

**I would really be grateful if you start to build the Shutter, that you go to the Photrio thread and say hi. Also please post photos of your completed tester.**

[Build a shutter tester for Focal Plane shutters - Cheap, Easy & it Works | Page 18 | Photrio.com Photography Forums](#)

Please refer to Photrio for further build help

## ESP32 Shutter Tester Film-Gate Sensor V1.1

08 09 2024

The Lasers work perfectly when aligned horizontally, using the 'block of wood' layout and is my personal preferred method of using the shutter tester. This of course can be improved upon by mounting them in project boxes or bespoke 3d printed housings, so they do not get knocked out of alignment.

However, trying to align them in a diagonal formation, for testing both horizontal and vertical sensors is quite challenging.

A different approach is to mount the sensors in a small box that fits into the film-gate of the camera. An LED light, shining into the mirror-box is used to illuminate the sensors. It is possible to mount the complete sensor modules into the box, but very fiddly and the lid cannot be put on. One could use a second box, joined open-end-to-open end, to make the box twice as deep.

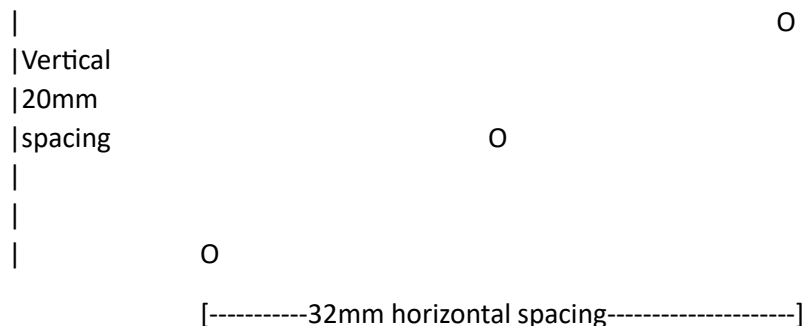
A 3d printed box, incorporating a lip to align it in the film-gate is the best and some project builders have made boxes & housings, see the Photrio thread for further details. However, this project has always been designed to use off-the-shelf modules and parts, so here, a design using cheap ready-made boxes are used.

There is also an open source pcb design, which will make a far neat job of mounting sensor, resister and capacitor. This of course adds additional expense of getting the pcb made. Details of the pcb are discussed in the Photrio thread.

Another option is to remove the sensor and add the capacitor & resister directly to the sensor legs, making it much smaller. This method is detailed below.

The sensors are arranged so the left and right Laser are spaced 32mm horizontally and 20mm vertically, with a central sensor as per the diagram below. With this layout, they can be used for both horizontal and vertical shutters. Placing them all horizontally or vertically is an option, which makes camera alignment easier, but it will then only work for that orientation of shutter. Separate sensor boxes could be made for horizontal & vertical shutters.

Another sensor box can be made for the light sensor, requiring just the central hole.



## Parts.

### Shrink Tube.

Used to cover the legs of the sensor. Electrical tape could also be used.

[127pcs/lot 2:1 Thermoresistant tube Shrink wrapping Black heat shrink Sleeving set Wire Cable Polyolefin Wrap Tubing - AliExpress](#)



### USB C chassis connector (Optional)

If using the large project box, this can be used, with a short USB-C to USB-C cable, to make the USB socket on the ESP32 board accessible. Alternate is to have a trailing USB lead from the ESP-32 board, exiting the project box via a suitable drilled hole.

[D-Shape USB Type-C Female Socket Chassis Panel Mount Connector Round Type Black Sliver Zinc alloy Industry Waterproof Extension \(aliexpress.com\)](#)



### RJ45 Chassis connector (Optional)

This can be used to enable the sensor cable to be unplugged from the project box. Useful if making different sensor heads. However, they are comparatively expensive.

Any suitable connector could be used (5 pin din or 9-way D type, for example). Or the sensor hardwired.

**Caution:-** It is important not to use pairs of wires (e.g blue and blue/white) for the sensors as they will interfere with each other. A good colour scheme is

Brown	+3.3V
Brown/White	0V
Blue	Sensor 1
Green	Sensor M
Orange	Sensor 2

A second RJ45 chassis connector can be used if using the light sensor.

**Caution:-** Ensure the 3.3V and 5V are wired such that accidentally plugging the film-gate or light sensor into the wrong socket, will not apply power to the wrong connector and damage it. A good colour scheme is

Brown/White	0V
Blue/White	+5V
Green/White	SDL
Orange/White	SDA

[RJ45 Network Cable Connector CAT5E Panel Installation Module Shielded Solder-free Network Cable Extender Category 5 Panel Socket - AliExpress](#)



#### **RJ45 Cable. (Optional – if using RJ45 chassis socket)**

There are many to choose from, or most likely you will have an odd one lying around.

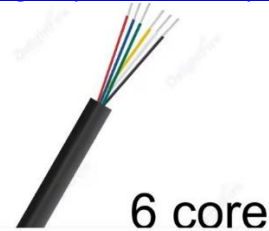
One cable will make both gate-sensor box and light meter.

**Ensure the finished length is no more than 0.5 metres length**, preferably shorter. If the cable is too long, interference can upset the sensors.

#### **Multicore cable. (Optional – needed if hardwiring or using plug & socket other than RJ45)**

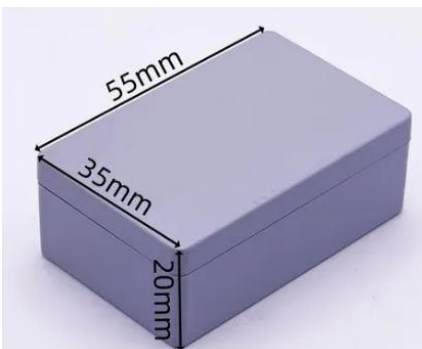
6 core 20AWG will be fine.

[Speaker Audio Wire 2/3/4/5/6/7/8 Conductor 12V Flexible Electrical Multi Core Round Car Automotive Cable For LED Light Speakers - AliExpress 13](#)



Project box for sensor 55 X 35 X 20

[1pc Waterproof Black/white Housing Instrument Case ABS Plastic Project Box Storage Case Enclosure Boxes Electronic Supplies - AliExpress](#)



## LED Light Box

About the cheapest rechargeable LED light box available. It has to be used at full brightness, else the Shutter Tester picks up the flickering LEDs. The variable brightness feature is useful if used with the light sensor. At maximum brightness, it gives EV 13.

A non-dimmable mains powered panel may be better for shutter testing alone. Having not tested any, an exact model cannot be recommended.



## 10K resistors

[100PCS Metal Film Resistor 1/4W 1% 100R 220R 1K 1.5K 2.2K 4.7K 10K 22K 47K 100K 100 220 1K5 2K2 4K7 Ohm Resistance 1R~22M - AliExpress](#)

## 0.1uF Capacitors (104 100NF)

[100PCS/ Porcelain Chip Capacitors 104 0.1uF 100NF 50V 30PF 103 0.01UF 22P 102 20PF 473 683 104 224 47NF 68NF 220NF 4.7NF 6.8NF - AliExpress](#)

## Additional parts.

Short USB-C to USB-C cable, if using optional USB chassis socket.

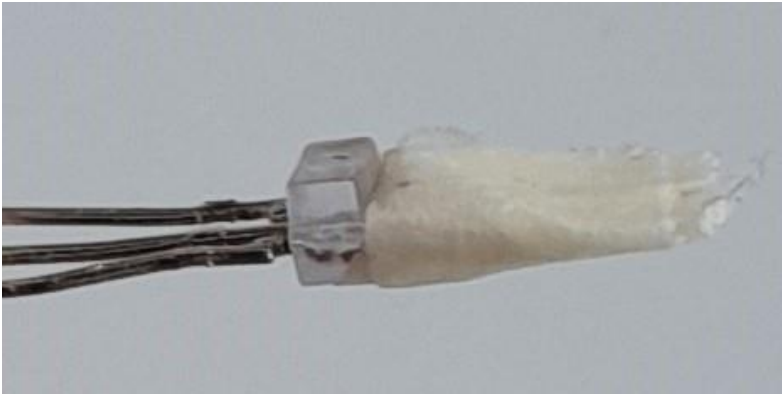
RJ45 cable(s) if using optional RJ 45 chassis socket.

## Making the Sensor Box.

(Photos show a larger box, made specifically for a Zenit. The smaller 35mm box is required for most other camera). The box is covered in masking tape and carefully marked out to give the 35 X 24 film gate opening. Then the centre hole & diagonal holes carefully measured and drilled with a 1mm drill bit.



The sensors have a rectangular protrusion just below the lens which must be filed and scraped off. Cover the lens with masking tape and then carefully remove the protrusion on the three sensors.



Rectangular protrusion almost removed.



A capacitor is soldered across GND & VCC (outer legs) and a 10k resistor between VCC and OUT.

Twisting the wires of the resistor & capacitor around the legs of the sensor helps keep them in place.

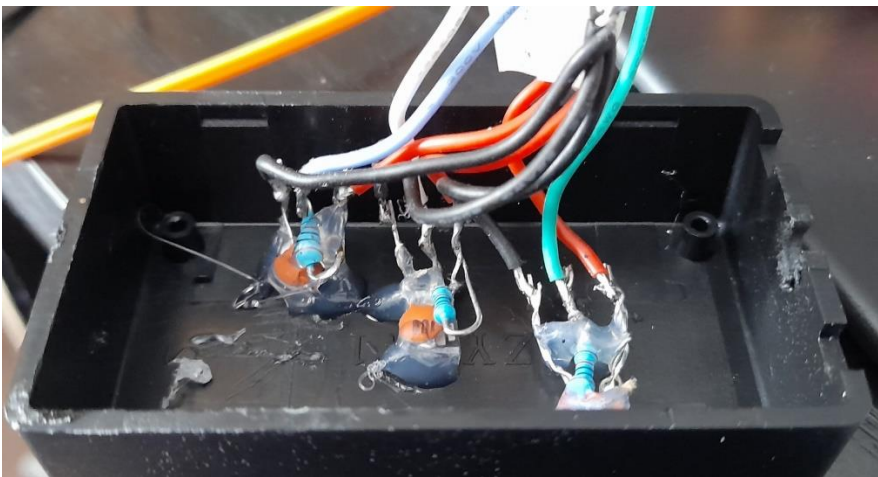
A surface mount resistor was originally used, which proved too fiddly.  
Photo from rear of sensor.





The sensors can now be located into the project box, the lens should drop into the drilled hole, to locate them. They can be held in place with hot-glue.

Small wires are soldered to each of the VCC legs and then connected together. The same is done with the GND. The VCC & GND can now be connected to the cable to the box, along with the individual wires for each of the sensors. Ensure shrink tube is placed onto the wires before soldering. These are then slid over the soldered joint.



Prototype sensor box.

Masking tape removed from the 35 X 24mm section which is the size of the film gate. Strips of card added top and bottom, to locate sensor box into the film gate. Ensure the card is not too high & does not touch the shutter blades.

