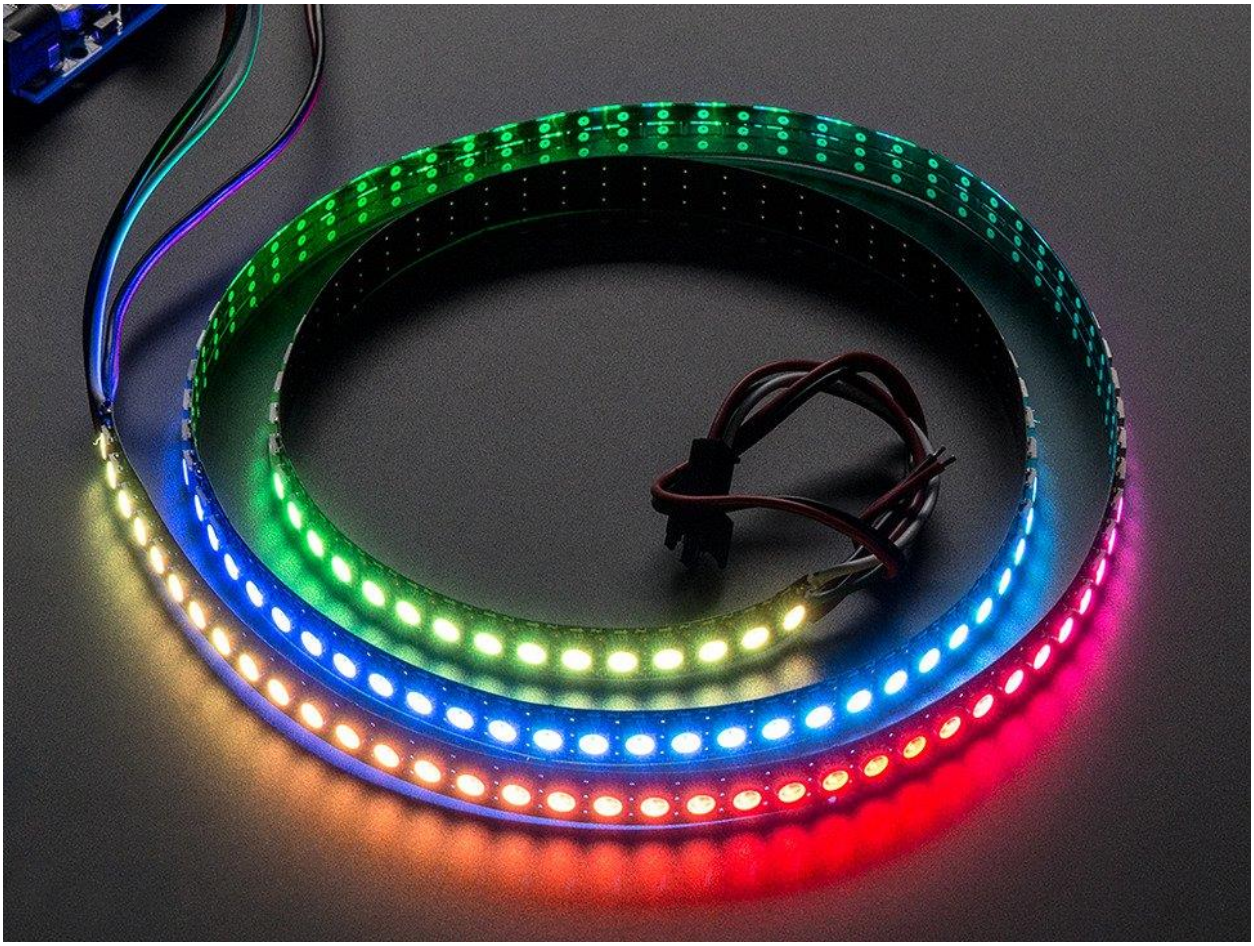
Adafruit NeoPixel Digital RGB LED Strip 144 LED - 1m Black - BLACK

PRODUCT ID: 1506



DESCRIPTION

We crammed **ALL THE NEOPIXELS** into this strip! An unbelievable 144 individually-controllable LED pixels on a flexible PCB. It's completely out of control and ready for you to blink. This strip has a black mask, and an extra heavy flex PCB.

These LED strips are even more fun and glowy. There are **144 RGB LEDs per meter**, and you can control each LED individually! Yes, that's right, this is the digitally-addressable type of LED strip. You can set the color of each LED's red, green and blue component with 8-bit PWM precision (so 24-bit color per pixel). The LEDs are controlled by shift-registers that are chained up and down the strip so you can shorten or lengthen the strip. Only 1 digital out pin is

required to send data. The PWM is built into each LED-chip so once you set the color you can stop talking to the strip and it will continue to PWM all the LEDs for you.

All your high-density LED dreams answered, yet there are a few things to watch for.

- First up, the ultra-high density means much higher power usage over a certain distance -35 Watts max (~7 Amps @ 5V). The max rating is assuming all the LEDs are on full white, usually the actual current for colorful design is about 1/3 to 1/2 the max current. A good power supply such as our 5V 10A supply is key!
- Second, to get high density, the controller chip is inside the LED, which is kind of cool, but also means that the chip only uses a single pin for input and a single pin for output. The protocol used is very very timing-specific and can only be controlled by microcontrollers with highly repeatable 100nS timing precision. We have example code for using with the Arduino Uno/Mega microcontroller at 8MHz and 16MHz, and with a little effort you can use with the Raspberry Pi, or Beagle Bone Black, but it will not work with the Basic Stamp, NETduino, any other interpreted/virtual machine microprocessor or any processor slower than 8 MHz. For those processors, check our DotStar digital LED strip which has SPI-like input/output and works easily with Pi, NETduino, and other processors.
- Third, just because you have all those pixels doesn't mean you have the RAM for it - the entire strip must be buffered in memory, and we've found many Arduino UNO projects only have about 1500 bytes of RAM available after all the extras are included - enough for about 2-3 meters of the 144 LED pixels. If you want to drive multiple meters and have some other libraries included, use a Mega.
- This strip now comes with a weatherproof sheathing, you can remove it if not wanted, with a pair of scissors

The strip is made of flexible PCB material, you can cut this stuff pretty easily with wire cutters. Solder to the 0.1" copper pads at the ends and you're good to go. Of course, you can also connect strips together to make them longer, just watch how much current you need! We have a 5V/4A supply that should be able to drive 1 meter (depending on use) and a 5V/10A supply that can drive up to 2 meters (depending on use) **You must use a 5V DC power supply to power these strips, do not use higher than 6V or you can destroy the entire strip**.

They come in 1 meter strips with a 2 or 3-pin JST SM connector on each end and separated power/ground wires. These strips are **sold by the meter**! There is a join in the middle of the strip and the LEDs are not perfectly spaced at that point - it's just a tradeoff with the ability of the flex PCB maker and density.

To wire up these strips we suggest picking up a 2.1mm DC jack to wire in so you can connect one of our wall adapters to power it. You can connect to the input side with any sort of wire. You'll probably want a 3-pin JST set to turn it into a quick connection.

TECHNICAL DETAILS

Technical specs:

- 144 LEDs per meter
- Maximum 5V @ 60mA draw per LED (all LEDs on full brightness)
- 5VDC power requirement (do not exceed 6VDC) – no polarity protection!
- 1 integrated RGB LEDs per segment, individually controllable
- LED wavelengths: 630nm/530nm/475nm
- Connector: 3-pin JST SM
- Strip Width: 15mm / 0.6"
- Strip Thickness: 4mm / 0.16"
- Weight: 35.42g
- May ship with either WS2812B or SK6812-based LEDs. They are the same brightness, color and protocol

WS2812

Intelligent control LED integrated light source

Features and Benefits

- Control circuit and RGB chip are integrated in a package of 5050 components, form a complete control of pixel point.
- Built-in signal reshaping circuit, after wave reshaping to the next driver, ensure wave-form distortion not accumulate.
- Built-in electric reset circuit and power lost reset circuit.
- Each pixel of the three primary color can achieve 256 brightness display, completed 16777216 color full color display, and scan frequency not less than 400Hz/s.
- Cascading port transmission signal by single line.
- Any two point the distance more than 5m transmission signal without any increase circuit.
- When the refresh rate is 30fps, low speed model cascade number are not less than 512 points, high speed mode not less than1024 points.
- Send data at speeds of 800Kbps.
- The color of the light were highly consistent, cost-effective..

Applications

- Full-color module, Full color soft lights a lamp strip.
- LED decorative lighting, Indoor/outdoor LED video irregular screen.

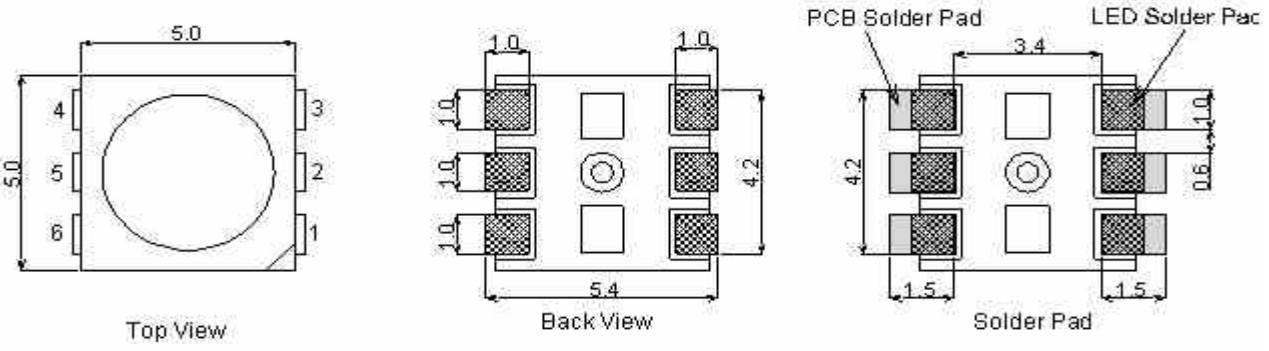
General description

WS2812 is a intelligent control LED light source that the control circuit and RGB chip are integrated in a package of 5050 components. It internal include intelligent digital port data latch and signal reshaping amplif ication drive circuit. Also include a precision internal oscillator and a 12V voltage programmable constant curre -nt control part, effectively ensuring the pixel point light color height consistent.

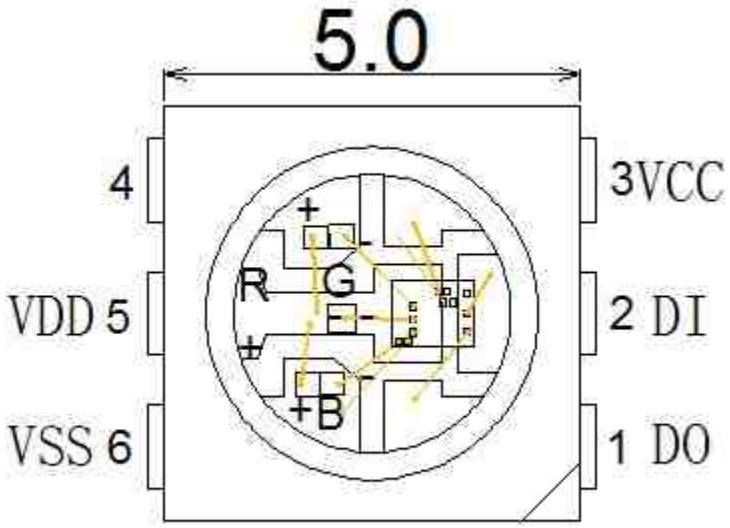
The data transfer protocol use single NZR communication mode. After the pixel power-on reset, the DIN port receive data from controller, the first pixel collect initial 24bit data then sent to the internal data latch, the other data which reshaping by the internal signal reshaping amplification circuit sent to the next cascade pixel through the DO port. After transmission for each pixel，the signal to reduce 24bit. pixel adopt auto resha -ping transmit technology, making the pixel cascade number is not limited the signal transmission, only depend on the speed of signal transmission.

LED with low driving voltage, environmental protection and energy saving, high brightness, scattering angl e is large, good consistency, low power, long life and other advantages. The control chip integrated in LED above becoming more simple circuit, small volume, convenient installation.

Mechanical Dimensions



PIN configuration



PIN function

NO.	Symbol	Function description
1	DOUT	Control data signal output
2	DIN	Control data signal input
3	VCC	Power supply control circuit
4	NC	
5	VDD	Power supply LED
6	VSS	Ground

Absolute Maximum Ratings

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Prameter	Symbol	Ratings	Unit
Power supply voltage	V_{CC}	+6.0~+7.0	V
Power supply voltage	V_{DD}	+6.0~+7.0	V
Input voltage	V_I	-0.5～VDD+0.5	V
Operation junction temperature	Topt	-25～+80	℃
Storage temperature range	Tstg	-55~+150	℃

Electrical Characteristics（T_A=-20～+70℃， V_{DD}=4.5～5.5V,V_{SS}=0V,unless otherwise specified）

Prameter	Smybol	conditions	Min	Tpy	Max	Unit
Low voltage output current	I_{OL}	ROUT	——	18.5	——	mA
	I_{dout}	Vo=0.4V，D_{OUT}	10	——	——	mA
Input current	I_I	V_I=V_{DD}/V_{SS}	——	——	±1	μA
Input voltage level	V_{IH}	D_{IN}，SET	0.7V_{DD}	——	——	V
	V_{IL}	D_{IN}，SET	——	——	0.3 V_{DD}	V
Hysteresis voltage	V_H	D_{IN}，SET	——	0.35	——	V

Switching characteristics（T_A=-20～+70℃， V_{DD}=4.5～5.5V,V_{SS}=0V,unless otherwise specified）

Prameter	Symbol	Condition	Min	Tpy	Max	Unit
Operation frequency	*Fosc*2	——	——	800	——	KHz
Transmission delay time	t_{PLZ}	CL=15pF,DIN→ DOUT,RL=10KΩ	——	——	300	ns
Fall time	t_{THZ}	CL=300pF,OUTR/OUTG/OUTB	——	——	120	μs
Data transmission rate	F_{MAX}	Duty ratio50%	400	——	——	Kbps
Input capcity	C_I	——	——	——	15	pF

WS2812

Intelligent control LED integrated light source

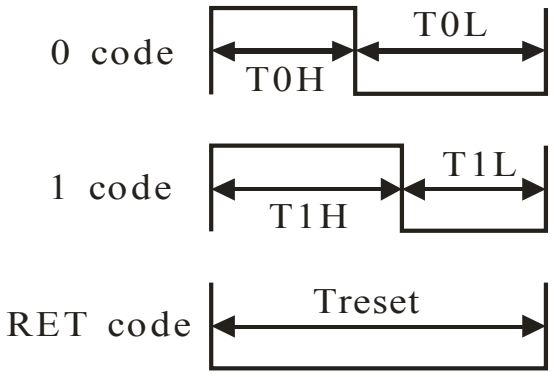
LED characteristic parameter

Emitting color	Wavelength(nm)	Luminous intensity(mcd)	Current(mA)	Voltage(V)
Red	620-630	550-700	20	1.8-2.2
Green	515-530	1100-1400	20	3.0-3.2
Blue	465-475	200-400	20	3.2-3.4

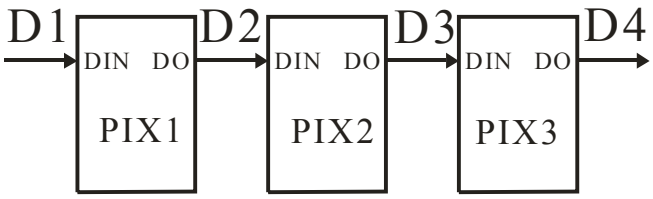
Data transfer time(TH+TL=1.25μs±600ns)

T0H	0 code ,high voltage time	0.35us	±150ns
T1H	1 code ,high voltage time	0.7us	±150ns
T0L	0 code , low voltage time	0.8us	±150ns
T1L	1 code ,low voltage time	0.6us	±150ns
RES	low voltage time	Above 50μs	

Sequence chart:



Cascade method:



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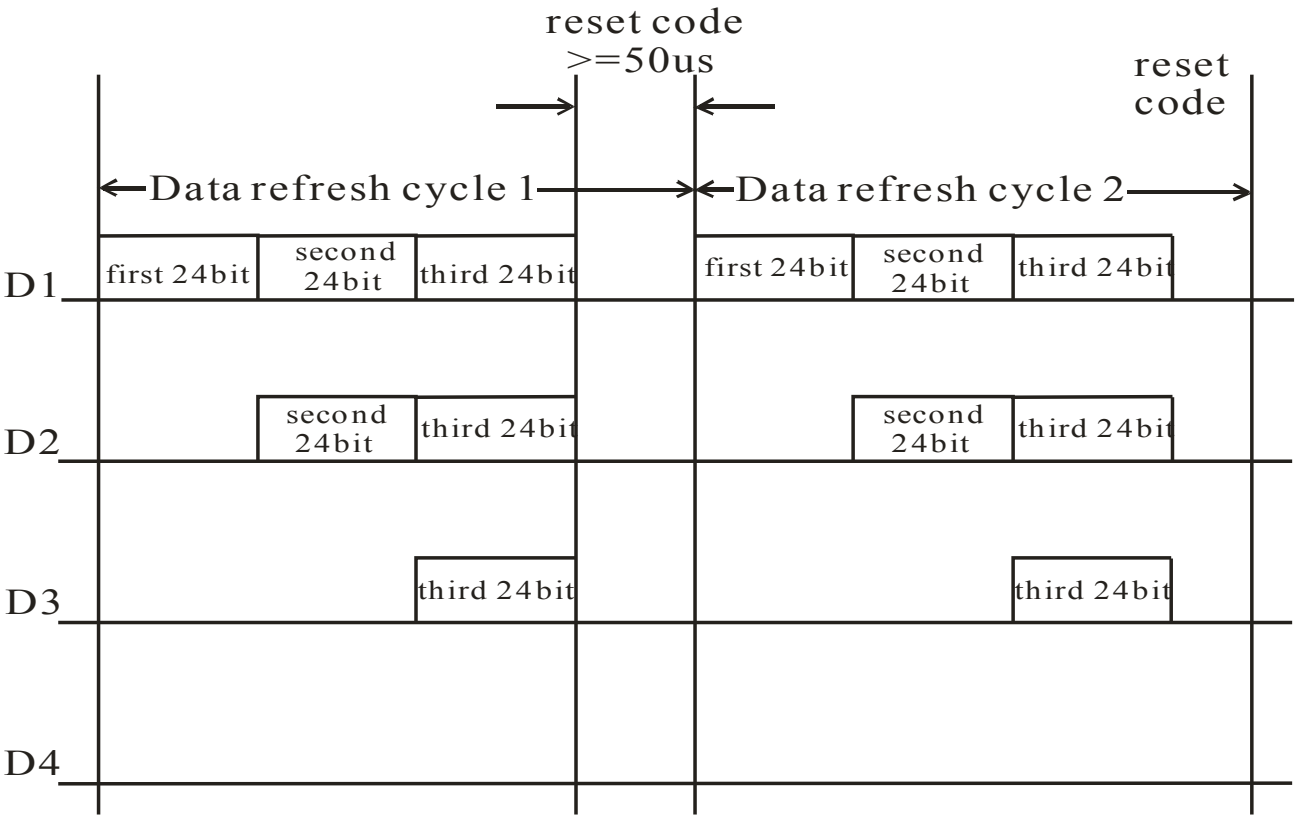
Data transmission method：



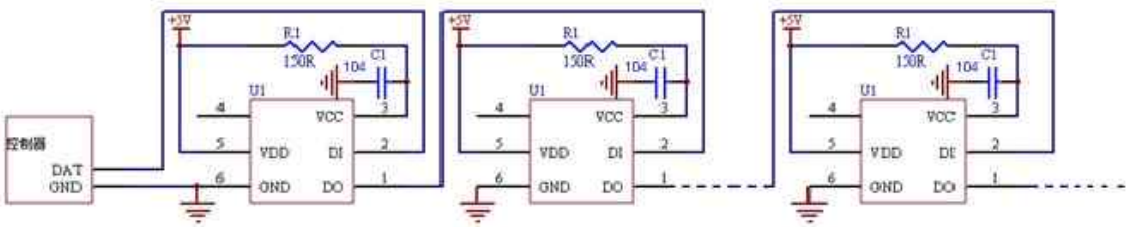
Note: The data of D1 is send by MCU,and D2, D3, D4 through pixel internal reshaping amplification to transmit.

Composition of 24bit data:

G7	G6	G5	G4	G3	G2	G1	G0	R7	R6	R5	R4	R3	R2	R1	R0	B7	B6	B5	B4	B3	B2	B1	B0

Note: Follow the order of GRB to sent data and the high bit sent at first.

Typical application circuit:



SK6812

Technical Data Sheet

Product Overview

SK6812 is a set of smart control circuit and a light emitting circuit in one of the controlled LED source. The outer type is the same with a 5050LED chip, each element is a pixel. Pixels contained within the intelligent digital interface data latch signal shaping amplification circuit, power supply circuit, a built-in constant current circuit, high precision RC oscillator, the output is driven by the patented PWM technology, effectively guarantee the pixels in the color of the light high consistency.

Data protocol using unipolar NRZ communication mode, the pixel is reset after the end of DIN, accept the data transmitted from the controller to the 24bit, the first to send data by the first pixel to pixel extraction, internal data latch, the remaining data after the internal plastic the processing circuit after shaping amplification through the DO port output began to turn to the next cascade of pixels, each pixel through a transmission signal, reduce. Pixel using automatic shaping forwarding technology, makes the number of cascade without signal transmission limit of the pixel, only limited signal transmission speed. The

LED has a low driving voltage, environmental protection and energy saving, high brightness, scattering angle, good consistency, low power, long life and so on. The control circuit is integrated in the LED above, more simple circuit, small volume, easy installation.

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..

Description:

● Top SMD internal integrated high quality external control line serial cascade constant current IC;

● control circuit and the RGB chip in SMD 5050 components, to form a complete control of pixel, color mixing uniformity and consistency;

●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;

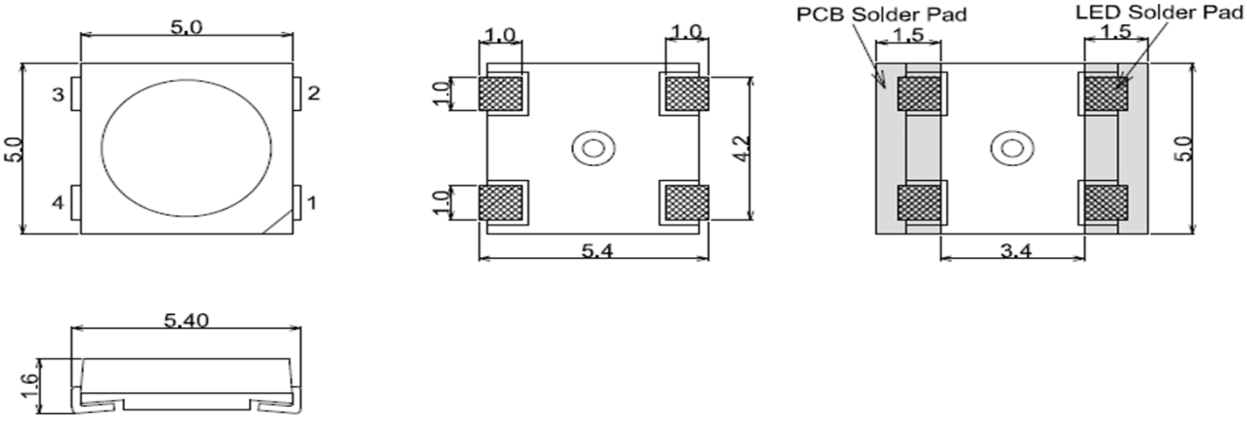
● line data transmission;

● plastic forward strengthening technology, the transmission distance between two points over 10M;

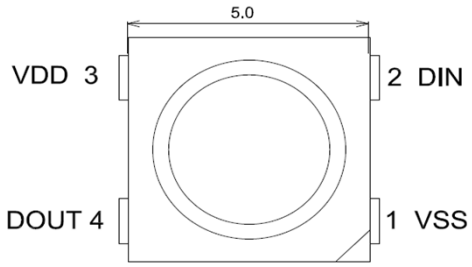
●data transmission frequency up to 800Kbps, when the refresh rate of 30 frames per second, a cascade of not less than 1024;

● built-in powerpolarity protection module, powerpolarity will not damage.

Mechanical Product Size (unit mm):



Mechanical Size and Pin Map (unit mm):



Pin Function:

Item	Symbol	Pin Name	Function description
1	VSS	Ground	The signal and power supply and grounding
2	DIN	Data Input	control signal input data
3	VDD	Power	power supply pin
4	DOUT	Data Output	control signal output data

The electrical parameters (limit parameters, Ta=25 C, VSS=0V):

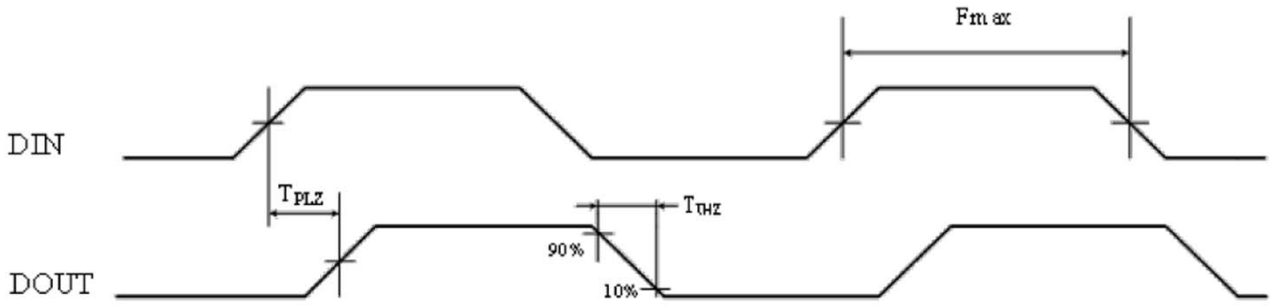
Parameter	Symbol	Range	Unit
Input voltage	V_{IN}	+5	V
Logic input voltage	V_I	-0.5～VDD+5.5	V
Working temperature	Topt	-40~+85	℃
Storage temperature	Tstg	-50~+150	℃
EST pressure	V_{ESD}	4K	V

The electrical parameters (such as no special instructions, TA=-20 ~ +70 ~ 5.5V C, VDD=4.5, VSS=0V):

Parmeter	Symbol	Min	Typical	Max	Unit	Test conditions
The chip supply voltage	VDD	---	5.2		V	---
R/G/B port pressure	VDS,MAX	---	---	26	V	---
DOUT drive capability	IDOH	---	49	---	mA	DOUT conect ground, the maximum drive current
	IDOL	---	-50	---	mA	DOUT conect +, the largest current
The signal input flip threshold	VIH	---	3.4	---		VDD=5.0V
	VIL	---	1.6	---		
The frequency of PWM	FPWM	---	1.2	---	KHZ	---
Static power consumption	IDD	---	1	---	mA	---

The dynamic parameters (Ta=25 C):

Parameter	Symbol	Min	Typical	Max	Unit	Test conditions
The speed of data transmission	fDIN	---	800	---	KHZ	The duty ratio of 67% (data 1)
DOUT transmission delay	T_{PLZ}	---	---	500	ns	DIN→DOUT
	T_{PLZ}	---	---	500	ns	



RGB chip characteristic parameters:

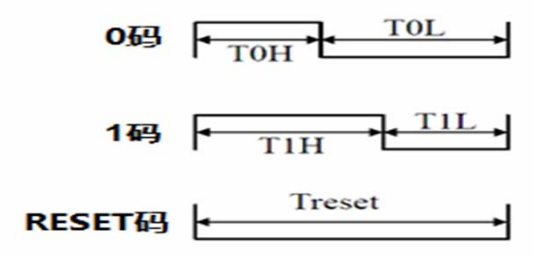
Color	Wavelength(nm)	Luminous intensity(mcd)	Working voltage(v)
Red	620-625	700-1000	2.0-2.2
Green	522.5-525	1500-2200	3.0-3.3
Blue	467.5-470	700-1000	3.0-3.3

The data transmission time (TH+TL=1.25μs±600ns):

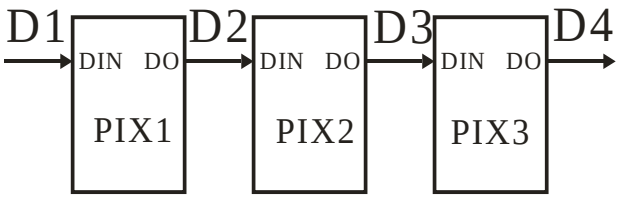
T0H	0 code, high level time	0.3μs	±0.15μs
T1H	1 code, high level time	0.6μs	±0.15μs
T0L	0 code, low level time	0.9μs	±0.15μs
T1L	1 code, low level time	0.6μs	±0.15μs
Trst	Reset code，low level time	80μs	

Timing waveform:

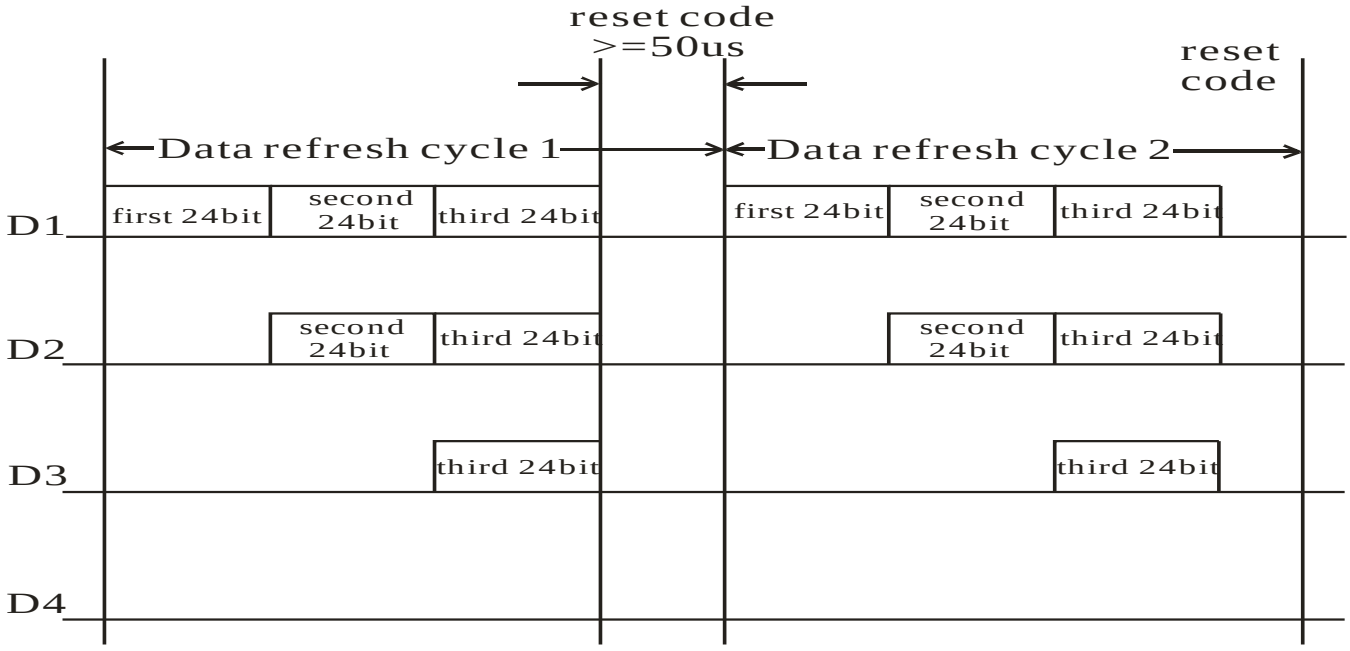
Input code:



Connection mode:



The method of data transmission:



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

The data structure of 24bit:

G7	G6	G5	G4	G3	G2	G1	G0	R7	R6	R5	R4
R3	R2	R1	R0	B7	B6	B5	B4	B3	B2	B1	B0

Note: high starting, in order to send data (G7 - G6 - ....B0)

The typical application circuit: