

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 V1.2

29 10 2024

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

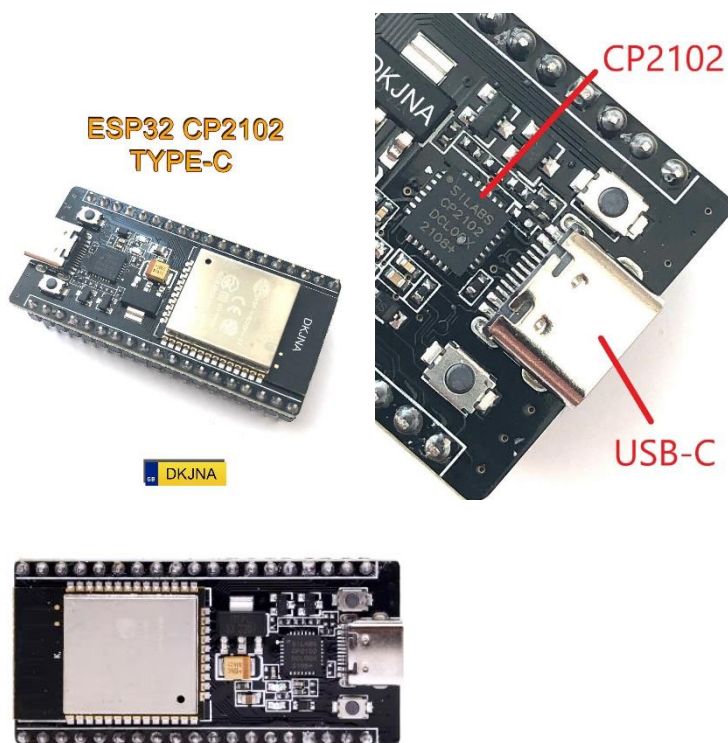
Links are valid now, but of course could become dead in the future.

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



ESP32 CP2102 TYPE-C USB

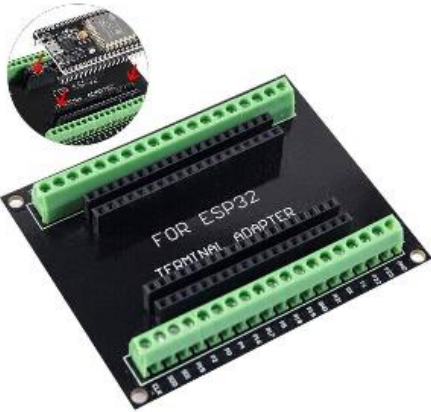
**IMPORTANT.** There are multiple variants of this board. Get 38 pin USB-C and CP2102 chip.

**Note:** - The guides have been written for this specific board type. Boards which differ with their USB chip and/or connector will still work, but the guides will not detail different driver installs or pin layout differences.

[ESP32 Expansion Board Compatible with ESP32 WiFi Bluetooth Development Board NodeMCU-32S Lua 38Pin GPIO Expansion Board - AliExpress 502](#)

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

### 38 Pin Breakout Board For ESP32



[ESP32 Expansion Board Compatible with ESP32 WiFi Bluetooth Development Board NodeMCU-32S Lua 38Pin GPIO Expansion Board - AliExpress 502](#)

**Note:** - this screw type breakout board was only available in 38-pin form. However, recently, a 30-pin version has become available.

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)

The link below shows both 30 & 38 pin board and different ESP32 boards.

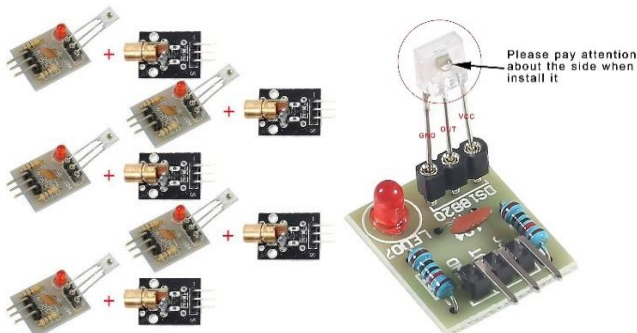
[ESP32 Expansion Board Compatible with ESP32 WiFi Bluetooth Development Board NodeMCU-32S Lua 38Pin GPIO Expansion Board - AliExpress 502](#)

### 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](#)



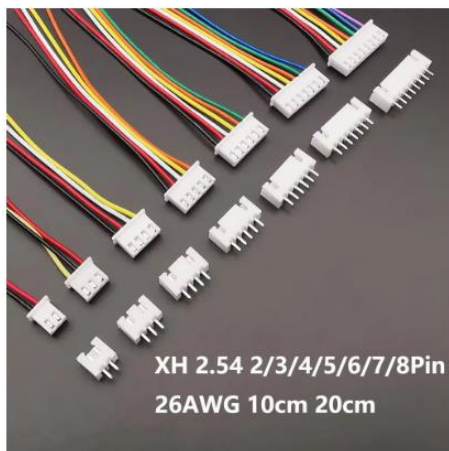
## JST XH 2.54MM Connectors. Order 8 way and 5 way.

These pre-made header cables make neat job of connecting the TFT screen and encoder to the breakout board. The ends can be cut to length and tinned (solder added to the wire) for insertion into the screw-terminal breakout board.

**Note:** - The individual wires will require rearranging into the correct colour order by gently pressing down on the metal barb of the connector and sliding out the wire. This can be a little tricky to do, without damaging the barb.

**Note:** - The Shutter Tester detailed and photographed in the build documents & schematic was built using these connectors.

[5Sets JST XH2.54 XH 2.54mm Wire Cable Connector 2/3/4/5/6/7/8 Pin Male and Female Plug Socket 10cm 20cm Wire Length 26AWG - AliExpress 13](#)



## Connector types.

8-way TFT screen      5-way Encoder, LED matrix      4-way LCD  
(3-way Sensors & Lasers (Six required) or solder the wires directly).

## JST XH 2.54MM Connector kit. (Optional)

This kit comes with pre-made crimped wires and housings separately. This allows the pins to be assembled in the correct colour order without the difficulty of removing them from the housing first. They are however comparatively expensive. (see cheaper kit below)

**Note:** - There is no Orange wire in this kit, so a substitute colour will be required (Blue is suggested).

[XH 2.54mm Connector Kit With Double Pre-crimped Soft Silicone Cable Wire 22AWG 2/3/4/5/6/7/8/9/10 Pin Housing JST Adapter Cable - AliExpress 13](#)



## Caution on the product below. (Optional).

Aliexpress is full of the kits below being sold at a very low price. The advert says JST HX 2.54MM, but the product pictures show the smaller 1.25MM connector. Reviews from this seller's customers do show the correct JST HX connectors.

**Note:** - there is no 8 bin housing in this kit. They can be purchased cheaply on Aliexpress \*

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



## \*8 way housing

[50pcs 1.0mm 1.25mm 1.5mm 2.0mm 2.54mm SH JST PH XH Housing Shell Connector 2/3/4/5/6/7/8/9/10P 1.0 1.25 2.0 2.54 Plastic Plugs - AliExpress 13](#)

### JST XH 2.54MM Bare Connector kit. (Optional).

This is a kit of bare JST HX connectors and housings. They can be crimped (using a special crimping tool) onto the multi-core cable, to connect to the external modules. Alternately, the multi-core cable can be soldered directly to the module pins.



### Crimp tool for the above. (Optional).

[0 Gauge Crimp Tools | 0-1.5mm<sup>2</sup> Dupont Crimping Tool Kit - Carbon Steel Jst Xh Pliers Set](#)



### Dupont wires. (Optional).

These are an alternative to the JST connectors detailed above.

Get 20cm male to female ones if using the screw terminal prototype board.

Each pack has 20 wires, two of each colour, so one or two packs may be required.

[Dupont Line 10cm 20cm Dupont Cables Male To Male Female To Female Male To FeMale Jumper Wire, for Arduino DIY Electronics KIT - AliExpress](#)



## TFT display.

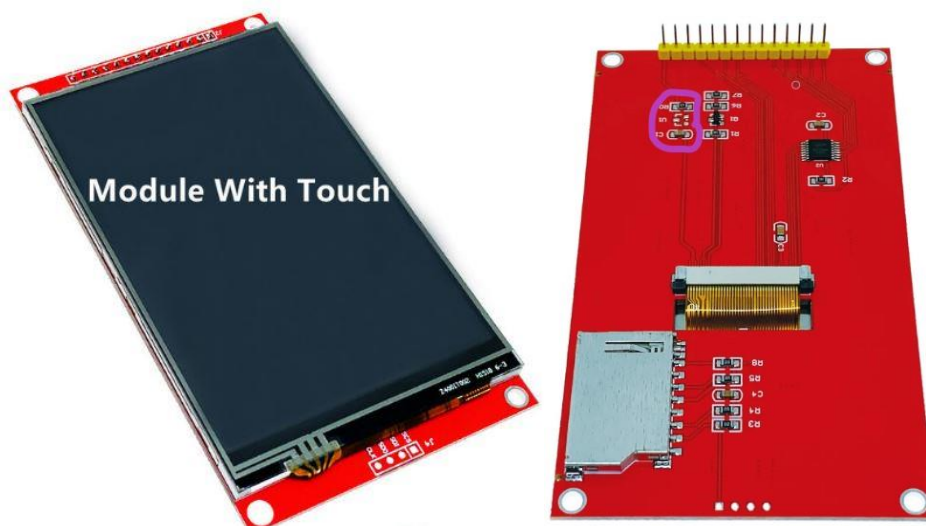
**New 4.0 inch SPI serial port LCD Touch screen Module 480\*320 (Free Shipping)TFT display ILI9488 HD Electronic STM32 ESP32 AR C51**

**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 & sometimes just the screen.

Note, whilst all output is also sent to the computer screen, making the tft screen optional, future firmware upgrades may incorporate touch-screen functionality, which will require use of the tft screen

[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.

[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.



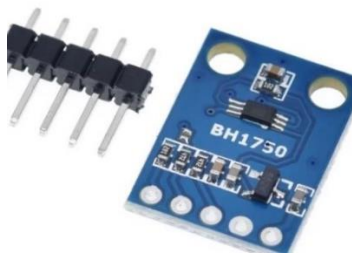
### Type-c Male to Female Extension Cable

[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 \(aliexpress.com\)](#)

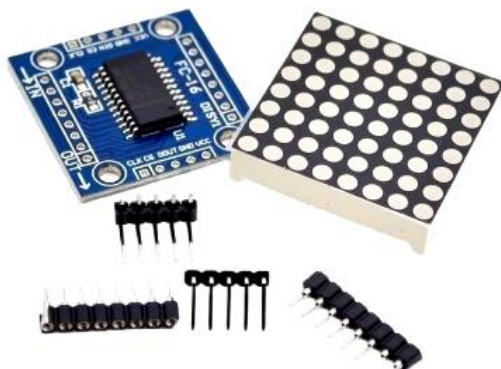


### LED Matrix Module. (Optional).

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.

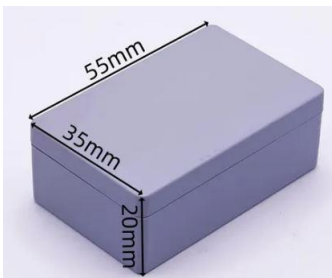
[Black Box Outdoor Waterproof Case Plastic Box Electronic Project Case Instrument Waterproof Junction Box Housing - AliExpress](#)



## 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 Socket Stereo Solder Panel Mount PJ-210B PJ-392 - AliExpress](#)

### Multicore Wire.

Used to connect the sensors to the breakout board.

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.

[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](#)

### Hook-up Wire. (Optional).

The above multicore cable can be used to connect the buttons & sockets within the project box. Alternately silicone hook-up wire can be purchased in a multicolour pack or single colour lengths.

### Connector-block. (Optional). 2 pole.

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 solder them 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 place along the cables, to hold them into a bunch, for neater

wiring.

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 8 pin. (Optional).**

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

Using 8 pin plugs & sockets allows for separate pins to be used for the sensors and light-meter.

5 for sensors/Lasers and 4 for the light-sensor, using a common 0V.

In this way, should the wrong plug be put into the socket, no pins (other than 0V would be connected) & no harm will be done.

An alternate would be using a different connector for sensors & light-meter. This of course adds a little extra cost.

[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 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 film-Gate-Sensor

### 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](#)



### 10K resistors. (Optional).

Required if making the Film-Gate Sensor

[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. (Optional). (104 100NF)

Required if making the Film-Gate Sensor

[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 useful parts**

Drill bits for making holes. 3MM for bolts, 7mm for encoder, 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)