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 V4 Parts V1.7   06 02 2026

Below are links to the parts required to make the ESP32 Shutter Tester.

If making The Shutter Tester using the pcb, then the breakout is not required.
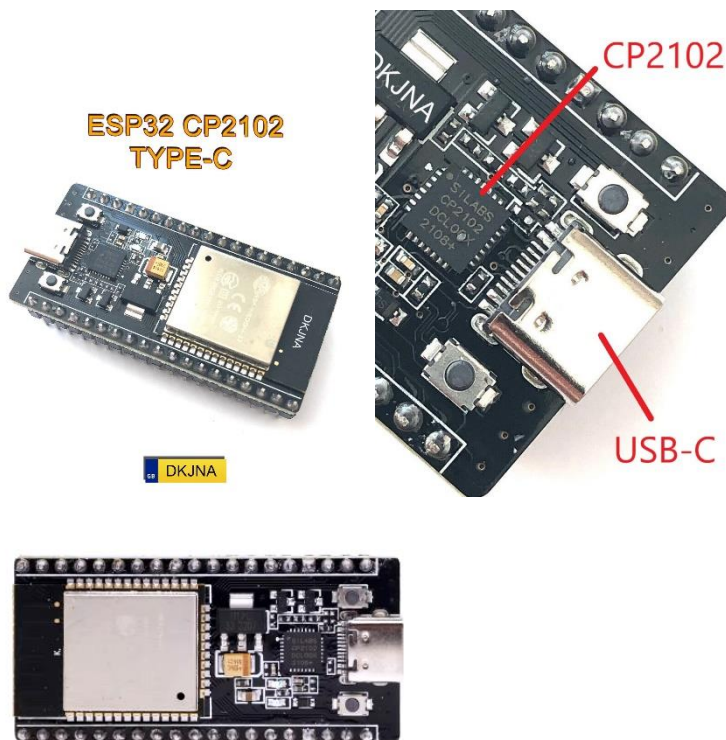
Links are valid now, but of course could become dead in the future.

Links are for AliExpress suppliers and are a guide only.

Use a supplier who ships to your country.

Note, often if buying from AliExpress, there is a 'Choice' free express shipping option, if buying parts over a set value.

ESP32 NodeMcu board. 38 pin version. USB-C   CP2102

IMPORTANT. There are multiple variants of this board. Get 38 pin USB-C and CP2102 chip.
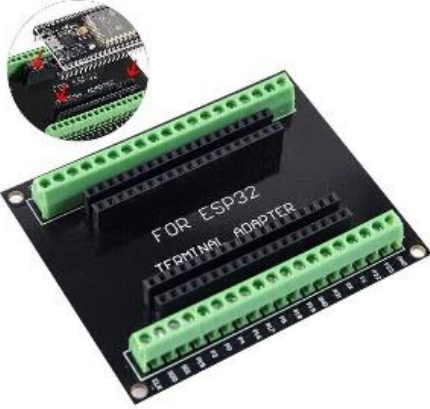*The board should NOT have mounting holes. Overall width is 25mm and pin spacing between the rows is 0.9" or 23mm (sometimes listed as 22.5mm)*
Note: - The guides have been written for this specific board type. Boards which differ with their USB chip and/or connector may still work, but the guides will not detail different driver installs or pin layout differences.

ESP32 Expansion (breakout) Board

ESP32 prototype/breakout board (38 pin screw-terminal version)

38 Pin Breakout Board For ESP32

Note: - this screw type breakout board was only available in 38-pin form and for the 22.5mm spaced eSP32 board. However, recently, a 30-pin version has become available, as well as a version for 25mm spaced boards.
This is causing confusion in China. My last few orders of this board have been incorrect. One time sending a purple board with pin headers and most recently a 30-pin board, blue in colour but in a sealed bag marked 38P

The link above is one I have used successfully, but is more expensive than other sellers (who have sent me the wrong board)

Important update There seems to be a big mess-up in China, with both 22.5mm and 25mm expansion boards being mixed. Despite my last few orders from a supplier with measurements written on their board stating it was 22.5mm, the expansion board was for the wider 25mm ESP32 board.

An optional choice is to replace the Expansion Board with a custom PCB.
Details below:

ESP32 (38 pin 22.5mm pin-row spacing) fits to one side of the board and the TFT plugs directly into the other side. All of the TFT wiring, including Touch, is wired on the pcb, thus negating the need for separate wires between the ESP32 and TFT screen, which makes wiring neater and easier.

All other pins are accessed by screw-terminals.

The pcb can only be ordered direct from the originator of The Shutter Tester (contact via Photrio).
See additional 'The Shutter Tester pcb' document on Github.

There is a newer V4 ESP32 board available. It has 25mm spacing, USB-C and the 2102 USB driver.
It is also cheaper.

Personally, I have not tried it yet, but it may be the way forward to overcome the issues with the current expansion board. Link is to the Aliexpress page. If you try it, get the 32D Type-C KIT which includes ESP32 board and the expansion board

ESP32 Development Board with GPIO Expansion Board Kit ESP32-WROOM-32D BT Wifi Module USB Type-C 38PIN CP2102 ESP32-DevKitC - AliExpress 502

Update 06/02/2026
A recent builder has used this link and reports they ordered the expansion board (not breakout board) and the ESP32 from here and they were the correct ones.

ESP32 Nodemcu ESP32 Expansion Board ESP32-S 32Mbit SPI Flash ESP32 Bluetooth Wifi ESP 32 Bluetooth Module ESP32 30Pin 38Pin - AliExpress

----
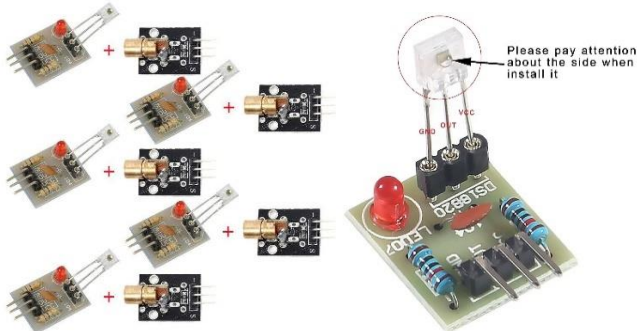
Laser tx & rx module.
Three Laser tx and rx module pairs are required.

The sensor is supplied loose. ENSURE YOU INSERT IT THE CORRECT WAY ROUND!!!. Little bubble lens points towards the header pins.

Arduino Laser Sensor Receiver | Laser Transmitter Module Arduino - 10pcs/set Sensor - Aliexpress

Buttons.
Below is a link to buttons which may be purchased as a 6-pack. Note they melt very easily with a soldering iron, so one must be proficient & quick when making the soldered joints. An alternate is to buy a 5-button module, which uses Dupont/JST header pins.

6piece Mini 12mm Waterproof Momentary On/off Push Button Round Switch Pbs-33b Kit White Black Red Yellow Blue Green - AliExpress

JST XH 2.54MM Connector kit.

This kit comes with connectors pre-crimped onto the wires. This allows the connectors to simply be pushed into the plastic housings, allowing for different connector sizes and colour combinations to be made.

Note: - There are no brown wires in these kits. (see below)*

The TFT needs a 14-pin connector. This is made by using two 7-way connectors from the kit and carefully cutting off the lips on the connectors, so they sit side-by-side. (Or you can buy a separate 8-way JST XH connector and use in combination with a 5-way connector, which fit either side of the unused pin on the TFT).

[2.54mm XH Connector Socket Kit with 22AWG Pre-Crimped Wire Cable JST XH 2/3/4/5/6/7 Pin Housing Male Female Adapter Cable - AliExpress 13](#)

*JST XH 2.54mm wires. Single colours, Select 30cm Double Head Brown.
OPTIONAL – See below
Note: The schematic uses Brown colour to distinguish 3V power and 5V (Red).

To save buying additional wires, which have additional postage costs,
Red can be used for both 3V and 5v, but BE CAREFUL with connections.

[10Pcs SH1.0mm Jst 1.25mm PH2.0mm XH 2.54mm Terminal Wire Single / Double Head Electronic Connecting Cable Without Shell 10-30CM - AliExpress 13](#)

TFT display.
4.0 inch SPI Touch screen Module 480*320 TFT display ILI9488

Board size is 108.04 X 61.74

Note: - there are many similar panels but they have different driver chips (ILI9488), the Shutter Tester only works with this specific screen. Please ensure you correctly order the screen. The AliExpress web sites often list similar but different boards.

New 4.0 inch SPI serial port LCD Touch screen Module 480*320 (Free Shipping)TFT display ILI9488 HD Electronic STM32 ESP32 AR C51 - AliExpress 502

Rotary Encoder.
Ensure you purchase the one mounted onto the blue pcb. As this has in-built pullup resisters & capacitors.
Rotating Potentiometer Knob Cap Digital Control Module Rotary Encoder Controller Switch 5V Diy Kit EC11 For Arduino PCB Board - AliExpress

USB extension cable. 0.2M length. (Optional)
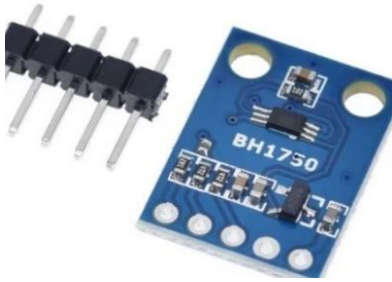Makes a neat job by bringing the USB port of the ESP32 board to the side of the project box.

1M 0.5M Panel Mount Type-C USB-C Male To Female Extension Cable With Screw Hole Lock Connector Cable Spacing 18mm - AliExpress 7

Light sensor. (Optional).

GY-301 LIGHT SENSOR MODULE

TZT GY-302 BH1750 BH1750FVI light intensity illumination module for arduino 3V-5V (aliexpress.com)
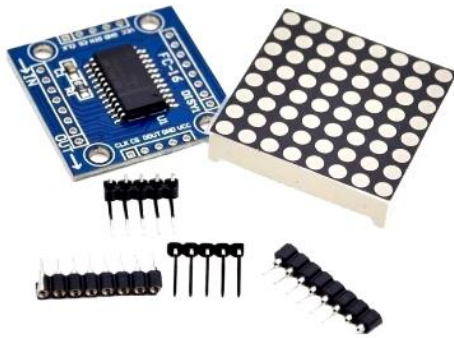
LED Matrix Module. (Optional).

Gives a visual indication of shutter speed, works like the old idea of photographing a scanning CRT.

New version – requires header pins soldering

MAX7219 Dot Matrix Microcontroller Display Module Together For Arduino - AliExpress 502

Project Box.

There are all sorts of shapes & sizes of project boxes. The 158 x 90 x 60 is a good size. If using the tft. The screen must be positioned as high as possible, to leave enough space below, for two rows of buttons. A suggested layout & template can be found in the 'Build a Box' document.

Black Box Outdoor Waterproof Case Plastic Box Electronic Project Case Instrument Waterproof Junction Box Housing - AliExpress
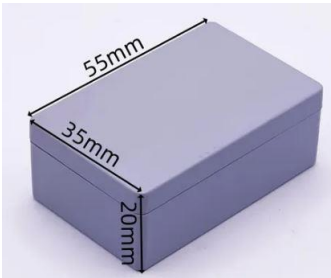
Note: a 3d printable enclosure is also available. Files are in the Github.

Project box for Light-Meter & Film-Gate Sensor 55 X 35 X 20. (Optional).

If making the Film-Gate Sensor or using the Light-Meter module, this box is the ideal size.
1pc Waterproof Black/white Housing Instrument Case ABS Plastic Project Box Storage Case Enclosure Boxes Electronic Supplies - AliExpress

Note: - if using the LED matrix, a suitable project box will also be required.

PC sync cable (flash) (Optional)

For testing flash synchronising. A 3.5mm socket will also be required.

3.5mm socket. (Optional)

If using the Flash Sensor, a 3.5MM socket is required. PJ-391 for the sockets.
10PCS 2.5 3.5MM Headphone Jack Audio Video Female Dual Channel Stereo Jack Jack Socket Stereo Solder Panel Mount PJ-210B PJ-392 - AliExpress
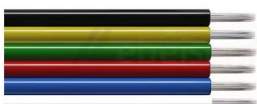
Multicore Wire.

Used to connect the sensors to the breakout board and button wiring.
5 cores are required, but buying the six cores, gives the additional yellow wire, which can be used to connect the yellow button & flash socket.

5/10Meter 22 AWG 2Pin 3Pin 4Pin 5Pin 6Pin Electronic Cable Extension Wire Color Line for 5050 3528 RGBW RGB CCT LED Strip Lights - AliExpress 13

More expensive but has outer insulation. Good for the external cable between project box & sensors.
[5-50m LED Strip Extension Cable Flexible Multi 2 3 4 5 6 7 8 9 10 Core Insulate Audio Electrical Wire For Speaker LED Lights Bar - AliExpress 13](#)
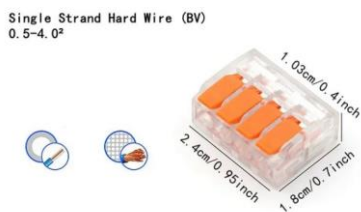

Connector-block - 2 pole.
(Not require for PCB version)
There are many 3V & 0V wires to be connected. The quickest way is to use a lever-locking connector as shown below. As the wires are thin, many can be put into each terminal, so a 2-terminal type is fine. Use one with more terminals if you like

Alternates are to the solder the wires together, or use a joining block.

[10-75pcs Orange Universal Type Quick Plug-in Terminals,Electrical Equipment Connectors,Wire Connector Terminals,250V/32A - AliExpress](#)

Shrink Tube. (Optional).
It is useful cut into small lengths of 5mm, and placed along the cables, to hold them into a bunch, for neater wiring. **Note** shrink tube also comes with the JST connector kit.

Also useful for covering soldered joints on wires, if using JST connectors for the sensors, for example, which then need soldering to the multicore cable.

If making the film-gate sensor, insulation is required for the sensor legs.

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

Plug & Sockets. (Optional).

The cable to the sensors/Lasers & Light-meter can be hardwired directly to the expansion board or connected via plugs & sockets.

Use 8 pin plugs & sockets for cabling to the Sensor/Laser frame. Five of the eight pins will be used.

There will be three spare pins. Another 8-pin plug & socket can be used for the light senor, using the three spare pins and sharing the 0V pin.

Ensure that the 3.3V and 5V are given their own dedicated pins and these pins are not used for data in another connector.

If using the LED matrix, use a connecter with a different number of pins, to avoid the possibility of it being plugged in to the wrong socket.

An alternate would be using a different connector type for each of the outputs (8-pin for sensor/Laser frame, six-pin for light-meter, 5-pin for Matrix, for example)

Solder Connector DIN 3 4 5 6 7 8 Pin DIN Male Female Plug with Plastic Handle + Female Socket Hulled Panel Mount Chassis a1 - AliExpress 13

M3 Bolts, Nuts, Washers. 25mm & 12MM Length Stainless Steel

M3 bolts can be used to mount the tft screen into the project box. Additionally, slightly elongating two of the mounting holes on the breakout board, allows it to also be easily mounted onto the same bolts. 25mm length is ideal for this. 12MM (or 25MM can be used, as shown in the photos) to mount the Din sockets, if using them.
Don't forget to also order washers & nuts.

Nuts & bolt set
M2 M3 M4 M5 M6 Nuts and Bolts Set 304 Stainless Steel Hexagon Button Hex Socket Fairing Bolt Assortment Kit Thread Allen Screws

Bolts only
5-50p ISO7380 M2 M2.5 M3 M4 M5 M6 M8 304 A2 Round Stainless Steel or Black G10.9 Hex Socket screw Button Head Allen Bolt Screws - AliExpress 13

Washers
GB97 DIN125 A2-70 304 Stainless Steel Flat Washer Plain Gasket M1.6 M2 M2.5 M3 M3.5 M4 M5 M6 M8 M10 M12 M14 M16 M18 M20 M22 M24 - AliExpress 13
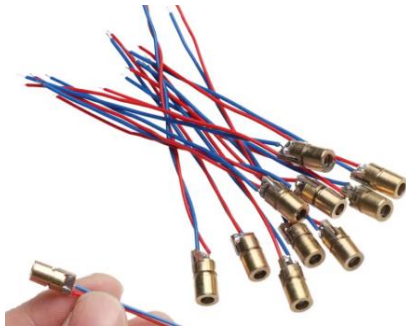
Nuts
100pcs/lot Metric thread DIN934 M2 M2.5 M3 M3.5 M4 M5 M6 Steel Hex Nuts - AliExpress 13

Items for 3d printed case and/or sensor & Laser Boxes. (Optional).

Lasers. These are not mounted to a module, making them easier to fit inside the Laser box.
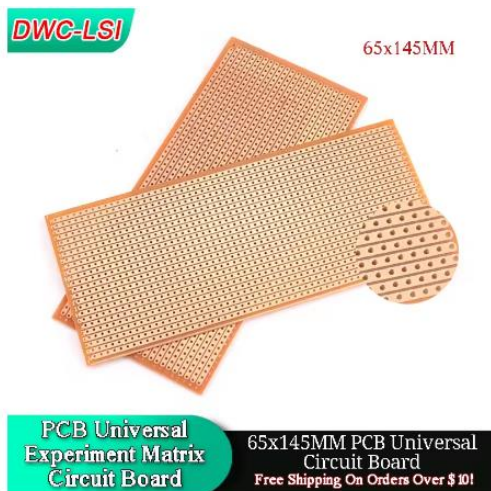Order the 5v Lasers.
5pcs Adjustable Laser Diode 650nm 6mm 3/5V 5 Million Watt Red Point Line Laser Diode Module Red Copper Head - AliExpress 1420

Pcb strip-board
This board has each row of holes electrically connected.
5/10PCS DIY 6.5x14.5 6.5*14.5CM Prototype Paper PCB Universal Experiment Matrix Circuit Board Single Row Continuous Hole - AliExpress 502

0.1uF Capacitors. (104 100NF)
100PCS 100nF 0.1uF 0.1 uF 104 50V 2.54mm Dip Mono Monolithic Capacitors - AliExpress

2mm screw selection box. Used to assemble the case and enclosures.
[800pcs M2(2mm) Self Tapping Wood Carbon Steel Phillips Pan Head Self Tapping Screws Assortment Kit M2*4/5/6/8/10/12/16/20mm - AliExpress 13](#)

Lifting platform. Used to place the camera on and allows height adjustment.
[Plastic Lift Table Woodworking Carving Laser Level Bracket Plastic or Aluminum Meterial Device Height Adjustment Lift Platform - AliExpress 1420](#)

Items for film-Gate-Sensor

(Note this is only for those wishing to experiment. Using a sensor frame with Lasers for the light source works the best).

LED Light Box (Optional – Not Recommended).

For use with Film-gate Sensor.

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.

A non-dimmable mains powered panel may be better for shutter testing alone.

Note the use of Lasers are far superior to using this light box, it is only listed here for people wishing to experiment with the film-gate sensor box.

LED Clip Video Light Portable Photography On-Camera 3000K-6000K Bi-Color Lighting Cold Shoe For DSLR Camera Camcorder Gopro Vlog - AliExpress

100PCS 100nF 0.1uF 0.1 uF 104 50V 2.54mm Dip Mono Monolithic Capacitors - AliExpress

_____

Additional useful parts

Drill bits for making holes. 3MM for bolts, 7mm for encoder & flash socket, 13mm for the buttons, 15MM for Din sockets.

[3-12mm Three-point Woodworking Drill Hole Opener Twist Drill Bit Practical Wood Milling Cutter Multifunctional Drilling Tools - AliExpress](#)

13mm bit.
[10-35mm Woodworking Twist Drill Bit Set Long Four-Slot 6.35mm Shank Carbide Drill Bit Hole Saw For Door Lock Wood Slotting Tools (aliexpress.com)](#)

Glue Gun.
Cheap glue gun, but surprisingly it works ok.
[20W Hot Melt Glue Gun DIY Mini Household Industrial Guns Heat Temperature Thermo EU Electric Repair Tool Use 7mm Glue Sticks - AliExpress](#)

Don't forget the glue :o)
[T TOVIA 60pcs/120pcs Hot Melt Glue Sticks 7mm Hot Glue Sticks Rod for Craft Album Repair Tools Hot Glue Gun Sticks - AliExpress](#)

Wire Strippers. Model 3001D
The JST HX wires are very thin 22AWG. A good quality wire stripper will be required. An alternate is to use a sharp scalpel or Stanley knife blade

[Pro'sKit 8PK-3001D 8PK-3002D high quality electronic wire stripper cutting pliers (AWG 30/28/26/24/22/20 precision pliers - AliExpress 1420](#)

Stanley knife & plasters trowel.
To safely make square cut-out for tft. Source locally.

Soldering Iron Kit.
Cheap soldering iron kits are available on Aliexpress. I found the tips are very loose & the internet mod is to wrap a strip of aluminium cooking foil around the ceramic heater, to reduce the gap. However, it is far better to buy a genuine branded product, Weller or Antex (not a cheap knock off)

Ensure you buy a roll of Lead/Tin solder, not the horrible lead-free stuff, which needs a higher temperature to melt and does not flow very well.

Update notes:
V 1.5 simplified build by removing pre-made JST cables, removing orange wire (substituted with blue)
Breakout board/pcb option added
Optional 3d printed parts added

V1.6 added warnings around the mixed 22.5 and 25mm Expansion boards.

V1.7 Updated links and added 3d printed parts.