



INTEL-IRRIS

Intelligent Irrigation System for Low-cost Autonomous Water Control
in Small-scale Agriculture



Intelligent Irrigation System for Low-cost Autonomous Water Control in Small-scale Agriculture



Building the INTEL-IRRIS IoT platform Annex-1: ordering PCBs, including PCBA

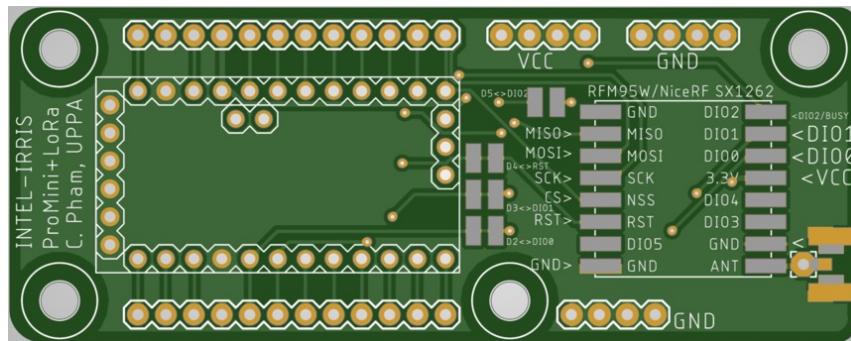


Prof. Congduc Pham
<http://www.univ-pau.fr/~cpham>
Université de Pau, France

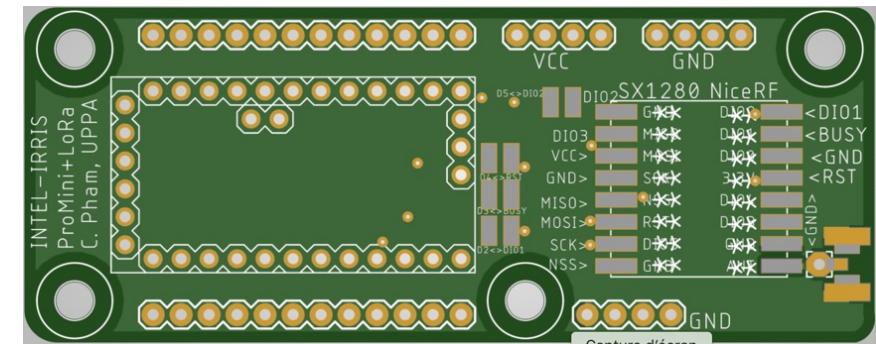


Various PCBs for soil device

Simple PCB v2



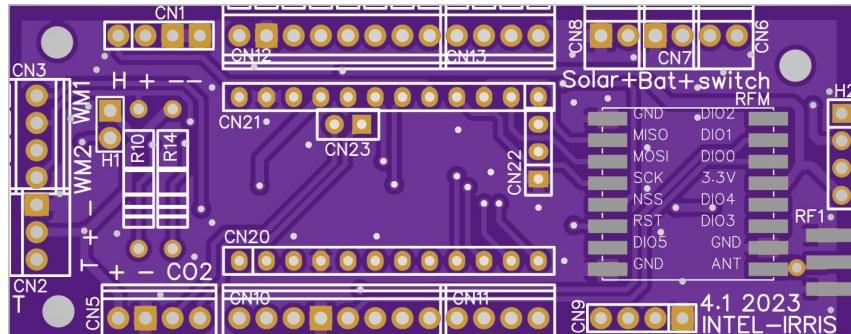
Arduino ProMini with
RFM95W (868MHz)
RFM96W (433MHz)
NiceRF SX1262 (868MHz)



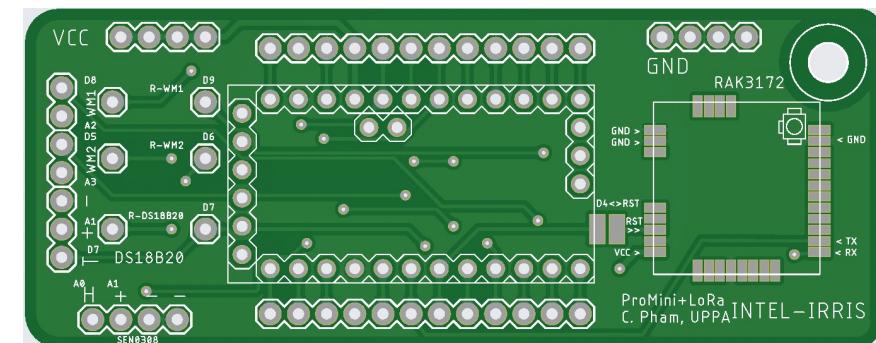
Arduino ProMini with NiceRF SX1280 (2.4GHz)

IRD PCB

v4.1



PCB for RAK3172



Download ProMini PCBs Gerber files

- <https://github.com/CongducPham/PRIMA-Intel-IrriS/tree/main/PCBs>

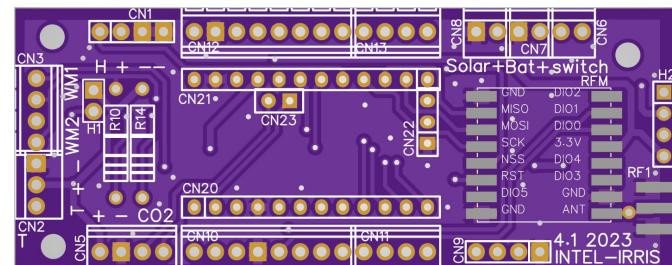
[PRIMA-Intel-IrriS](#) / [PCBs](#) / [...](#)



CongducPham Update README.md

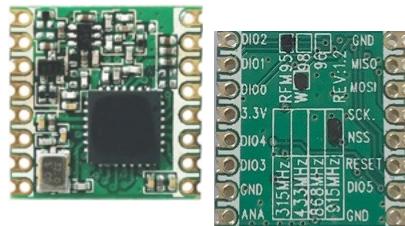
| Name | Last commit message |
|--|-----------------------------------|
| .. | |
| IRD_PCB_4_1 | Update PCB files and tutorials |
| MySecondProMiniLoRaBreakout_2022-01-20.zip | Update PCB files |
| MySecondProMiniLoRaBreakout_RAK3172_2023-0... | Add new PCBs and update tutorials |
| MySecondProMiniLoRaBreakout_SX128X_2022-01-... | Update PCB files |

**Latest and most achieved
PCB is IRD PCB v4.1
in folder IRD_PCB_4_1**



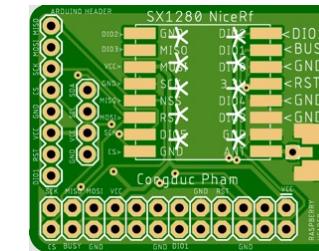
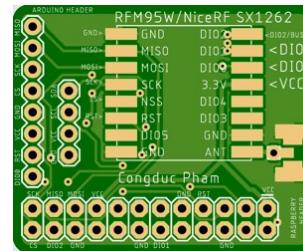
PCBs for LoRa hat, for the gateway

RFM95W
RFM96W
NiceRF SX1262
breakout

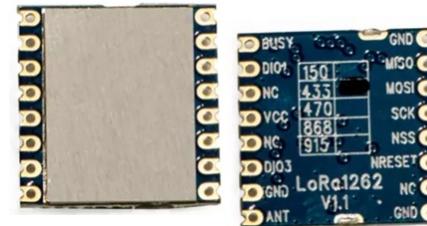


RFM95W (868MHz) | RFM96W (433MHz)

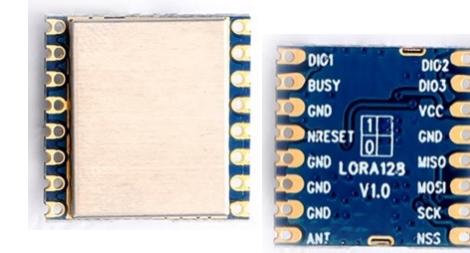
https://github.com/CongducPham/LowCostLoRaGw/blob/master/PCBs/RFM95Breakout_2020-11-14.zip



NiceRF SX1280
breakout

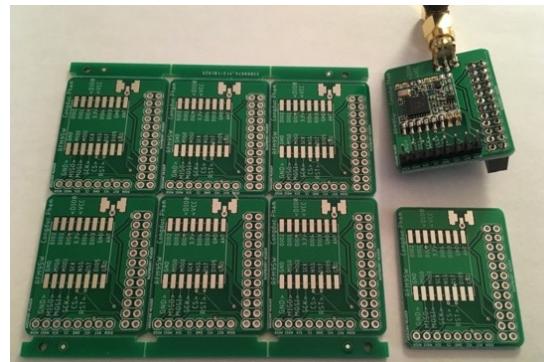


NiceRF SX1262 (868MHz)



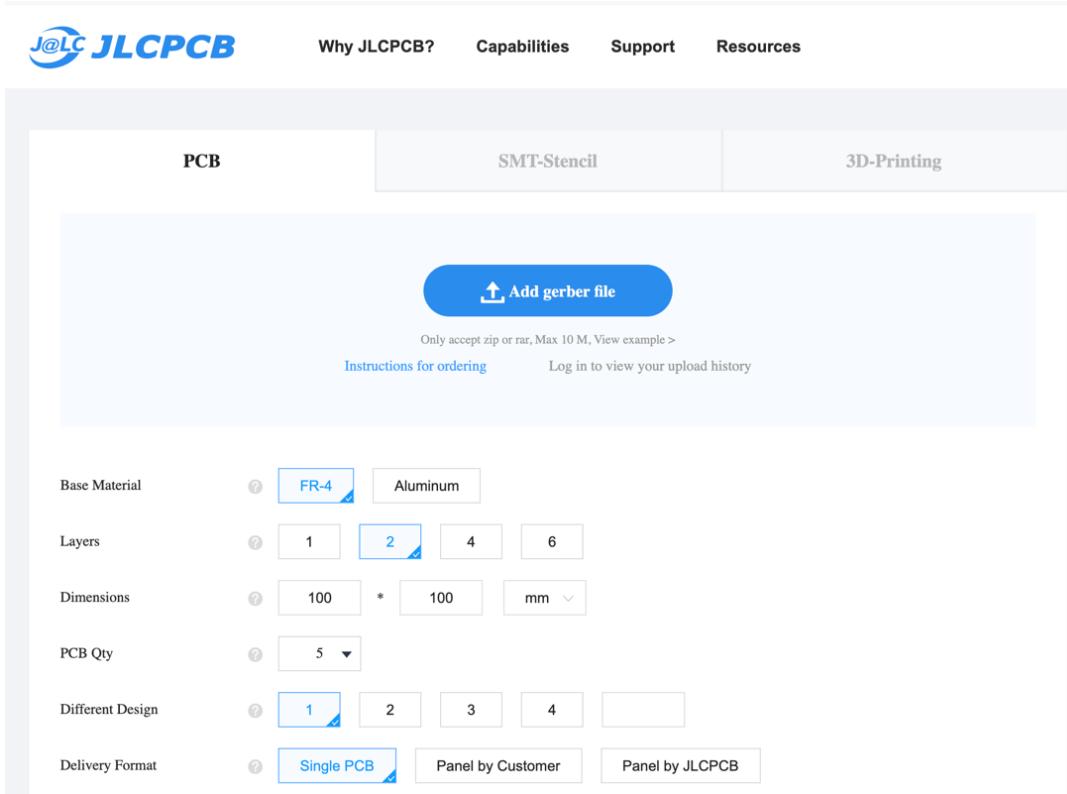
NiceRF SX1280 (2.4GHz)

https://github.com/CongducPham/LowCostLoRaGw/blob/master/PCBs/SX1280Breakout_2020-11-14.zip



Manufacture the PCBs

- Example: JLCPCB: <https://jlpcb.com/>
- Click on "Instant Quote"

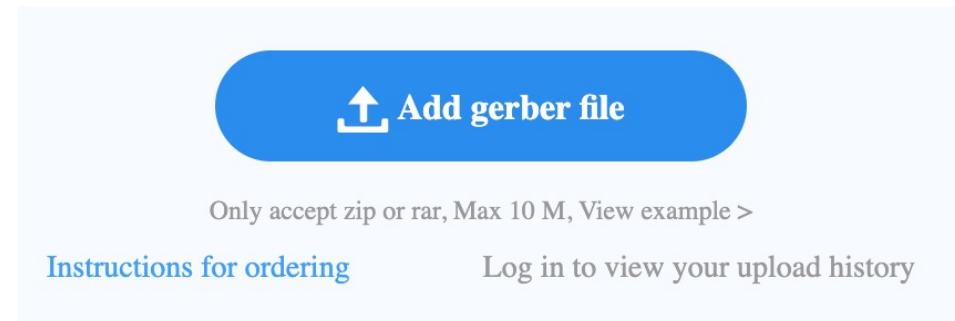


The screenshot shows the JLCPCB Instant Quote interface. At the top, there are tabs for PCB, SMT-Stencil, and 3D-Printing. Below the tabs is a large button labeled "Add gerber file" with an upward arrow icon. Underneath the button, it says "Only accept zip or rar, Max 10 M, View example >". To the left of the button are links for "Instructions for ordering" and "Log in to view your upload history". The main form area contains the following settings:

- Base Material: FR-4 (selected)
- Layers: 1, 2 (selected), 4, 6
- Dimensions: 100 * 100 mm
- PCB Qty: 5
- Different Design: 1 (selected), 2, 3, 4
- Delivery Format: Single PCB (selected)

Add your PCB Gerber files

- Click "Add gerber files" and select one of the PCB .zip files, do not unzip the downloaded file



Processing Gerber files...



- Some parameters will be defined by the Gerber file itself, for instance the PCB size

J@LC JLCPCB ☰ EUR

Standard PCB/PCBA **Advanced PCB/PCBA** **SMT-Stencil** **3D/CNC**

[← Back to Upload File](#) Detected 2 layer board of 30.89x79.5mm(1.22x3.13 inches). [Gerber Viewer](#)

| | | | | | | | | | | | | | |
|---------------|---------------------------------|-----------|---------|--------------------|---|---|----|----|----|----|----|----|--|
| Base Material | | | | | | | | | | | | | |
| Layers | 1 | 2 | 4 | High Precision PCB | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | |
| Dimensions | 79.5 | * | 30.89 | mm | | | | | | | | | |
| PCB Qty | 5 | | | | | | | | | | | | |
| Product Type | Industrial/Consumer electronics | Aerospace | Medical | | | | | | | | | | |

Quantity and Panel format

- Change "PCB Qty" to 10 for instance and select "Panel by JLCPCB"
- Indicate 1 (column) by 3 (rows)

Dimensions 79.5 * 30.89 mm

Panel Qty **10** Panel Single Pieces Qty: 30

Product Type Industrial/Consumer electronics Aerospace Medical

PCB Specifications

Different Design **1** 2 3 4

Delivery Format Single PCB Panel by Customer **Panel by JLCPCB**

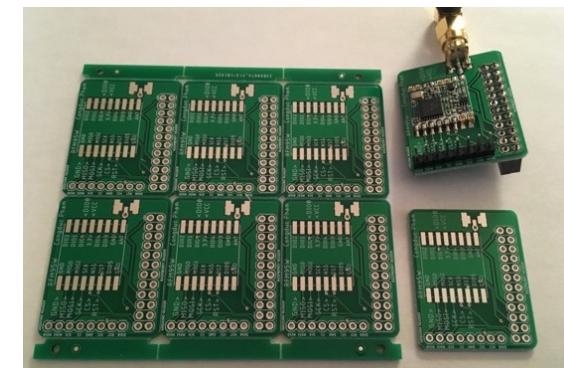
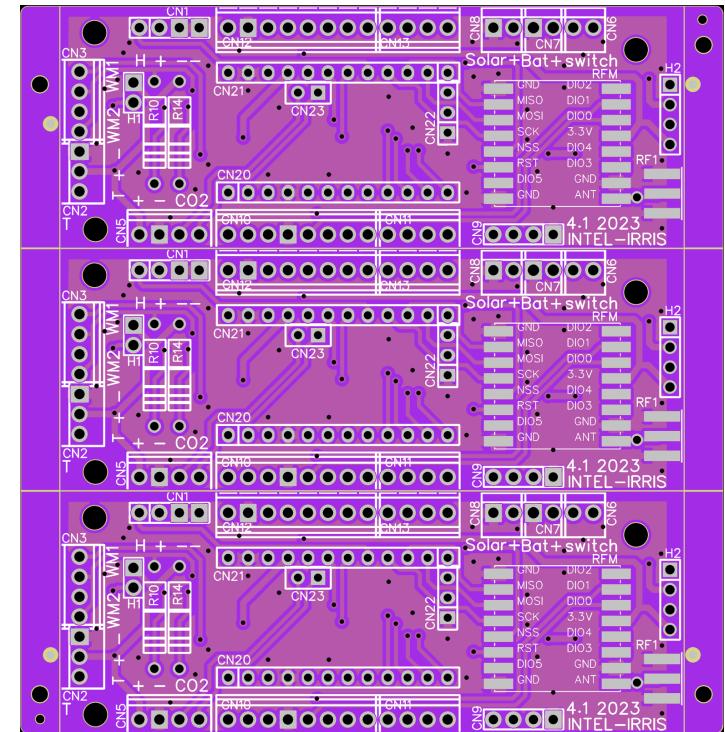
Panel Format Column : **1** 79.5mm Row : **3** 30.89mm

Edge Rails **No** On 2 Sides On 4 Sides

Panel size X : (79.5 x 1) = 79.500 mm Y : (30.89 x 3) = 92.670 mm

PCB Thickness **1.6** 0.4 0.6 0.8 1.0 1.2 2.0

- Panelized will put several PCBs on the same PCB panel, with v-cut so that you will be able to easily separate them by hand
 - For minimal cost, JLCPCB offers 10cm X 10cm PCB panel
 - Here 1 x 3 will give 3 PCBs per PCB panel
 - For radio breakout PCB, use 3 x 2 to have 6 PCB boards
 - So if Qty=10, you will have
 - $10 \times 3 = 30$ for the ProMini PCB boards
 - $10 \times 6 = 60$ for the radio breakout PCBs



Save to cart

- You do not need to change the other parameters
- Save your board to cart
- Then, add another PCB .zip file and repeat the same procedure, if needed
- The shipping cost is probably the most expensive cost, so better to order all PCBs at the same time!
- You have several shipping option, you can select faster or cheaper options
- Once you are done, display your cart, review carefully your order and then checkout

Charge Details

| | |
|-----------------|-------|
| Engineering fee | €3.54 |
| Board | €5.22 |

Build Time ?

| | | |
|-------|----------|-------|
| PCB : | 2-3 days | €0.00 |
|-------|----------|-------|

Calculated Price €8.76

Additional charges may apply for [special cases](#)

Weight ? 0.23kg

SAVE TO CART

| | |
|-------------------|--------------------|
| Shipping Estimate | €11.66 |
| ▼ EuroPacket | 8-12 business days |

A close-up photograph of a young green plant with several leaves and a thin stem, growing in dark brown soil. The background is slightly blurred.

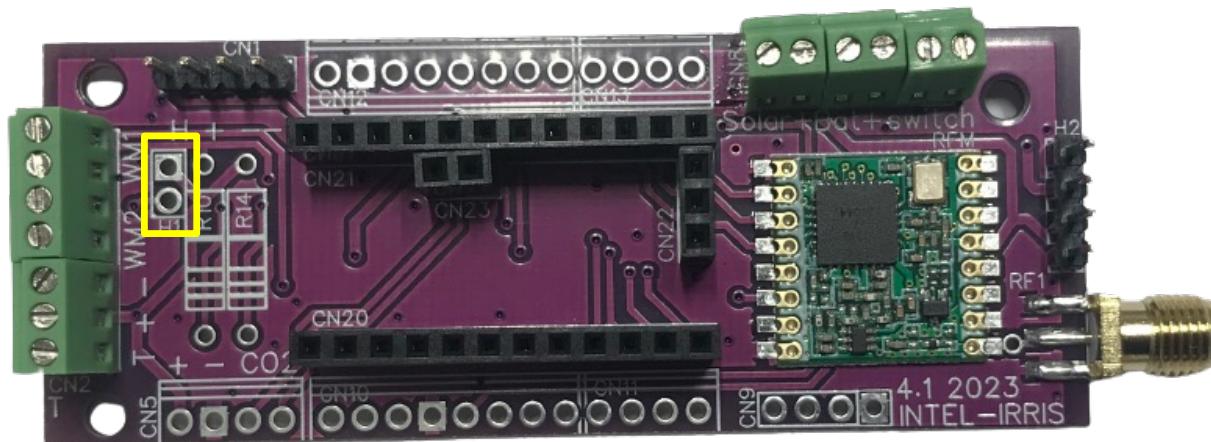
INTEL-IRRIS

Intelligent Irrigation System for Low-cost Autonomous Water Control
in Small-scale Agriculture

PCBA FOR
FULLY
ASSEMBLED

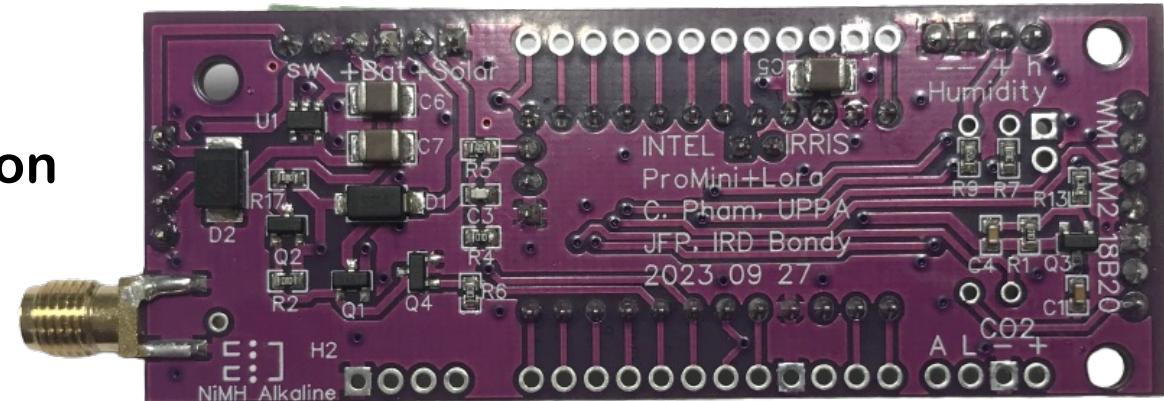
PCB Assembly

- The IRD PCB v4.1 is intended to be fully assembled by the PCB manufacturer in order to have the solar charging circuit



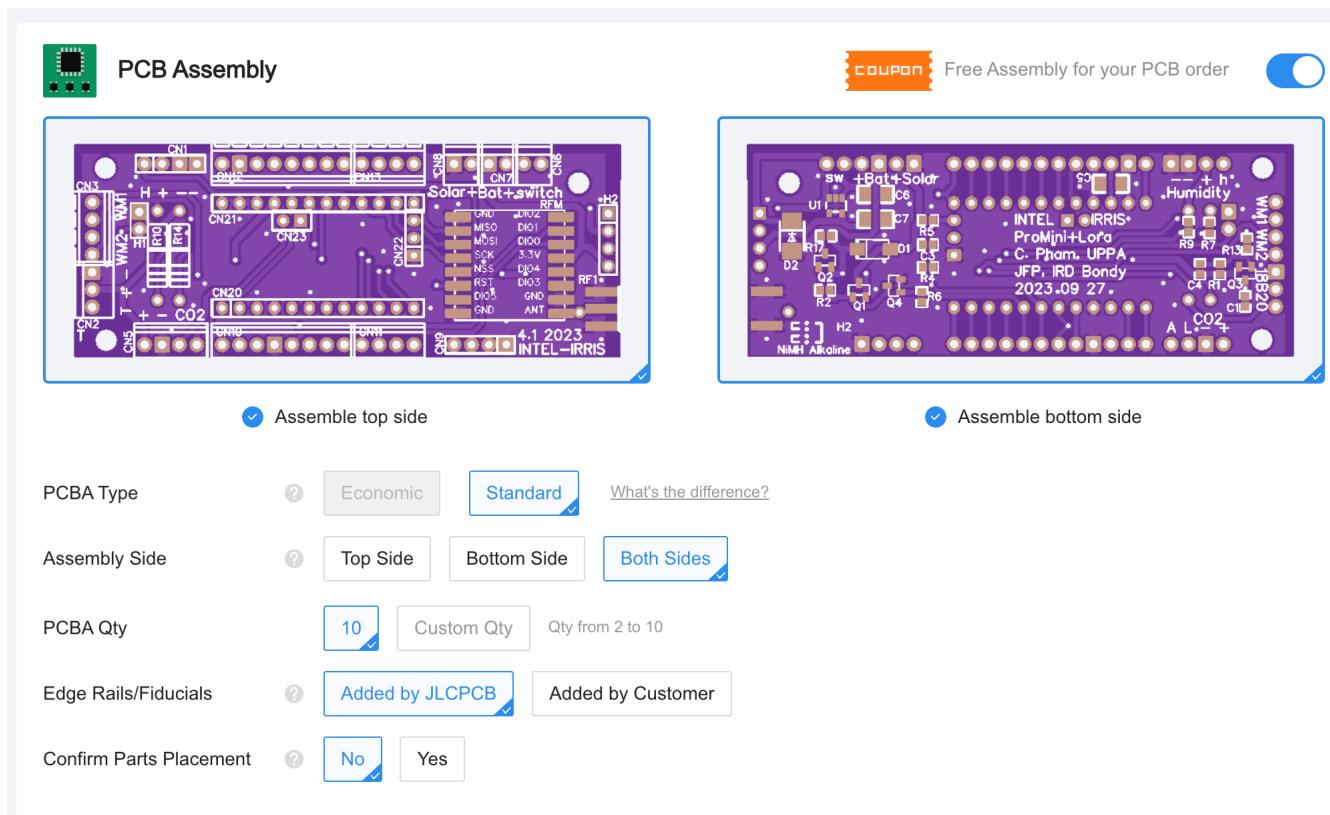
The full version
does not need to
have header for H1

The solar circuit is on
the back side



Enabling PCB assembly

- Click on PCBA to indicate you want PCB assembly
- Choose Standard PCBA type and select "Both sides" option



BOM & CPL

- BOM: Bill of Material file (2 files: RFM95W or RFM96W)
- CPL: Pick&Place file

PRIMA-Intel-IrriS / PCBs / IRD_PCB_4_1 / ...

 CongducPham Update PCB Gerber, BOM and CPL files for PCB Assembly 42cbaeb · 1 minute ago 

| Name | Last commit message | Last commit date |
|--|---|------------------|
| .. | | |
|  BOM_SMT_TB_RF95_868_IISS_PCB4_1_wh2.xlsx | Update PCB Gerber, BOM and CPL files for PCB Assembly | 1 minute ago |
|  BOM_SMT_TB_RF96_433_ISSI_PCB4_1_wh2.xlsx | Update PCB Gerber, BOM and CPL files for PCB Assembly | 1 minute ago |
|  CPL.csv | Update PCB Gerber, BOM and CPL files for PCB Assembly | 1 minute ago |
|  Gerber_PCB4_1_ISSI_2023_09_27.zip | Update PCB files and tutorials | 2 weeks ago |
|  Schematic_ISSI_4_1_2023-09-27.pdf | Update PCB files and tutorials | 2 weeks ago |

- At next step, you will be invited to upload BOM & CPL files

 Why JLCPCB? Capabilities Support Resources Order now My file congd

Gerber_PCB4_1_ISSI_2023_09_27 Automatically saved, last update

PCB Bill of Materials Component Placements Quote & Order

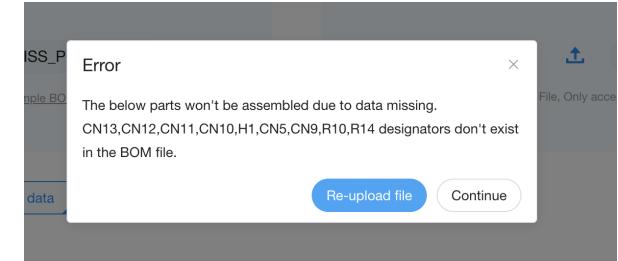
↑ Add BOM File ↑ Add CPL File

Only accept XLS,XLSX,CSV [View Sample BOM](#)

Pick&Place File, Only accept XLS,XLSX,CSV [View Sample CPL](#)

Check availability of components

- If you see this message, click on "Continue"
- Then, check that all components are available. Here, there are not enough components for CN23 (2-pin female header).
- You can wait until they are all available (recommended), or decide that you do not want to place them (you must know what you are doing then)
- You can also have the choice to replace by another similar component with  , if any



J@LC **JLCPBCB** Why JLCPBCB? Capabilities Support Resources Order now My file conduc.phm64 v0

Gerber_PCB4_1_IISS_2023_09_27

PCB Bill of Materials Component Placements Quote & Order Automatically saved, last updated on 28 October, 20:53

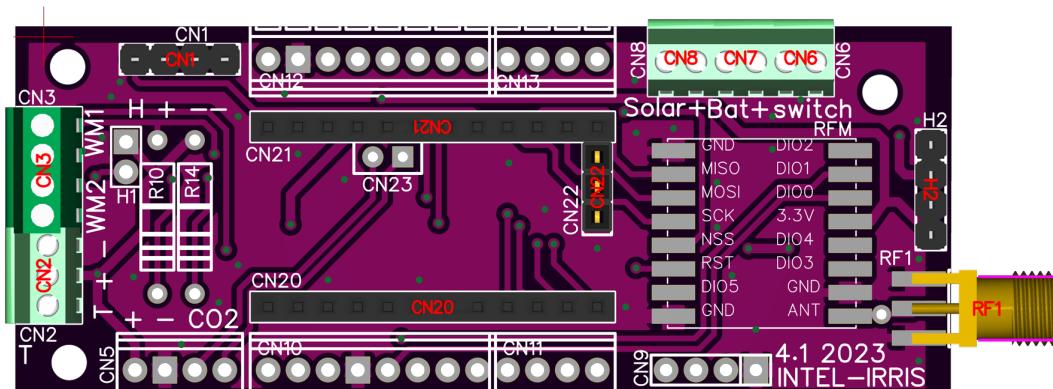
Both Sides Total 24 parts detected 23 Parts confirmed 1 parts Inventory shortage Upload BOM/CPL

| Uploaded BOM Data | | | | Review Matched Parts | | | | | | |
|-------------------|-------------------|---------------|--|----------------------|----------|------------|----------|----------|--|-------------------------------------|
| Top Designator | Bottom Designa... | Comment | Footprint | Matched Part Detail | | Qty | Source | Lib Type | Total Cost | Select |
| RFM | C4 | 33nF | C603 | CC0063KRX7R9B8333 | C106856 | 35 | JLCPBCB | Extended | €0.0861 | <input checked="" type="checkbox"/> |
| | R17 | 68 | R603 | RC0063FR-0710KL | C126362 | 35 | JLCPBCB | Extended | €0.0364 | <input checked="" type="checkbox"/> |
| | R1,R2,R4,R6 | 100K1% | R603 | RC0063FR-0710KL | C14675 | 125 | JLCPBCB | Extended | €0.1064 | <input checked="" type="checkbox"/> |
| | C3 | 330pF | C603 | CG0063KRNP09BN431 | C2181158 | 35 | JLCPBCB | Extended | €0.1358 | <input checked="" type="checkbox"/> |
| | D1 | SS14 | SMAIDO-Z... | SS14 | C2837270 | 32 | JLCPBCB | Extended | €0.3179 | <input checked="" type="checkbox"/> |
| | | DL-RFM95-868M | DL-RFM... | DL-RFM95-868M | C2844472 | 30 | JLCPBCB | Extended | €128.7106 | <input checked="" type="checkbox"/> |
| | | DL-RFM95-868M | WIRELESS... | DL-RFM95-868M | C2844472 | 30 | JLCPBCB | Extended | €128.7106 | <input checked="" type="checkbox"/> |
| | Q4 | BSS113B | SOT-23 | BSS113B | C2874697 | 32 | JLCPBCB | Extended | €0.6358 | <input checked="" type="checkbox"/> |
| | CN20,CN21 | 12P_F | KH-2.54FH... | KH-2.54FH... | C2905419 | 60 | JLCPBCB | Extended | €4.3822 | <input checked="" type="checkbox"/> |
| | | 100nF | C603 | 0603104M500NT | C2998 | 35 | JLCPBCB | Extended | €0.0662 | <input checked="" type="checkbox"/> |
| D2 | SMBJ5.0A | SMBJ(DO-2... | 50V 100nF YSV ±20% 0603 Multilayer Cer... | C473804 | 32 | JLCPBCB | Extended | €1.2414 | <input checked="" type="checkbox"/> | |
| R5 | 430K1% | R603 | SOT-23TO-236 MOSFET IRHSS34 | C482869 | 35 | JLCPBCB | Extended | €0.0397 | <input checked="" type="checkbox"/> | |
| CN1 | P2Z54V-... | HDR-TH-4... | 50V 100nF YSV ±20% 0603 Multilayer Cer... | C492403 | 61 | JLCPBCB | Extended | €1.1313 | <input checked="" type="checkbox"/> | |
| H2 | P2Z54V-... | HDR-TH-4... | 50V 100nF YSV ±20% 0603 Multilayer Cer... | C492403 | 61 | JLCPBCB | Extended | €1.1313 | <input checked="" type="checkbox"/> | |
| RF1 | RF1 | SMA-SMD... | 50V 100nF YSV ±20% 0603 Multilayer Cer... | C492403 | 30 | JLCPBCB | Extended | €6.2137 | <input checked="" type="checkbox"/> | |
| Q1,Q2,Q3 | IRLML5203... | SOT-23 | IRLML5203... | C518778 | 92 | JLCPBCB | Extended | €3.7083 | <input checked="" type="checkbox"/> | |
| CN22 | 3P_F | PM254V-1... | 3P_F 2.54mm 3P Brass Straight 1x3P Plu... | C541850 | 31 | JLCPBCB | Extended | €2.4727 | <input checked="" type="checkbox"/> | |
| CN5,CN7,CN8 | X1308-2... | X1308-2... | 1x2P 6A 150V Green 18-26 Straight pin 2... | C557685 | 90 | JLCPBCB | Extended | €12.7907 | <input checked="" type="checkbox"/> | |
| CN2 | X1308-2... | CONN-TH... | X1308-2.54-3P | C557686 | 30 | JLCPBCB | Extended | €7.9736 | <input checked="" type="checkbox"/> | |
| U1 | RT9080-33 | TSOT-23-5 | RT9080-330J5 | C841192 | 32 | JLCPBCB | Extended | €4.3480 | <input checked="" type="checkbox"/> | |
| CN3 | XY308-2... | CONN-TH... | XY308-2.54-3P | C841913 | 30 | JLCPBCB | Extended | €7.5988 | <input checked="" type="checkbox"/> | |
| | C5,C6,C7 | 4.7uF | C1206 | TMK2584J75KN-T | C92837 | 92 | JLCPBCB | Extended | €6.9553 | <input checked="" type="checkbox"/> |
| R7,R13 | 10K1% | R603 | 20V 4.7uF X5R ±10% 1210 Multilayer Cer... | C98220 | 65 | JLCPBCB | Extended | €0.0554 | <input checked="" type="checkbox"/> | |
| R9 | 4.7k | R603 | 100nW Thick Film Resistors ±100ppm/°C | C99782 | 35 | JLCPBCB | Extended | €0.0397 | <input checked="" type="checkbox"/> | |
| CN23 | 2P_F | PM254V-1... | PM254V-11-02-H85 | C541849 | 31 | 14 JLCPBCB | Extended | €0.8425 | <input checked="" type="checkbox"/> 17 shortfall | |

Please carefully check the packages of selected parts before proceeding.

Customize your PCB Assembly

- You can also decide which component you actually do not want the manufacturer to assemble
- For instance, if you un-select the radio module (RFM), you will have a fully assembly board, but without the LoRa module



- This solution can be used to have a board where you will solder yourself the radio module (RFM95W 868/915/923 or RFM96W 433), according to the frequency band of the target countries

Checking the expected result

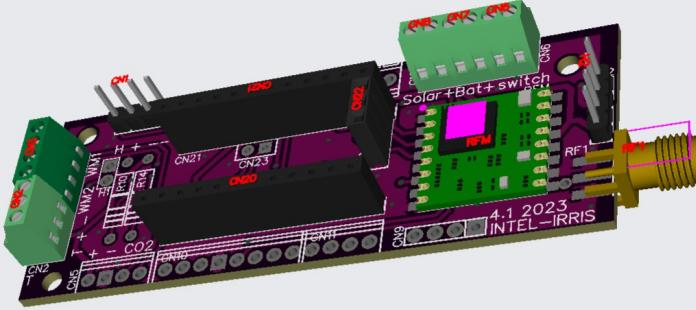
- At next step, you will be able to visually check the final result
- You can switch between 2D & 3D display
- Check top & bottom side (see next slide)

Gerber_PCB4_1_IISS_2023_09_27 

PCB Bill of Materials **Component Placements** Quote & Order

Automatically saved, last updated on 28 October, 21:24

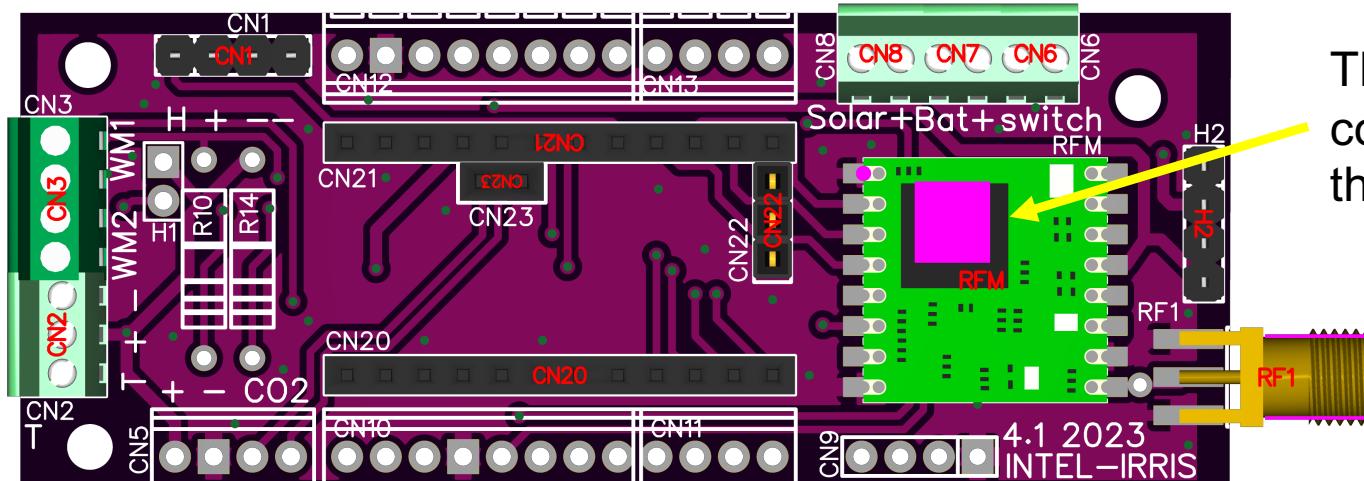

Select all top parts
Select all bottom parts

Top Bottom


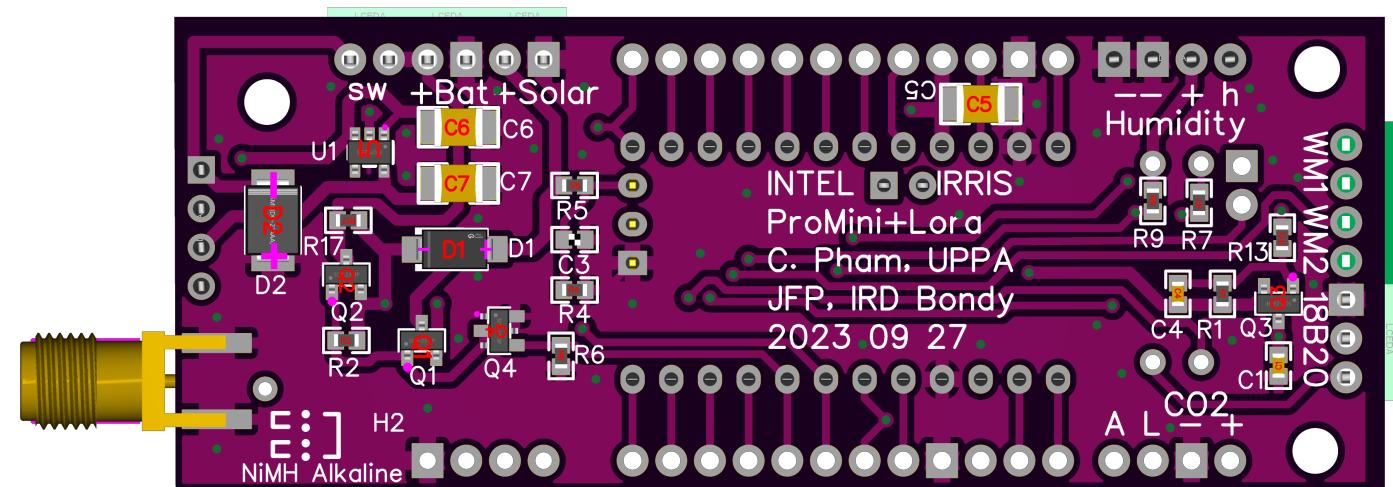
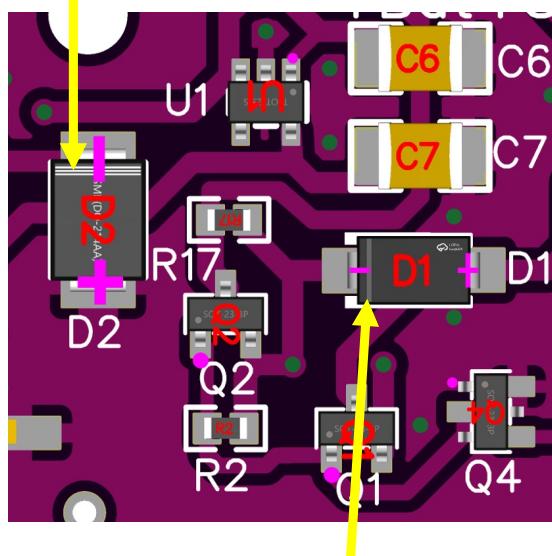
| Top Designator | JLCPCB Part # | Comment | Footprint |
|----------------|---------------|-------------|-------------|
| RFM | C2844472 | DL-RFM9... | WIRELES... |
| CN20,CN21 | C2905419 | 12P_F | KH-2.54F... |
| CN1 | C492403 | PZ254V... | HDR-TH... |
| H2 | C492403 | PZ254V... | HDR-TH... |
| RF1 | C496550 | RF1 | SMA-SM... |
| CN22 | C541850 | 3P_F | PM254V... |
| CN6,CN7,CN8 | C557685 | XY308-2.... | XY308-2.... |
| CN2 | C557686 | XY308-2.... | CONN-T... |
| CN3 | C915913 | XY308-2.... | CONN-T... |

Check top & bottom

The diode D2 has the horizontal line on the top



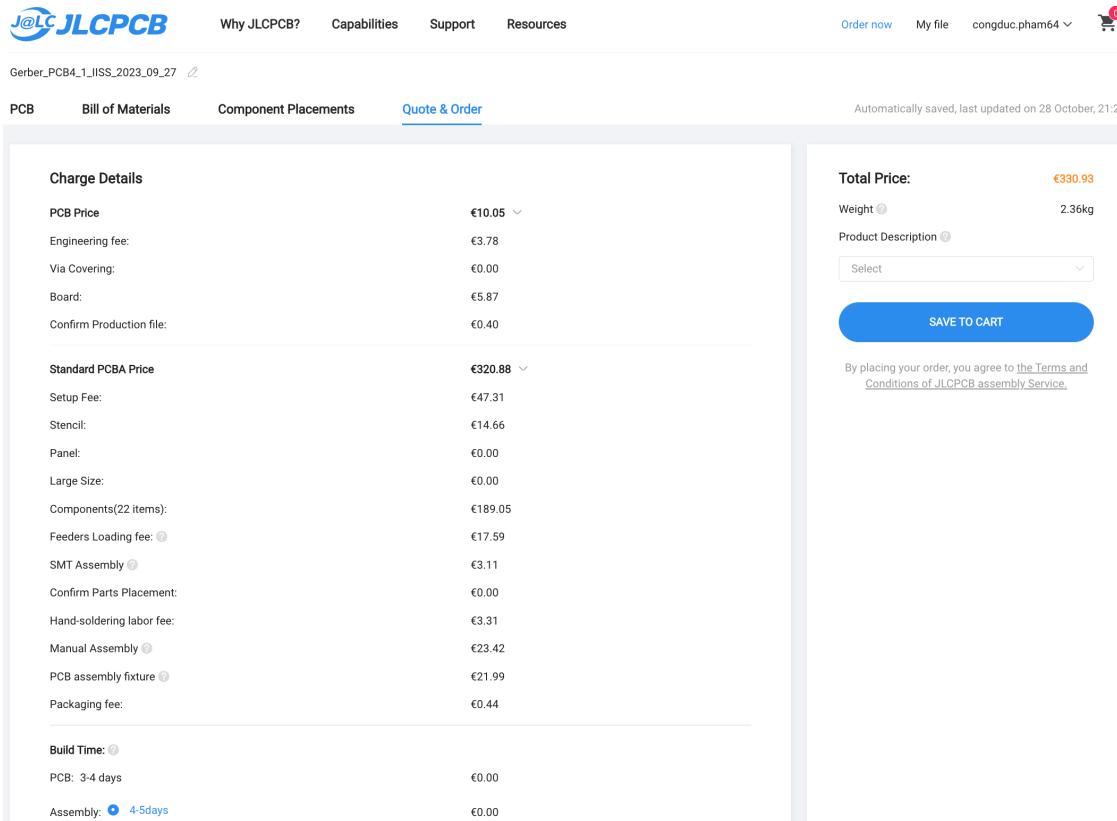
The RFM is correctly placed this way



The diode D1 has the vertical line on the left

Saving to cart

- ➊ Finally, you will be able to save the configured PCBA to cart
- ➋ You will also have the detail of all the pricing



The screenshot shows the JLCPCB Quote & Order interface. At the top, there are navigation links: Why JLCPCB?, Capabilities, Support, Resources, Order now, My file, congduc.pham64, and a shopping cart icon.

The main content area has tabs: PCB, Bill of Materials, Component Placements, and Quote & Order (which is selected). Below these tabs, it says "Automatically saved, last updated on 28 October, 21:27".

The left panel displays "Charge Details" with two sections: "PCB Price" and "Standard PCBA Price". The right panel shows the "Total Price: €330.93" with fields for "Weight" (2.36kg) and "Product Description" (Select), and a large blue "SAVE TO CART" button. Below the button, a small note states: "By placing your order, you agree to the [Terms and Conditions of JLCPCB assembly Service](#)".

| Charge Details | |
|---------------------------|--------------------|
| PCB Price | €10.05 |
| Engineering fee: | €3.78 |
| Via Covering: | €0.00 |
| Board: | €5.87 |
| Confirm Production file: | €0.40 |
| Standard PCBA Price | €320.88 |
| Setup Fee: | €47.31 |
| Stencil: | €14.66 |
| Panel: | €0.00 |
| Large Size: | €0.00 |
| Components(22 items): | €189.05 |
| Feeders Loading fee: | €17.59 |
| SMT Assembly | €3.11 |
| Confirm Parts Placement: | €0.00 |
| Hand-soldering labor fee: | €3.31 |
| Manual Assembly | €23.42 |
| PCB assembly fixture | €21.99 |
| Packaging fee: | €0.44 |
| Build Time: | PCB: 3-4 days |
| | Assembly: 4-5 days |

Final step, pay to order!

- This is the final step, pay to order your PCBA
- You will be able to choose the shipping methods and other details

JLC Mechanical Services: 3D Printing | CNC Machining | Mechatronic Parts \$? FR

JLCPCB Why JLCPCB? Capabilities Support Resources Order now My file congduc.pham64 ▾ 2

SHOPPING CART

| All | PCB/PCBA/Stencil | 3D Printing | CNC Machining | Mechatronic Parts |
|--|---|--|---------------|-------------------|
| <input checked="" type="checkbox"/> Item | | | | |
| | | Qty | Price | |
| <input checked="" type="checkbox"/> |  | Gerber_PCB4_1_IISS_2023_09_27_Y50 PCB prototype:Y50-2389907A Purple, 1.6 thickness, HASL(with lead) 3-4... | 10 | €10.05 |
| | | Product Details Edit Order | | |
| <input checked="" type="checkbox"/> |  | Gerber_PCB4_1_IISS_2023_09_27_Y50 Standard PCBA: SMT02310281452645-23... Assemble Both Sides, 4-5days | 10 | €320.88 |
| | | Product Details | | |

SUMMARY (2 items)

| | |
|---|---------|
| Subtotal | €330.93 |
| Weight | 2.36kg |
| Shipping calculated at checkout | |
| Secure Checkout | |
| + Add new item | |
|       | |
| SSL ENCRYPTED PAYMENT | |

Receiving your PCBA!

