

The page features three large, overlapping blue circles of varying sizes, each with a gradient from dark blue to light blue. Two thin blue lines intersect at the top left, forming a large 'V' shape that frames the circles and the text.

Technical Data Sheet PC4xx301V0500-L

UBLeds Co., LTD.

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1. MODEL

PC 4 x x 301 V 05 00 - L

Lead frame type

Drive IC type

Color

W: White, warm white

X: RGB Tri-color.

Grade

S: Standard/Color

A: CRI > 95

B: CRI > 90

C: CRI > 80

D: CRI > 70

Power Dissipation

abc: $ab \cdot 10^c$ mWatt. ex. 301=30*10¹=0.3W

Driving Source

V: Constant voltage

Source

05: 5V

12: 12V

24: 24V

Remark

General brightness

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2. FEARTURES

- ◆ Functional led , non-addressable , single point control.
- ◆ Small package with integrated RGB leds and drive IC.
- ◆ Easy control by MCU.
- ◆ Simplifying circuit design and PCB layout for designer.
- ◆ Diffused encapsulant to make excellent distribution for luminous intensity and radiation. (patent pending)
- ◆ Wide viewing angle. (120°)
- ◆ Compatible with IC P9823, WS2811, UCS1903
- ◆ ESD protection for V_{DD} , Data In, Data Out



Top View LED with Reflector

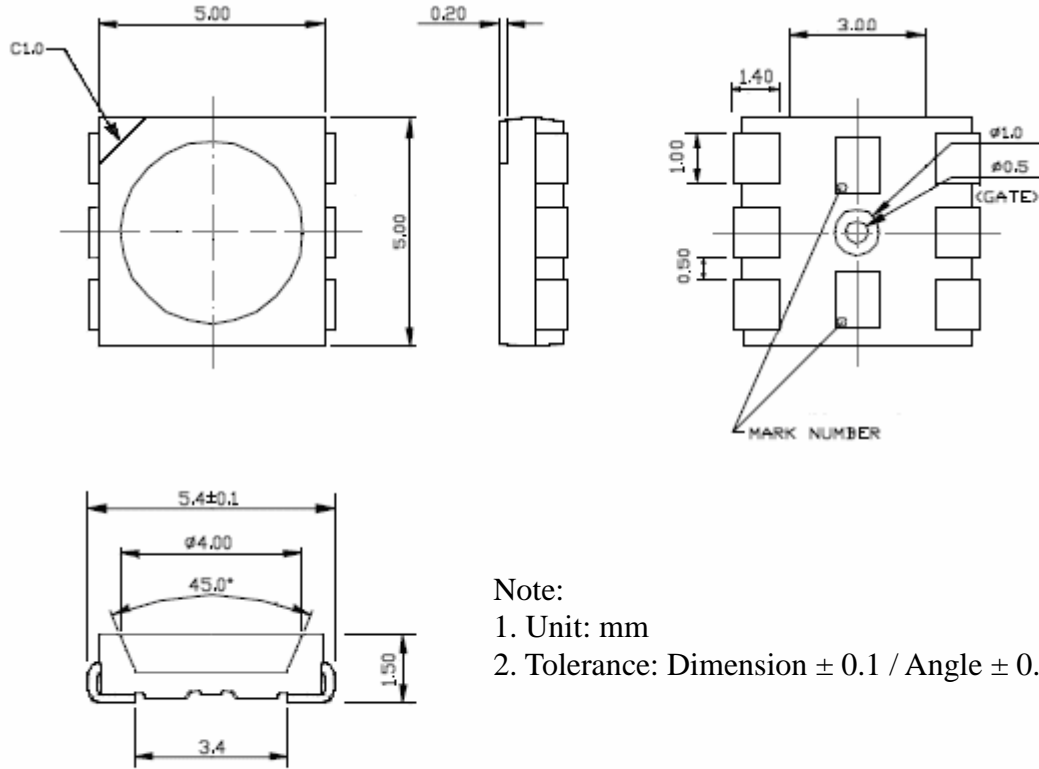
3. APPLICATIONS

- ◆ Indoor/outdoor lighting
- ◆ Channel Letter
- ◆ Decorative Lighting
- ◆ Glass panel
- ◆ LED Display
- ◆ Automotive

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4. OUTLINE DRAWING

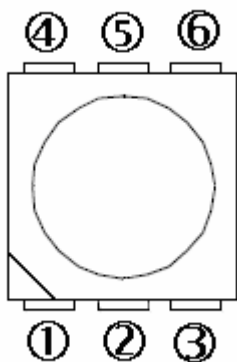
4.1 Outline Drawing



Note:

1. Unit: mm
2. Tolerance: Dimension ± 0.1 / Angle $\pm 0.5^\circ$

4.2 Pin Assignment



Pin No.	Function	Function description
①	Data Out	Data output
②	Data In	Data input
③	V _{DD}	Power input of control IC
④	GND	Ground
⑤	V _{CC}	Power input of LED
⑥	X	N/A

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5. ABSOLUTE MAXIMUM RATINGS (TA=25°C)

Parameter	Symbol	Range	Unit
Forward Voltage	V_{DD}/V_{CC}	7	V
Power Dissipation	P_D	300	mW
Forward Current	$I_F(R/B/G)$	20/20/20	mA
Frequency of clock	F_{CLK}	800	kHz
Soldering Temperature	T_{sol}	245(5sec)	°C
Junction Temperature	T_j	125	°C

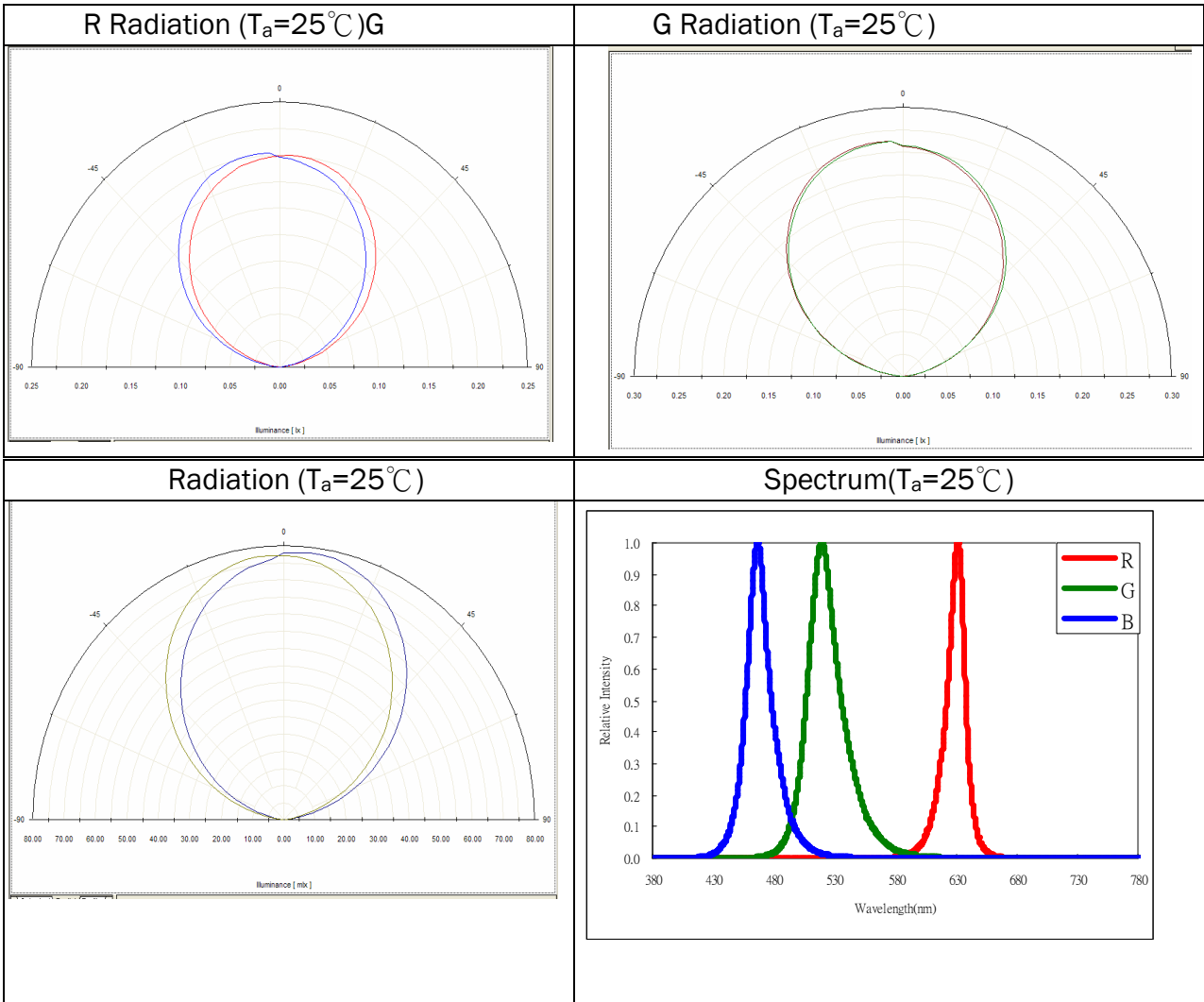
6. ELECTRICAL OPTICAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit	
Forward Voltage	V_{DD}/V_{CC}	3.5	5.0	7.0	V	
Clock Frequency	F_{CLK}			800	kHz	
LED Wavelength $V_{DD}=V_{CC}=5V$	R	λ_d	620	625	nm	
	G	λ_d	523	528		
	B	λ_d	465	475		
	W	CCT	1800		15000	K
Luminous Intensity $V_{DD}=V_{CC}=5V$	R	I_v	300	410	520	mcd
	G	I_v	700	850	1000	
	B	I_v	160	200	250	
	W	I_v	4250		6000	
Thermal Resistance	R_{js}			10	°C/W	
Operating Temperature	T_{OP}	-30		80	°C	
Storage Temperature	T_{STG}	-40		100	°C	

* V_{DD} : IC Operation Voltage

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7. CHARACTERISTICS

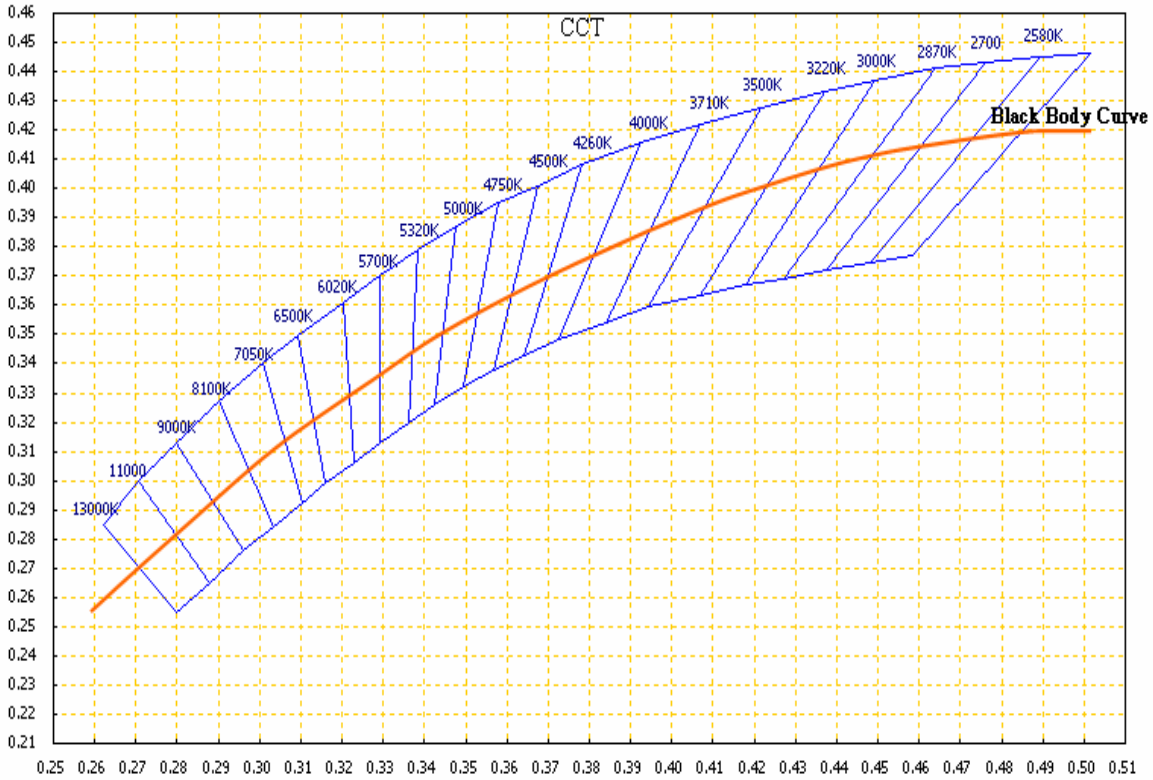


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8. CHROMATICITY COORDINATES RANKS

* Chromaticity Coordinates (CIE 1931 system)

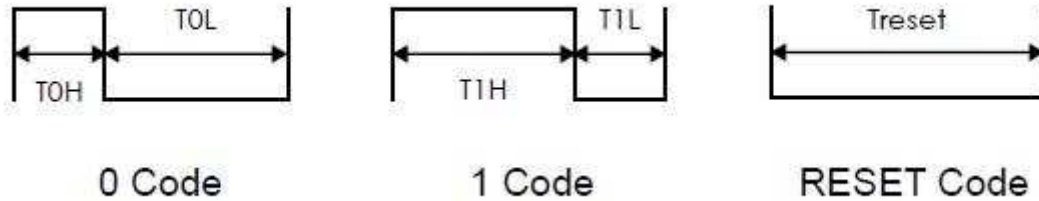


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9. PROTOCOL

9.1 Input code pattern

9.2 Timing waveform



INPUT

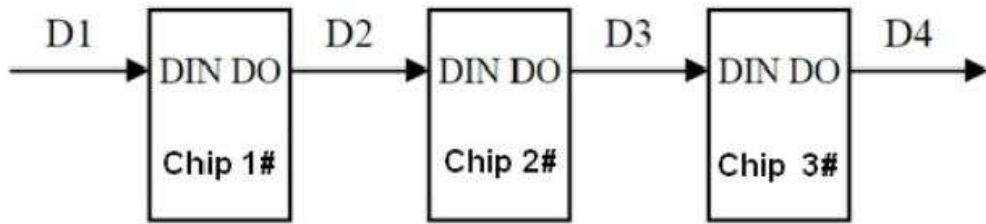
Period time Data transfer time ($T_H + T_L = 1.25\mu s \pm 600ns$)

Name	Description	Typical(ns)	Tolerance(ns)
T0H	0 code High level time	400	± 150
T1H	1 code High level time	800	± 150
T0L	0 code Low level time	850	± 150
T1L	1 code Low level time	450	± 150
RES	RESET code	> (longer than) $50\mu s$	

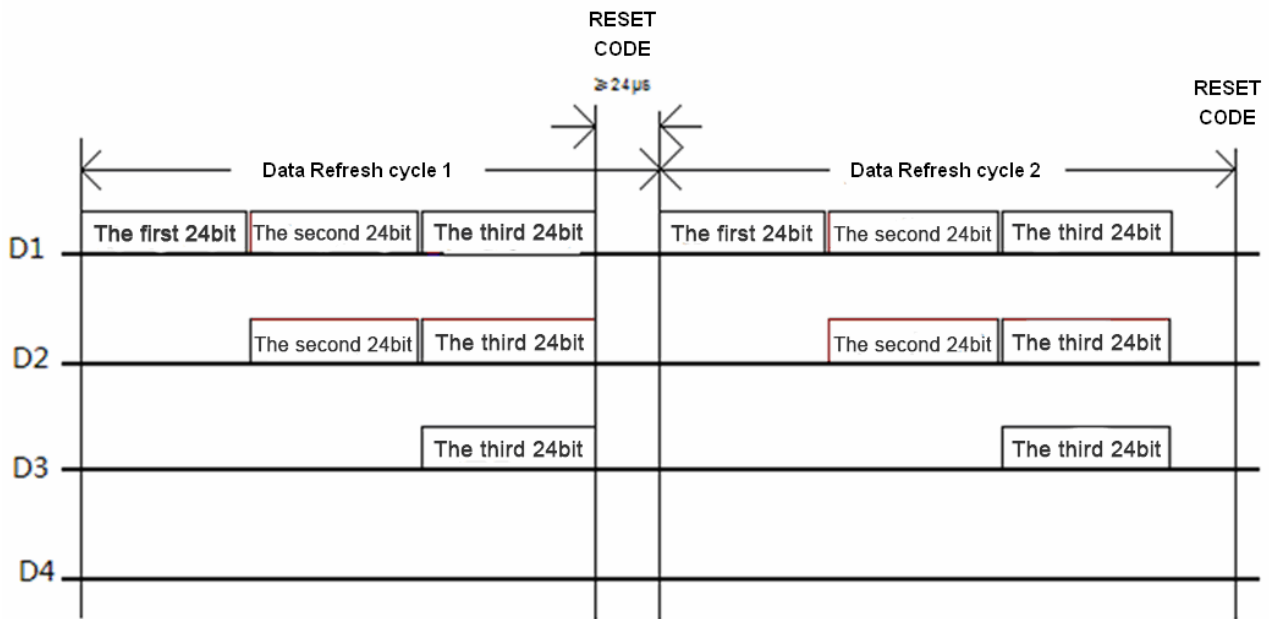
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9.3 Connect method



9.4 Data transmission method



*D1 is the transmitted data of MCU; D2, D3, D4 are the data of cascade circuit automatically shaping forwarding data.

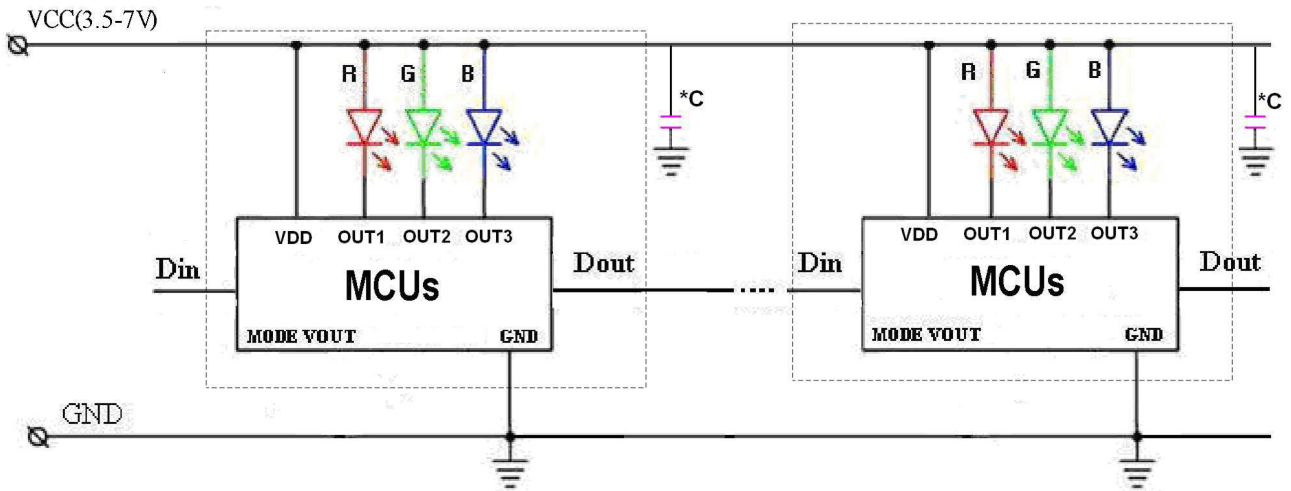
9.5 24bit data structure

G7	G6	G5	G4	G3	G2	G1	G0	R7	R6	R5	R4	R3	R2	R1	R0	B7	B6	B5	B4	B3	B2	B1	B0
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*Send the high bit at first, then send the data according to the GRB sequence.

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10. Typical Applications



*C: The recommended capacitance value is 100pF.

Example : One GRB unit

Color Pattern: GGGG GGGG RRRR RRRR BBBB BBBB

MSB will be transmitted first.

Case I : 100%Green for 1st LED, 100%Red for 2nd LED, 100%Blue for 3rd LED :

```
1
1111 1111 0000 0000 0000 0000 0000 0000 1111 1111 0000 0000 0000 0000 0000
0000 1111 1111
```

Case II : 12/24 Green for 1st LED, 12/24 Red for 2nd LED, 12/24 Blue for 3rd LED :

```
1
1111 0000 0000 0000 0000 0000 0000 0000 1111 0000 0000 0000 0000 0000 0000
0000 1111 0000
```

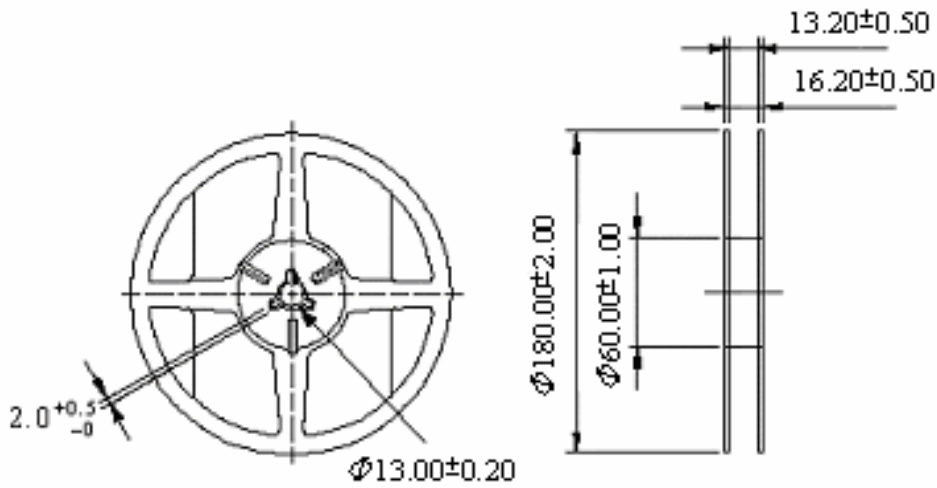
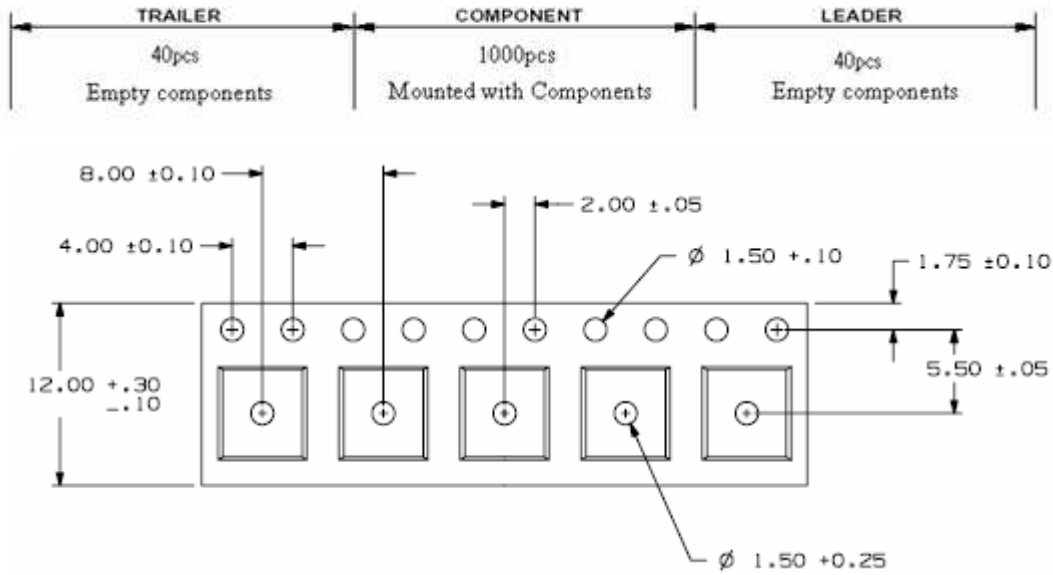
Case III : 100%White for 1st LED, 12/24 Green+12/24Blue for 2nd LED, 12/24 Green for 3rd LED :

```
1
1111 1111 1111 1111 1111 1111 1111 0000 0000 0000 1111 0000 1111 0000 0000
0000 0000 0000
```

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11. REEL PACKAGE

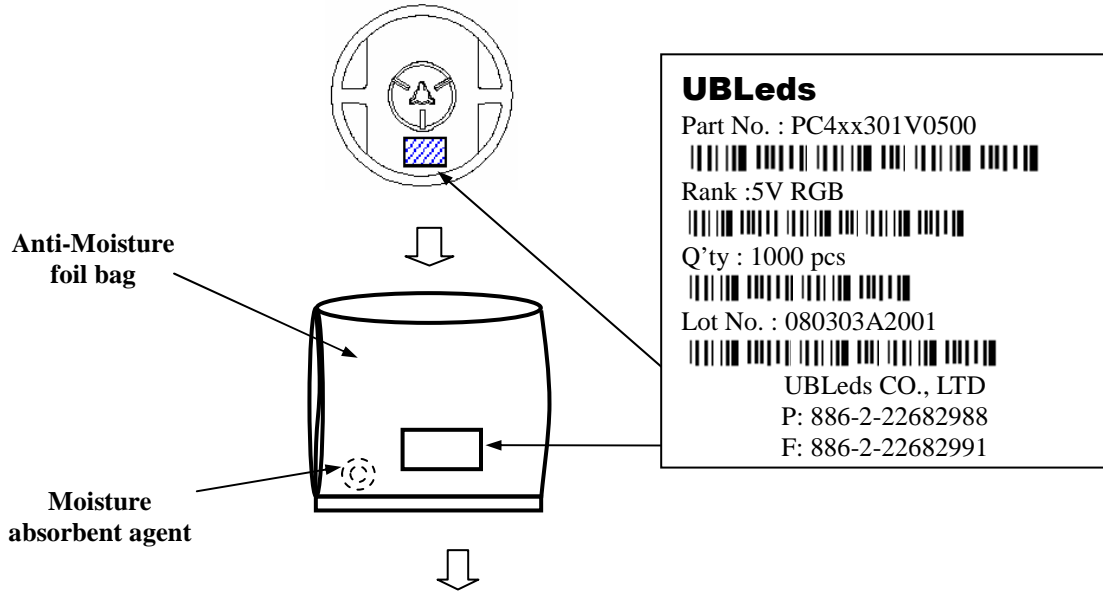






Note:
 1. Unit: mm
 2. 1,000 pcs / reel

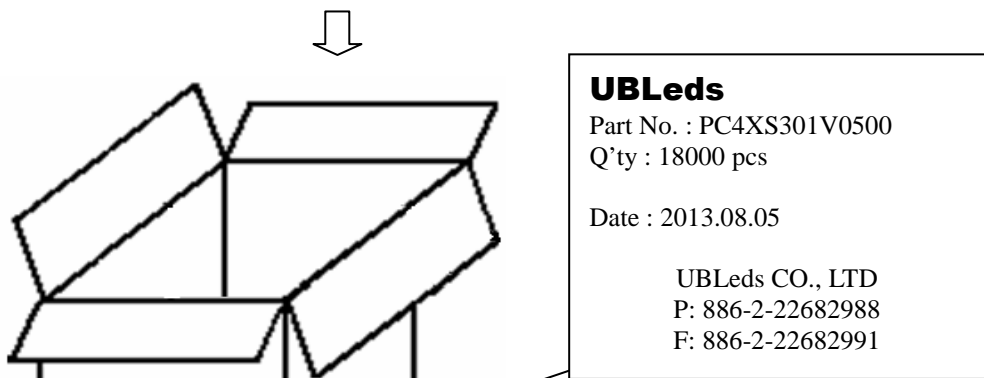
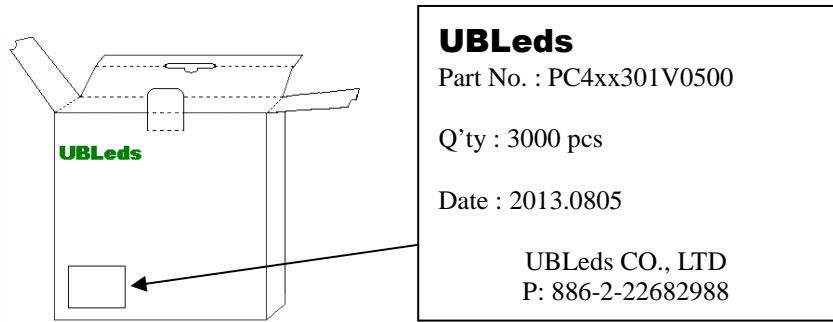
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12. SHIPPING PACKAGE



UBLeds
 Part No. : PC4xx301V0500

 Rank :5V RGB

 Q'ty : 1000 pcs

 Lot No. : 080303A2001

 UBLeds CO., LTD
 P: 886-2-22682988
 F: 886-2-22682991



Note:

1. 1000 pcs (max.) / reel
2. 3 reels / box
3. 6 box / carton

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13. RELIABILITY PLAN

* The reliability of products shall be satisfied with items listed below.

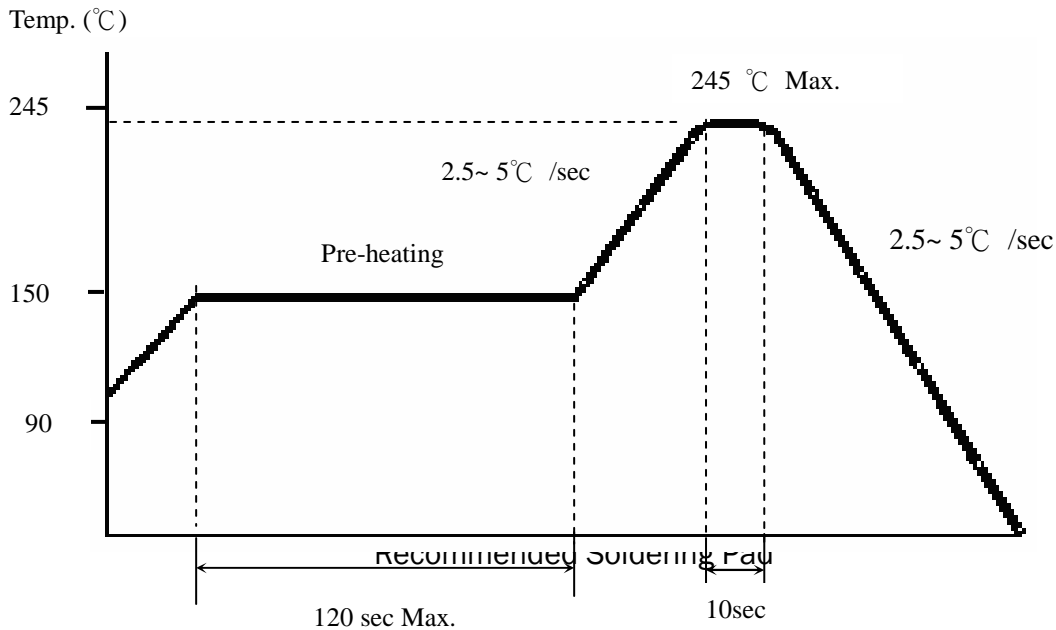
Confidence Level : 95 %

No	Test Item	Description & Condition		Sample size	Ac/Re
1	Solderability	Tsld =245±5°C, 10sec,	2 time	22	0/1
2	Low Temperature Storage	Ta = -40 °C	1000 hrs	22	0/1
3	High Temperature Storage	Ta = 100 °C	1000 hrs	22	0/1
4	High Temperature Running Test	Ta = 100 °C	1000 hrs	22	0/1
5	Temperature Cycling	-40 °C ~ 100 °C	300 cycles	22	0/1

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14. SOLDERING CONDITIONS

(1) Recommended Re-flow profile



- (2) Re-flow soldering should not be done more than two times.
- (3) It is recommended that the user use the nitrogen reflow method.
- (4) When soldering, don't put stress on the LEDs during heating.
- (5) After soldering, don't warp the circuit board.
- (6) It is recommended that isopropyl alcohol (IPA) be used as a solvent for cleaning the LEDs.

15. CAUTIONS

(1) Storage

- Before opening the package :

The LEDs should be kept at 30°C or less and 30%RH~85%RH. The LEDs should be used within a year. When storing the LEDs, moisture proof pac (Unit : mm) desiccant (Silica gel) is recommended.

- After opening the package :

The LEDs should be kept at 30°C or less and 30%RH~70%RH. The LEDs should be soldered within 168 hours (7 days) after opening the package. If unused LEDs remain, they should be stored in moisture proof packages, such as sealed containers with packages of moisture desiccant (Silica gel), or reseal the moisture proof bag again.

If the moisture desiccant (Silica gel) has faded away or the LEDs have exceeded the storage time, baking treatment should be performed using the following conditions.

Baking treatment: 24 hours at 60°C on tap and reel, 7 hours at 125°C have no reel&tap.

Please avoid conditions which may cause the LED to corrode, tarnish or discolor. This corrosion or discoloration might lower solderability or might effect on optical characteristics. Please avoid rapid transitions in ambient temperature, especially in high

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humidity environments where condensation can occur.

Moisture Proof package

When moisture is absorbed into the SMT package it may vaporize and expand during soldering. There is a possibility that this can cause exfoliation of the contacts and damage to the optical characteristics of the LEDs. For this reason, the moisture proof package is used to keep moisture to a minimum in the package. A package of a moisture desiccant (silica gel) is inserted into the moisture proof bag. The silica gel changes its color from blue to pink as it absorbs moisture.

(2) Static Electricity

- Static electricity or surge voltage damages the LEDs. It is recommended that a wrist band or an anti-electrostatic glove and shoe be used when handling the LEDs.
- All devices, equipment and machinery must be properly grounded. It is recommended that measures be taken against surge voltage to the equipment that mounts the LEDs.
- When inspecting the final products in which LEDs were assembled, it is recommended to check whether the assembled LEDs are damaged by static electricity or not. It is easy to find static-damaged LEDs by a light-on test or a V_F test at a lower current (below 1 mA).
- Damaged LEDs will show some unusual characteristics such as the leak current remarkably increases, the forward voltage becomes lower, or the LEDs do not light at the low current. (Criteria : $V_F > 2.0V$ at $I_F = 0.5mA$.)

(3) Heat Generation

- Please consider the heat generation of the LED when making the system design that it's very important. The coefficient of temperature increase per input electric power is effected by the thermal resistance of the circuit board and density of LED placement on the board, and other components. It is necessary to avoid intense heat generation and operate within the maximum ratings given in this specification.
- The operating current should be decided after considering the ambient maximum temperature of LEDs.

(4) Others

- Care must be taken to ensure that the reverse voltage will not exceed the absolute maximum rating when using the LEDs with matrix drive.
- The LED light output is strong enough to injure human eyes. Precautions must be taken to prevent looking directly for more than a few seconds. Flashing lights have been known to cause discomfort in people; you can prevent this by taking precautions during use. Also, people should be cautious when using equipment that has had LEDs incorporated into it.