

Feature

- DIN port withstand voltage 9V.
- 12V power supply, no need for any external circuit.
- 256 Gray-scale adjustable
- 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.
- PMW 256-level adjustable and scan frequency is **4KHz**.
- Cascading port transmission signal by single line.
- The transmission distance of any two pixels is less than two meters without any additional circuit.
- When the refresh rate is 30fps, the cascade number is at least 1024 pixels.
- Send data at speed of 800Kbps.
- Dual signal input.

Applications

- LED full color string, LED full color module.
- LED full color flexible/rigid strip, LED guardrail tube light.
- LED point light source, LED pixel screen, LED shaped screen.
- Various electronic products, electrical equipment running lights.
- Other kinds of LED lighting products.

General description

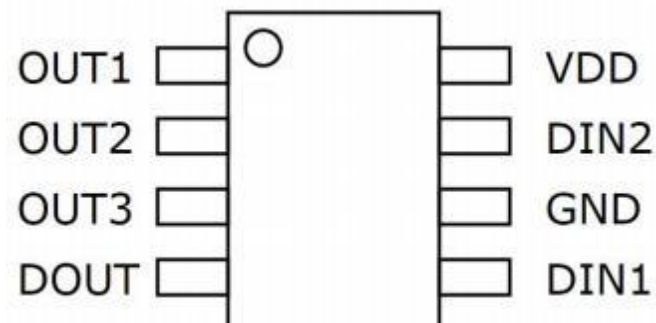
WS28108 is 12V 3-output channels special for LED driver circuit. Its internal includes intelligent digital port data latch and signal reshaping amplification drive circuit. Also include a precision internal oscillator and a 20V voltage programmable constant current output drive. With the function of the dual signal input, even if one IC is damaged, the rest of ICs can work normally.

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 OUT1, OUT2, OUT3 port. All chip synchronous send the received data to each segment when the DIN 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 OUT1 ,OUT2, OUT3 port unchanged. IC sent PWM data that received justly to OUT1, OUT2, OUT3 port, after receive a low voltage reset signal the time retain over **280μs**.

SOP8 and FSOP8 package types available.

PIN configuration



PIN function

NO.	Symbol	PIN	Function description
1	OUT1	LED Driver Output	Output of OUT1 PWM control
2	OUT2	LED Driver Output	Output of OUT2 PWM control
3	OUT3	LED Driver Output	Output of OUT3 PWM control
4	DOUT	Data Output	Control data signal output
5	DIN1	Data-1 input	Control data signal input
6	GND	Grounding	Signal & Power Grounding
7	DIN2	Data-2 input	backup data signal input
8	VDD	Power Voltage	IC power supply

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

Parameter	Symbol	Ratings	Unit
Power Supply Voltage	V_{DD}	+9.5~+14.5	V
Logical Input Voltage	V_I	$V_{DD}-0.7 \sim V_{DD}+0.7$	V
Operation Temperature	T_{opt}	-40 ~ +65	$^{\circ}\text{C}$
Storage Temperature Range	T_{stg}	-40~+85	$^{\circ}\text{C}$

Electrical Characteristics ($T_A=25^{\circ}\text{C}$, $V_{DD}=11.5 \sim 12.5\text{V}$, $V_{SS}=0\text{V}$)

Parameter	Symbol	Min	Tpy	Max	Unit	Conditions
Quiescent current	I_O	—	1.5	—	mA	DC=12V
R/G/B Low voltage output current	I_{OL}	—	12	—	mA	DC= 12V, DIN (FFH)
RGB Difference in current	D_{if}	0	—	0.8	mA	DC= 12V, DIN
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}	2.7V	—	—	V	D_{IN}
Low level input	V_{IL}	—	—	0.7V	V	D_{IN}
Hysteresis voltage	V_H	—	0.35	—	V	D_{IN}

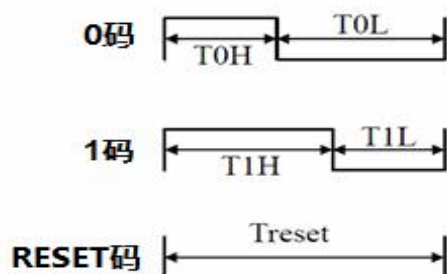
Switching characteristics ($T_A=25^{\circ}\text{C}$, $V_{DD}=11.5 \sim 12.5\text{V}$, $V_{SS}=0\text{V}$)

Parameter	Symbol	Min	Tpy	Max	Unit	Condition
Oscillation frequency	F_{osc}	—	800	—	KHz	—
Transmission delay time	T_{PLZ}	—	—	300	ns	CL=15pF, DIN→DOUT, RL=10K Ω
Fall time	T_{THZ}	—	—	120	μs	CL=300pF, OUTR/OUTG/OUTB
Data transmission rate	F_{MAX}	600	—	—	Kbps	Duty ratio 50%
Input capacity	C_I	—	—	15	pF	—

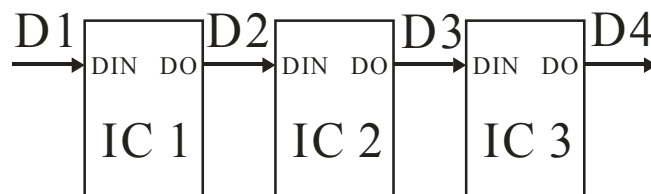
Data Transfer Time

T0H	0 code, high voltage time	220ns~380ns
T1H	1 code, high voltage time	580ns~840ns
T0L	0 code, low voltage time	900ns~5000ns
T1L	1 code, low voltage time	600ns~5000ns
RES	Frame unit, low voltage time	>280 μs
T _{DATA}	Data cycling time	$\geq 1.25\mu\text{s}$

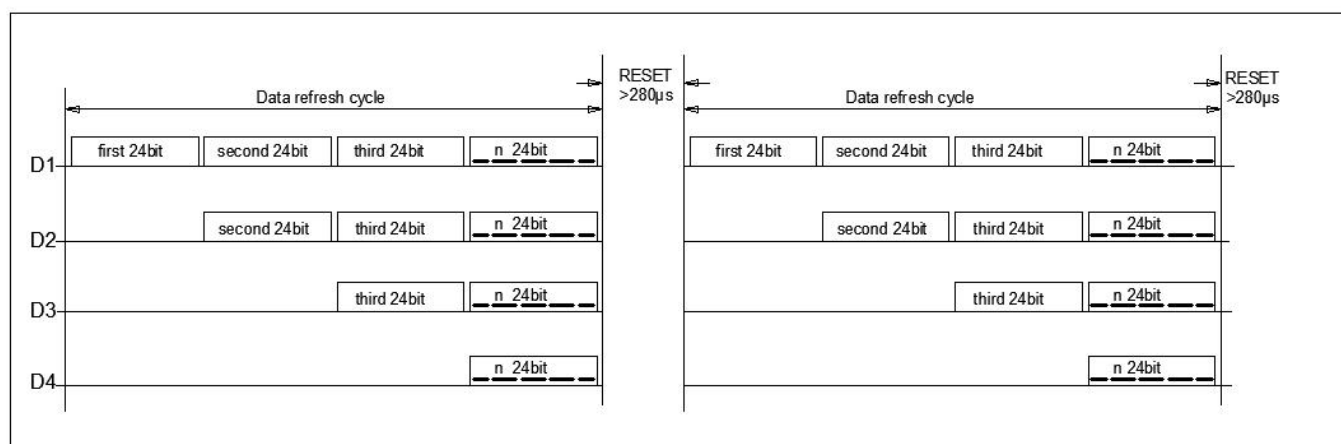
Timing Waveform Sequence Chart



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.

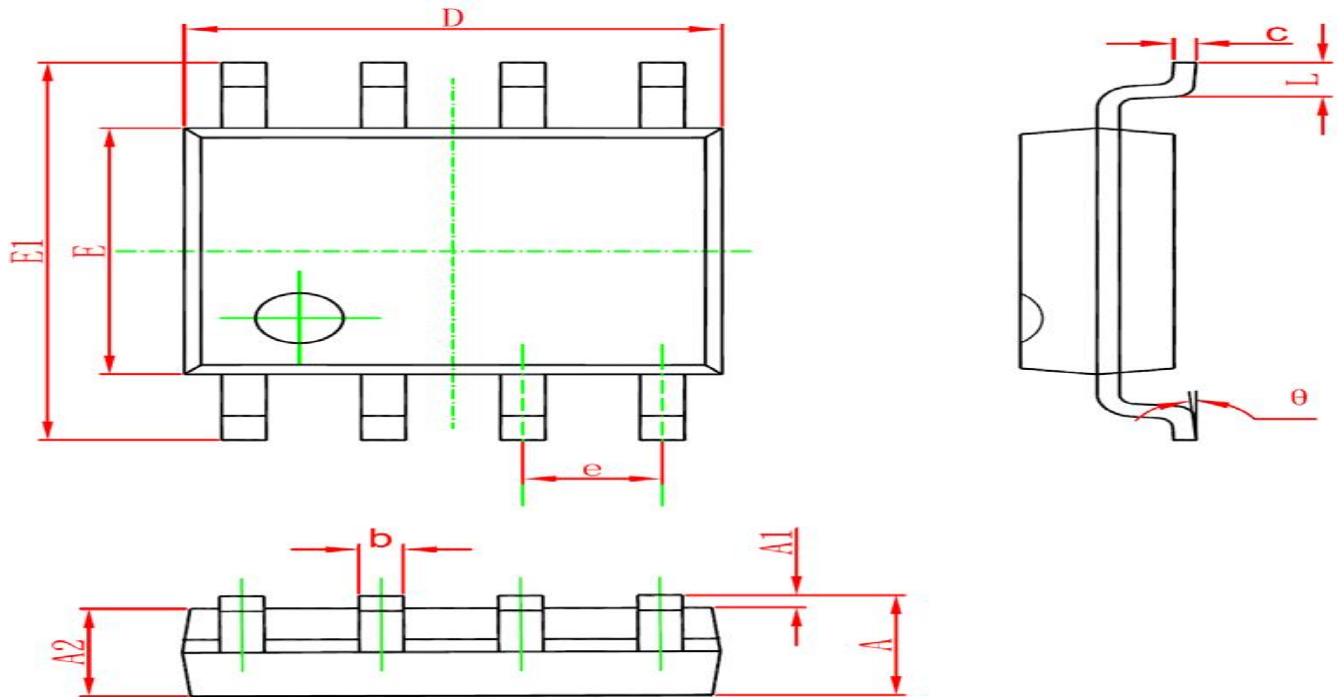
Composition of 24bit Data

G7	G6	G5	G4	G3	G2	G1	R0	R7	R6	R5	R4	R3	R2	R1	R0	B7	B6	B5	B4	B3	B2	B1	B0
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Note: Data transmit in order of GRB, high bit data sent at first.

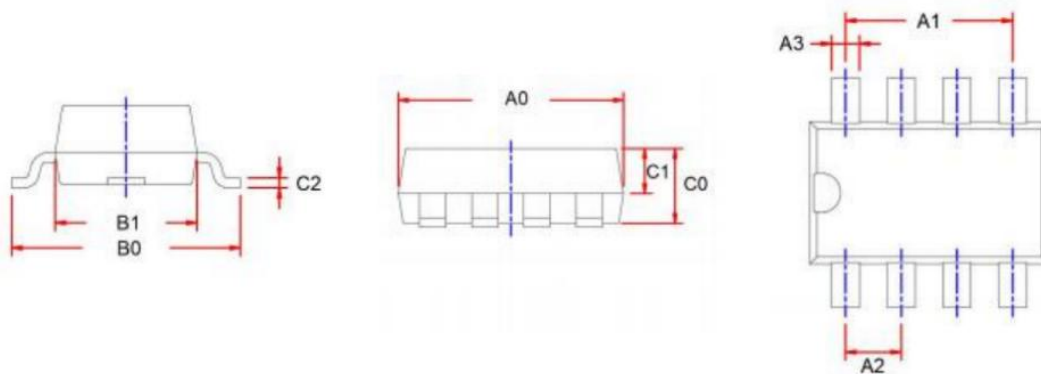
Package information

- 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°

● FSOP8 Package



Label	Description	Typical Size
A0	Total length	3.25
A1	Total distance between PIN	2.40
A2	Single distance between PIN	0.80
A3	Width of the PIN	0.25
B0	Total width	2.85
B1	Width of the colloid	1.65
C0	Height of the colloid	1.00
C1	Height of the soldering	0.55
C2	Thickness of the PIN	0.15

Modify Records

Version №	Status Bar	Modify Content Summary	Date	Reviser	Approved
V1.0	N	New	20221028	Hu Jin	Yu XingHui
V1.1	M	Optimization of Timing Description	20221221	Hu Jin	Yu XingHui

Remarks: Initial version: V1.0; Version number plus "0.1" after each revision;

Status bar: N--New, A--Add, M--Modify, D--Delete.