

Product Specification

Document No.: NMD-SPC-SK9818MICRO

Product No.: SK9818MICRO

Description: 2.4x2.7x1.1mm Top SMD Type 0.1Watt Power Single line transmission And High grade grey level tegrated light source Intelligent control LED (5a)

Rev. No.: Temporary specification

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CONTENTS

1、Product overview.....	4
2、Main Application Field.....	4
3、Description.....	4
4、Mechanical Dimensions.....	5
5、PIN configuration.....	5
6、Recommended dimensions for PCB	5
7、General description of product naming.....	6
8、Electrical parameters.....	6
9、Electrical/Optical Characteristics.....	6
10、IC The electrical parameters.....	7
11、Switching characteristics.....	7
12、The data transmission time	7
13、Timing waveform.....	8
14、The method of data transmission.....	8
15、The data structure of 24bit.....	9-11
16、Packaging Standard.....	12
18、Reliability Test.....	13

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1. Product Overview :

SK9818MICRO is an intelligent external control LED light source which integrates control circuit and luminous circuit. Its appearance is the same as that of a SMD 2427 top emitting LED lamp bead, and each element is a pixel. The pixel contains intelligent digital interface data latch signal shaping and amplifying driving circuit, power supply voltage stabilizing circuit, built-in constant current circuit, high-precision RC oscillator, and patented PWM technology is used for output drive, which effectively ensures the high color consistency of the light in the pixel.

The data protocol adopts the communication mode of unipolar return code. After the pixel is powered on and reset, the din terminal receives the data transmitted from the controller. The first 48 bit data is extracted by the first pixel and sent to the data latch inside the pixel. The remaining data is reshaped and amplified by the internal shaping processing circuit and then transferred through the do port. The output is sent to the next cascaded pixel, and the signal is reduced by 48 bit after each pixel is transmitted. The number of cascaded pixels is not limited by signal transmission, but only limited by the speed of signal transmission.

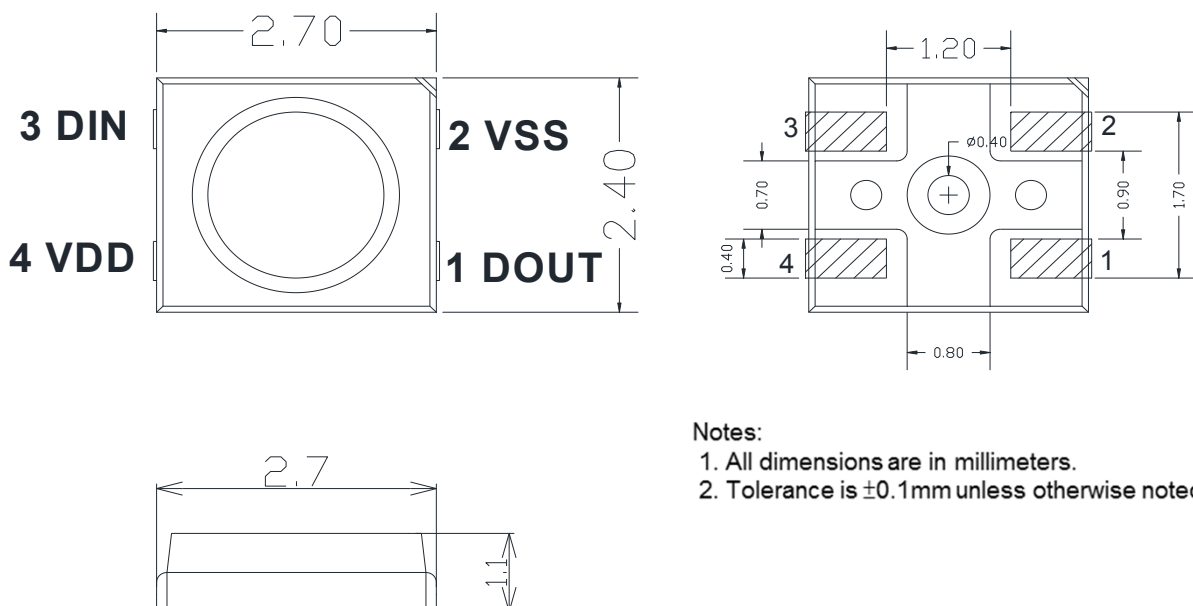
2. Main applications:

- Led full-color light string, led full-color module, led magic soft and hard light strip, LED guardrail tube, led appearance / scene lighting

3. Description:

- High quality external control single line serial cascade constant current IC integrated in top SMD;
- The control circuit and chip are integrated into SMD 2427 components to form a complete external control pixel, with uniform color temperature effect and high consistency.
- The built-in data shaping circuit ensures that the waveform distortion of the line will not accumulate after any pixel receives the signal through waveform shaping.
- Power on reset circuit and power down reset circuit are built in, and the light is not on after power on;
- OUT R/G/B each 5bits current gain adjustment position, output gray level: 65536;
- Default output constant current value 3.5mA; also output constant current value through the controller, maximum 12mA
- Single line data transmission, unlimited cascade.
- The transmission distance between two points is more than 10m
- Serial cascade interface, which can receive and decode data through one signal line.

4. Mechanical Dimensions:

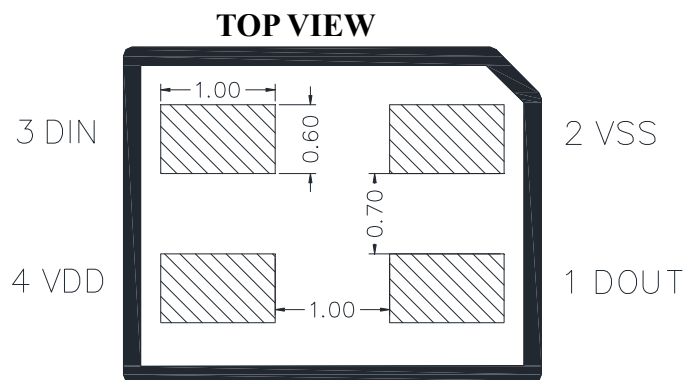


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5. PIN configuration

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

6. Recommended dimensions for PCB(mm)



7. General description of product naming.

SK9818MICRO

① ② ③

①	②	③
Series	IC series and current code	Product dimensions
The default is to integrate the RGB chip with the IC package	Refers to the 9818 series IC	Micorx: 2.4x2.7x1.1mm shape

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

Parameter	Symbol	Range	Unit
Power supply voltage	VDD	+3.5~+5.5	V
Logic input voltage	VIN	-0.5~VDD+0.5	V
Working temperature	Topt	-40~+85	°C
Storage temperature	Tstg	-40~+85	°C
ESD pressure(DM)	VESD	200	V
ESD pressure(HBM)	VESD	>2K	V

9. Electrical/Optical Characteristics (For reference only):

Color	SK9818MICRO			
	Dominate Wavelength(nm)	Brightness(MCD)		
		Min	Typical	Max
Red	615-625	120	190	240
Green	525-535	385	500	697.5
Blue	465-475	80	115	160

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

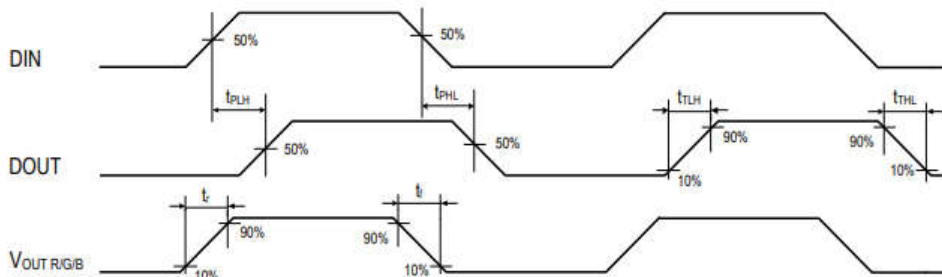
Parameter	Symbol	Min	Typical	Max	Unit	Test conditions
The chip supply voltage	VDD	3.5	---	5.5	V	---
The signal input flip threshold	VIH	0.5*VDD	---	---	V	DIN Input High level
	VIL	---	---	0.3*VDD	V	DIN Input low level
DOUT Output Current	IOH	---	11	---	mA	DOUT output high, series 10Ω resistor to GND
DOUT Perfusion current	IOL	---	13	---	mA	DOUT output is low, power to DOUT pouring current
OUT R/G/B Constant current inflexion voltage	VDS_S	---	0.4	---	V	---
OUT R/G/B Output Current, variation	%VS.VDS	---	0.5	---	%	IOUT = 6.5mA, VDS = 1.0~3.0V
	%VS.VDD	---	0.5	---	%	IOUT = 6.5mA, VDD = 4.5~5.5V
	%VS.TA	---	5.0	---	%	IOUT = 6.5mA, TA= -40~+85°C

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11. Switching characteristics(VCC=5V Ta=25 °C):

Parameter	Symbol	Min	Typical	Max	Unit	Test conditions
Signal Transmission delay (Note 4)	tPLH		65		ns	DOUT Port-to-ground load capacitor 30PF, Transmission delay from Din to Dout
	tPHL		65		ns	
Dout conversion time (Note 5)	tTLH		10		ns	DOUT Port-to-ground load capacitor 30PF
	tTHL		6		ns	
OUTR/G/B conversion time (Note 6)	Tr	---	125	---	ns	IOUT R/G/B =6.5mA, OUT R/G/B Port serial connection 400Ω resistor to VDD, load capacitance to ground 30PF
	Tf	---	160	---	ns	

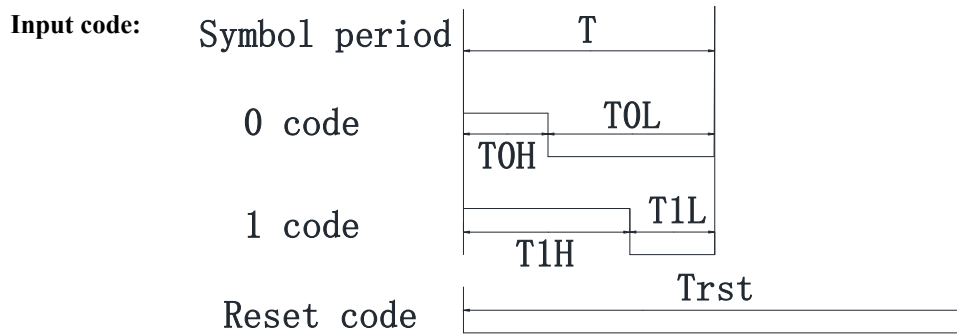
Note 4, Note 5, note 6, as shown below



12. Data transmission time:

Timeline name		Min.	Typical	Max.	Unit
T	Code period	---	1.2	---	US
T0H	0 code, high level time	0.2	0.3	0.4	US
T0L	0 code, low level time	0.8	---	---	US
T1H	1 code, high level time	0.8	0.9	1	US
T1L	1 code, low level time	0.2	---	---	US
Reset	Reset code, low level time	>200	--	--	US

13. Timing waveform:



14. The method of data transmission (Ta=25°C) :

Chip1	Trst	The first set of 48 bits	Group 2 48 bits of data	Group 3 48 bits of data	16 bit current gain data	Trst	The first set of 48 bits	Group 2 48 bits of data	Group 3 48 bits of data	16 bit current gain data
Chip2	Trst		Group 2 48 bits of data	Group 3 48 bits of data	16 bit current gain data	Trst		Group 2 48 bits of data	Group 3 48 bits of data	16 bit current gain data
Chip3	Trst			Group 3 48 bits of data	16 bit current gain data	Trst			Group 3 48 bits of data	16 bit current gain data

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

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15. The data structure of 48bit (Ta=25°C) :

G15	G14	G13	G12	G11	G10	G9	G8	G7	G6	G5	G4	G3	G2	G1	G0
R15	R14	R13	R12	R11	R10	R9	R8	R7	R6	R5	R4	R3	R2	R1	R0
B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0

Note: high starting, in order to send data(G15 → G14 →.....B0)

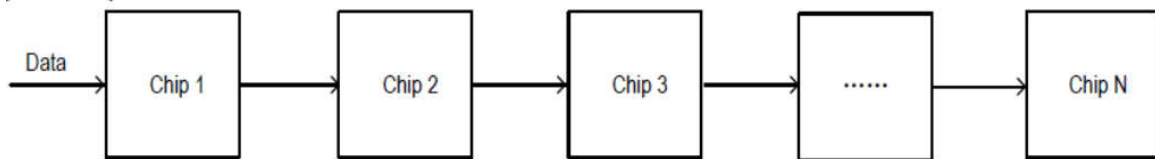
The first chip 48bits data + the second chip 48bits data +..... + Nth chip 48bits data + 16bits current gain data

48Bits grayscale data structure: high first, sent in GRB order

Current gain adjustment parameters:

G15	G14	G13	G12	G11	G10	G9	G8	G7	G6	G5	G4	G3	G2	G1	G0	R15.....R0	B15.....B0
Bit48.....bit0																	

• 系统拓扑图 :



The current gain data is 16bits in total, This product supports software to set the current of OUT output, It contains 5bits of current gain, gain data and 1bit reserved bit data for each OUT G/R/B port, The current gain data is 16bits in total, High up in the front, Send in the order of the grbs, The structure is as follows:

Current gain parameter transmission format			
Green light (G)	Red light (R)	Blue light (B)	S0 (reserved data)
<u>GG4 , GG3 , GG2,GG1 ,</u> <u>GG0</u>	<u>GR4 , GR3 , GR2,GR1 ,</u> <u>GR0</u>	<u>GB4 , GB3 , GB2, GB1 ,</u> <u>GB0</u>	0

- (1) GG4-GG0 is the OUTG port current gain data, GR4-GR0 is the OUTR port current gain data, GB4-GB0 is the OUTB port current gain data, and S0 is the reserved bit data;
- (2) when sending current gain data, the reserved bit data s 0 must be 0.

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Out G/R/B maximum output 6.5 MA, while the user can change the current gain value to set other current values, the reference current value please refer to the following table:

Current gain	IOUT(mA)	Current gain	IOUT(mA)
0	0.2	16	3.4
1	0.4	17	3.6
2	0.6	18	3.8
3	0.8	19	4.0
4	1.0	20	4.2
5	1.2	21	4.4
6	1.4	22	4.6
7	1.6	23	4.8
8	1.8	24	5.0
9	2.0	25	5.2
10	2.2	26	5.4
11	2.4	27	5.6
12	2.6	28	5.8
13	2.8	29	6.0
14	3.0	30	6.2
15	3.2	31	6.5

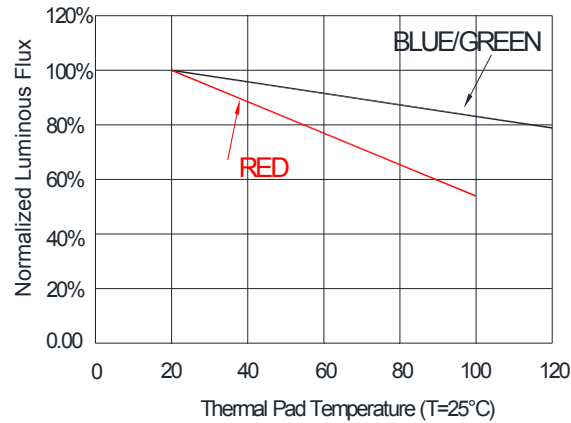
Note 10: the above current is only theoretical current, the actual current may be biased, it is recommended that customers adjust the current value based on the actual measurement

Note: 1. Suggested use of current: 1 ~ 10 current regulation grade

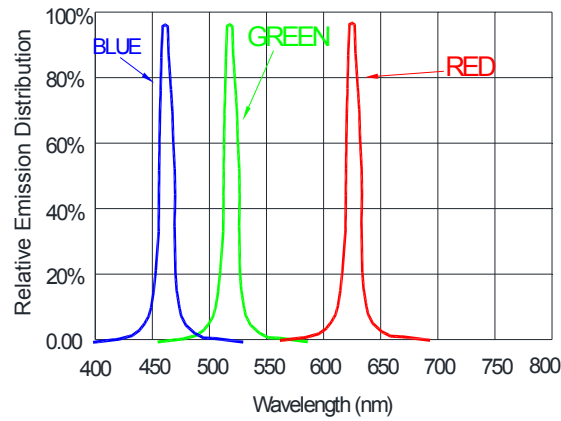
2. Based on the heat dissipation of the product, the recommended maximum use of this product current is: 5.4 mA (level 10) , current regulation level 11-15 is not recommended to use

16. Standard LED Performance Graph:

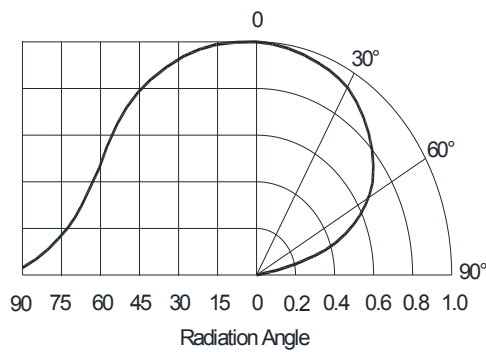
Thermal Pad Temperature vs. Relative Light Output



Wavelength Characteristics



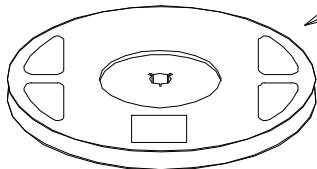
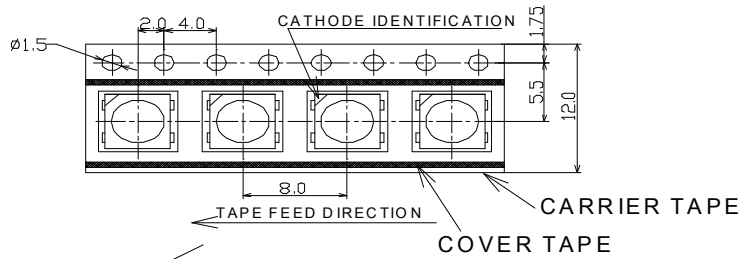
Typical Radiation Pattern 120°



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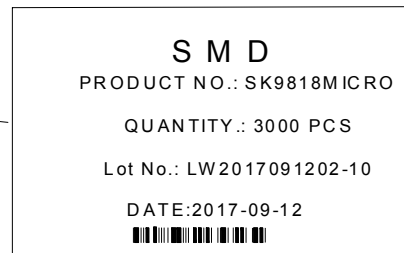
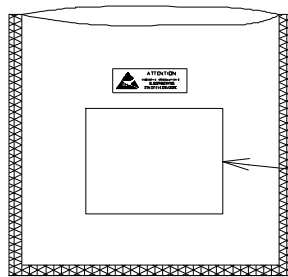
17. Packaging Standard:

SK9818MICR0

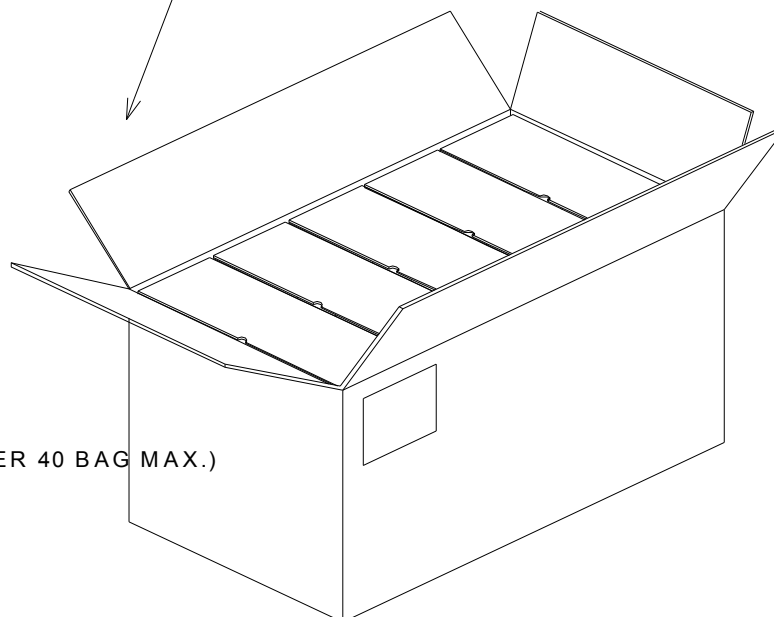


REEL (178x12mm)
(INNER 3000pcs LED MAX)

ESD POLYETHYLENE BAG



LABEL SKETCHING



CARDBOARD (INNER 40 BAG MAX.)

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18. Reliability Test :

NO.	Test item	Test Conditions	Reference	Criterion
1	Thermal Shock	100 ± 5° C ~ -40° C ± 5° C 15min~15min 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	