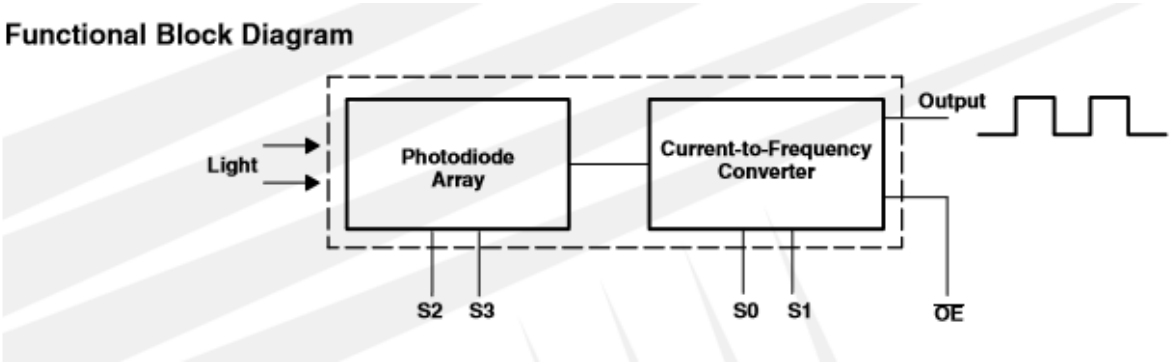
TCS 3200

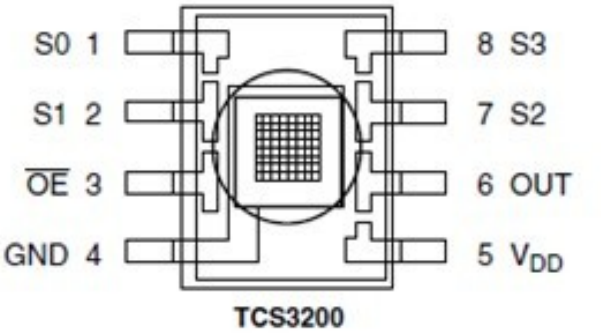
The TCS3200 and TCS3210 programmable colour light-to-frequency converters that combine configurable silicon photodiodes and a current-to-frequency converter on a single monolithic CMOS integrated circuit. The output is a square wave (50% duty cycle) with frequency directly proportional to light intensity (irradiance). The full-scale output frequency can be scaled by one of three preset values via two control input pins. Digital inputs and digital output allow direct interface to a microcontroller or other logic circuitry. Output enable (OE) places the output in the high-impedance state for multiple-unit sharing of a microcontroller input line. In the TCS3200, the light-to-frequency converter reads an 8 x 8 array of photodiodes. Sixteen photodiodes have blue filters, 16 photodiodes have green filters, 16 photodiodes have red filters, and 16 photodiodes are clear with no filters. In the TCS3210, the light-to-frequency converter reads a 4 x 6 array of photodiodes. Six photodiodes have blue filters, 6 photodiodes have green filters, 6 photodiodes have red filters, and 6 photodiodes are clear with no filters. The four types (colours) of photodiodes are inter-digitised to minimize the effect of non-uniformity of incident irradiance. All photodiodes of the same colour are connected in parallel. Pins S2 and S3 are used to select which group of photodiodes (red, green, blue, clear) are active. Photodiodes are 110 µm x 110 µm in size and are on 134-µm centres.



Specifications

- Single-Supply Operation (2.7V to 5.5V)
- High-Resolution Conversion of Light Intensity to Frequency
- Programmable Color and Full-Scale Output Frequency
- Power Down Feature
- Communicates Directly to Microcontroller
- S0~S1: Output frequency scaling selection inputs
- S2~S3: Photodiode type selection inputs
- OUT Pin: Output frequency
- OE Pin: Output frequency enable pin (active low), can be impending when using
- Support LED lamp light supplement control
- Size: 28.4x28.4mm

- # PinOut



TCS3200

Pin Name	I/O	DESCRIPTION
GND(4)		Power supply ground. All voltages are referenced to GND
OE(3)	I	Enable for fo (active low).
OUT	O	Output frequency (fo).
S0,S1（1，2）	I	Output frequency scaling selection inputs.
S2,S3（7，8）	I	Photodiode type selection inputs
VDD（5）		Supply voltage

INTERFACING WITH ARDUINO

Wiring instructions	
VCC——5V	GND——GND
S0——D3	S1——D4
S2——D5	S3——D6
OUT——D2	

S0,S1,S2,S3

To TCS3002D, when choose a color filter, it can allow only one particular color to get through and prevent other color. For example, when choose the red filter, Only red incident light can get through, blue and green will be prevented. So we can get the red light intensity. Similarly ,when choose other filters we can get blue or green light.

TCS3002D has four photodiode types. Red , blue, green and clear, reducing the amplitude of the incident light uniformity greatly, so that to increase the accuracy and simplify the optical. When the light project to the TCS3002D we can choose the different type of photodiode by different combinations of S2 and S3. Look at the form as follows.

S0	S1	OUTPUT FREQUENCY SCALING (fo)
L	L	Power down
L	H	2%
H	L	20%
H	H	100%

TCS3002D can output the frequency of different square wave (occupies emptiescompared 50%),different color and light intensity correspond with different frequency of square wave. There is a relationship between the output and light intensity. The range of the typical output frequency is 2HZ~500KHZ. We can get different scaling factor by different combinations of S0 and S1. Look at the form as follows.

S2	S3	PHOTODIODE TYPE
L	L	RED
L	H	BLUE
H	L	Clear (no filter)
H	H	GREEN

Sample Code

```
int s0=3,s1=4,s2=5,s3=6;

int out=2;

int flag=0;

byte counter=0;

byte countR=0,countG=0,countB=0;

void setup()

 {

 Serial.begin(115200);

 pinMode(s0,OUTPUT);

 pinMode(s1,OUTPUT);

 pinMode(s2,OUTPUT);
```

```
 pinMode(s3,OUTPUT);


 }
void TCS()
 {
 flag=0;
 digitalWrite(s1,HIGH);
 digitalWrite(s0,HIGH);
 digitalWrite(s2,LOW);
 digitalWrite(s3,LOW);
 attachInterrupt(0, ISR_INTO, CHANGE);
 timer0_init();


 }
void ISR_INTO()
 {
 counter++;
 }
 void timer0_init(void)
 {
  TCCR2A=0x00;
  TCCR2B=0x07;   //the clock frequency source 1024 points
  TCNT2= 100;    //10 ms overflow again
  TIMSK2 = 0x01; //allow interrupt
 }
```

```
 int i=0;
 ISR(TIMER2_OVF_vect)//the timer 2, 10ms interrupt overflow again. Internal overflow interrupt executive function
{
   TCNT2=100;
   flag++;
 if(flag==1)
  {
   countR=counter;
   Serial.print("red=");
   Serial.println(countR,DEC);
   digitalWrite(s2,HIGH);
   digitalWrite(s3,HIGH);
  }
  else if(flag==2)
   {
   countG=counter;
   Serial.print("green=");
   Serial.println(countG,DEC);
   digitalWrite(s2,LOW);
   digitalWrite(s3,HIGH);
   }
   else if(flag==3)
   {
   countB=counter;
   Serial.print("blue=");
```

```
    Serial.println(countB,DEC);
    Serial.println("\n");
    digitalWrite(s2,LOW);
    digitalWrite(s3,LOW);


    }
    else if(flag==4)
    {
     flag=0;
    }
      counter=0;
}
void loop()
 {
  TCS();
while(1);
 }
```