Product Specification

Document No.: NMD-SPC- SK6812RGBWP8-BW-A

Product No.: SK6812RGBWP8-BW-A

Description: 5.4x5.0x1.6mm Top SMD Type 0.25 Watt Power targeted light source Intelligent control LED(MSL:5a)

Rev. No.: A/0

Date: 2021-08-02

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1. Product Overview :

SK6812RGBWP8-BW-A is a smart LED control circuit and light emitting circuit in one controlled LED source, which has the shape of a 5050 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 32-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. Main Application Field:

● Full color LED string light, LED full color module, LED super hard and soft lights, LED guardrail tube, LED appearance / scene lighting

● LED point light, LED pixel screen, LED shaped screen, a variety of electronic products, electrical equipment etc..

3. Description:

● Top SMD internal integrated high quality external control line serial cascade constant current IC;

● control circuit and the chip in SMD 5050 components, to form a complete control of pixel, color mixing uniformity and consistency;

●built-in data shaping circuit, a pixel signal is received after wave shaping and output waveform distortion will not guarantee a line;

●The built-in power on reset and reset circuit, the power does not work;

●gray level adjusting circuit (256 level gray scale adjustable);

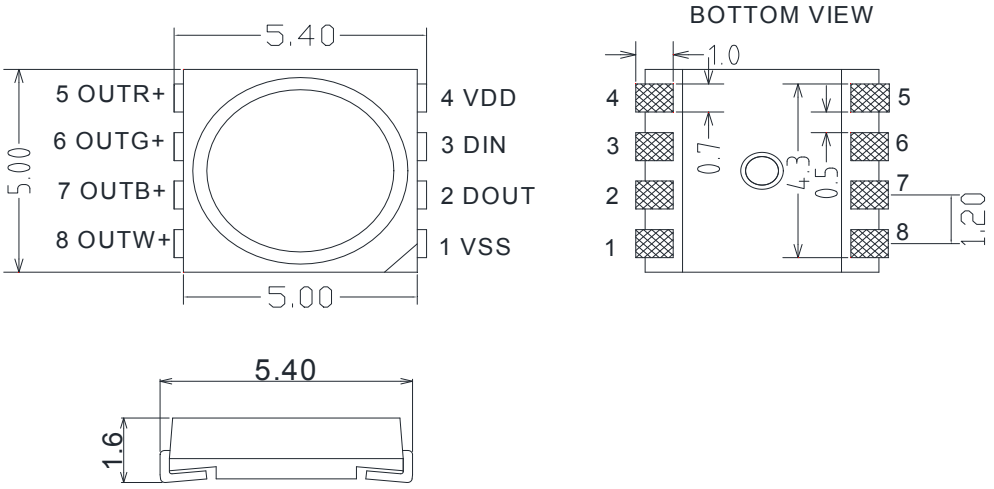
● red drive special treatment, color balance;

● line data transmission;

● plastic forward strengthening technology, the transmission distance between two points over 10M;

●Using a typical data transmission frequency of 800 Kbps, when the refresh rate of 30 frames per sec

4. Mechanical Dimensions:



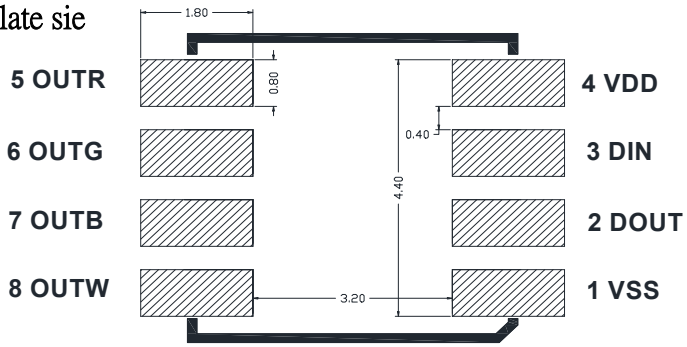
Notes:

1. All dimensions are in millimeters.
2. Tolerance is ±0.1mm unless otherwise noted

5. PIN configuration

The serial number	symbol	Pin name	Functional description
1	VSS	Ground wire	Signal grounding and power supply
2	DOUT	Data output	Control data signal output
3	DIN	Data input	Control signal input data
4	VDD	The power supply	Power supply pin
5	OUTR	Output port	Red output port
6	OUTG	Output port	Green output port
7	OUTB	Output port	Blue output port
8	OUTW	Output port	White output port

6. Product welding plate sie



7. General description of product naming.

SK 6812 RGBW-P8-BW-A

① ② ③ ④ ⑤ ⑥

①	②	③	④	⑤	⑥
Series	IC series and current code	IC series and current code	Number of support feet	Color zone	Internal coding
The default is to integrate the RGB and X chip with the IC	Refers to the 68 series IC 12MA	RGBW: indicates that red, green, blue and white light colors are packaged together	P8:Refers to 8 BIN pins	BW 5700-7500K	A

8. Electrical paratemers（Ta=25℃,VSS=0V）：

Parameter	Symbol	Range	Unit
Power supply voltage	VDD	+3.7～+5.5	V
Logic input voltage	V_{IN}	-0.5～VDD+0.5	V
Working temperature	Topt	-40~+85	℃
Storage temperature	Tstg	-40~+150	℃
ESD pressure(HBM)	V_{ESD}	2K	V
ESD pressure(DM)	V_{ESD}	200	V

9. Electrical/Optical Characteristics:

Color	SK6812RGBWP8-BW-A	
	Dominate avelength(nm)	Luminance(mcd)
Red	615-625	450-815
Green	525-535	1050-1500
Blue	465-470	160-320
WHITE	2700-7000K	2525-3400

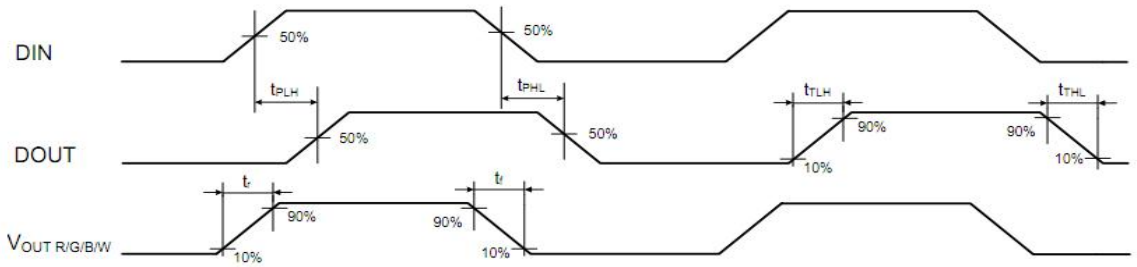
10. The IC electrical parameters (unless otherwise specified, TA=-20 ~ +70 ℃, VDD=4.5 ~ 5.5V, VSS=0V):

Parmeter	Symbol	Min	Typical	Max	Unit	Test conditions
The chip supply voltage	VDD	---	5.2	---	V	---
The signal input flip threshold	VIH	0.7* VDD	---	---	V	VDD=5.0V
	VIL	---	---	0.3*V DD	V	
The frequency of PWM	FPWM	---	4	---	KHZ	---
Static power consumption	IDD	---	0.29	---	mA	---

11. Switching characteristics (Ta=25 ℃):

parameter	Symbol	Min	Typical value	Max	Unit	Test conditions
Chip operating voltage	VDD	3.5	-	5.5	V	-
Chip operating voltage	I_{DD}	-	0.29	-	mA	VDD =5V，I_{OUT} "OFF"
Input signal threshold voltage	V_{IH}	2.7	-	-	V	VDD=5V,Adjust DIN input level
	V_{IL}	-	-	1.8	V	
DOUT Output current	I_{OH}	-	-29	-	mA	High DOUT output, 10 Ω resistor in series
DOUT current	I_{OL}	-	20	-	mA	DOUT output is low, the power supply charges current to DOUT
OUT R/G/B Output current	I_{OUT}	-	8	-	mA	VDD=5V, V_{DS} =1.0V
OUT W Output current			16.5		mA	VDD=5V, V_{DS} =1.0V
OUT R/G/B Constant current inflection voltage	V_{DS_S}	-	0.6	-	V	I_{OUT} = 8mA
OUTW Constant current inflection voltage		-	0..8	-	V	I_{OUT} = 16.5mA
OUT R/G/B/WOutput current change	%VS.V_{DS}	-	0.5	-	%	$I_{OUTR/G/B}$ = 8mA，V_{DS} =1.0~3.0V
		-	0.5	-	%	I_{OUTW} = 16.5mA，V_{DS} =1.0~3.0V
	%VS.VDD	-	0.5	-	%	$I_{OUTR/G/B}$ =8mA，VDD = 4.5~5.5V
		-	0.5	-	%	I_{OUTW} =16.5mA，VDD = 4.5~5.5V
	%VS.T_A	-	5.0	-	%	$I_{OUT\ R/G/B}$= 8mA，T_A= -40~+85℃
		-	5.0	-	%	I_{OUTW} = 16.5mA，T_A= -40~+85℃
OUT R/G/B/W Port withstand voltage	BVOUT	-	14	-	V	OUT R / G / B / W port closed, leakage current 1uA

注 3、注 4、注 5：如下图所示



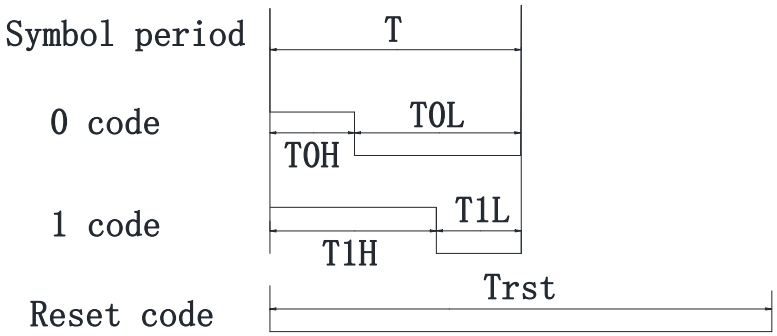
12. The data transmission time :

Name		Min.	Standard value	Max.	Unit
T	Code period	1.20	--	--	μs
T0H	0 code, high level time	0.2	0.30	0.4	μs
T0L	0 code, low level time	0.8	--	--	μs
T1H	1 code, high level time	0.62	0.75	1.0	μs
T1L	1 code, low level time	0.2	--	--	μs
Trst	Reset code，low level time	>200	--	--	μs

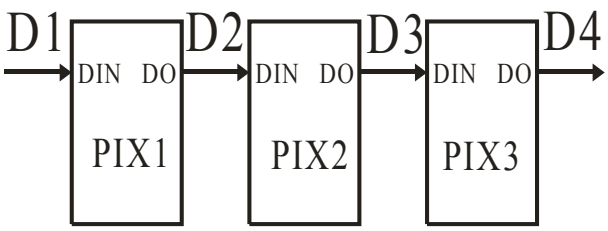
1. The protocol uses a unipolar zeroing code. Each symbol must have a low level. Each symbol in this protocol starts with a high level. The high time width determines the "0" or "1" code. .
2. When writing programs, the minimum symbol period is 1.2μs.
3. The high time of “0” code and “1” code should 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. Timing waveform:

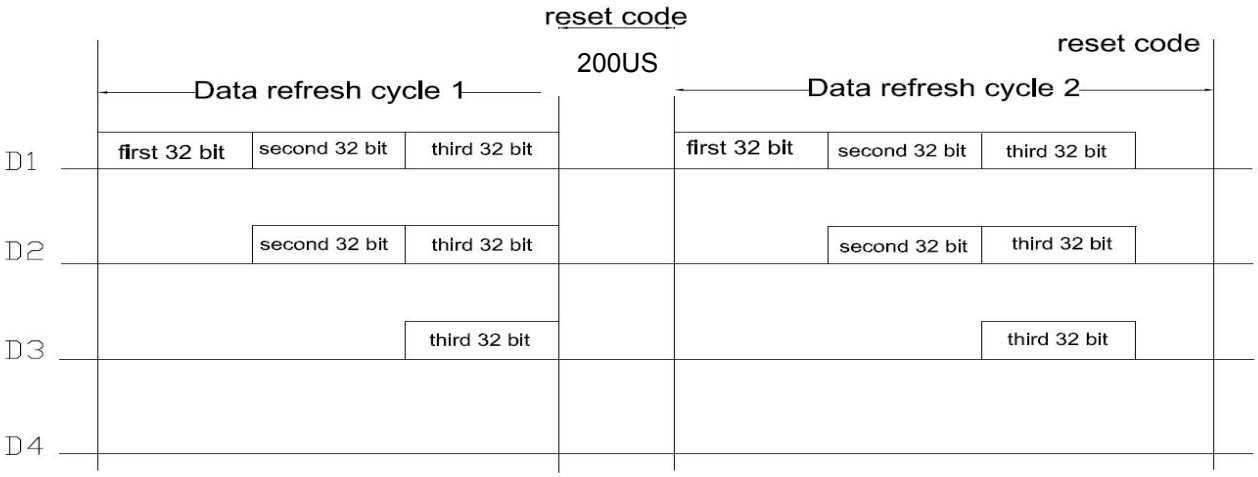
Input code:



Connection mode:



14. The method of data transmission:



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

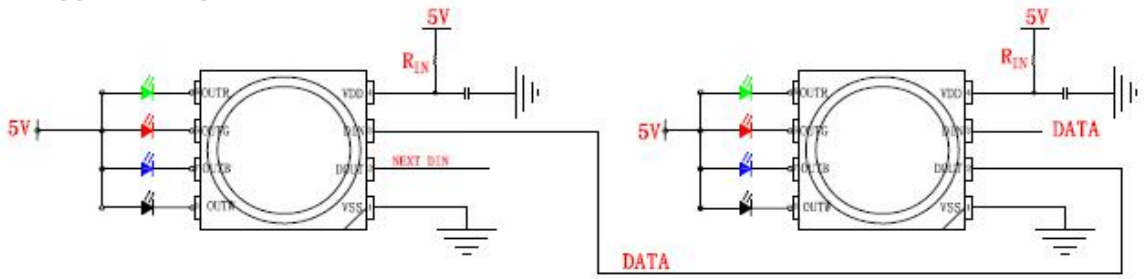
15. The data structure of 32bit:

R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4
G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
W7	W6	W5	W4	W3	W2	W1	W0				

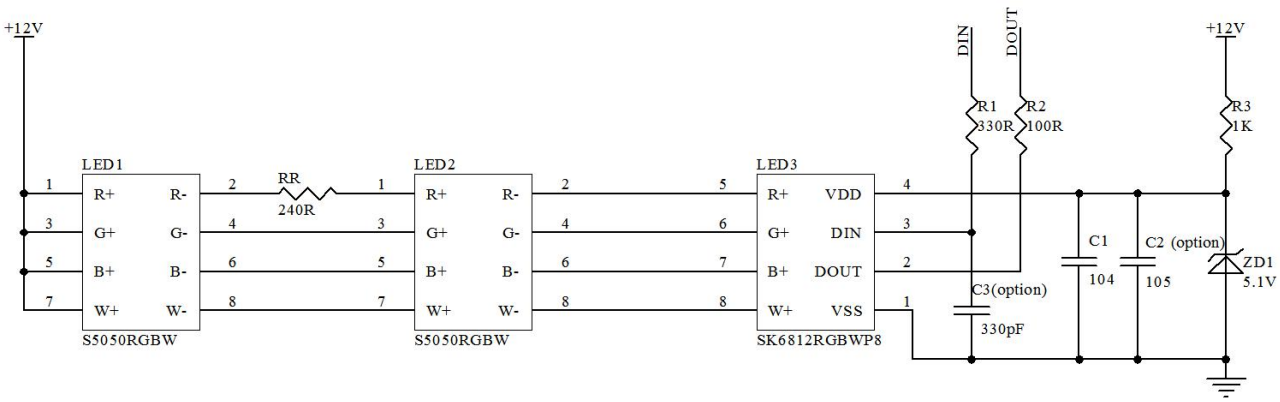
Note: high starting, in order to send data (R7 - R6 - ....W0)

16. The typical application circuit:

5V application profile



12V application profile



R1 only needs to be placed at the P8 head lamp din of each lamp strip, R2 only needs to be placed at the P8 tail lamp dout of each lamp strip, and there is no resistance at the other P8 middle lamp beads din and dout.If the standby power consumption is not considered, R3 uses 1K resistor. If the standby power consumption is small, increase

R3 resistance (1k-6.8k), because the 12V power supply at the tail end of a long lamp strip is generally low. If you increase R3 resistance, it may lead to insufficient voltage stabilization of p8 lamp bead VDD. Therefore, it is necessary to comprehensively select R3 resistance according to the actual power supply voltage at the tail end of the lamp strip.
24V scheme is not supported temporarily.

V_{IN}	5V	12V
R_{IN}	33	1K

17. Hue Bin Specification for Yellow、Red、 Green、Blue

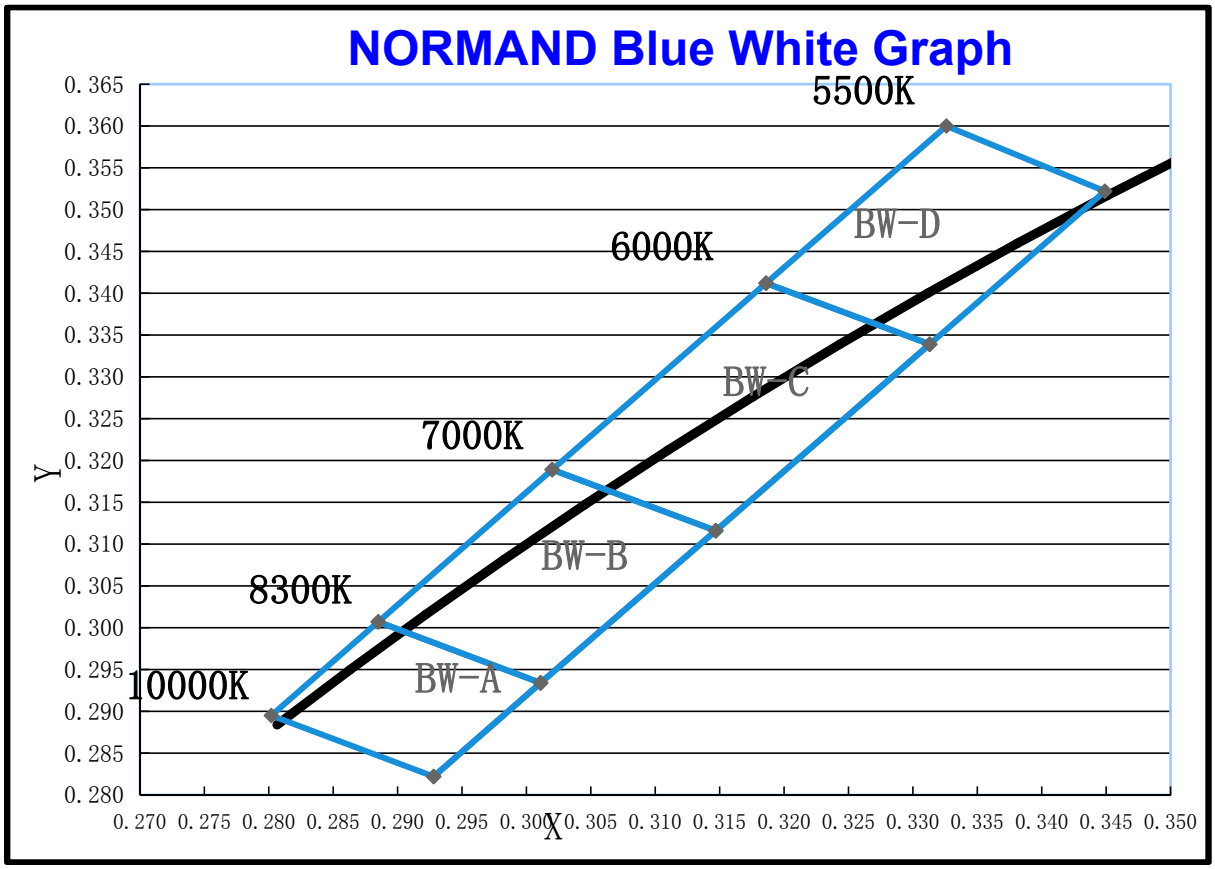
Name	Code	λd MIN (nm)	λd MAX (nm)
YELLOW	YL1	585	590
	YL2	590	595
RED	HR1	620	625
	HR2	625	630
BLUE	BL5	460	465
	BL6	465	470
GREEN	PG2	515	520
	PG3	520	525
	PG4	525	530

18. White Color Temperature Ranks & CIE Color Rank (Refer to CIE 1931 chromaticity diagram)

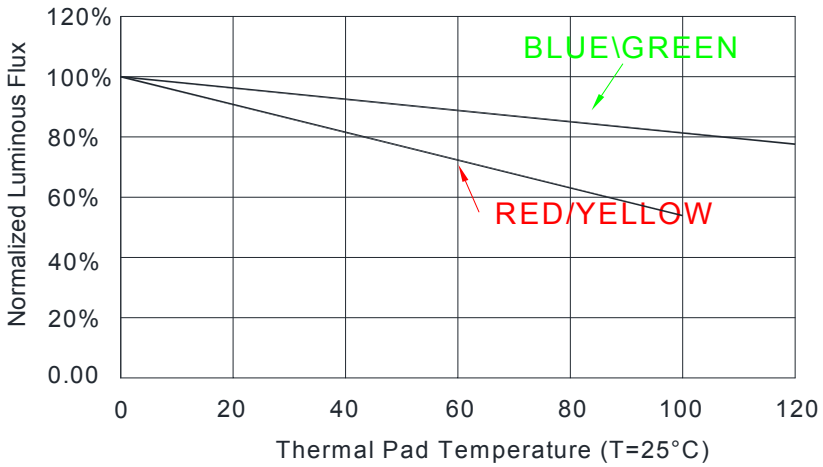
CIE chromaticity coordinates (ANSI Cool White)

Name	X1	Y1	X2	Y2	X3	Y3	X4	Y4
BW-A	0.2928	0.2822	0.2802	0.2895	0.2885	0.3007	0.3011	0.2934
BW-B	0.3011	0.2934	0.2885	0.3007	0.302	0.3189	0.3147	0.3116
BW-C	0.3147	0.3116	0.302	0.3189	0.3186	0.3412	0.3313	0.3339
BW-D	0.3313	0.3339	0.3186	0.3412	0.3326	0.36	0.3449	0.3522

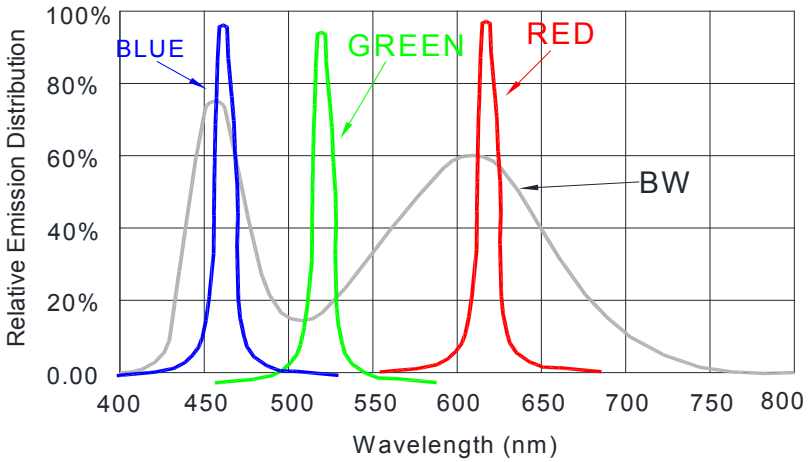
ANSI Blue White Color bin structures



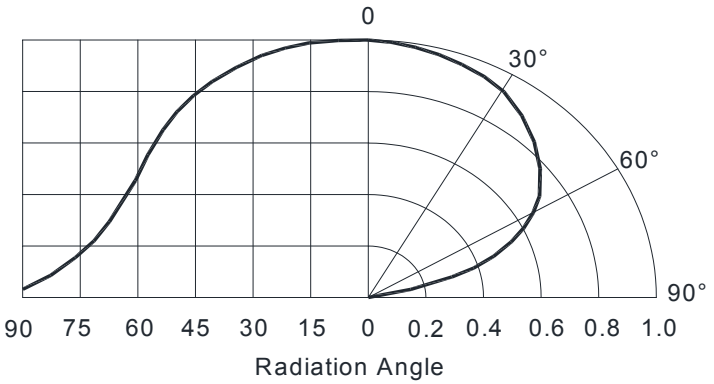
19. Standard LED Performance Graph:



Wavelength Characteristics

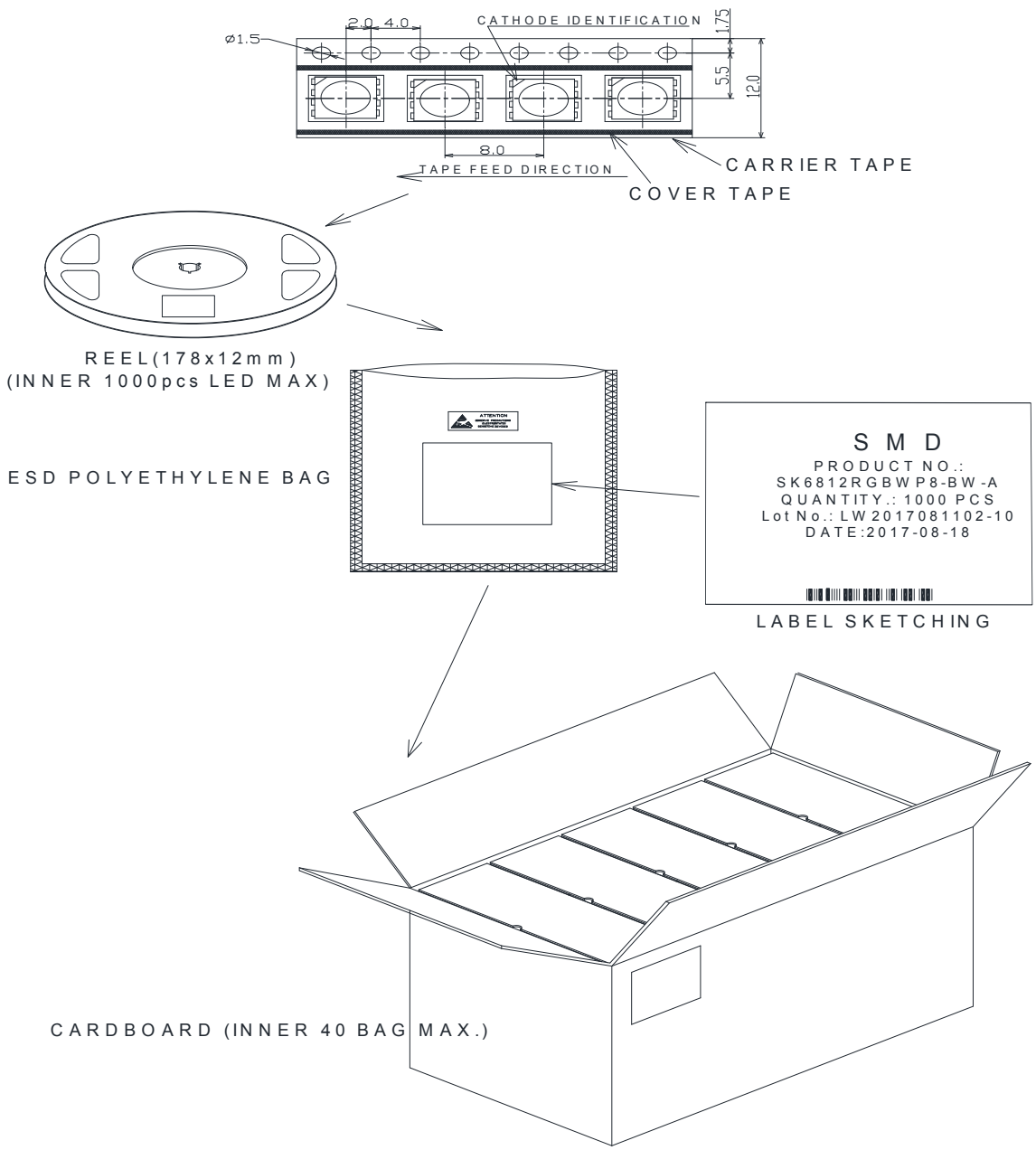


Typical Radiation Pattern 120°



20. Packaging Standard:

S K 6 8 1 2 R G B W P 8 - B W - A



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.

21. Reliability Test :

NO.	Test item	Test Conditions	Reference	Criterion
1	Thermal Shock	100 ± 5° C ~ -40° C ± 5° C 30min~30min 100 cycles	MIL-STD-202G	0/22
2	High Temperature Storage	Ta= +100°C 1000hrs	JEITA ED-4701 200 201	0/22
3	Low Temperature Storage	Ta= -40°C 1000hrs	JEITA ED-4701 200 202	0/22
4	High Temperature High Humidity Storage	Ta=60°C RH=90% 1000hrs	JEITA ED-4701 100 103	0/22
5	Temperature Cycle	-40°C~25°C~100°C~25°C 30min~5min~30min~5min 100 cycles	JEITA ED-4701 100 105	0/22
6	Resistance to Soldering Heat	Tsld = 260° C, 10sec. 2 times	JEITA ED-4701 300 301	0/22
7	Room temp Life Test	25° C, IF: Typical current , 1000hrs	JESD22-A 108D	0/22

Criteria for Judging the Damage:

Item	Symbol	Test Condition	Limit	
			Min	Max
Luminous Intensity	IV	DC=5V, Typical current	Init. Value*0.7	---
Resistance to Soldering Heat	---	DC=5V, Typical current	No dead lights or obvious damage	