

APA102C

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

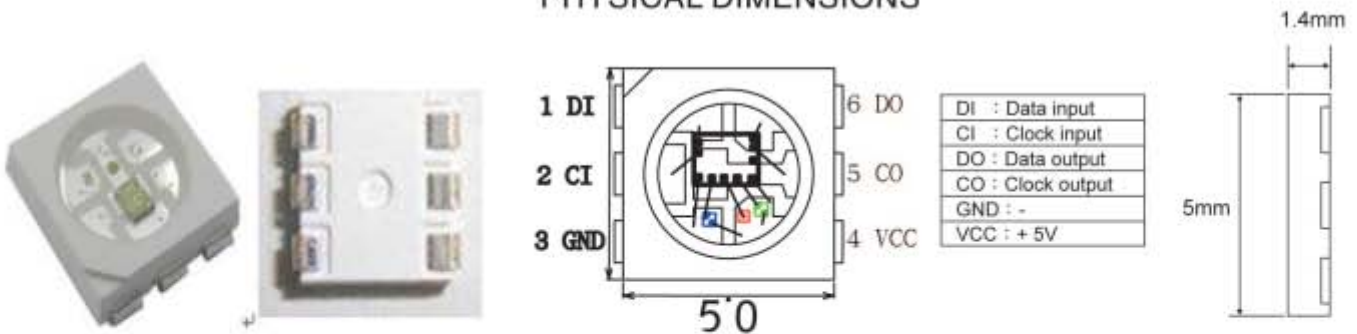
● (Features)

- 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

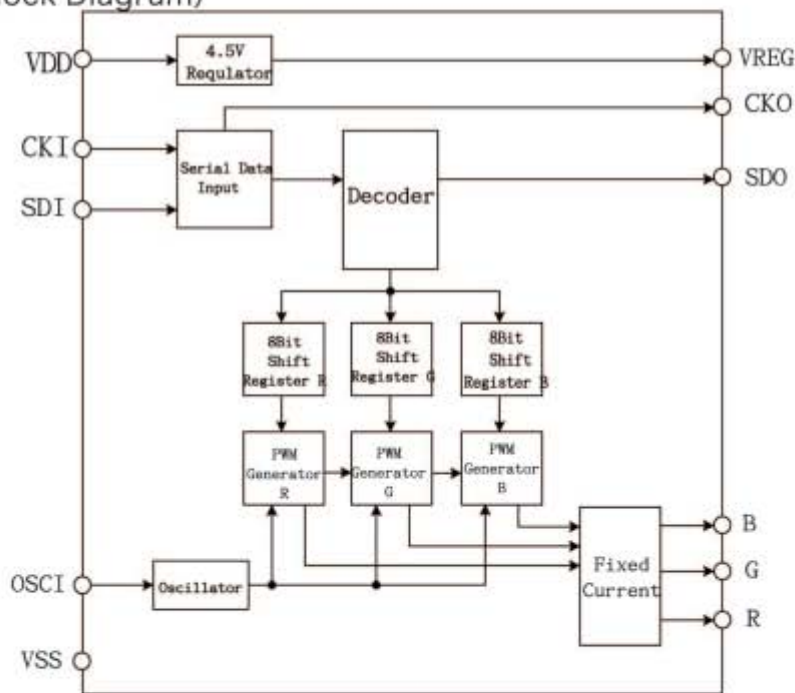


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● 腳位說明 (Pin Description)

| 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)



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● 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

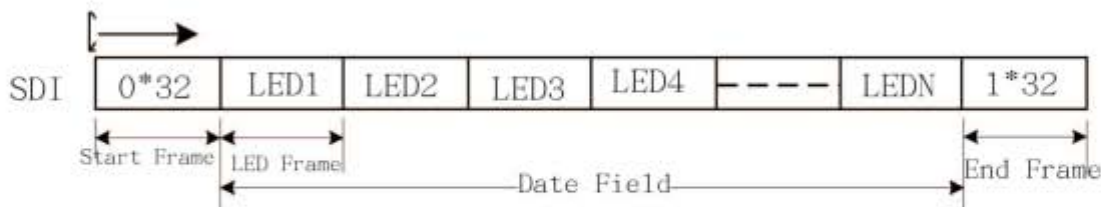
● 電氣特性 (Electrical Characteristics)

| 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

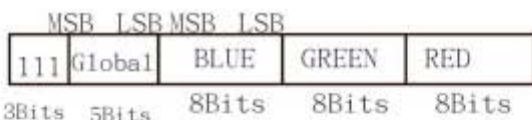
Tabdem N-LED



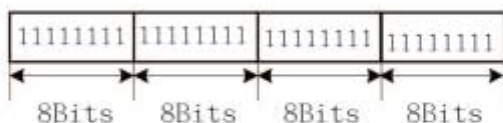
Start Frame 32 Bits



LED Frame 32 Bits



LED Frame 32 Bits

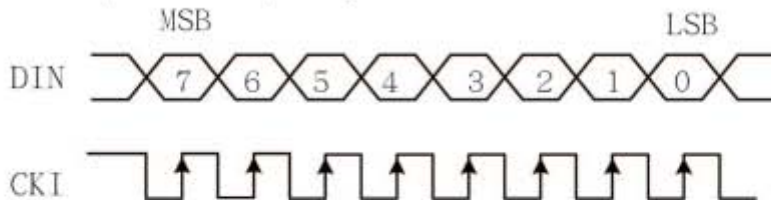


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Global bit : 5-bit (32 level) brightness setting , while controlling R, G, B three-color constant current output value , if set the Global bit for the 10000 (16/31) is the output current is half again the original PWM settings.

| 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.

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● 應用線路圖 (Application Circuit)

