

## WS2812B-Mini

Intelligent external control LED  
Integrated light source

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### Features and Benefits

- The IC's control circuit and the LED share the same power supply.
- Control circuit and RGB chip are integrated in a package of 3535 component, to form a complete external control pixel.
- Built-in signal reshaping circuit, any pixel receives the signal, and then re-export after waveform reshaping to ensure that the waveform distortion of the circuit will not accumulate.
- Built-in Power-on reset and Power-off reset circuits.
- The three primary color of each pixel can achieve 256 level Gray scale, and to fulfill 16777216 colors full-color display, its scan frequency is higher than 400Hz/s.
- The reception and decoding of cascading data can be completed by a Serial Interface.
- Any two transmission distance not more than 3 Meters, without adding any circuit.
- When the refresh rate of 30fps, cascade numbers are not less than 1024 points.
- Data transfer speeds up to 800Kbps.
- Highly brightness consistency, and cost-effective.

### Applications

- Full-color module, Full-color flexible strip.
- LED decorative lighting, Indoor/outdoor LED video irregular screen.

### General description

WS2812B-Mini is an intelligent control LED light source that the control circuit and RGB chip are integrated in a package of 3535 component. It 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.

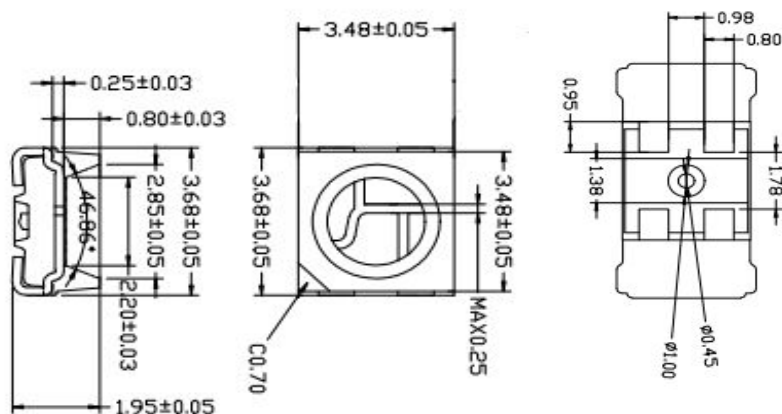
The data transfer protocol use single NZR communication mode. After the pixel power-on reset, the DIN port receive data from controller, the first pixel collect initial 24bit data then sent to the internal data latch, the other data which reshaping by the internal signal reshaping amplification circuit 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, 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.

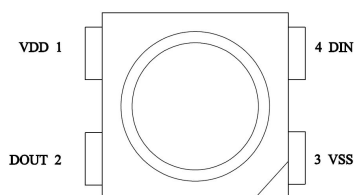
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### Mechanical Dimensions



### PIN Configurations



### PIN Functions

NO.	Symbol	Function description
1	VDD	LED Power supply
2	DOUT	Control data signal output
3	VSS	Ground
4	DIN	Control data signal input

### Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Power supply voltage	V <sub>DD</sub>	+3.5~+5.3	V
Input voltage	V <sub>I</sub>	-0.5~V <sub>DD</sub> +0.5	V
Operation junction temperature	T <sub>opt</sub>	-25~+60	°C
Storage temperature range	T <sub>stg</sub>	-40~+120	°C

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**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	Condition	Min	Tpy	Max	Unit
Input current	$I_I$	$V_I=V_{DD}/V_{SS}$	—	—	$\pm 1$	$\mu\text{A}$
Input voltage level	$V_{IH}$	$D_{IN}, \text{SET}$	$0.7V_{DD}$	—	—	V
	$V_{IL}$	$D_{IN}, \text{SET}$	—	—	$0.3 V_{DD}$	V
Hysteresis voltage	$V_H$	$D_{IN}, \text{SET}$	—	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
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

### Reflow Instructions

Curve Description	Leaded Reflow	Lead-free Reflow
The Lowest Pre-heat Temperature ( $T_{smin}$ )	$100^{\circ}\text{C}$	$150^{\circ}\text{C}$
The Highest Preheat Temperature ( $T_{smax}$ )	$150^{\circ}\text{C}$	$200^{\circ}\text{C}$
Preheat Time ( $T_{smin}$ to $T_{smax}$ )(ts)	60-120 S	60-180 S
Average heating rate ( $T_{smax}$ to $T_p$ )	$<3^{\circ}\text{C}/\text{S}$	$<3^{\circ}\text{C}/\text{S}$
Liquid Phase Temperature (TL)	$183^{\circ}\text{C}$	$217^{\circ}\text{C}$
Liquid Phase Heat Preservation Time (TL)	60-150 S	60-150 S
Peak Temperature ( $T_p$ )	$215^{\circ}\text{C}$	$250^{\circ}\text{C}$

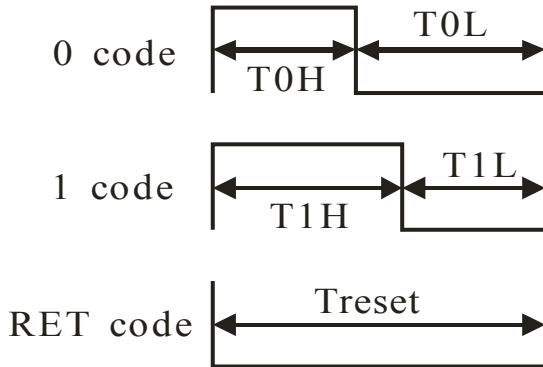
**Data Transfer Time** ( $T_H+T_L=1.25\mu\text{s}\pm 600\text{ns}$ )

T0H	0 code, high voltage time	0.4us	$\pm 150\text{ns}$
T1H	1 code, high voltage time	0.8us	$\pm 150\text{ns}$
T0L	0 code, low voltage time	0.85us	$\pm 150\text{ns}$
T1L	1 code, low voltage time	0.45us	$\pm 150\text{ns}$
RES	low voltage time	Above $50\mu\text{s}$	

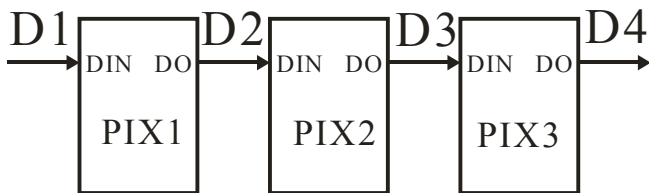
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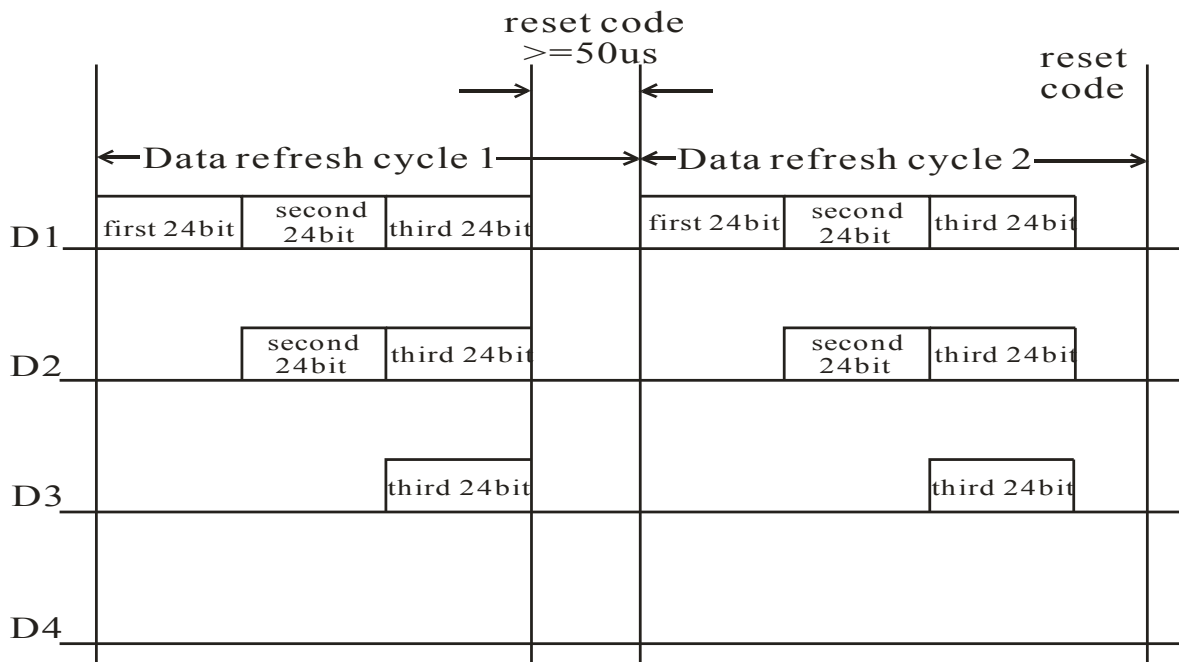
### Sequence Chart



### Cascade Method



### Data Transmission Method



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Note: The data of D1 is sent 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: Follow the order of GRB to send data and the high bit sent at first.

### Typical Application Circuit

