

# Signal line 256 Gray level 3 channal Constant current LED drive IC

#### **Feature**

- Output port compression 12V.
- Built in stabilivolt, Only add a resistance to IC
   VDD feet when under 24V power supply.
- Gray level 256 can be adjusted and scan freque ncy not less than 400Hz/s.
- 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
- Cascading port transmission signal by single line.
- Any two point the distance more than 10m transmission signal without any increasecircuit.
- When the refresh rate is 30fps, low speedmodelc ascade number are not less than 512 points, high h speed mode not less than 1024 points.
- Send data at speeds of up to 400 Kbps and 800 Kbps two patterns.

### **Applications**

- LED decorative lighting.
- Indoor/outdoor LED video or irregular screen.

### **General description**

The WS2811 is 3 output channels special for LED driver circuit. 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 output drive. In the purpose of reduce power supply ripple, the 3 output channels designed to delay turn-on function.

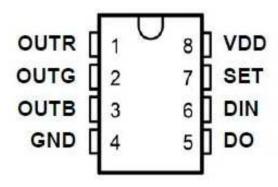
IC use single NZR communication mode. After the chip power-on reset, the DIN port receivedata from con troller, the first IC collect initial 24bit data then sent to the internal data latch, theother data which reshaping by the internal signal reshaping amplification circuit sent to the next cascade IC 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 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 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 50us. We offer two package SOP8 and DIP8.



Signal line 256 Gray level 3 channal Constant current LED drive IC

### PIN configuration



### **PIN** function

NO.	Symbol	Function description
1	OUTR	Output of Red PWM control
2	OUTG	Output of Green PWM control
3	OUTB	Output of Blue PWM control
4	GND	Ground
5	DOUT	Data signal cascade output
6	DIN	Data signal input
7	SET	Set work mode of IC as low speed model(connect VDD) or high speed model(vacant)
8	VDD	Power supply voltage

### **Absolute Maximum Ratings**

Prameter	Symbol	Ratings	Unit
Power supply voltage	$V_{\mathrm{DD}}$	+6.0~+7.0	V
Output voltage	$V_{OUT}$	12	V
Input voltage	$V_{I}$	-0.5∼VDD+0.5	V
Operation junction temperature	Topt	-25~+85	${\mathbb C}$
Storage temperature range	Tstg	-55~+150	$^{\circ}$

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



# Signal line 256 Gray level 3 channal Constant current LED drive IC

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

Prameter	Smybol	conditions	Min	Тру	Max	Unit
Low voltage	$I_{OL}$	ROUT		18.5		mA
output current	$I_{dout}$	Vo=0.4V, D <sub>OUT</sub>	10			mA
Input current	$I_{I}$	$V_I = V_{DD}/V_{SS}$			±1	μΑ
Input valtage level	V <sub>IH</sub>	D <sub>IN</sub> , SET	$0.7V_{DD}$			V
Input voltage level	V <sub>IL</sub>	D <sub>IN</sub> , SET			$0.3~\mathrm{V_{DD}}$	V
Hysteresis voltage	$V_{\mathrm{H}}$	D <sub>IN</sub> , SET		0.35		V

Switching characteristics (T<sub>A</sub>=-20 $\sim$ +70°C, V<sub>DD</sub>=4.5 $\sim$ 5.5V,V<sub>SS</sub>=0V,unless otherwise specified)

Prameter	Symbol	Condition	Min	Тру	Max	Unit
Operation	Fosc1			400		KHz
frequency	Fosc2			800		KHz
Transmission delay time	$t_{PLZ}$	CL=15pF,DIN $\rightarrow$ DOUT,RL=10K $\Omega$			300	ns
Fall time	$t_{ m THZ}$	CL=300pF,OUTR/ OUTG/OUTB			120	μs
Data transmission rate	$F_{MAX}$	Duty ratio50%	400			Kbps
Input capcity	$C_{I}$				15	pF

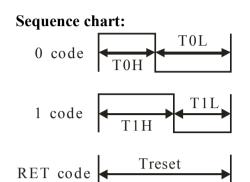
### Low Speed mode time

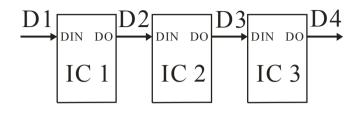
ТОН	0 code,high voltage time	0.5 μs	±150ns
T1H	1 code,high voltage time	1.2 μs	±150ns
T0L	0 code,low voltage time	2.0 μs	±150ns
T1L	1 code,low voltage time	1.3 μs	±150ns
RES	low voltage time	Above 50µs	

Note: It is one half of the time when high speed mode(reset time unchanged)

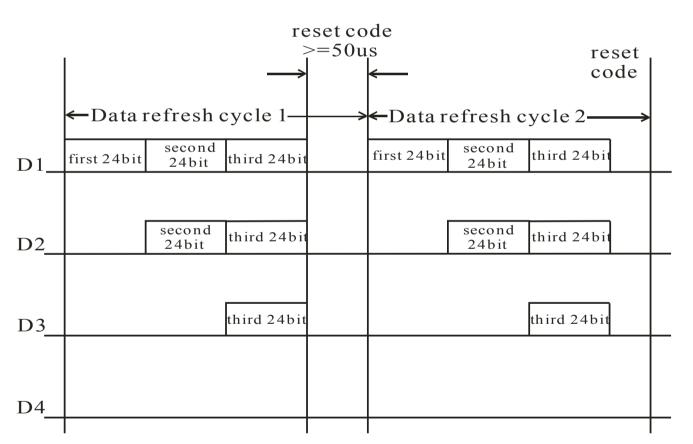


Signal line 256 Gray level 3 channal Constant current LED drive IC





#### 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	В7	В6	В5	B4	В3	B2

Note: Follow the order of RGB to sent data and the high bit sent at first.



Signal line 256 Gray level 3 channal Constant current LED drive IC

### Typical application circuit:

1.power supply is 5V with 1 LED and constant current (18.5mA) driving

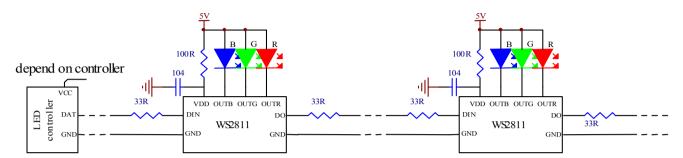
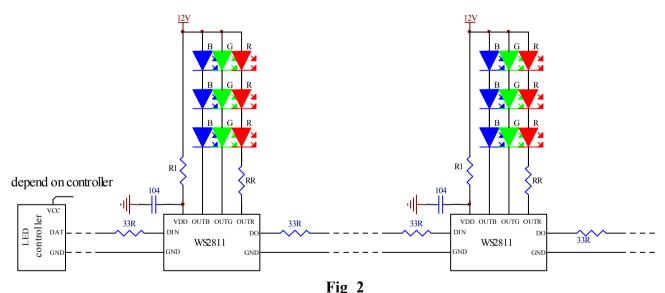


Fig 1

This driving mode use constant current output, the advantage of is the LED can retain luminance and colour temperature when the power supply lessen. We require, in order to prevent power spikes phenomenon and power reverse polarity, series a not more than 100ohm resistor at the po-wer supply pin(VDD). The capacitance 104 as bypass capacitor. To prevent the reflection and hot-swap protection, we suggest to connect a 33 ohm resistor at the data input or output port for impedance.

### 2.power supply is 12V with 3 LED and constant current(18.5mA) driving



The same as the front mode, it is also use constant current output. In this circuit, R1 is used as the IC internal LDO divider resistance and the value is 2.7K. The capacitance 104 as bypass capacitor. To prevent the reflection and hot-swap protection, we suggest to connect a 33ohm resistor at the data input or output port for impedance. At the OUTR port we should add a divider resistance RR. The value of RR can be derived by the following equation:

$$RR = \frac{12 - 3V_{LEDR}}{18.5} \, \text{K}\Omega$$

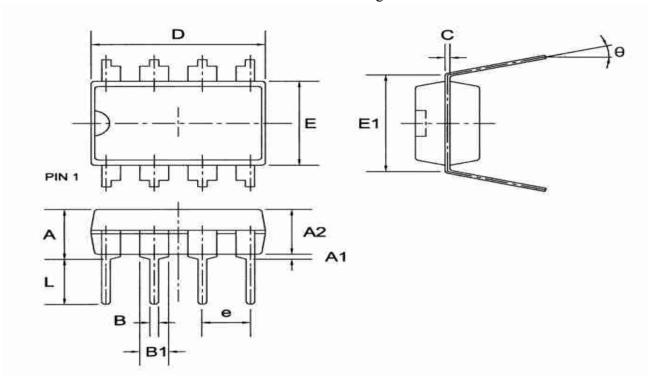
V<sub>LEDR</sub> is the red LED forward conduction voltage drop.



Signal line 256 Gray level 3 channal Constant current LED drive IC

### Package imformation:

DIP-8 Package:

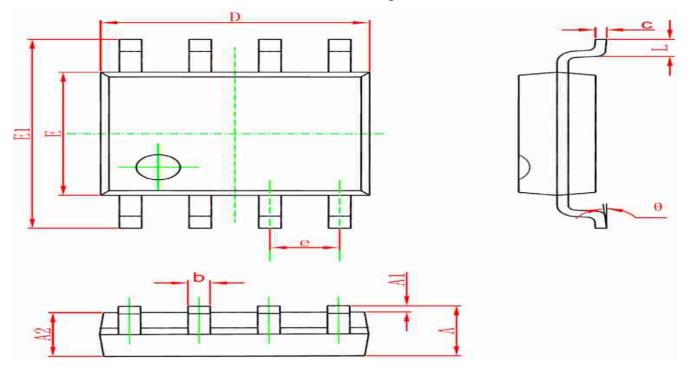


Symbo	Dime	ensions In Millm	neters	Dimensions In Inches					
1	Min	Nom	Max	Min	Nom	Max			
A		_	4.31	_	_	0.170			
A1	0.38			0.015	_	_			
A2	3.15	3.40	3.65	0.124	0.134	0.144			
В	0.38	0.46	0.51	0.015	0.018	0.020			
B1	1.27	1.52	1.77	0.050	0.060	0.070			
С	0.20	0.25	0.30	0.008	0.010	0.012			
D	8.95	9.20	9.45	0.352	0.362	0.372			
Е	6.15	6.45	6.65	0.242	0.252	0.262			
E1		7.62		_	0.300	_			
e	_	2.54	_		0.1				
L	3.00	3.30	3.60	0.118	0.130	0.142			
θ	$0_{\rm o}$		15°	$0_{\rm o}$		15°			



Signal line 256 Gray level 3 channal Constant current LED drive IC

SOP-8 Package:



Symbol	Dimensions	In Millmeters	Dimensions In Inches			
Syllibol	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		
Е	3.800	4.000	0.150	0.157		
E1	5.800	6. 200	0. 228	0. 244		
e	1.2	270	0.0	)50		
L	0.400	1.270	0.016	0.050		
θ	0°	8°	0°	8°		