



## RGB Full Color LED control IC

### ● ( General Description )

APA102C for the three-color RGB LED dimming control string Then IC , using the CMOS process , providing three-color RGB LED output driver to adjust the output with 256 gray-scale and 32 brightness adjustment APA102 with two-output WAY ,the CLK signal by synchronization , so that the crystal cascadePiece of output movements synchronized.

### ● ( application)

LED lamps  
Large LED screen  
LED billboards

### ● ( Features )

CMOS process , low voltage, low power consumption

Synchronous of two-lane

Choose positive output or negative output RGB tri-color LED output, 8 Bit ( 256 level ) color Set, 5Bit ( 32 level ) brightness adjustment  
Built-20mA constant current output

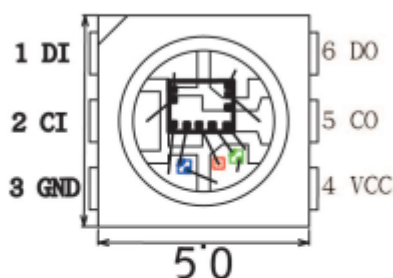
With self-detection signal

Built-in support for continuous oscillation PWM output can be maintained Static Screen

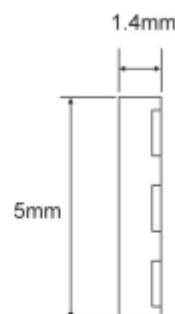
## PRODUCT SPECIFICATIONS

Model number	Color	Millicandela	refresh rate	Applied voltage	Power consumption	View angle	weight (g)	Dimensions(mm) L x W x D	Operating temperature
SUPER LED	Full Color 16777216	R 500-650 mcd G 370-530 mcd B 120-165 mcd	400 cycle	5VDC	0.2W (MAX:1W)	H:160	0.1	5x5x1.4	-40°C~70°C

## PHYSICAL DIMENSIONS



DI : Data input
CI : Clock input
DO : Data output
CO : Clock output
GND : -
VCC : + 5V

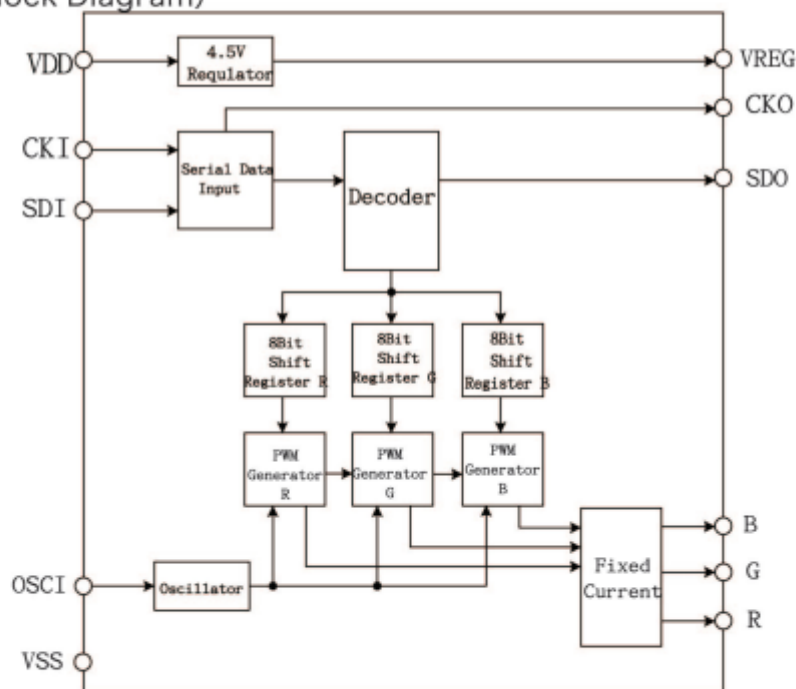




## ● 腳位說明 (Pin Description)

NO.	PIN NAME	I/O	FUNCTION
1	VDD	P	Power is terminal
2	VREG	O	4.5V regulator output
3	CKO	O	Series with the output clock signal
4	SDO	O	Series with the output data
5	VEN	I	Self-test function selection
6	CSEL	I	Invert the clock signal cascade
7	POLAR	I	Positive and negative output options
8	OSCI	I	Oscillator input
9	SDI	I	Series with the input data
10	CKI	I	Series with the input clock signal
11	REXT	I	Constant current source to adjust side
12	VSS	P	Power supply negative terminal
13	G	O	Green LED output
14	R	O	Red LED output
15	B	O	Blue LED output

## ● 功能方塊圖 (Block Diagram)





### ● 最大額定範圍 (Absolute Maximum Ratings)

Supply Voltage—————-0.3V to 6.0V

Input Voltage—————VSS-0.3 to VDD+0.3

Operating Temperature—————-40℃ to 70 ℃

Storage Temperature—————-50℃ to 125 ℃

Note: Stress above those listed may cause permanent damage to the devices

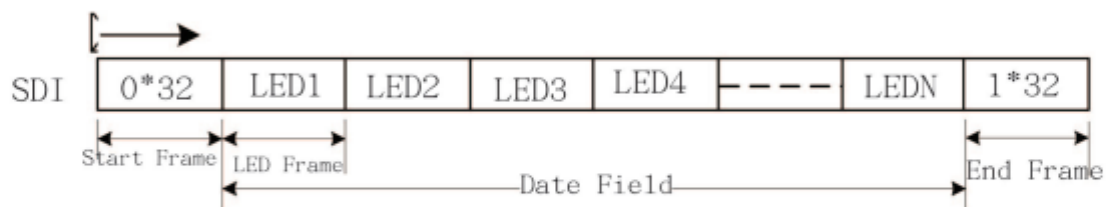
### ● 電氣特性 (Electrical Characteristics)

Symbol	Parameter	Condition	Min.	Typ.	Max	Units
VDD	Supply Voltage			5.0	5.5	V
VIH	Input High Voltage		0.7VDD		VDD+0.3	V
VH	Input Low Voltage		Vss-0.3		0.3VDD	V
LOL	Sink Current Voltage ( RGB )	@VDD=5V, VOL>1V	22.5	24.5	26.5	mA
RIN	Pull High	@VDD=5V		570		KΩ
VREG	Regulator Voltage ( VREG )	@VDD>5V	4.4	4.5	4.7	V
FOSC	Oscillator Frequency		800		1200	KHz

### ● 功能說明 (function description)

( 1 ) .cascading data structure

Tabdem N-LED



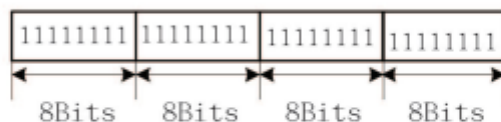
Start Frame 32 Bits



LED Frame 32 Bits



LED Frame 32 Bits

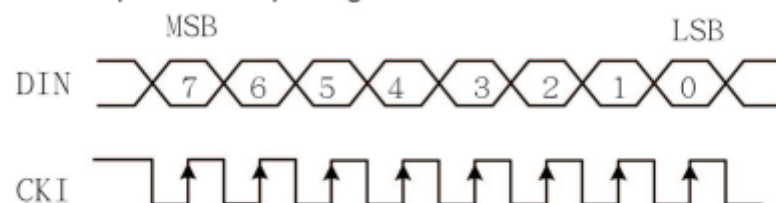




Global bit : 5-bit ( 32 level ) brightness setting, while controlling R, G, B three-color constant current output value, if set the Global bit for the 10000 ( 16/31 ) is the output current is half again the original PWM settings.

DATA MSB↔LSB	Driving Current
00000	0/31
00001	1/31
00010	2/31
...	
11110	30/31
11111	31/31(max)

PWM input and output signals Relations



Data MSB—	Duty Cycle
00000000	0/256(min)
00000001	1/256
00000010	2/256
...	
11111101	253/256
11111110	254/256
11111111	255/256(max)

2).The number of pixels per second sent to CKI frequency ( FCKI ) minus the Start Frame bit divided by the number 40 the number of LED Frame bit 32, if CKI frequency ( FCKI ) to 512KHz, the pixel number ( 512000-40 ) /32=15998, if the 50 second update Views can be connected in series LED number 15998/50=319.To increase the number of cascaded IC CKI frequency to be increased.

(3).POLAR to empty , R, G, B for the negative output; POLAR access VSS, R, G, B is positive output.

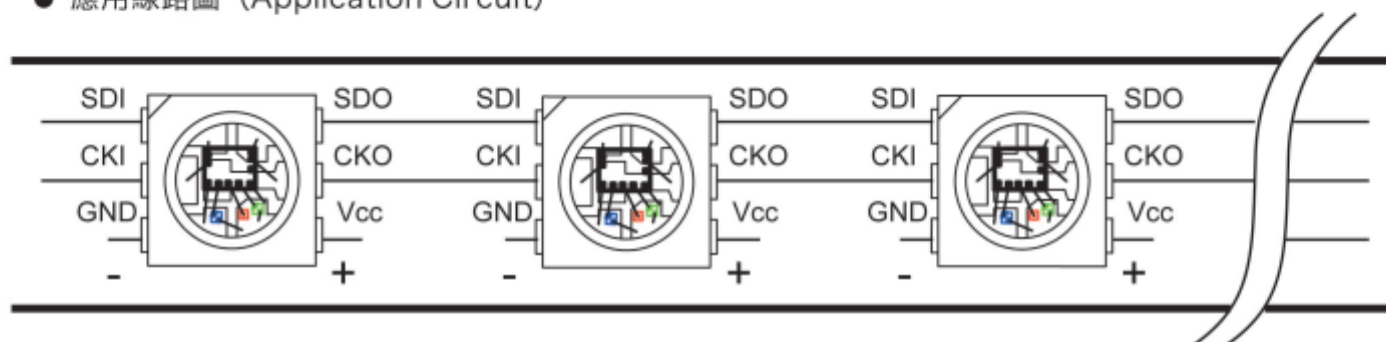
(4).VEN: Self-detection

Data Field to the middle of 3bit were B, G, R in the MSB of the opposite phase, otherwise regarded as invalid data. VEN close to empty when the self-detection; when VEN VSS then activated self-detection.

(5).CSEL to empty when the CKO and CKI RP :CSEL connected with VSS when the CKO compared with CKI.



● 應用線路圖 (Application Circuit)



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