



# WS2812D-F5\_Straw Hat-15mA

## Intelligent control LED integrated light source

### Features and Benefits

- The control circuit and the LED share the only power source.
- Control circuit and RGB chip are integrated in a package of 5\*5mm round shape of Through Hole Device, to 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 2KHz.
- Cascading port transmission signal by single line.
- Any two point the distance not more than 2M transmission signal without any increase circuit.
- When the refresh rate is 30fps, cascade number are not less than 2048 points.
- Send data at speeds of 800Kbps.
- The color of the light is highly consistent, cost-effective.

### Applications

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

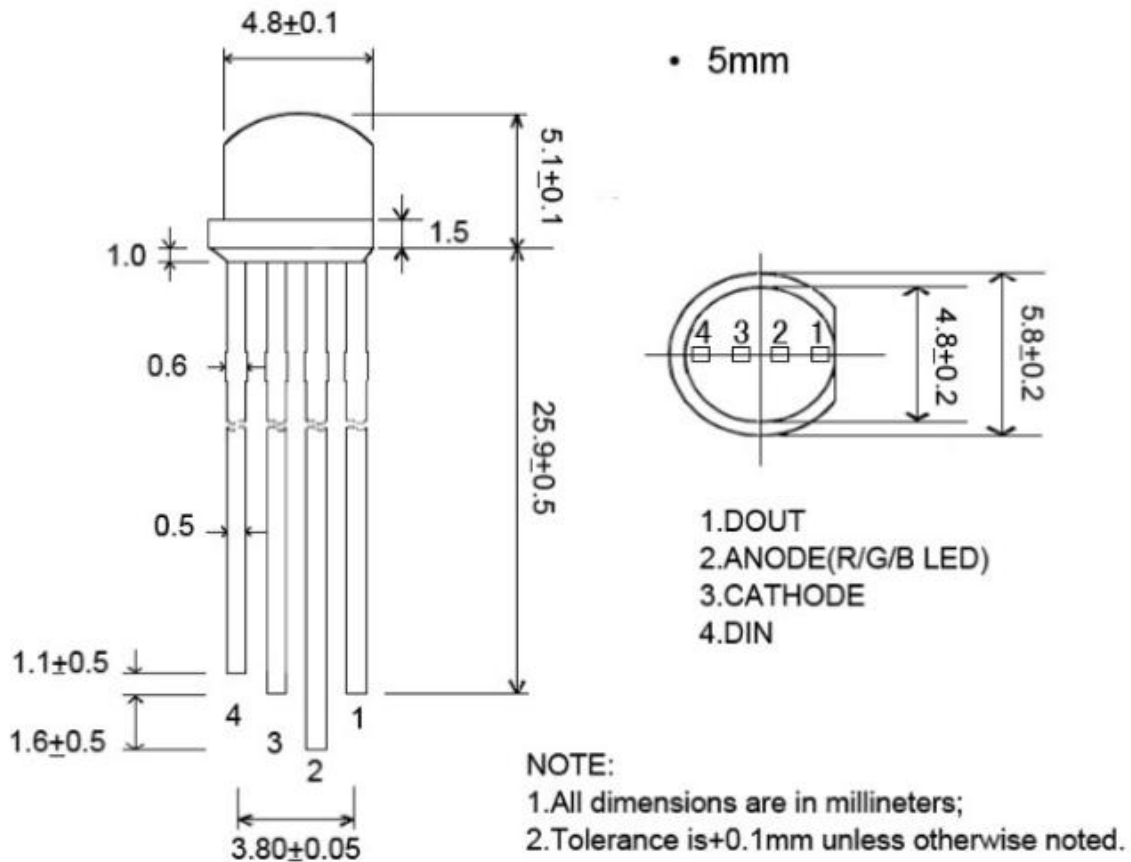
### General description

WS2812D-255-15mA is a intelligent control LED light source that the control circuit and RGB chip are integrated in a package of 5\*5mm round shape of Through Hole Device. Its internal includes intelligent digital port data latch and signal reshaping amplification drive circuit. Also include a precision internal oscillator and a 12V voltage programmable constant current 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 reshaping transmit technology, making the pixel cascade number is not limited the signal transmission, but only depends on the speed of signal transmission.

LED with low driving voltage, environmental protection and energy saving, high brightness, scattering angle 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	VDD	Power supply LED
3	GND	Ground, Data &
4	Din	Control data signal input

## Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Power supply voltage	$V_{DD}$	+3.7~+5.3	V
Input voltage	$V_I$	-0.5~ $V_{DD}+0.5$	V
Operation junction temperature	$T_{opt}$	-25~+80	°C
Storage temperature range	$T_{stg}$	-55~+150	°C

**Electrical Characteristics** ( $T_A=-20\sim+70^{\circ}\text{C}$ ,  $V_{DD}=4.5\sim 5.5\text{V}$ ,  $V_{SS}=0\text{V}$ , unless otherwise specified)

Parameter	Symbol	Conditions	Min	Tpy	Max	Unit
Low voltage Output Current	$I_{dout}$	$V_o=0.4\text{V}$ , Dout	14.5	15	15.5	mA
Input current	$I_I$	$V_I=V_{DD}/V_{SS}$	—	—	$\pm 1$	$\mu\text{A}$
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** ( $T_A=-20\sim+70^{\circ}\text{C}$ ,  $V_{DD}=4.5\sim 5.5\text{V}$ ,  $V_{SS}=0\text{V}$ , unless otherwise specified)

Parameter	Symbol	Condition	Min	Tpy	Max	Unit
Oscillation Frequency	$F_{osc}$	—	—	800	—	KHz
Transmission delay time	$t_{PLZ}$	$CL=15\text{pF}$ , $D_{IN}\rightarrow D_{OUT}$ , $RL=10\text{K}\Omega$	—	—	300	ns
Fall time	$t_{THZ}$	$CL=300\text{pF}$ , OUTR/OUTG/OUTB	—	—	120	$\mu\text{s}$
Input capacity	$C_I$	—	—	—	15	pF

### LED Chips Characteristics

● **RED**

Parameter	Symbol	Min	Tpy	Max	Unit	Condition
Forward Voltage	$V_F$	1.8	2.0	2.2	V	$I_F=20\text{mA}$
Luminous Intensity	$I_v$	100	120	150	mcd	$I_F=20\text{mA}$
Peak Emission Wavelength	$\lambda_p$	620	622.5	625	nm	—
Viewing Angle	$2\ 8\frac{1}{2}$	—	—	—	deg	—

● **Green**

Parameter	Symbol	Min	Tpy	Max	Unit	Condition
Forward Voltage	$V_F$	3.0	3.2	3.4	V	IF=20mA
Luminous Intensity	$I_v$	400	450	600	mcd	IF=20mA
Peak Emission Wavelength	$\lambda_p$	520	522.5	525	nm	—
Viewing Angle	2 8 <sub>1/2</sub>	—	—	—	deg	—

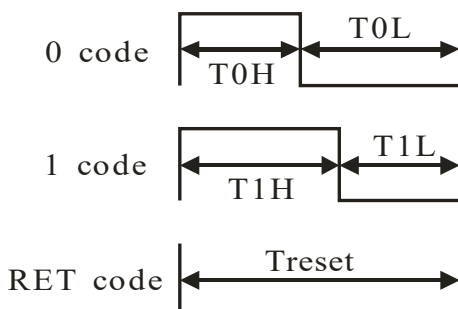
● **Blue**

Parameter	Symbol	Min	Tpy	Max	Unit	Condition
Forward Voltage	$V_F$	3.0	3.2	3.4	V	IF=20mA
Luminous Intensity	$I_v$	80	90	100	mcd	IF=20mA
Peak Emission Wavelength	$\lambda_p$	465	467.5	470	nm	—
Viewing Angle	2 8 <sub>1/2</sub>	—	—	—	deg	—

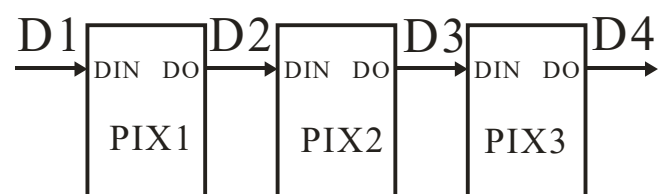
**Data Transfer Time** (TH+TL=1.25 $\mu$ s $\pm$ 600ns)

T0H	0 code, high voltage time	220ns~380ns
T1H	1 code, high voltage time	750ns~1 $\mu$ s
T0L	0 code, low voltage time	750ns~1 $\mu$ s
T1L	1 code, low voltage time	220ns~380ns
RES	low voltage time	>280 $\mu$ s

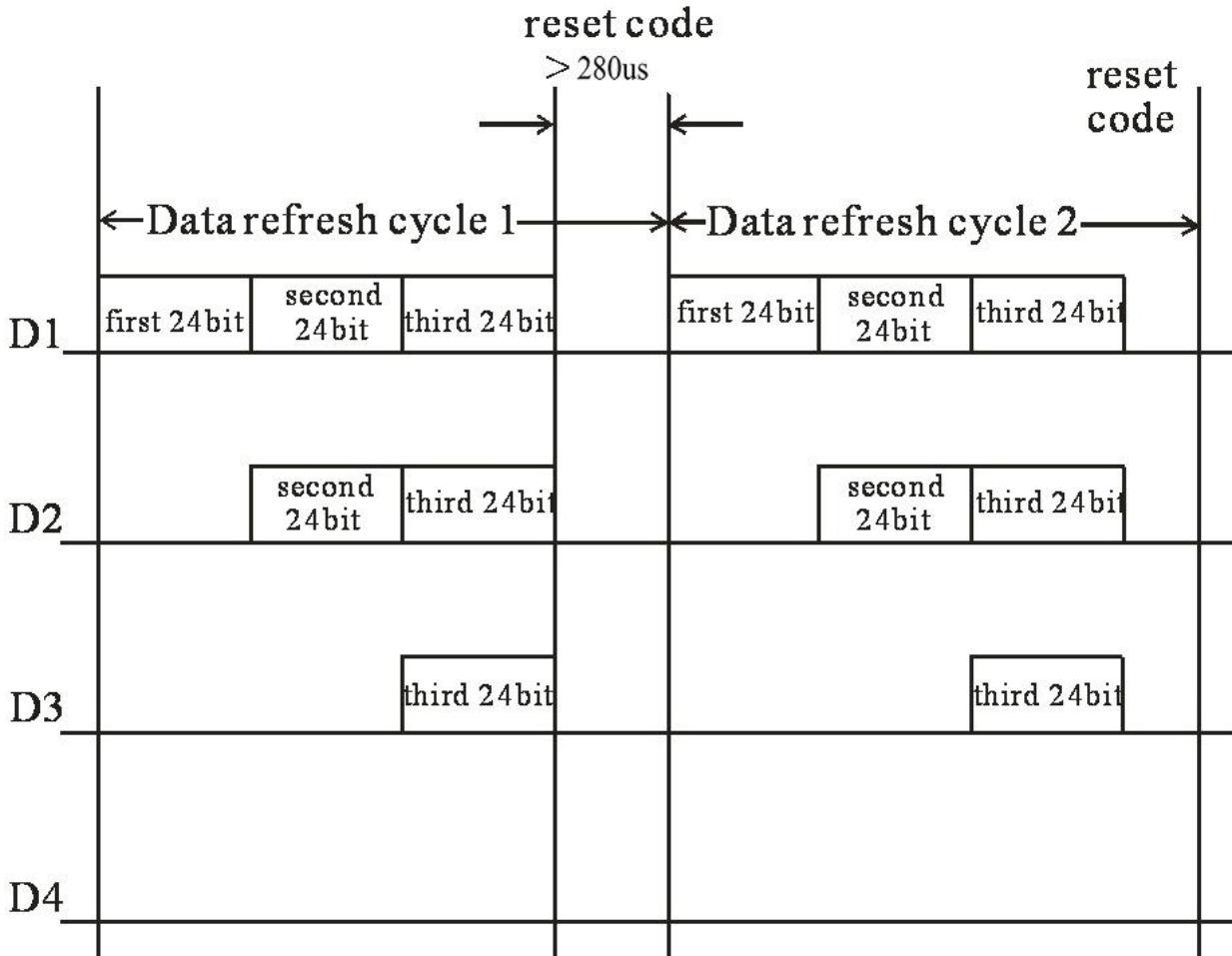
**Sequence chart:**



**Cascade method:**



**Data transmission method:**



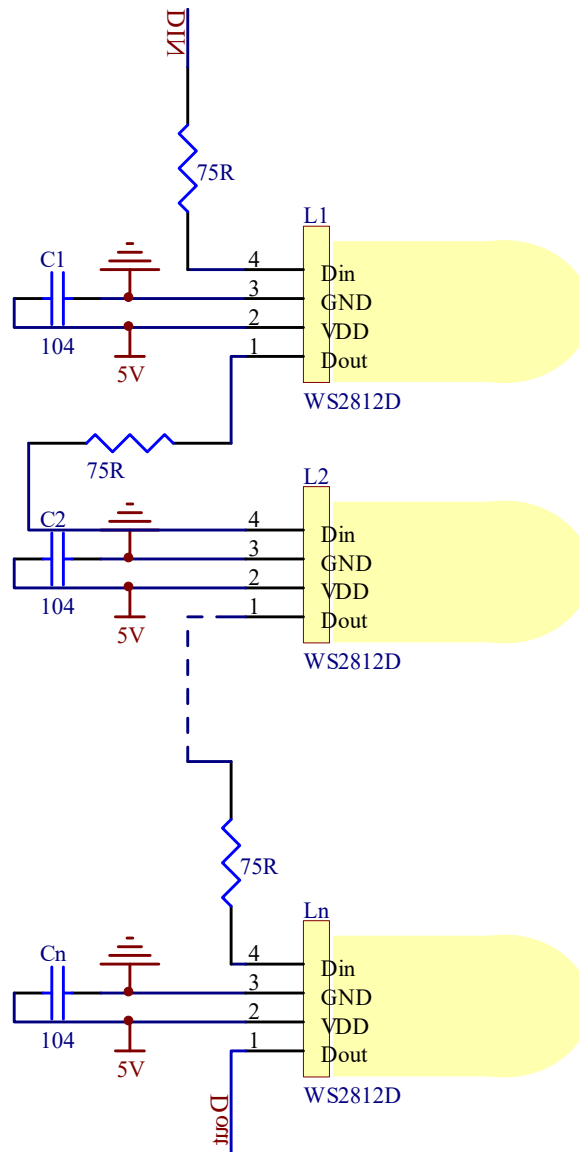
Note: The data of D1 is send by MCU, and D2, D3, D4 through pixel internal reshaping amplification to transmit.

**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
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Note: Data transmit in order of GRB, high bit data at first.

### Typical application circuit



### Modify Records

Version №	Status Bar	Modify Content Summary	Date	Reviser	Approved
V1.0	N	New	20180413	Shen JinGuo	Yin HuaPing

Remarks: Initial version: V1.0; Version number plus "0.1" after each revision;

Status bar: N--New, A--Add, M--Modify, D--Delete.