产 品 规 格 书

Product Specification

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注：　**1.**此规格书以中英文方式书写，若有冲突以中文版文本为准。/This specification is written in both Chinese and English. In case of conflict, the Chinese version shall prevail.

　　　2.此规格书的最终解释权归由本公司。/The final interpretation of this specification shall be vested in the company.

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1、产品概述/Product Overview：

N302B7-3535RGB 是一款集成高质量单线级联恒流驱动 IC N302B7 和高质量 RGB LED 芯片的外控恒流 3535 集成灯珠。其中内置控制 IC N302B7 具有高可靠，低功耗，抗干扰性能高和恒流精度高的特点，而内部集成优选高质量的 LED 芯片，具有发光一致性优良，白光效果纯正，光衰小的优点。N302B7-3535RGB 将 2 者优点相结合，同时带来体积小，外围元件少，版面干净的特点。通过外部控制器控制，可展现幻彩，动画以及高标准视频效果。/N302B7-3535RGB is an externally controlled constant current 3535 integrated bead that integrates high-quality single-line cascade current drive IC N302B7 and high-quality RGB LED chips. Among them, the built-in control IC N302B7 has the characteristics of high reliability, low power consumption, and high anti-interference performance. The internal integration of high-quality LED chips has the advantages of excellent luminous consistency, pure white light effect, and low light decay. N302B7-3535RGB combines the advantages of 2 people with the characteristics of small size, few peripheral components, and clean layout. Through the external controller control, can show the color, animation and high standard video effects.

2、功能特点/Functional characteristics：

2.1 3535 灯珠内部集成高质量外控单线级联恒流 IC(IC 内置滤波器件，增强其信号抗干扰能力)，优质 RGB LED 芯片，体积小巧，外围简单。/The 3535 ball interior integrates high-quality external single-line cascade current IC(IC built-in filter device, enhances its signal anti-jamming ability), high-quality RGB LED chip, compact size, and simple periphery.

2.2 内置 N302B7 恒流精度高，内部 RGB 芯片预先分光处理。发光高度一致，白光效果纯正。此款 N302B7 可接受白光及其单色定制。/The built-in N302B7 constant current has high accuracy and the internal RGB chip is pre-spectroscopic. The luminous height is the same, and the white light effect is pure. This N302B7 accepts white light and its monochrome customization.

2.3 整形转发强化技术，单线数据传输，可无限级联。/Plastic forwarding enhancement technology, single-line data transmission, can be cascaded.

2.4 数据传输频率 800Kbps/秒，可实现画面刷新速率 30 帧 / 秒时，不小于 1024 点。/The data transmission frequency is 800Kbps per second, and the screen refresh rate can be achieved at 30 frames per second, not less than 1024 points.

2.5 输出端口 PWM 控制能够实现 256 级灰度调节，端口扫描频率 1.5KHz／s。/The output port PWM control can achieve 256 levels of grayscale adjustment, and the port scan frequency is 1.5 KHz / S.

2.6 采用优化预置 12mA/通道恒流模式，低压驱动级联数量最大化。高恒流精度，片内误差<1.5%，片间误差<3%。/Optimized preset 12mA / channel constant current mode is adopted to maximize the number of low-voltage drive cascades. High constant current accuracy, intraslice error & lt; 1.5 %, interslice error & lt; 3 %.

2.7 内置低压强化模块，VDD 在 2.7V 以上 100%正常工作。/The built-in low-pressure reinforcement module, VDD is 100 % normal above 2.7 V.

2.8 超强数据整形能力：接受完本单元数据自动将后续数据整形输出。/Super data shaping ability: accept this unit data automatically will follow the data shaping output.

3、应用领域/Application area：

3.1 全彩发光字/Full color luminous words   3.2 全彩模组/Full color module

3.3 点光源/Point light source   3.4 全彩灯条/Full Light Bar

3.5 灯条屏/Lamp scn   3.6 彩幕屏/Color screen

3.7 圣诞装饰等多场景产品/Christmas decorations and other multi-scene products

4、外观描述 /Appearance description:

型号 **Type**	发光颜色 **Luminescent colors**	表面胶体颜色 **Surface colloid color**
3535 内封 IC N302B7	全彩	半透明雾状胶体

5、封装尺寸/Package Size：

正面图

背面图

侧面图

建议焊盘图
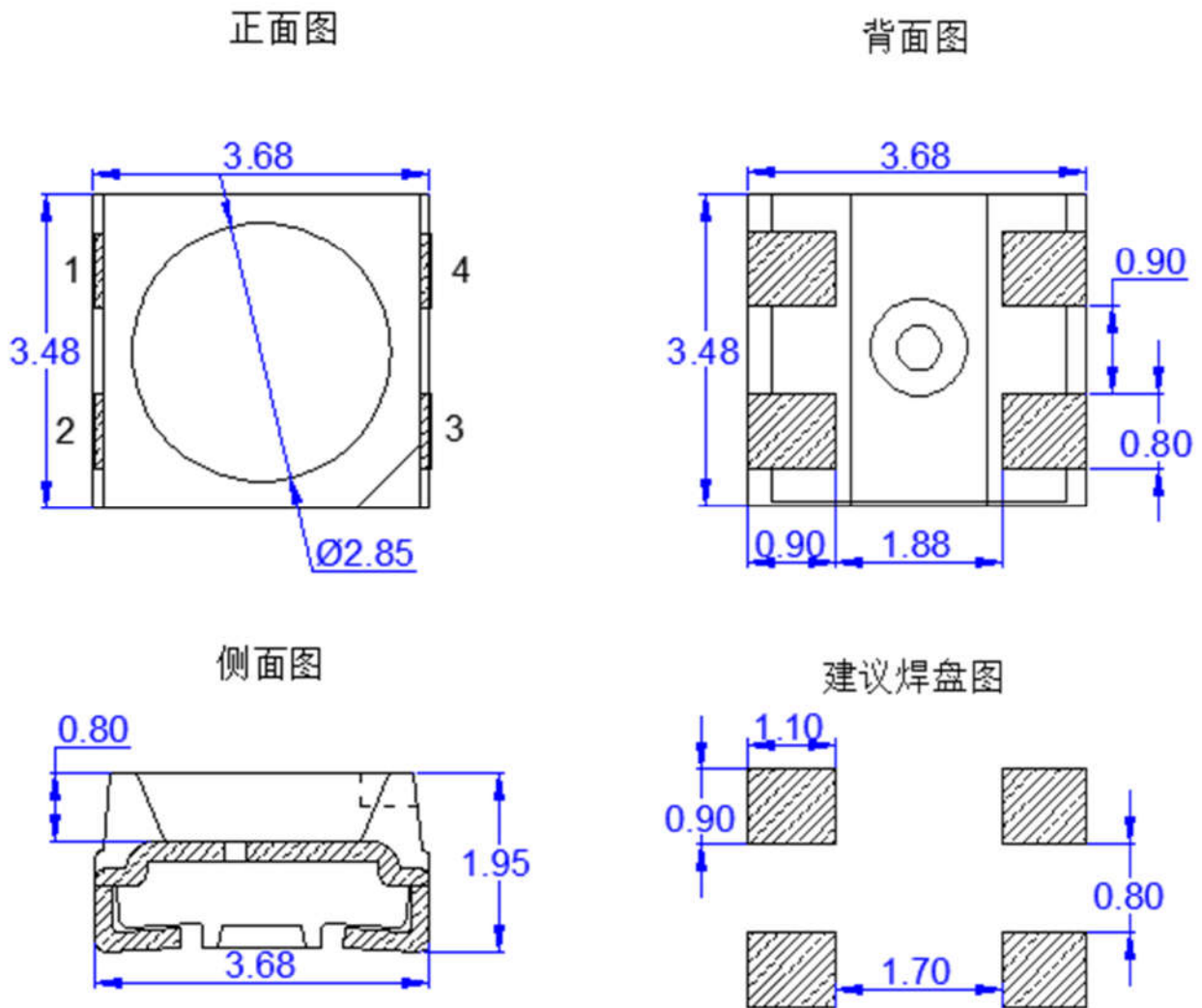
备注/Notes：

   1.所有尺寸以毫米为单位/All dimensions are in millimeters.

   2. 未标注公差为：X.X ±0.10mm , X.XX±0.05mm/Unmarked tolerances: X. X ± 0.10 mm, X. XX ± 0.05

6、脚位图（4PIN）/Foot map(4PIN)：

```
  1 VDD                        4 DIN


  2 DOUT                       3 GND/VSS
```
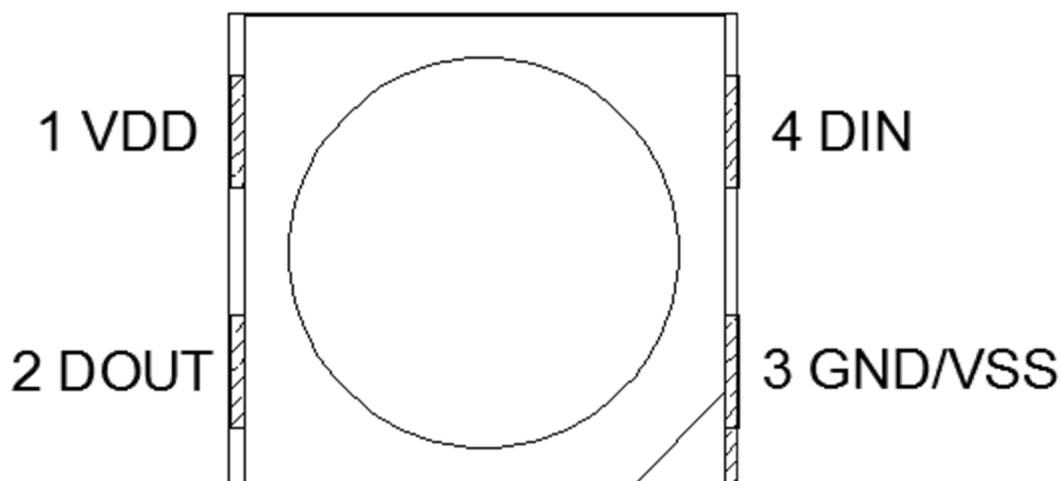
脚位说明/Foot description：

序号	符号	功 能 描 述
1	VDD	内部 N302B7、RGB 正
2	DOUT	显示数据级联输出（800K）
3	GND/VSS	信号地及电源地
4	DIN	显示数据输入（800K）

7、最大额定值（如无特殊说明，$T_A = 25℃$，$V_{ss} = 0V$）/Maximum Rating:(TA = 25 ° C, VSS = 0V, if not specified)：

参数	符号	范围	单位
逻辑电源电压	Vdd	6.5	V
输出端口耐压	Vout	24	V
逻辑输入电压	Vi	$-0.5 \sim Vdd + 0.5$	V
工作温度	Topt	$-40 \sim +85$	℃
储存温度	Tstg	$-55 \sim +150$	℃

8、推荐工作范围（如无特殊说明，Ta= −40～＋85℃，Vss＝0V)/Recommended scope of work(Ta = − 40 ~ +85 ° C, Vss = 0V without special description)：

参数	符号	最小	典型	最大	单位	测试条件
逻辑电源电压	Vdd	–	5.2	6.5	V	–
高电平输入电压	Vih	0.65Vdd	–	Vdd	V	–
低电平输入电压	Vil	0	–	0.3Vdd	V	–
输出端口耐压	Vout	24			V	
PWM 频率			1.5		KHz	

9、电气参数（如无特殊说明，Ta＝－40～＋85℃，Vss＝0V，Vdd＝4.5～5.5V）/Electrical parameters:(Without special instructions, Ta = - 40 ~ +85 ° C, Vss = 0V, Vdd = 4.5 ~ 5.5 V)：

参数	符号	最小	典型	最大	单位	测试条件
低电平输出电流	Iout	–	12	–	mA	R，G，B
低电平输出电流	Ido	10	–	–	mA	$V_o = 0.4V$，Dout
输入电流	Ii	–	–	±1	μA	
输出管脚电流	Isink		12		mA	
高电平输入电压	Vih	0.7Vdd	–		V	D_{IN}，SET
低电平输入电压	Vil	–	–	0.3Vdd	V	D_{IN}，SET
滞后电压	Vh	–	0.35	–	V	D_{IN}，SET
电流偏移量（通道间）	dIout		±1.5	±3.0	%	Vds=1V，Iout=12mA
电流偏移量（芯片间）	dIout		±3.0	±5.0	%	Vds=1V，Iout=12mA
电流偏移量 VS-Vds	%dVds		±0.1	±0.5	%/V	1V<Vds<3V
电流偏移量 VS-Vdd	%dVds		±1.0	±2.0	%/V	4.5V<Vdd<5.5V
动态电流损耗	IDDdyn	无负载		1	mA	
消耗功率	PD	（Ta=25℃）		250	mW	
热阻值	Rth(j-a)		80	190	℃/W	

10、开关特性（如无特殊说明，Ta＝－40～＋85℃，Vss＝0V，Vdd＝4.5～5.5V）/Switching characteristics:(Without special instructions, Ta = - 40 ~ +85 ° C, Vss = 0V, Vdd = 4.5 ~ 5.5 V)：

参数	符号	最小	典型	最大	单位	测试条件
振荡频率	FOSC1	-	800	-	KHz	Vdd =5V
	FOSC2	-	10	-	MHz	Vdd =5V
传输延迟时间	Tflz	-	160	300	ns	$C1 = 15\,pF$，$D_{IN} \rightarrow D_{OUT}$, $R1 = 10\,k\Omega$
下降时间	Tthz	-	-	120	μs	$C1 = 300\,pF$，OUTR／OUTG／OUTB
数据传输率	Fd	800	-	-	Kbps	占空比 50％
输入电容	Ci	-	-	15	pF	-

11、内置 LED 参数/Built-in LED parameters：

| 发光颜色	主波长（nm）	发光强度（mcd）	工作电流（mA）	工作电压（V）
R	620-625	500-600	20	2.0-2.2
G	520-525	2000-2400	20	3.0-3.3
B	465-470	240-300	20	3.0-3.3

12、功能说明/Description of functions：

　　N302B7-3535RGB 灯珠采用单线通讯方式，采用归零码的方式发送信号。芯片在上电复位以后，接收 DIN 端打来的数据，接收够 24bit 后，DO 端口开始转发数据，供下一个芯片提供输入数据。在转发之前，DO 口一直拉低。此时灯珠将不接收新的数据，内置 RGB 芯片根据接收到的 24bit 数据后产生的不同占空比信号，展现不同亮度。如果 DIN 端输入信号为 RESET 信号，芯片将接收到的数据送显示，芯片将在该信号结束后重新接收新的数据，在接收完开始的 24bit 数据后，通过 DO口转发数据，灯珠在没有接收到 RESET 码前，RGB 亮度保持不变，当接收到 100us 以上低电平 RESET码后，灯珠内部 RGB 芯片将根据刚才接收到的 24bit 数据后产生的不同占空比信号，展现不同亮度。/N302B7-3535RGB lamp beads use single-line communication, using zero-return code to send signals. After the reset, the chip receives the data from Din. After receiving 24 bits, the DO begins to transmit the data for the next chip to provide input data. Do mouth pulled down until retweeted. At this point will not receive new data, BUILT-IN RGB chip according to the received 24 bit data generated by the duty cycle signal, display different brightness. If Din input signal is RESET signal, the chip will receive the data sent display, the chip will receive the new data after the end of the signal, after receiving the initial 24 bit data, the data will be transmitted through the DO port Before receiving the Reset Code, the RGB brightness remains the same. After receiving the low level RESET code above 100us, the RGB chip inside the lamp will display different brightness according to the different duty cycle signal generated after receiving the 24bit data just now.
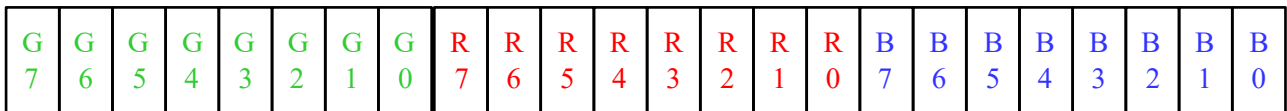

1）芯片级联方法/Chip cascading method：
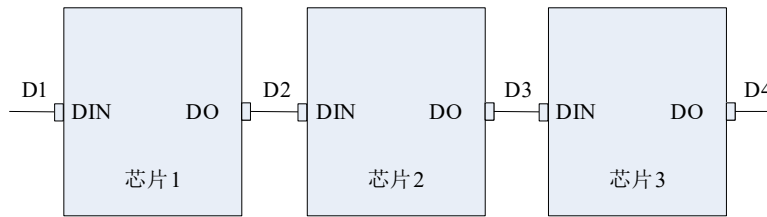
2）数据传输/Data transmission：
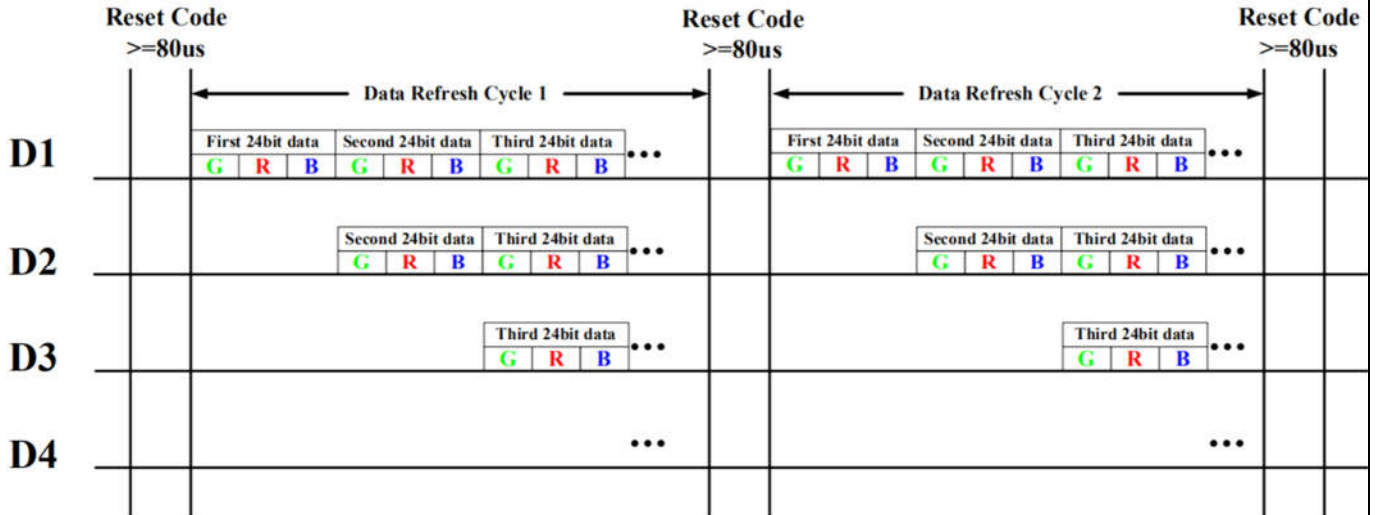
注：其中 D1 为 MCU 端发送的数据，D2、D3、D4 为级联电路自动整形转发的数据。/Note: Where D1 is the data sent by the MCU, D2, D3, and D4 are the data automatically transferred by the cascading circuit.

3） 24bit 数据结构/24 bit data structure:

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

注：高位先发，按照 GRB 的顺序发送数据/Note: Higher-level starts, sending data in GRB order.

4）时序波形图/Sequential wave map:
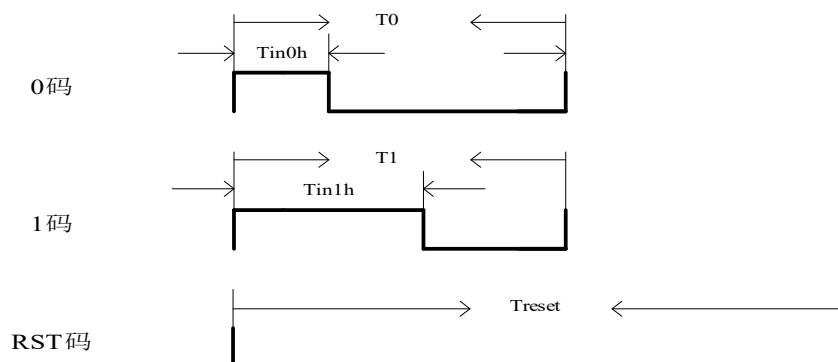
5）信号传输定义/Signal Transmission Definition：

参数名称	参数符号	最小值	典型值	最大值	单位

输入 0 码高电平时间	Tin0h	0.20	0.28	0.35	μs
输入 1 码高电平时间	Tin1h	0.65	0.9	1.0	μs
输入 0 码低电平时间	T0L	1.55	1.72	30	μs
输入 1 码低电平时间	T1L	1.10	1.10	30	μs
0 码/1 码周期	T0/T1	1.75	–	35	μs
RESET 码低电平时间	Treset	100	150	–	μs

注/Note:

    a：3535RGB 主要根据高电平时间判断"0"码和"1"码。高电平时间介于 200ns~410ns, IC 判断为"0"码, 高电平时间介于 640ns~1000ns, 判断为"1"码。"0"码和"1"码的低电平代表此码结束，准备接收下一数据码。/a: 3535RGB is mainly based on high-voltage flat time to determine "0" code and "1" code. The high power level time is between 200ns ~ 410ns, IC is judged to be "0" code, high power level time is between 640ns ~ 1000ns, and it is judged to be "1" code. The low levels of the "0" code and the "1" code represent the end of this code and are ready to receive the next data code.

    b：低电平复位时间最小为100us，为了留有裕度，一帧数据传输过程中(包括 24bit 和 24bit 之间、bit 和 bit 之间)不要中断超过 35us，否则可能会被 IC 认为是 RESET。中断时间在 35us 之内，控制器可以进行正常数据传输等其他操作。/b: The low flat reset time is a minimum of 100us. In order to leave a margin, do not interrupt more than 35us during a frame data transmission(including between 24bit and 24bit, between bit and bit), otherwise it may be considered by IC as RESET. The interrupt time is within 35us, and the controller can perform other operations such as normal data transmission.

6）控制器时序建议值/Recommended Controller Timing：

| 名称	描述	典型值	建议设定值
T0H	0 码，高电平时间	0.28μs	0.28μs
T1H	1 码，高电平时间	0.9μs	0.9μs
T0L	0 码，低电平时间	>1.72μs	1.72μs
T1L	1 码，低电平时间	>1.1μs	1.1μs
T	"0"码或"1"码周期	>2.0μs	--
Treset	Reset 码，低电平时间	>100μs	150μs

13、恒流曲线/Constant-current curve：

    N302B7-3535RGB 内置N302B7 IC恒流特性优异，通道间甚至芯片间的电流差异极小。/The N302B7-3535RGB built-in N302B7 IC has excellent constant current characteristics, and the current difference between channels

and even between chips is minimal.

(1)：通道间的最大电流误差小于±1.5％，而芯片间的最大电流误差小于±3％。The maximum current error between channels is less than ± 1.5％ , and the maximum current error between chips is less than ± 3％.

(2)：当负载端电压发生变化时，输出电流不受影响，如下图所示/When the voltage at the load end changes, the output current is not affected, as shown in the figure below:
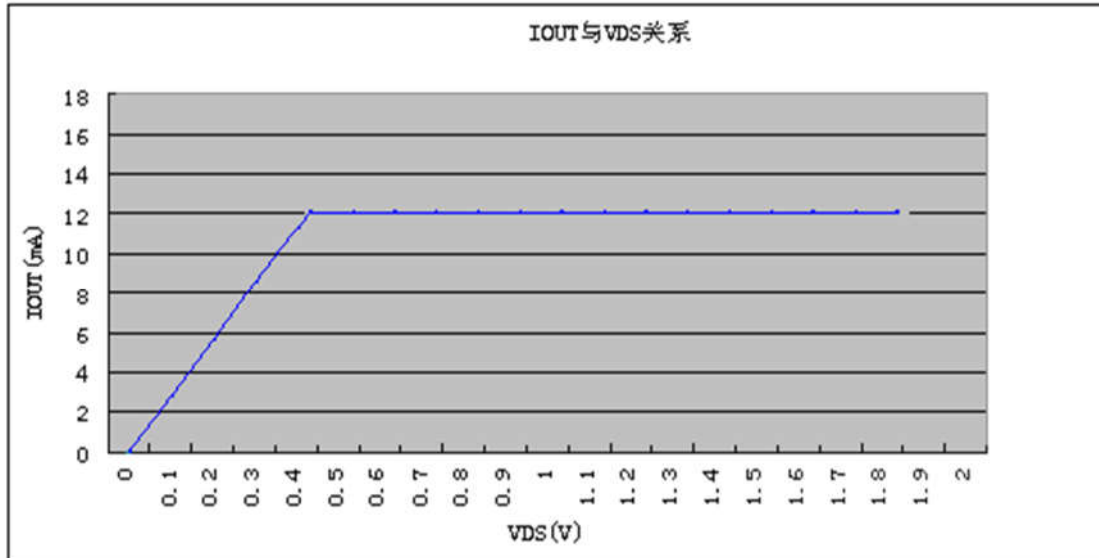
14、应用线路图/Application Route Diagram：

电源电压 5V（如下图示）/Power supply voltage 5V(as shown)
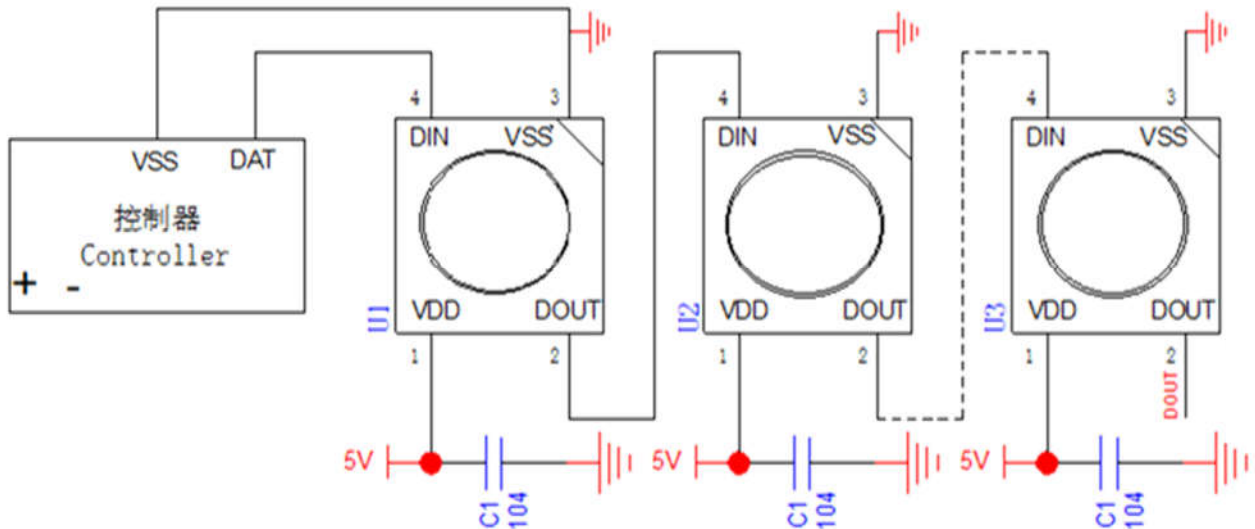
产品应用中驱控灯珠级联数量及控制器参数配置、驱动电源品质均有较大差异，故请在批量使用 N302B7-3535RGB 产品前，客户方务必自行验证产品兼容性，威能不承诺满足客户所有应用需求./There are great differences in the number of drive lights and the configuration of controller parameters and the quality of drive power supply in product applications. Therefore, before using the N302B7-3535RGB product in bulk, the customer must verify the product compatibility. Power does not promise to meet all customer application requirements.

15、使用注意事项/Precautions：

15.1、存储要求:1.1 推荐储存环境：温度：5°C – 30°C ；湿度：相对湿度 60％以下；/Storage requirements: 1.1 Recommended storage environment: temperature: 5 ℃ -30 ℃; Humidity: Relative humidity below 60

15.2、防潮袋密封包装储存时间为 15 天，起始时间以包装标签日期为准，包装袋封口良好并无漏气现象，如超过 15 天的 LED 需放进 65 ± 5℃；相对湿度≤10%RH 的烤箱烘烤，烘烤时间：24 小时；／The storage time of the waterproof bag sealed packaging is 15 days. The starting time is based on the date of the packaging label. The packaging bag has a good sealing and no leakage. For example, LEDs over 15 days need to be put into 65 ± 5 °C; Relative humidity ≤ 10 % RH oven baking time: 24 hours。

15.3、表面贴装器件(SMDs)属于潮湿敏感性元件，空气中的湿气通过扩散渗透到产品中。当 SMD 元件焊接到电路板上的过程是将其通过温度为 150℃-260℃的回流焊，在高温状态下，渗入其中的湿气快速膨胀产生足够的蒸汽压力损伤或毁坏 LED 元件，从而出现材料内胶裂、分层或金线损失等可靠性失效问题；／Surface mount devices(SMDs) are moist sensitive elements, and moisture in the air penetrates the product through diffusion. When the SMD component is welded to the circuit board, it is welded through a return welding at a temperature of 150 °C -260 °C. At a high temperature, the moisture that infiltrates it rapidly expands to produce enough steam pressure damage or damage to the LED component. Therefore, there are reliability failure problems such as internal cracking, delamination or gold wire loss。

15.4、除潮烘烤条件：低温除湿，即去除铝箔袋后将料盘放置在柜式干燥箱内进行 65±5℃／ 相对湿度≦10%RH，烘烤时间≧24 小时的除湿作业（如属热风烤箱则建议除湿时关闭烤箱进风口开关，关键确保箱内相对湿度≦10%RH）！且回温过程必须在干燥的环境下进行！建议产品除湿后在 4 个小时内完成贴片固焊作业；／Dehumidification baking conditions: low temperature dehumidification, that is, after removing aluminum foil bags, the tray is placed in a cabinet drying box for 65 ± 5 °C / relative humidity of 10 % RH, The baking time is a 12-hour dehumidification(in the case of a hot air oven, it is recommended to close the oven inlet switch when dehumidifying, and the key is to ensure that the relative humidity in the box is 10 % RH)! And the warming process must be carried out in a dry environment! Recommends that the product be dehumidified and finished within 4 hours。

15.5、产品拆封后，LED 在温度≤30℃，相对湿度≤60%RH 的条件下，请在 12H 内使用完，若没有使用完的产品需以 65 ± 5℃/24H 除潮后密封，建议放入干燥柜中存放；／After the product is unsealed, the LED is used within 12H under conditions of temperature ≤ 30 °C and relative humidity ≤ 60 % RH. If the product is not used, it must be sealed after dehumidification with 65 ± 5 °C / 24H. Suggestions for storage in drying cabinets。

15.6、回流焊注意事项：／Attention to Reflow Welding。

15.6.1、无铅锡膏的温度曲线建议，作业前检查回流焊设备的峰值温度/时间是否控制在 240+0\-5℃／≦10 秒！／The temperature curve of lead-free solder paste is recommended. Before operation, check whether the peak temperature / time of the reflux welding equipment is controlled at 240 +0 \ -5 °C / <UNK> 10 seconds!
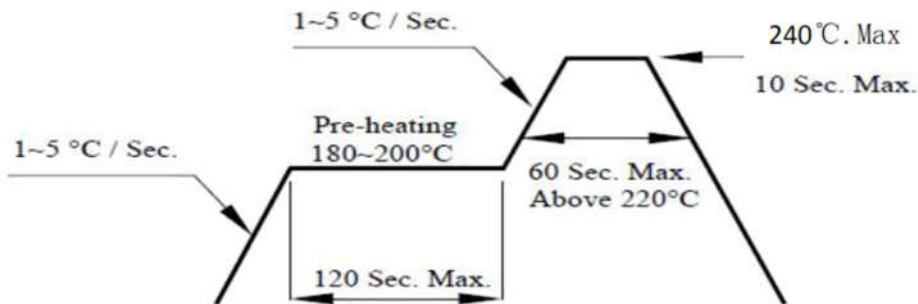
15.6.2、建议检查终端产品是否需要经历二次回流焊工艺，二次回流焊工艺具有一定品质风险性，如需请自行评估并尽量缩短二次回流焊间隔时间（建议不超过 4 小时）；／It is recommended to check whether the terminal product needs to undergo secondary reflux welding process. The secondary reflux welding process has certain quality risks. If you need to evaluate yourself and shorten the secondary reflux welding interval as much as possible(recommended not to exceed 4 hours)。

15.6.3、焊接期间，加热时不要在 LEDs 上添加任何压力；／Do not add any pressure to the LEDs when heated during welding。

15.6.4、焊接后，正常回温至 40℃以下后才可过电流。／After welding, the normal return temperature is below 40 °C before the current can be passed。

15.7、 防护措施：／Protection measures。

15.7.1、LED 器件封装胶水采用的是硅树脂系原材，终端产品如需户外使用需对器件做二次防护措施并请特别注意：／The packaging glue for LED devices is made of silicone. If the end product needs to be used outdoors, the

device must be protected twice. Please pay special attention to it:

A、建议检查各个工艺流程环节应规避产品有堆叠及不规则棱角物伤及产品胶体；/It is recommended that the inspection of various process links should avoid products with stacking and irregular angular injuries and product colloids;

B、建议检查各个工艺流程环节应规避产品与硫、卤、酸、醇、碱、酮类强氧化物、塑化剂等腐蚀性物质接触；/It is recommended to avoid contact with corrosive substances such as sulfur, halogen, acid, alcohol, alkali, ketone strong oxide and plasticizer;

C、建议检查终端产品是否需要封盖、灌胶、裸板高温挤出、超声等二次封装工艺，如需请评估可能伤及 LED 器件的风险；是否需要刷胶、涂油、抹漆等二次涂装工艺，如需请评估可能导致器件胶体表面凹凸、污垢等因素影响发光、导热的风险。/recommends checking whether the terminal product needs to cover, glue, bare plate high temperature extrusion, ultrasound and other secondary packaging process, if necessary, please assess the risk of possible damage to LED devices; If need brush glue, oil, paint and other secondary painting process, if you need to assess the device glue surface bump, dirt and other factors may affect the light emission, heat conductivity risk.

15.8、其他注意事项：/Other points of note:

15.8.1、 电路设计时，建议使用定电流驱动设计，如以定电压设计，请考虑不同电压所造成的影响；/When designing a circuit, it is recommended to use a constant current drive design. If you design with a constant voltage, consider the impact of different voltages;

15.8.2、 LED 产品为单向导通性，使用安装前请确认产品极性，一般产品缺口边为产品负极，若反向安装，不能正常点亮， 且在施加电压时容易造成 LED 芯片损伤或失效；/LED products are simple guides, please confirm the polarity of the product before using the installation. The general product gap edge is the negative electrode of the product. If it is installed in the opposite direction, it can not be lit normally, and it is easy to cause LED chip damage or failure when voltage is applied;

15.8.3、 注意正确的电路设计，不当之设计与电流控制，易造成 LED 失效，如电流过大引起寿命问题甚至烧毁，电流过小引起亮度不足等；/Pay attention to the correct circuit design, improper design and current control, it is easy to cause LED failure, such as excessive current causing life problems or even burning, too small current causing insufficient brightness, etc.;

15.8.4、 不同 BIN 号之 LED 建议分开使用，若需安装在同一个组件时，请先确认是否可满足相关电气及光学特性要求，如电流是否均衡，光色、亮度的一致性等. /The LEDs of different BIN numbers are recommended to be used separately. If you need to install on the same component, please first confirm whether the relevant electrical and optical characteristics can be met, such as whether the current is balanced, the consistency of light color, brightness, etc

15.8.5、 本规格书列出的产品是设计于普通电子产品的应用，例如电器'可视化设备、通信产品等等。因此，建议这些产品不应该用于医疗设施、手术设备、航天器、核电控制系统、灾难/犯罪预防设备等类似的设备。这些产品的错误使用可能直接或间接导致威胁到人们的生命或者导致伤害及财产损失。/The products listed in this specification are designed for applications of ordinary electronic products, such as electrical 'visual equipment, communication products, etc.. Therefore, it is recommended that these products should not be used for similar equipment such as medical facilities, surgical equipment, spacecraft, nuclear power control systems, and disaster-crime prevention equipment. Misuse of these products may directly or indirectly result in a threat to human life or lead to injury and loss of property.