WS2821

Parallel-Single wire-Three channels
256 Gray level Constant current LED driven IC

Main Features

- Signal adopts the single line parallel connection type,any pixels' failure won't effect other pixel's display effect.
- Signal can compatible and expand the DMX512(1990) protocol signal.
- Data transmission speed is 250Kbps~750Kbps.
- The built-in voltage regulator chip, 5V above 24V power supply only series resistance to IC VDD feet, without additional voltage regulator tube
- WS2821 IC has VR-tube(voltage-regulator tube) built-in,for higher than 5V,lower than 24V's power supply,only require one resistor being series connected to the IC's VDD pin,no need to add the VR-tube outside.
- Output voltage can bear 24V
- R/G/B out three channels' output,each output driven channel has PWM circuit to control the gray,256 gray is adjustable
- R/G/B output default current 19mA,maximum 60mA.
- Storage space is built-in,support 1024 pixel's parallel connection.
- Support output polarity reversal function.

Main Application

- LED full color exposed light string
- LED point light,LED module product
- LED decorative lighting system
- LED full color flexible strip
- Other LED decorate products,DMX related products

General Description

WS2821 is a LED driven IC,which adopts the parallel single wire control signal,owns the independent programmable address and large range programmable constant current,three channels output.

WS2821 has the power supply voltage stabilizing circuit,time base circuit,signal decoder block,data buffer,built-in address storage circuit.

WS2821 is mainly designed for the indoor/outdoor LED project lighting and decorative LED lighting system.

WS2821 owns three independent output driven channels,each channel can independent realize 256 gray PWM control,it can control the LED 256 gray without changing the LED light color,the default current is 19mA,meantime,users can use the external REXT resistor to adjust the output current.It support the output polarity reversal function.

WS2821 has the independent write code signal line,the address can be written in series at one time.

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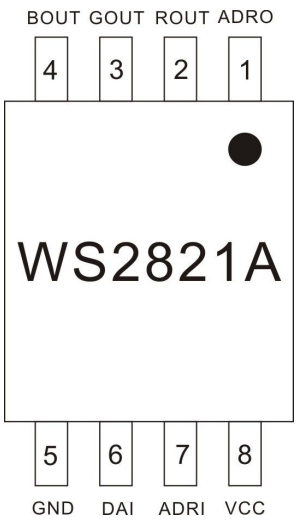
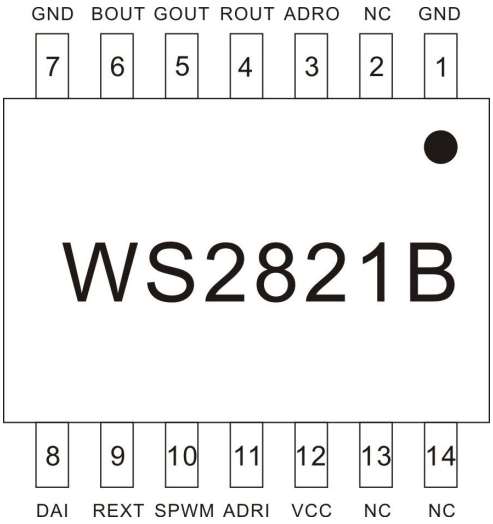
PIN configuration





PIN Function

Pin NO.	Symbol	Pin Name	Pin description
1	GND	Chip Ground	Ground
2	NC	Non connection	Non connection
3	ADRO	Address output	Cascade address output port
4	ROUT	Driven output	R（Red LED）PWM control output,hight voltage **PIN**
5	GOUT		G（Green LED）PWM control output,hight voltage **PIN**
6	BOUT		B（Blue LED）PWM control output,hight voltage **PIN**
7	GND	Chip Ground	External adjustable resistor being connected to the ground,control OUT（R/G/B）output current
8	DAI	Data input	Gray control data signal input port
9	REXT	Output current set port	External resistor,connect with the REXT and GND,used to adjust the R/G/B OUT output current value
10	SPWM	PWM output polarity reversal	Default"1":Three channel normal output,(Non connection or connect with VCC); For"0",(SPWM connect with the GND),three channels output polarity reversal
11	ADRI	Address input	Cascade address input port
12	VCC	Chip power supply	Power supply,typical application is 5V
13	NC	Non connection	Non connection
14	NC	Non connection	Non connection

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Extreme parameter（Without special instruction，T_A=25℃,GND=0V）

Parameter	Symbol	Range	Unit
Logical power supply voltage	Vcc	-0.5～+5.5	V
Output port bearing voltage	Vout	24	V
Logical input voltage	Vi	-0.5～VDD+0.5	V
LED driven output current	Iol	60	mA
Power consumption	PD	<250	mW
Working temperature	Topt	-25～+85	℃
Storage temperature	Tstg	-55~+150	℃
ESD	V_{ESQ}	>2K	V

Electrical specifications(Without special instruction，T_A=-20～70℃, GND=0V）

Parameter	Symbol	Testing Condition	Min.	Typical	Max.	Unit
Power supply voltage	VCC		4		24	V
Quiescent current	ICC	VCC=5V,REXT Non connection		1.5		mA
		VCC=5V,REXT=500R		6.0		
		VCC=5V,REXT=2K		3.0		
R/G/B OUT output current	IOUT	VCC=5V	3		60	mA
R/G/B OUT port leakage current	Ileak	VCC=5V			1	uA
Vout inflection point voltage(IPV)	Vout	IOUT=19mA		0.9		V
		IOUT=40mA		1.2		
DAI port reversal voltage	VIH	VCC=5V	3			V
	VIL				1.7	
REXT port voltage	VREXT	DAI=VCC=5V				

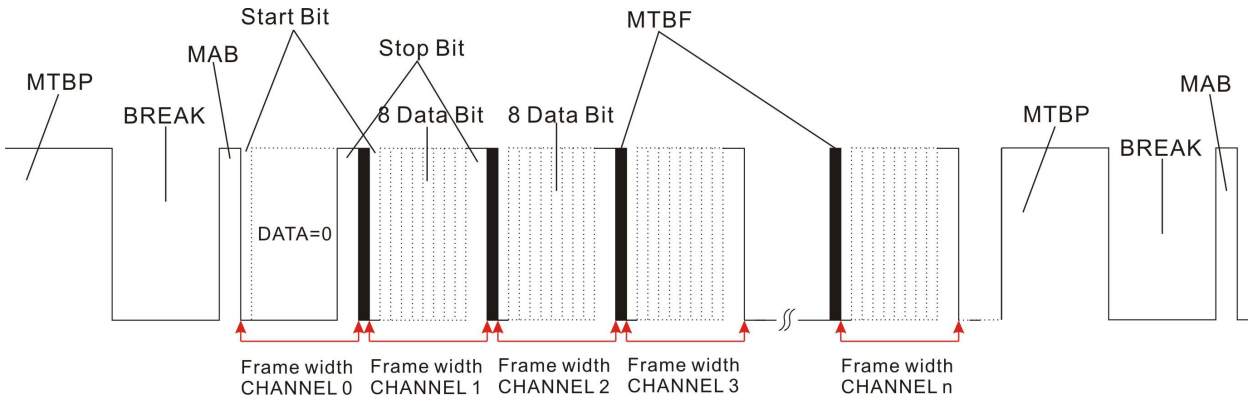
Constant current parameter setting ：

When the REXT being non connected,R/G/B OUT three port's output current is 19mA(default value),users can connect the resistor at the REXT as well.Set the R/G/B OUT three port's current,its range is 19mA～60mA,relations between the output current value and the resistance value are as followings:

$$I_{OUT}(mA) = 15V_{REF} + \frac{V_{REF}}{R_{EXT}} \times 3 \times 10^4$$

Tips:V_{REF}=1.24V.

Data Communication Protocol :(250K,frequency raising will leads time being changed)



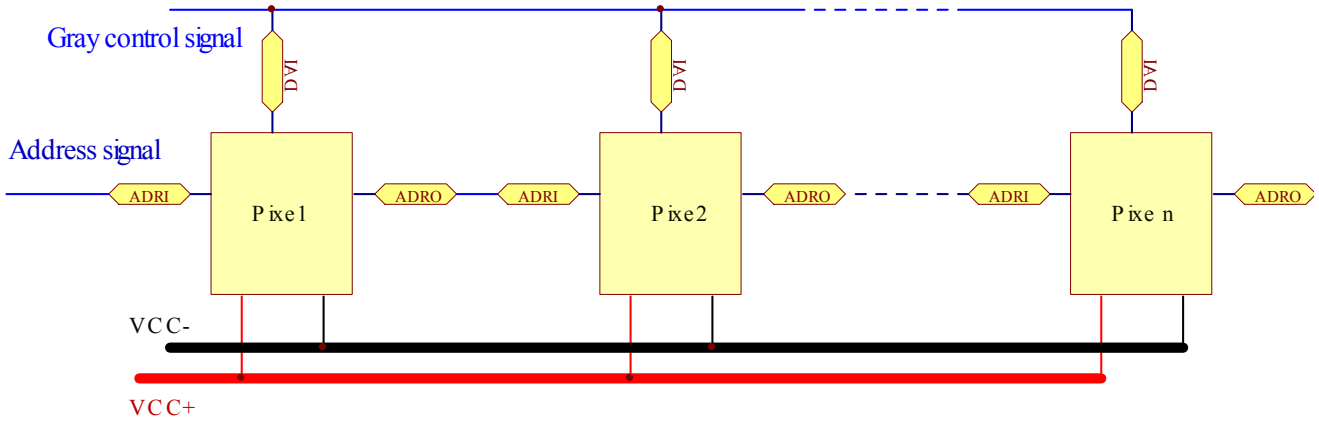
description	Min	Typ	Max	unit
MTBP	88	NS	1000000	us
BREAK	88	88	1000000	us
MAB	4	8	12	us
Framce width		44		us
Sart Bit/Data Bit		4		us
Stop Bit		8		us
MTBF	0	NS	1000000	us

Note:NS means Not specified and designer definable

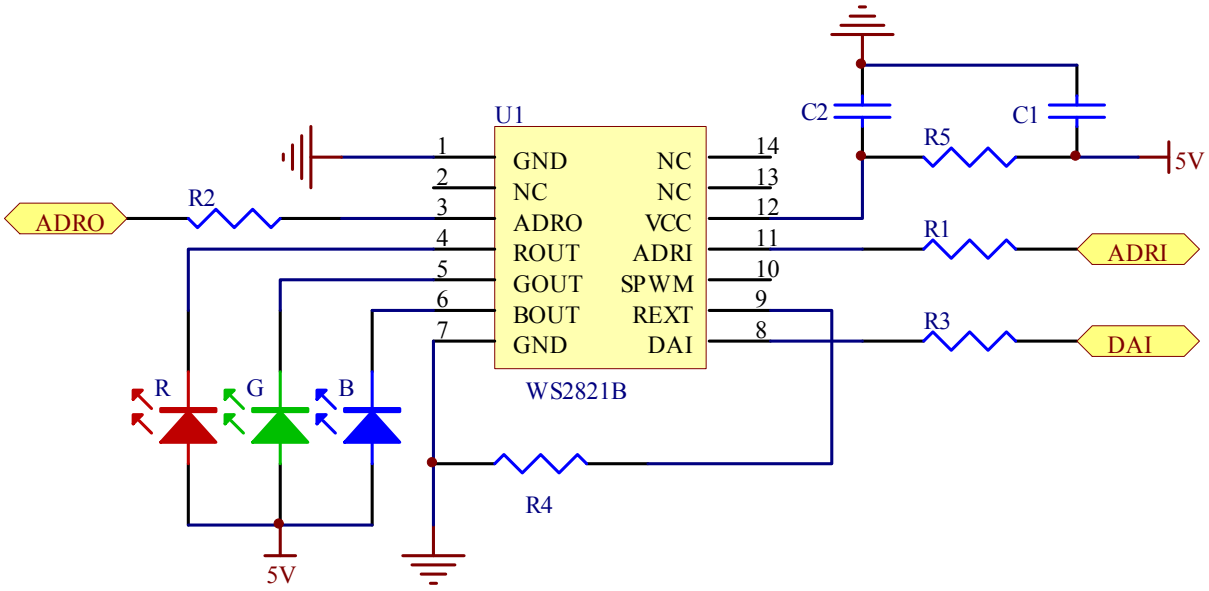
Each data packet consists of several data frames, each frame of data including 1 low start bit, 8 data bits, 2 stop bit high level. Control data is 8 bits, the level combinations from 00000000 to 11111111,total of 256 state (corresponding decimal number 0 ~ 255), control the brightness of light, can produce 256 brightness levels, 00000000 (0) corresponding to light the darkest, 11111111 (255) corresponding to the brightest lights. Packet first frames, lamps and lanterns corresponding to the first channel, second frames corresponding to the second channel lamp, and so on, 512nd frames corresponding to the 512nd channel lamp, lamp channel address can be set on the lamp.

Typical Application

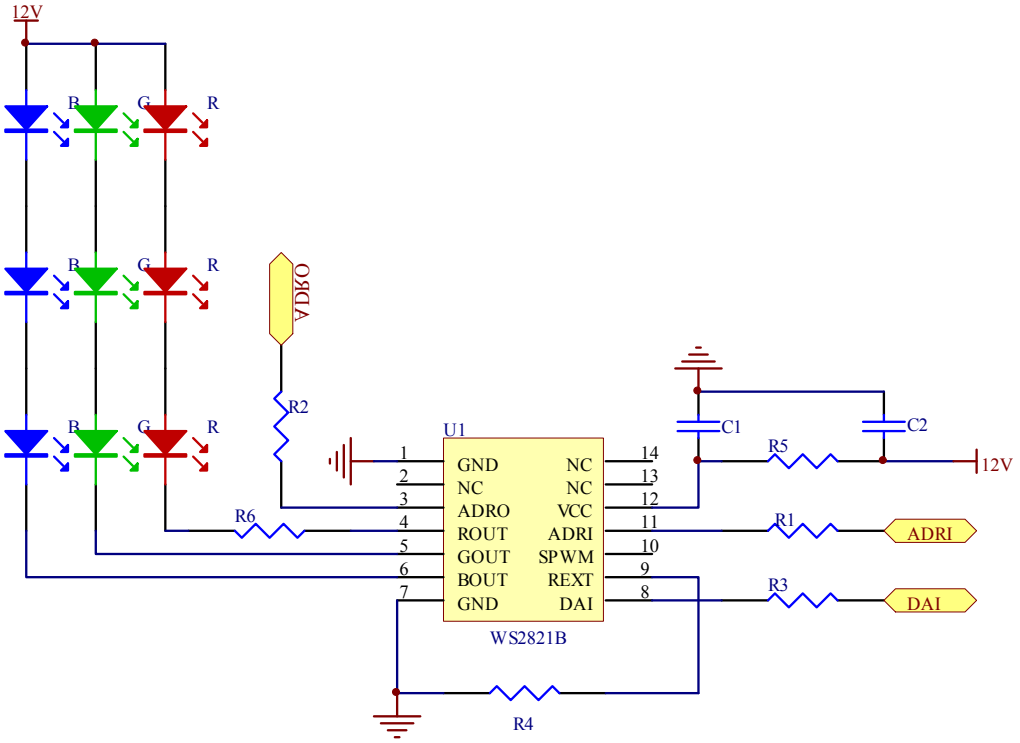
Schematic diagram of multi pixel parallel control：



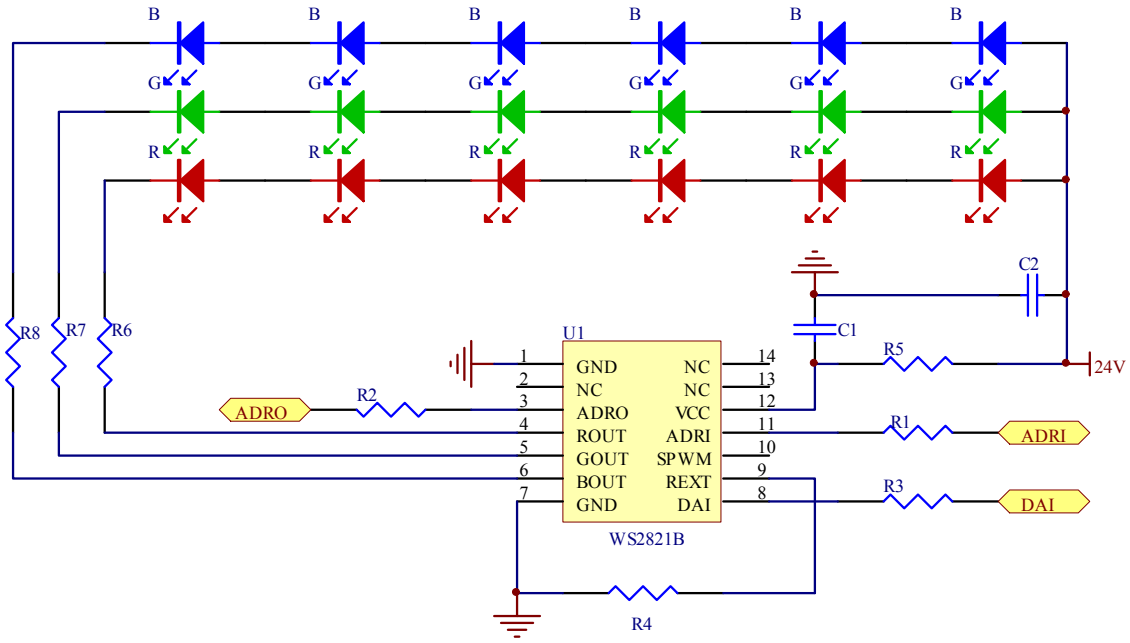
Single pixel 5V application circuit:



Single pixel 12V application circuit:



Single pixel 24V application circuit:



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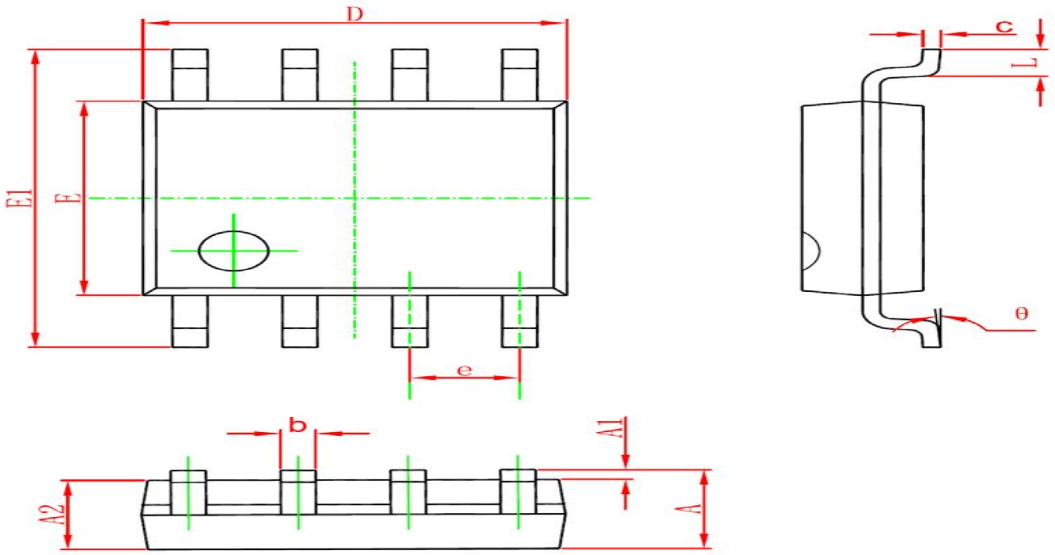
Package type：

WS2821A -SOP8 package：



Symbol	Dimensions In Millmeters		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°

WS2821B-SOP-14 Package (Unit: mm)