Optoelectronics Technology Co.

DONGGUAN OPSCO OPTOELECTRONICS CO., LTD

Product Specification

Document number. : OSK-SPC-SK9822-EC20 Product Model. : SK9822-EC20

Sample number. EP000008-001

Product Description: 2.0x2.0x0.65mm 0.3W Recessed Control LED (MSL:4a) Version No.: A1

Time Date: 2021-05-04

Customer approval			Opsco approval		
Approval	Audit	Confirmation	Approval	Audit	Confirmation
			regeneration	Wu Dong	Wu Zhenlei
□Qualified □Disqualified Stamp			Stamp		

electostatic sensitive devices

RoHS

Caution Moisture-Sensitive

*Before using our products, please search our official website to check the version of the specification, the version of the product specification is updated, please refer to the latest information on the official website.

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revised record

date	Rev. No. 1	Reason for modification/change	sign (one's name with a pen etc)
2018-07-13	01	initial release	KEVIN ZHU
2018-10-30	02	Modification of packaging information	KEVIN ZHU
2018-12-13	03	Modifying PCB Solder Pads	KEVIN ZHU
2019-01-18	04	Modification of the specification book layout	KEVIN ZHU
2019-02-20	05	Update PCB recommended pad size	KEVIN ZHU
2021-05-04	A1	Modification of the specification book layout	Wu Zhen Lei

Table of Contents

1. Product Overview :

SK9822-EC20 is an embedded control LED light source with control **circuit** and light-emitting **circuit in** one, the product contains signal decoding module, data buffer, built-in constant current circuit and RC oscillator; CMOS process, low voltage, low power consumption; 256 levels of PWM grayscale adjustment and 32 levels of brightness adjustment. Adopt dual-line output method, DATA data and synchronous CLK signal, so that the output action of each chip connected in series is synchronized.

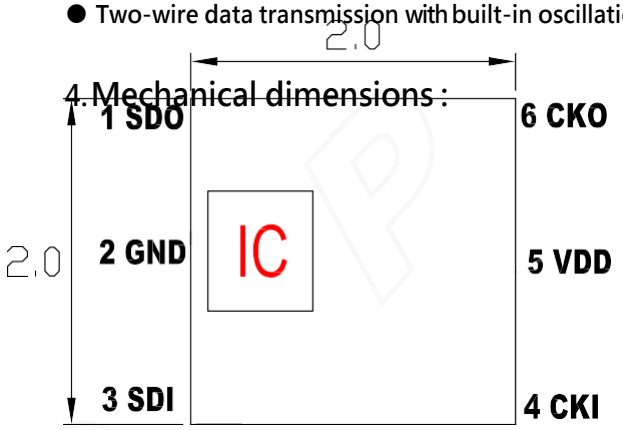
2. Key Features :

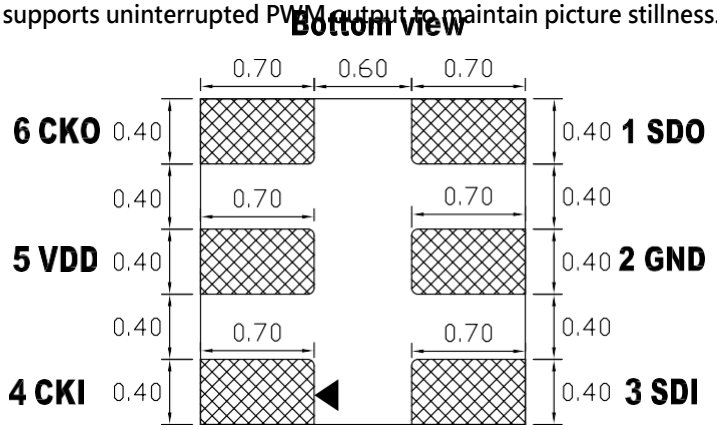
- Easy To Design
- Easy To Build
- Easy To Program

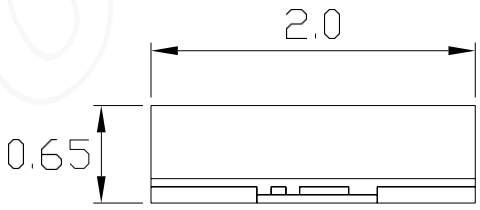
3. Characterization:

- EC LED internal integrated high quality serial cascade constant current IC; 5V power supply application; default power up without light;
- Two-wire synchronous control.
- RGB tricolor output control, 8Bit (256 levels) color setting; 5Bit (32 levels) brightness adjustment.
- Three-way constant current driver, specific signal self-detection function
- Maximum Serial Input Data Frequency 30MHZ
- Two-wire data transmission with built-in oscillation supports uninterrupted PWM output to maintain picture stillness.

4. Mechanical dimensions :





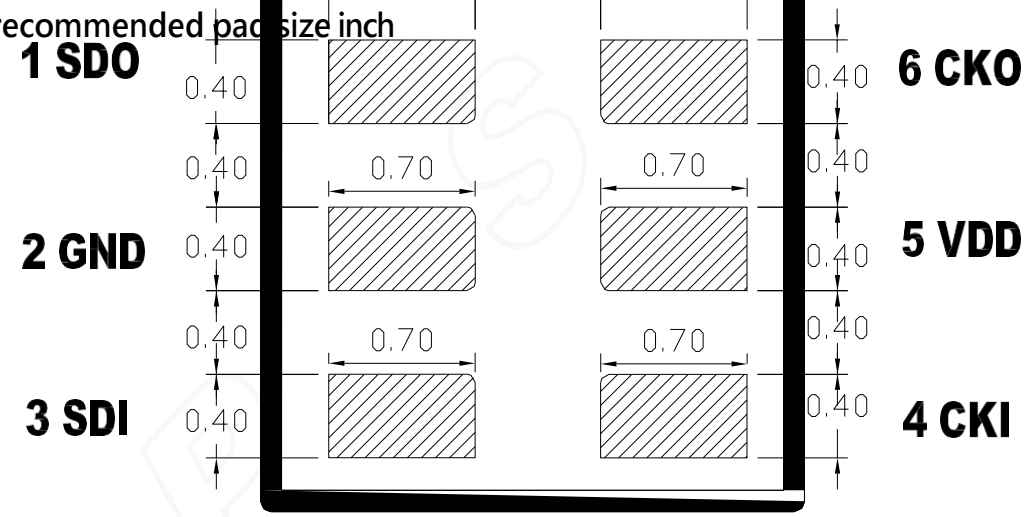


Remarks:
1. The units indicated above are in millimeters.
2. Dimensional tolerances are ±0.1 mm, unless otherwise noted.

5. Pin Function Description

Serial number	symbolic	footnote	Function Description
1	SDO	Data output	Serial data output
2	GND	Ground or negative side of power supply	Power supply negative terminal
3	SDI	Data Entry	Serial data input
4	CKI	Clock input	Serially connected clock signal input
5	VDD	Positive side of power supply	Power supply positive
6	CKO	Clock output	Serially connected clock signal output

6. PCB recommended pad size inch



7. General description of product naming

SK 9822-EC20

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①	②	③

range	IC Series and Current Codes	Package shape
Default is RGB chip integrated with IC	Finger 9822 Series Dual Wire Low Gray Transmission IC 18MA Current Version	2.0x2.0x0.65mm PCB holder package

8. Electrical parameters (limit parameters, Ta=25°C,VSS=0V) :

parameters	symbolic	coverage	unit
Voltage	VDD	+3.7 to +5.5	V
Logic input voltage	VI	-0.5 to VDD+0.5	V
Working temperature	Topt	-40~+80	℃
Storage temperature	Tstg	-40~+80	℃
ESD withstand voltage (device mode)	VESD	200	V
ESD withstand voltage (human body mode)	VESD	4K	

9. RGB chip optoelectronic parameters:

color	SK9822-EC20 12MA		
	Wavelength (nm)	Brightness (mcd)	Brightness (lm)
Red (RED)	620-625	300-500	0.8-2.0
Green (GREEN)	520-530	400-700	2.0-3.5
BLUE)	460-470	100-300	0.5-1.5

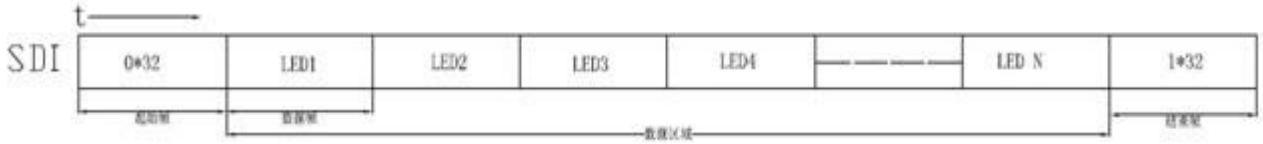
10. IC electrical parameters (if not specified, TA=-20 ~ +70℃, VDD=4.5 ~ 5.5V,VSS=0V):

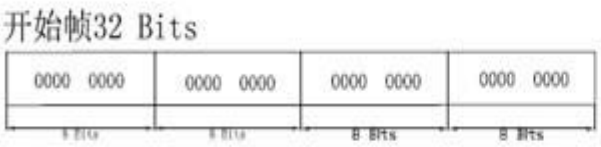
parameters	symbolic	minimum	typical	largest	unit	Test conditions
Internal chip supply voltage	VDD	---	5.0	5.5	V	---
Maximum LED output current	Iomax	---	---	20	mA	----
Clock High Level Width	TCLKH	---	17	---	ns	---
Clock Low Level Width	TCLKL	---	17	---	ns	---
Time when data is created	TSETUP	---	---	10	ns	---

PWM frequency	F_{PWM}	---	4	---	KHZ	---
Static power consumption	I_{DD}	---	1	---	mA	---

11. Function description

(1) Structure of serial connection information



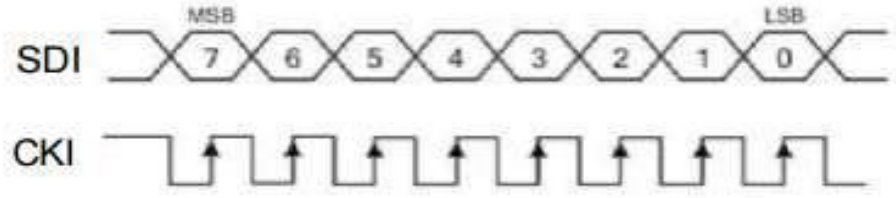


Product output structure: GRB sequential lighting, optimizing the product mixing effect (adjusting the IC default RGB sequential wafer position).

(2) 256 levels of grayscale

numerical value	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 (32 steps) brightness adjustment (simultaneous control of the current of the three ports OUTR\OUTG\OUTB.

Current regulation level	numerical value (MSB)..... LSB)	Current adjustment	Corresponding current value (mA)	note
1	00000	0/31	0	Recommended 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	00110	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 product heat dissipation, this product current is recommended to use a maximum of: 5.229mA, current regulation level 11 ~ 31 level 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	9.296	
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. Recommended current: 1~10 current regulation level

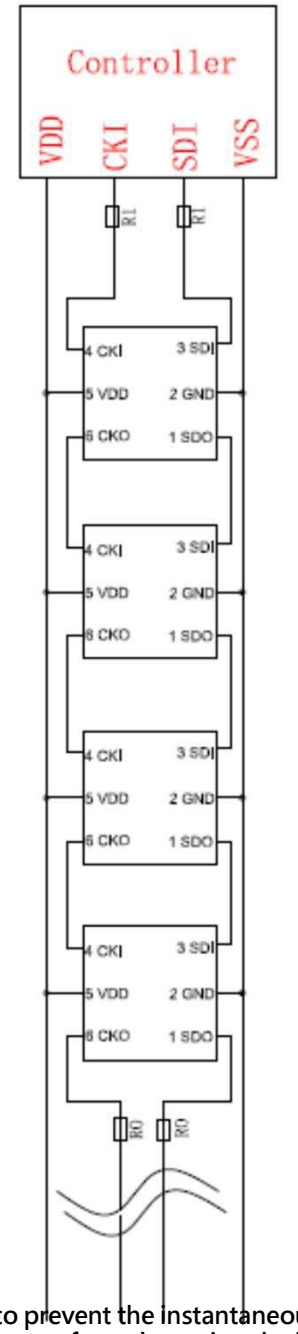
2, based on product heat dissipation, the maximum recommended use of this product current: 5.229mA, current regulation level 11 ~ 31 level is not recommended

(5) Refresh rate.

Frame rate = 1/((64+(32*dots))*CKI period)

(Unit: frame/sec) e.g. 1024 dots, CKI frequency is 1MHZ, then frame rate = 30 frames/sec.

12. Typical application circuit.

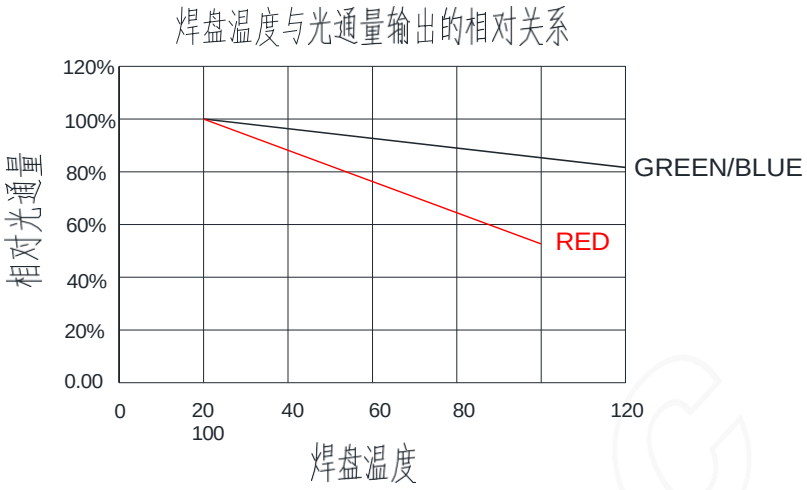


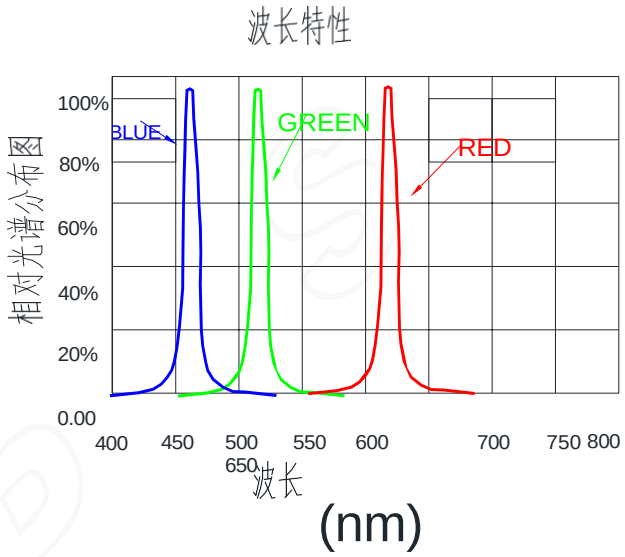
In the actual application circuit, in order to prevent the instantaneous high voltage generated by the plugging and unplugging of the product during the test from damaging the internal signal input and output pins of the IC, protective resistors should be connected in series with the signal input and output terminals. In addition, in order to make the IC chips work more stable, the decoupling capacitor between the lamp beads is essential.

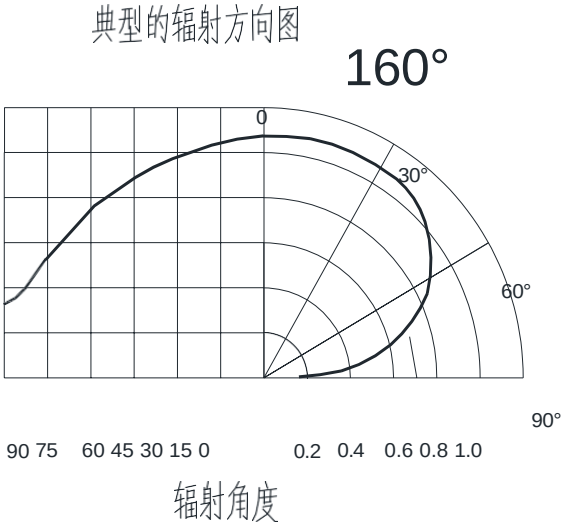
Application 1: for soft light lamps or hard light strips with short transmission distance between lamp beads, it is recommended to connect a protective resistor in series at each input and output of the signal and clock line, i.e. R1 = R0 about 500 ohms.

Application two: used for module or general shaped products, long transmission distance between lamp beads, due to different wire and transmission distance, the protection resistor connected in series at both ends of the signal and clock line will be slightly different; set by the actual use;

13. Photovoltaic properties

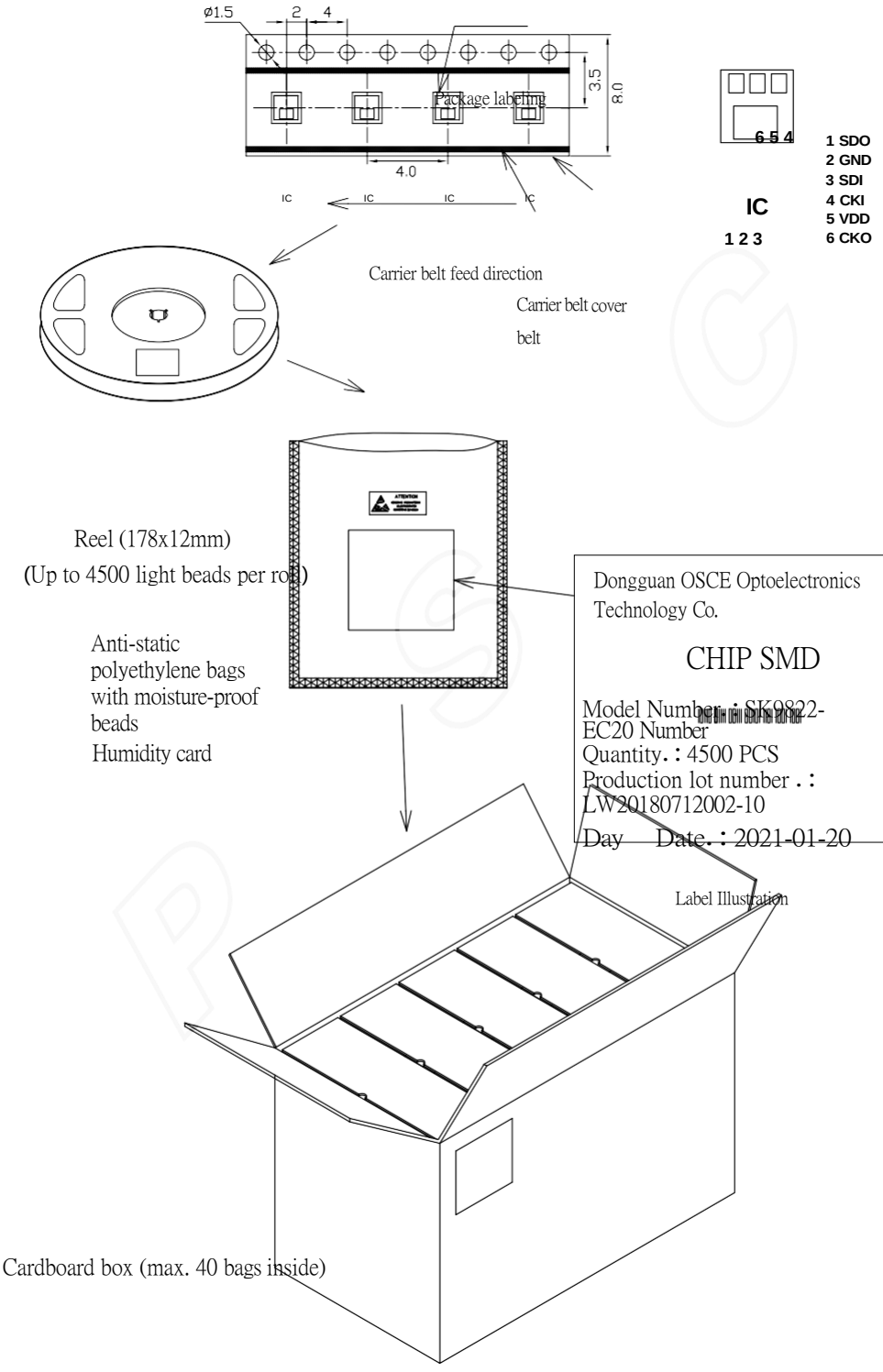






14. Packaging Standards:

SK9822-EC20



Surface mount LEDs are packed in reels, LEDs are packed in ordinary or anti-static bags and then packed in cartons. The carton is used to protect the LED from mechanical shock during transportation, the carton is not waterproof, so please pay attention to moisture and water resistance.

15. Reliability Testing :

Serial number	Experimental projects	Experimental conditions	Reference standard	judgement
1	cold and hot shock	-40℃*15min～100℃*15min 100cycles	MIL-STD-202G	0/64
2	High temperature storage	Ta= 85℃ 1000hrs	JEITA ED-4701 200 201	0/64
3	Low temperature storage	Ta= -40℃ 1000hrs	JEITA ED-4701 200 202	0/64
4	High temperature and humidity storage	Ta=85℃ RH=85% 1000hrs	JEITA ED-4701 100 103	0/64
5	temperature cycling	-40℃~25℃~100℃~25℃ 30min~5min~30min~5min 100 cycles	JEITA ED-4701 100 105	0/64
6	Resistance to welding heat	Tsld = 260℃, 10sec. 2times	jeita ed-4701 300 301	0/64
7	Ambient temperature life test	Ta＜35℃, IF:Typical current, 3000hrs	/	0/22

Failure determination criteria:

sports event	symbolic	Test conditions	Judgment criteria	
			minimum value	maximum value

luminous intensity	IV	DC=5V,Specification Typical Current	Initial data X 0.7	---
Resistance to welding heat	---	DC=5V,Specification Typical Current	No dead lights or visible damage	