

### 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 F5 plug-in 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.
- 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.
- Reverse-connection protection.

### 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.

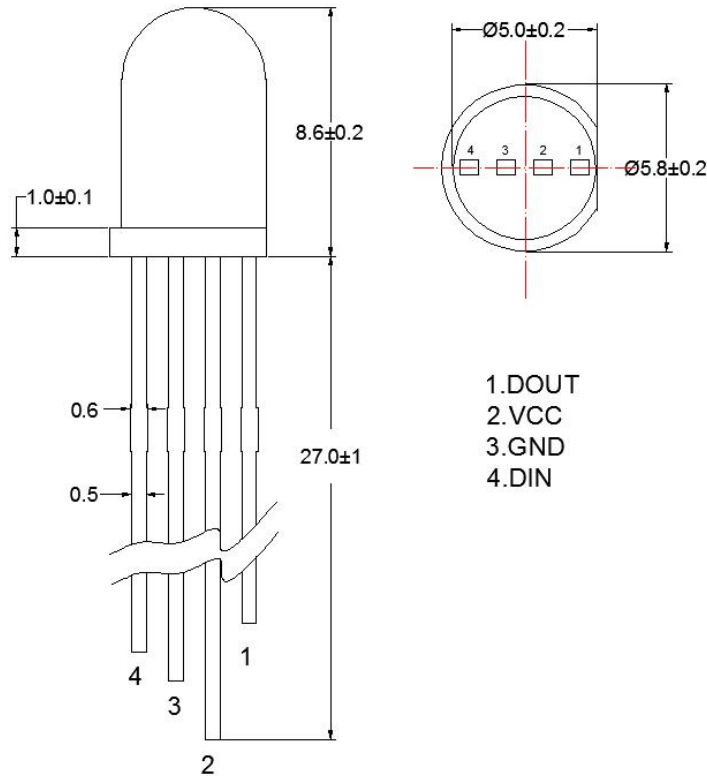
### General description

WS2812D-F5-1261 is an intelligent external control LED light source that integrates control circuit and light-emitting circuit. Its appearance is the same as an F5 LED lamp bead, and each element is a pixel. 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.

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(Unit:mm)



### PIN Function

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

### Absolute Maximum Ratings( $T_A=25^{\circ}\text{C}$ , $V_{CC}=5\text{V}$ , $V_{SS}=0\text{V}$ , unless otherwise specified)

Parameter	Symbol	Ratings	Unit
Power supply voltage	Vcc	+3.7~+5.3	V
Logical Input Voltage	V <sub>I</sub>	-0.3V~VCC+0.7V	V
Operation junction temperature	T <sub>opt</sub>	-25~+85	°C
Storage temperature range	T <sub>stg</sub>	-40~+105	°C

**Electrical Characteristics**(TA=-20~+70℃, VCC=5V, VSS=0V,unless otherwise specified)

Parameter	Symbol	Min	Tpy	Max	Unit	Conditions
RGB Current	I <sub>out</sub>	32	36	40	mA	R+G+B
Input current	I <sub>I</sub>	—	—	±1	μA	V <sub>I</sub> =VCC/V <sub>SS</sub>
High Voltage Input	V <sub>IH</sub>	2.7V	—	VCC+0.7V	V	D <sub>IN</sub>
Low Voltage Input	V <sub>IL</sub>	-0.3V	—	0.7V	V	D <sub>IN</sub>

**Switching Characteristics**(TA=-20~+70℃, VCC=5V, VSS=0V,unless otherwise specified)

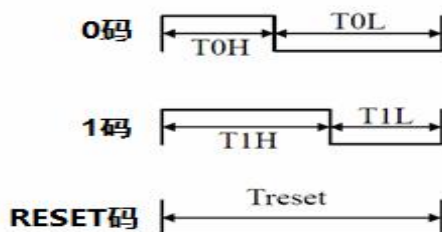
Parameter	Symbol	Min	Tpy	Max	Unit	Condition
Oscillation frequency	F <sub>osc</sub>	—	800	—	KHz	—
Transmission delay time	t <sub>PLZ</sub>	—	—	300	ns	CL=15pF, DIN→DO, RL=10KΩ
Fall time	t <sub>THZ</sub>	—	—	120	μs	CL=300pF, OUTR/OUTG/OUTB
Input capacity	C <sub>I</sub>	—	—	15	pF	—

### LED light chip parameters

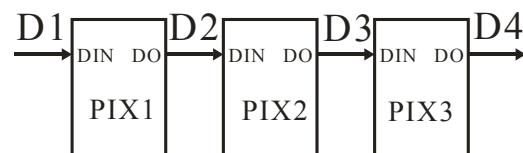
Parameter	Symbol	Color	Quiescent Current: 0.6mA			Unit
			Mini	Typ	Max	
Brightness	IV	Red	250	--	350	mcd
		Green	500	--	700	
		Blue	80	--	150	
Wavelength	λd	Red	620	--	625	nm
		Green	520	--	530	
		Blue	465	--	475	

### Sequence waveform

#### Sequence Chart



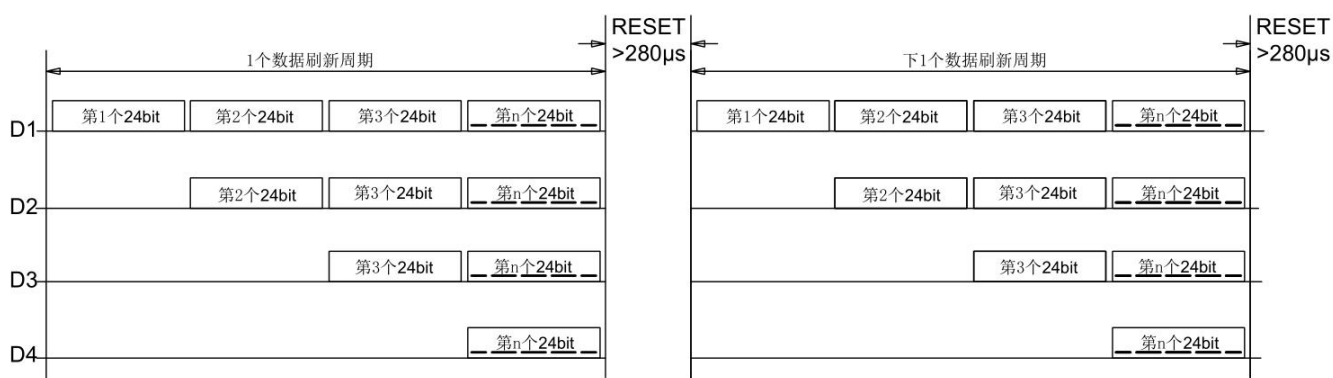
#### Cascade Method



### 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

### Data Transmission Method



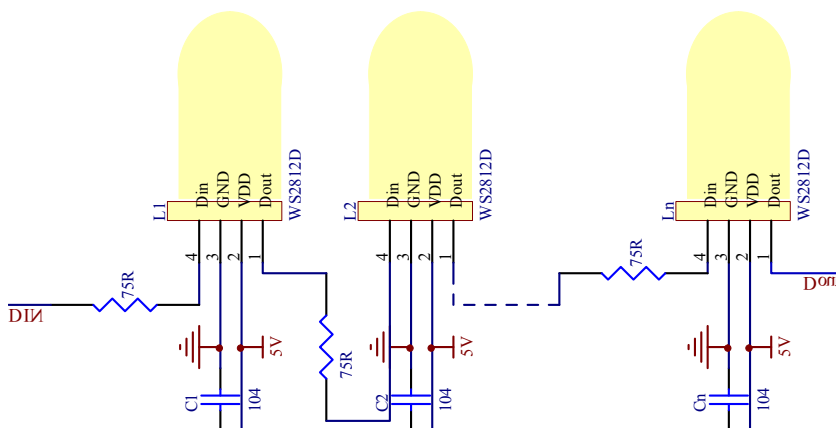
Note: The data of D1 is send by MCU, and D2, D3, D4 through pixel internal reshaping amplification to transmit.

### Composition of 24bit Data

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

### Typical Application Circuit:



**Modify Record**

Version №	Status Bar	Modify Content Summary	Date	Reviser	Approved
V1.0	N	New	20181201	Shen JinGuo	Yin HuaPing
V1.1	M	Outline drawing. Luminous chip parameters, maximum rating, data transmission time.	20190507	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.