velleman®
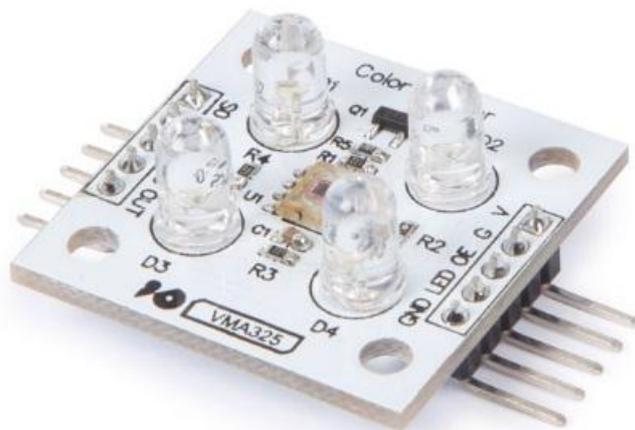
VMA325

COLOR SENSOR TCS3200 MODULE

CE

USER MANUAL

1.   Introduction

To all residents of the European Union

Important environmental information about this product

This symbol on the device or the package indicates that disposal of the device after its lifecycle could harm the environment. Do not dispose of the unit (or batteries) as unsorted municipal waste; it should be taken to a specialized company for recycling. This device should be returned to your distributor or to a local recycling service. Respect the local environmental rules.

If in doubt, contact your local waste disposal authorities.

Thank you for choosing Velleman®! Please read the manual thoroughly before bringing this device into service. If the device was damaged in transit, do not install or use it and contact your dealer.

2.   Safety Instructions

	• This device can be used by children aged from 8 years and above, and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning the use of the device in a safe way and understand the hazards involved. Children shall not play with the device. Cleaning and user maintenance shall not be made by children without supervision.

	• Indoor use only. Keep away from rain, moisture, splashing and dripping liquids.

3.   General Guidelines

	• Refer to the Velleman® Service and Quality Warranty on the last pages of this manual.
	• Familiarise yourself with the functions of the device before actually using it.
	• All modifications of the device are forbidden for safety reasons. Damage caused by user modifications to the device is not covered by the warranty.
	• Only use the device for its intended purpose. Using the device in an unauthorised way will void the warranty.
	• Damage caused by disregard of certain guidelines in this manual is not covered by the warranty and the dealer will not accept responsibility for any ensuing defects or problems.
	• Nor Velleman nv nor its dealers can be held responsible for any damage (extraordinary, incidental or indirect) – of any nature (financial, physical…) arising from the possession, use or failure of this product.
	• Due to constant product improvements, the actual product appearance might differ from the shown images.
	• Product images are for illustrative purposes only.
	• Do not switch the device on immediately after it has been exposed to changes in temperature. Protect the device against damage by leaving it switched off until it has reached room temperature.
	• Keep this manual for future reference.

4.   What is Arduino®

Arduino® is an open-source prototyping platform based in easy-to-use hardware and software. Arduino® boards are able to read inputs – light-on sensor, a finger on a button or a Twitter message – and turn it into an output – activating of a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so, you use the Arduino programming language (based on Wiring) and the Arduino® software IDE (based on Processing).

Surf to www.arduino.cc and www.arduino.org for more information.

5. Overview

VMA325

The TCS230 senses colour light with the help of an 8 x 8 array of photodiodes. Then, using a current-to-frequency converter the readings from the photodiodes are converted into a square wave with a frequency directly proportional to the light intensity. Finally, using the Arduino® board we can read the square wave output and get the results for the colour.

supply voltage: 2.7 to 5.5 VDC
dimensions : 28.4 x 28.4 mm

6. Pin Layout

GND	ground
OUT	output frequency
S0	output frequency scaling selection input
S1	output frequency scaling selection input
S2	photodiode type selection input
S3	photodiode type selection input
V	5 VDC power supply
G	ground
OE	output enable, must be connected to G (ground)
LED	LED enable input , low=ON

7. Example

```
                        Connection.
                       V======5V
                     GND======GND
                      S0======D3
                      S1======D4
                      S2======D5
                      S3======D6
                     OUT======D2
                     LED======D7
                      OE======GND
```

Connect your VMA325 to your microcontroller (VMA100) as above.

Download the library and data sheet from our website.

Open the Arduino IDE and import the three libraries. LiquidCrystal_I2C.h is only needed if you are also connecting an I2C LCD to your controller.

Load the VMA325_code sketch into the IDE, compile and upload.

Start the serial monitor. You should see a result like this:

```
->WB Start
->Frequency R=5429
->Frequency G=2383
->Frequency B=1921
->WB End
250
248
243
1894
->WB End
```

Please also read the data sheet of the TCS2300, which is included in the VMA325.zip available from our website.

```
// CODE BEGIN
#include <TimerOne.h>
#include <Wire.h>
#include <LiquidCrystal_I2C.h> //This is only needed if You connect a I2C LCD to Your microcontroller
LiquidCrystal_I2C lcd(0x27,20,4);

#define S0      6
#define S1      5
#define S2      4
#define S3      3
#define OUT     2
#define LED     7

int   g_count = 0;    // count the frequency
int   g_array[3];     // store the RGB value
int   g_flag = 0;     // filter of RGB queue
float g_SF[3];        // save the RGB Scale factor
// Init TSC230 and setting Frequency.

void TSC_Init()
{
  pinMode(S0, OUTPUT);
  pinMode(S1, OUTPUT);
  pinMode(S2, OUTPUT);
  pinMode(S3, OUTPUT);
  pinMode(OUT, INPUT);
  pinMode(LED, OUTPUT);
  digitalWrite(S0, LOW);// OUTPUT FREQUENCY SCALING 2%
  digitalWrite(S1, HIGH);
  digitalWrite(LED,HIGH) ; // LOW = Switch ON the 4 LED's , HIGH = switch off the 4 LED's
}

// Select the filter color//
void TSC_FilterColor(int Level01, int Level02)
{
  if(Level01 != 0)
    Level01 = HIGH;
```

```
  if(Level02 != 0)
    Level02 = HIGH;

  digitalWrite(S2, Level01);
  digitalWrite(S3, Level02);
}


void TSC_Count()
{
  g_count ++ ;
}


void TSC_Callback()
{
  switch(g_flag)
  {
    case 0:
      Serial.println("->WB Start");
      TSC_WB(LOW, LOW);
      break;
    case 1:
      Serial.print("->Frequency R=");
      //lcd.setCursor(0,0);
      //lcd.print("Start");
      Serial.println(g_count);
      g_array[0] = g_count;
      TSC_WB(HIGH, HIGH);
      break;
    case 2:
      Serial.print("->Frequency G=");
      Serial.println(g_count);
      g_array[1] = g_count;
      TSC_WB(LOW, HIGH);
      break;
    case 3:
      Serial.print("->Frequency B=");
      Serial.println(g_count);
      Serial.println("->WB End");
      g_array[2] = g_count;
      TSC_WB(HIGH, LOW);
      break;
    default:
      g_count = 0;
      break;
  }
}

 void TSC_WB(int Level0, int Level1)  //White Balance
 {
   g_count = 0;
   g_flag ++;
   TSC_FilterColor(Level0, Level1);
   Timer1.setPeriod(1000000);
```

```
  }

 void setup()
 {
  TSC_Init();
  lcd.init();
  delay(100);
  lcd.backlight();
  Wire.begin();
  delay(100);
  lcd.setCursor(14,0);
  lcd.print("Color");
  lcd.setCursor(0,3);
  lcd.print("S0:2 S1:3 S2:4 S3:5 OUT:6 LED:-");
  Serial.begin(9600);
  Timer1.initialize();           // defaulte is 1s
  Timer1.attachInterrupt(TSC_Callback);
  attachInterrupt(0, TSC_Count, RISING);
  delay(4000);
  for(int i=0; i<3; i++)
  Serial.println(g_array[i]);
  g_SF[0] = 255.0/ g_array[0];    //R Scale factor
  g_SF[1] = 255.0/ g_array[1] ;   //G Scale factor
  g_SF[2] = 255.0/ g_array[2] ;   //B Scale factor

  Serial.println(g_SF[0]);
  Serial.println(g_SF[1]);
  Serial.println(g_SF[2]);

 //for(int i=0; i<3; i++)
  // Serial.println(int(g_array[i] * g_SF[i]));
 }
 void loop()
 {
  g_flag = 0;
  for(int i=0; i<3; i++)

  {
   Serial.println(int(g_array[i] * g_SF[i]));
   //lcd.setCursor(0,1);
   //lcd.print(int(g_array[i] * g_SF[i]));
  }
  lcd.setCursor(0,1);
  lcd.print(int(g_array[0] * g_SF[0]));
  lcd.setCursor(6,1);
  lcd.print(int(g_array[1] * g_SF[1]));
  lcd.setCursor(12,1);
  lcd.print(int(g_array[2] * g_SF[2]));
  delay(4000);
  Clean2004();
 }

 void Clean2004()
 {
```

```
    lcd.setCursor(0,1);
    lcd.print("              ");
    lcd.setCursor(0,2);
    lcd.print("              ");
}
// CODE END
```

8.   More Information

Please refer to the VMA325 product page on www.velleman.eu for more information.

Use this device with original accessories only. Velleman nv cannot be held responsible in the event of damage or injury resulting from (incorrect) use of this device. For more info concerning this product and the latest version of this manual, please visit our website www.velleman.eu. The information in this manual is subject to change without prior notice.

Velleman® Service and Quality Warranty

Since its foundation in 1972, Velleman® acquired extensive experience in the electronics world and currently distributes its products in over 85 countries.

All our products fulfil strict quality requirements and legal stipulations in the EU. In order to ensure the quality, our products regularly go through an extra quality check, both by an internal quality department and by specialized external organisations. If, all precautionary measures notwithstanding, problems should occur, please make appeal to our warranty (see guarantee conditions).

General Warranty Conditions Concerning Consumer Products (for EU):

• All consumer products are subject to a 24-month warranty on production flaws and defective material as from the original date of purchase.

• Velleman® can decide to replace an article with an equivalent article, or to refund the retail value totally or partially when the complaint is valid and a free repair or replacement of the article is impossible, or if the expenses are out of proportion.

You will be delivered a replacing article or a refund at the value of 100% of the purchase price in case of a flaw occurred in the first year after the date of purchase and delivery, or a replacing article at 50% of the purchase price or a refund at the value of 50% of the retail value in case of a flaw occurred in the second year after the date of purchase and delivery.

• **Not covered by warranty:**
- all direct or indirect damage caused after delivery to the article (e.g. by oxidation, shocks, falls, dust, dirt, humidity...), and by the article, as well as its contents (e.g. data loss), compensation for loss of profits;

- consumable goods, parts or accessories that are subject to an aging process during normal use, such as batteries (rechargeable, non-rechargeable, built-in or replaceable), lamps, rubber parts, drive belts... (unlimited list);

- flaws resulting from fire, water damage, lightning, accident, natural disaster, etc.…;

- flaws caused deliberately, negligently or resulting from improper handling, negligent maintenance, abusive use or use contrary to the manufacturer's instructions;

- damage caused by a commercial, professional or collective use of the article (the warranty validity will be reduced to six (6) months when the article is used professionally);

- damage resulting from an inappropriate packing and shipping of the article;

- all damage caused by modification, repair or alteration performed by a third party without written permission by Velleman®.

• Articles to be repaired must be delivered to your Velleman® dealer, solidly packed (preferably in the original packaging), and be completed with the original receipt of purchase and a clear flaw description.

• Hint: In order to save on cost and time, please reread the manual and check if the flaw is caused by obvious causes prior to presenting the article for repair. Note that returning a non-defective article can also involve handling costs.

• Repairs occurring after warranty expiration are subject to shipping costs.

• The above conditions are without prejudice to all commercial warranties.

The above enumeration is subject to modification according to the article (see article's manual).