



Specification

Document No.: OSK-SPC- SK6812MINI-XW-B

Product No.: SK6812MINI-XW-B

Description: 3.5x3.7x1.1 mm 0.15W Intelligent external control surface mount SMD white light LED (MSL:5a)

Rev. No.: 临时规格

Date: 2022-08-08

Customer approval			Opsco approval		
Approval	Review	Confirmation	Approval	Review	Confirmation
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☐ Qualified ☐ Disqualified Stamp			Stamp		



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1. Product Overview :

SK6812MINI-XW-B is a smart LED control circuit and light emitting circuit in one controlled LED source, which has the shape of a 3535 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.

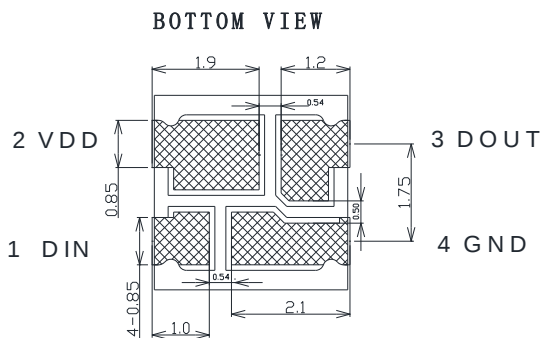
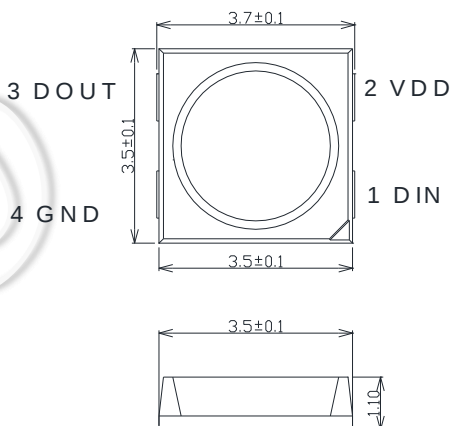
2. Main Application Field:

- 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;
- 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:

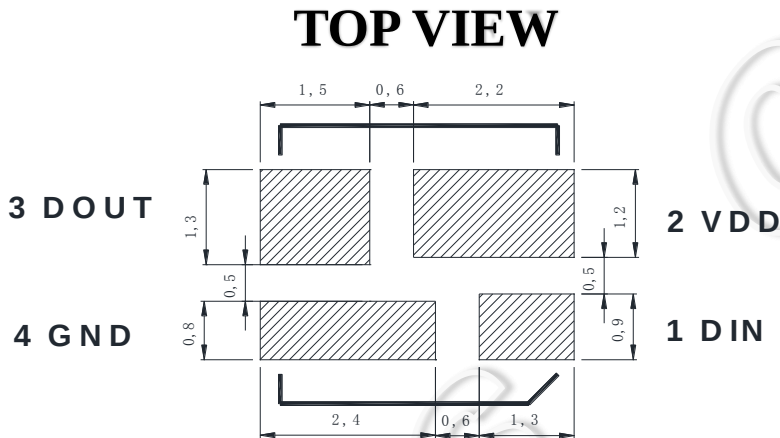


Notes:

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

5. PIN configuration

NO.	Symbol	Function description
1	DIN	Control data signal input
2	VDD	Power supply LED
3	DOUT	Control data signal output
4	GND	Ground

6. Recommended dimensions for PCB products**7. General description of product naming.**

SK 6812 MINI-XW-B

① ② ③ ④ ⑤

①	②	③	④	⑤
Series	IC series and current code	package outline	Color zone	PPA Surface Color
The default is to integrate the X chip with the IC W White Color	Refers to the 68 series IC 12MA current version	3.5x3.7x1.95mm package outline	XW: AW Amethyst White 8000-15000K BW Blue White 5700-8300K NW Natural White 3800-4500K WS Warm Sunlight 2700-3200K GW GOLD White 2400-2700K	B: Black faceW: White face, usually not marked.

8. Electrical Parameters (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~+85	℃
ESD pressure(HBM)	V _{ESD}	2K	V
ESD pressure(DM)	V _{ESD}	200	V

9. Electrical/Optical Characteristics:

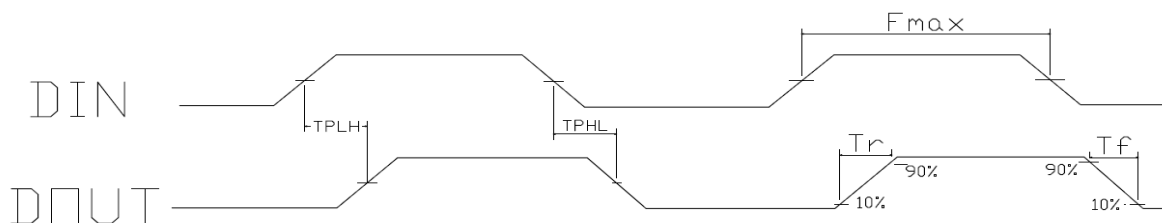
Color	CCT(K)	Luminous(lm)
Amethyst White	8000-15000K	9-12
BLUE WHITE	5700-8300K	9-13
NATURAL WHITE	3800-4500K	9-13
WARM WHITE	2700-3200K	9-13
GOLD WHITE	2400-2700K	9-13

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

parameter	Symbol	minimum	typical	maximum	unit
Chip input voltage	VDD	3	5	7.5	V
R / G / B output port withstand voltage	Vds	8.5	9	9.5	V
R / G / B output drive current	IO	9.6	12	14.4	mA
High level input voltage	VIH	0.7 VDD	0.9 VDD	VDD	V
Low level input voltage	VIL	0	0.1 VDD	0.3 VDD	V
Dout pull current capability	IDOH	-	15	-	mA
Dout current filling capacity	IDOL	-	30	-	mA
PWM frequency	fPWM	3	4	5	kHZ
Static power consumption	IDD	0.4	0.65	0.9	mA

11. Switching characteristics (Ta=25 °C):

Parameter	Smbol	Min	Typical	Max	Unit	Test conditions
The speed of data transmission	fDIN	---	800	1100	KHZ	The duty ratio of 67% (data 1)
Transmission delay time	TPLH	---	---	200	ns	DIN→DOUT
Output current conversion time	Tr	---	---	400	ns	VDS=1.5 IOUT=12mA
	Tf	---	---	400	ns	



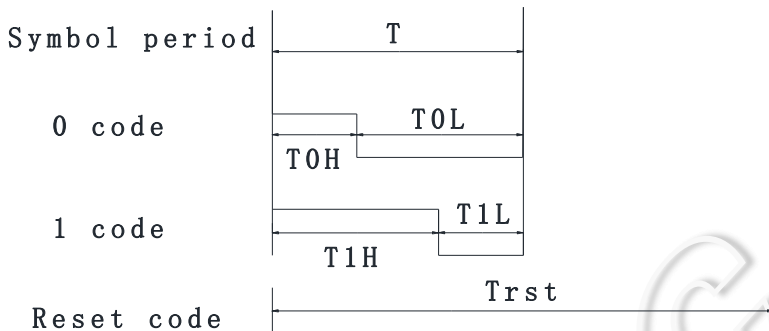
12. The data transmission time :

Name		Standard value	Unit
T	Code period	1.20	μs
T0H	0 code, high level time	0.3	μs
T0L	0 code, low level time	0.6	μs
T1H	1 code, high level time	0.6	μs
T1L	1 code, low level time	0.3	μs
Trst	Reset code, low level time	≥80	μs

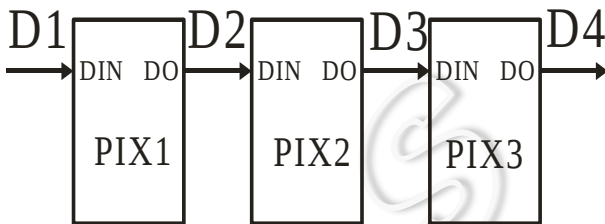
1. The protocol uses a unipolar zeroing code. Each symbol must have a low level. Each symbol in this protocol starts with a high level. The high time width determines the "0" or "1" code. .
2. When writing programs, the minimum symbol period is 1.2μs.
3. The high time of "0" code and "1" code should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

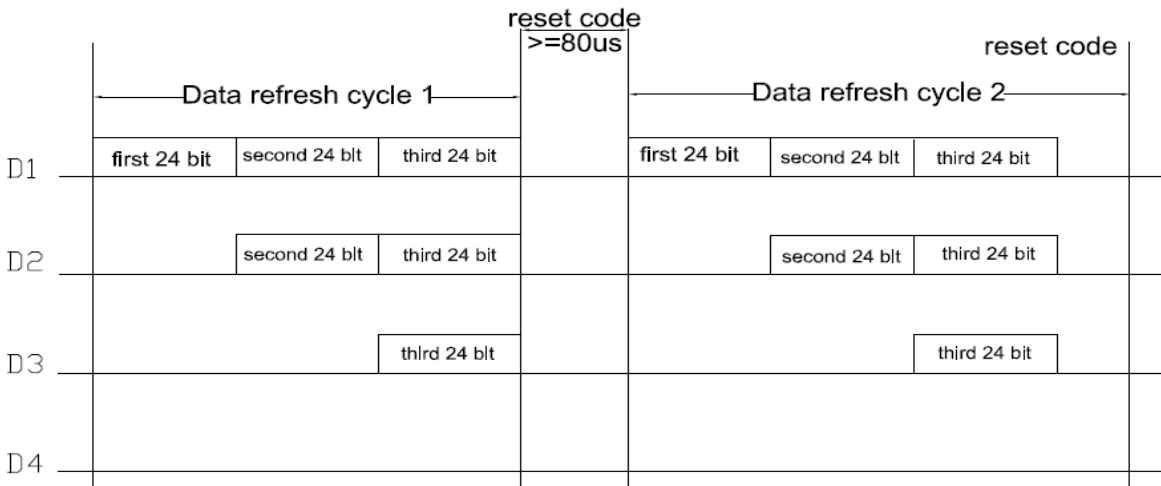
Input code:



Connection mode:



14. The method of data transmission:



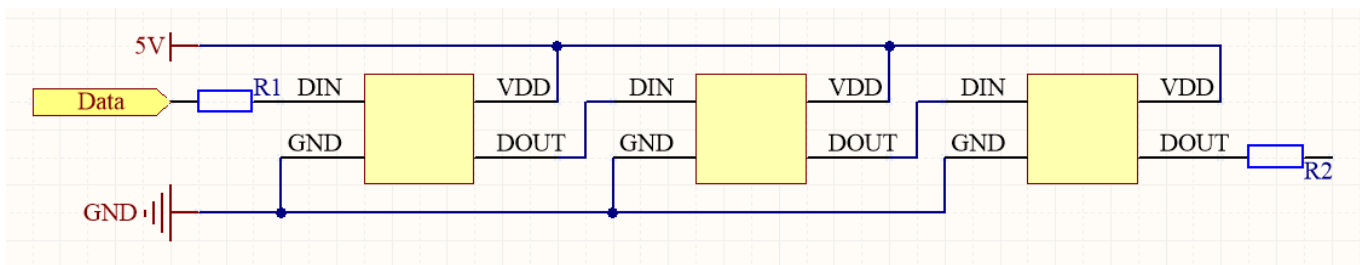
Note: the D1 sends data for MCU, D2, D3, D4 for data forwarding automatic shaping cascade circuit.

15. The data structure of 24bit:

W7	W6	W5	W4	W3	W2	W1	W0	W7	W6	W5	W4
W3	W2	W1	W0	W7	W6	W5	W4	W3	W2	W1	W0

Note: high starting, in order to send data (W7 - W6 -W0)

16. The typical application circuit:



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;

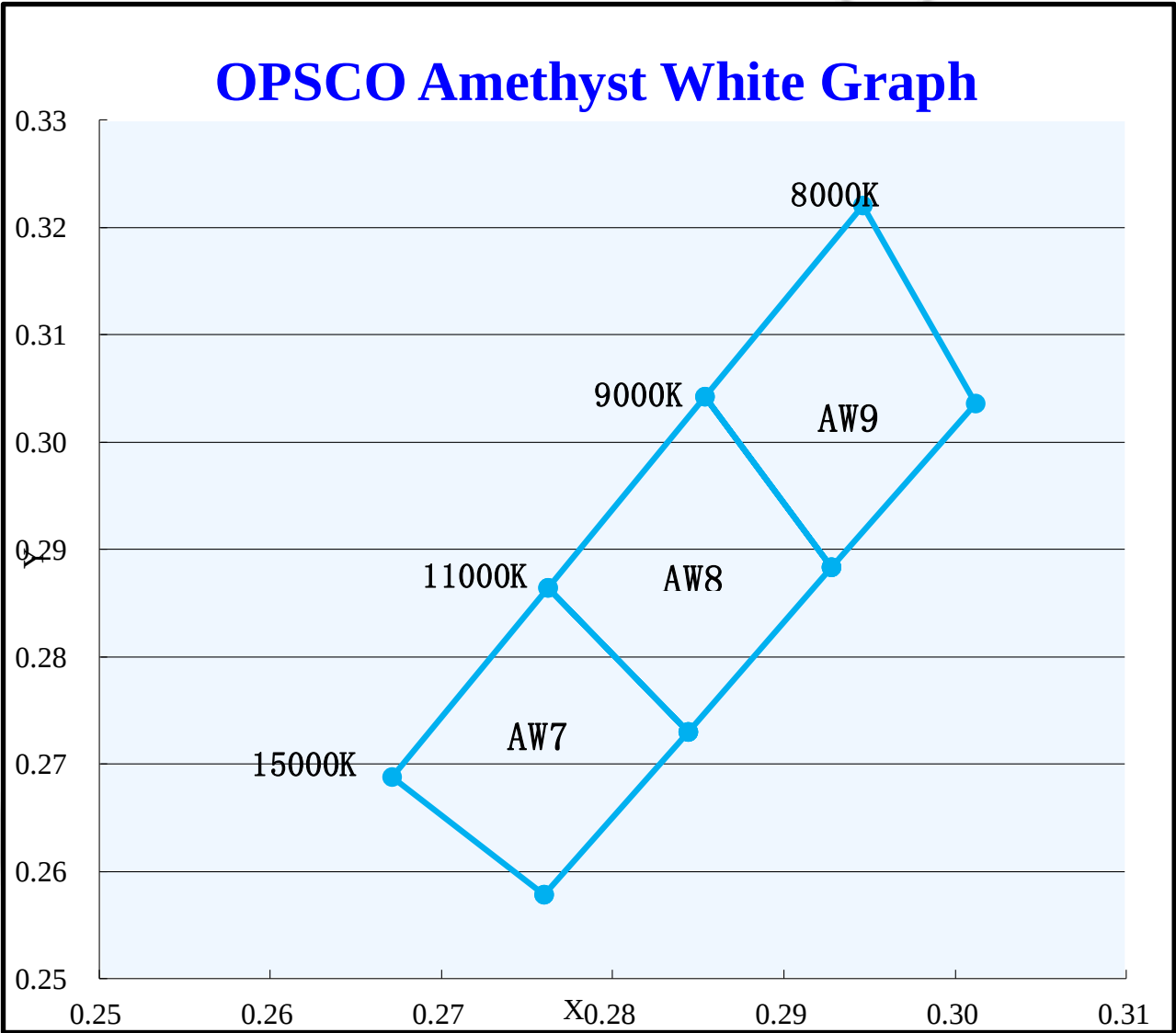


17. White Color Temperature Ranks & CIE Color Rank (Refer to CIE 1931 chromaticity diagram)

CIE chromaticity coordinates (Amethyst White)

CA	X1	Y1	X2	Y2	X3	Y3	X4	Y4
AW7	0.276	0.2528	0.267114	0.263756	0.276214	0.281456	0.2844	0.268
AW8	0.2844	0.268	0.276214	0.281456	0.285414	0.299256	0.2928	0.2833
AW9	0.2928	0.2833	0.285414	0.299256	0.294614	0.317056	0.3012	0.2986

Amethyst White Color bin structures

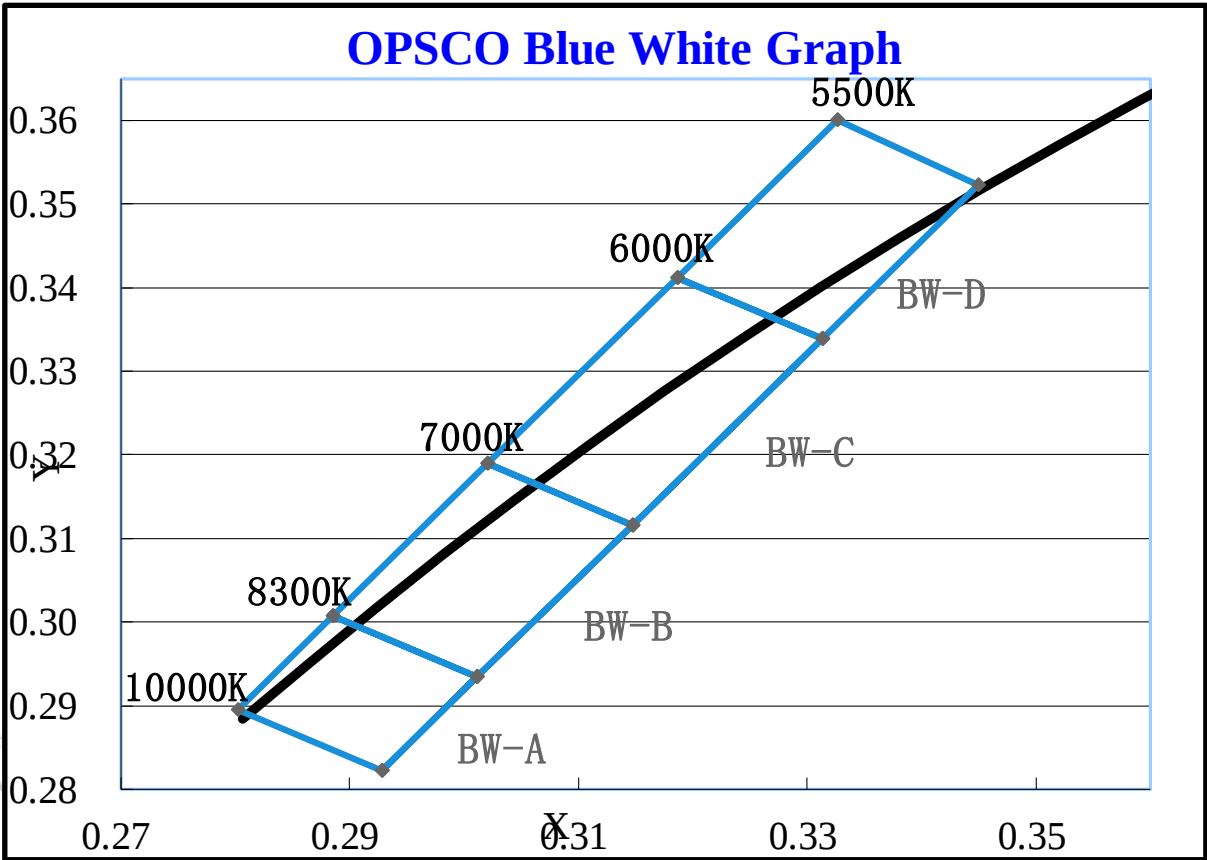




CIE chromaticity coordinates (ANSI Cool White)

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

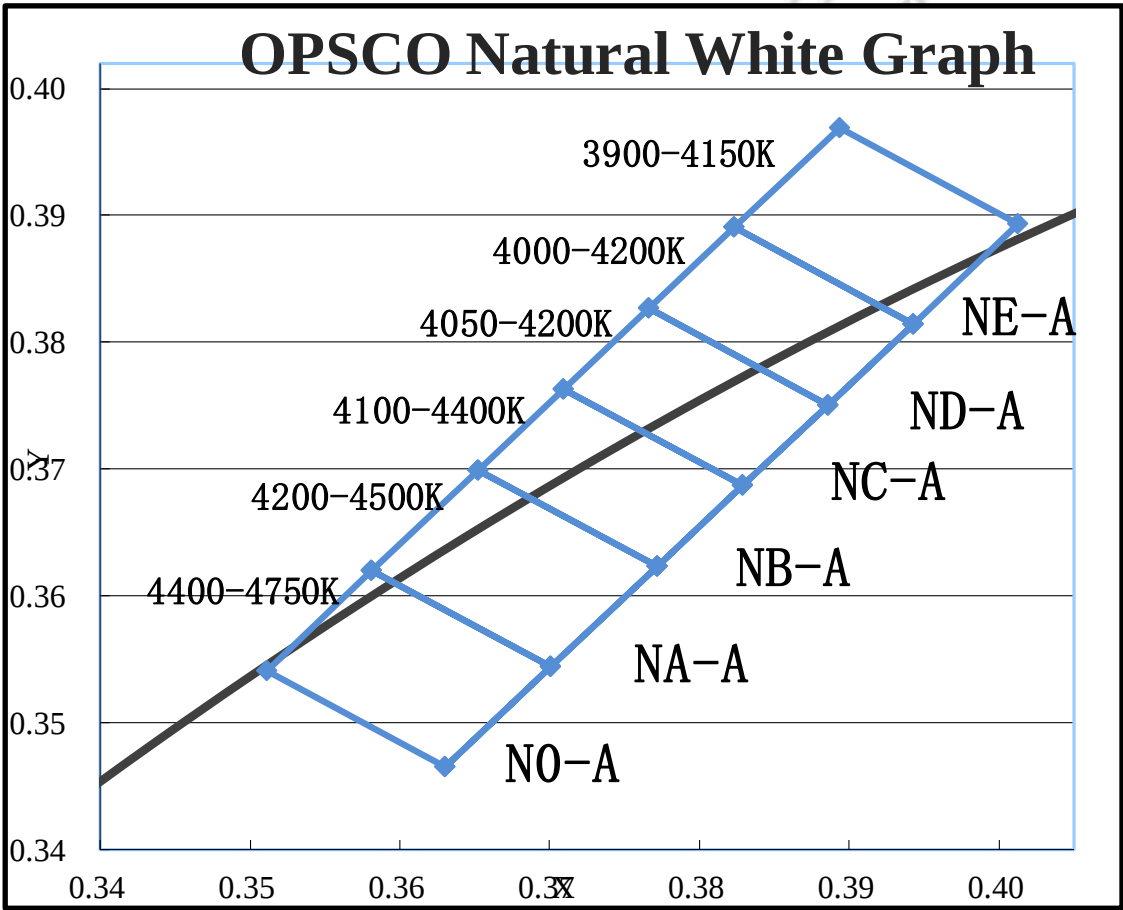




CIE chromaticity coordinates (ANSI Natural white)

CA	X1	Y1	X2	Y2	X3	Y3	X4	Y4
NA	0.3662	0.3541	0.3578	0.3594	0.3623	0.3666	0.3707	0.3612
NB	0.3707	0.3612	0.3623	0.3666	0.3669	0.3737	0.3753	0.3683
NC	0.3753	0.3683	0.3669	0.3737	0.3714	0.3808	0.3798	0.3754
ND	0.3798	0.3754	0.3714	0.3808	0.3759	0.3879	0.3844	0.3825
NE	0.3844	0.3825	0.3759	0.3879	0.3805	0.3950	0.3889	0.3897

ANSI Natural White Color bin structures

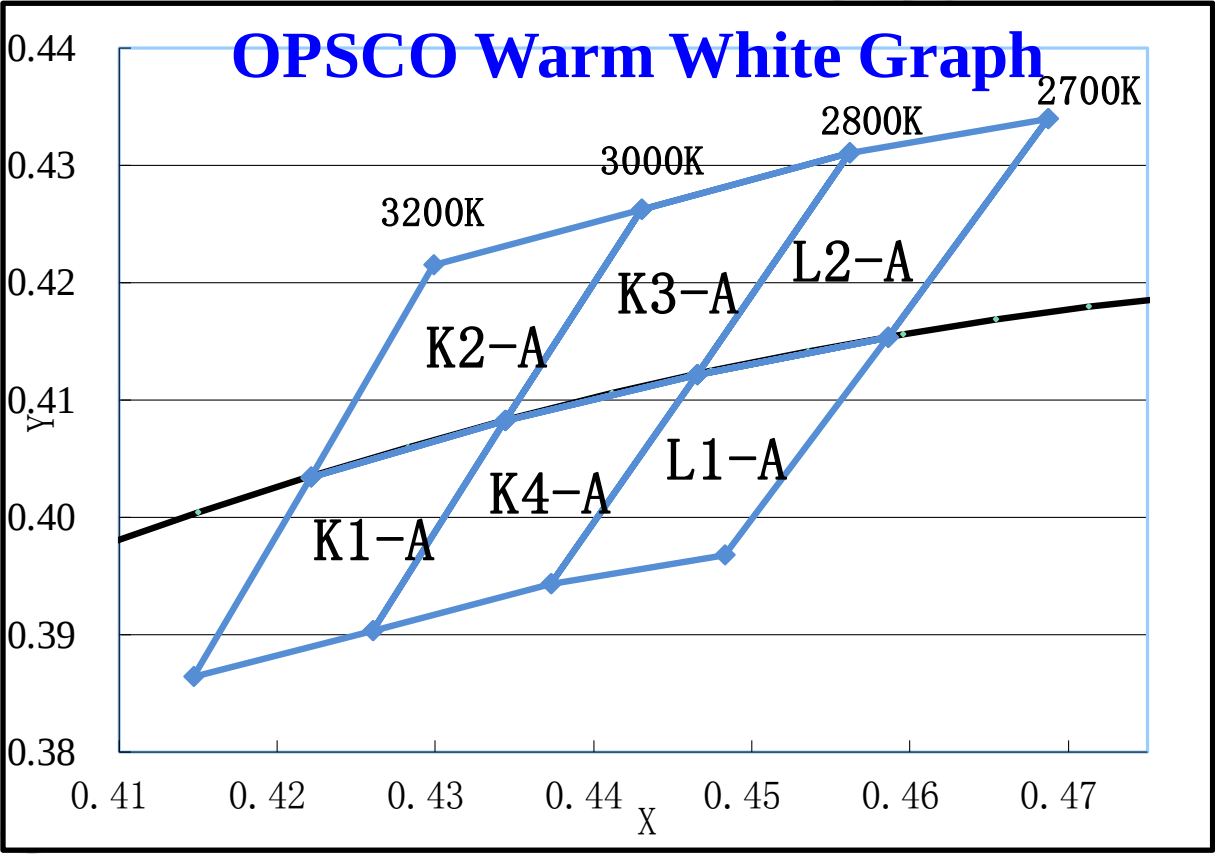




CIE chromaticity coordinates (ANSI Warm White)

名称	X1	Y1	X2	Y2	X3	Y3	X4	Y4
K1-A	0.4344	0.4032	0.4221	0.3984	0.4147	0.3814	0.426	0.3853
K2-A	0.443	0.4212	0.4299	0.4165	0.4221	0.3984	0.4344	0.4032
K3-A	0.4562	0.426	0.443	0.4212	0.4344	0.4032	0.4465	0.4071
K4-A	0.4465	0.4071	0.4344	0.4032	0.426	0.3853	0.4373	0.3893
L1-A	0.4586	0.4103	0.4465	0.4071	0.4373	0.3893	0.4483	0.3918
L2-A	0.4687	0.4289	0.4562	0.426	0.4465	0.4071	0.4586	0.4103

ANSI Warm White Color bin structures

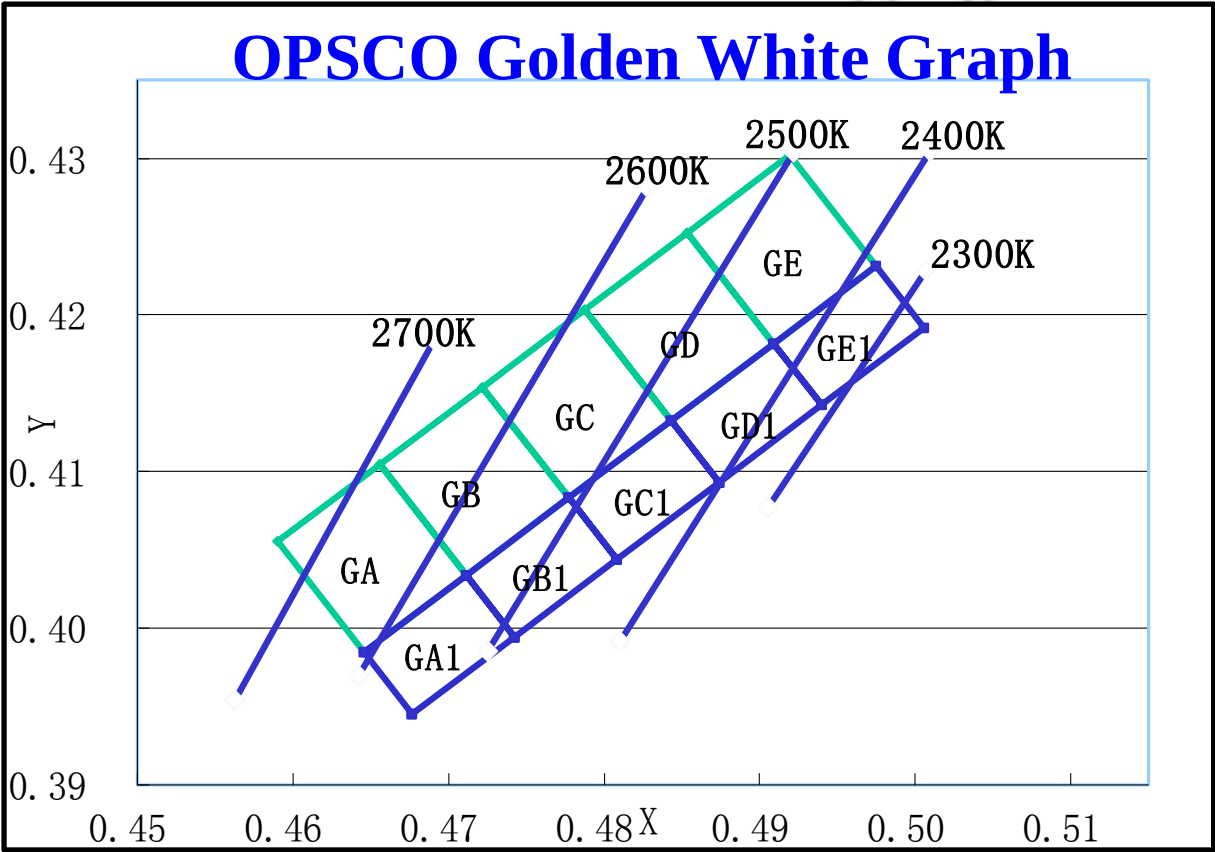




CIE chromaticity coordinates (ANSI Warm Lighting)

CA	X1	Y1	X2	Y2	X3	Y3	X4	Y4
GA	0.459741	0.3982	0.4548	0.4045	0.4613	0.4096	0.4662	0.4033
GB	0.466212	0.4033	0.4613	0.4096	0.4677	0.4147	0.4727	0.4084
GC	0.472682	0.4084	0.4677	0.4147	0.4742	0.4198	0.4792	0.4135
GD	0.479152	0.4135	0.4742	0.4198	0.4807	0.4248	0.4856	0.4185
GE	0.485622	0.4185	0.4807	0.4248	0.4872	0.4299	0.4921	0.4236
GA1	0.462676	0.3945	0.4597	0.3982	0.4662	0.4033	0.4693	0.3994
GB1	0.469255	0.3994	0.4662	0.4033	0.4727	0.4084	0.4758	0.4044
GC1	0.475835	0.4044	0.4727	0.4084	0.4792	0.4135	0.4824	0.4093
GD1	0.482415	0.4093	0.4792	0.4135	0.4856	0.4185	0.489	0.4142
GE1	0.488995	0.4142	0.4856	0.4185	0.4921	0.4236	0.4956	0.4192

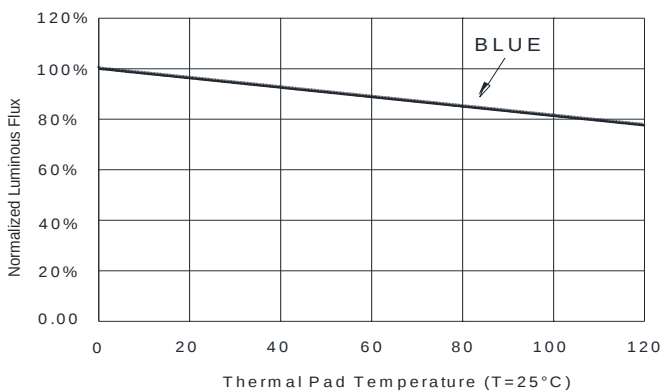
ANSI Warm Lighting Color bin structures



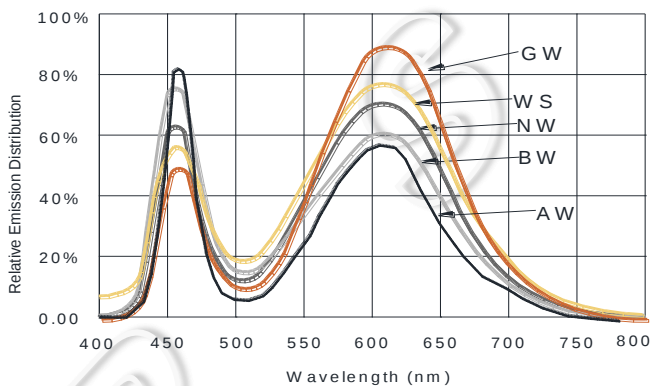
• Color coordinates measurement allowance is ± 0.005
• To order specify color temperature ranks, please contact OPSCO Lighting Holdings LTD. for further information.
• Thermal Pad Temperature @25℃ @ 20mA

14. Optical-Electrical Characteristic Graphs (InGaN)

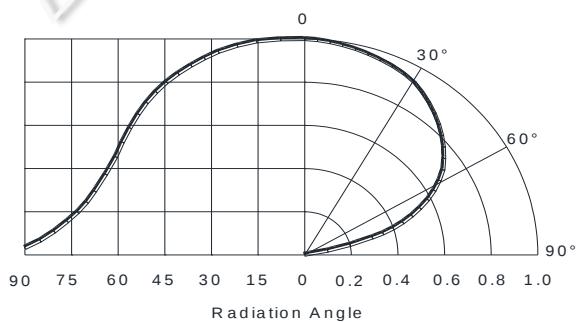
Thermal Pad Temperature vs. Relative Light Output



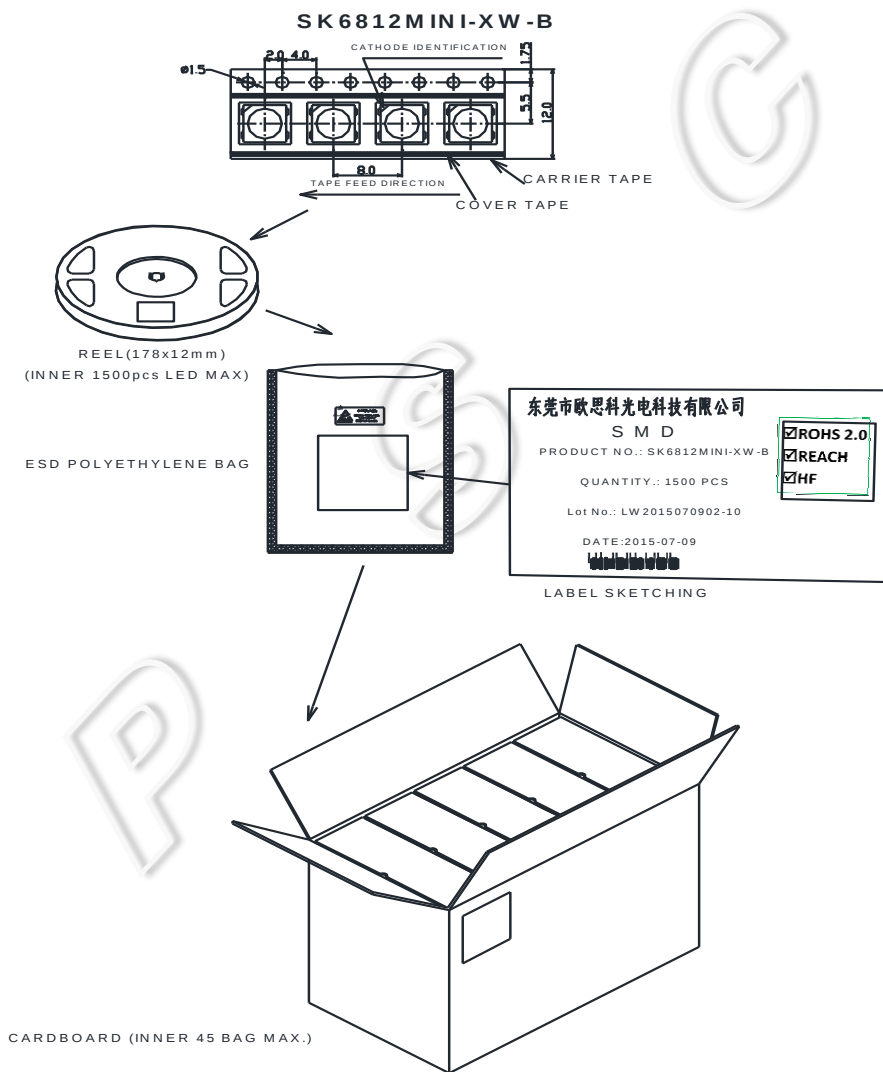
Wavelength Characteristics



Typical Radiation Pattern 120°



17. Packaging Standard:



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	$100 \pm 5^{\circ} \text{C} \sim -40^{\circ} \text{C} \pm 5^{\circ} \text{C}$ 30min~30min 100 cycles	MIL-STD-202G	0/22
2	High Temperature Storage	Ta= $+100^{\circ} \text{C}$ 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	$-40^{\circ} \text{C} \sim 25^{\circ} \text{C} \sim 100^{\circ} \text{C} \sim 25^{\circ} \text{C}$ 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	