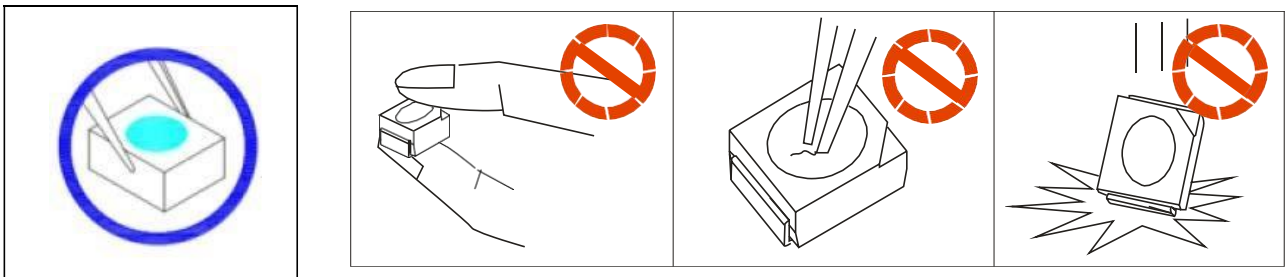
Very fragile epoxy resin encapsulation part of LED products, please do not use hard, sharp objects scratching encapsulating resin parts, use tweezers clip also should be careful when you pick up the LED.

15.4.2 请勿直接用手拿取 LED 产品：直接用手拿取 LED 产品不但会污染封装树脂表面，也可能由于静电等因素导致产品性能的改变。

Please do not directly by hand take LED products: directly with the hand take LED products will not only pollution encapsulating resin surface, may also be due to factors such as electrostatic leads to a change in product performance.

15.4.3 请勿对 LED 产品施加过度压力，特别当 LED 产品处于高温状态下（例如在回流焊接过程中），过度的压力可能直接影响封装内部的管芯和金线。

Please do not put too much pressure on LED product, especially when LED products under high temperature condition (for example) in the process of reflow soldering, excessive stress can directly affect the sealed tube core and gold thread.



16. 包装

PACKAGING

(1) 包装标签:

Packaging label:

标签说明:

Notes of Label:

a、在使用我公司 LED 产品生产时请对应好我司产品型号是否一致不同型号产品不能混用。

Please make sure the type of our led products, different types cannot be mixed when using.

b、不同拌料编号不能用于同一块显示屏(型号、参数相同也不能用在同一显示屏)。

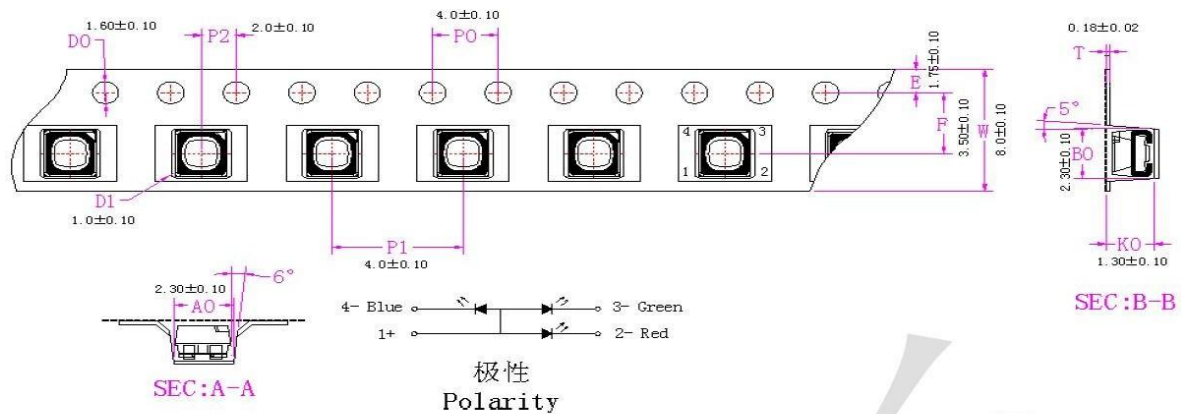
Products in different Banliao number cannot be used in one display panel together ,even with the same type and parameter.

(2) LED 在装带之后纸箱包装。

The LED are packed in cardboard boxes after taping.

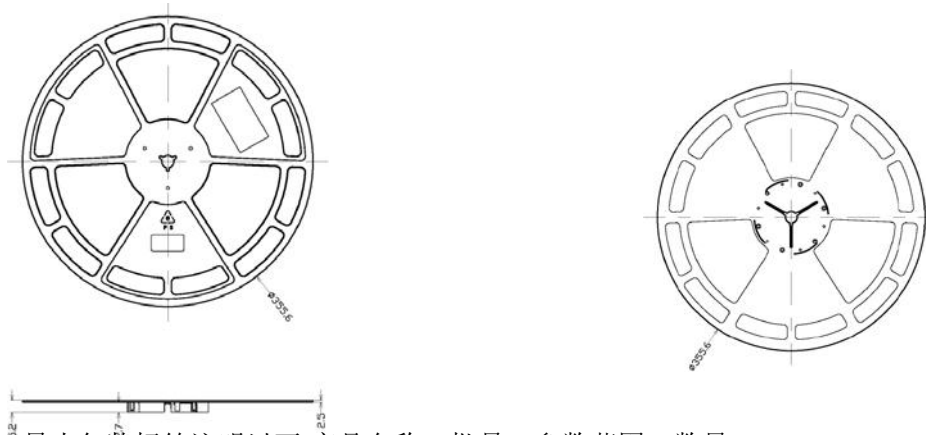
(3) 装带规格(单位:毫米)

Taping Specifications (Units:mm)



(4) 卷轴尺寸

Reel Dimension



(5) 最小包装标签注明以下:产品名称、批号、参数范围、数量。

The label on the minimum packing unit shows ; Part Number, Lot Number, Ranking, Quantity.

(6) 请注意防水防潮。

Keep away from water, moisture in order to protect the LED.

(7) 须采取适当防护措施,以防包装箱跌落或受到强力撞击造成对产品的损伤。

The LED may be damaged if the boxes are dropped or receive a strong impact against them. so precautions must be taken to prevent any damage.