Worldsemi

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 8mm round diameter LED 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 2KHz.
- Cascading port transmission signal by single line.
- Any two point the distance not more than 3m transmission signal without any increase circuit.
- When the refresh rate is 30fps, cascade number are not less than1024 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-F8 is a intelligent control LED light source that the control circuit and RGB chip are integrated in a package of 8mm diameter LED components. Its internal include 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.

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Mechanical Dimensions & PIN Configuration

• 8mm

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.
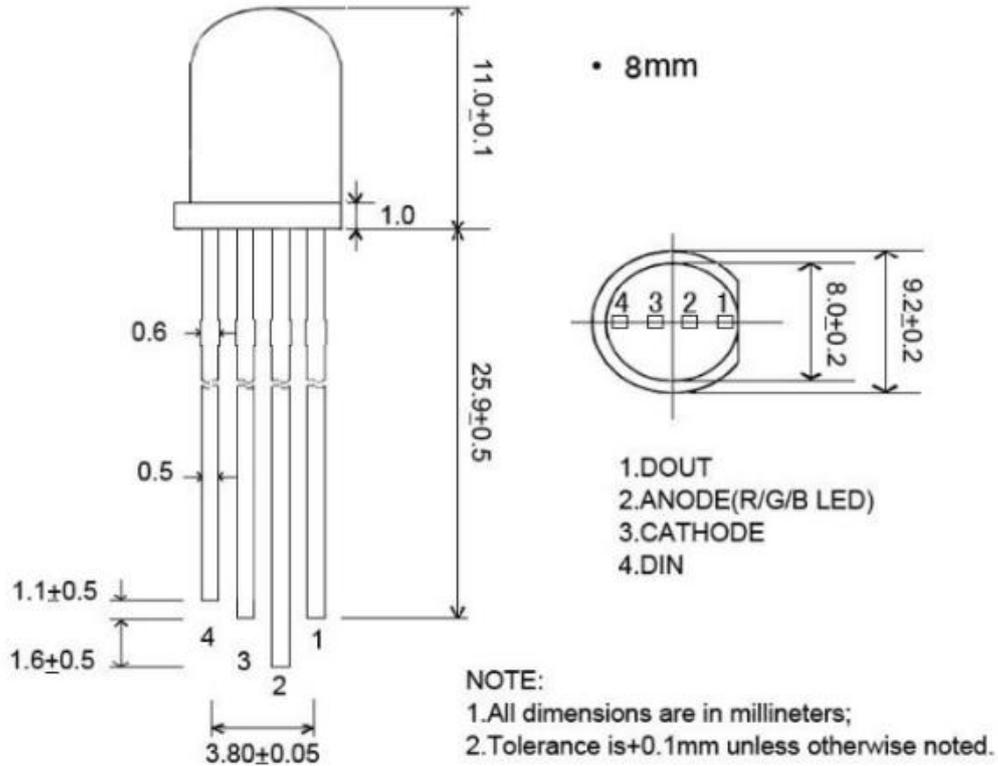
PIN Function

NO.	Symbol	Function description
1	Dout	Control data signal output
2	VDD	Power supply LED
3	GND	Ground
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～VDD+0.5	V
Operation junction temperature	Topt	-25～+80	°C
Storage temperature range	Tstg	-55~+150	°C

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

Parameter	Symbol	Conditions	Min	Tpy	Max	Unit
Low voltage Output Current	I_{dout}	Vo=0.4V, Dout	14.5	15	15.5	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）

Parameter	Symbol	Condition	Min	Tpy	Max	Unit
Oscillation Frequency	$Fosc$	——	——	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
Input capacity	CI	——	——	——	15	pF

LED Characteristics

● **RED**

Parameter	Symbol	Min	Tpy	Max	Unit	Condition
Forward Voltage	VF	1.8	2.0	2.2	V	IF=20mA
Luminous Intensity	Iv	100	120	150	mcd	IF=20mA
Peak Emission Wavelength	λp	620	622.5	625	mm	——
Viewing Angle	$2\,8_{1/2}$	——	——	——	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	λp	520	522.5	525	mm	——
Viewing Angle	$2\,8_{1/2}$	——	——	——	deg	——

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● **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	λp	465	467.5	470	mm	——
Viewing Angle	$2\,8_{1/2}$	——	——	——	deg	——

Data Transfer Time (TH+TL=1.25μs±600ns)

T0H	0 code, high voltage time	220ns~380ns
T1H	1 code, high voltage time	750ns~1us
T0L	0 code, low voltage time	750ns~1us
T1L	1 code, low voltage time	220ns~380ns
RES	low voltage time	>280μs

Timing Sequence
Sequence chart:

Cascade method:

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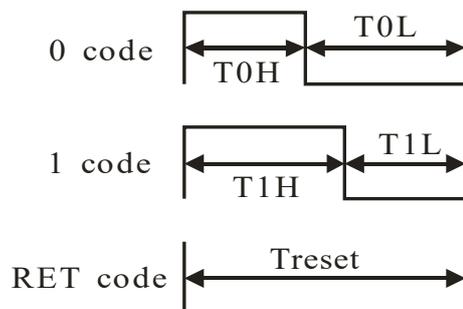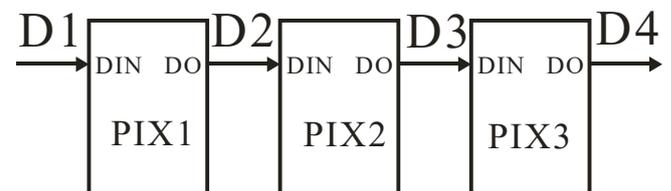
Data transmission method
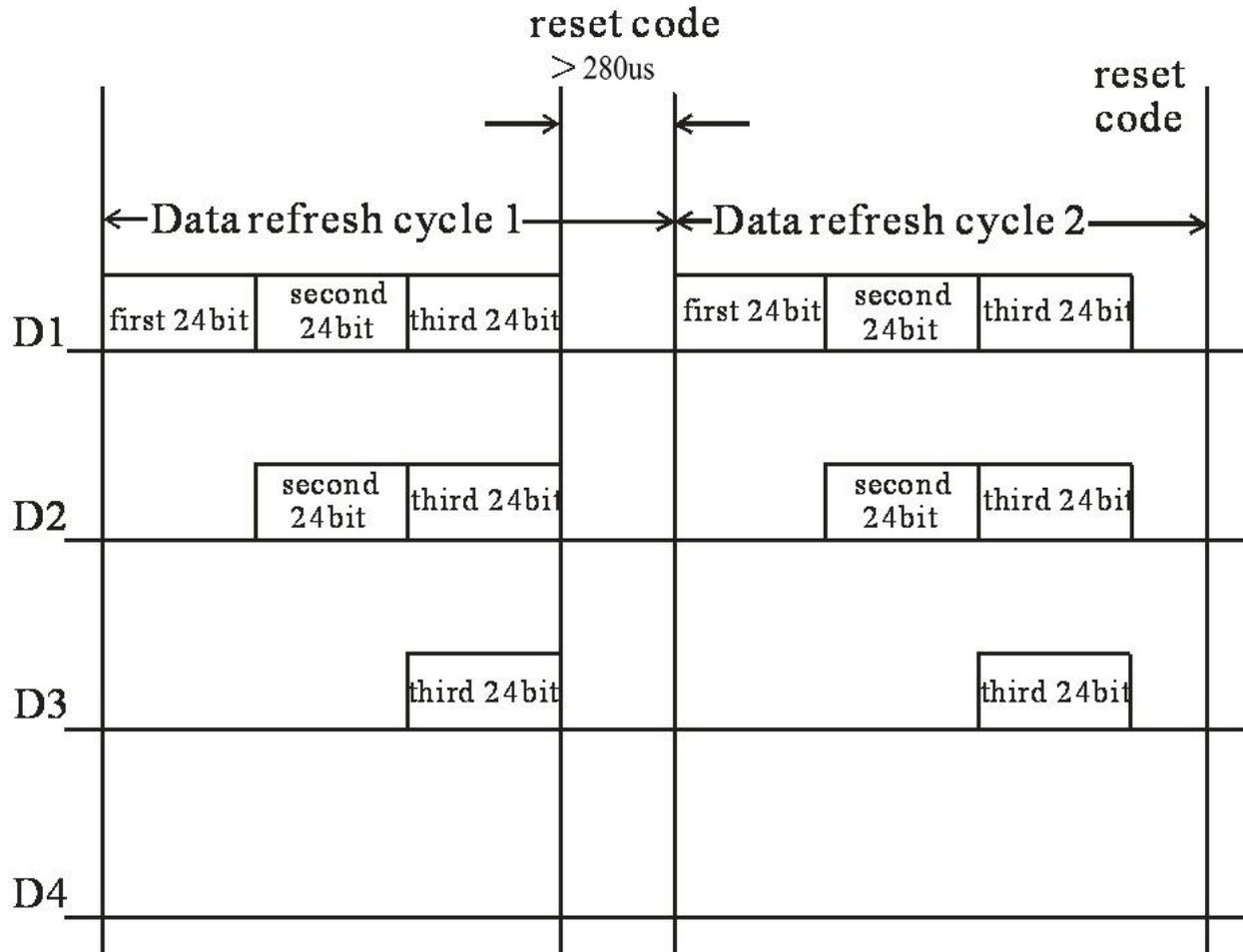
Note: The data of D1 is send by MCU, and D2, D3, D4 through pixel internal reshaping amplification to transmit.

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

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Typical application circuit
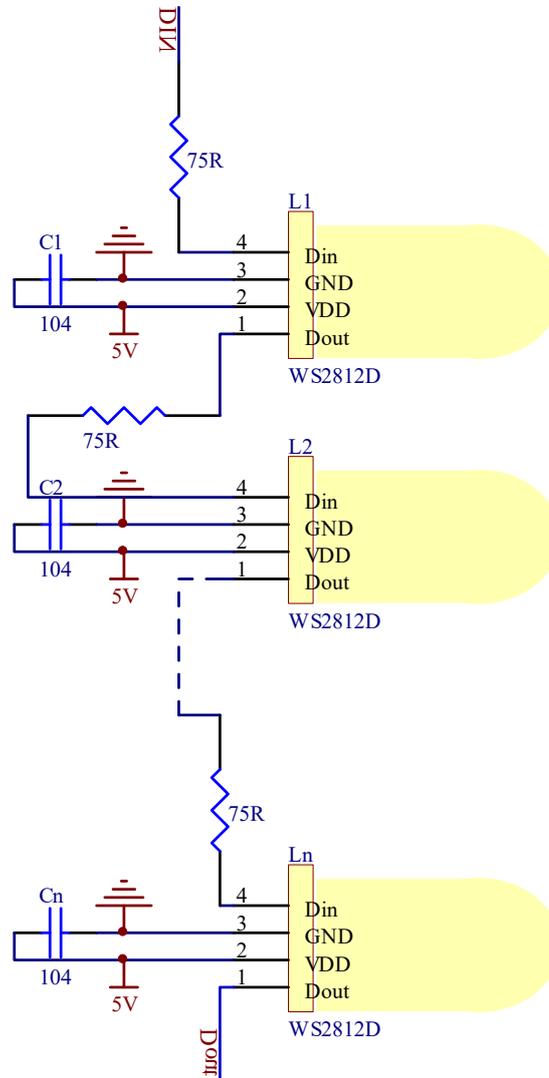
Modify Records

Version №	Status Bar	Modify Content Summary	Date	Reviser	Approved
V1.0	N	New	20171109	Shen JinGuo	Yin HuaPing
V1.1	M	Timing	20180418	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.