



main feature

- IC control circuit and LED point light source share a power supply.
- The working current of each channel is 5mA.
- The control circuit and RGB chip are integrated in a 2020 packaged component to form a complete external control pixel.
- Built-in signal shaping circuit, after any pixel receives a signal, it will be output after waveform shaping, so as to ensure that the line waveform distortion will not accumulate.
- Built-in power-on reset and power-off reset circuits.
- The three primary colors of each pixel can realize 256 levels of brightness display, and complete the true color display of 16,777,216 colors.
- The port scanning frequency is 2KHz/s.
- Serial cascading interface, which can complete data receiving and decoding through one signal line.
- There is no need to add any circuit when the transmission distance between any two points does not exceed 5 meters.
- When the refresh rate is 30 frames per second, the cascade number is not less than 1024 points.
- Data sending speed can reach 800Kbps.
- Highly consistent light color, high cost performance.

Main application areas

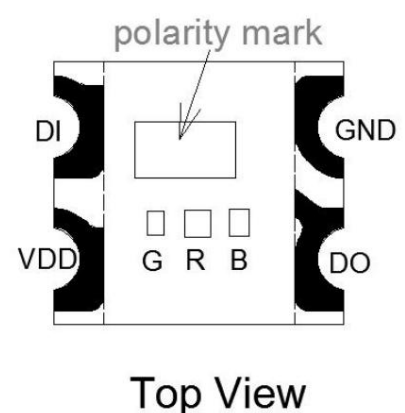
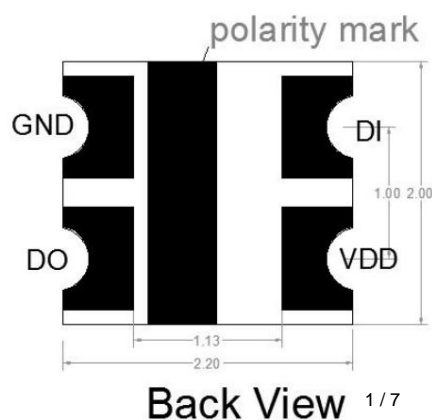
- LED full-color luminous character light string, LED full-color soft light bar and hard light bar, LED guardrail tube.
- LED point light source, LED pixel screen, LED special-shaped screen, various electronic products, electrical equipment marquee.

product description

WS2812C-2020 is an intelligent externally controlled LED light source that integrates the control circuit and the light-emitting circuit; its appearance adopts the latest molding packaging technology, and the IC and the light-emitting chip are packaged in a 2020 package size, and each component is a Pixel: The pixel contains an intelligent digital interface data latch signal shaping and amplifying drive circuit, as well as a high-precision internal oscillator and a programmable constant current control part, which effectively ensures that the color of the pixel light is highly consistent. The data

protocol adopts the single-line return-to-zero code communication method. After the pixel is powered on and reset, the DIN terminal receives the data transmitted from the controller. The 24bit data sent first is extracted by the first pixel and sent to the pixel. The data latch, the remaining data is reshaped and amplified by the internal shaping processing circuit, and then forwarded and output to the next cascaded pixel through the DO port. After each pixel is transmitted, the signal is reduced by 24bit; the pixel adopts automatic shaping and forwarding Technology, so that the number of cascaded pixels is not limited by signal transmission, only limited by the signal transmission speed requirements; up to **2KHz** port scanning frequency, there will be no flickering phenomenon under the capture of high-definition cameras, which is very suitable for high-speed movement The use of the product; the RESET time of more than 280's , interruption will not cause false reset, can support lower frequency, cheap MCU; LED has low voltage drive, environmental protection and energy saving, high brightness, large scattering angle, good consistency , low power and long life and so on. The control circuit is integrated on the LED, the circuit becomes simpler, the volume is smaller, and the installation is easier.

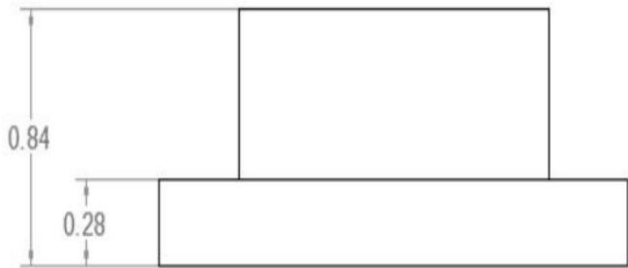
Mechanical size (in mm)



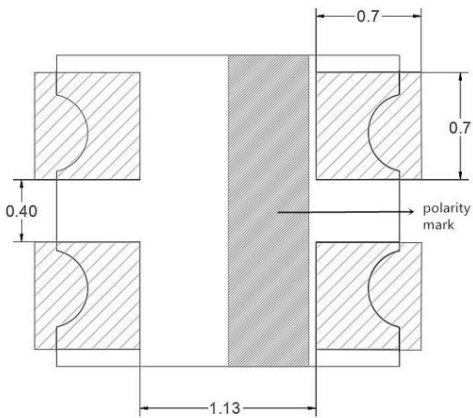


WS2812C-2020

Intelligent external control integrated LED light source

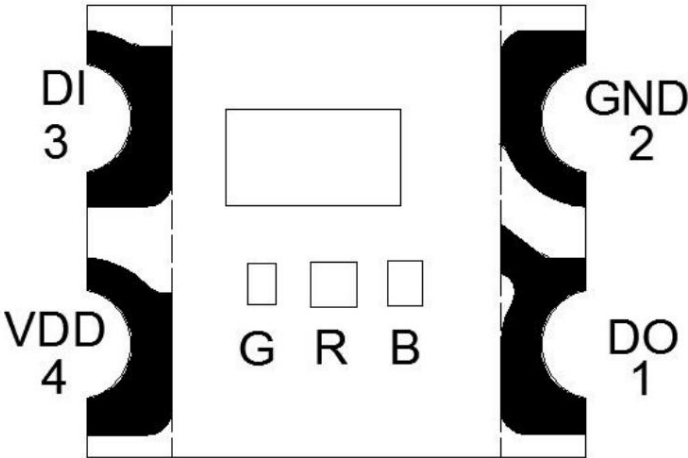


Side View



PCB Solder Pad

Terminal Arrangement



pin function

No.	Symbol	Pin Name	Functional description
1		DO data output control data signal output	
2	GND	land	Signal Ground and Power Ground
3	FROM	Data input Control data signal input	
4	VDD	power supply pin	

Maximum rated value (unless otherwise specified, TA=25℃, VSS=0V)

Parameter	symbol	scope	unit
Power Supply	VDD	+3.7~+5.3	V
Voltage Logic Input Voltage	WE	-0.3V~VDD+0.7	V
Operating	Top	-25~+85	℃
Temperature Storage Temperature	Tstg	-40~+105	℃



Electrical parameters (unless otherwise specified, TA=25°C, VDD=5V, VSS=0V)

Parameter Symbol	Minimum	Typical	Maximum	Unit	Input Current High Level Input VIH Low	Test Conditions
Level Input	II	—	±1		μA	VI=VDD/VSS
VIL		2.7V	VDD+0.7V	V		FROM SET
		-0.3V	0.7V	V	IN	FROM SET

Switching characteristics (unless otherwise specified, TA=25°C, VDD=5V, VSS=0V)

Parameter Symbol	Minimum	Typical	Maximum	Unit		Test Conditions
Transmission delay time tPLZ	—	—	300		ns	CL=15pF, DIN/DOUT, RL=10KΩ
Fall time tTHZ	—	120	Input capacitance CI	—	15	μs
					pF	CL=300pF, OUTR/OUTG/OUTB

LED characteristic parameters

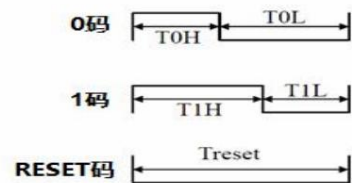
parameter	symbol	color	Quiescent current: <0.5mA			Test Conditions:
			minimum value		Maximum unit (operating current)	
shine strength	IV	Red	100		150	mcd
		Green	250		350	
		Blue	30		60	
wavelength λd		Red	620	623	630	nm
		Green	515	520	525	
		Blue	455	460	465	

data transfer time

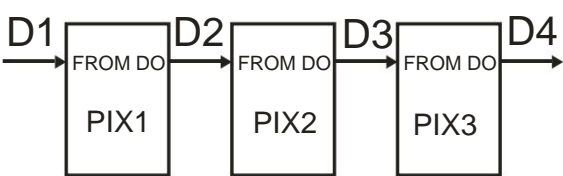
T0H	0 yards, high time	220ns~380ns
T1H	1 code, high time	580ns~1μs
T0L	0 code, low time	580ns~1μs
T1L	1 code, low time	580ns~1μs
RES	Frame unit, low level time	280 μs or more

Timing Waveform

Input pattern:

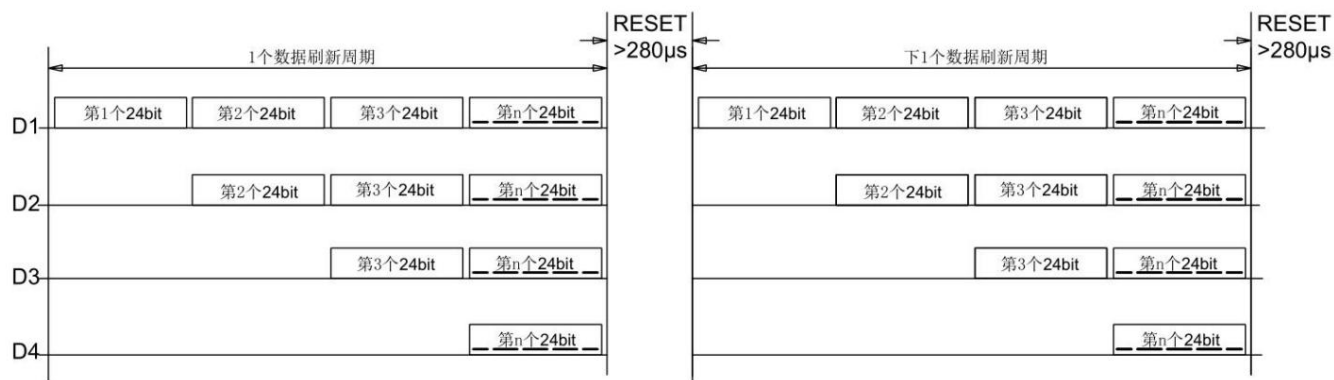


connection method:



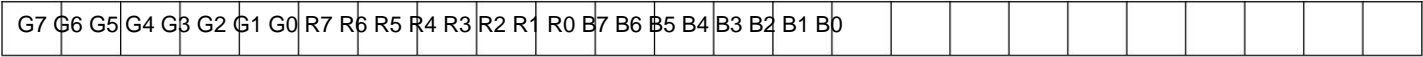


data transfer method



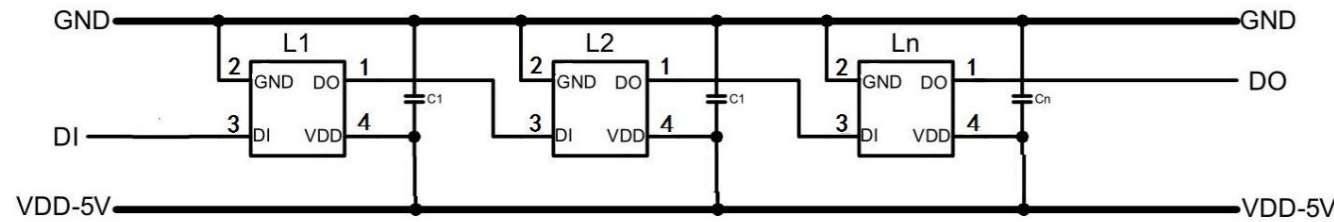
Note: D1 is the data sent by the MCU side, D2, D3, D4 are the data automatically reshaped and forwarded by the cascade circuit.

24bit data structure



Note: The high bit is sent first, and the data is sent in the order of GRB.

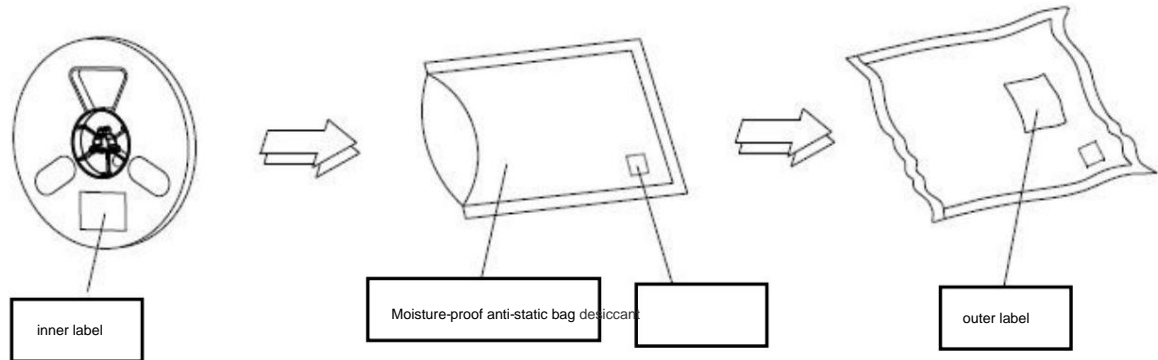
Typical Application Circuit



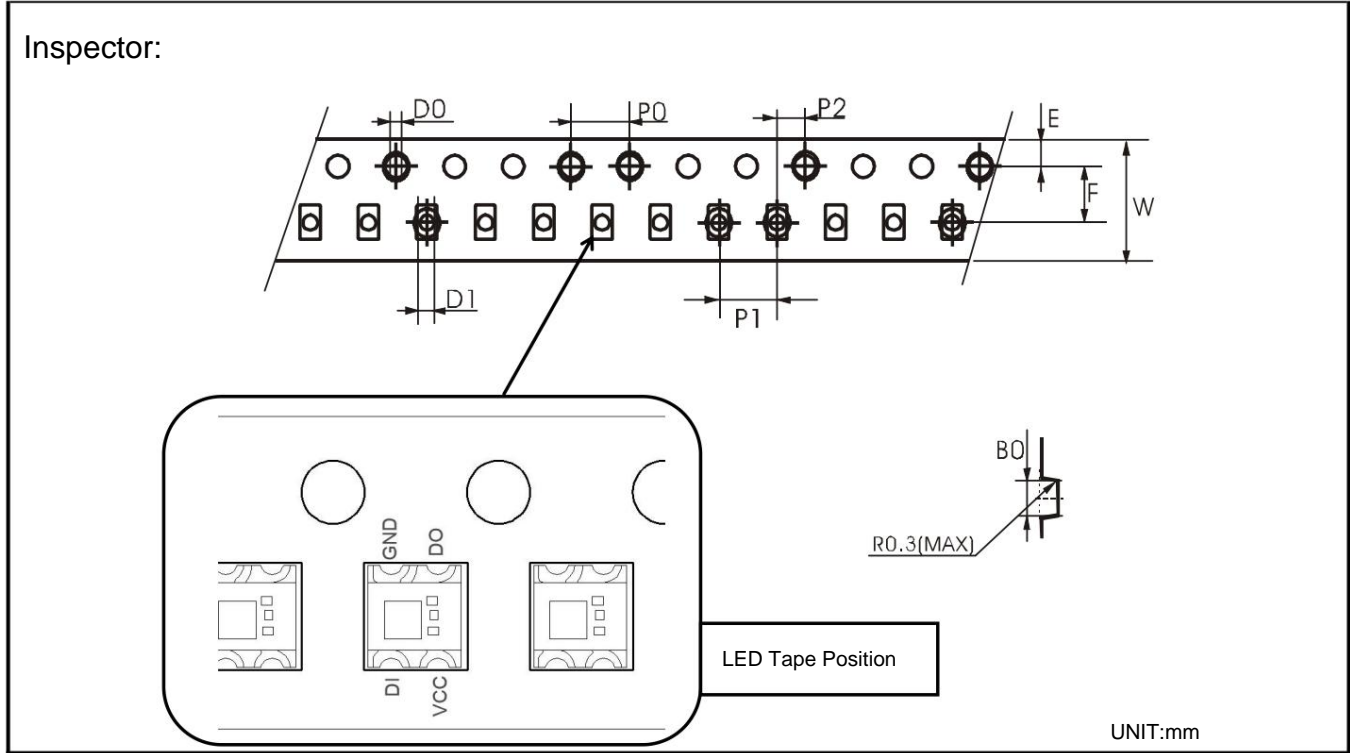
Among them, C1 is the filter capacitor of the VDD pin of the lamp bead, and the general value is 100NF.

Moisture-proof bag packaging

Packing quantity: 4500PCS / bag



Carrier tape specification (unit: mm)

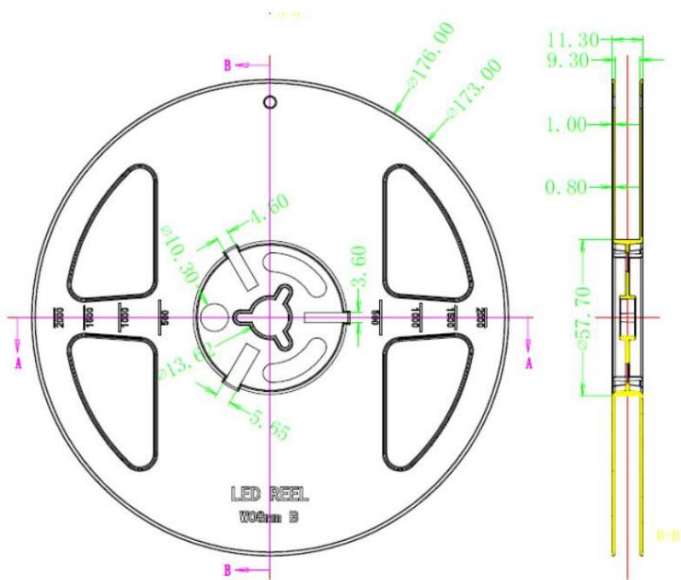


CARRIER TAPES TEST REPORTS

SYMBOL A0		B0	K0	P0	P1	P2	T	AND	F	D0	D1 W	
SPEC	2.20	2.40	1.01	4.00	4.00	2.00	0.18	1.75	3.50	1.50	1.00	8.00

Reel size

Unit: mm





Precautions for use of surface mount LEDs

1. Description Generally, LEDs are used in the same way as other electronic components. In order to allow customers to use Huacaiwei better

For electronic LED products, please refer to the LED protection precautions below.

2. Precautions:

2.1. Dust and cleaning The surface of the LED is packaged with modified epoxy glue, which is very important for the optical system and aging resistance of the LED

Can play a very good protective role. Epoxy glue is easy to stick to dust and keep the working environment clean. When there is dust within a certain limit on the surface of the LED

The dust will not affect the brightness of the light, but we should still avoid dust falling on the surface of the LED. The ones that open the packaging bag are used first, and the installation LED-passed components should be stored in clean containers,

When the surface of the LED needs to be cleaned, if a solution such as triaminoethylene or acetone is used, the surface of the LED will be dissolved, so do not use

Use a soluble solution to clean the LED, you can use a solution of isopropyl, before using any cleaning solution, you should confirm whether it is

It will dissolve the LED; please do not use ultrasonic to clean the LED, if the product must use ultrasonic, then it must be evaluated

Some parameters that affect the LED, such as ultrasonic power, baking time and assembly conditions, etc., must be tested and confirmed before cleaning.

Will it affect the LED

2.2. Moisture-proof packaging

TOP SMD LEDs are moisture-sensitive components, and the purpose of packaging LEDs in aluminum film bags is to prevent LEDs from absorbing moisture during transportation and storage.

Air, there is a desiccant in the bag to absorb moisture. If the LED absorbs water vapor, then when the LED goes through reflow soldering, the water vapor will

It will evaporate and expand, which may detach the colloid from the bracket and damage the optical system of the LED. For this reason, moisture-proof packaging is for

In order to avoid moisture in the packaging bag. The moisture resistance level of this product is: LEVEL5a Table 1: IPC/JEDEC J-STD-020 requirements

Material moisture level (MSL) definition

moisture level	Workshop life after unpacking	
	time	condition
LEVEL1	unlimited	ÿ30ÿ/85%RH
LEVEL2	1 year	ÿ30ÿ/60%RH
LEVEL2a	4 weeks	ÿ30ÿ/60%RH
LEVEL3	168 hours	ÿ30ÿ/60%RH
LEVEL4	72 hours	ÿ30ÿ160%RH
LEVEL5	48 hours	ÿ30ÿ/60%RH
LEVEL5a	24 hours	ÿ30ÿ/60%RH
LETTER 6	out of the box	ÿ30ÿ/60%RH

2.3 SMT placement instructions:

2.3.1 The MSL level of this product is 5a, the recommended storage temperature is 25+/-5°C, the humidity is <60%RH, and the storage period is 3 months (storage

LEDs that have been stored for an extended period of time must be dehumidified), and the LEDs that have been unpacked must complete SMT within 24H.



2.3.2 In order to avoid delamination or glue cracking caused by abnormal moisture absorption of LEDs, our company recommends that all LEDs be unpacked and baked before SMT goes online

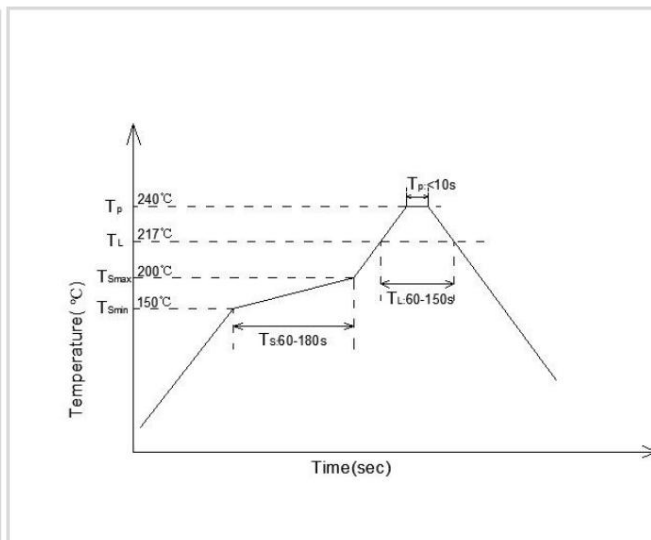
Dehumidification, dehumidification conditions: 70 ° × 24H, can put an end to the abnormality of similar layered glue cracking.

3. Reflow soldering

Surface mount LEDs have been tested and verified to comply with JEDEC J-STD-020C using the parameters listed below. As a general guideline,

It is recommended to follow the soldering profile recommended by the manufacturer of the solder paste used.

Description of temperature curve	Lead-free reflow soldering
Minimum preheating temperature (T _{min})	150°
Maximum preheating temperature (T _{max})	200°
Preheating zone time (T _{min} to T _{max})(t _s)	60-180 S
Average heating rate (T _{max} to T _p)	<3°/S
Liquidus temperature (T _L)	217°
Liquid phase holding time (t _L)	60-150 S
Peak temperature (T _p)	240°
High temperature zone residence time (t _p)	<10 S
cooling rate	<6°/S
Room temperature to peak temperature residence time	<6 min



Note: 1. The above are general guidelines and may not apply to all PCB designs and reflow soldering configurations

2. All temperatures refer to the temperature measured on the upper surface of the package body

4. Matters needing attention in product assembly process

1. By using the appropriate tool Tool gripping from the side of the material	2. Do not directly use your hands or sharp metal stamped surface, it may will damage the internal circuitry	3. Do not pile up module materials together starting, it may damage the internal circuit	4. Can not be used in acid with PH<7 sex place

file change log

version number	status	Summary of revisions	Revision Date	Revision By	approver
V1.0	N	new build	20180801	Shen Jinguo	Yin Huaping
V1.1	M	Modify R, G, B brightness to 3:6:1 ratio	20190301	Shen Jinguo	Yin Huaping
V1.2	M	Modify LED wavelength range	20190508	Shen Jinguo	Yin Huaping
V1.3	M	Modify LED brightness value and wavelength range	20200922	Shen Jinguo	Yin Huaping