

## 产品规格书

### Specification

文件编号 (Document No) : NMD-SPC-SK6808MICRO-000

产品型号 (Product No) : SK6808MICRO-000

产品描述 (Description) : 2.4x2.7x1.1毫米 0.1W 智能外控表面贴装SMD型  
LED(MSL 5a)  
2.4\*2.7\*1.1mm Top SMD Type 0.1Watt Power Double line  
transmission tegrated light source Intelligent control LED(MSL:5a)

版本号 (Rev. No) : A/0

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## 1.产品概述 (Product Overview) :

SK6808MICRO-000是一个集控制电路与发光电路于一体的智能外控LED光源。其外型与一个SMD2427顶面发光LED灯珠相同，每个元件即为一个像素点。像素点内部包含了智能数字接口数据锁存信号整形放大驱动电路，电源稳压电路，内置恒流电路，高精度RC振荡器，输出驱动采用专利PWM技术，有效保证了像素点内光的颜色高一致性。

数据协议采用单极性归零码的通讯方式，像素点在上电复位以后，DIN端接受从控制器传输过来的数据，首先送过来的24bit数据被第一个像素点提取后，送到像素点内部的数据锁存器，剩余的数据经过内部整形处理电路整形放大后通过DO端口开始转发输出给下一个级联的像素点，每经过一个像素点的传输，信号减少24bit。像素点采用自动整形转发技术，使得该像素点的级联个数不受信号传送的限制，仅仅受限信号传输速度要求。

LED具有低电压驱动，环保节能，亮度高，散射角度大，一致性好，超低功率，超长寿命等优点。将控制电路集成于LED上面，电路变得更加简单，体积小，安装更加简便。

SK6808MICRO-C-000 is a smart LED control circuit and light emitting circuit in one controlled LED source, which has the shape of a 2427 LED chip. Each lighting element is a pixel, and the intensities of the pixels are contained within the intelligent digital interface input. The output is driven by patented PWM technology, which effectively guarantees high consistency of the color of the pixels. The control circuit consists of a signal shaping amplification circuit, a built-in constant current circuit, and a high precision RC oscillator.

The data protocol being used is unipolar RZ communication mode. The 24-bit data is transmitted from the controller to DIN of the first element, and if it is accepted it is extracted pixel to pixel. After an internal data latch, the remaining data is passed through the internal amplification circuit and sent out on the DO port to the remaining pixels. The pixel is reset after the end of DIN. Using automatic shaping forwarding technology makes the number of cascaded pixels without signal transmission only limited by signal transmission speed.

The LED has a low driving voltage (which allows for environmental protection and energy saving), high brightness, scattering angle, good consistency, low power, and long life. The control circuit is integrated in the LED above.

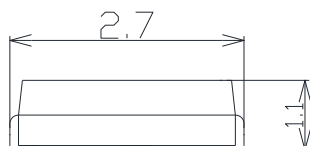
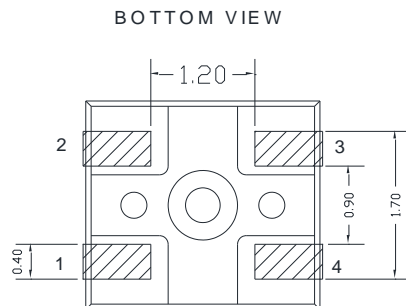
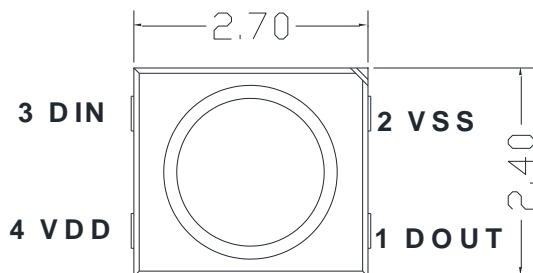
## 2.主要应用领域 ( Main Application Field) :

- LED全彩发光字灯串,LED全彩模组,LED幻彩软硬灯条,LED护栏管, LED外观/情景照明
- Full color LED string light, LED full color module, LED super hard and soft lights, LED guardrail tube, LED appearance / scene lighting
- LED点光源,LED像素屏,LED异形屏,各种电子产品,电器设备跑马灯。
- LED point light, LED pixel screen, LED shaped screen, a variety of electronic products, electrical equipment etc..

### 3.特性说明 ( Description ) :

- TopSMD内部集成高质量外控单线串行级联恒流IC ;
- Top SMD internal integrated high quality external control line serial cascade constant current IC;
- 控制电路与芯片集成在SMD 2427元器件中, 构成一个完整的外控像素点,色温效果均匀且一致性高。
- control circuit and the RGB chip in SMD 5050 components, to form a complete control of pixel, color mixing uniformity and consistency
- 内置数据整形电路, 任何一个像素点收到信号后经过波形整形再输出, 保证线路波形畸变不会累加。
- built-in data shaping circuit, a pixel signal is received after wave shaping and output waveform distortion will not guarantee a line;
- 内置上电复位和掉电复位电路, 上电不亮灯 ;
- The built-in power on reset and reset circuit, the power does not work;
- 灰度调节电路 (256级灰度可调) ,
- gray level adjusting circuit (256 level gray scale adjustable);
- 红光驱动特殊处理, 配色更均衡,
- red drive special treatment, color balance;
- 单线数据传输, 可无限级联。
- line data transmission;
- 整形转发强化技术, 两点间传输距离超过10M.
- plastic forward strengthening technology, the transmission distance between two points over 10M;
- 数据传输频率可达800Kbps, 当刷新速率30帧/秒时, 级联数不小于1024点。
- Using a typical data transmission frequency of 800 Kbps, when the refresh rate of 30 frames per sec, The cascade number is not less than 1024 points.
- 产品湿敏等级 : 5a
- Product humidity sensitivity grade : 5a

### 4.机械尺寸 ( Mechanical Dimensions ) :



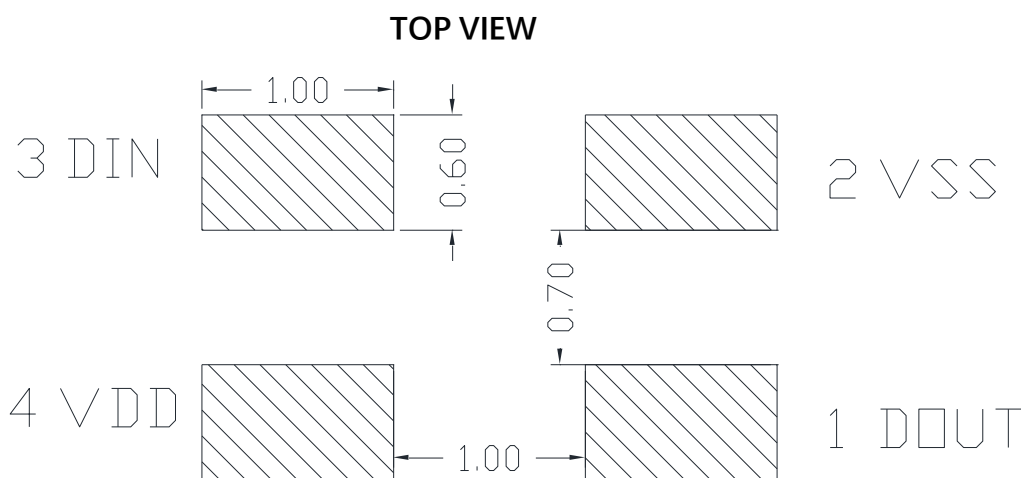
#### 备注 (Notes):

1. 以上标示单位为毫米。
1. All dimensions are in millimeters.
2. 除非另外注明, 尺寸公差为  $\pm 0.1$  毫米。
2. Tolerance is  $\pm 0.1$ mm unless otherwise noted

## 5. 引脚功能说明 (PIN configuration) :

序号 (Item)	符号 (Symbol)	管脚名 (Pin Name)	功能描述 (Function description)
1	DOUT	数据输出 (Data Input)	控制数据信号输出 (Control data signal output)
2	VSS	地 (Ground)	电源接地 (Power grounding)
3	DIN	数据输入 (Data Input)	控制数据信号输入 (Control data signal input)
4	VDD	电源	供电管脚 (Power supply LED)

## 6. 产品PCB建议焊盘尺寸 ( Recommended dimensions for PCB products ) :



## 7. 产品命名一般说明 ( General description of product naming ) :

# SK6808MICRO-000

①                      ②                      ③                      ④

①	②	③	④
系列 series	IC系列与电流代码 IC series and current code	封装外形 Package Outline	内部编码 Internal Coding
默认为 RGB 与 IC集成 在一起The default is to integrate the RGB chip with the IC	指68系列IC 08:8MA电 流版本 Refers to the 68 series IC 8MA current version	2.4x2.7x1.1毫米外形封装 2.4x2.7x1.1 Package Outline	000 : 表示内部编码 000:Represents Internal Coding

## 8. 电气参数 (Electrical Parameters) (Ta=25°C, VSS=0V) :

参数 (Parameter)	符号 (Symbol)	范围 (Range)	单位 (Unit)
电压 (Power supply voltage)	$V_{DD}$	+3.7 ~ +5.5	V
逻辑输入电压 (Logic input voltage)	$V_{IN}$	-0.3 ~ VDD+0.3	V
工作温度 (Working temperature)	$T_{opt}$	-40 ~ +80	°C
储存温度 (Storage temperature)	$T_{stg}$	-40 ~ +80	°C
ESD耐压 (设备模式) (ESD pressure(HBM))	$V_{ESD}$	200	V
ESD耐压 (ESD pressure(DM))	$V_{ESD}$	2K	V

## 9. RGB LED 特性参数 (Electrical/Optical Characteristics) :

颜色 Color	SK6808MICRO-000 8mA	
	波长(nm) Dominate avelength	发光强度(mcd) Luminance
红色 (Red)	615-625	160-320
绿色 (Green)	520-530	450-815
蓝色 (Blue)	460-470	80-160

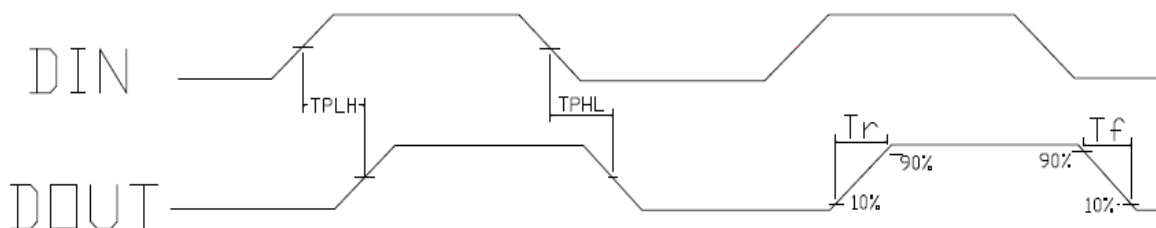
## 10. IC 电气参数 (如无特殊说明, TA=-20 ~ +70°C, VDD=4.5 ~ 5.5V, VSS=0V) :

The IC electrical parameters (unless otherwise specified, TA=-20 ~ +70 °C, VDD=4.5 ~ 5.5V, VSS=0V):

参数 (Parameter)	符号 (Symbol)	最小 (Min)	典型 (Typical)	最大 (Max)	单位 (Unit)	测试条件 (Test conditions)
芯片内部电源电压 (The chip supply voltage)	$V_{DD}$	---	5.2	---	V	---
信号输入翻转阈值 (The signal input flip threshold)	$V_{IH}$	0.7*VDD	---	---	V	+VDD=5.0V
	$V_{IL}$	---	---	0.3*VDD	V	
PWM频率 (The frequency of PWM)	$F_{PWM}$	---	1.2	---	KHZ	---
静态功耗 (Static power consumption)	$I_{DD}$	---	1	---	mA	---

## 11. 开关特性 ( Switching characteristics ) ( VCC=5V Ta=25C° ) :

参数 (Parameter)	符号 (Symbol)	最小 (Min)	典型 (Typical)	最大 (Max)	单位 (Unit)	测试条件 (Test conditions)
数据传输速度 (The speed of data transmission)	fDIN	---	800	---	KHZ	占空比67% (数据1) The duty ratio of 67% (data 1)
DOOUT传输延迟 (DOOUT transmission delay)	T <sub>PLH</sub>	---	---	500	ns	DIN→DOOUT
	T <sub>PHL</sub>	---	---	500	ns	
I <sub>out</sub> 上升时间 (IOUT Rise/Drop Time)	T <sub>r</sub>	---	100	---	ns	V <sub>DS</sub> =1.5V I <sub>OUT</sub> =8mA
	T <sub>f</sub>	---	100	---	ns	



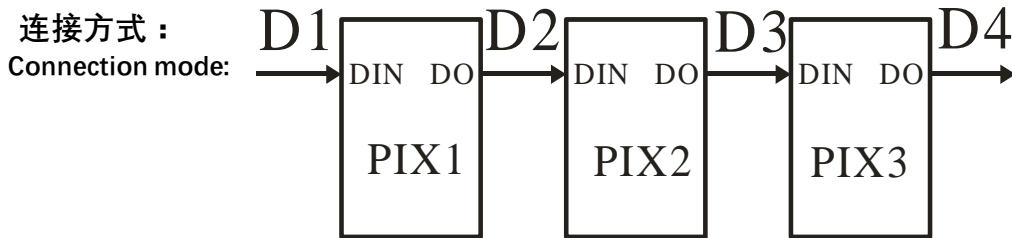
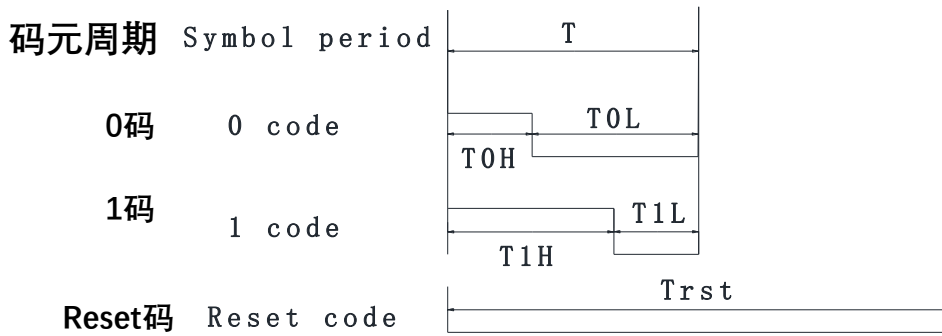
## 12. 数据传输时间 ( The data transmission time ) :

时序表名称 (Name)		Min.	实际值 (Standard value)	Max.	单位 (Unit)
T	码元周期 (Code period)	1.20	--	--	μs
T0H	0码, 高电平时间 (0 code, high level time)	0.2	0.32	0.4	μs
T0L	0码, 低电平时间 (0 code, low level time)	0.8	--	--	μs
T1H	1码, 高电平时间 (1 code, high level time)	0.58	0.64	1.0	μs
T1L	1码, 低电平时间 (1 code, low level time)	0.2	--	--	μs
Reset	Reset码, 低电平时间 (Reset code, low level time)	>80	--	--	μs

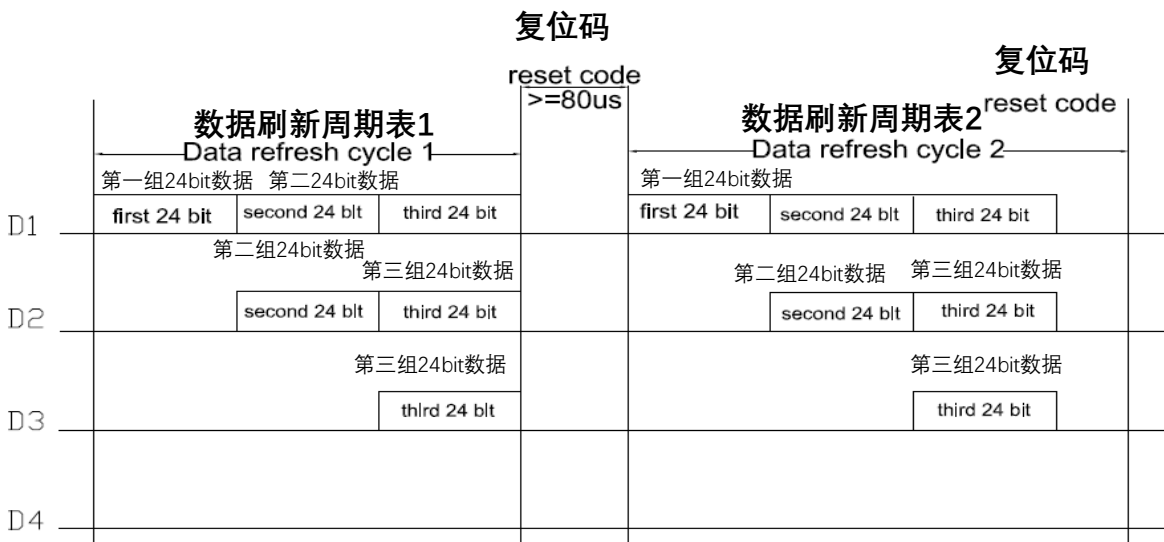
1. 协议采用单极性归零码, 每个码元必须有低电平, 本协议的每个码元起始为高电平, 高电平时间宽度决定“0”码或“1”码。
2. 书写程序时, 码元周期最低要求为1.2μs。
3. “0”码、“1”码的高电平时间需按照上表的规定范围, “0”码、“1”码的低电平时间要求小于20μs。

1. The protocol uses a unipolar zeroing code. Each symbol must have a low level. Each symbol in this protocol starts with a high level. The high time width determines the “0” or “1” code. .
2. When writing programs, the minimum symbol period is 1.2μs.
3. The high time of “0” code and “1” code should be in accordance with the stipulated range in the above table. The low time requirement of “0” code and “1” code is less than 20μs.

### 13.时序波形图 ( Timing waveform ) (Ta=25C°) :



### 14.数据传输方式 ( The method of data transmission: ) (Ta=25C°) :



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: the D1 sends data for MCU, D2, D3, D4 for data forwarding automatic shaping cascade circuit.

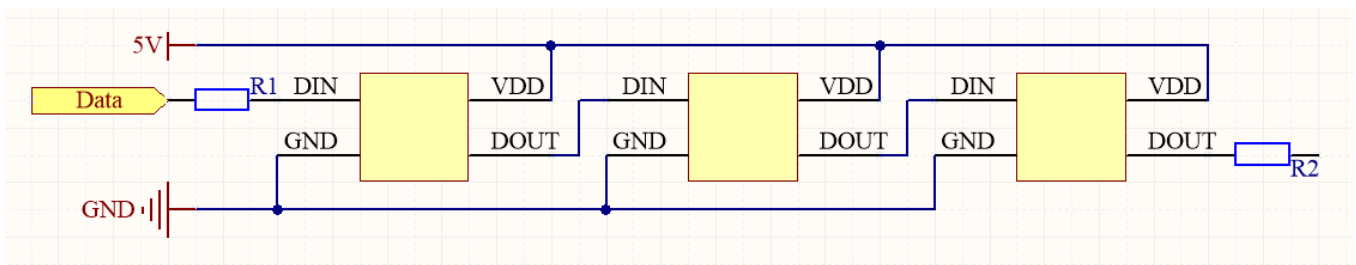
## 15. 24bit数据结构 ( The data structure of 24bit ) (Ta=25C°) :

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(G7 → G6 →……..B0)

Note: high starting, in order to send data (G7 - G6 - ..... ..B0)

## 16. 典型应用电路 ( The typical application circuit ) :



在实际应用电路中，为防止产品在测试时带电插拔产生的瞬间高压损伤IC内部信号输入输出引脚，应在信号输入及输出端串接保护电阻。此外，为了使各IC芯片间更稳定工作，各灯珠间的退偶电容则必不可少；

应用一：用于软灯灯或硬灯条的，灯珠间传输距离短的，建议在信号及时钟线输入输出端各串接保护电阻，即R1约500欧；

应用二：用于模组或一般异形产品，灯珠间传输距离长，因线材及传输距离不同，在信号及时钟线两端串接的保护电阻会略有不同；以实际使用情况定；

In the practical application circuit, the signal input and output pins of the IC signal input and output pins should be connected to the signal input and output terminals. In addition, in order to make the IC chip is more stable, even the capacitance between beads is essential back;

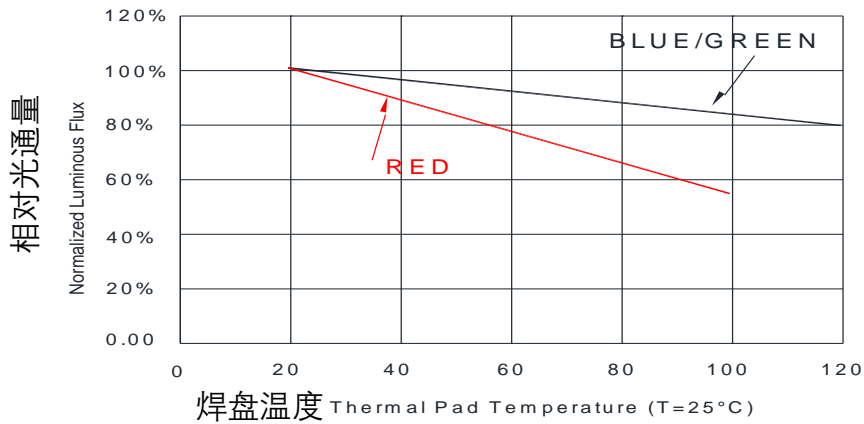
Application: used for soft lamp strip or hard light, lamp beads transmission distance is short, suggested in signal in time the clock line input and output end of each connected in series protection resistors, R1=R2 of about 500 ohms.

Application: for module or general special-shaped products, lamp beads transmission distance is long, because of different wire and transmission distance, in the signal in time clock at both ends of the line on grounding protection resistance will be slightly different; to the actual use of fixed;

## 17.光电特性 ( Standard LED Performance Graph ) :

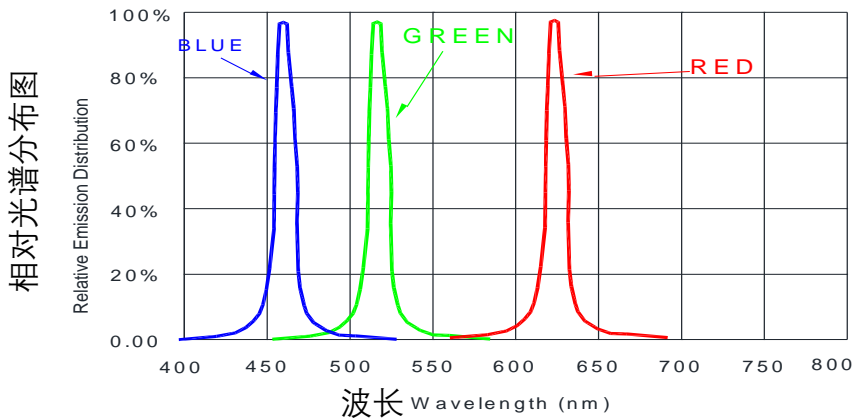
焊盘温度与光通量输出的相对关系

Thermal Pad Temperature vs. Relative Light Output



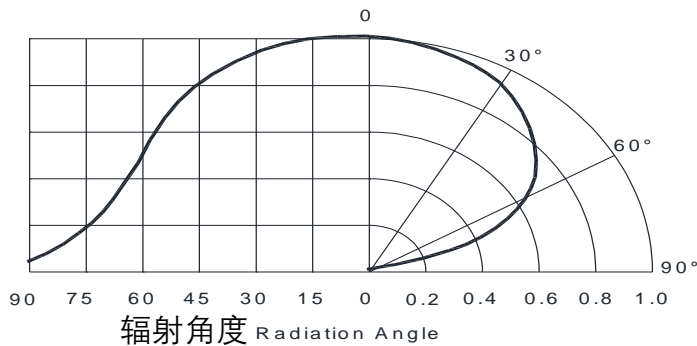
波长特性

Wavelength Characteristics



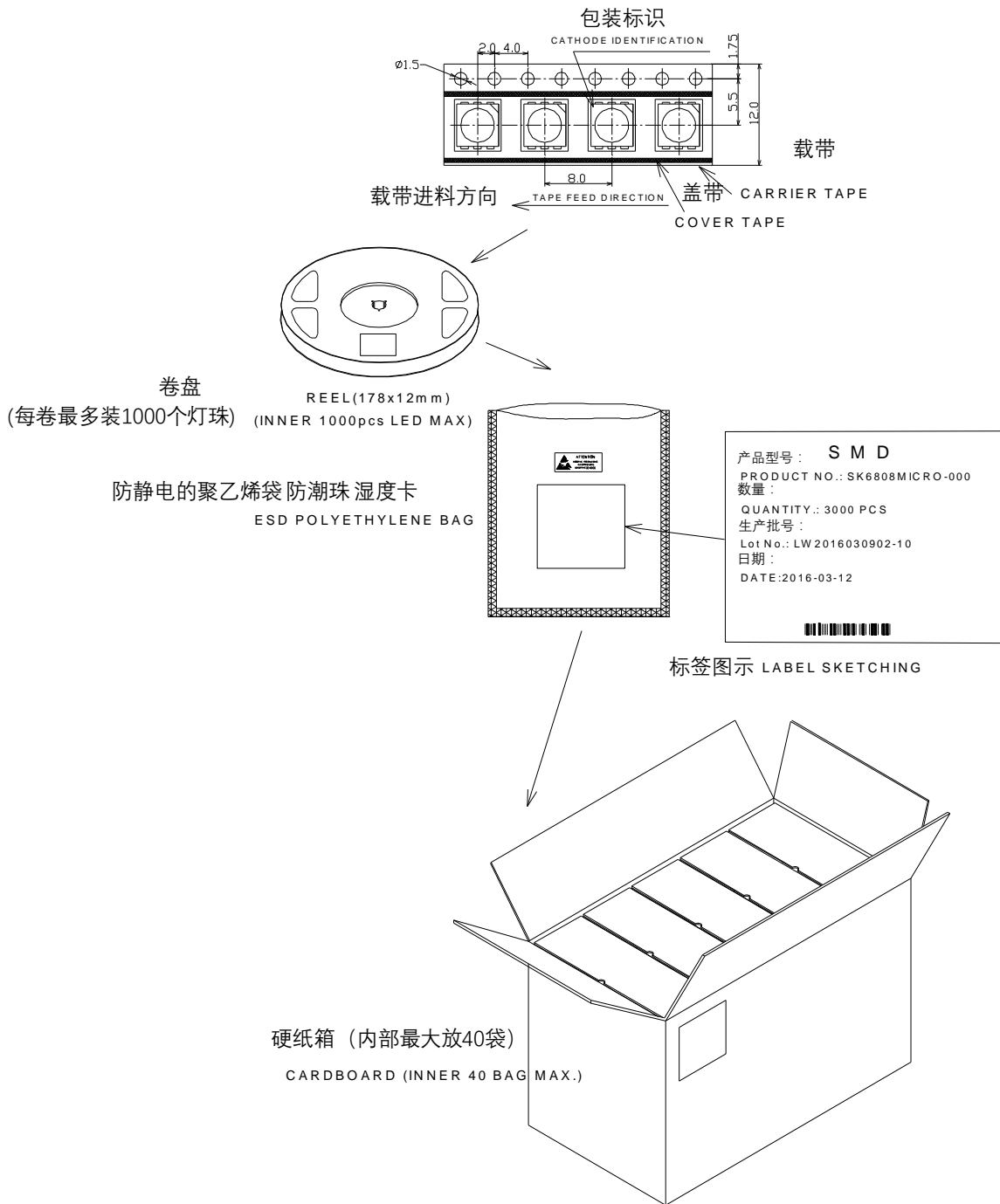
典型的辐射方向图 120C°

Typical Radiation Pattern 120°



## 18. 包装标准 (Packaging Standard) :

### SK6808MICRO-000



表面贴装LED采用卷盘包装，LED在用普通或防静电袋包装后再装在纸箱中。纸箱用于保护运输途中LED不受机械冲击，纸箱不防水，因此请注意防潮防水。  
 The reel pack is applied in SMD LED. The LEDs are packed in cardboard boxes after packaging in normal or anti-electrostatic bags. cardboard boxes will be used to protect the LEDs from mechanical shocks during transportation. The boxes are not water resistant and therefore must be kept away from water and moisture.

## 19. 可靠性测试 ( Reliability Test ) :

序号 (NO)	实验项目 (Test item)	实验条件 (Reference)	参考标准 (Reference)	判断 (Criterion)
1	冷热冲击 (Thermal Shock)	100 ± 5°C ~ -40°C ± 5°C 30min~30min 100cycles	MIL-STD-202G	0/22
2	高温储藏 (High Temperature Storage)	Ta= +100°C 1000hrs	JEITA ED-4701 200 201	0/22
3	低温储藏 (Low Temperature Storage)	Ta= -40°C 1000hrs	JEITA ED-4701 200 202	0/22
4	高温高湿储藏 (High Temperature High Humidity Storage)	Ta=60°C RH=90% 1000hrs	JEITA ED-4701 100 103	0/22
5	温度循环 (Temperature Cycle)	-40°C~25°C~100°C~25°C 30min~5min~30min~5min 100 cycles	JEITA ED-4701 100 105	0/22
6	耐焊接热 (Resistance to Soldering Heat)	Tsld = 260°C, 10sec. 2 times	JEITA ED-4701 300 301	0/22
7	常温寿命测试 (Room temp Life Test)	25°C, IF: Typical current , 1000hrs	JESD22-A 108D	0/22

## 失效判定标准 ( Criteria for Judging the Damage ) :

项目 (Item)	符号 (Symbol)	测试条件 (Test Condition)	判断标准 (Limit)	
			最小值 (Min)	最大值 (Max)
发光强度 (Luminous Intensity)	IV	DC=5V,规格典型电流 (Typical current)	初始数据 (Init. Value) X0.7	---
耐焊接热 (Resistance to Soldering Heat)	---	DC=5V,规格典型电流 (Typical current)	无死灯或明显损坏 (No dead lights or obvious damage)	