JERCIO

深圳市阶新科技有限公司

Shenzhen Jercio Technology Co.,Ltd.

Specification

Product Number： XT9822-D20

Document No.： JERCIO/XT9822-D20 REV.03 EN

Description： 2.0x2.0x0.65mm Type 0.3Watt Power Embedded(MSL:4)

Change History

Rev. No.	Date	Changes/Reason of changes
.01	2018-07-13	Initial Document
.02	2018-12-13	Modification of PCB pad
.03	2019-02-20	Updating PCB Recommended Pad Size

Prepared by	Design by	Reviewed by	Approved by
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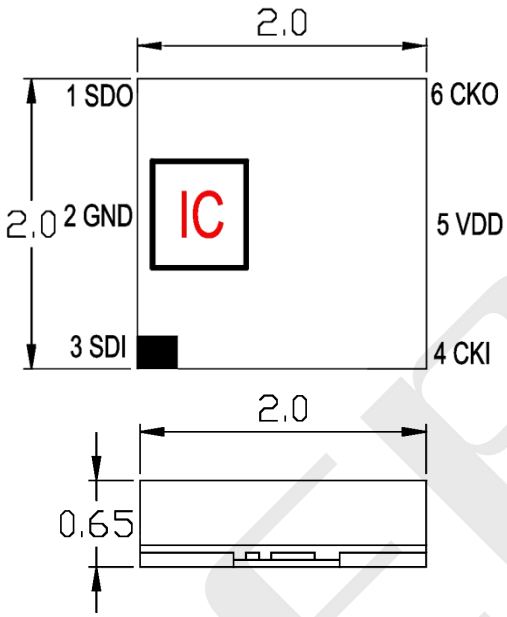
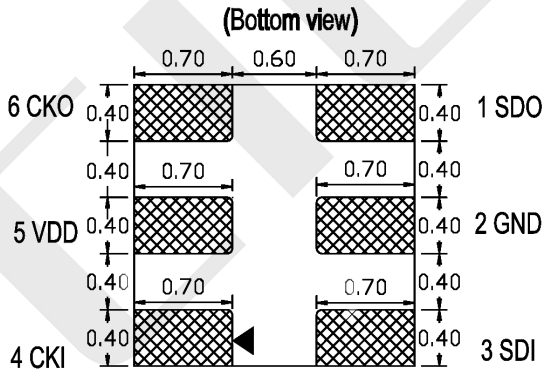
1.Product Overview：

XT9822-D20 is a two-wire transmission channel three (RGB) driving intelligent control circuit and the light emitting circuit in one of the LED light source control. Products containing a signal decoding module,data buffer, a built-in constant current circuit and RC oscillator; CMOS, low voltage, low power consumption; 256 level grayscale PWM adjustment and 32 brightness adjustment; use the doubleoutput, Data and synchronization of the CLK signal, connected in series each wafer output action synchronization.

2.Mechanical Dimensions：





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

3.Main Application Field：

●Easy To Design

●Easy To Build

●Easy To Program

4.Description：

● The three constant current drive, self detection function specific signal

●The three RGB output control, 8Bit (256) color; 5Bit (32) to adjust the brightness;

● The two-wire synchronous control.The maximum frequency of 30MHZ serial data input

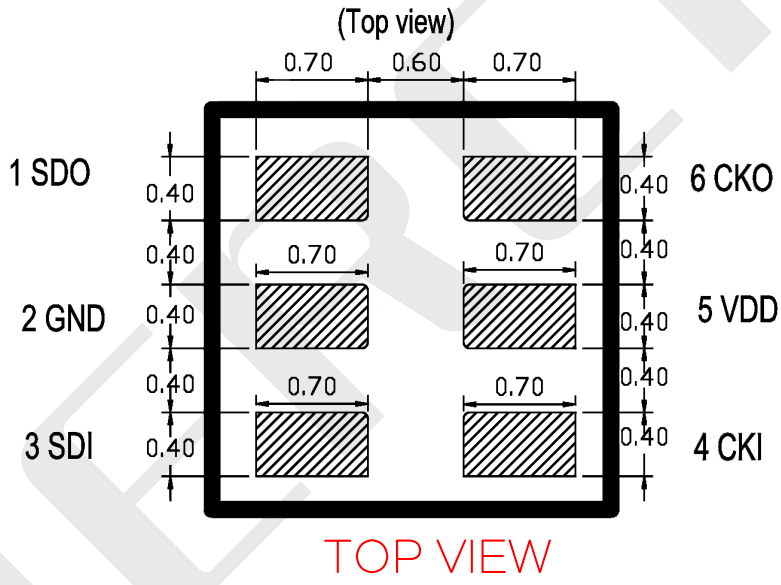
● The double data transmission, built-in support uninterrupted oscillation PWM output, can maintain a static image.

● EC LED internal integrated high quality external control line serial cascade constant current IC; 5Vapplication; default on electric lights;

5. PIN configuration：

NO.	Symbol	Function description
1	SDO	Control signal output data
2	GND	The signal and power supply and grounding
3	SDI	Control signal Input data
4	CKI	Control signal Input Clock data
5	VDD	Power supply pin
6	CKO	Control signal output Clock data

6.Recommended dimensions for PCB：



7. General description of product naming：

XT - 9822 - D20

① ② ③

①	②	③
XT series	**IC Type and Current Code**	**Package outline**
The default is to integrate the RGB chip with the IC	Refers to the 9822 series IC 18MA current version Double line transmission	package in 2.0x2.0x0.65mm PCB

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

Parameter	Symbol	Range	Unit
Power supply voltage	V_{DD}	+3.7~+5.5	V
Logic input voltage	V_{IN}	-0.3～VDD+0.3	V
Working temperature	Topt	-40~+80	℃
Storage temperature	Tstg	-40~+80	℃
ESD pressure(DM)	V_{ESD}	200	V
ESD pressure(HBM)	V_{ESD}	4 K	

9.RGB LED Photoelectric parameter：

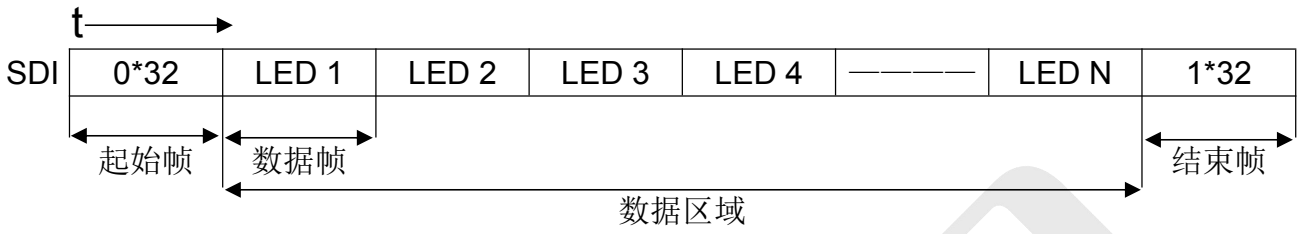
Colour	XT9822-D20		
	Dominate Wavelength (nm)	Luminance (mcd)	Luminous flux (lm)
RED	620-625	300-500	0.8-2.0
GREEN	520~530	400-700	2.0-3.5
BLUE	460-470	100-300	0.5-1.5

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

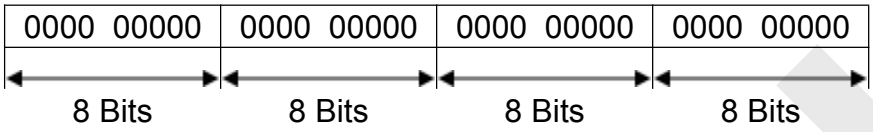
Parameter	Symbol	Min	Typical	Max	Unit	Test Conditions
The chip supply voltage	V_{DD}	---	5.0	5.5	V	---
R/G/B port pressure	VDS,MAX	---	---	17	V	
The biggest LED output current	L_{MAX}	---	---	20	mA	
The clock high level width	TCLKH	---	17	---	ns	---
The clock low level width	TCLKL	---	17	---	ns	---
Data set up time	TSETUP			10	ns	
The frequency of PWM	F_{PWM}	---	4.0	---	KHZ	
Static power consumption	L_{DD}		1		mA	

11.Feature Descriptions：

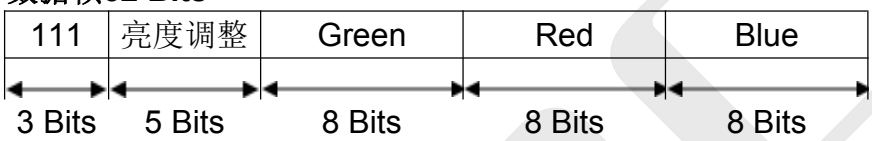
（1）Series data structure



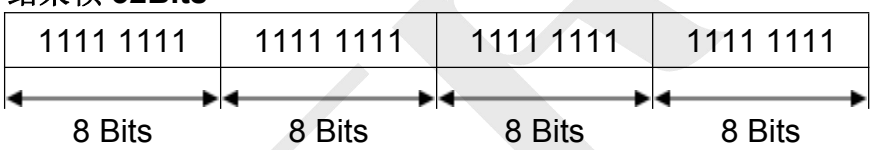
开始帧32 Bits



数据帧32 Bits



结束帧 32Bits

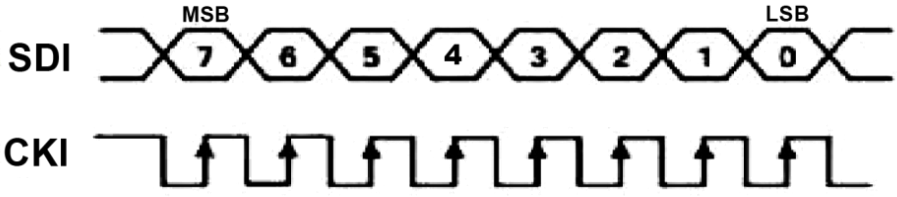


Product structure: GRB order output light, optimize the product blending effect (adjusted IC default RGB order wafer position)；

（2）256 level gray leve

Data	Duty Cycle
MSB... ...LSB	
0000 0000	0/256
0000 0001	1/256
0000 0010	2/256
- - -	- - -
1111 1101	253/256
1111 1110	254/256
1111 1111	255/256

（3）PWM input / output signal relationship：



（4）5-Bit (level 32) brightness adjustment (simultaneous control of OUTR\OUTG\OUTB three port current):

Current level	numerical value（MSB... ...LSB）	Current adjustment	Corresponding current value（mA）	Remarks
1	00000	0/31	0	Suggested Current: 1-10 Current Regulation Level
2	00001	1/31	0.581	
3	00010	2/31	1.162	
4	00011	3/31	1.743	
5	00100	4/31	2.324	
6	00101	5/31	2.905	
7	00111	6/31	3.486	
8	00111	7/31	4.067	
9	01000	8/31	4.648	
*10	01001	9/31	5.229	
11	01010	10/31	5.81	Based on the heat dissipation of the product, the current of this product is recommended to be used at a maximum of 5.229 mA, and the current regulation level of 11-31 is not recommended.
12	01011	11/31	6.391	
13	01100	12/31	6.972	
14	01101	13/31	7.553	
15	01110	14/31	8.134	
16	01111	15/31	8.715	
17	10000	16/31	8.296	
18	10001	17/31	9.877	
19	10010	18/31	10.458	
20	10011	19/31	11.039	
21	10100	20/31	11.62	
22	10101	21/31	12.201	
23	10110	22/31	12.782	
24	10111	23/31	13.363	
25	11000	24/31	13.944	
26	11001	25/31	14.525	
27	11010	26/31	15.106	
28	11011	27/31	15.687	
29	11100	28/31	16.268	
30	11101	29/31	16.849	
31	11110	30/31	17.43	
32	11111	31/31	18	

Note: 1. Suggested Current: 1-10 Current Regulation Level

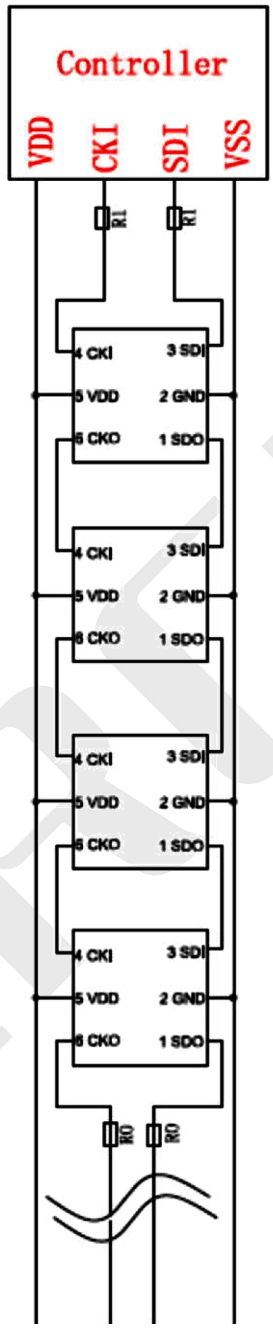
2. Based on the heat dissipation of the product, the current of this product is recommended to be used as maximum as 5.229mA, and the current regulation level of 11-31 is not recommended.

（5）Refresh Rate：

Frame rate (=1/ (64+ (32* points)) *CKI (cycle) unit: frames per second)

Such as: 1024 points, CKI frequency is 1MHZ, is =30 frames per second frame rate.

12. The typical application circuit：

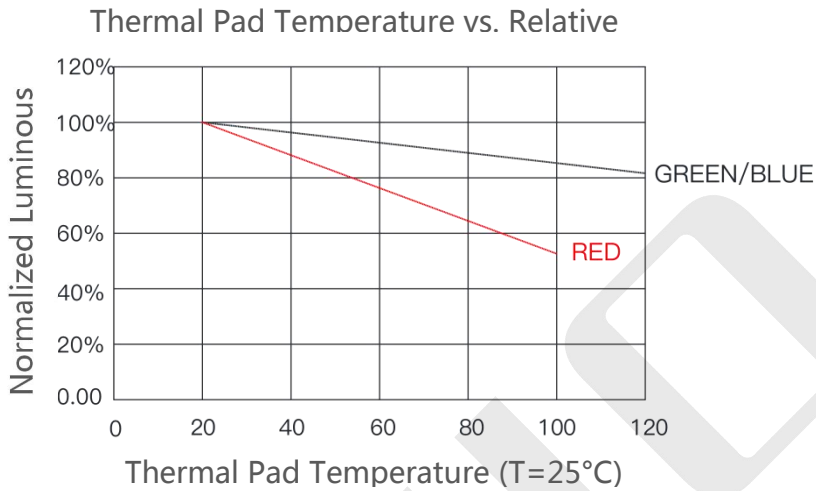


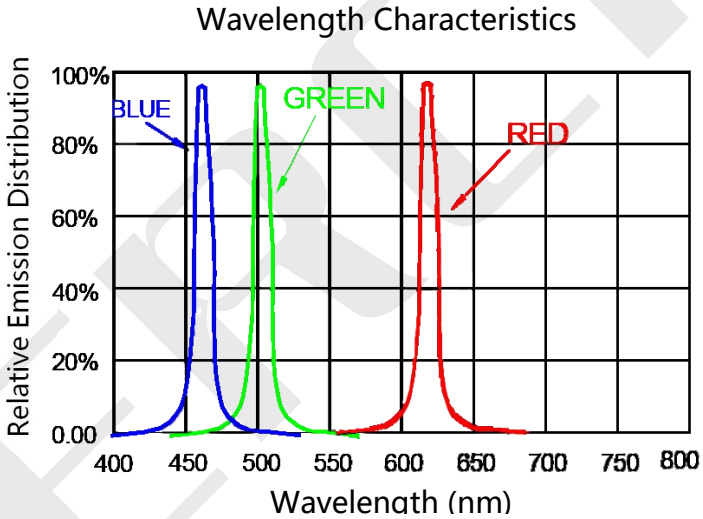
In the application circuit, in order to prevent the input and output pins in the IC from being damaged by the instantaneous high voltage generated by the hot plug of the product during the test, the protection resistor should be connected in series at the signal input and output terminals. In addition, in order to make each IC chip work more stably, the decoupling capacitance between the lamp beads is essential.

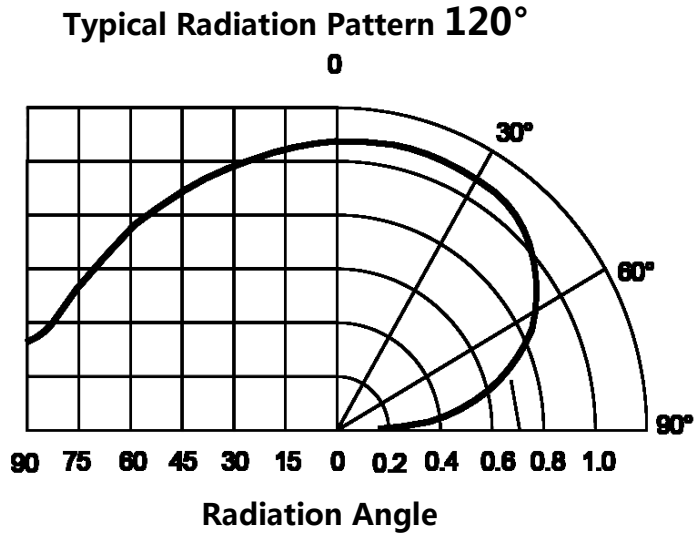
Application case 1:For flexible or rigid led strips with short transmission distance between the lamp beads, it is recommended to connect protection resistance in series at input and output end of signal line, R1 = R2 = 500 ohm

Application case 2:For module or irregular shape products, due to the long transmission distance between the lamp beads, different wire and transmission distance, the protection resistance value of the two ends of the signal wire will be different, which should be determined according to the actual use.;

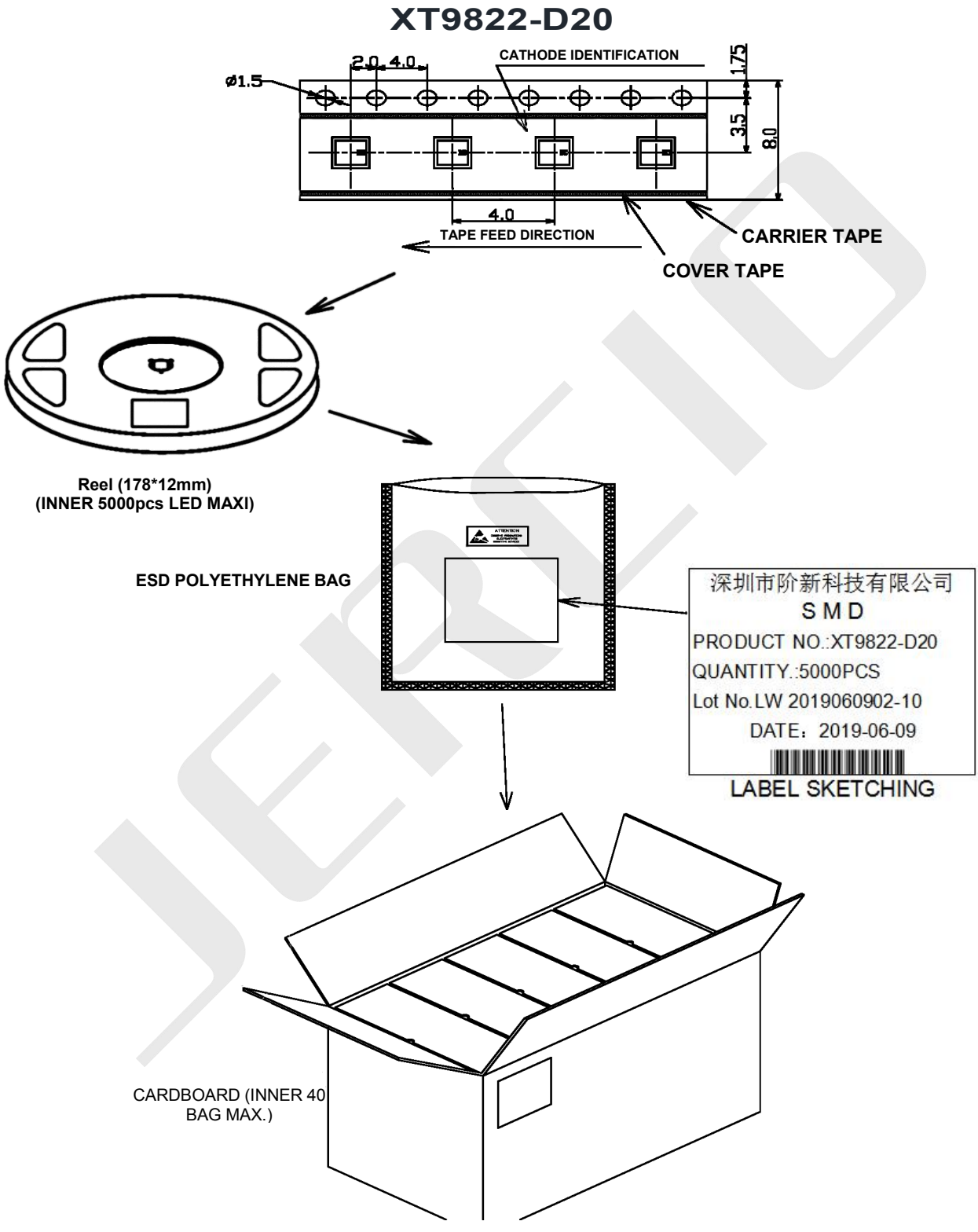
13.Photoelectric characteristics：







14.Packing 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.

15.Reliability Testing：

Serial number	Testing Items	Testing Conditions	Standard	Result
1	Thermal shock	100 ± 5°C ~ -40°C ± 5°C 30min~30min 300cycles	MIL-STD-202G	0/22
2	High temperature storage	Ta= +100ºC 1000hrs	JEITA ED-4701 200 201	0/22
3	Low temperature storage	Ta= -40ºC 1000hrs	JEITA ED-4701 200 202	0/22
4	High temperature and high humidity storage	Ta=60ºC RH=90% 1000hrs	JEITA ED-4701 100 103	0/22
5	Temperature cycle	-55ºC~25ºC~100ºC~25ºC 30min~5min~30min~5min 100 cycles	JEITA ED-4701 100 105	0/22
6	Resistance to soldering heat	Tsld = 260°C， 10sec. 3 times	JEITA ED-4701 300 301	0/22
7	Normal temperature life test	25°C， IF： Typical current，1000hrs	JESD22-A 108D	0/22

Failure criteria：

Item	Symbol	Test Conditions	Limit	
			Min	Max
Luminous Intensity	IV	DC = 12V, typical current	Init. Value*0.7	---
Resistance To Soldering Heat	---	DC = 12V, typical current	No dead LEDs or obvious damage	

Appendix 1、EC LED Application Notes

1.Features：

The purposes of making JERCIO's customers and users to have a clear understanding on the ways how to use the LED.

2.Description：

Generally.The LED can be used the same way as other general purposed semiconductors.When using JERCIO's EC LED, the following precautions must be taken to protect the LED.

3.Cautions：

3.1.Dust & Cleaning：

The surface of LED is packaged with silicone adhesive. Silicone resin plays a good protective role in the optical system and anti-aging properties of LED. However, silicon resin is soft and easy to stick to dust, so it is necessary to keep the working environment clean. Of course, there is a certain limit of dust on the LED surface, which will not affect the luminous intensity, but we should still avoid dust falling on the LED surface. Opening the bag is a priority, and components installed with LED should be stored in clean containers。

When the surface of LED needs to be cleaned, if the solution such as trichloroethylene or acetone is used, the surface of LED will be dissolved and so on.

Do not use soluble solution to clean the LED. Make sure whether it dissolves the LED before using any cleaning solution.

Do not clean the LEDs by the ultrasonic. When it is absolutely necessary, the influence as ultrasonic cleaning on the LEDs depends on factors such as ultrasonic power. Baking time and assembled condition. Before cleaning, a pre-test should be done to confirm whether any damage to the LEDs will occur.

3.2 Shipping and Storage：

EC LED is humidity sensitive, the LED packaging in the aluminum bag is to avoid the LED in the transport and storage of moisture absorption, in the bag with a desiccant to absorb the moisture inside the bag. If the LED absorbs water vapor, then in the LED over reflow, in the high temperature state,into which the rapid expansion of gas vaporization and produce a greater internal stress, so that the material crack,layered or damaged bonding wire,Resulting in product failure.

The top SMD LED is packed in moisture-proof and anti-static aluminum foil bags. During the handling process, it is necessary to avoid squeezing and piercing the bags and take electrostatic protection measures;If air leakage or damage is found in the product packaging before assembly, please take high temperature dehumidification before use; in the process of material transfer, mounting, shipment and installation of the finished products, the external force shall be prevented from directly or indirectly acting on the LED, resulting in the damage of LEDs and product failure.;

Such as before the material has been found to prevent moisture-proof aluminum foil bags have been opened, damaged, perforated can be returned to the original re-dehumidification, must not be

on-line use;

The humidity level of this product is LEVEL 5a.

Chart 1:Definition of material’s MSL prescribed by IPC/JEDECJSTD020E

Moisture proof level	Workshop life after packaging and unpacking	
	time	condition
LEVEL1	Unlimited	≦30℃/85 % RH
LEVEL2	1 year	≦30℃/60 % RH
LEVEL2a	4 weeks	≦30℃/60 % RH
LEVEL3	168 hours	≦30℃/60 % RH
LEVEL4	72 hours	≦30℃/60 % RH
LEVEL5	48 hours	≦30℃/60 % RH
LEVEL5a	24 hours	≦30℃/60 % RH
LEVEL6	Take out and use	≦30℃/60 % RH

3.3.Storage before unsealing：

In order to avoid the moisture barrier caused by the reliability of the failure problem, need to do LED products SMT pre-storage and moisture-proof measures;

If the moisture-proof bag is not open, the EC element will be stored for less than 2 months at <30 °C/ 60% RH;(Note: The label date is the same and the packing is not leaked. Discoloration under the premise of use; for different moisture-proof grade materials or packaging to save the time there is a certain difference, the specific preservation time to the specification book or packaging tips prevail); recommended in the unassembled do not open the moisture before the bag;

3.4.Control after the packing bag is opened：

After opening the moisture-proof bag, please read the moisture-proof bag inside the humidity indicator card in the moisture-proof beads into pink to confirm moisture in the moisture bag is too much, according to the color of the ball to determine whether the bag material on-line operation; And the material after opening the package should be strictly controlled in the table 1 as specified by the maximum temperature and humidity and operating time allowed, as long as the material exposed in the environment described in Table 1, the need to accumulate its use in the workshop time. Open the bag and paste the material on the PCB board, should be completed within 0.5H welding work, do not recommend the material attached to the PCB, a long time stay in the workshop does not carry out SMT work; Caused by adverse water within the lead;

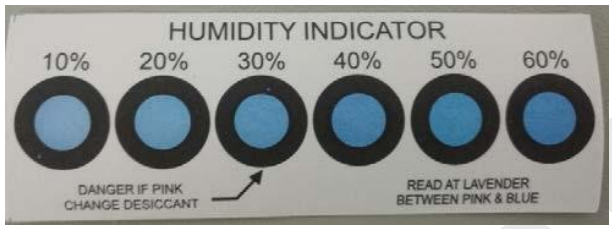
3.5.Definition of humidity card：

Open the package after the EC LED bag inside the humidity card color instructions are as follows：

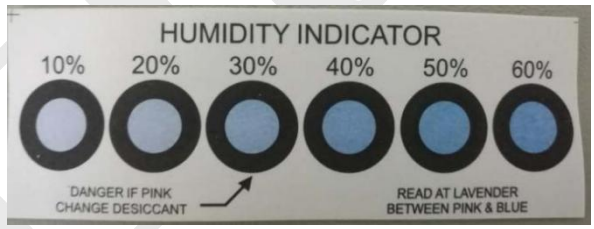
A. If the moisture card 10% of the moisture-proof beads into pink, other files for the blue, this situation, LED can be used directly;

B. If the humidity card moisture-proof beads 10%, 20% at all become pink, in fact, the file is blue, this situation, the need for low-temperature components dehumidification;

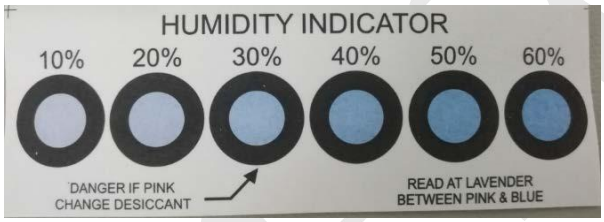
C. If the humidity card moisture-proof beads 10%, 20%, 30% more than three are turned pink, in this case, the customer needs to return the material to our company for high humidity dehumidification, re-packaging before use;



Humidity indicator DO not change color



Humidity indicator tums pink in 10% 20%



Humidity indicator tums pink in 10% 20% 30%

3.6.Unwanted material moisture- - proof storage and moisture- - proof control of finished material：

If a roll of SMDs is not used at once and the plant temperature and humidity are within the defined conditions (<30°C/60%RH), the exposure time of the element in the air does not exceed 2H, the remaining material should be carried out together with the desiccant Vacuum sealed, otherwise, the material must be low-wet baking dehumidification;dehumidified material can be re-packaged to re-start the calculation time;

Perform moisture control on SMDs components that have been assembled

A. After the components have been assembled to the PCB board no longer need to go through the high temperature process or reflow process, it will not be special treatment;

B. Do not need to do the necessary dehumidification work before making the appropriate protection process, bake in 70℃ ± 5℃ oven baking for less than 48 hours, To remove the product

in the detection and aging process exposed to moisture in the air to avoid the product in the protective treatment, the package in the material surface of the moisture will slowly invade the product, will cause product failure (Specific desiccant baking parameters refer to 3.6.2 items);

C. For products that require secondary SMT process or high temperature, they should be subjected to the necessary moisture treatment before secondary welding, after exposure to(<30℃ /60%RH) , The maximum length of not more than 4H, Connaught second high temperature process separated by a long time, then a welding material must be necessary dehumidification work (70℃ ±5℃ oven baking no less than 48 hours), and then pumping Vacuum storage;or the first product stored in the oven or with a desiccant container, the second high-temperature process before doing dehumidification work(70℃± 5℃ in the oven baking no less than 48 hours) , To ensure that products in the high temperature before the process is not damp (Specific desiccant baking parameters refer to 3.6.2 items);

Low-temperature baking conditions：

70℃± 5℃baking not less than 48 hours high temperature baking conditions：

130℃± 5℃baking not less than 6 hours (lamp beads must be split into particles)

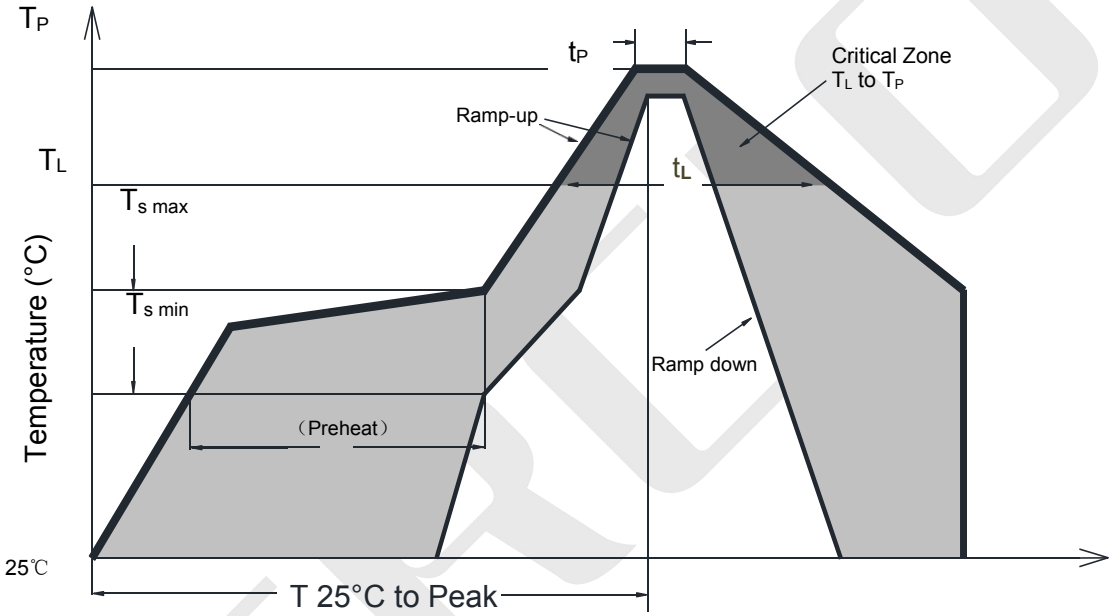
3.6.2. Low temperature / high temperature dehumidification corresponding to environmental humidity and dehumidification time：

Environment humidity	Oven temperature	Baking time	Baking method
40%	70℃	24H	Remove from the electrostatic bag and bake and dehumidify with the reel
50%	70℃	48H	Remove from the electrostatic bag and bake and dehumidify with the reel
＞60%	70℃	Ineffective dehumidification baking	
40%	130℃	6H	Baking and dehumidification in granular form.
50℃	130℃	12H	Baking and dehumidification in granular form.

3.7 Reflow Soldering Characteristics：

In testing, JERCIO has found SMD LEDs to be compatible with JEDEC J-STD-020E,using the parameters listed below. As a general guideline JERCIO recommends that users follow the recommended soldering profile provided by the manufacturer of solder paste used.

Note that this general guideline is offered as a starting point and may require adjustment for certain PCB designs and Configurations of reflow soldering equipment.



Profile Feature	Lead-containing Solder	Lead-free Solder
Average heating rate (Ts max to Tp)	3℃/second max.	3℃/second max.
Preheat: Temperature Min (Ts min)	100℃	150℃
Preheat: Temperature Min (Ts max)	150℃	200℃
Preheat: Time (ts min to ts max)	60-120 seconds	60-180 seconds
Time Maintained Above: Temperature (T L)	183℃	217℃
Time Maintained Above: Time (t L)	60-150 seconds	60-150 seconds
Peak/classification temperature (T P)	215℃	240℃
Time at 5 °C at the actual peak temperature (^{t}p)	<10 seconds	<10 seconds
Ramp-Down Rate	6℃/second max.	6℃/second max.
Time 25 ℃ to Peak Temperature	<6 minutes max.	<6 minutes max.

Note： All temperatures refer to topside of the package, measured on the package body surface.

3.8. Heat Generation：

Thermal design of the end product is of paramount importance. Please consider the heat generation of the LED when making the system design. The coefficient of temperature increase per input electric power is affected by the thermal resistance of the circuit board and density of LED placement on the board, as well as components. It is necessary to avoid in tense heat generation and operate within the maximum rating given in this specification. The operating current should be decided after considering the ambient maximum temperature of LEDs.

The maximum working temperature of the product is not easy to exceed 40°C (≤ 40℃, refers to the product pin at the operating temperature)

4.Anti-static and surge protection for IC devices：

Electrostatic discharge (ESD) or surge current (EOS) may damage LED.

Precautions such as ESD wrist strap, ESD shoe strap or antistatic gloves must be worn whenever handling ofLED.

IC device signal input and output ports must be connected in series protection resistor to prevent surge orstatic shock port caused by product failure;

All devices, equipment and machinery must be properly grounded.

It is recommended to perform electrical test to screen out ESD failures at final inspection.

It is important to eliminate the possibility of surge current during circuitry design.

5.Disclaimer：

The light emitted by the LED is enough to hurt the eyes. Please take precautions. Never look directly at the LED light source with naked eyes for long periods of time. Before overdose use, please communicate with JERCIO to understand the operation in more detail for avoid unnecessary losses. If operating not in accordance with the specifications,JERCIO will not hold any responsible for the consequences.

XT9822-D20 specifications are subject to change without notice due to version update or other reasons.Shenzhen JERCIO Technology Co., Ltd. reserves the right to modify the contents of this specification without notice or suggestion. This manual is used as guidance only, the data in this paper are experimental results, the actual results may be slightly different. Shenzhen JERCIO Technology Co., Ltd. will make every effort to provide accurate information in this specification, but does not ensure that there are no errors at all, and that the contents, information and suggestions stated in the document do not constitute any express or implied guarantee. The documents are provided in accordance with the status quo of the products and are not subject to any warranty liability, including marketability and specific purpose guarantees.