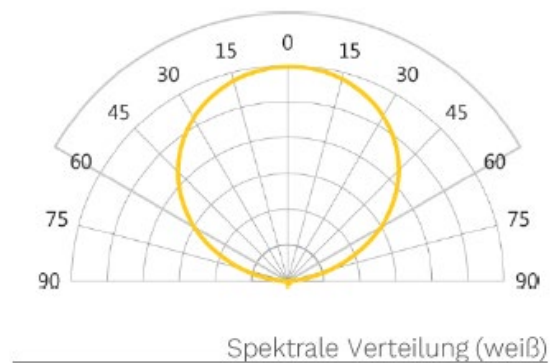
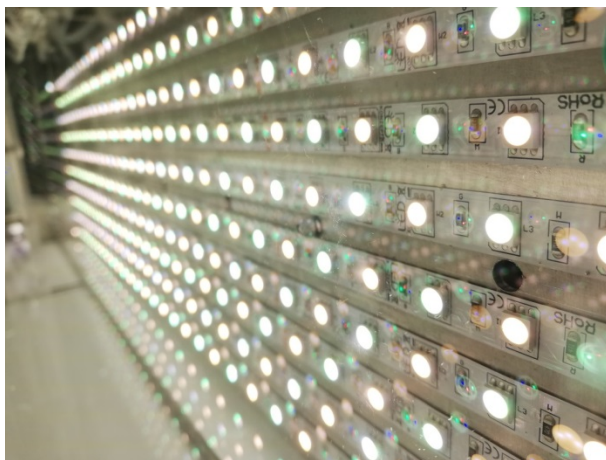


## LED Panel (openPBR)

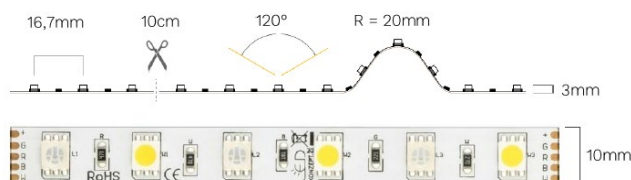
Step by step tutorial.

### Introduction

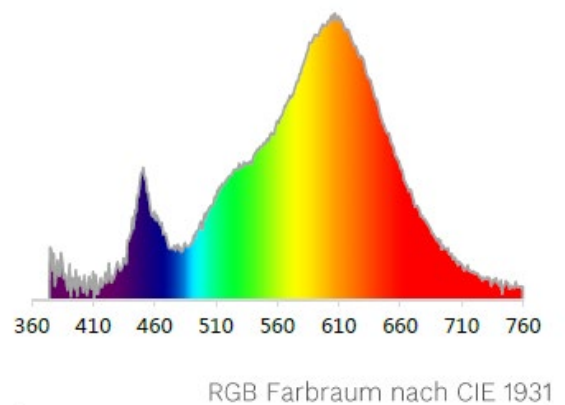
In a photo bioreactor setup the photon source is probably the most expensive and complicated part, we decided to build in a RGBW light source with an intensity of at least 300  $\mu\text{E}$  to make light-dependent growth at high densities possible.



### Technical data:



- 5 m LED strip with 72W
- RGB LED and white LED alternating
- Up to 300 $\mu\text{E}$  intensity



More details you can find under GitHub: Datasheets

**Parts list:**

- 5 m RGBW LED strip 79,90 Euro

<https://www.led-konzept.de/RGBW-LED-Streifen-12V-72W-pro-5m-RGB-warmweiss-500cm-mit-Litzenanschluss>

- 120W Power adapter 64,49 Euro

<https://www.led-konzept.de/MeanWell-LED-Netzteil-HLG-120H-12B-12V-120W-IP67>

- Aluminium Plate 57 x 175 x 2 mm ~ 2 Euro

- 4x N-Channel MOSFET 0,67 Euro

<https://www.reichelt.de/mosfet-n-ch-60v-50a-110w-0-018r-to220-stp55nf06-p257486.html?r=1>

- 4x Aluminium cool bloc 0,83 Euro

[https://www.reichelt.de/kuehlkoerper-25-mm-alu-60-k-w-sot-32-to-220-sk-12-25-sa-32-p227995.html?&trstct=pos\\_0](https://www.reichelt.de/kuehlkoerper-25-mm-alu-60-k-w-sot-32-to-220-sk-12-25-sa-32-p227995.html?&trstct=pos_0)

Total:150,39

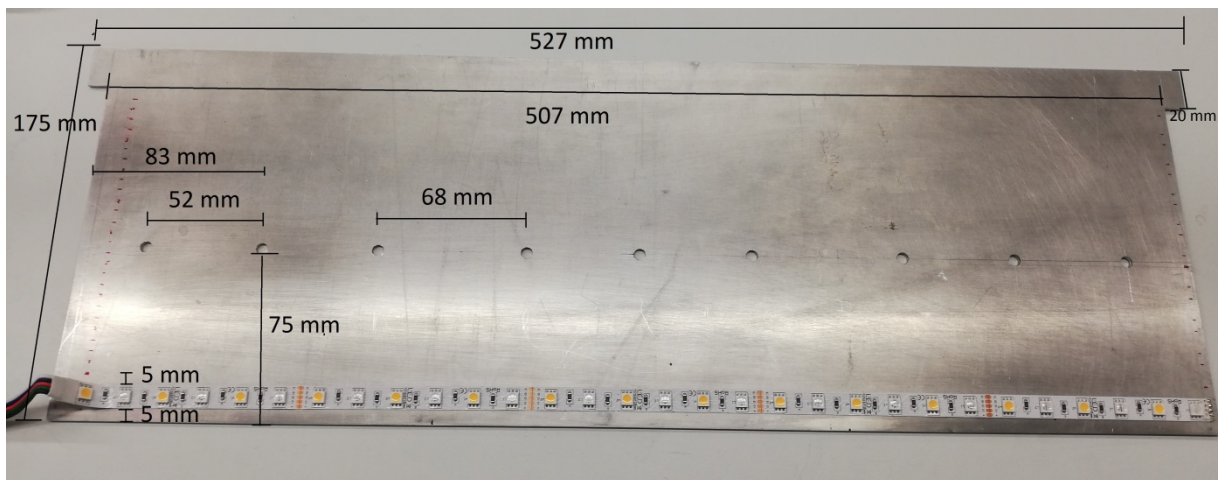
## Step by step tutorial:

### 1. Step: Aluminum Plate

Take a generic 2 mm thick aluminum plate and cut it to a 175 x 527 mm. Drill 5 mm holes for the sensor LED's.



The position of these holes is crucial they have to sit exactly on the opposite to the Opt101 sensor of the sensor bar.



## Step 2: LED stripes

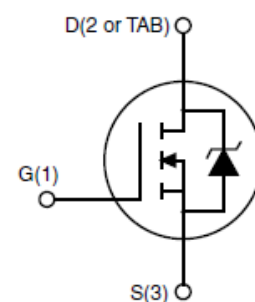
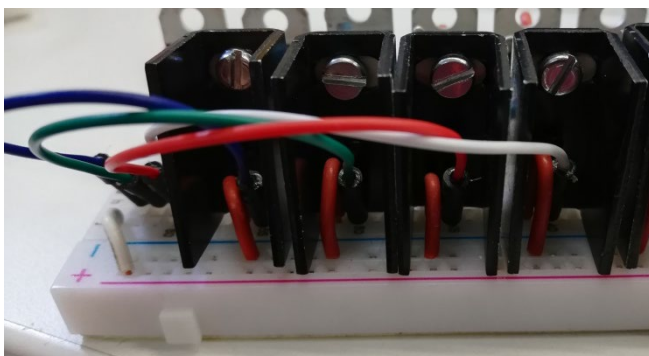
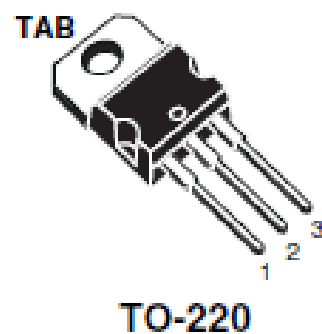
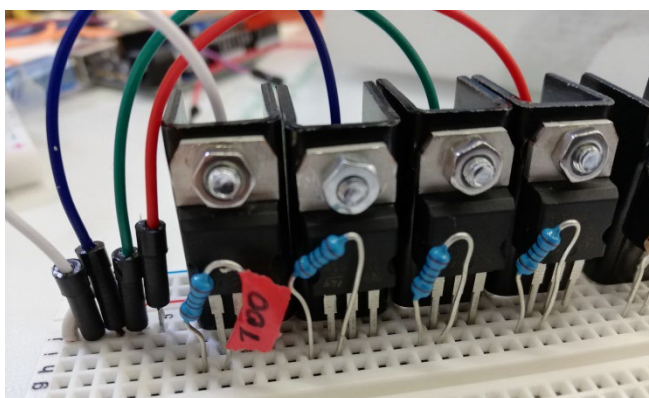
- Stick the Led stripes with the tape of 50 cm in a distance of 5 mm.
- Solder the 5 pin contacts with cable to the next LED stripe.



## Step 3: Electronics

This LED panel is controlled by 4 N-Channel MOSFET. One MOSFET per color (R,G,B,W ). These transistors divide the 12V in to 255 steps in the Arduino code.

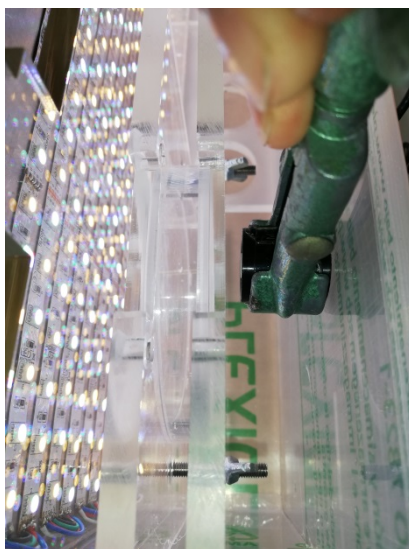
- Use 2 -3 mm screws to attach the cooling blocks to the MOSFET
- Connect G (Gate) with a 100 ohm resistor to your Arduino digital pin red pin 3, green pin 4, blue pin 5, white pin 6.
- Connect S (Source) to ground (-).
- Connect D (Drain) to each color cable of the LED.
- Connect the 12V (+) of the LED to the network adapter.





#### 4. Calibration of the LED Panel

To determine the intensity of your LED panel use a  $\mu\text{mol}$  meter. Put the LED Panel in the casing of the Open PBR. Paint a point in a raster on the front wall, every 25 mm from top to bottom and every 80 mm. Measure the intensity at every point and plot them in to a graph. In the case of this LED panel the maximum intensity is 300  $\mu\text{mol/s}\cdot\text{m}^2$  e.g. (300 $\mu\text{E}$ ).



The software to control the LED's you find in the openPBR\_control software.