

Signal line 256 Gray level 3 channel Constant current LED driver IC

Feature

- R, G, B output port withstand voltage 20V, DIN1, DIN2 port withstand voltage 9V
- Built-in voltage-regulator tube, only a resistance needed to add to IC VDD feet when under 24V power supply.
- 256 Gray-scale adjustable and scan frequency is more than 2KHz.
- Built in signal reshaping circuit, to ensure waveform distortion do not accumulate after wave reshaping to the next driver
- Built-in electrify reset circuit and power-down reset circuit.
- Cascading port transmission signal by single line.
- Any two point the distance less than 5 Meters' transmission signal without any increase circuit.
- When the refresh rate is 30fps, the cascade number is at least 1024 pixels.
- Send data at speed of 800Kbps.

Applications

- LED full color decorative lighting, such as LED string, LED strip, LED module etc.
- Indoor/outdoor LED video or irregular screen.
- LED consumer electronics.

General description

WS2818B is 3 output channels special for LED driver circuit. Its internal includes intelligent digital port data latch and signal reshaping amplification drive circuit. Also include a precision internal oscillator and a 20V voltage programmable constant current output drive. It effectively ensures that the color of the pixel point light on the driving circuit is highly consistent.

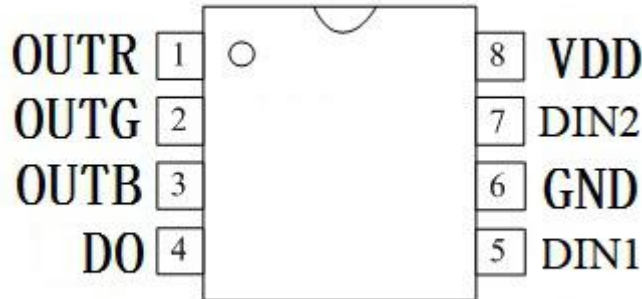
IC use single NZR communication mode. After the chip power-on reset, the DIN1 port receive data from controller, the first IC collect initial 24bit data then sent to the internal data latch, the other data which reshaping by the internal signal reshaping amplification circuit sent to the next cascade IC through the DO port. After transmission for each chip, the signal to reduce 24bit. IC adopt auto reshaping transmit technology, making the chip cascade number is not limited the signal transmission, only depend on the speed of signal transmission.

The data latch of IC depend on the received 24bit data produce different duty ratio signal at OUTR, OUTG, OUTB port. All chip synchronous send the received data to each segment when the DIN1 port input a reset signal. It will receive new data again After the reset signal finished. Before a new reset signal received, the control signal of OUTR, OUTG, OUTB port unchanged. IC sent PWM data that received justly to OUTR, OUTG, OUTB port, after receive a low voltage reset signal the time retain over 280μs.

SOP8, CPC8 and FSOP8 package types available.



PIN configuration



PIN function

NO.	Symbol	PIN	Function description
1	OUTR	LED Driver Output	Output of RED PWM control
2	OUTG	LED Driver Output	Output of GREEN PWM control
3	OUTB	LED Driver Output	Output of BLUE PWM control
4	DO	Ground Data Output	Display data cascade output
5	DIN1	Data 1 input	Display data 1 input
6	GND	Grounding	Signal & Power Grounding
7	DIN2	Data 2 input	Display data 2 input
8	VDD	Power Voltage	IC power supply

Absolute Maximum Ratings ($T_A=25^{\circ}\text{C}$, $V_{SS}=0\text{V}$, unless otherwise noted.)

Parameter	Symbol	Ratings	Unit
Power Supply Voltage	V_{DD}	+3.5~+5.5	V
Logical Input Voltage	V_I	-0.7~ $V_{DD}+0.7$	V
R/G/B Channel Output Port Withstand Voltage	V_{out}	20	V
Operation Temperature	T_{opt}	-25~+85	$^{\circ}\text{C}$
Storage Temperature Range	T_{stg}	-40~150	$^{\circ}\text{C}$

Note: If the voltage on the pins exceeds the maximum ratings may cause permanent damage to the device.

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	Min	Tpy	Max	Unit	Conditions
R/G/B Low voltage output current	I_{OL}	15.5	16.5	17.5	mA	
Low voltage output current	I_{dout}	10	—	—	mA	$V_o = 0.4\text{V}$, D_{OUT}
Input current	I_I	—	—	± 1	μA	$V_I = V_{DD}/V_{SS}$
High level input	V_{IH}	$0.7V_{DD}$	—	—	V	D_{IN}
Low level input	V_{IL}	—	—	$0.3 V_{DD}$	V	D_{IN}
Hysteresis voltage	V_H	—	0.35	—	V	D_{IN}

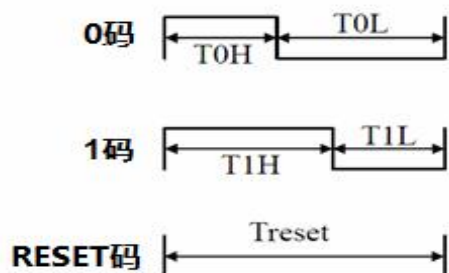
Switching characteristics ($T_A = -20 \sim +70^\circ\text{C}$, $V_{DD} = 4.5 \sim 5.5\text{V}$, $V_{SS} = 0\text{V}$, unless otherwise specified)

Parameter	Symbol	Min	Tpy	Max	Unit	Condition
Transmission delay time	T_{PLZ}	—	—	300	ns	$CL = 15\text{pF}$, $D_{IN} \rightarrow D_{OUT}$, $RL = 10\text{K}\Omega$
Fall time	T_{THZ}	—	—	120	μs	$CL = 300\text{pF}$, $OUT_R/OUT_G/OUT_B$
Data transmission rate	F_{MAX}	600	—	—	Kbps	Duty ratio 50%
Input capacity	C_I	—	—	15	pF	—

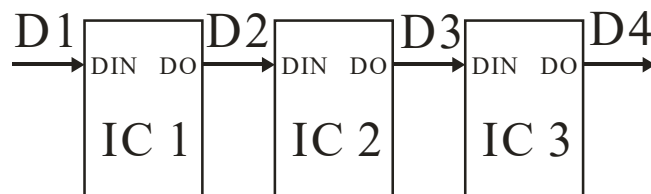
Data Transfer Time

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

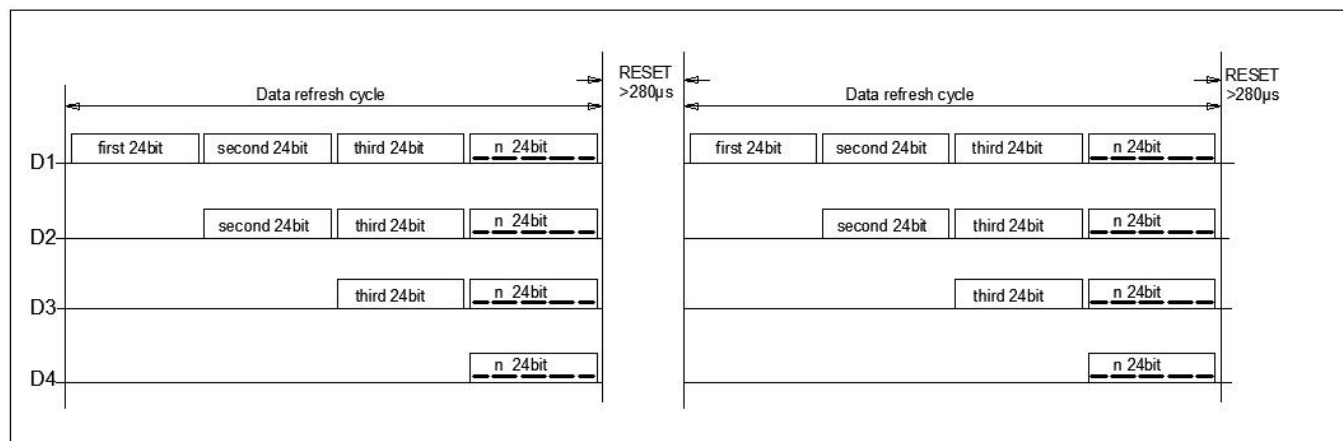
Sequence Chart



Cascade Method



Data Transmission Method



Note: The data of D1 is send by MCU, and D2, D3, D4 through IC 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.



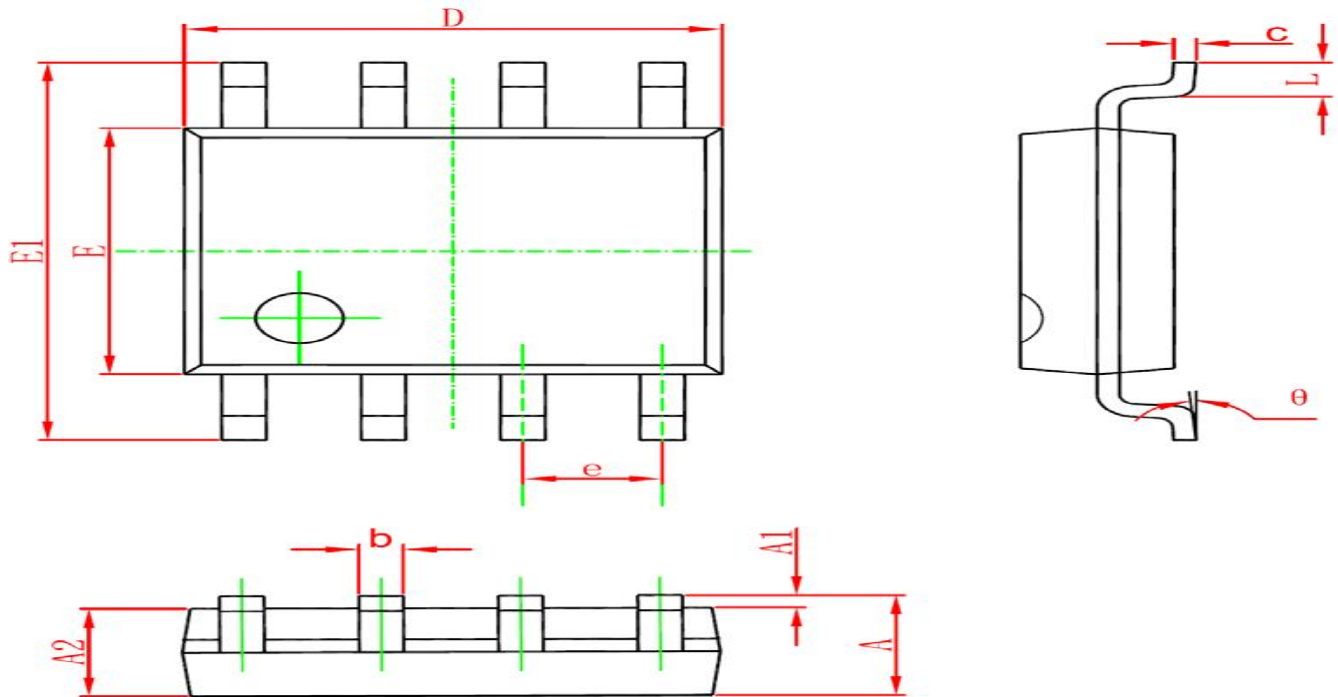
Worldsemi

WS2818B

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Package information

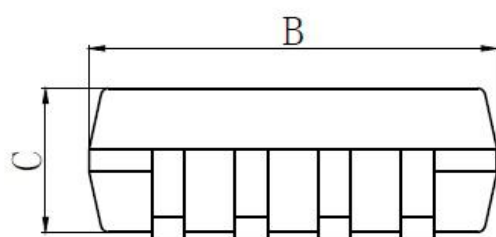
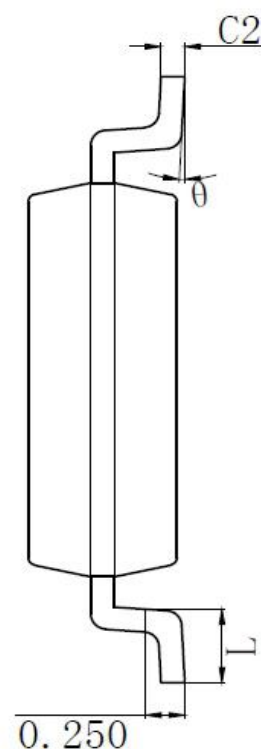
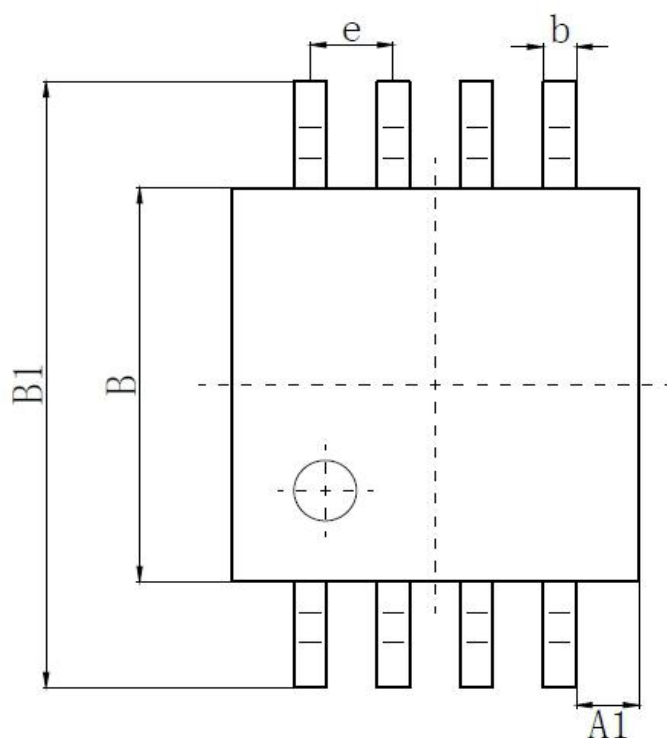
● SOP8 Package



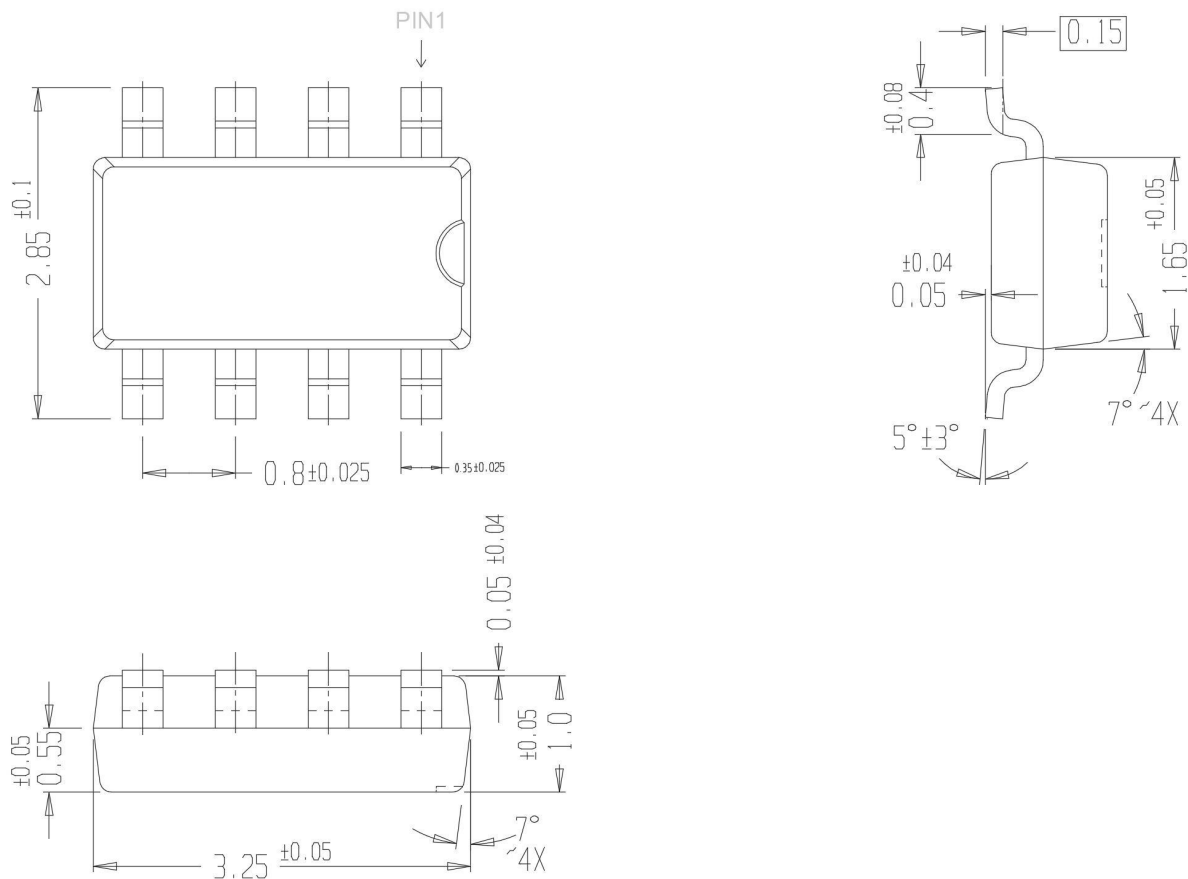
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270		0.050	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

● CPC8 Package

尺寸 标注	最小 (mm)	最大 (mm)	尺寸 标注	最小 (mm)	最大 (mm)
A	2.50	2.70	C	0.85	1.05
A1	0.35	0.45	C1	0.00	0.15
e	0.53 (BSC)		C2	0.15	0.18
B	2.50	2.70	L	0.40	0.60
B1	3.85	4.15	θ	0°	8°
b	0.16	0.26			



● FSOP8 Package



Modify Records

Version №	Status Bar	Modify Content Summary	Date	Reviser	Approved
V1.0	N	New	20170523	Shen JinGuo	Yin HuaPing
V1.1	M	Absolute Maximum Ratings	20171010	Shen JinGuo	Yin HuaPing
V1.2	M	Logic input voltage range, TIL time, Modify the description text in the first column of the electrical parameters	20180207	Shen JinGuo	Yin HuaPing
V1.3	M	Modify the RGB port withstand voltage and add 24V applications	20190906	Shen JinGuo	Yin HuaPing
V1.4	M	Modify description	20210401	Shen JinGuo	Yin HuaPing
V1.5	M	Add FSOP8 new package type	20221027	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.