

## Features and Benefits

- With WS2811 IC and RGB chip integrated in a 5050 component, the WS2811 IC not only controls the integrated RGB5050, but also controls the external RGB5050 LEDs.
- 12V Voltage of Output port.
- With VR-tube built in 5050 components, only one resistor is needed to make it work when voltage is below 24V.
- Built-in Signal Reshaping circuit, any IC receives the signal, and then re-exported through the waveform reshaping to ensure that the waveform distortion of the circuit will not accumulate.
- Built-in Power-on reset circuit and Power-off reset circuit, PWM control side can achieve 256 gray level adjustment.
- The reception and decoding of cascading data can be completed by a Serial Interface.
- Transmission distance between any two points is no more than 10 meters, any additional circuit unneeded.
- Much smaller and more space-saving while applied in LED flexible strips.

## General Descriptions

WS2851 is an intelligent control LED light source with the WS2811 IC control circuit and RGB chip integrated in a 5050 component, the WS2811 IC controls the integrated RGB5050 and the external RGB5050 LEDs simultaneously, which makes the control circuit more simple. WS2851 includes a smart digital interface, data latch, signal shaping & amplifying driver circuit, and a high precision internal oscillator and 12V programmable constant current output driver.

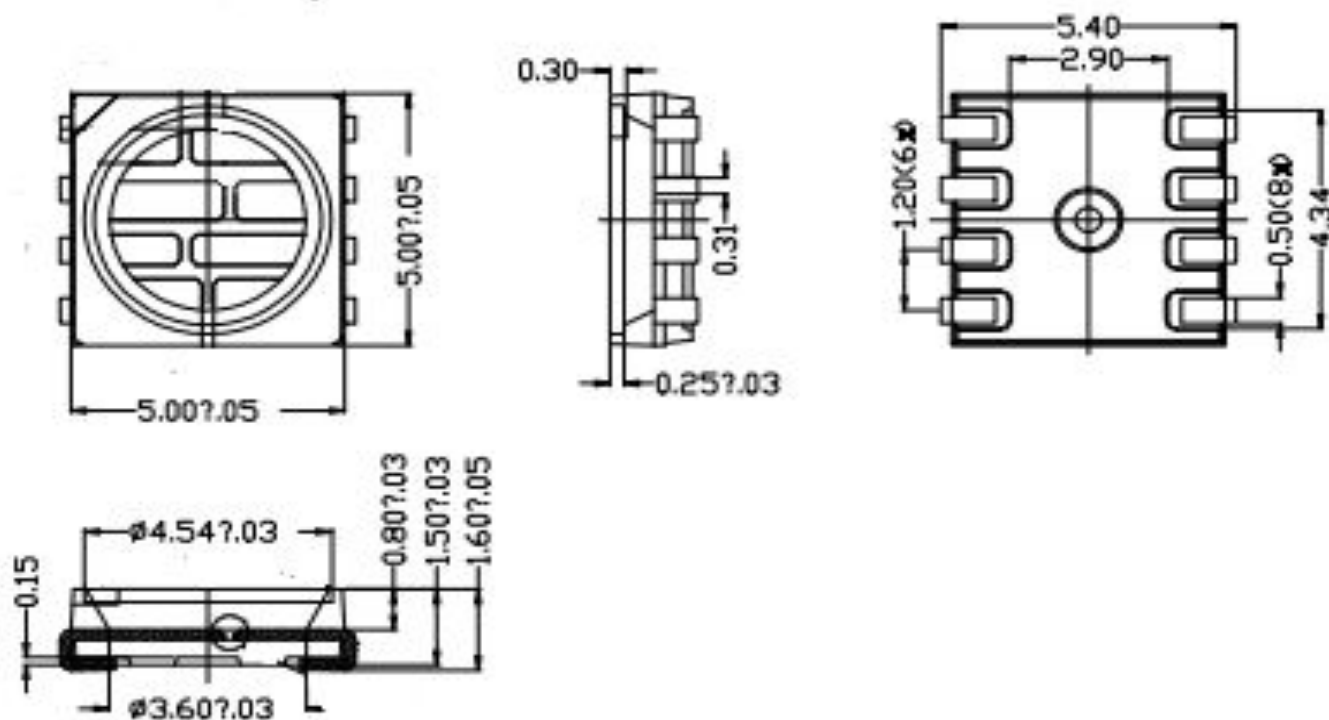
Data transfer protocol adopts Singlet ZR mode. After Power-on reset, the DIN port transmits data from the controller, the first pixel extracts the initial 24bit data and then send to its internal data latch, the rest of the data is transmitted through the DO port to the next cascade of pixels which processed by internal reshaping and amplifying circuit, each with a pixel point of the transmission, the signal is reduced by 24bit. Those pixels adopt automatic reshaping transmission mode, making the number of cascading pixels are not limited by the signal transmission but its signal transmission speed.

WS2851 acquires the advantages of low-voltage driver, environment friendly, excellent scattering angle, ultra-low power consumption, long lifespan and better light consistence etc.

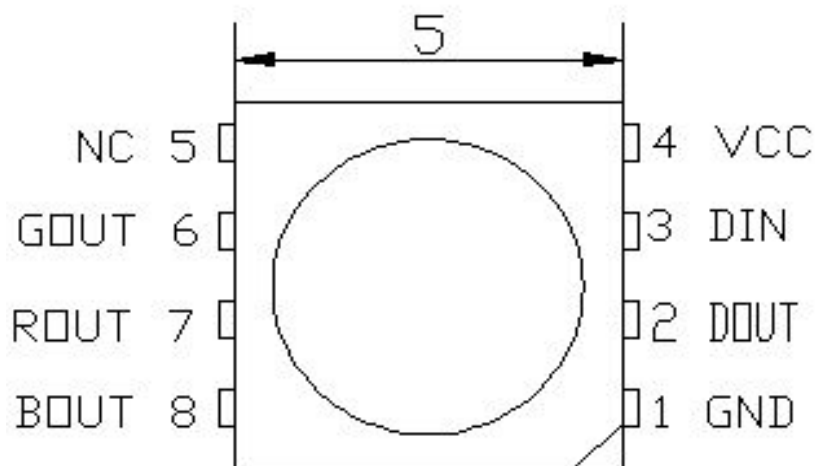
## Applications

- LED String Light, Full-Color LED Module, Full Color Flexible/Rigid Strip Light and LED Digital Tube.
- LED Decorative Lighting, Indoor/Outdoor LED Video Irregular Screen/Flexible Panel Screen.

## Mechanical Dimensions



## PIN Configurations



## PIN Functions

No.	Symbol	PIN	Function description
1	GND	GROUND	Signal Grounding and Power Grounding
2	DOUT	DATA OUTPUT	Data Cascade Output
3	DIN	DATA INPUT	Data Input
4	VCC	POWER	Control Circuit and LED Power Supply
5	NC	NONE	None
6	OUTG	LED DRIVER OUTPUT	<b>Green</b> PWM Driver Output
7	OUTR	LED DRIVER OUTPUT	<b>Red</b> PWM Driver Output
8	OUTB	LED DRIVER OUTPUT	<b>Blue</b> PWM Driver Output

## Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Power supply voltage	V <sub>DD</sub>	+2.5~+5.5	V
Output Port Voltage	V <sub>OUT</sub>	12	V
Input voltage	V <sub>I</sub>	-0.5~V <sub>DD</sub> +0.5	V
Operation temperature	T <sub>opt</sub>	-25~+80	°C
Storage temperature range	T <sub>stg</sub>	-40~+105	°C

## Electrical Characteristics (T<sub>A</sub>=-20~+70°C, V<sub>DD</sub>=4.5~5.5V, V<sub>SS</sub>=0V)

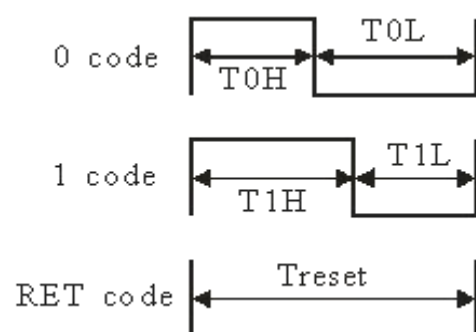
Parameter	Symbol	Min.	Tpy	Max.	Unit	Conditions
Low-level Output Current	I <sub>OL</sub>	--	18.5	--	mA	μA
Low-level Output Current	I <sub>d out</sub>	10	--	--	mA	V <sub>O</sub> =0.4V, D <sub>OUTS</sub>
Input Voltage	I <sub>I</sub>	--	--	±1	μA	V <sub>I</sub> =V <sub>DD</sub> /V <sub>SS</sub>
High-level Input	V <sub>IH</sub>	0.7V <sub>DD</sub>	--	--	V	D <sub>IN</sub> , SET
Low-level Input	V <sub>IL</sub>	--		0.3 V <sub>DD</sub>	V	D <sub>IN</sub> , SET
Hysteresis voltage	V <sub>H</sub>	--	—	0.35	V	D <sub>IN</sub> , SET

## Switch Characteristics (TA=-20~+70℃, VDD=4.5~5.5V, VSS=0V)

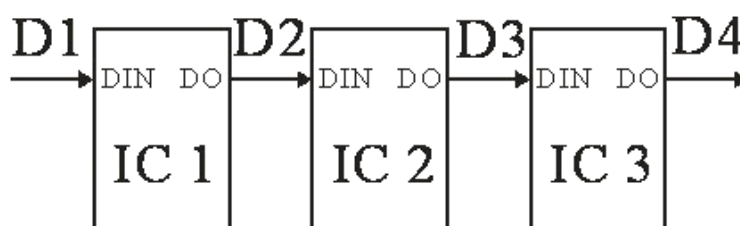
Parameter	Symbol	Min.	Tpy	Max.	Unit	Condition
Transmission Frequency	$F_{osc}$	--	800	--	KHz	--
Transmission Delay Time	$T_{PLZ}$	--	--	300	ns	CL=15pF, DIN→DO, RL=10KΩ
Fall Time	$T_{THZ}$	--	--	120	μs	CL=300pF, OUTR/OUTG/OUTB
Input Capacity	$C_i$	--	--	15	pF	--

## Sequence Charts

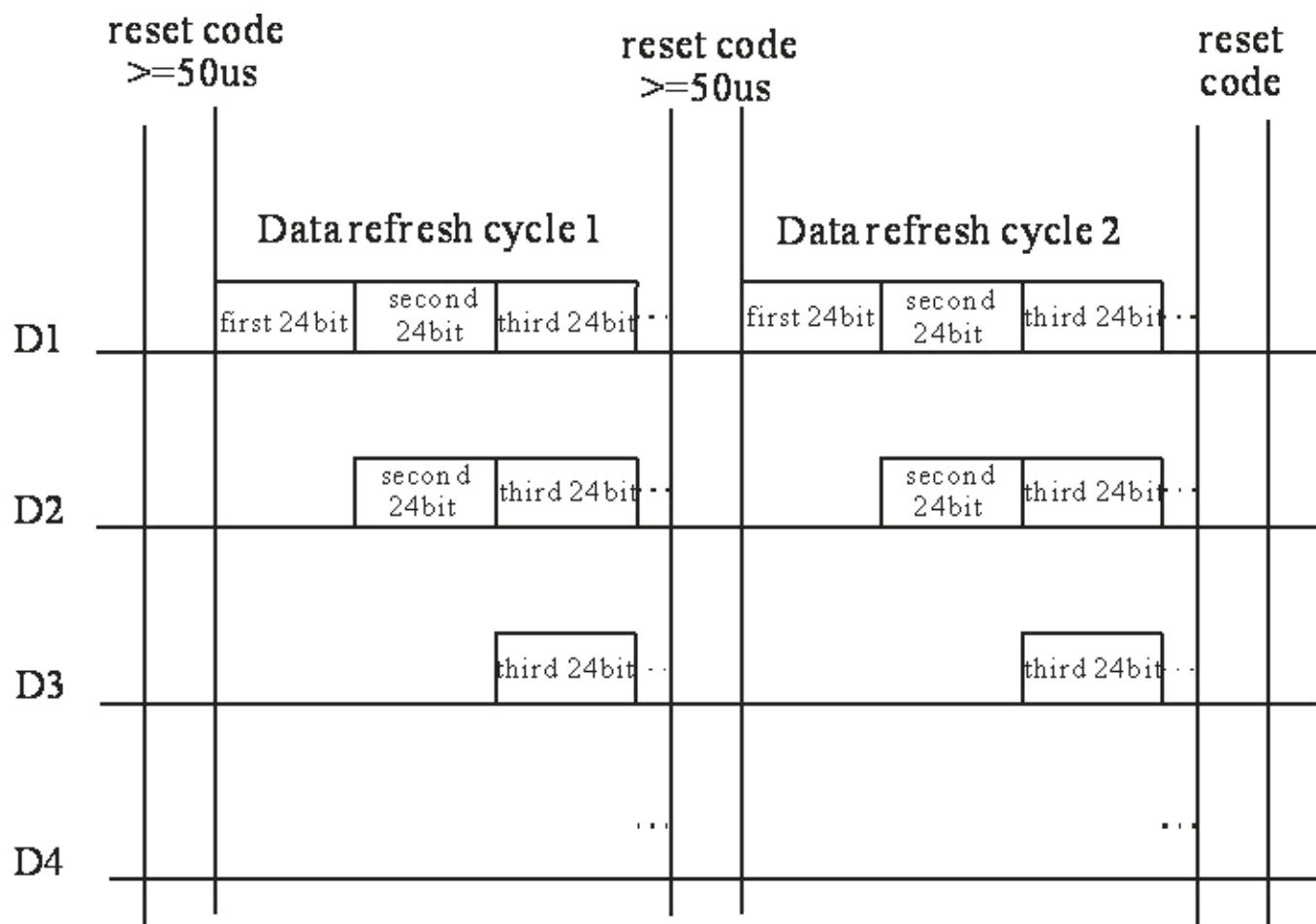
### Input Code



### Cascade Method



## Data Transmission Method



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

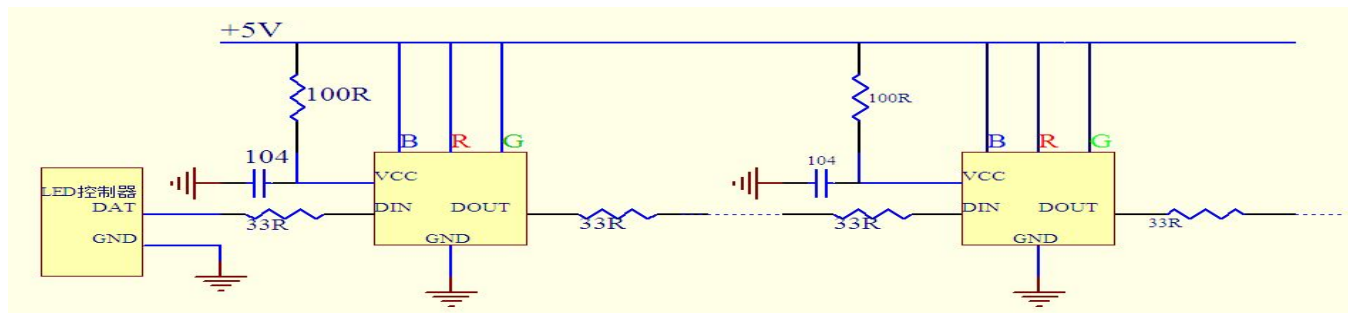
## Composition of 24bit data

R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
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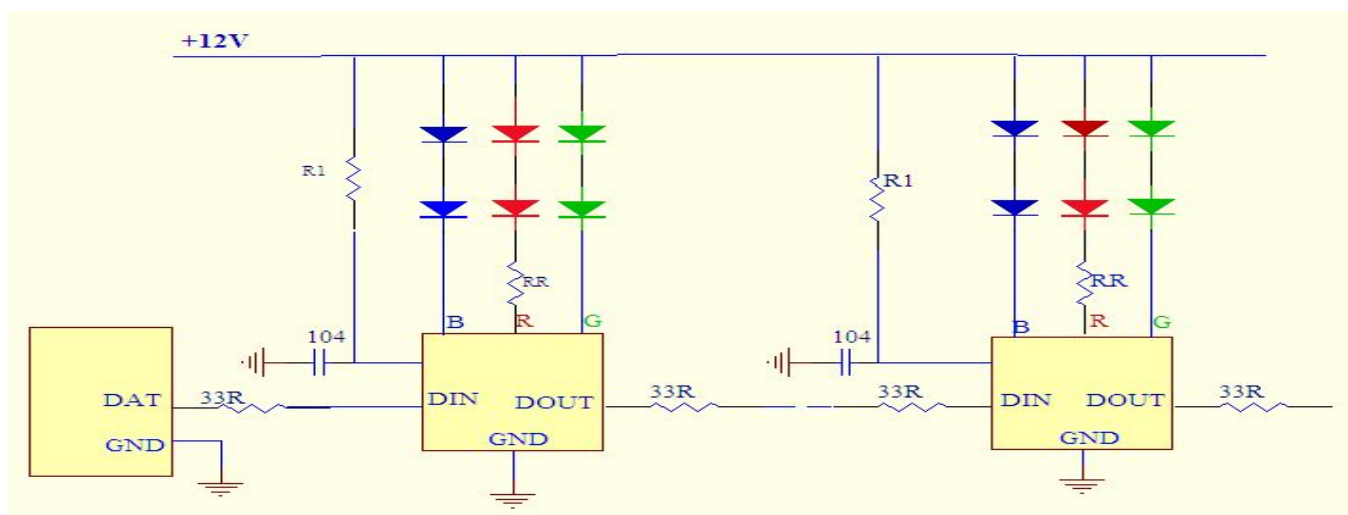
Note: Follow the order of RGB to sent data and the high bit sent at first.

## Typical Application Circuits

### 1. DC5V, one piece of IC/18.5mA Constant Current Output

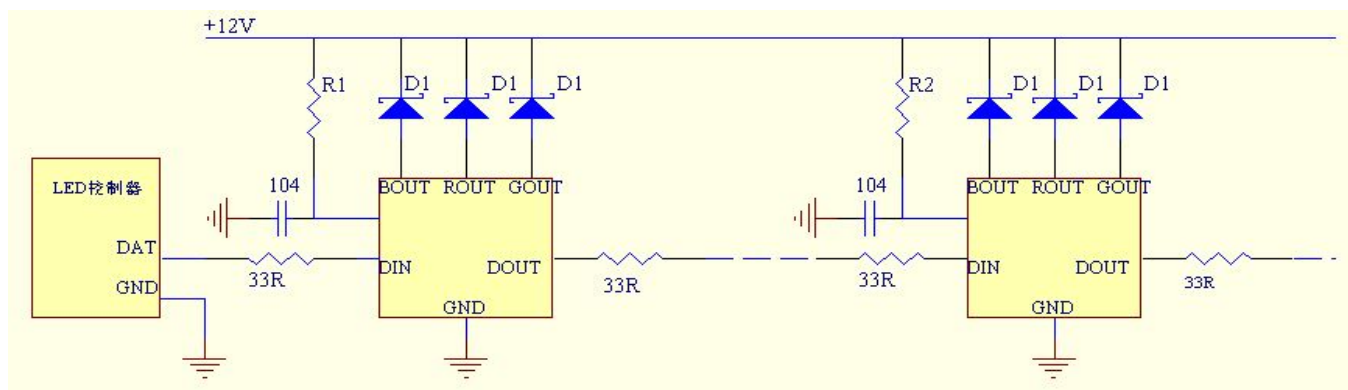


### 2. DC12V, two pieces of IC/18.5 Constant Current Output



Note: WS2850 LEDs are recommended to ensure the light emitting consistence.

### 3. DC5V, one piece of IC/18.5mA Constant Current Output



## The reliability test Items & Conditions

No.	ITEM	Condition	Sample	Acceptance/Rejection
1	Lifespan Test	Current: 20mA Temperature: 25°C Time: 1000h	20	0/1
2	High Temperature & Humidity (Static Test)	Temperature: 85°C Humidity: 95%RH Time: 1000h	20	0/1
3	Cold and hot impact	-35°C~80°C 20min - 10s - 20min Time: 50 Cycles	20	0/1
4	High Temperature Storage	Temperature: 100°C Time: 1000h	20	0/1
5	Low Temperature Storage	Temperature: -40°C Time: 1000h	20	0/1
6	Temperature Cycling	-40°C~100°C 3min - 5min - 30min Time: 20 Cycles	20	0/1
7	Reflow Solder	Preheat: 140°C-160°C(<120S) High Temperature Sec.: Max.260°C(<5S)	20	0/1

## The reliability of the test criteria

- IV: Decay <30%
- VF: Diversification <10%
- IR: Two times more than the upper limit

Note: 1. The results of the same test should be completed within 2 hours.

2. The test must be done under the condition that all materials return to normal state.