3D Printable LED Photometer

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1   Considerations

This photometer was built to be used with a micro-volume cuvette. For other cuvette models, changing the dimensions of the base may be necessary .ipt file.

2   List of Materials

- 1x BPW34;

- 1x Switch Mts102;

- 1x OPA344PA;

- 1x Resistor 1 MΩ;

- 1x Resistor 10 MΩ;

- 1x Resistor 220 Ω;

- 1x Potentiometer 10k kΩ;

- 2x Polyester Capacitor 10 nF;

- 1x LED;

- 1x Arduino;

- Wire 3 mm gauge.

3   Assembly Guide

Glue the photodiode to the recessed wall of the cell holder. Then, on the other side, the LED is glued. Finish the cell holder by gluing "Tampa LED" into the top where the LED was fixed. Be careful if using super glue; their vapors adhere over the LED and photodiode surface in excess.
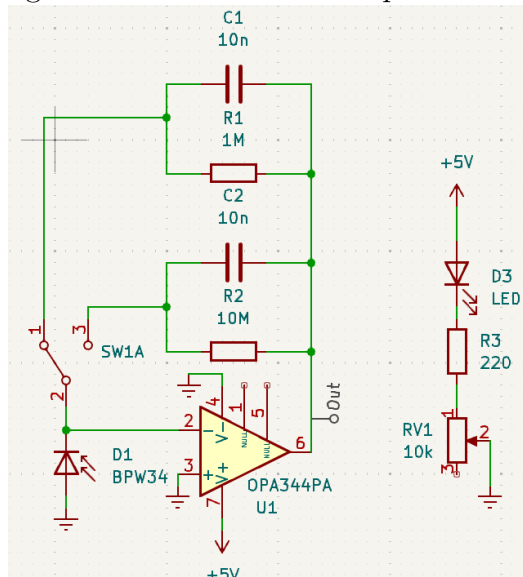
Figure 1: Cuvette holder
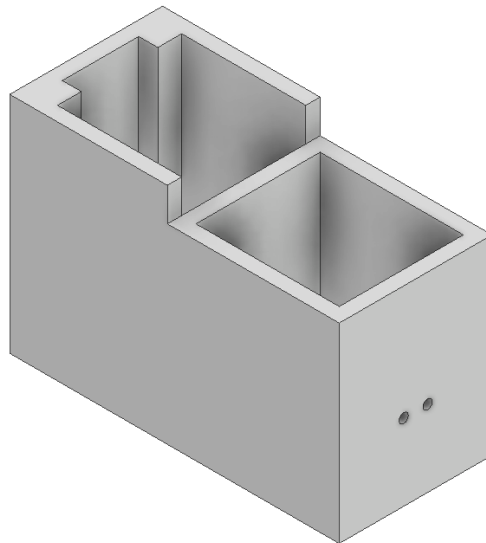
The PCB board design is provided in the following file: Schematics/Photometer. We recommend that a specialized company produce the board.

Solder the electronic components to the circuit board following the schematics:

Figure 2: Schematics of the photometer

Place the switch and the potentiometer in the photometer box and measure the wire length necessary to connect the photodiode, LED, potentiometer, and switch Mts102 to the PCB board.

The PCB board needs three wires connected to the Arduino: 5 V, ground, and A0 analog ports. The solder is placed on the board and passes through the side of the box for the Arduino connection.

Glue the cuvette holder to the photometer box and close with the photometer cover.

The Arduino code can be found inside the example library of the Arduino IDE: Examples/Analog/Smoothing.

4   How to Use

Using the Serial Monitor from Arduino IDE, change the potentiometer settings to lower the signal.

Place the cuvette and read the value shown inside the Serial Monitor.

Absorbance can be calculated using the following formula:

$$Absorbace = -log(SampleSignal/BlankSample) \qquad (1)$$

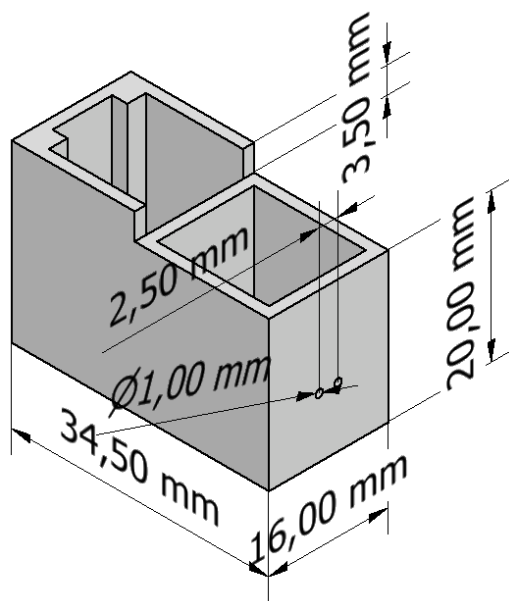# 5 Dimensions

Figure 3: Dimensions of the cuvette holder.

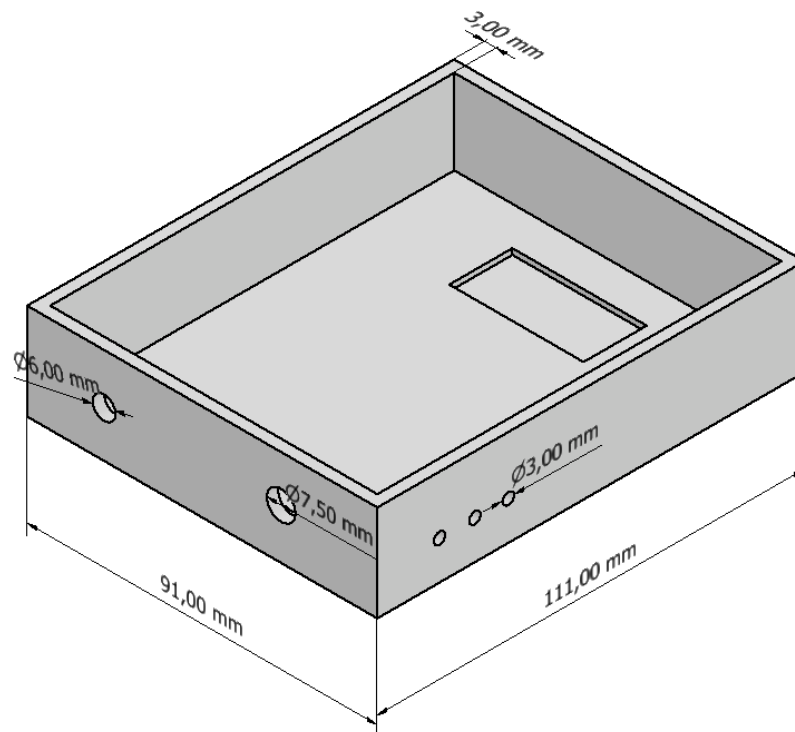Figure 4: Dimensions of the photometer box.
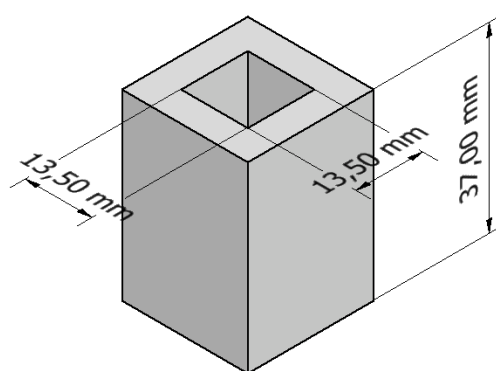

Figure 5: Dimensions of the cuvette cover.

Figure 6: Dimensions of the LED cover.

16,00 mm
18,00 mm
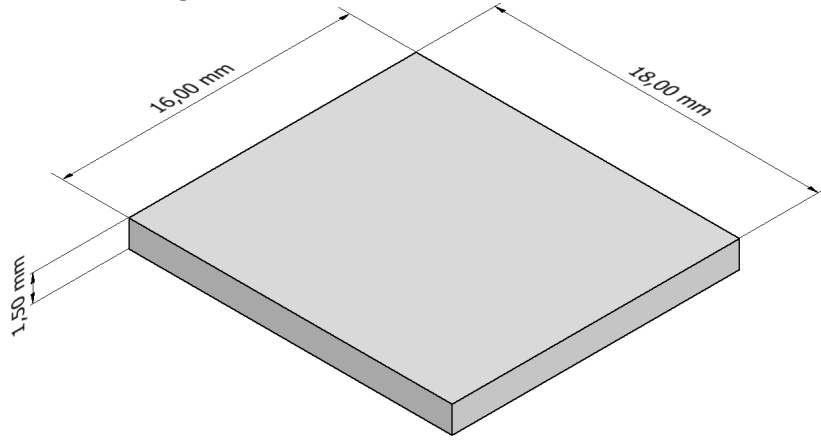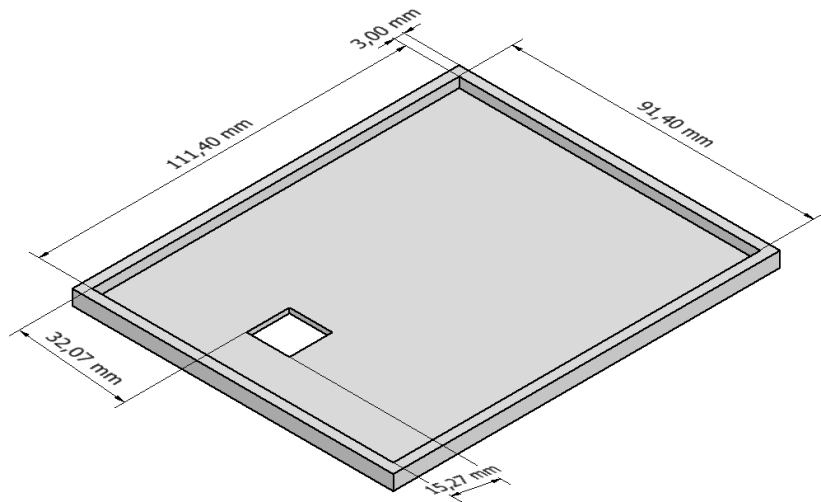1,50 mm

Figure 7: Dimensions of the photometer cover.

3,00 mm
91,40 mm
111,40 mm
32,07 mm
15,27 mm

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