



连云港美华电子科技有限公司

Lianyungang Meihua Electronics Technology Co., Ltd

产品规格书

DATA SHEET

Part No: MHP1515ICRGBDT
REV.1

本产品符合 ROHS 指令有关限制有害物质的环保要求.

日期 DATE	拟制 PREPARED	审核 VERIFIED	批准 APPROVED
2021-12-07	Bob		Sunny

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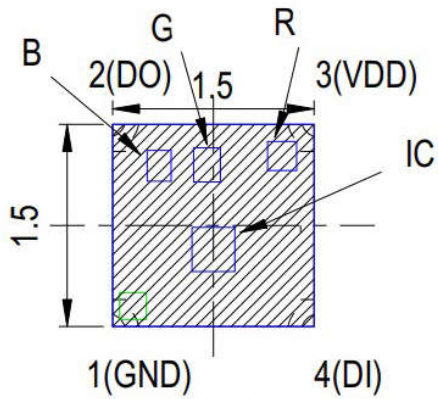


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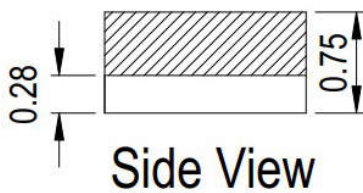
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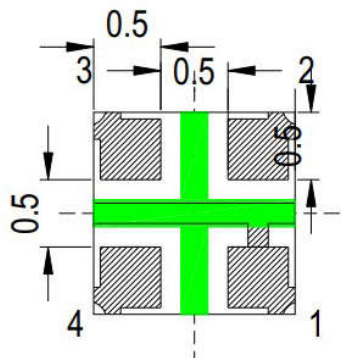
产品外观尺寸 PACKAGE DIMENSIONS



Top View

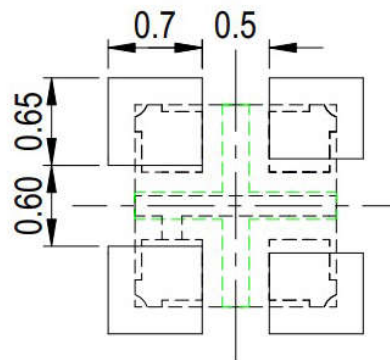


Side View



Bottom View

Recommended Solder Pad



注意 NOTES :

1. 所有尺寸均为 mm(英寸)

All dimensions are in millimeters. (inches)

2. 如无特殊说明, 公差为 0.10mm(0.004")

Tolerance is $\pm 0.10\text{mm}$ (0.004") unless otherwise specified.

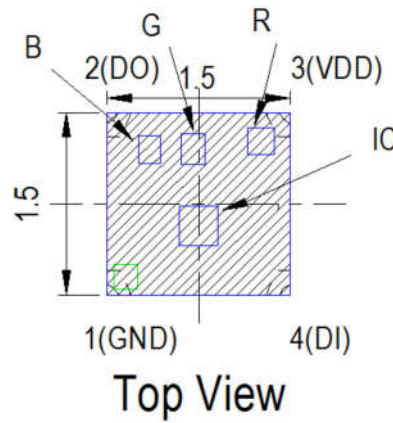


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引脚图和功能 Pin diagram and functions



NO.	符号 Symbol	Pin 名 Pin name	功能描述 Function description
3	VDD	电源 Power Supply	5V± 10%
4	DI	数据输入 Data input	Built-in Pull down resistance
1	GND	接地 Ground	Signal ground
2	DO	数据输出 Data output	Built-in Pull down resistance@input mode

极限参数 Absolute Maximum Ratings (Limit parameter, Ta=25℃, VDD=5V, VSS=0V)

参数 Parameter	符号 Symbol	范围 Range	单位 Company
电压 Voltage	VDD	-0.4 ~ +5.5	V
逻辑输入电压 Logic input voltage	V _I	-0.4 ~ VDD+0.4	V
工作温度 Working temperature	T _{opt}	-40~+150	℃
储存温度 Storage temperature	T _{stg}	-55~+150	℃
静电 ESD (Human Body Model)	VESD	2K	V



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产品特性 FEATURES

- 高可靠性和高稳定性
High intensity and reliability
- 高品质、和低功耗、低成本
High quality, Low power requirement and low cost
- 室内小间距显示屏
Indoor signage display applications
- 全彩型
Full-color type
- IC 易兼容、易装配
IC compatible, Easy assembly
- 符合 RoHS 指令要求
ROHS COMPLIANT
- 无铅产品
Pb FREE PRODUCTS
- 静电承受能力 2000V(HBM)
ESD 2000V

产品特征 Description

- 1515 规格封装
1515 package
- 顶部发光
Top view LED
- 胶体颜色:
Lens Color:
- 胶体材质:
Lens Material:
- 发光颜色 Emitted color:
 1. 红色: Red
 2. 绿色: Green
 3. 蓝色: Blue



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光电特性 Optical-Electrical Characteristic(Ta=25°C)

符号 Symbol	参数 Parameter	测试条件 Test Condition	最小 Min	标准 Typ	最大 Max	单位 Unit
IR	反向漏电流 Reverse Current	R: VR = 5V	-	-	10	uA
		G: VR = 5V	-	-	10	
		B: VR = 5V	-	-	10	
λ_p	峰值波长 Peak Wavelength	R: IF = 12mA	-	632	-	nm
		G: IF = 12mA	-	518	-	
		B: IF = 12mA	-	468	-	
λ_d	主波长 Dominant Wavelength	R: IF = 12mA	619	-	626	nm
		G: IF = 12mA	519	-	526	
		B: IF = 12mA	465	-	472	
2 θ 1/2	发光角度 Viewing Angle	R: IF = 12mA	-	130	-	deg
		G: IF = 12mA	-	130	-	
		B: IF = 12mA	-	130	-	
Iv	发光强度 Luminous Intensity	R: IF = 12mA	180	-	285	mcd
		G: IF = 12mA	450	-	715	
		B: IF = 12mA	90	-	140	
		W: IF = 12mA	360	-	715	

Notes:

1. 发光强度公差为±10%。 Tolerance of Luminous Intensity ±10%.
2. 主波长公差为±1nm。 Tolerance of Dominant Wavelength ±1nm.
3. 使用产品时需做防静电措施。The products are sensitive to static electricity and must be carefully taken when handling products.



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发光强度等级 Bin Range of Luminous Intensity(IV) W

等级 Bin Code	最小值 Min	最大值 Max	单位 Unit	条件 Condition
T1	360	450	mcd	@12mA
U1	450	565	mcd	@12mA
U2	565	715	mcd	@12mA

Note:

发光强度公差范围: $\pm 10\%$ 。Tolerance of Luminous Intensity: $\pm 10\%$

色度坐标范围 Bin Range of Chromaticity Coordinates

等级 Bin Code	x 坐标 CEI_x	y 坐标 CEI_y	等级 Bin Code	x 坐标 CEI_x	y 坐标 CEI_y
A1	0.195	0.285	B1	0.255	0.285
	0.195	0.370		0.255	0.370
	0.225	0.370		0.285	0.370
	0.225	0.285		0.285	0.285
A2	0.225	0.285	B2	0.285	0.285
	0.225	0.370		0.285	0.370
	0.255	0.370		0.315	0.370
	0.255	0.285		0.315	0.285
A3	0.195	0.200	B3	0.255	0.200
	0.195	0.285		0.255	0.285
	0.225	0.285		0.285	0.285
	0.225	0.200		0.285	0.200
A4	0.225	0.200	B4	0.285	0.200
	0.225	0.285		0.285	0.285
	0.255	0.285		0.315	0.285
	0.255	0.200		0.315	0.200

Notes:

1.色度坐标数据是基于 12mA 条件测试的 The value is based on driving current by 12mA.

2.色度坐标的公差范围: ± 0.01 Tolerance of Chromaticity Coordinates: ± 0.01

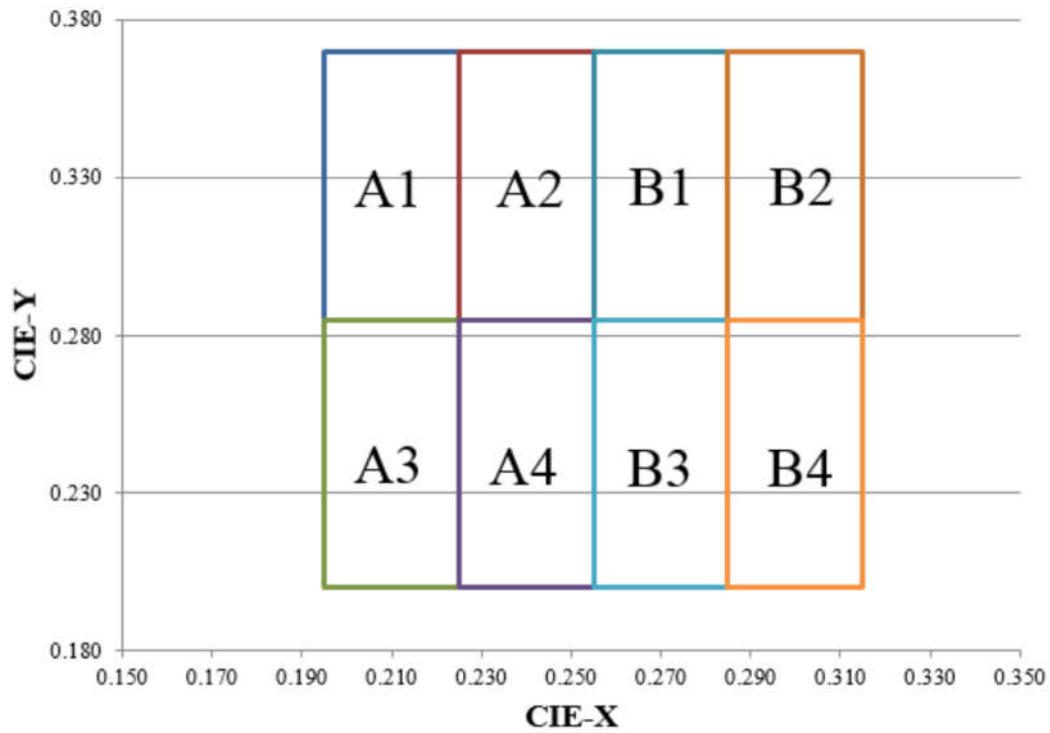


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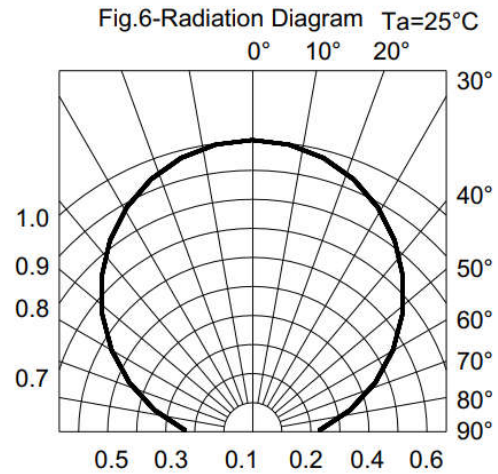
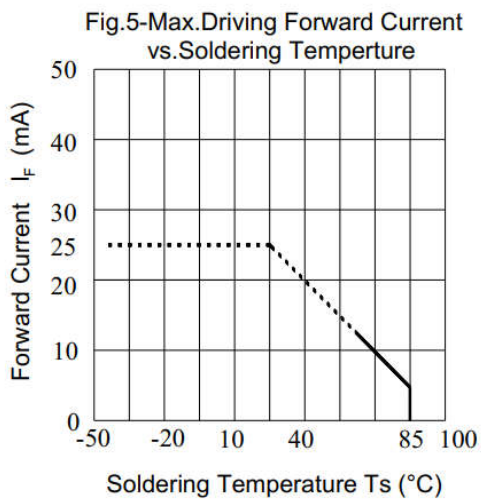
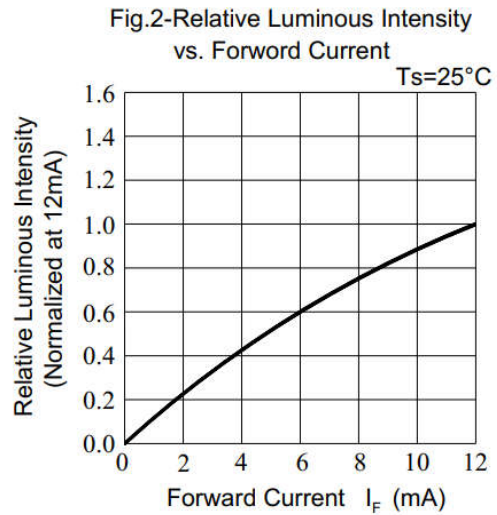
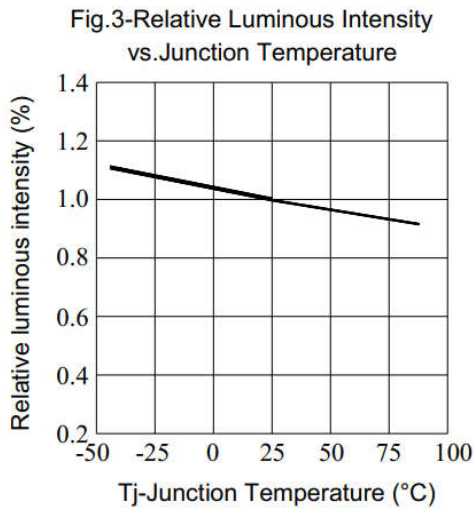
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色度坐标图 The C.I.E. 1931 Chromaticity Diagram



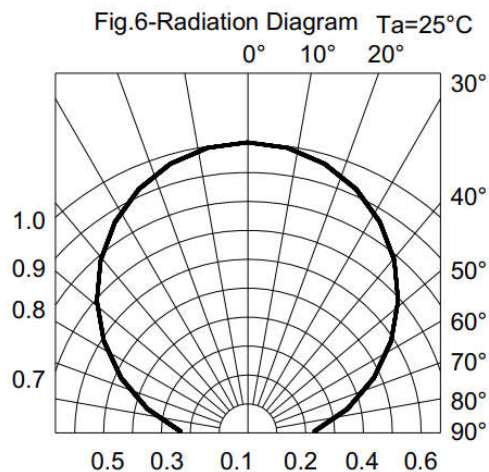
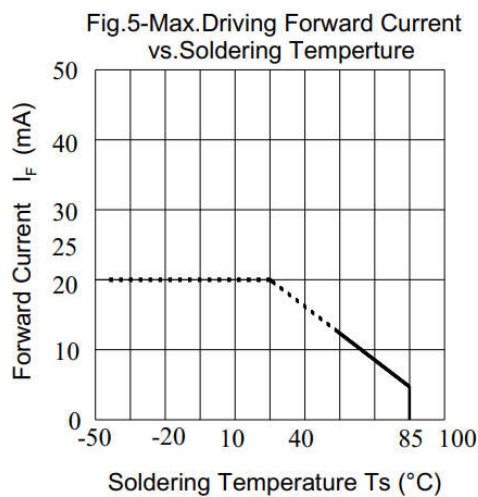
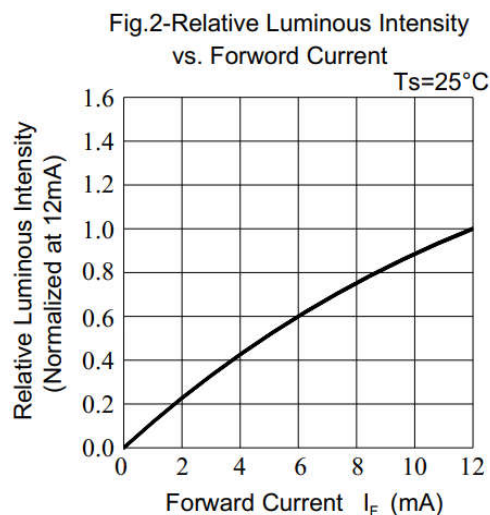
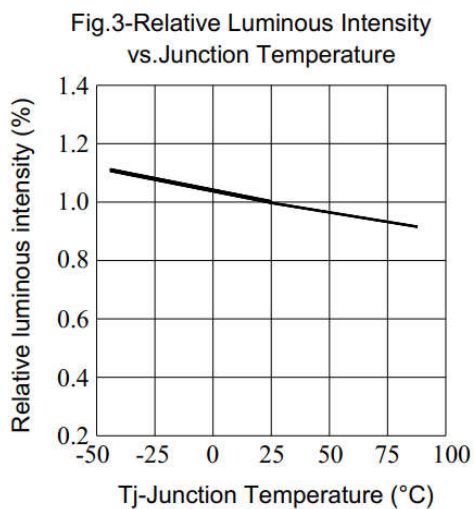


光电特性图 Typical Electrical Characteristic Curves(Ta=25°C) R





光电特性图 Typical Electrical Characteristic Curves($T_a=25^{\circ}\text{C}$) G/B





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电气特性 Electrical Characteristics

(Without special instructions ,Ta= -40 ~ +80℃, VDD=3.0~5.5V,VSS=0 V)

参数 Parameter	符号 Symbol	最小 Min.	平均 Avg.	最大 Max.	单位 Compan y	测试条件 Test conditions
芯片内部电源电压 Chip internal supply voltage	VDD	3.5		5.5	V	
高电平输入电压 High level input voltage	VIH	2.8			V	VDD=5V, Din
低电平输入电压 Low level input voltage	VIL			1.6	V	VDD=5V, Din
高电平输出电流 High level output current	IOH		-35		mA	High level output voltage
低电平输出电流 Low level output current	IOL		35		mA	Low level output voltage
输出 R/G/B 输出电流 OUT R/G/B output current	IOUT		12		mA	VDD=5V, VDS =1.0V
输出 R/G/B 恒流拐点电压 OUT R/G/B Constant current inflection point voltage	VDS_S		0.6		V	VDD=5V, IOUT = 12mA
静态电流 Quiescent current	IDD			0.35	mA	VDD = 4.5V IOUT" OFF
输出 R/G/B 输出电流变化 OUT R/G/B Output current variation	%VS.VDS			0.5	%	IOUT = 12mA, VDS =1.0~3.0V
	%VS.VDD			0.5	%	IOUT =12mA, VDD = 4.5~5.5V
	%VS.TA			5.0	%	IOUT = 12mA, TA= -40~+85℃
输出 R/G/B 端口泄漏电流 OUT R/G/B Port leakage current	Ileak			1	uA	VDS =15V, IOUT" OFF



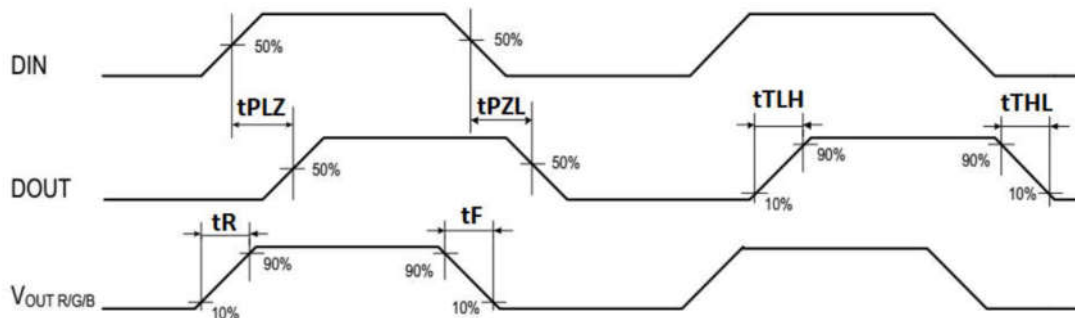
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动态参数 Dynamic Parameter (Ta=25°C)

参数 Parameter	符号 Symbol	最小 Min.	平均 Avg.	最大 Max.	单位 Company	测试条件 Test conditions
输出 R/G/B 输出 PWM 频率 OUT R/G/B Output PWM frequency	F _{PWM}	---	1	---	KHz	I _{OUT} =5mA
输出传输延迟 DOUT Transmission delay	T _{PLH}	---	67	---	ns	DIN→DOUT CL=30pF
	T _{PZH}		93		ns	
上升时间 Rising time	T _{TLH}		15		ns	
下降时间 Falling time	T _{THL}		23		ns	
I out rise time	T _r	---	50	---	ns	CL=30pF
	T _f		50		ns	R、G、B=20mA





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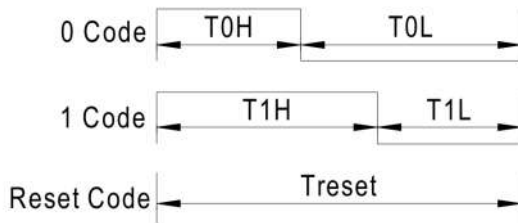
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数据传输时间 Data Transfer Time ($T_H+T_L=1.25\mu s \pm 600ns$)

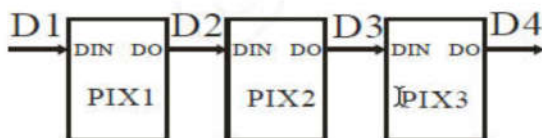
T0H	0 code, High time	0.3 μs	$\pm 0.05\mu s$
T1H	1 code, High time	0.9 μs	$\pm 0.05\mu s$
T0L	0 code, Low level time	0.9 μs	$\pm 0.05\mu s$
T1L	1 code, Low level time	0.3 μs	$\pm 0.05\mu s$
Trst	Reset, Code Low level time	>200 μs	

时序波形 Timing Waveform ($T_a=25^\circ C$) :

Input code type:

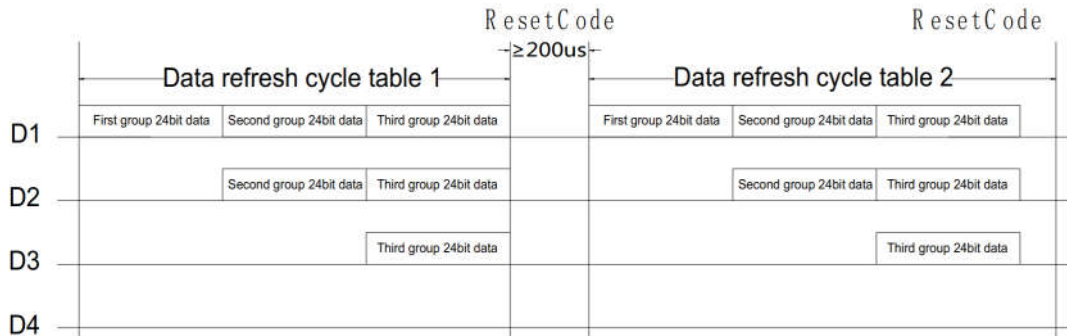


Connection mode:





数据传输模式 Data Transmission Mode (Ta=25°C):



Note:

其中 D1 是发送到 MCU 侧的数据，D2、D3、D4 自动成形和转发级联的数据电路

Where D1 is the data sent to the MCU side, D2, D3, D4 are automatically shaping and forwarding data for cascaded circuits

24 位数据结构 24bit Data Structure (Ta=25°C):



Note:

高优先级，按照 RGB 的顺序发送数据 (R7~G6~B0)

High priority, in accordance with the order of RGB to send data (R7 ~ G6 ~ B0)

RGB 当前描述 RGB Current description

R: bit(R7-R0)	R: Current	G: bit(G7-G0)	G: Current	B: bit(B7-B0)	B: Current
00000000(00)	0mA	00000000(00)	0mA	00000000(00)	0mA
00000001(01)	0.047mA	00000001(01)	0.047mA	00000001(01)	0.047mA
01000000(40)	3mA	01000000(40)	3mA	01000000(40)	3mA
10000000(80)	6mA	10000000(80)	6mA	10000000(80)	6mA
11111111(FF)	12mA	11111111(FF)	12mA	11111111(FF)	12mA

Note:

1. 该 IC 电流可调 This IC current is adjustable.
2. RGB 输出灰度: 256RGB Output gray level: 256.

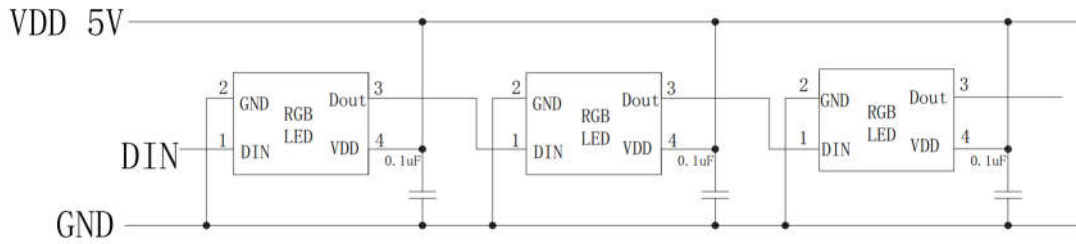


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典型应用电路 Typical Application Circuit:





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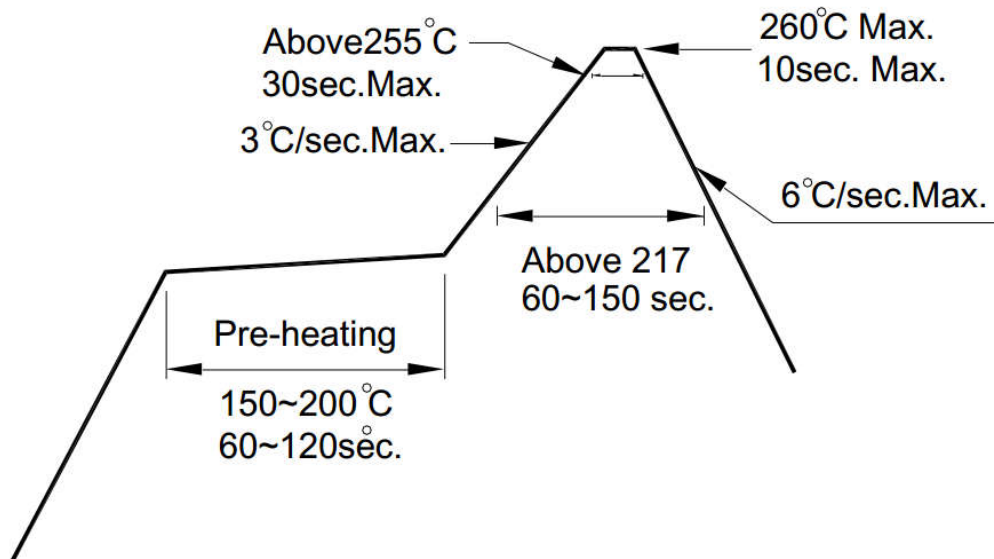
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焊接条件 Soldering Condition

方法 METHOD	焊接条件 SOLDERING CONDITIONS	备注 REMARK
回流焊 Reflow Soldering	260°C for 10 sec.	
烙铁焊 Soldering Iron	315°C for 3 sec.	使用 25W 以下功率的电烙铁 the soldering iron capacity 25W

无铅制程炉温曲线 Pb-free solder temperature profile



Notes:

- 过回流焊次数不可超过 2 次。
Reflow soldering should not be done more than two times.
- 焊接加热过程中不要挤压 LED
When soldering, do not put stress on the LEDs during heating.
- 焊接完成后，不要用力玩去线路板
After soldering, do not warp the circuit board
- 客户在设计使用时需串联保护电阻，避免电压波动烧毁发光二极管。
Customer must apply resistors for protection; otherwise, slight voltage shift will cause big current change (Burn out will happen)



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可靠度测试及条件 Reliability Test Items and Conditions

编号 No.	项目 Items	测试条件 Test Condition	测试时间 Test Hours/Cycles	样品数量 Sample Size	判定标准 Ac/Re
1	回流焊 Reflow Soldering	260+/-5°C/10sec.	3 Cycles	22pcs	0/1
2	热冲击 Thermal Shock	H : +100°C 5min ∫ 10 sec L : -40°C 5min	300 Cycles	22pcs	0/1
3	温度循环 Temperature Cycle	H : +100°C 15min ∫ 5 min L : -40°C 15min	300 Cycles	22pcs	0/1
4	高温高湿测试 High Temperature/Humidity Reverse Bias	Ta=85°C,85%RH	1000 Hrs.	22pcs	0/1
5	低温贮藏 Low Temperature Storage	Ta= - 40°C	1000 Hrs.	22pcs	0/1
6	高温贮藏 High Temperature Storage	Ta=100°C	1000 Hrs.	22pcs	0/1
7	寿命测试 DC Operation Life	Ta=25°C 正常电流	1000 Hrs.	22pcs	0/1



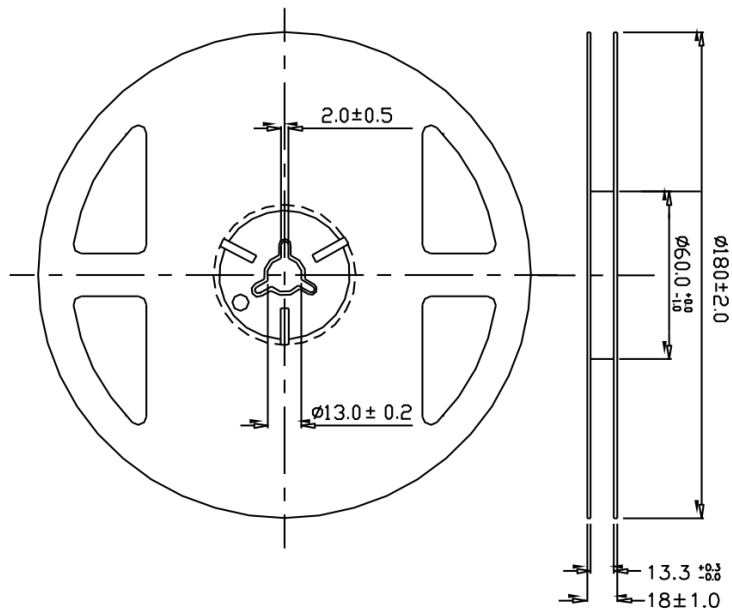
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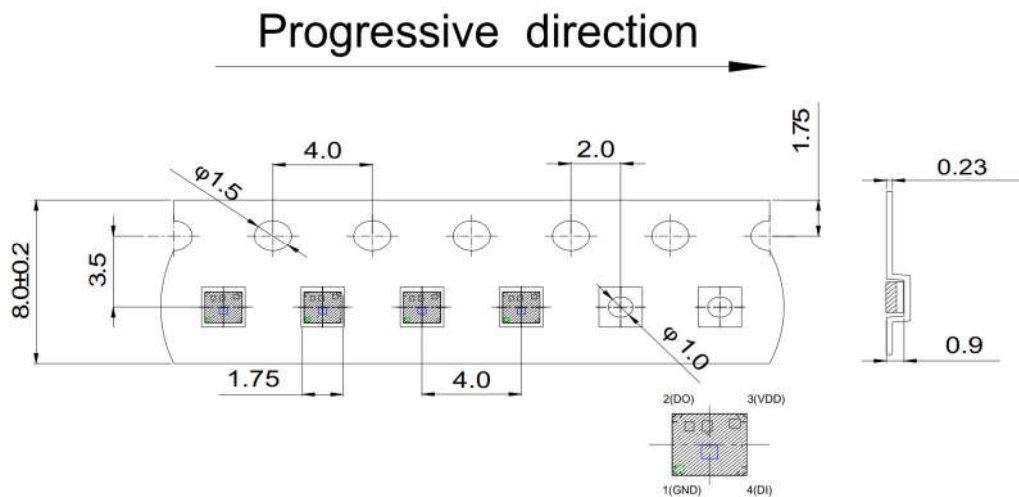
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包装 Packing

1. 卷轴尺寸 Reel Dimensions



2. 载带尺寸 Carrier Tape Dimensions



Notes:

1. 量测公差为 $\pm 0.1\text{mm}$ ，单位是毫米。

Tolerances unless mentioned $\pm 0.1\text{mm}$, Unit = mm

2. 最小包装数量为每卷 2000 个

Minimum packing amount is 2000 pcs per reel



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储藏 STORAGE

1. 发光二极管在出厂后可在温度 30 度以下,湿度 60% 以下的环境内保存 1 年。The LED should be stored at 30°C or less and 60% RH or less after being shipped from MH and the storage life limits are 1 year.
2. 在产品准备使用前请不要打开防潮袋。Do not open moisture proof bag before the products are ready to use.
3. 打开包装后: 产品暴露在温度 30 度以下湿度 60% 以下的 24 小时内用完, 若仍然有剩余, 请一定要放到防潮柜内储存。After opening the package: The LED's floor life is 24 hr under 30°C or less and 60% RH or less. If unused LEDs remain, it should be stored in moisture proof packages.
4. 如果吸湿性材料(硅胶)已用完或发光二极管已超过存储时间, 应使用以下条件进行烘烤处理, 处理: 60±5°C 烘烤 5 小时。If the moisture absorbent material (silica gel) has faded away or the LEDs have exceeded the storage time, baking treatment should be performed using the following conditions. Baking treatment: 60±5°C for 5 hours.
3. 请避免保存在温度变化明显, 尤其是高湿度的地方 Please avoid rapid transitions in ambient temperature, especially, in high humidity environments where condensation can occur.

使用注意事项 Application Restrictions

1. 生产环境: 建议在 20°C~30°C&30%~60%RH 下作业。
Production environment: it is recommended to operate at 20 DEG ~30 DEG &30%~60%RH
2. 维修温度建议控制在 280°C 以下, 持续加热时间不超过 30S。
The service temperature shall be controlled below 280 degrees, and the continuous heating time shall not exceed 30S.
3. 维修时避免尖锐物体直接戳到胶体, 取料时建议夹取板材两端。
When repairing, the sharp object should be directly punched into the colloid, and when picking the material, it is recommended to clamp both ends of the PCB.



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其他注意事项 Others

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4. 静电放电（静电放电）ESD (Electrostatic Discharge) 产品敏感的静电或冲击电压。当使用产品时静电放电会损坏模具及其可靠性。对静电放电的措施强烈推荐消除电荷接地的手环，防静电鞋，衣服和地板等 The products are sensitive to static electricity or surge voltage. ESD can damage a die and its reliability. When handling the products, the following measures against electrostatic discharge are strongly recommended: Eliminating the charge Grounded wrist strap, ESD footwear, clothes, and floors

5. 发光二极管正向电流方向使用，驱动电路的设计必须使 LED 在关闭的状态下不经受正向或逆向电压，如果反向电压不断应用于发光二极管，它可以导致 LED 损坏。cause migration resulting in LED damage. The LEDs should be operated with forward bias. The driving circuit must be designed so that the LEDs are not subjected to forward or reverse voltage while it is off. If reverse voltage is continuously applied to the LEDs, it may cause migration resulting in LED damage.