WS2812D-F5
Intelligent control through-hole 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 5mm through-hole components, to form a complete addressable pixel.
- 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 is of 2KHz.
- Cascading port transmission signal by single line.
- Any two point the distance not more than 5m transmission signal without any increase circuit.
- When the refresh rate is 30fps, cascade number are not less than 1024 pixels.
- Send data at speeds of 800Kbps.
- The color of the light is highly consistent, cost-effective..

Applications

- Full-color module, LED full-color soft/hard light bar, LED guardrail tube.
- LED decorative lighting, LED Screen, Indoor/outdoor LED video irregular screen, various electronic products, electrical equipment marquee.

General description

WS2812D-F5 is a intelligent control LED light source that the control circuit and RGB chip are integrated in a package of 5mm through-hole components.It internal include intelligent digital port data latch and signal reshaping amplification drive circuit.Also include a precision internal oscillator and a voltage programmable constant current control part, effectively ensuring the pixel point light color height consistent.
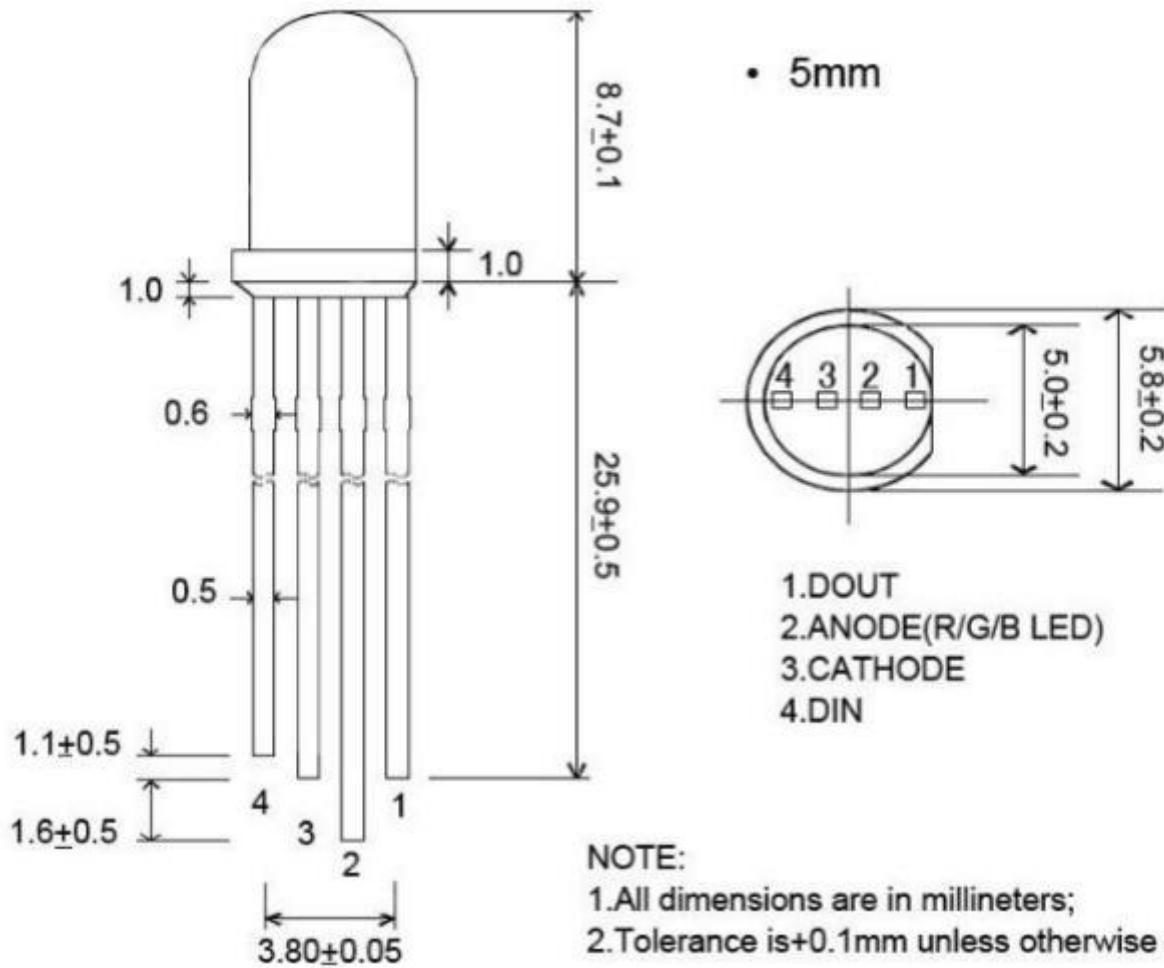
The data transfer protocol use single NZR communication mode. After the pixel power-on reset, the DIN port receive data from controller, the first pixel collect initial 24bit data then sent to the internal data latch, the other data which reshaping by the internal signal reshaping amplification circuit 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, only depend on the speed of signal transmission.

RESET time>**280μs** , it won't cause wrong reset while interruption, it supports the lower frequency and inexpensive MCU.

Refresh Frequency updates to **2KHz**, Low Frame Frequency and No Flicker appear in HD Video Camera, it improve excellent display effect.

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.

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Mechanical Dimensions & PIN Configuration

• 5mm

1.DOUT
2.ANODE(R/G/B LED)
3.CATHODE
4.DIN

NOTE:
1.All dimensions are in millineters;
2.Tolerance is+0.1mm unless otherwise noted.

PIN Function

NO.	Symbol	PIN	Function description
1	DOUT	DATA OUT	Control data signal output
2	VDD	POWER SUPPLY	Power supply
3	GND	GROUND	Ground,data & power grounding
4	DIN	DATA IN	Control data signal input

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Power supply voltage	V_{DD}	+3.7~+5.3	V
Logical Input Voltage	V_I	**-0.3V～VDD+0.7V**	V
Operation junction temperature	Topt	-25～+85	°C
Storage temperature range	Tstg	-40~+105	°C

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Electrical Characteristics （T_A=25℃, V_{DD}=5V, V_{SS}=0V, unless otherwise specified）

Parameter	Symbol	Min	Tpy	Max	Unit	Conditions
Input current	I_I	——	——	±1	μA	V_I=V_{DD}/V_{SS}
High Voltage Input	V_{IH}	2.7V	——	VDD+0.7V	V	D_{IN}，SET
Low Voltage Input	V_{IL}	-0.3V	——	0.7V	V	D_{IN}，SET

Switching Characteristics （T_A=25℃, V_{DD}=5V, V_{SS}=0V, unless otherwise specified）

Parameter	Symbol	Min	Tpy	Max	Unit	Condition
Transmission delay time	t_{PLZ}	——	——	300	ns	CL=15pF, DIN→DOUT,RL=10KΩ
Fall time	t_{THZ}	——	——	120	μs	CL=300pF, OUTR/OUTG/OUTB
Input capacity	C_I	——	——	15	pF	——

LED Characteristics

RED COLOR:

Parameter	Symbol	Min	Typ.	Max	Unit	Test Condition
Forward voltage	V_F	1.8	2.0	2.2	V	IF=20 mA
Luminous intensity	Iv	2500	3000	3500	mcd	IF=20 mA
Peak emission wavelength	λp	620	622.5	625	nm	❖
Half intensity angle	2 θ½	❖	❖	❖	deg	❖

GREEN COLOR:

Parameter	Symbol	Min	Typ.	Max	Unit	Test Condition
Forward voltage	V_F	3.0	3.2	3.4	V	IF=20 mA
Luminous intensity	Iv	3500	4000	4500	mcd	IF=20 mA
Peak emission wavelength	λp	520	522.5	525	nm	❖
Half intensity angle	2 θ½	❖	❖	❖	deg	❖

BLUE COLOR:

Parameter	Symbol	Min	Typ.	Max	Unit	Test Condition
Forward voltage	V_F	3.0	3.2	3.4	V	IF=20 mA
Luminous intensity	Iv	2000	2500	3000	mcd	IF=20 mA
Peak emission wavelength	λp	465	467.5	470	nm	❖
Half intensity angle	2 θ½	❖	❖	❖	deg	❖

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Data Transfer Time

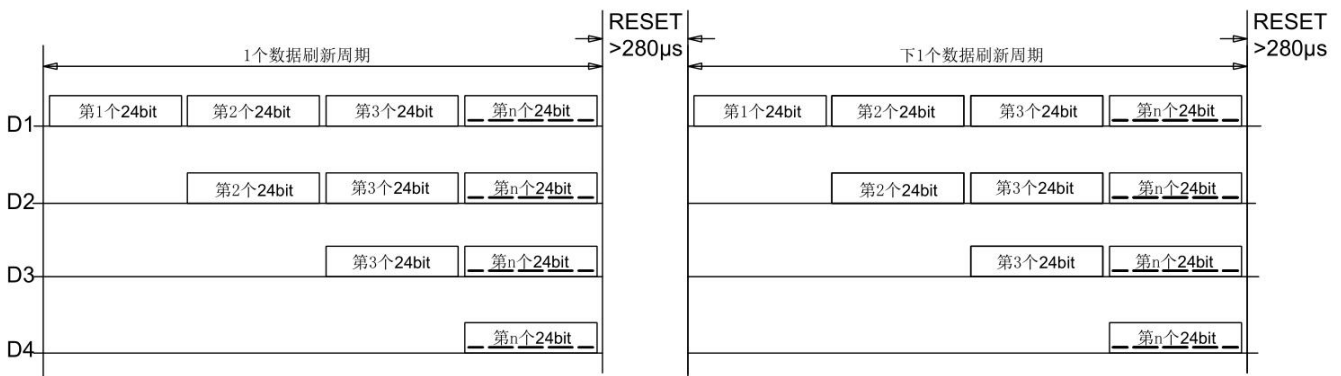| T0H	0 code, high voltage time	220ns~380ns
T1H	1 code, high voltage time	580ns~1µs
T0L	0 code, low voltage time	580ns~1µs
T1L	1 code, low voltage time	**580ns~1µs**
RES	Frame unit, low voltage time	>280µs

Sequence Chart
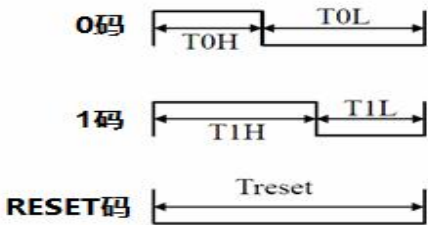
Cascade Method
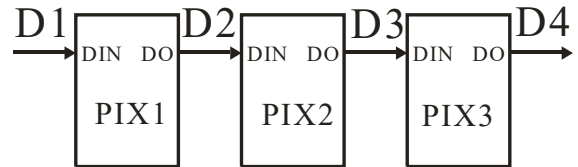

Data Transmission Method

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

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

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Typical Application Circuit: The peripheral circuit don't need to add filter capacitor.
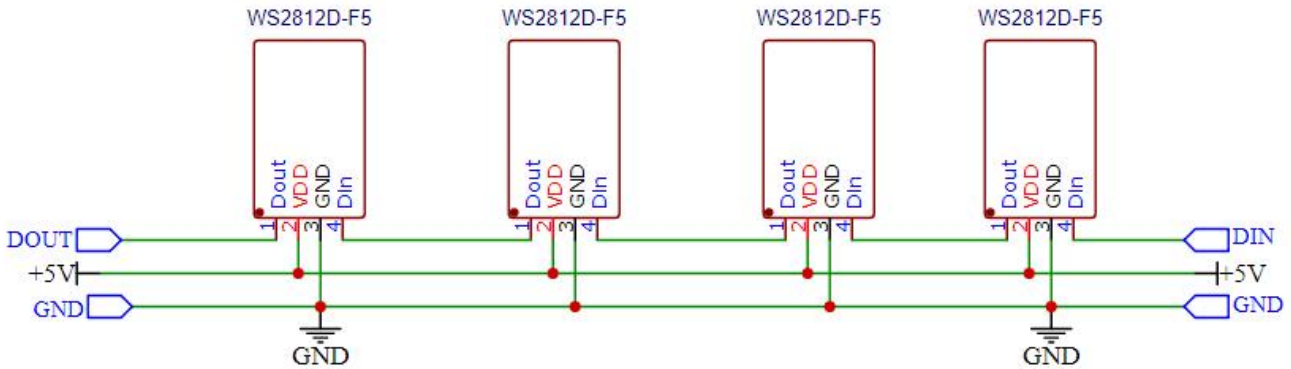
Modify Record

Version №	Status Bar	Modify Content Summary	Date	Reviser	Approved
V1.0	N	New WS2812D-F5	20190219	Shen JinGuo	Yin HuaPing
V2.0	M	IC updated	20210910	Yu XingHui	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.

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